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**INFRA-STR-004 (PR-122 Lajas-San Germán Connector)**

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554 Calle Perseo, Suite J-3, San Juan, P.R. 00920 Tel.(787)783-0290

Project Begins
Lat: 18.058536, Long: -67.045267
Project Ends
Lat: 18.076742, Long: -67.034764

**Figure 1**

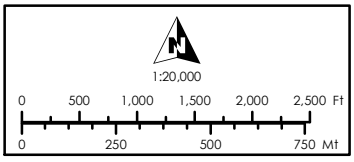
# Location: Aerial Map

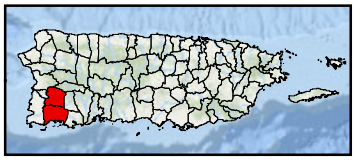
Puerto Rico Department of Housing




## Legend:

- Project Begins and Ends
- Proposed Project



Service Layer Credits:
Source: Esri, Vantor, Earthstar Geographics, and the GIS User Community
Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community
Esri, Garmin, GEBCO, NOAA NGDC, and other contributors

Source:
Centro de Recaudación de Ingresos Municipales (CRIM)
https://catastro.crimpr.net/cdprpc/

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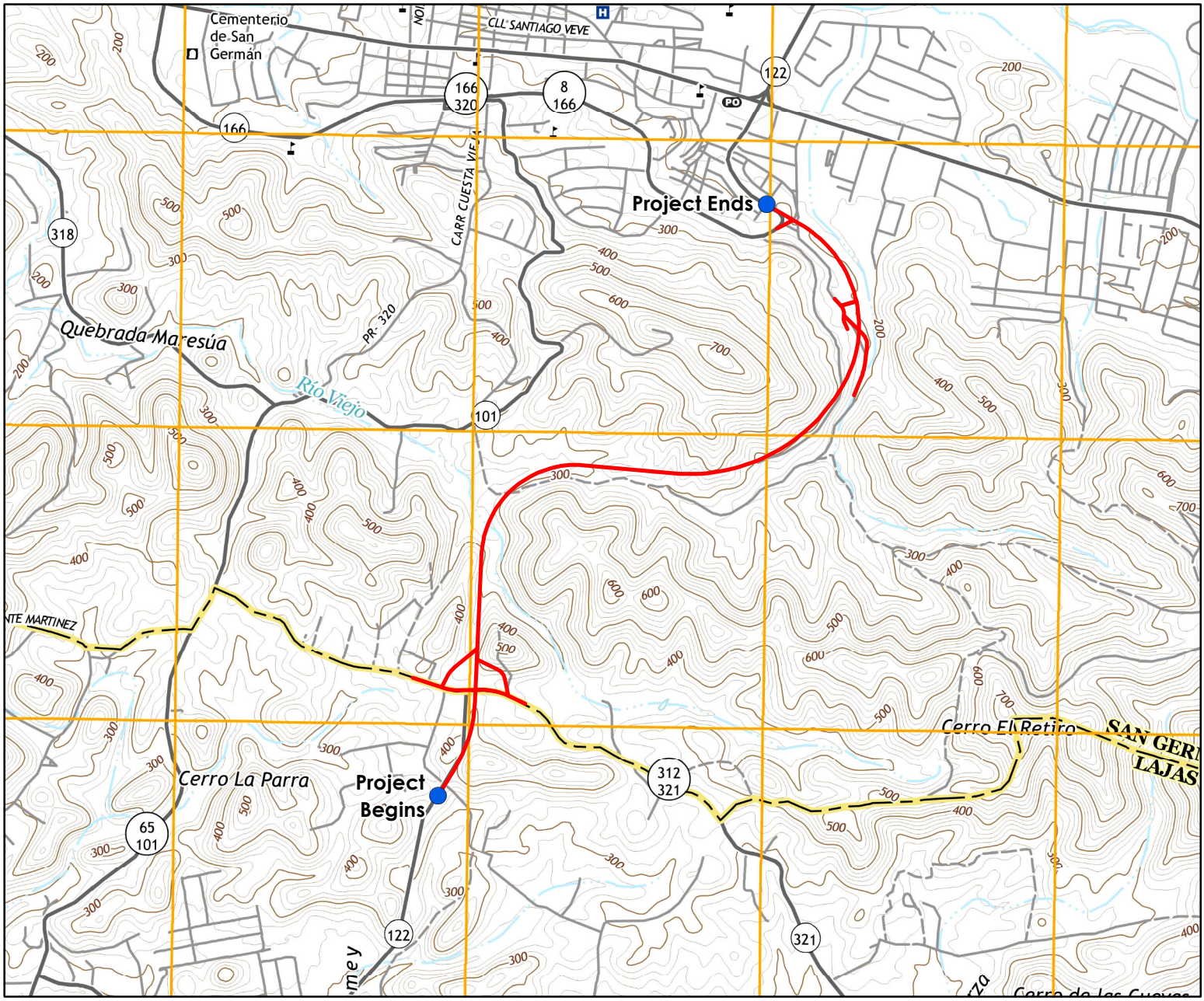
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Project Ends
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**Figure 2**

# Location: Topographic Map

Puerto Rico Department of Housing

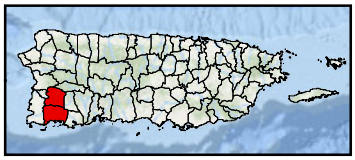



**Legend:**

- Project Begins and Ends
- Proposed Project

**Quadrangle: San Germán**

1:20,000
0 500 1,000 1,500 2,000 2,500 Ft
0 250 500 750 Mt



Service Layer Credits: Esri, Garmin, GEBCO, NOAA NGDC, and other contributors and Google Earth

Source:
United States Geological Survey (USGS)
National Geologic Map Database
https://ngmdb.usgs.gov/ngmdb/ngmdb_home.html

**INFRA-STR-004 (PR-122 Lajas-San Germán Connector)**

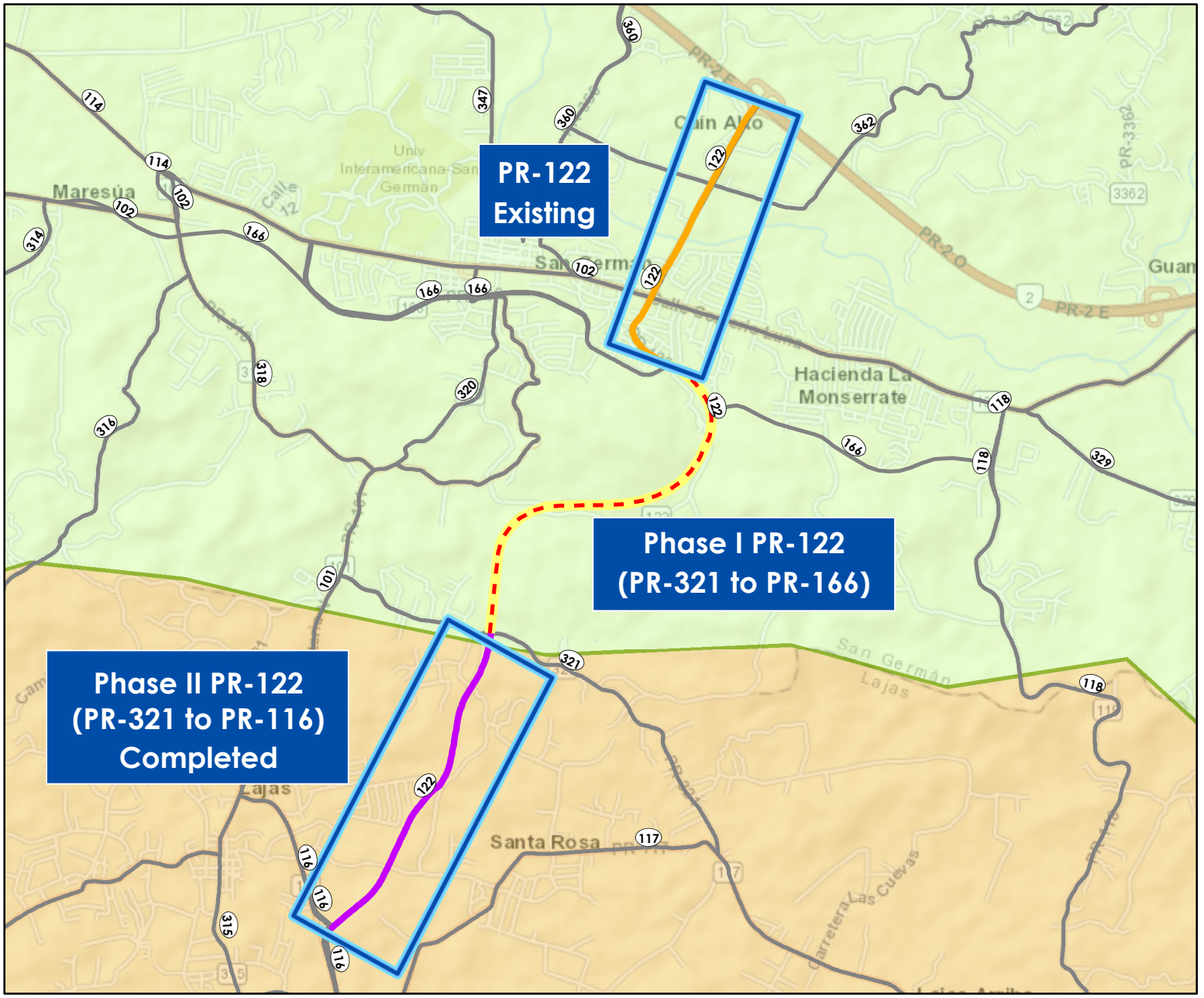
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**Figure 3**

# PR-122 Project Phases

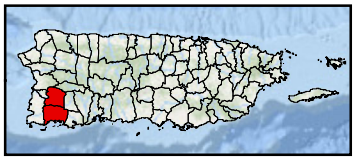
Puerto Rico Department of Housing




**Legend:**

- PR-122 (Proposed Phase I)
- PR-122 Existing Phase II
- Existing PR-122
- Existing Street
- Phase
- Municipality of San Germán
- Municipality of Lajas

1:35,000
0 1,000 2,000 3,000 4,000 Ft
0 300 600 900 1,200 Mt



Service Layer Credits:
Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, (c) OpenStreetMap contributors, and the GIS User Community
Esri, Garmin, GEBCO, NOAA NGDC, and other contributors

Source:
Centro de Recaudación de Ingresos Municipales (CRIM)
https://catastro.crimpr.net/cdprpc/

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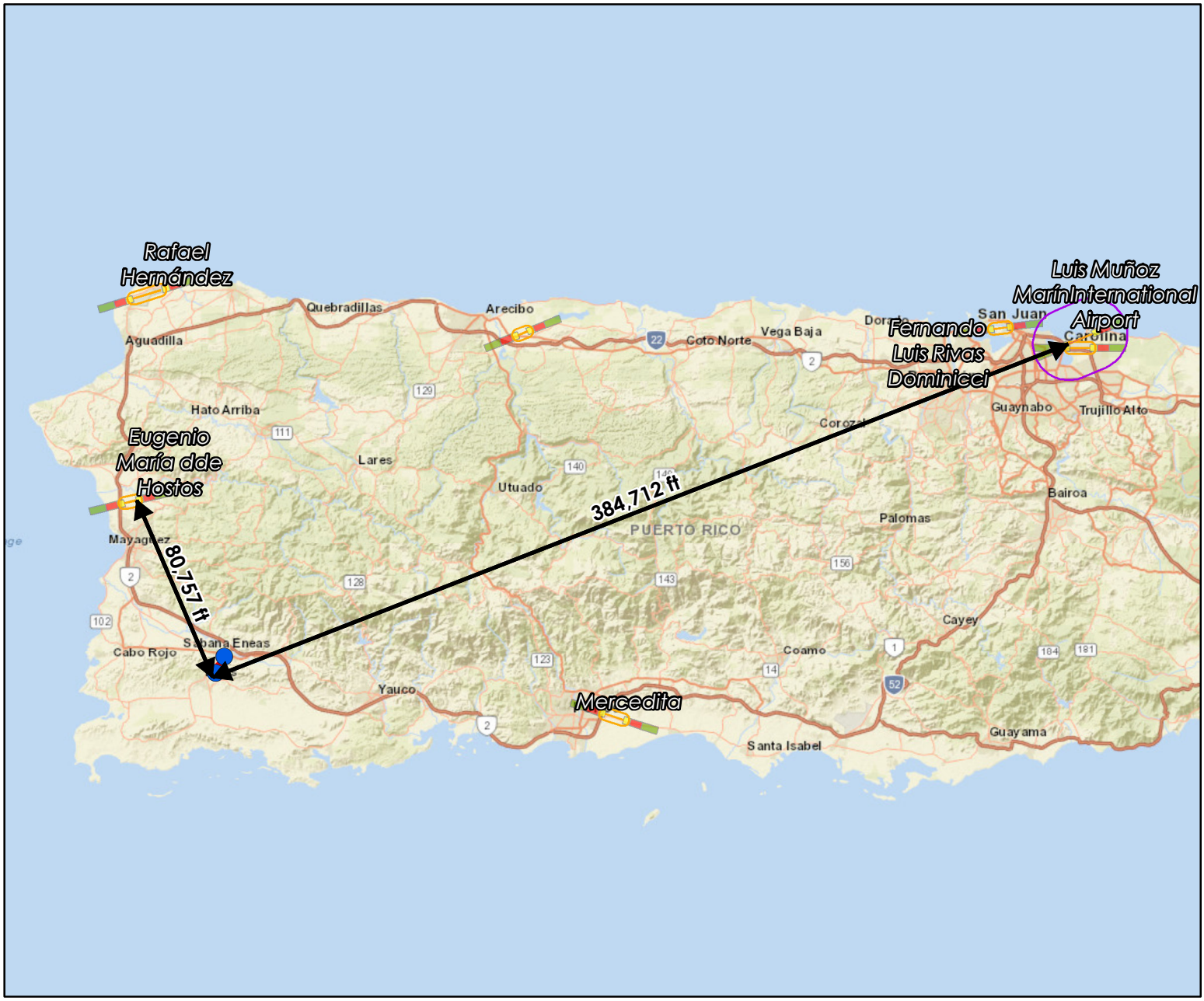
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Project Ends
Lat: 18.076742, Long: -67.034764

**Figure 4**

# Airports Map

Puerto Rico Department of Housing



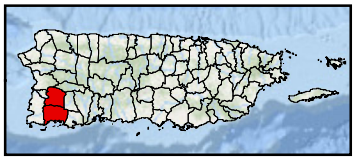

## Legend:

- Project Begins and Ends
- Proposed Project
- SJU Military Runaway
- SJU Civil Runaway
- Militaryl Airport Buffer (15,000 Fts.)
- Civil Airport Buffer (2,500 Fts.)

**Accident Potential Zone**

- APZ 1
- APZ 2
- Clear Zone

1:750,000
0 5,000 10,000 15,000 20,000 Meters
0 10 20 Kilometers



Service Layer Credits:
Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, (c) OpenStreetMap contributors, and the GIS User Community
Esri, Garmin, GEBCO, NOAA NGDC, and other contributors

Source:
Federal Aviation Administration (FAA)
https://adds-faa.opendata.arcgis.com/
The Environmental Protection Agency
https://www.epa.gov/nepa/nepassist
https://ejscreen.epa.gov/mapper/

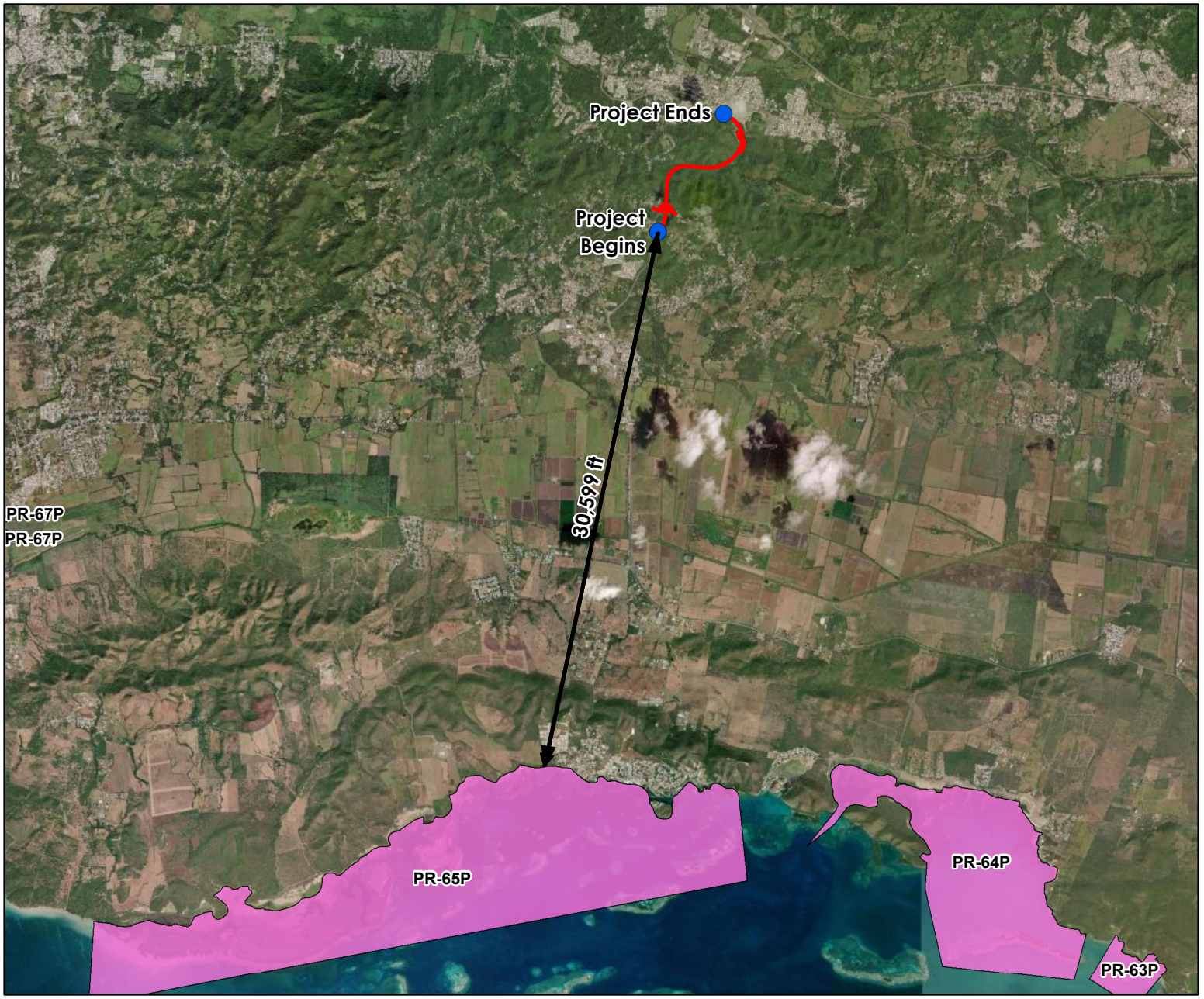
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**Figure 5**

Project Begins
Lat: 18.058536, Long: -67.045267
Project Ends
Lat: 18.076742, Long: -67.034764

# Coastal Barrier Resources System Map

Puerto Rico Department of Housing



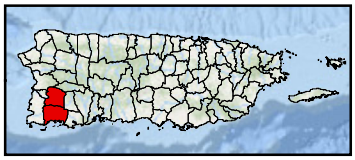

**Legend:**

- Project Begins and Ends
- Proposed Project

Coastal Barrier Resources System

- Otherwise Protected Area
- System Unit

1:100,000
0 2,000 4,000 6,000 8,000 10,000 12,000 Ft
0 1,000 2,000 3,000 Mt



Service Layer Credits:
Source: Esri, Vantor, Earthstar Geographics, and the GIS User Community
Esri, Garmin, GEBCO, NOAA NGDC, and other contributors

Source:
U.S. Fish and Wildlife Service (FWS)
https://www.fws.gov/program/coastal-barrier-resources-act
https://fwsprimary.wim.usgs.gov/CBRSMapper-v2/

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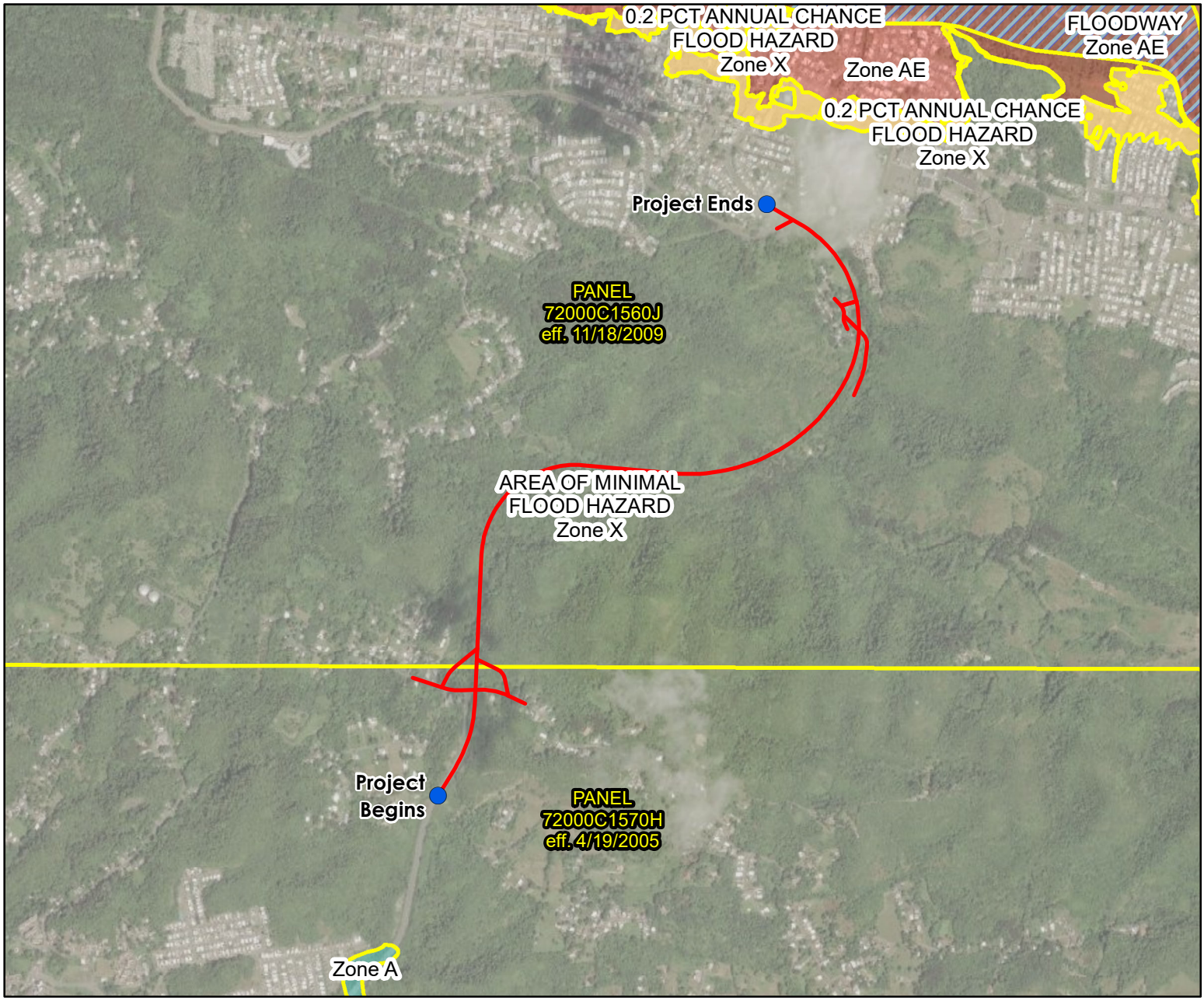
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Project Begins
Lat: 18.058536, Long: -67.045267
Project Ends
Lat: 18.076742, Long: -67.034764

**Figure 6**

# Flood Insurance Rate Map (FIRM)

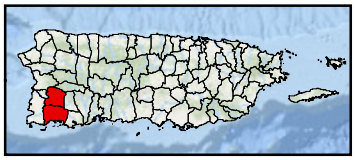
Puerto Rico Department of Housing




**Legend:**

- Project Begins and Ends
- Proposed Project
- FIRM Panel
- Floodway
- 0.2% Annual Chance Flood Hazard
- Zone D Area of Undetermined Flood Hazard
- Zone A
- Zone AE
- Zone AH
- Zone AO
- Zone VE
- Zone X

1:20,000
0 500 1,000 1,500 2,000 2,500 Ft
0 250 500 750 Mt



Service Layer Credits:
Source: Esri, Vantor, Earthstar Geographics, and the GIS User Community
Esri, Garmin, GEBCO, NOAA NGDC, and other contributors

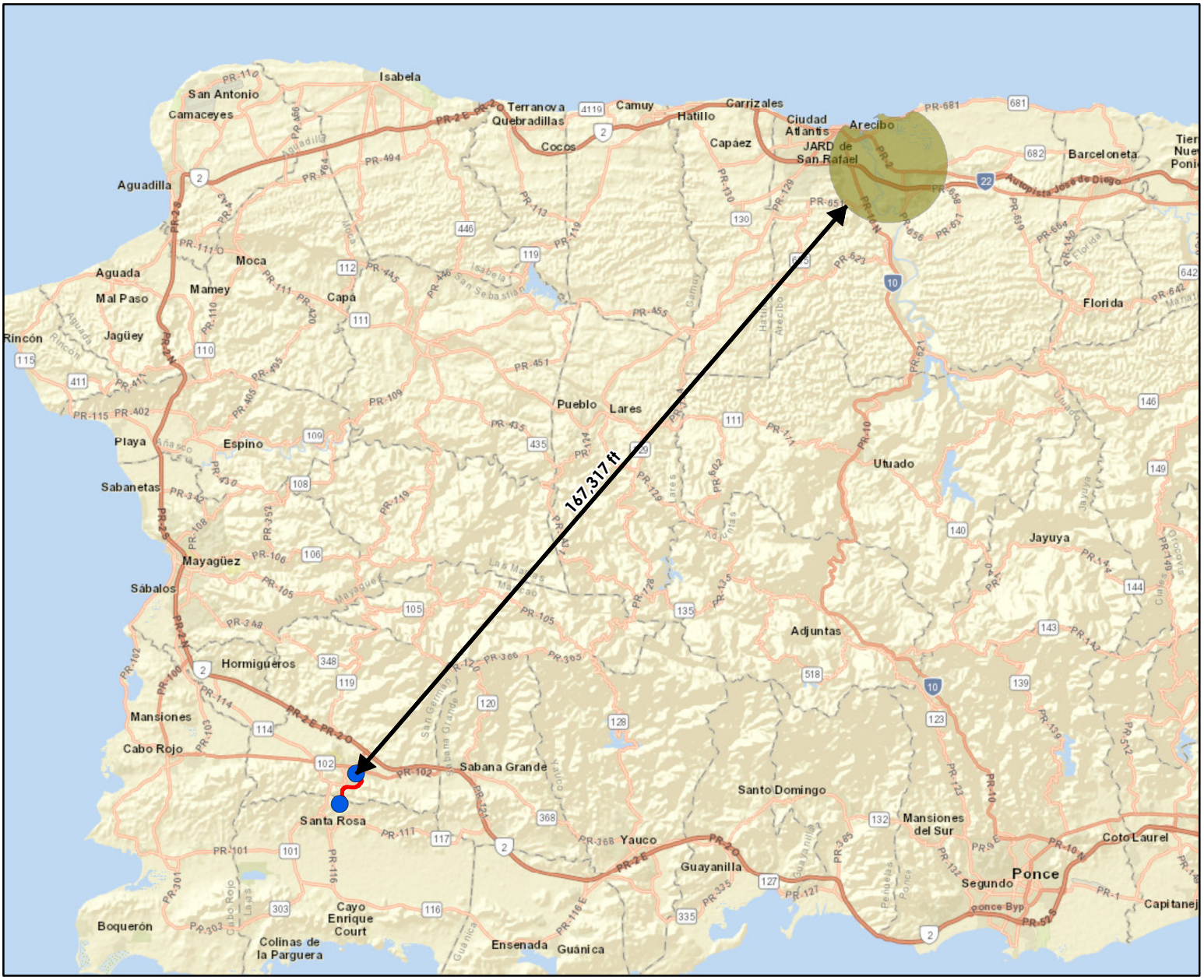
Source:
Federal Emergency Management Agency (FEMA)
https://msc.fema.gov/portal/home

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Project Begins
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Lat: 18.076742, Long: -67.034764

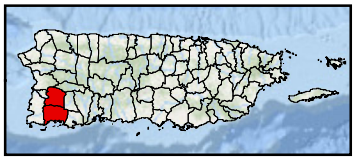
# Figure 7
# Clean Air Map
Puerto Rico Department of Housing




**Legend:**

- Project Begins and Ends
- Proposed Project
- Non - Attainment - SO2
- Non - Attainment - Lead

1:400,000
0 10,000 20,000 30,000 40,000 50,000 Ft
0 5,000 10,000 15,000 Mt



Service Layer Credits:
Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, (c) OpenStreetMap contributors, and the GIS User Community
Esri, Garmin, GEBCO, NOAA NGDC, and other contributors

Source:
U.S. Geological Survey (USGS)
https://pubs.er.usgs.gov

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Project Begins
Lat: 18.058536, Long: -67.045267
Project Ends
Lat: 18.076742, Long: -67.034764

**Figure 8**

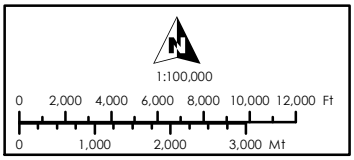
# Coastal Zone Management Map

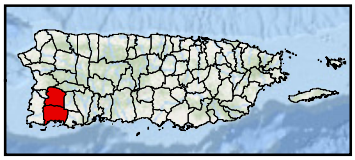
Puerto Rico Department of Housing




**Legend:**

- Project Begins and Ends
- Proposed Project
- Coastal Zone Management Act Boundary



Service Layer Credits:
Source: Esri, Vantor, Earthstar Geographics, and the GIS User Community
Esri, Garmin, GEBCO, NOAA NGDC, and other contributors

Source:
NOAA Office for Coastal Zone Management Act Boundary
https://www.fisheries.noaa.gov/inport/item/53132

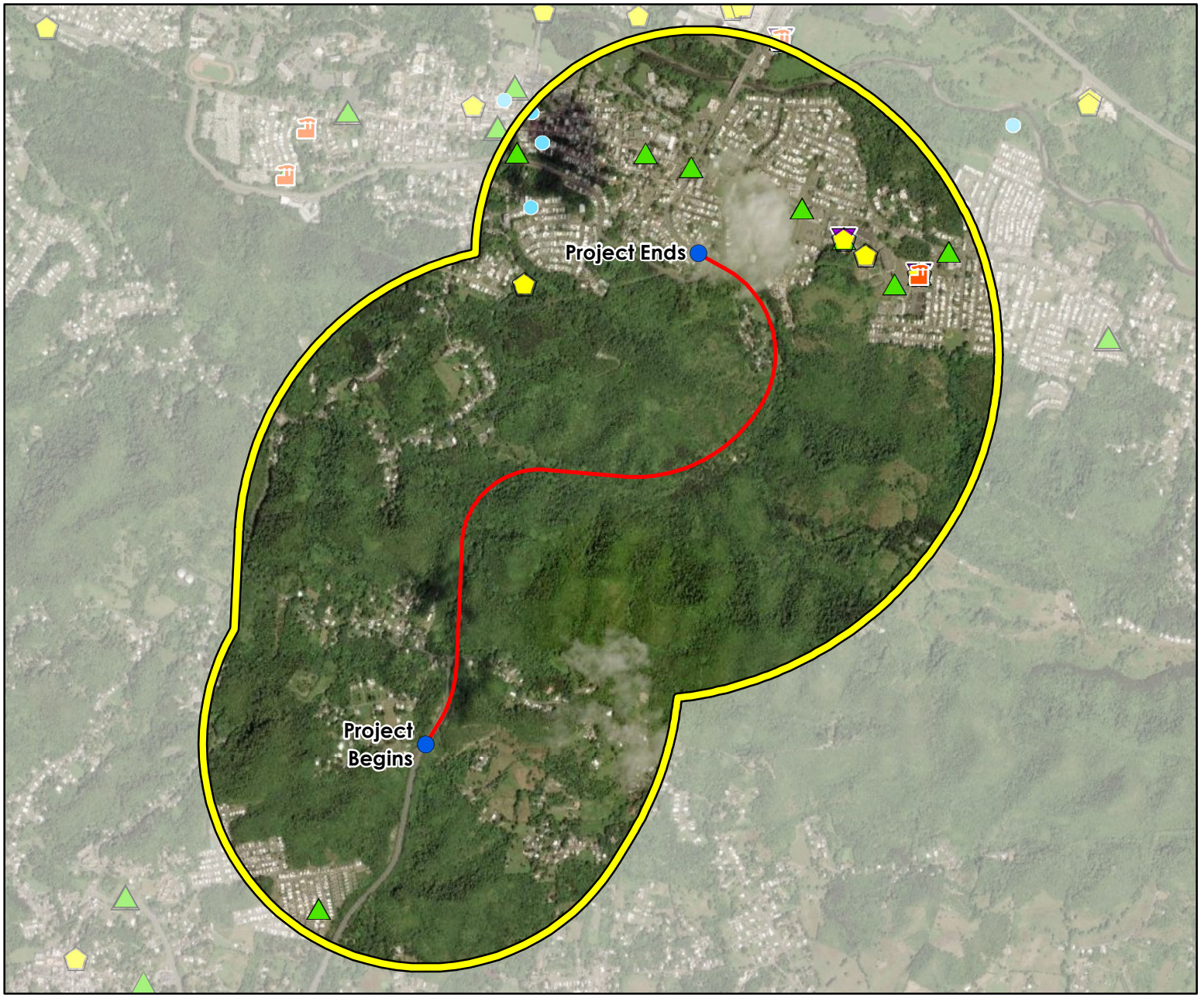
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Project Ends
Lat: 18.076742, Long: -67.034764

**Figure 9**

# Toxic and Hazardous Facilities Map

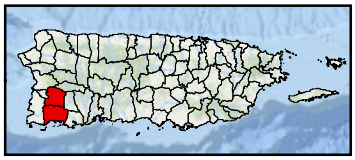
Puerto Rico Department of Housing




## Legend:

- Project Begins and Ends
- Proposed Project
- Buffer (3,000 Fts.)
- Superfund (NPL & SAA)
- ACRES
- AIR
- NPDES
- NPDES - Major
- RCRA
- RCRA - Active
- RCRA - Inactive
- TRI

1:24,000
0 500 1,000 1,500 2,000 2,500 3,000 Ft
0 250 500 750 Mt



Service Layer Credits:
Source: Esri, Vantor, Earthstar Geographics, and the GIS User Community
Esri, Garmin, GEBCO, NOAA NGDC, and other contributors

Source:
EPA Facility Registry Service (FRS)
https://www.epa.gov/frs
https://ejscreen.epa.gov/mapper/

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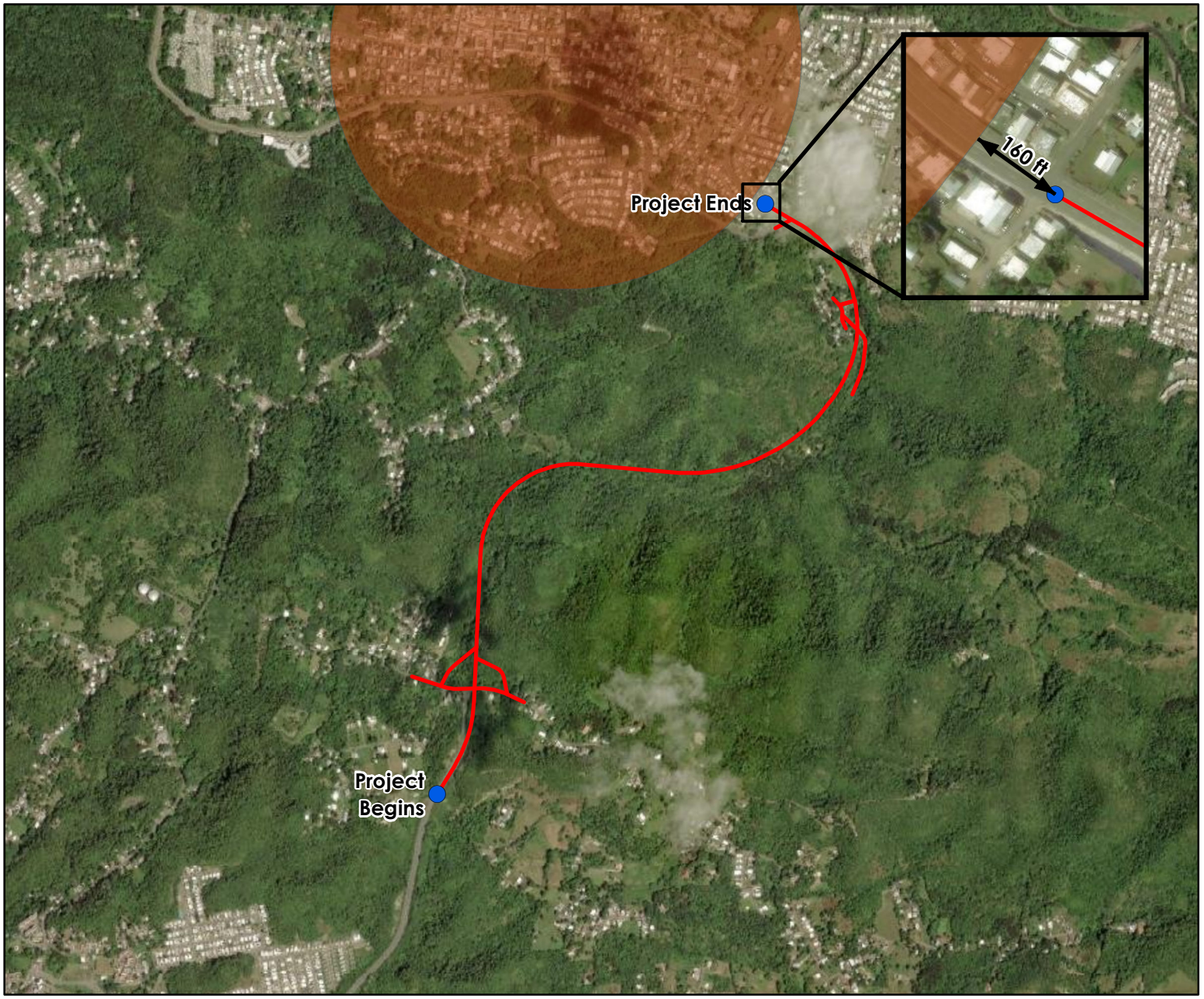
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**Figure 10**

Project Begins
Lat: 18.058536, Long: -67.045267
Project Ends
Lat: 18.076742, Long: -67.034764

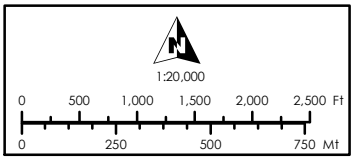
# Threatened & Endangered Species Map

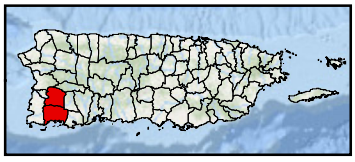
Puerto Rico Department of Housing




**Legend:**

- Project Begins and Ends
- Proposed Project
- Critical Habitat



Service Layer Credits:
Source: Esri, Vantor, Earthstar Geographics, and the GIS User Community
Esri, Garmin, GEBCO, NOAA NGDC, and other contributors

Source:
NOAA Office of Response and Restoration
https://response.restoration.noaa.gov/

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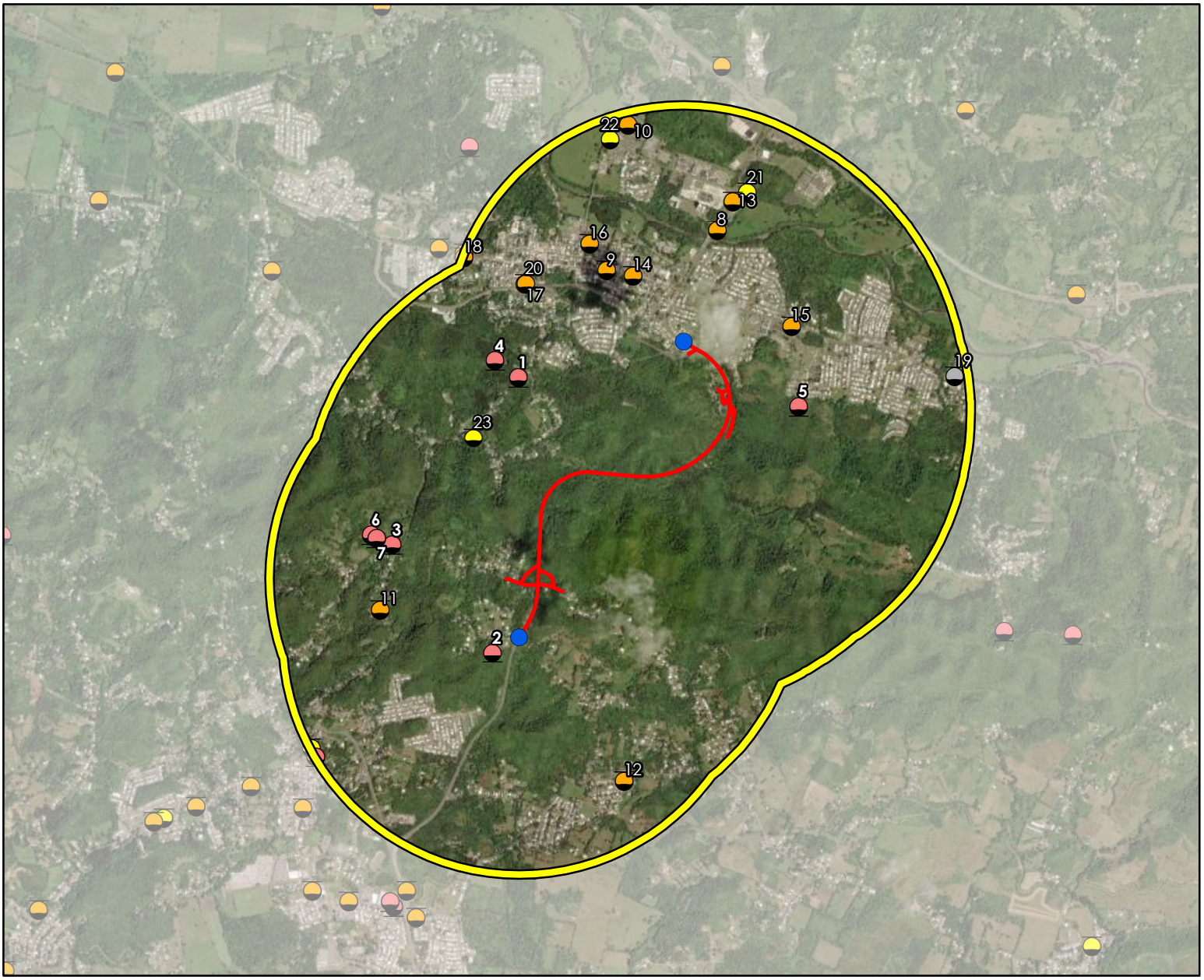
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Project Begins
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Project Ends
Lat: 18.076742, Long: -67.034764

**Figure 11**

# Above and Underground Storage Tanks Map

Puerto Rico Department of Housing



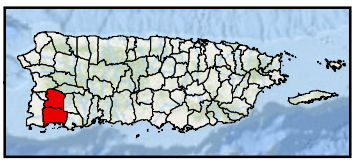

## Legend:

- Project Begins and Ends
- Proposed Project
- 1 Miles (5,280 Ft) Buffer
- Aboveground Storage Tanks (AST)
- Underground Storage Tanks (UST)

**Leaking Underground Storage Tank (LUST)**

- No Further Action
- Open

1:40,000
0 1,000 2,000 3,000 4,000 5,000 Ft
0 500 1,000 1,500 Mt



Service Layer Credits:
Source: Esri, Vantor, Earthstar Geographics, and the GIS User Community
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Source:
Underground Storage Tanks (USTs)
https://www.epa.gov/ust

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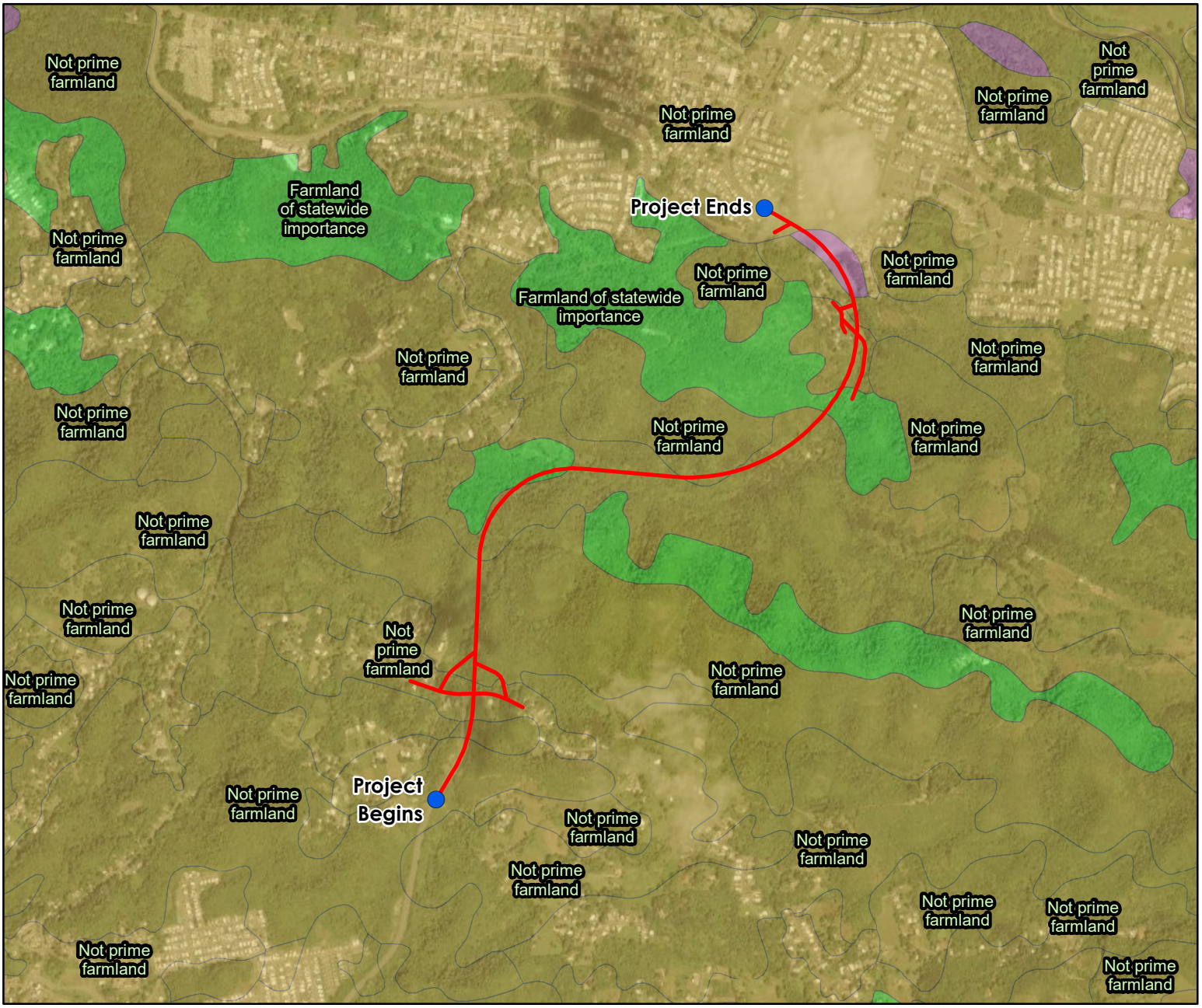
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Project Begins
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Project Ends
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**Figure 12**

# Farmland Protection Map

Puerto Rico Department of Housing

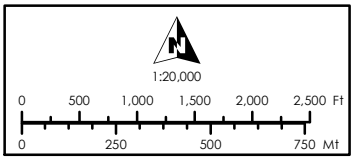


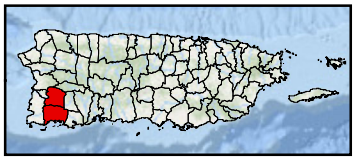

## Legend:

- Project Begins and Ends
- Proposed Project

**Farm Class**

- All areas are prime farmland
- Farmland of statewide importance
- Not prime farmland



Service Layer Credits:
Source: Esri, Vantor, Earthstar Geographics, and the GIS User Community
Esri, Garmin, GEBCO, NOAA NGDC, and other contributors

Source:
National Resources Conservations Service (NRCS)
Gridded Soil Survey Geographic Database (gSSURGO)
https://data.nal.usda.gov/dataset/soil-survey-geographic-database-ssurgo

BYA BEHAR-YBARRA AND ASSOCIATES LLC
ENGINEERING • ARCHITECTURE • ENVIRONMENTAL • PROJECT MANAGEMENT
554 Calle Perseo, Suite J-3, San Juan, P.R. 00920 Tel.(787)783-0290

Project Begins
Lat: 18.058536, Long: -67.045267
Project Ends
Lat: 18.076742, Long: -67.034764

# (ABFE) Advisory Base Flood Elevation Map

**Figure 13**

Puerto Rico Department of Housing



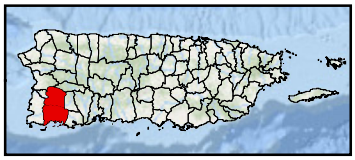

**Legend:**

- *Project Begins and Ends*
- *Proposed Project*
- Advisory Base Flood Elevations (ABFE)
- 0.2 % Annual Chance Flood
- 1 % Annual Chance Flood

**Flood Zone**

- Zone A
- Zone AE
- Zone AO
- Zone VE
- Zone X - Area of Minimal Flood Hazard
- 0.2 % Annual Chance Flood
- Floodway

1:20,000
0 500 1,000 1,500 2,000 2,500 Ft
0 250 500 750 Mt



Service Layer Credits:
Source: Esri, Vantor, Earthstar Geographics, and the GIS User Community
Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community
Esri, Garmin, GEBCO, NOAA NGDC, and other contributors

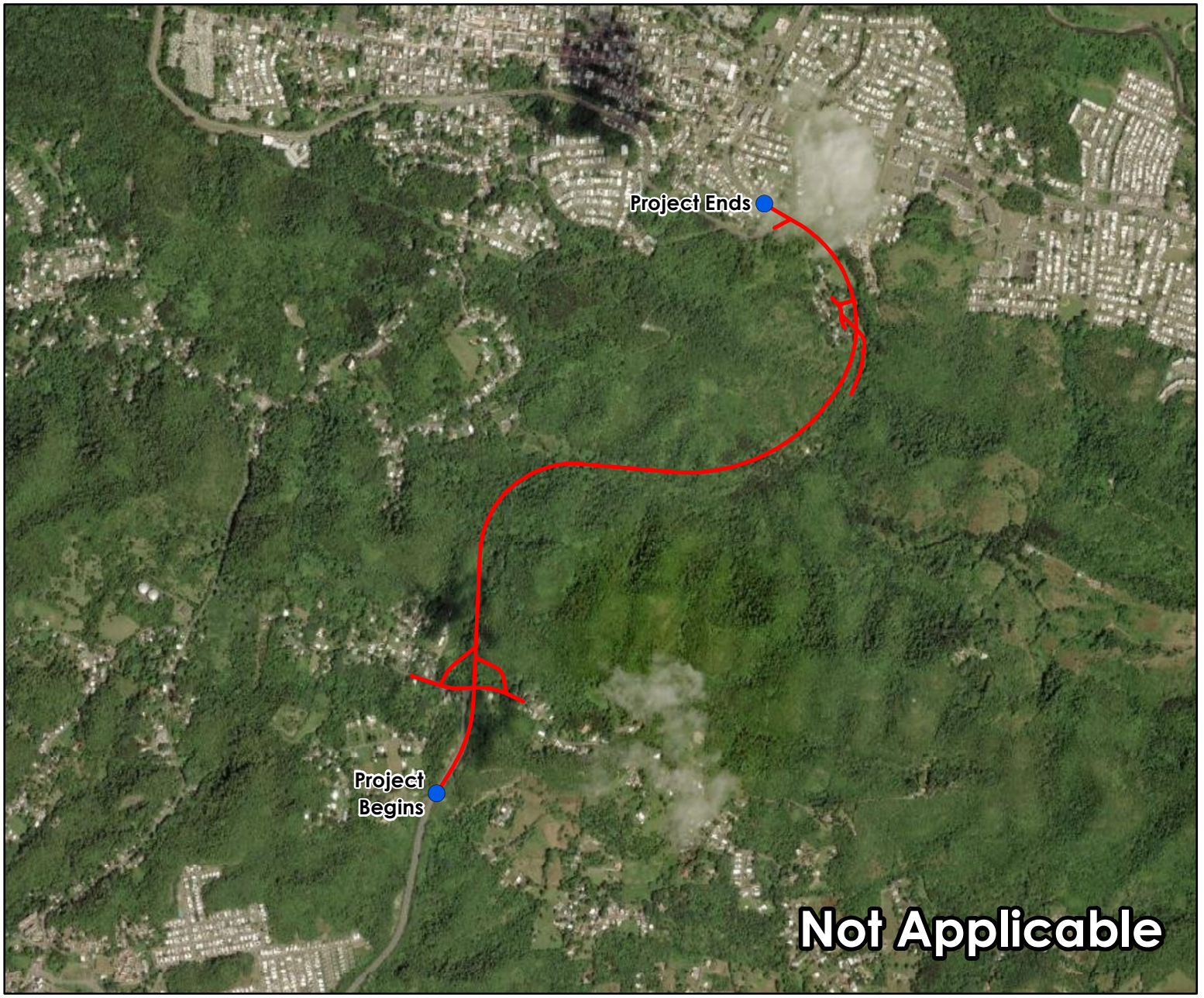
Source:
Federal Emergency Management Agency (FEMA),
https://gis-r2-fema.hub.arcgis.com/
Junta de Planificacion de Puerto Rico (JP), https://maps.jp.pr.gov/
Mapas de Niveles de Inundacion Base Recomendados

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Project Begins
Lat: 18.058536, Long: -67.045267
Project Ends
Lat: 18.076742, Long: -67.034764

# Figure 14
# Preliminary Flood Insurance Rate Map(FIRM)

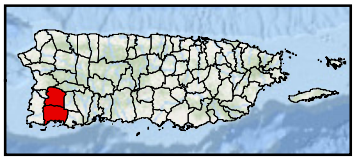
Puerto Rico Department of Housing




**Legend:**

- Project Begins and Ends
- Proposed Project
- FIRM Panel
- Floodway
- 0.2% Annual Chance Flood Hazard
- Zone D Area of Undetermined Flood Hazard
- Zone A
- Zone AE
- Zone AH
- Zone AO
- Zone VE
- Zone X

1:20,000
0 500 1,000 1,500 2,000 2,500 Ft
0 250 500 750 Mt



Service Layer Credits:
Source: Esri, Vantor, Earthstar Geographics, and the GIS User Community
Esri, Garmin, GEBCO, NOAA NGDC, and other contributors

Source:
Federal Emergency Management Agency (FEMA)
https://msc.fema.gov/portal/home

**INFRA-STR-004 (PR-122 Lajas-San Germán Connector)**

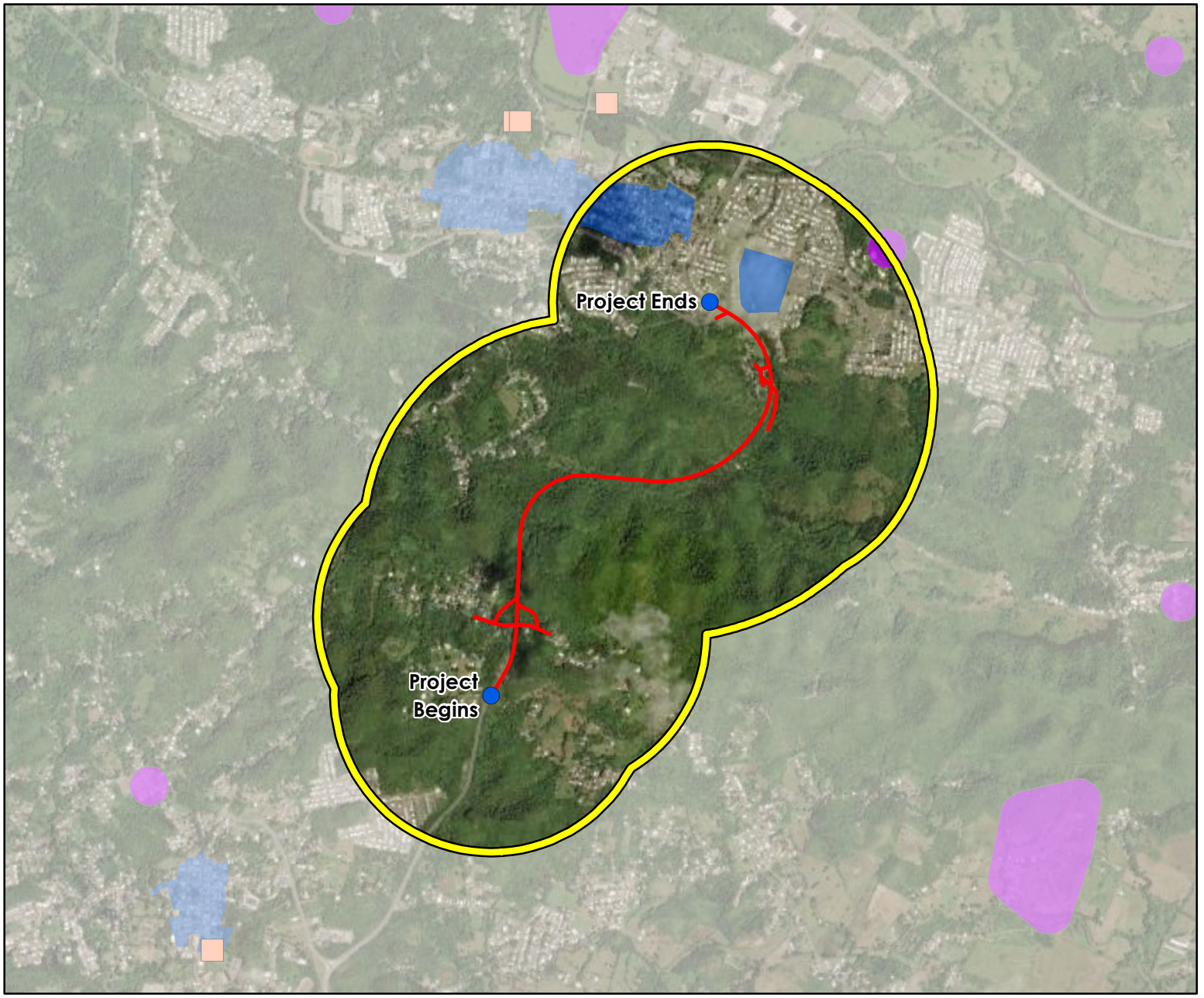
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Project Begins
Lat: 18.058536, Long: -67.045267
Project Ends
Lat: 18.076742, Long: -67.034764

**Figure 15**

# Historic Preservation Map

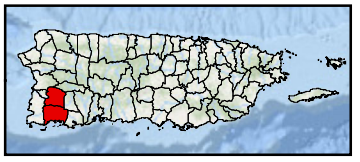
Puerto Rico Department of Housing




## Legend:

- Project Begins and Ends
- Proposed Project
- 0.5 Mile (2,640 Ft) Buffer
- Cultural Resource Building
- Cultural Resource Structure
- Cultural Resource Object
- Cultural Resource Site
- Historic Centers
- Cultural Resource District
- Sensitive Archaeological Zones
- Archaeological Resource Zones
- Historic Communities
- Traditional Urban Center

1:30,000
0 1,000 2,000 3,000 Ft
0 250 500 750 1,000 Mt



Service Layer Credits:
Source: Esri, Vantor, Earthstar Geographics, and the GIS User Community
Esri, Garmin, GEBCO, NOAA NGDC, and other contributors

Source:
Sitios Históricos Designados por la JP (TUC)
https://sigejp.pr.gov/portal/apps
National Park Service (NPS) - National Register of Historic Places(NRHP)
https://www.nps.gov/subjects/nationalregister/index.htm
State Historic Preservation Office (SHPO)
https://oech.pr.gov/Pages/default.aspx

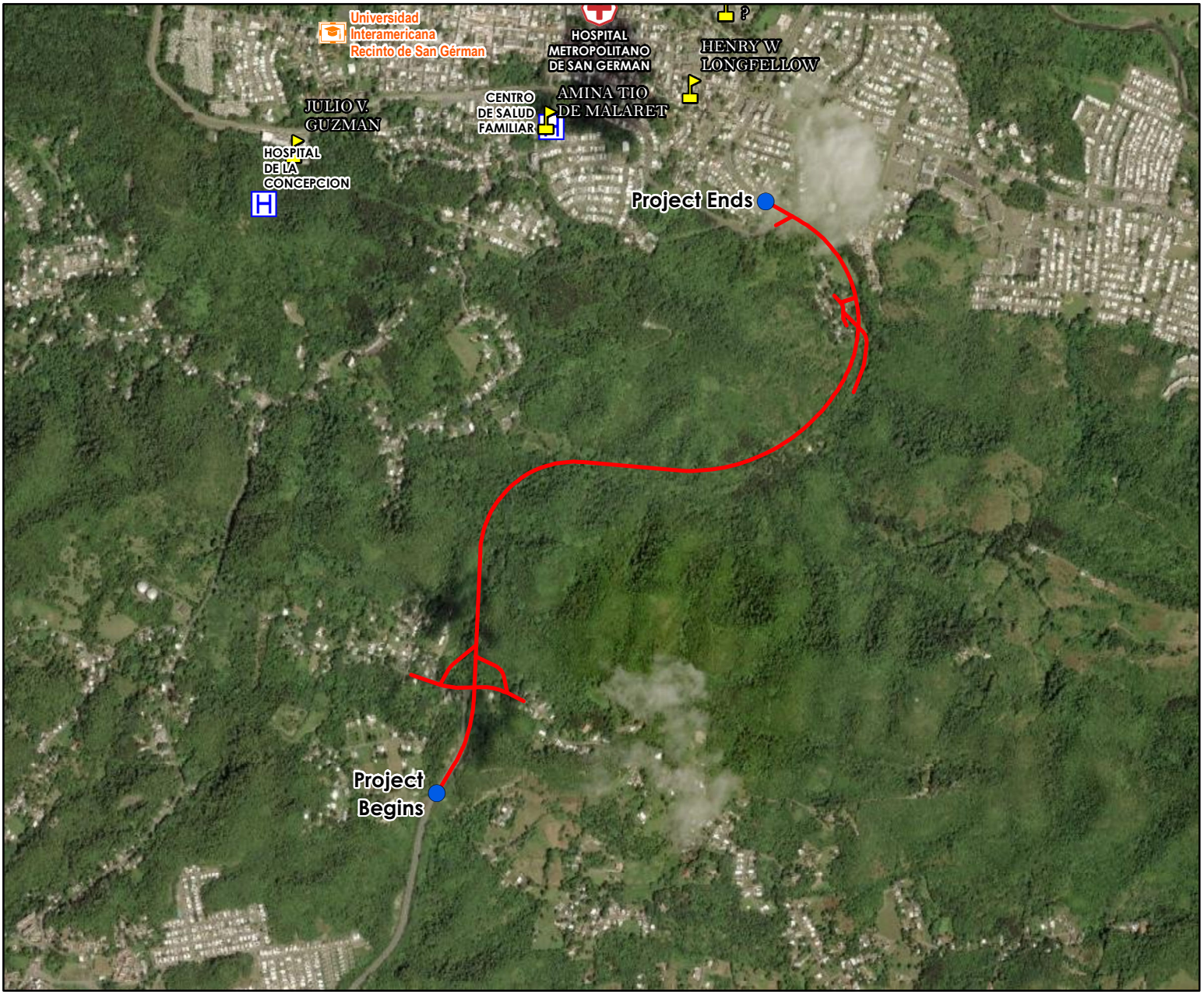
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Project Begins
Lat: 18.058536, Long: -67.045267
Project Ends
Lat: 18.076742, Long: -67.034764

**Figure 16**

# Noise Abatement and Control Map

Puerto Rico Department of Housing

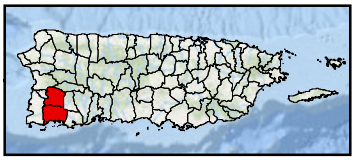



## Legend:

- Project Begins and Ends
- Proposed Project
- University
- School
- Hospital
- Emergency Hospital

1:20,000

0 500 1,000 1,500 2,000 2,500 Ft
0 250 500 750 Mt



Service Layer Credits:
Source: Esri, Vantor, Earthstar Geographics, and the GIS User Community
Esri, Garmin, GEBCO, NOAA NGDC, and other contributors

Source:
U.S. Geological Survey (USGS)
https://pubs.er.usgs.gov/publication/ofr20201022

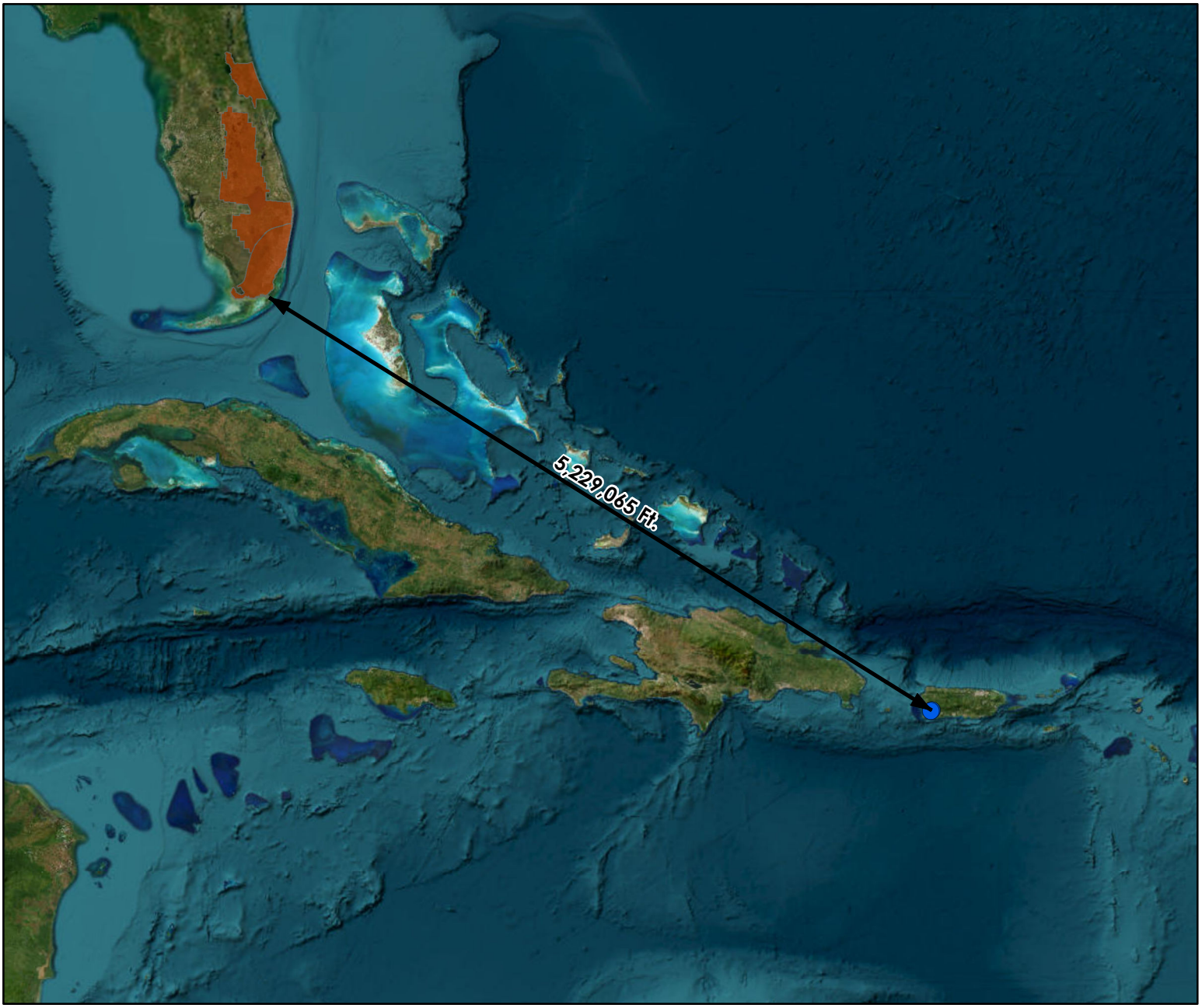
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Project Begins
Lat: 18.058536, Long: -67.045267
Project Ends
Lat: 18.076742, Long: -67.034764

**Figure 17**

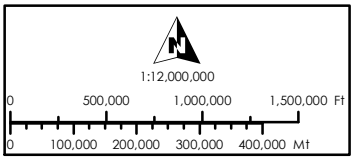
# EPA Sole Source Aquifers

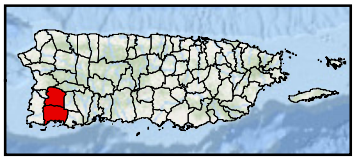
Puerto Rico Department of Housing




**Legend:**

- Project Begins and Ends
- EPA Sole Source Aquifers



Service Layer Credits:
Source: Esri, Vantor, Earthstar Geographics, and the GIS User Community
Esri, Garmin, GEBCO, NOAA NGDC, and other contributors

Source:
U.S. Environmental Protection Agency
https://epa.maps.arcgis.com/apps/webappviewer/index.html
?id=9ebb047ba3ec41ada1877155fe31356b

**INFRA-STR-004 (PR-122 Lajas-San Germán Connector)**

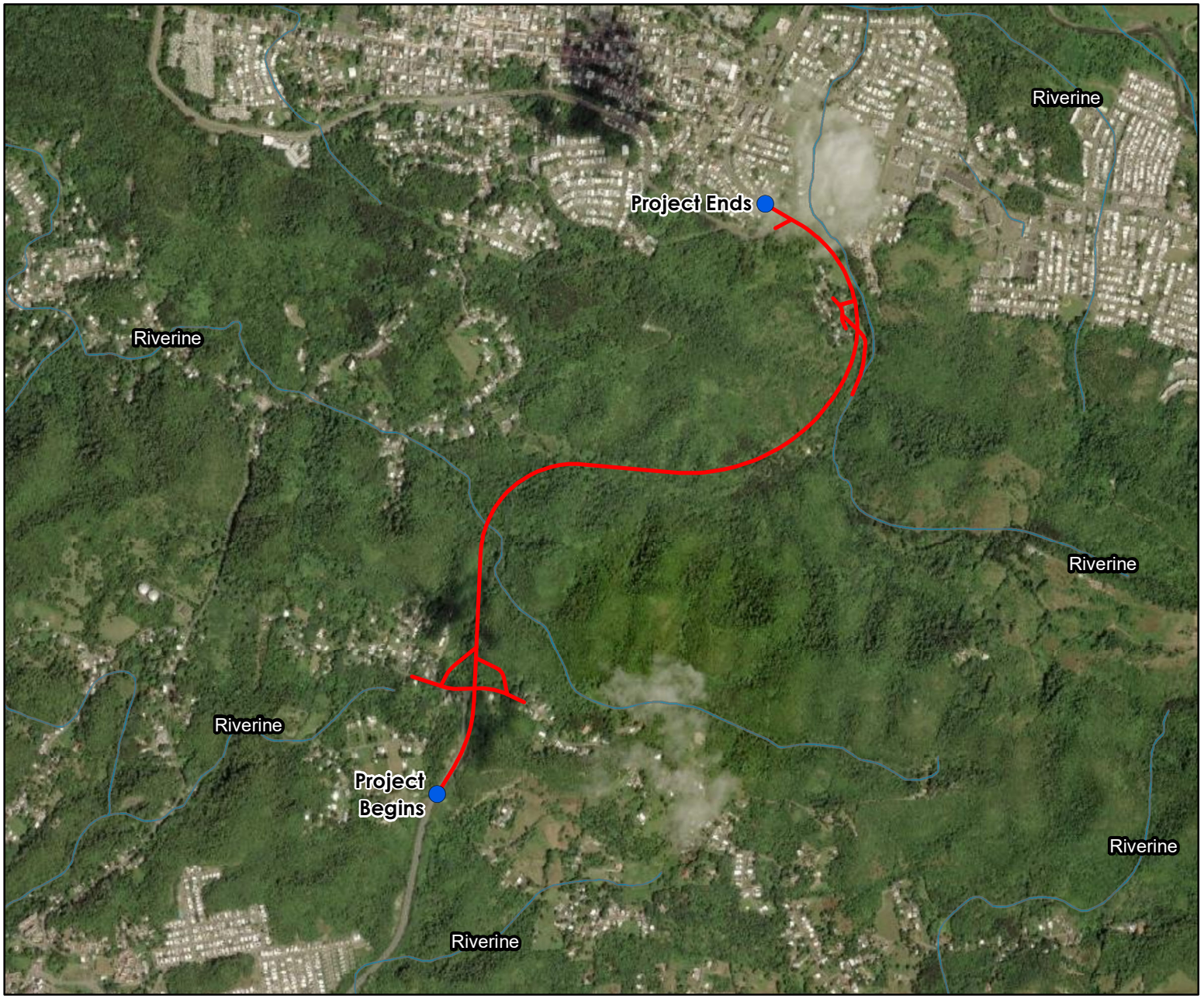
BYA BEHAR-YBARRA AND ASSOCIATES LLC
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Project Begins
Lat: 18.058536, Long: -67.045267
Project Ends
Lat: 18.076742, Long: -67.034764

**Figure 18**

# Wetlands Map

Puerto Rico Department of Housing



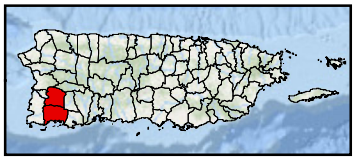

## Legend:

- Project Begins and Ends
- Proposed Project

**National Wetlands Inventory**

- Riverine

1:20,000
0 500 1,000 1,500 2,000 2,500 Ft
0 250 500 750 Mt



Service Layer Credits:
Source: Esri, Vantor, Earthstar Geographics, and the GIS User Community
Esri, Garmin, GEBCO, NOAA NGDC, and other contributors

Source:
U.S. Fish and Wildlife Service - National Weatlands Inventory
https://www.fws.gov/program/national-wetlands-inventory

**INFRA-STR-004 (PR-122 Lajas-San Germán Connector)**

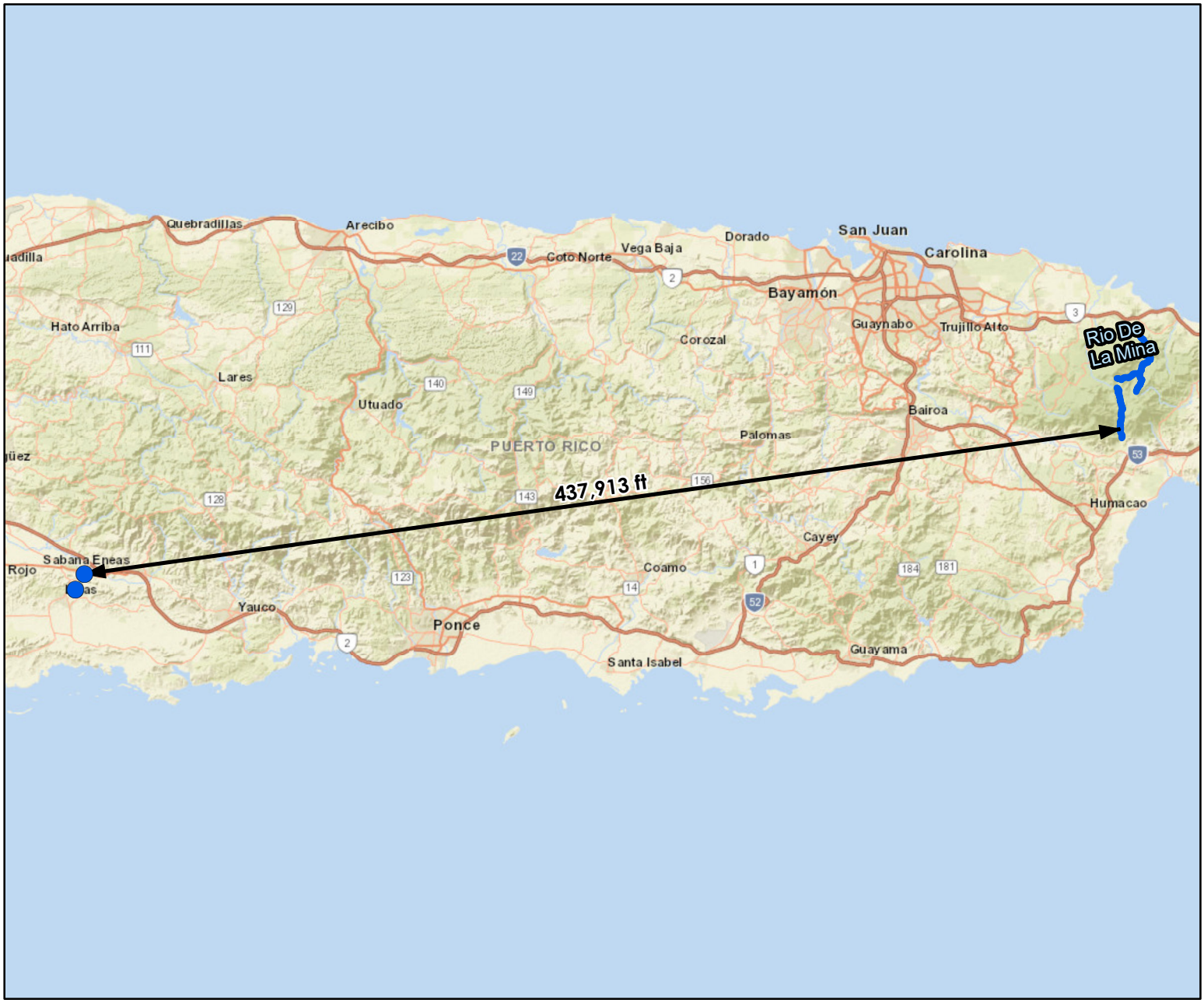
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Project Begins
Lat: 18.058536, Long: -67.045267
Project Ends
Lat: 18.076742, Long: -67.034764

**Figure 19**

# Wild and Scenic Rivers Map

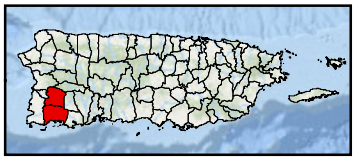
Puerto Rico Department of Housing CEWRI




## Legend:

- Project Begins and Ends
- Wild and Scenic Rivers

1:750,000
0 25,000 50,000 75,000 Ft
0 5,000 10,000 15,000 20,000 25,000 Mt



Service Layer Credits:
Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, (c) OpenStreetMap contributors, and the GIS User Community
Esri, Garmin, GEBCO, NOAA NGDC, and other contributors

Source:
FWS National Wild and Scenic Rivers System
https://www.rivers.gov/mapping-gis.php
https://nps.maps.arcgis.com/apps/View/index.html?

**INFRA-STR-004 (PR-122 Lajas-San Germán Connector)**

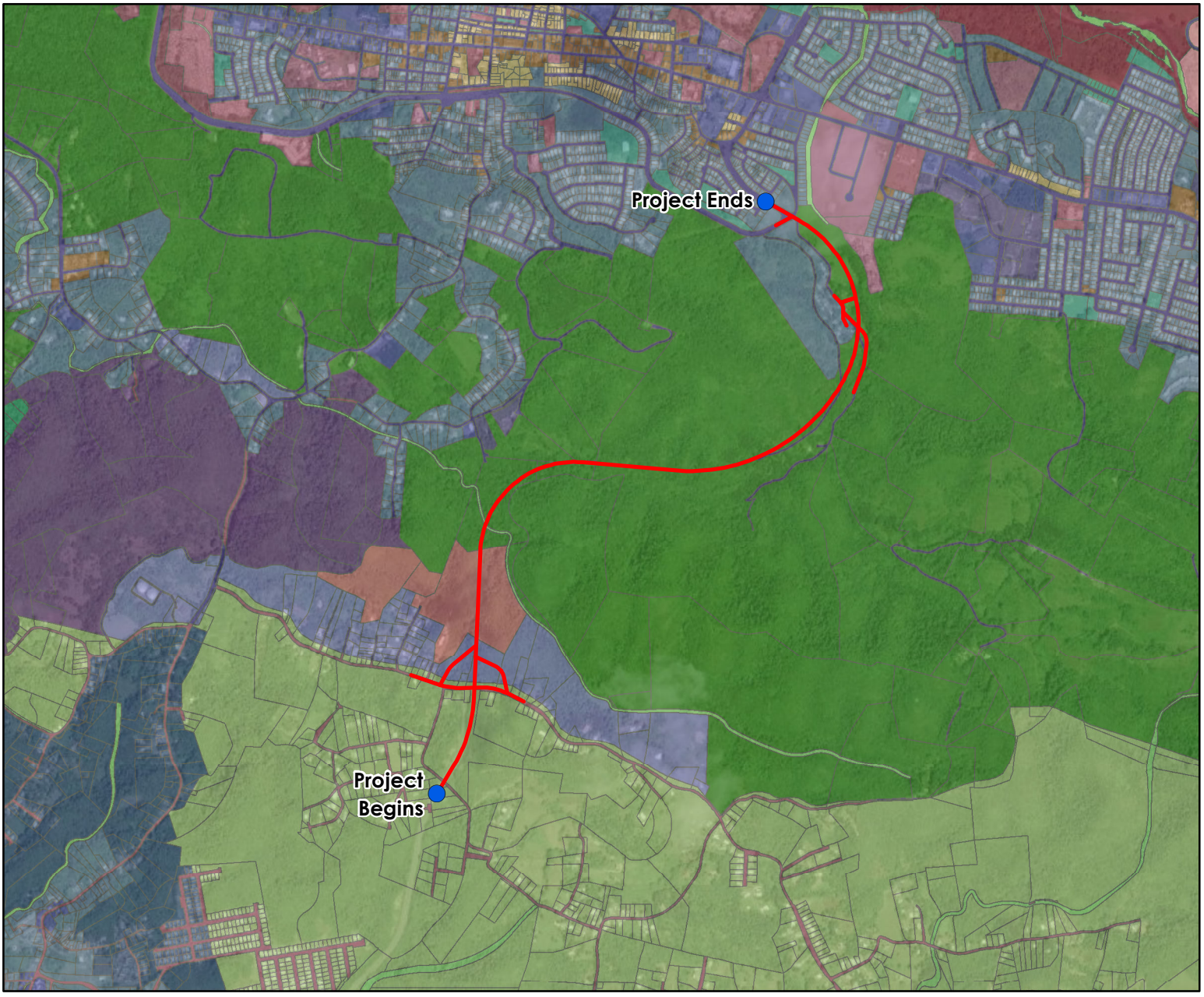
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Project Begins
Lat: 18.058536, Long: -67.045267
Project Ends
Lat: 18.076742, Long: -67.034764

**Figure 20**

# Land Uses Map

Puerto Rico Department of Housing

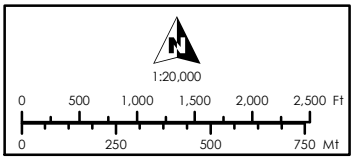


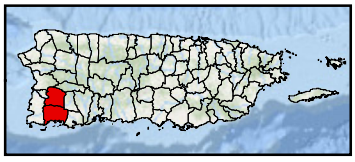

## Legend:

- Begins and Ends
- Project

**CALI**

| | | |
|---|---|---|
| A-G | CR-C | R-A |
| AD | DT-G | R-G |
| Agua | DT-P | R-I |
| C-I | I-L | RC-2 |
| C-L | I-P | RC-M |
| CR | NC | UR |
| | PR | Vial |



Service Layer Credits:
Source: Esri, Vantor, Earthstar Geographics, and the GIS User Community
Esri, Garmin, GEBCO, NOAA NGDC, and other contributors

Source:
Junta de Planificación, Catálogo interactivo de Zonificación (CIC).
https://jp.pr.gov/catalogo-de-calificacion/

**INFRA-STR-004 (PR-122 Lajas-San Germán Connector)**

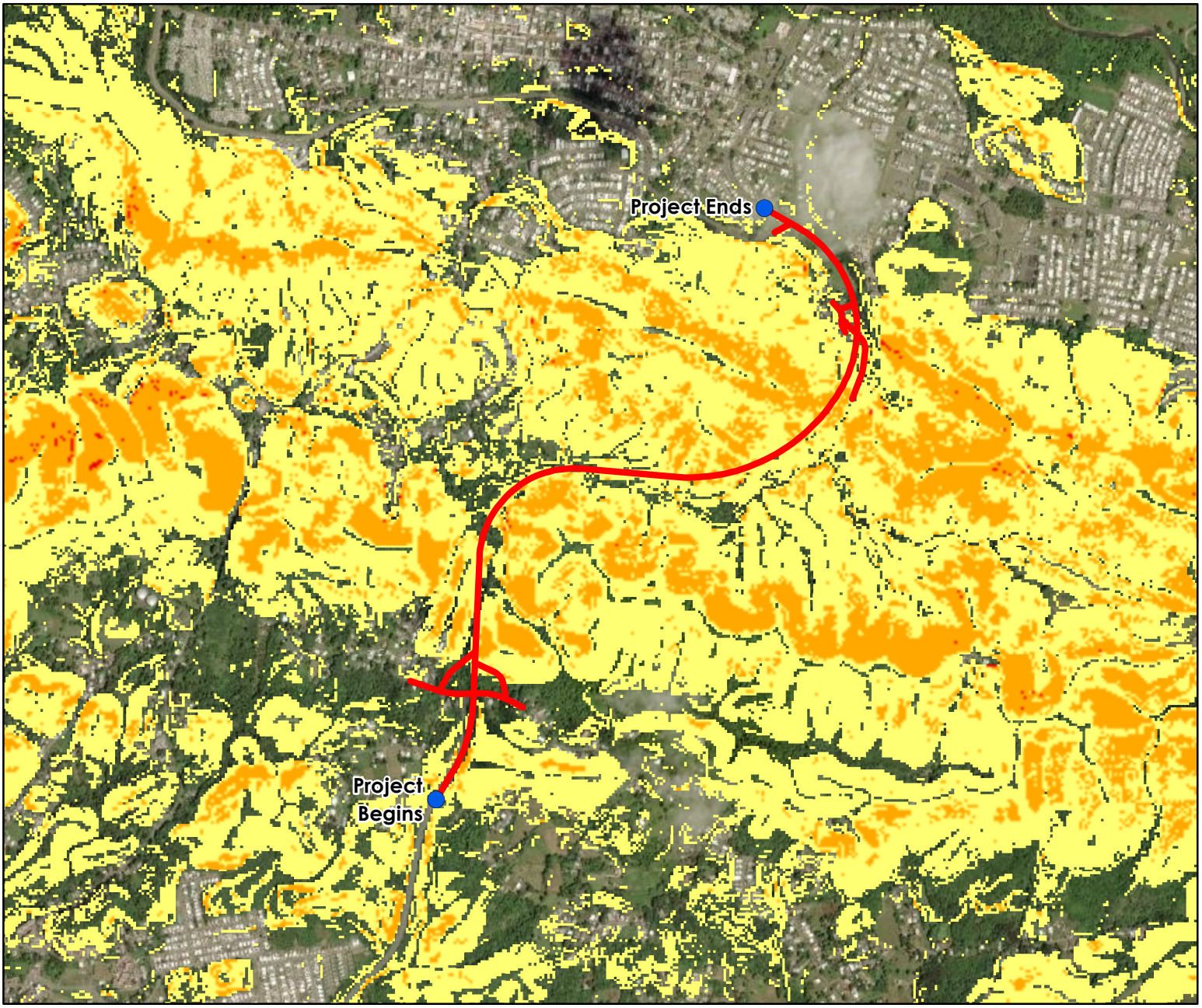
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Project Begins
Lat: 18.058536, Long: -67.045267
Project Ends
Lat: 18.076742, Long: -67.034764

**Figure 21**

# Landslide Susceptibility

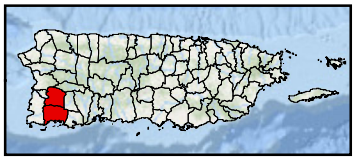
Puerto Rico Department of Housing




**Legend:**

- Begins and Ends
- Project
- Low
- Moderate
- High
- Very High
- Extremely High

1:20,000
0 500 1,000 1,500 2,000 2,500 Ft
0 250 500 750 Mt



Service Layer Credits:
Source: Esri, Vantor, Earthstar Geographics, and the GIS User Community
Esri, Garmin, GEBCO, NOAA NGDC, and other contributors

Source:
Centro de Recaudación de Ingresos Municipales (CRIM)
https://catastro.crimpr.net/cdprpc/

# APPENDIX 2: FIELD REPORT

# ENVIRONMENTAL FIELD OBSERVATION REPORT (E-FOR)

| Application General Application | | | |
|---|---|---|---|
| Program Funds | Community Development Block Grant - Disaster Recovery (CDBG-DR) | Sector | |
| Program | INFRASTRUCTURE | Application ID | PR-INFRA-004 |
| Applicant or Entity Name | Puerto Rico Highway and Transportation Authority | | |
| Project Name | PR-122 Lajas-San German Connector | | |

| Inspection Information | | | |
|---|---|---|---|
| Inspector Name | Miguel A. Perez Correa | | |
| Inspection Company | Behar Ybarra and Associates, LLC | | |
| Company Address | Condominio Iberia I, Perseo Street #554 | | |
| Municipality | San Juan | Zip Code | 00920 |
| Company Phone | 787-783-0290 | Company E-Mail | mperez@byaea.com |
| Inspection Date | 12/18/2022 | Weather Conditions | Sunny |
| Inspection Start Time | 10:00am | Inspection End Time | 12:45pm |

| Property Information | | | |
|---|---|---|---|
| Property Physical Address | The proposed project is located within the boundaries of the municipalities of Lajas and San Germán in the Commonwealth of Puerto Rico. The project begins at road PR-321, coordinates 18.058536, -67.045267 in the Municipality of Lajas and ends at road PR-166 (San Germán South Bypass), coordinates 18.076742, -67.034764 in the Municipality of San Germán. | | |
| Municipality | Lajas and San German | Zip Code | 00670 |
| Latitude | Begins 18.058536, Ends 18.076742 | Longitude | Begins -67.045267 Ends -67.034764 |

| | | | | |
|---|---|---|---|---|
| Cadastral Number | 334-093-206-11, 334-000-007-02, 334-000-007-91, 334-000-007-86, 334-074-201-54 | Property Type | Proposed Highway | |
| Number of Buildings/Structure | N/A | If Other* Property Type, Explain | | |
| Number of Housing Units | N/A | Property Year Built | N/A | ☐ Circa ☐ Actual |
| Property Remarks *(Include Additional Property Remarks or Other Location Description)* | | | | |
| Front Side of Property | N/A | | | |
| Back Side of Property | N/A | | | |
| Left Side of Property | N/A | | | |
| Right Side of Property | N/A | | | |
| *Please describe and identify below any observed or known business activities currently or in the past on either the subject or adjoining property.* | | | | |
| Description of Adjoining Properties and Use | The proposed action consists of extending the existing PR-122 Highway, known as Casto Perez Avenue, from its current intersection with the PR-321 highway in Lajas to its intersection with the eastern end of the PR-166 highway (San Germán South Bypass) in San German. The existing PR-122 serves as an access to the Municipality of San Germán, connecting the Interstate PR-2, which is a principal arterial, with the existing PR-166 (minor arterial) at the El Retiro ward. See Figure 1: Location: Aerial Map.<br>The proposed route runs mostly parallel to road PR-101 and is approximately one kilometer (1 Km) to the east of it. On its trajectory, PR-122 passes between the El Retiro Community and a creek without name in San Germán, then it continues passing over the Maresúa creek toward to Lajas until crossing through Km 1.0 in road PR-321. The topography of the property goes from flat to steep. | | | |

## Inspection

### Property Surrounding and Historical Information

Instructions: Identify any observed or known surrounding conditions that should be taken into consideration and Historical Information.

| Inspection Criteria | Finding | Comment/Explain all "Yes" Responses |
|---|---|---|
| Permanent standing water (pond, lake) on site. | ☒ Yes ☐ No | Quebrada Maresúa |
| Project lot have water frontage | ☐ Yes ☒ No | |
| Evidence of lead-based paint present or hazardous containing material present. | ☐ Yes ☒ No | |
| Any other unusual conditions on site. | ☐ Yes ☒ No | |
| Structure 45 years or older (As best of Property Owner's knowledge) | ☐ Yes ☒ No | |
| Is applicant aware of any significant historical events or person associated with structure; or does structure have a historic marker? | ☒ Yes ☐ No | The project has the potential to impact historic properties or eligible for listing in the National Register of Historic Places or cultural and religious tribal resources. The project site is not located in a historic district. |
| Is there any indicator of soil instability? | ☐ Yes ☒ No | |
| Presence of indication of any Landslide event | ☐ Yes ☒ No | |
| Additional Field Observations: The Maresúa Creek cross from east to west through the southern section of the Study Area. | | |

### Potable and Drinking Water Supply

Instructions: Identify the presence of any observed or known water supply sources currently on the subject property

| Inspection Criteria | Finding | Comment/Explain all "Yes" Responses |
|---|---|---|
| Property connected and serviced by the municipal water system - PR Aqueduct and Sewer Authority (PRASA) | ☐ Yes ☒ No | The project is a roadway extension through rural/agricultural land and is not a facility requiring potable water service. |
| Subject property is connected and serviced by a community water system (NON-PRASA) | ☐ Yes ☒ No | No community water systems are present within the roadway corridor. |
| Presence of a water well currently or in the past of the subject or adjoining property | ☐ Yes ☒ No | Field review and Phase I ESA found no evidence of wells within or adjacent to the alignment. |

| | | |
|---|---|---|
| Water cistern and/or back-up storage system installed | ☐Yes ☒No | No structures requiring potable water storage exist within the project limits. |
| Water treatment currently or in the past of the subject or adjoining property | ☐Yes ☒No | No water treatment facilities were identified in the corridor |
| Additional Field Observations: The project consists of roadway construction in undeveloped rural land; no potable water infrastructure is present or required. | | |

**Wastewater**

Instructions: Identify the wastewater disposal on the subject property.

| Inspection Criteria | Finding | Comment/Explain all "Yes" Responses |
|---|---|---|
| Property connected and serviced by the municipal sewer system - PR Aqueduct and Sewer Authority (PRASA) | ☐Yes ☒No | The project is a roadway corridor and does not require sanitary sewer service. |
| Presence of a septic system currently or in the past of the subject or adjoining property | ☐Yes ☒No | No septic systems were identified within or adjacent to the alignment. |
| Septic system showing signs of failure such as overflow of wastewater, cracks, bad odors, etc. | ☐Yes ☒No | No septic systems present. |
| Wastewater treatment currently or in the past of the subject or adjoining property | ☐Yes ☒No | No wastewater treatment facilities exist within the project area. |
| Any visible discharge of solid or viscous contaminants that may cause the obstruction in the sewer system | ☐Yes ☒No | No discharges observed. |
| Sewer controlled equipment installed such as, but not limited to grease traps | ☐Yes ☒No | Not applicable to roadway infrastructure. |
| Any known current or past events of overflow or uncontrolled discharge of wastewater on the subject or adjoining property | ☐Yes ☒No | No evidence of wastewater releases. |
| Additional Field Observations: | | |

**Hazardous Materials and Toxics**

**Storage and Handling**

Instructions: Identify any chemicals of concerns currently or in the past on the subject or adjoining property

| Inspection Criteria | Finding | Comment/Explain all "Yes" Responses |
|---|---|---|
| Any 55-gallon drums/containers on site? | ☐Yes ☒No | No drums observed during field review. |
| Aboveground Storage Tanks (ASTs) | ☐Yes ☒No | None identified in the corridor. |

| | | |
|---|---|---|
| Drums (steel or plastic) | ☐ Yes ☒ No | None present. |
| Underground Storage Tanks (USTs) | ☐ Yes ☒ No | Phase I ESA confirms no USTs in the project area. |
| Any known Leaking Underground Storage Tanks (LUSTs) | ☐ Yes ☒ No | No LUSTs identified in EPA or EQB databases. |
| Are there any petroleum underground storage tanks (PUSTs) on site? | ☐ Yes ☒ No | None identified. |
| Any signs of surface staining? | ☐ Yes ☒ No | No staining or evidence of spills observed. |
| Any ground water monitoring or injection wells on site? | ☐ Yes ☒ No | None identified |
| **Check all chemicals of concern identified on site:**<br>☐ Hazardous materials ☐ Pesticides ☐ Petroleum products ☐ Fuels ☐ LPG or Propane<br>☐ Compressed gas cylinders ☐ Lubricants ☐ Paints ☐ Antifreeze or Coolants<br>☐ Other, Specify: | | |
| Additional Field Observations: The Phase I ESA found no Environmentally Recognized Conditions (ERCs) within the project corridor. | | |

**Pollution Control and Prevention**

Instructions: Identify potential hazardous materials releases and pollution concerns currently or in the past on the subject or adjoining property

| Inspection Criteria | Finding | Comment/Explain all "Yes" Responses |
|---|---|---|
| Overall poor housekeeping such as uncontained waste materials | ☐ Yes ☒ No | The corridor is undeveloped rural land. |
| Signs of pollution, stain or releases near stormwater drains | ☐ Yes ☒ No | No stormwater infrastructure exists; no releases observed. |
| Sand, soil or other sediment piles on site | ☐ Yes ☒ No | No stockpiles present prior to construction. |
| Storage containers broken, cracked and/or corroded | ☐ Yes ☒ No | No storage containers present. |
| Signs of distressed vegetation | ☐ Yes ☒ No | Vegetation appears consistent with natural conditions. |
| Any known historical spill events | ☐ Yes ☒ No | Phase I ESA found no spill history. |
| Additional Field Observations: | | |

| **Other Relevant Environmental Matters**<br>Instructions: Identify any other matter relevant to the field inspection not previously identified in this inspection report | | |
|---|---|---|
| Inspection Criteria | Finding | Additional Field Observations |
| Any additional identifiable field observation not listed in the inspection criteria | ☐Yes ☒No | No additional environmental concerns observed. |
| Additional Field Observations: | | |

| **Certification Signature** |
|---|

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is to the best of my knowledge and belief true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

| Miguel A. Pérez Correa |  | 12/18/2022 |
|---|---|---|
| **Inspector Print Name** | **Inspector Signature** | **Date** |

| | |
|---|---|
| Photo Direction: North<br><br>Comments: General view from PR-321 to project site entrance |  |
| Photo Direction: South<br><br>Comments: View from the project centerline towards PR-321 |  |

| | |
|---|---|
| Photo Direction: North<br><br>Comments: General View towards the Maresúa Creek area, near the project's southern section |  |
| Photo Direction: South<br><br>Comments: View of hills adjacent to the south-central section of the project route |  |

| | |
|---|---|
| Photo Direction: North<br><br>Comments: View of areas dominated by pasture within the central section of the project. |  |
| Photo Direction: South<br><br>Comments: View of an area within the northern section of the project. |  |

# APPENDIX 3: EPA's published Summary of Nonattainment Area Population Exposure 1 Report. EPA's Published Status of Puerto Rico Designated Areas.

## Air Quality Study

# EPA’s Published Summary of Nonattainment Areas Population Exposure Report & Status of Puerto Rico Designated Areas

# Summary Nonattainment Area Population Exposure Report

Data is current as of May 31, 2023

Ordered by state(s)
The $NO_2$ nonattainment area became a maintenance area on September 22, 1998. All Carbon Monoxide areas were redesignated to maintenance areas as of September 27, 2010. The 8-hour Ozone (1997) standard was revoked on April 6, 2015 and the 1-hour Ozone (1979) standard was revoked on June 15, 2005.

| State(s) | General Area Name (see note) | 2010 Population in 1000s (area count) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 8-Hour Ozone (2015) | 8-Hour Ozone (2008) | PM-2.5 (2012) | PM-2.5 (2006) | PM-2.5 (1997) | PM-10 (1987) | $SO_2$ (2010) | $SO_2$ (1971) | Lead (2008) | Lead (1978) |
| AK | Fairbanks | | | | 87(1) | | | | | | |
| AZ | Douglas/ Paul Spur (Cochise County) | | | | | | 17(1) | | | | |
| AZ | Hayden/ Miami | | | | | | 26(2) | 20(2) | 5(1) | 5(1) | |
| AZ | Nogales | | | | | | 30(1) | | | | |
| AZ | Phoenix-Mesa | 3,945(1) | 3,850(1) | | | | 3,853(1) | | | | |
| AZ | Rillito (Pima County) | | | | | | 1(1) | | | | |
| AZ | West Pinal | | | | 52(1) | | 283(1) | | | | |
| AZ | Yuma | 87(1) | | | | | 101(1) | | | | |

| State(s) | General Area Name (see note) | 2010 Population in 1000s (area count) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 8-Hour Ozone (2015) | 8-Hour Ozone (2008) | PM-2.5 (2012) | PM-2.5 (2006) | PM-2.5 (1997) | PM-10 (1987) | $SO_2$ (2010) | $SO_2$ (1971) | Lead (2008) | Lead (1978) |
| CA | Amador and Calaveras Cos (Central Mountain Cos) | 84(2) | 46(1) | | | | | | | | |
| CA | Chico | 220(1) | 220(1) | | | | | | | | |
| CA | Imperial County | 175(1) | 175(1) | 154(1) | 154(1) | | | | | | |
| CA | Los Angeles-South Coast Air Basin | 15,704(3) | 15,723(3) | 15,716(1) | 15,716(1) | 15,716(1) | | | | 9,437(1) | |
| CA | Mariposa and Tuolumne Cos (Southern Mountain Cos) | 74(2) | 18(1) | | | | | | | | |
| CA | Mono County | | | | | | 0(1) | | | | |
| CA | Nevada County (Western Part) | 82(1) | 82(1) | | | | | | | | |
| CA | Owens Valley | | | | | | 7(1) | | | | |
| CA | Plumas County | | | 6(1) | | | | | | | |

| State(s) | General Area Name (see note) | 2010 Population in 1000s (area count) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 8-Hour Ozone (2015) | 8-Hour Ozone (2008) | PM-2.5 (2012) | PM-2.5 (2006) | PM-2.5 (1997) | PM-10 (1987) | $SO_2$ (2010) | $SO_2$ (1971) | Lead (2008) | Lead (1978) |
| CA | Sacramento Metro | 2,240(1) | 2,241(1) | | 2,206(1) | | | | | | |
| CA | San Diego | 3,077(1) | 3,095(1) | | | | | | | | |
| CA | San Francisco-Bay Area | 6,969(1) | 6,973(1) | | 6,971(1) | | | | | | |
| CA | San Joaquin Valley | 3,937(2) | 3,938(2) | 3,842(1) | 3,842(1) | 3,842(1) | 126(1) | | | | |
| CA | San Luis Obispo | 1(1) | 2(1) | | | | | | | | |
| CA | Searles Valley | | | | | | 4(1) | | | | |
| CA | Southeast Desert Modified AQMA | 1,292(2) | 1,294(2) | | | | 495(2) | | | | |
| CA | Tuscan Buttes | 0(1) | 0(1) | | | | | | | | |
| CA | Ventura County | 821(1) | 823(1) | | | | | | | | |
| CA | Yuba City | 0(1) | | | | | | | | | |
| CO | Denver-Boulder-Greeley-Ft. Collins-Loveland | 3,331(1) | 3,330(1) | | | | | | | | |

| State(s) | General Area Name (see note) | 2010 Population in 1000s (area count) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 8-Hour Ozone (2015) | 8-Hour Ozone (2008) | PM-2.5 (2012) | PM-2.5 (2006) | PM-2.5 (1997) | PM-10 (1987) | $SO_2$ (2010) | $SO_2$ (1971) | Lead (2008) | Lead (1978) |
| CT | Greater Connecticut | 1,629(1) | 1,629(1) | | | | | | | | |
| DC-MD-VA | Washington | 5,136(1) | | | | | | | | | |
| GU | Piti-Cabras | | | | | | | 6(1) | 1(1) | | |
| GU | Tanguisson Power Plant | | | | | | | | 1(1) | | |
| IA | Muscatine County | | | | | | | 30(1) | | | |
| ID | Pocatello | | | | | | 1(1) | | | | |
| IL-IN-WI | Chicago-Joliet-Napier | 9,075(1) | | | | | | | | | |
| IN | Fort Wayne-Huntington-Auburn | | | | | | | 21(1) | | | |
| KS | Salina | | | | | | | | | 0(1) | |
| KY | Henderson-Webster Counties | | | | | | | 7(1) | | | |
| KY-IN | Louisville | 876(1) | | | | | | | | | |
| LA | Evangeline Parish | | | | | | | 0(1) | | | |

| State(s) | General Area Name (see note) | 2010 Population in 1000s (area count) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 8-Hour Ozone (2015) | 8-Hour Ozone (2008) | PM-2.5 (2012) | PM-2.5 (2006) | PM-2.5 (1997) | PM-10 (1987) | $SO_2$ (2010) | $SO_2$ (1971) | Lead (2008) | Lead (1978) |
| LA | New Orleans | | | | | | | 36(1) | | | |
| MA-NH | Boston-Worcester-Manchester | | 17(1) | | | | | | | | |
| MD | Baltimore | 2,663(1) | 2,663(1) | | | | | 990(1) | | | |
| MI | Allegan County | 47(1) | | | | | | | | | |
| MI | Benton Harbor | 157(1) | | | | | | | | | |
| MI | Detroit-Ann Arbor | | | | | | | 306(2) | | | |
| MI | Muskegon | 147(1) | | | | | | | | | |
| MN | Minneapolis-St. Paul | | | | | | | | | 9(1) | |
| MO | Iron, Dent, and Reynolds Counties | | | | | | | | | 0(1) | |
| MO | New Madrid County | | | | | | | 0(1) | | | |
| MO-IL | St. Louis | 2,488(1) | | | | | | 0(1) | | 5(1) | 3(1) |
| MT | Billings/Laurel | | | | | | | | 7(1) | | |

| State(s) | General Area Name (see note) | 2010 Population in 1000s (area count) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 8-Hour Ozone (2015) | 8-Hour Ozone (2008) | PM-2.5 (2012) | PM-2.5 (2006) | PM-2.5 (1997) | PM-10 (1987) | $SO_2$ (2010) | $SO_2$ (1971) | Lead (2008) | Lead (1978) |
| MT | Lame Deer | | | | | | 1(1) | | | | |
| MT | Libby | | | | | 9(1) | | | | | |
| MT | Polson (Lake County) | | | | | | 4(1) | | | | |
| MT | Ronan (Lake County) | | | | | | 3(1) | | | | |
| NV | Las Vegas | 1,892(1) | | | | | | | | | |
| NY | Jamestown | | 135(1) | | | | | | | | |
| NY | St. Lawrence County | | | | | | | 12(1) | | | |
| NY-NJ-CT | New York-N. New Jersey-Long Island | 20,217(1) | 20,217(1) | | | | | | | | |
| OH | Canton-Massillon | | | | | | | | | 6(1) | |
| OH | Cleveland-Akron-Elyria | 2,780(1) | | | | | | | | | |
| OH-KY-IN | Cincinnati-Middletown-Wilmington | 348(1) | | | | | | | | | |

| State(s) | General Area Name (see note) | 2010 Population in 1000s (area count) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 8-Hour Ozone (2015) | 8-Hour Ozone (2008) | PM-2.5 (2012) | PM-2.5 (2006) | PM-2.5 (1997) | PM-10 (1987) | $SO_2$ (2010) | $SO_2$ (1971) | Lead (2008) | Lead (1978) |
| OR | Klamath Falls | | | | 47(1) | | | | | | |
| PA | Clearfield and Indiana Counties | | | | | | | 93(1) | | | |
| PA | Lancaster | | 519(1) | | | | | | | | |
| PA | Pittsburgh-New Castle | | 2,356(1) | 1,223(1) | 21(1) | 21(1) | | 142(2) | 5(1) | 18(1) | |
| PA | Reading | | 411(1) | | | | | | | 49(2) | |
| PA | Warren County | | | | | | | 18(1) | | | |
| PA-NJ | Allentown-Bethlehem-Easton | | 712(1) | | | | | | 109(1) | | |
| PA-NJ-DE-MD | Philadelphia-Wilmington-Atlantic City | 7,437(1) | 7,634(2) | | | | | | | | |
| PR | Arecibo | | | | | | | | | 32(1) | |
| PR | Guayama-Salinas | | | | | | | 23(1) | | | |
| PR | San Juan | | | | | | | 275(1) | | | |
| TN | Johnson City- | | | | | | | 15(1) | | | |

| State(s) | General Area Name (see note) | 2010 Population in 1000s (area count) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 8-Hour Ozone (2015) | 8-Hour Ozone (2008) | PM-2.5 (2012) | PM-2.5 (2006) | PM-2.5 (1997) | PM-10 (1987) | $SO_2$ (2010) | $SO_2$ (1971) | Lead (2008) | Lead (1978) |
| | Kingsport-Bristol | | | | | | | | | | |
| TX | Dallas-Fort Worth | 6,202(1) | 6,280(1) | | | | | | | | |
| TX | Fairfield | | | | | | | 4(1) | | | |
| TX | Houston-Sugar Land-Baytown | 5,773(1) | 5,892(1) | | | | | | | | |
| TX | Howard County | | | | | | | 0(1) | | | |
| TX | Hutchinson County | | | | | | | 15(1) | | | |
| TX | Mount Pleasant | | | | | | | 0(1) | | | |
| TX | Navarro County | | | | | | | 2(1) | | | |
| TX | San Antonio | 1,715(1) | | | | | | | | | |
| TX | Tatum | | | | | | | 2(1) | | | |
| TX-NM | El Paso-Las Cruces | 813(1) | | | | | 652(2) | | | | |
| UT | Provo | 516(1) | | | 518(1) | | | | | | |
| UT | Salt Lake City | 1,616(1) | | | 1,665(1) | | | | 1,030(1) | | |
| UT | Tooele County | | | | | | | | 58(1) | | |

| State(s) | General Area Name (see note) | 2010 Population in 1000s (area count) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 8-Hour Ozone (2015) | 8-Hour Ozone (2008) | PM-2.5 (2012) | PM-2.5 (2006) | PM-2.5 (1997) | PM-10 (1987) | $SO_2$ (2010) | $SO_2$ (1971) | Lead (2008) | Lead (1978) |
| UT | Uinta Basin | 47(1) | | | | | | | | | |
| VA | Giles County | | | | | | | 0(1) | | | |
| WA | Whatcom County | | | | | | | 0(1) | | | |
| WI | Milwaukee-Racine | 1,648(1) | | | | | | | | | |
| WI | Sheboygan | 68(1) | | | | | | | | | |
| WV-OH | Parkersburg-Marietta | | | | | | | 4(1) | | | |
| WY | Upper Green River Basin | | 11(1) | | | | | | | | |
| | | 2010 Population in 1000s (area count) by Pollutant | | | | | | | | | |
| Total Estimated 2010 Population in Nonattainment Areas (1000's)<br><br>Across All Criteria Pollutants: 121,456 | | 8-Hour Ozone (2015) | 8-Hour Ozone (2008) | PM-2.5 (2012) | PM-2.5 (2006) | PM-2.5 (1997) | PM-10 (1987) | $SO_2$ (2010) | $SO_2$ (1971) | Lead (2008) | Lead (1978) |
| | | 115,329 ( 47) | 90,288 ( 34) | 20,942 ( 5) | 31,280 ( 11) | 19,589 ( 4) | 5,605 ( 20) | 2,022 ( 30) | 1,214 ( 8) | 9,561 ( 11) | 3 ( 1) |

The Summary Population Exposure Report is a summary of the population living in an area that is in nonattainment for at least one of the NAAQS.

## Area Name:

The "State(s) Area Name" column contains a common or general name for the nonattainment areas on the row but may not reflect the exact name of any area on the row. This column cannot be exact since the nonattainment area for one pollutant may not contain the same counties, cities, or states as the nonattainment area for another pollutant on the same row. The abbreviations listed in the "State(s)" column reflect all states identified in row. However, some states on a row may be nonattainment for some pollutants and not for others in the general area. A multi-state area with states that have not all been redesignated to maintenance is counted as a nonattainment area until all of the states in the area are redesignated, with the whole area population displayed.

# Status of Puerto Rico Designated Areas

**Puerto Rico Areas by NAAQS**

**NOTE: As of 03/12/2021, these reports are no longer being updated. For the latest information, see the SIP Status Tools.**

**Jump to Puerto Rico section for:** CO (1971) Lead (1978) Lead (2008) NO2 (1971) Ozone-1Hr (1979) Ozone-8Hr (1997) Ozone-8Hr (2008) Ozone-8Hr (2015) PM-10 (1987) PM-2.5 (1997) PM-2.5 (2006) PM-2.5 (2012) SO2 (1971) SO2 (2010)

## Puerto Rico CO (1971) Areas

*Return to map*

No designated areas for this pollutant.

## Puerto Rico Lead (1978) Areas

*Return to map* Top of page

No designated areas for this pollutant.

## Puerto Rico Lead (2008) Areas

*Return to map* Top of page

| Click on the Area name to view SIP Required Elements<br><br>Area | Status | Designation Date | Classification | 2010 Population (state portion) | Meets NAAQS Basis | Design Value Annual (µg/m³) (entire area) | Meets NAAQS | SIP Requirements Original/ Approved | Clean Air Determination Citation Effective Date Click to view FR notice | Redesignation Request Date | Redesignation Citation Effective Date Click to view FR notice |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Arecibo | Nonattainment | 12/31/2011 | | 32,185 | 2017-2019 | 0.18 | No | 6 / 6 | | | |

## Puerto Rico NO2 (1971) Areas

*Return to map* Top of page

No designated areas for this pollutant.

## Puerto Rico Ozone-1Hr (1979) Areas

*Return to map* Top of page

No designated areas for this pollutant.

## Puerto Rico Ozone-8Hr (1997) Areas

Return to map Top of page

No designated areas for this pollutant.

## Puerto Rico Ozone-8Hr (2008) Areas

Return to map Top of page

No designated areas for this pollutant.

## Puerto Rico Ozone-8Hr (2015) Areas

Return to map Top of page

No designated areas for this pollutant.

## Puerto Rico PM-10 (1987) Areas

Return to map Top of page

| Click on the Area name to view SIP Required Elements<br>Area | Status | Designation Date | Classification | 2010 Population (state portion) | Meets NAAQS Basis | Average Estimated Exceedances (est. exc.) (entire area) | Meets NAAQS | SIP Requirements Original/ Approved | Clean Air Determination Citation Effective Date Click to view FR notice | Redesignation Request Date | Redesignation Citation Effective Date Click to view FR notice |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Guaynabo County | Maintenance | 11/15/1990 | Moderate | 90,470 | 2017-2019 | | Insufficient Data | 3 / 3 | | 03/31/2009 | 02/11/2010 75 FR 1543 |

## Puerto Rico PM-2.5 (1997) Areas

Return to map Top of page

No designated areas for this pollutant.

## Puerto Rico PM-2.5 (2006) Areas

Return to map Top of page

No designated areas for this pollutant.

## Puerto Rico PM-2.5 (2012) Areas

Return to map Top of page

No designated areas for this pollutant.

## Puerto Rico SO2 (1971) Areas

*Return to map* Top of page

No designated areas for this pollutant.

## Puerto Rico SO2 (2010) Areas

*Return to map* Top of page

| Click on the Area name to view SIP Required Elements<br><br>Area | Status | Designation Date | Classification | 2010 Population (state portion) | Meets NAAQS Basis | 3 Year 1-Hour Design Value (ppb) (entire area) | Meets NAAQS | SIP Requirements Original/ Approved | Clean Air Determination Citation Effective Date Click to view FR notice | Redesignation Request Date | Redesignation Citation Effective Date Click to view FR notice |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Guayama-Salinas | Nonattainment | 04/09/2018 | | 23,401 | 2017-2019 | | No Data | 6 / 0 | | | |
| San Juan | Nonattainment | 04/09/2018 | | 275,267 | 2017-2019 | | No Data | 6 / 0 | | | |

We have made our best effort to ensure that the data contained in these reports is accurate. We note that there may be brief delays in updating the reports as we receive new state submissions and we take rulemaking action on plans. In order to assist us in providing accurate information, we request that you contact us by clicking on the "Contact Us" link near the top of this page with any comments regarding or corrections to the posted information, including concerns about whether the entries reflect the most recent status.

Current and historical design value data can be found on the EPA Air Quality Design Values website and the EPA Green Book contains comprehensive nonattainment area, designation status, and historical information.

The level of the 1-hour NAAQS for sulfur dioxide is 75 parts per billion (ppb) calculated as the 3-year average of the 99th percentile of the annual distribution of daily maximum 1-hour average concentrations.

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# Air Quality Study




HIGHWAY & TRANSPORTATION AUTHORITY

# Air Quality Impact Assessment

## PR-122 Extension Project

**Prepared by:**

BYA BEHAR–YBARRA & ASSOCIATES, L.L.P.

Cond. Iberia 1 Suite J-3, Calle Perseo 554, Altamira, San Juan, P.R. 00920 Tel.(787)783-0290

**January, 2020**



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# CHAPTER 1 : INTRODUCTION

## 1.1 GENERAL DESCRIPTION

The Puerto Rico Highway and Transportation Authority (PRHTA) and the U.S. Department of Transportation (USDOT), through the Federal Highway Administration (FHWA) propose to extend the Angel Castro Pérez Avenue (PR-122), from road PR-321 to road PR-166 (San Germán South Bypass), within the boundaries of the municipalities of San Germán and Lajas in the Commonwealth of Puerto Rico. The project is approximately 2.7 kilometers long and the vicinity area is shown on **Figure 1**.

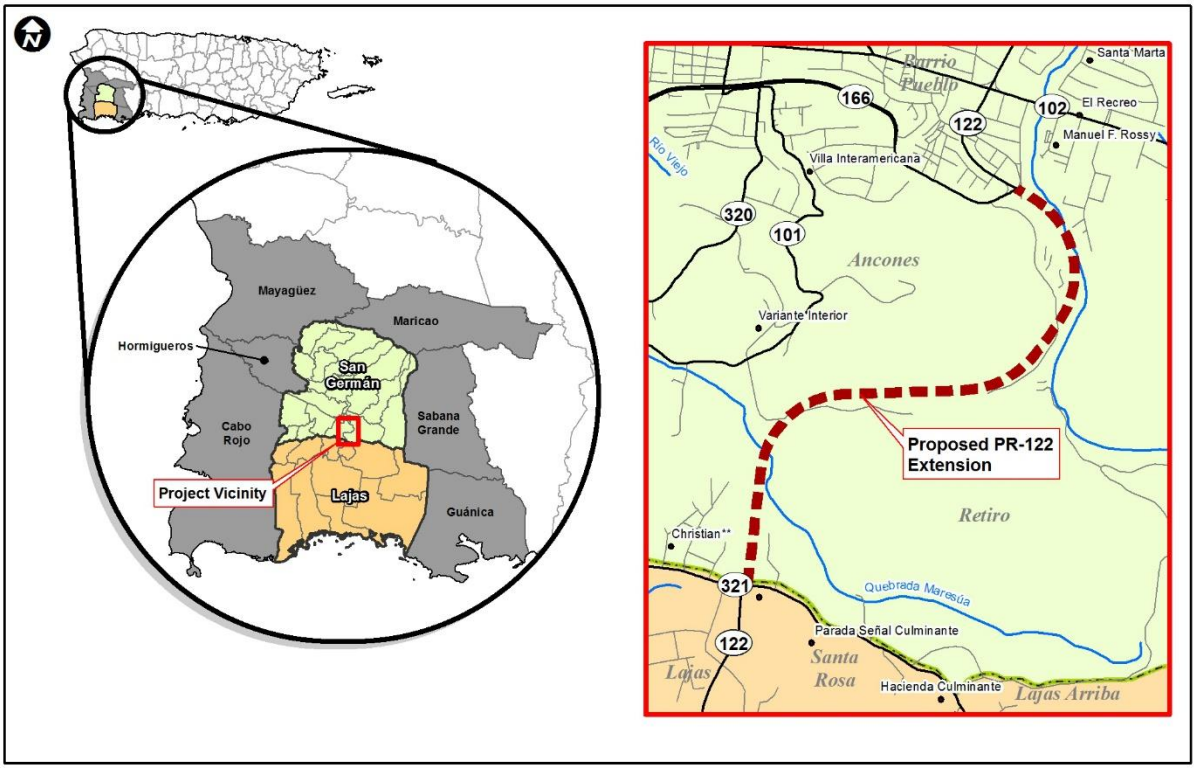



**Figure 1: Project Vicinity**

The purpose of the proposed PR-122 Extension project is to improve the mobility and connectivity in the project study area. The proposed project would provide a direct link between road PR-2 in the Municipality of San Germán and the Municipality of Lajas and its tourist area. It would provide an alternate route to PR-101, enhancing regional

travel options and safety while protects the environment and promotes the economic development of the region.

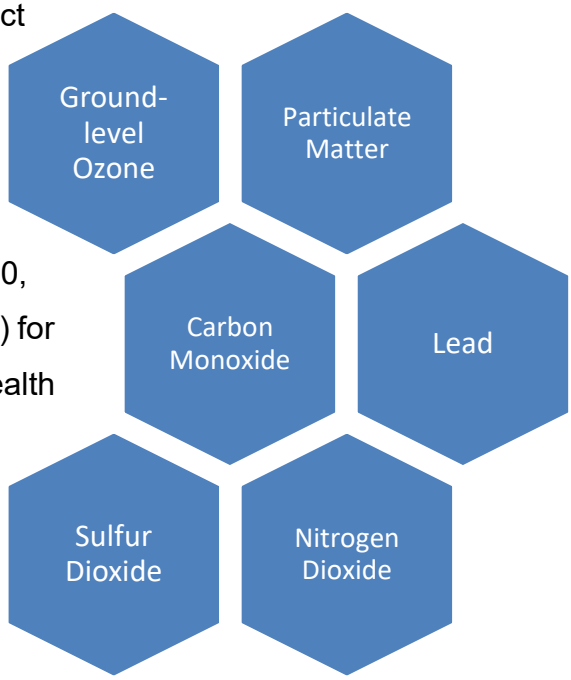
## 1.2 PURPOSE OF STUDY

This report presents the analysis of the potential air quality impact from the transit associated with the proposed PR-122 Extension (AC-012201), a new connector between the municipalities of San Germán and Lajas.

The purpose of this study is to estimate the future emission levels when the proposed PR-122 Extension will be operational. Future air pollutant emissions were predicted using the methodology provided by the U.S. Environmental Protection Agency (EPA). The results of this analysis are presented herein, along with a discussion of impacts and proposed mitigation measures.

# CHAPTER 2 : REGULATIONS

The Clean Air Act (CAA), approved in 1970 and amended in 1977 and 1990, is the comprehensive federal law that regulates air emissions from stationary and mobile sources. Among other things, this law authorizes EPA to establish National Ambient Air Quality Standards (NAAQS) to protect public health and public welfare and to regulate emissions of hazardous air pollutants.




The federal CAA, last amended in 1990, requires EPA to set NAAQS (40 CFR part 50) for pollutants considered harmful to public health and the environment. The EPA Office of Air Quality Planning and Standards (OAQPS) has set NAAQS for six common air pollutants, known as "criteria air pollutants", which can harm the health and environment, and cause property damage.

There are also two pollutants which, Volatile Organic Compounds and Greenhouse Gases, although they are not included in the NAAQS, are of concern due to their effects on the environment. Each of these pollutants is briefly described below.

## 2.1 POLLUTANT DESCRIPTIONS

### 2.1.1 CARBON MONOXIDE

Carbon monoxide, or CO, is a colorless, odorless gas that is formed when carbon in fuel is not burned completely. It is a component of motor vehicle exhaust; therefore, higher levels of CO generally occur in areas with heavy traffic congestion. In cities, 85 to 95 percent of all CO emissions may come from motor

vehicle exhaust. Other sources of CO emissions include industrial processes (such as metals processing and chemical manufacturing), residential wood burning, and natural sources such as forest fires. Woodstoves, gas stoves, cigarette smoke, and unvented gas and kerosene space heaters are sources of CO indoors. The highest levels of CO in the outside air typically occur during the colder months of the year when inversion conditions are more frequent. Under these conditions, the air pollution becomes trapped near the ground beneath a layer of warm air.

CO can cause harmful health effects by reducing oxygen delivery to the body's organs (like the heart and brain) and tissues. At extremely high levels, CO can cause death.

Exposure to CO can reduce the oxygen-carrying capacity of the blood. People with several types of heart disease already have a reduced capacity for pumping oxygenated blood to the heart, which can cause them to experience myocardial ischemia (reduced oxygen to the heart), often accompanied by chest pain (angina), when exercising or under increased stress. For these people, short-term CO exposure further affects their body's already compromised ability to respond to the increased oxygen demands of exercise or exertion. [1]

CO also contributes to the formation of ground-level ozone.

### 2.1.2 LEAD

Lead is an element found naturally as well as in manufactured products. Historically lead was a gasoline additive to boost octane but leaded fuel has been banned by the EPA since 1996. Today, industrial processes involving lead (smelters, waste incinerators, and lead-acid battery manufacturers) are the

[1] U.S. EPA, 2014. Carbon Monoxide - Health. http://www.epa.gov/airquality/carbonmonoxide/health.html

greatest sources of lead emissions to the atmosphere. Lead is also found in older paint, dust, and soil.[2]

Once taken into the body, lead distributes throughout the body in the blood and is accumulated in the bones. Depending on the level of exposure, lead can adversely affect the nervous system, kidney function, immune system, reproductive and developmental systems and the cardiovascular system. Lead exposure also affects the oxygen carrying capacity of the blood. The lead effects most commonly encountered in current populations are neurological effects in children and cardiovascular effects (e.g., high blood pressure and heart disease) in adults. Infants and young children are especially sensitive to even low levels of lead, which may contribute to behavioral problems, learning deficits and lowered IQ.[3]

### 2.1.3 NITROGEN DIOXIDE

Nitrogen dioxide ($NO_2$) is one of a group of highly reactive gases known as "oxides of nitrogen," or "nitrogen oxides (NOx)." $NO_2$ forms quickly from emissions from cars, trucks and buses, power plants, and off-road equipment. In addition to contributing to the formation of ground-level ozone, and fine particle pollution, $NO_2$ is linked with a number of adverse effects on the respiratory system.4

Current scientific evidence links short-term $NO_2$ exposures, ranging from 30 minutes to 24 hours, with adverse respiratory effects including airway inflammation in healthy people and increased respiratory symptoms in people with asthma. Also, studies show a connection between breathing elevated short-

[2] U.S. EPA, 2014. Lead in Air. http://www.epa.gov/airquality/lead/index.html

[3] U.S. EPA, 2014. Lead in Air – Health. http://www.epa.gov/airquality/lead/health.html

[4] U.S. EPA, 2014. Nitrogen Dioxide. http://www.epa.gov/airquality/nitrogenoxides/index.html

term $NO_2$ concentrations, and increased visits to emergency departments and hospital admissions for respiratory issues, especially asthma.

$NO_2$ exposure concentrations near roadways are of particular concern for susceptible individuals, including people with asthma, children, and the elderly. NOx reacts with ammonia, moisture, and other compounds to form small particles. These small particles penetrate deeply into sensitive parts of the lungs and can cause or worsen respiratory disease, such as emphysema and bronchitis, and can aggravate existing heart disease, leading to increased hospital admissions and premature death.5

NOx emissions are also a primary component in the formation of ground-level ozone.

### 2.1.4 GROUND-LEVEL OZONE

Ozone ($O_3$) is a gas comprised of three oxygen atoms and is found throughout the atmosphere. At high altitudes 10 to 30 miles above sea level, it is considered a beneficial gas, since it occurs naturally, absorbing harmful ultraviolet rays and preventing them from reaching the earth. At ground level, however, it is considered a pollutant. It is not usually emitted directly, but is produced as a result of a chemical reaction between carbon monoxide (CO), oxides of nitrogen (NOx), and volatile organic compounds (VOCs), in the presence of sunlight.

Ground level ozone can trigger a variety of health problems including chest pain, coughing, throat irritation, and congestion. It can worsen bronchitis, emphysema, and asthma. Ground-level ozone also can reduce lung function and inflame the linings of the lungs. Repeated exposure may permanently scar lung tissue. [6].

[5] U.S. EPA, 2014. Nitrogen Dioxide - Health. http://www.epa.gov/airquality/nitrogenoxides/health.html

[6] U.S. EPA, 2015. Ground-level Ozone. http://www.epa.gov/airquality/ozonepollution/

### 2.1.5 PARTICULATE MATTER

"Particulate matter," also known as particle pollution or PM, is a complex mixture of extremely small particles and liquid droplets. Particle pollution is made up of a number of components, including acids (such as nitrates and sulfates), organic chemicals, metals, and soil or dust particles.

The size of particles is directly linked to their potential for causing health problems. EPA is concerned about particles that are 10 micrometers in diameter or smaller because those are the particles that generally pass through the throat and nose and enter the lungs. Once inhaled, these particles can affect the heart and lungs and cause serious health effects. EPA groups particle pollution into two categories:

"Inhalable coarse particles," such as those found near roadways and dusty industries, are larger than 2.5 micrometers and smaller than 10 micrometers in diameter.

"Fine particles," such as those found in smoke and haze, are 2.5 micrometers in diameter and smaller. These particles can be directly emitted from sources such as forest fires, or they can form when gases emitted from power plants, industries and automobiles react in the air.

Particle pollution - especially fine particles - contains microscopic solids or liquid droplets that are so small that they can get deep into the lungs and cause serious health problems. Numerous scientific studies have linked particle pollution exposure to a variety of problems, including:

- increased respiratory symptoms, such as irritation of the airways, coughing, or difficulty breathing, for example;
- decreased lung function;
- aggravated asthma;
- development of chronic bronchitis;

- irregular heartbeat;
- nonfatal heart attacks; and,
- premature death in people with heart or lung disease.

People with heart or lung diseases, children, and older adults are the most likely to be affected by particle pollution exposure. Even healthy people, however, may experience temporary symptoms from exposure to elevated levels of particle pollution.

Fine particles ($PM_{2.5}$) are also a major cause of reduced visibility (haze) in parts of the United States.

Particles can be carried over long distances by wind and then settle on ground or water. The effects of this settling include: making lakes and streams acidic; changing the nutrient balance in coastal waters and large river basins; depleting the nutrients in soil; damaging sensitive forests and farm crops; and affecting the diversity of ecosystems. Particle pollution can stain and damage stone and other materials, including culturally important objects such as statues and monuments. [7]

### 2.1.6 SULFUR DIOXIDE

Sulfur dioxide ($SO_2$) is one of a group of highly reactive gasses known as "oxides of sulfur." The largest sources of $SO_2$ emissions are from fossil fuel combustion at power plants (73%) and other industrial facilities (20%). Smaller sources of $SO_2$ emissions include industrial processes such as extracting metal from ore, and the burning of high sulfur containing fuels by locomotives, large ships, and non-road equipment. $SO_2$ is linked with a number of adverse effects on the respiratory system. [8]

[7] U.S. EPA. 2013. Particulate Matter – Health http://www.epa.gov/airquality/particlepollution/health.html

[8] U.S. EPA, 2015. Sulfur Dioxide. http://www.epa.gov/air/sulfurdioxide/

$SO_2$ is a contributor to an array of adverse respiratory effects including bronchoconstriction and increased asthma symptoms. These effects are particularly important for asthmatics at elevated ventilation rates (e.g., while exercising or playing). Studies also show a connection between short-term exposure and increased visits to emergency departments and hospital admissions for respiratory illnesses, particularly in at-risk populations including children, the elderly, and asthmatics.[9]

Sulfur oxides can react with other compounds in the atmosphere to form small particles. These particles penetrate deeply into sensitive parts of the lungs and can cause or worsen respiratory disease, such as emphysema and bronchitis, and can aggravate existing heart disease, leading to increased hospital admissions and premature death. [10]

Additionally, there are two other pollutants of concern in this analysis: Volatile Organic Compounds (VOCs) and Greenhouse Gases (GHG).

### 2.1.7 VOLATILE ORGANIC COMPOUNDS

Organic chemical compounds are everywhere in both indoor and outdoor environments because they have become essential ingredients in many products and materials. Outdoors, VOCs are volatized or released into the air mostly during manufacture or use of everyday products and materials, while indoors VOCs are mostly released into the air from the use of products and materials containing VOCs. VOCs are of concern as both indoor air pollutants and as outdoor air pollutants. However, the emphasis of that concern outdoors is different from indoors. The main concern indoors is the potential for VOCs to adversely impact the health of people that are exposed. While VOCs can also be

[9] U.S. EPA, 2015. Sulfur Dioxide – Health. http://www.epa.gov/airquality/sulfurdioxide/health.html

[10] U.S. EPA, 2015. Sulfur Dioxide – Health. http://www.epa.gov/airquality/sulfurdioxide/health.html

a health concern outdoors, EPA regulates VOCs outdoors mainly because of their ability to create photochemical smog under certain conditions.

In the United States, emissions of VOCs to the outdoors are regulated by EPA mostly to prevent the formation of ozone, a constituent of photochemical smog. Many VOCs form ground-level ozone by "reacting" with sources of oxygen molecules such as nitrogen oxides (NOx), and carbon monoxide (CO) in the atmosphere in the presence of sunlight. However, only some VOCs are considered "reactive" enough to be of concern. [11]

### 2.1.8 GREENHOUSE GASES

Gases that trap heat in the atmosphere are called greenhouse gases. These gases include Carbon dioxide (CO2), Methane (CH4), Nitrous oxide (N2O), and Fluorinated gases (hydrofluorocarbons, perfluorocarbons, sulfur hexafluoride, and nitrogen trifluoride).

Although these gases do not directly affect a person's health, they are believed to be responsible for global climate change. Over the past century, human activities have released large amounts of carbon dioxide and other greenhouse gases into the atmosphere. The majority of greenhouse gases come from burning fossil fuels to produce energy, although deforestation, industrial processes, and some agricultural practices also emit gases into the atmosphere.

Greenhouse gases act like a blanket around Earth, trapping energy in the atmosphere and causing it to warm. This phenomenon is called the greenhouse effect and is natural and necessary to support life on Earth. However, the buildup of greenhouse gases can change Earth's climate and result in dangerous effects to human health and welfare and to ecosystems.[12]

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[11] U.S. EPA, 2012, Volatile Organic Compounds (VOCs) Technical Overview, http://www.epa.gov/iaq/voc2.html

[12] U.S. EPA, 2014. Climate Change: Basic Information. http://www.epa.gov/climatechange/basics/

## 2.2 NATIONAL AMBIENT AIR QUALITY STANDARDS

The 1970 Clean Air Act was enacted by Congress to protect the health and welfare of the public from the adverse effects of air pollution. As required by the Clean Air Act, EPA has promulgated NAAQS for these criteria pollutants; nitrogen dioxide ($NO_2$), $SO_2$, PM ($PM_{10}$ and $PM_{2.5}$), CO, $O_3$, and lead (Pb). The NAAQS are listed in **Table 1**. The federal NAAQS are the applicable standards followed in Puerto Rico. There are no other standards specific only to Puerto Rico.

The NAAQS presented in Table 1 specify concentration levels for various averaging times. The NAAQS includes both "primary" and "secondary" standards. The primary standards are intended to protect human health; whereas, the secondary standards are intended to protect public welfare from any known or anticipated adverse effects associated with the presence of air pollutants, such as damage to vegetation. The more stringent of the primary or secondary standards were applied when comparing the modeling results.

A new 1-hour NO2 standard was promulgated on January 22, 2010 to protect public health, including the health of sensitive populations – people with asthma, children and the elderly. The final rule for the new hourly NO2 NAAQS was published in the Federal Register on February 9, 2010, and became effective on April 12, 2010. The form of this standard is the 3-year average of the 98th percentile of the daily maximum 1-hour concentrations.

A new 1-hour $SO_2$ standard was promulgated on June 2, 2010 to also protect public health, including the health of sensitive populations – people with asthma, children and the elderly. The final rule for the new hourly $SO_2$ NAAQS was published in the Federal Register on June 22, 2010, and became effective on August 23, 2010. The form of this standard is the 3-year average of the 99th percentile of the daily maximum 1-hour concentrations

## Table 1: National Ambient Air Quality Standards

| Pollutant | | Primary / Secondary | Averaging Time | Level | Form |
|---|---|---|---|---|---|
| Carbon Monoxide (CO) | | Primary | 8 hours | 9 ppm | Not to be exceeded more than once per year |
| | | | 1 hour | 35 ppm | |
| Lead (Pb) | | Primary and secondary | Rolling 3 month Average | 0.15 µg/m³ (a) | Not to be exceeded |
| Nitrogen Dioxide ($NO_2$) | | Primary | 1 hour | 100 ppb | 98th percentile of 1-hour daily maximum concentrations, averaged over 3 years |
| | | Primary and secondary | 1 year | 53 ppb (b) | Annual Mean |
| Ozone ($O_3$) | | Primary and secondary | 8 hours | 0.070 ppm (c) | Annual fourth-highest daily maximum 8-hour concentration, averaged over 3 years |
| Particle Pollution (PM) | $PM_{2.5}$ | Primary | 1 year | 12.0 µg/m³ | annual mean, averaged over 3 years |
| | | Secondary | 1 year | 15.0 µg/m³ | annual mean, averaged over 3 years |
| | | Primary and secondary | 24 hours | 35 µg/m³ | 98th percentile, averaged over 3 years |
| | $PM_{10}$ | Primary and secondary | 24 hours | 150 µg/m³ | Not to be exceeded more than once per year on average over 3 years |
| Sulfure Dioxide ($SO_2$) | | Primary | 1 hour | 75 ppb (d) | 99th percentile of 1-hour daily maximum concentrations, averaged over 3 years |
| | | Secondary | 3 hours | 0.5 ppm | Not to be exceeded more than once per year |

(a) In areas designated nonattainment for the Pb standards prior to the promulgation of the current (2008) standards, and for which implementation plans to attain or maintain the current (2008) standards have not been submitted and approved, the previous standards (1.5 µg/m3 as a calendar quarter average) also remain in effect.

(b) The level of the annual NO2 standard is 0.053 ppm. It is shown here in terms of ppb for the purposes of clearer comparison to the 1-hour standard level.

(c) Final rule signed October 1, 2015, and effective December 28, 2015. The previous (2008) O3 standards additionally remain in effect in some areas. Revocation of the previous (2008) O3 standards and transitioning to the current (2015) standards will be addressed in the implementation rule for the current standards.

(d) The previous SO2 standards (0.14 ppm 24-hour and 0.03 ppm annual) will additionally remain in effect in certain areas: (1) any area for which it is not yet 1 year since the effective date of designation under the current (2010) standards, and (2)any area for which an implementation plan providing for attainment of the current (2010) standard has not been submitted and approved and which is designated nonattainment under the previous SO2 standards or is not meeting the requirements of a SIP call under the previous SO2 standards (40 CFR 50.4(3)). A SIP call is an EPA action requiring a state to resubmit all or part of its State Implementation Plan to demonstrate attainment of the required NAAQS.

The NAAQS also reflect various durations of exposure. The short-term periods (24 hours or less) refer to exposure levels not to be exceeded more than once a year. Long-term periods refer to limits that cannot be exceeded for exposure averaged over three months or longer.

The inhalable particulate (PM10) NAAQS were promulgated on July 1, 1987 at the federal level with the intent of replacing the existing standards limiting ambient levels of Total Suspended Particulate (TSP). EPA also promulgated a new Fine Particulate (PM2.5) NAAQS effective December 2006 with an annual standard of 15 µg/m3 and the 24-hour standard of 35 µg/m3. The annual standard has since been strengthened to 12 µg/m3.

## 2.3 ATTAINMENT STATUS

Section 107 of the 1977 Clean Air Act Amendment requires that the USEPA publish a list of all geographic areas in compliance with the NAAQS, plus those not attaining the NAAQS. Areas not in NAAQS compliance are deemed non-attainment areas. Areas that have insufficient data to make a determination are deemed unclassified, and are treated as being attainment areas until proven otherwise. An area's designation is based on the data collected by the state monitoring network on a pollutant-by-pollutant basis. The attainment status for each pollutant is shown in **Table 2**.

## Table 2: San Germán Attainment Status

| Pollutant | | NAAQS | Primary / Secondary | Averaging Time | Date | Status |
|---|---|---|---|---|---|---|
| Carbon Monoxide (CO) | | | | | 11/15/1990 | Unclassifiable / Attainment |
| Lead (Pb) | | 2008 | | | 12/31/2011 | Unclassifiable / Attainment |
| Nitrogen Dioxide ($NO_2$) | | 1971 | | annual | | Cannot be classified or better than national standards |
| | | 2010 | | 1 hour | 1/29/2012 | Unclassifiable / Attainment |
| Ozone ($O_3$) | | 1997 | Primary and secondary | 8 hours | 6/15/2004 | Unclassifiable / Attainment |
| | | 2008 | Primary and secondary | 8 hours | 7/20/2012 | Unclassifiable / Attainment |
| | | 2015 | Primary and secondary | 8 hours | 1/16/2018 | Attainment / Unclassifiable |
| Particle Pollution (PM) | $PM_{2.5}$ | 1997 | Primary and secondary | annual | 4/5/2005 | Unclassifiable / Attainment |
| | | | | 24 hours | 4/5/2005 | Unclassifiable / Attainment |
| | | 2006 | Primary and secondary | 24 hours | 12/13/2009 | Unclassifiable / Attainment |
| | | 2012 | primary | annual | 4/15/2015 | Unclassifiable |
| | $PM_{10}$ | | | | 11/15/1990 | Unclassifiable |
| Sulfure Dioxide ($SO_2$) | | 1971 | Primary and secondary | | | Better than national standards |
| | | 2010 | Primary | | 4/9/2018 | Attainment / Unclassifiable |
| Source: 40 CFR **§** 81.355 (7–1–18 Edition) | | | | | | |

## 2.4 CONFORMITY

Section 176 (c) of the Clean Air Act requires that any entity of the federal government that engages in, supports, or in any way provides financial support for, licenses or permits, or approves any activity must demonstrate that the action conforms to the area's commitment of eliminating or reducing the severity and number of violations of the National Ambient Air Quality Standards (NAAQS) and achieving expeditious attainment of those standards.

Based on the attainment status of the project area and the results of the regional emissions analysis presented in Chapter 4, the proposed project is consistent with the objectives of the State Implementation Plan (SIP) and does not interfere with the region's ability to maintain compliance with the NAAQS.

# CHAPTER 3 : OVERVIEW OF THE STUDY AREA

The purpose of the proposed PR-122 Extension would provide a direct link between the Municipality of San Germán and the Municipality of Lajas. The project is approximately 2.7 kilometers long.

## 3.1 SOCIOECONOMIC PARAMETERS

The Municipality of San Germán is located in the southwestern region of Puerto Rico. It is bounded on the north by the Municipality of Mayagüez and the Municipality of Maricao, on the south by the Municipality of Lajas, on the west by the Municipality of Hormigueros and the Municipality of Cabo Rojo, and on the east by the Municipality of Sabana Grande. The municipality has a surface area of 54.42 square miles ($mi^2$) and consists of 19 wards. These are: Ancones, Caín Alto, Caín Bajo, Cotuí, Duey Alto, Duey Bajo, Guamá, Hoconuco Alto, Hoconuco Bajo, Meresuá, Minillas, Rosario Alto, Rosario Bajo, Rosario Peñón, Sabana Eneas, Sabana Grande Abajo, San Germán Pueblo, Tuna and Retiro. **Figure 2** shows the Municipality of San Germán and its 19 wards.

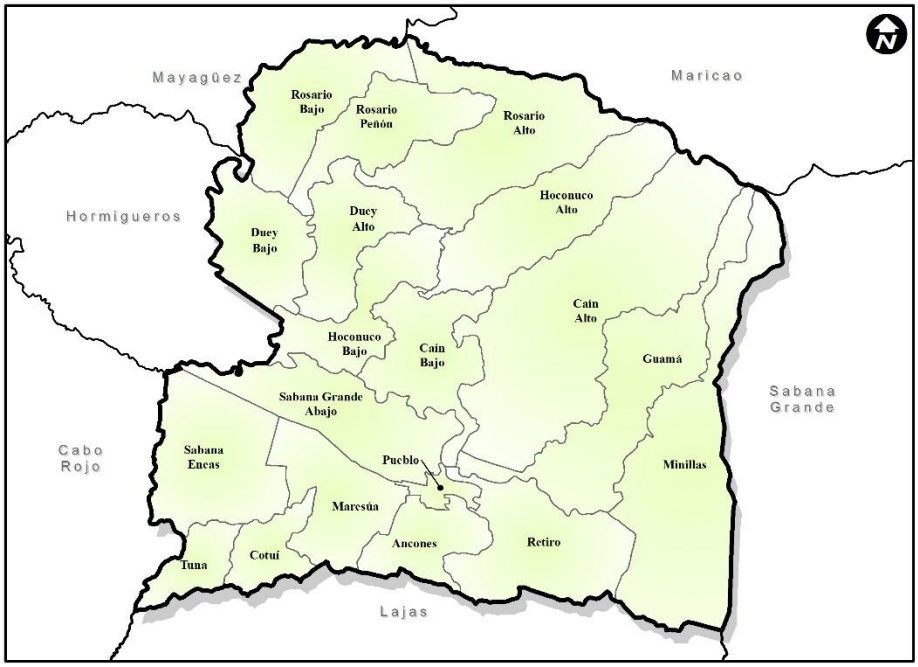



**Figure 2: Municipality of San Germán and Its Wards**

The Municipality of San Germán belongs to the region of the West Coast Plain. To the Northeast is the Central Mountain Range where the Cerro Gordo's Hills (883 mmsl of altitude) and Alto del Descanso (768 mmsl of altitude) are located. It is watered by the rivers Guanajibo, Cupeyes, Cain, Hoconuco and Nuevo Pasos.

According to the 2010 Census, San Germán has a population of 35,527 inhabitants, for a population density of 448 people per $mi^2$ of land area. For the 2018 Annual Estimates of the Resident Population the San Germán population was estimated in 30,229 inhabitants. For the decade from 2000-2010, like other municipalities on the Island, San Germán experienced a decline in population. For the 2010 Census, the Municipality had 1,578 less inhabitants than the 2000 Census. This is a reduction of 4.25%.

In the Municipality of San Germán, as well as for the whole island of Puerto Rico, the private car is the main means of transport used to reach employment centers and to perform daily activities. As shown in **Table 3**, most workers use private vehicles to get to their workplaces.

**Table 3: San Germán Select Means of Travel to Work**

| Car, Truck, or Van | | Public Transportation | Walked | Other Means | Worked at home | Total |
|---|---|---|---|---|---|---|
| Drove Alone | Carpooled | | | | | |
| 7,391 | 383 | 29 | 342 | 67 | 221 | 8,433 |
| Source: 2013-2017 ACS 5-Year Estimates | | | | | | |

According to the data from the US Census Bureau, there are approximately 15,689 housing units in the municipality of San Germán but only 11,922 are occupied. **Figure 3** shows the areas with the highest concentration of housing units throughout the municipality.

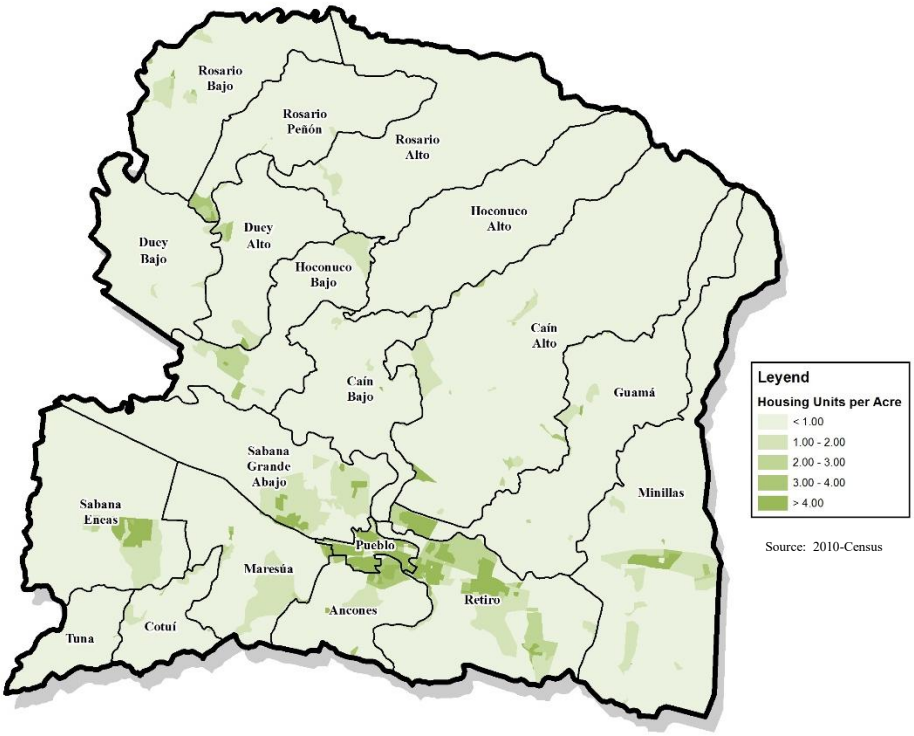



**Figure 3: High Housing Concentration Area through San Germán Municipality**

**Table 4** shows the occupied housing and those units that do not have motor vehicles as per the US Census Bureau's 2013-2017 ACS 5-Year Estimates. In general, private cars are the main means of transportation people use for everyday trips like: going to work, school, medical appointments, and other activities.

**Table 4: Vehicles Available per Housing Unit in San German**

| Total Housing Units | Occupied housing units | Vehicles Available | | | | |
|---|---|---|---|---|---|---|
| | | No vehicles | 1 vehicle | 2 vehicles | 3 vehicles | 4 or more vehicles |
| 15,689 | 11,922 | 2,344 | 5,068 | 3,214 | 980 | 316 |
| Source: 2013-2017 ACS 5-Year Estimates | | | | | | |

## 3.2 METEOROLOGY AND CLIMATOLOGY

Puerto Rico is the easternmost and smallest of the Greater Antilles and lies between 17°55' N and 18° 31' N latitude and 65° 37'W and 67° 17'W longitude. It is approximately 109 miles east to west and 40 miles north to south, with an overall area of approximately 3,400 square miles. San Germán is located on the southwest region at approximately 18°05' N latitude and 66° 02' W longitude.

Puerto Rico terrain is fairly rugged, rising from sea level to over 4,000 feet with the highest location of 4,359 feet at Cerro de Punta. This significant terrain difference produces rainfall patterns that are orographic, where moist ocean are is lifted over the higher terrain and cooled, producing clouds and rainfall typical of tropical islands. Therefore, rainfall patterns are varied, with areas receiving upwards of 170 inches annually. The San Germán area averages approximately 50 inches annually.

The entire island is in the path of the easterly trade winds (from the east). However, the land-sea breeze is also an influence in coastal areas. Average wind in the San Germán area is approximately 10 miles per hour (mph).

Due to its tropical island characteristics, temperatures in San Germán have a small seasonal variability range. Normal maximum temperatures are in the 87-92°F range while minimum temperatures are in the 62-71°F range. Humidity is typically near 80%.

Finally, Puerto Rico is subject to tropical hurricanes during typical hurricane season from June through November. These systems have the potential to produce winds well over 100 mph and over 10 inches of rainfall in a relatively short period, causing structural damage and localized flooding. The last hurricane to directly make landfall on Puerto Rico was Hugo (as a Category 3 on the Saffir-Simpson scale) in 1989, although hurricane Earl (also as a Category 3) in 2010 tracked close enough to produce 45 mph winds and over 3 inches of rainfall in San Juan. **Figure 4** shows the hurricane path near Puerto Rico since 1980.

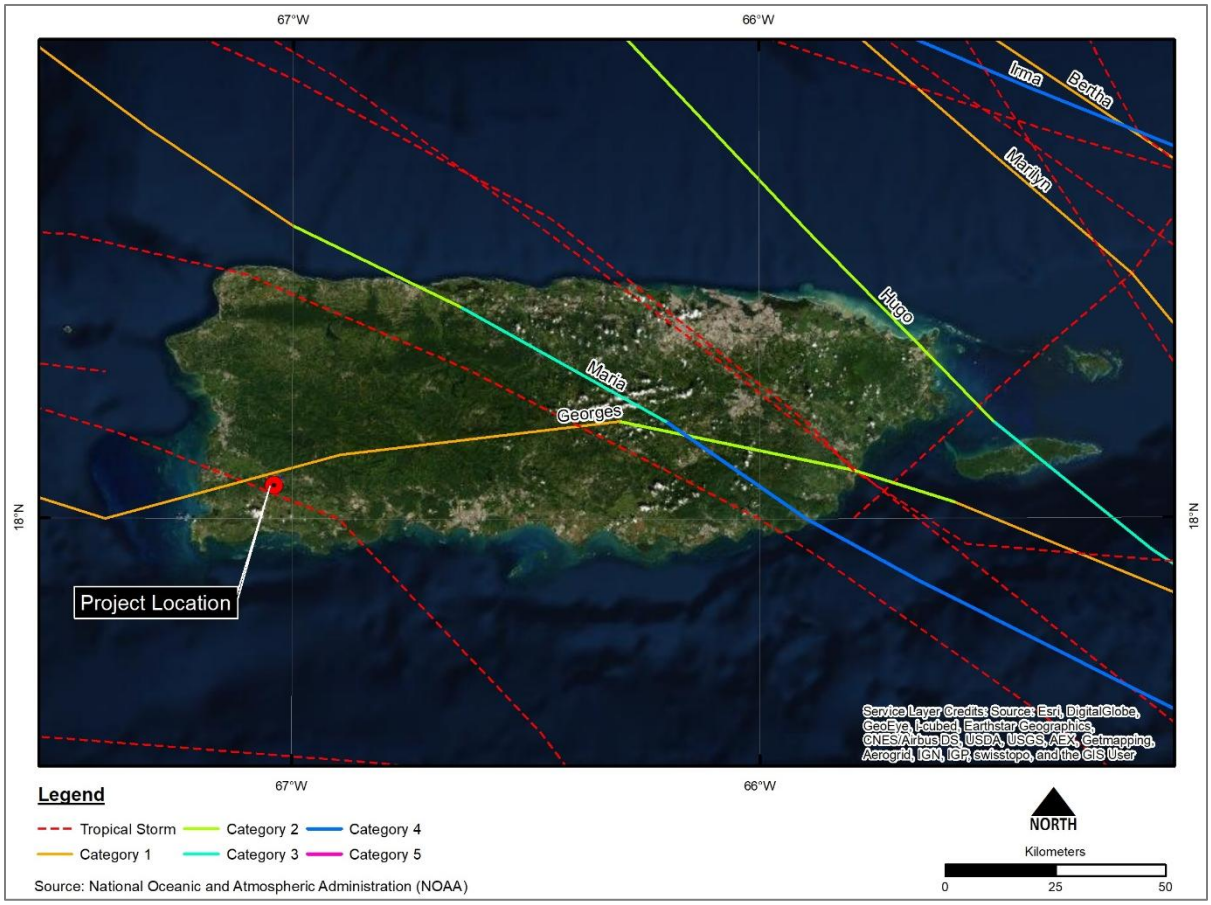



**Figure 4: Tropical Storm and Hurricane Paths Since 1980**

## 3.3 CRITERIA POLLUTANT AMBIENT AIR QUALITY DATA

To estimate pollutant levels representative of the area, the most recent data obtained from the EPA Air Data website was reviewed. Typically, the use of the latest three years of available monitoring data is representative of the project site. The closest most representative monitoring locations are the monitors in Ponce, Guayama, Arecibo, Cataño and Guaynabo. Location of the monitoring points is shown in **Figure 5**.

The ambient air quality data presented above indicates that monitored concentrations for the evaluated pollutants are generally below the applicable National Ambient Air Quality Standards (NAAQS), consistent with the attainment/unclassifiable designation

for the project area (see Table 2). Although some variability exists among monitoring locations and years, the overall air quality conditions in the region meet federal standards, supporting the conclusion that the study area is in compliance with the NAAQS.

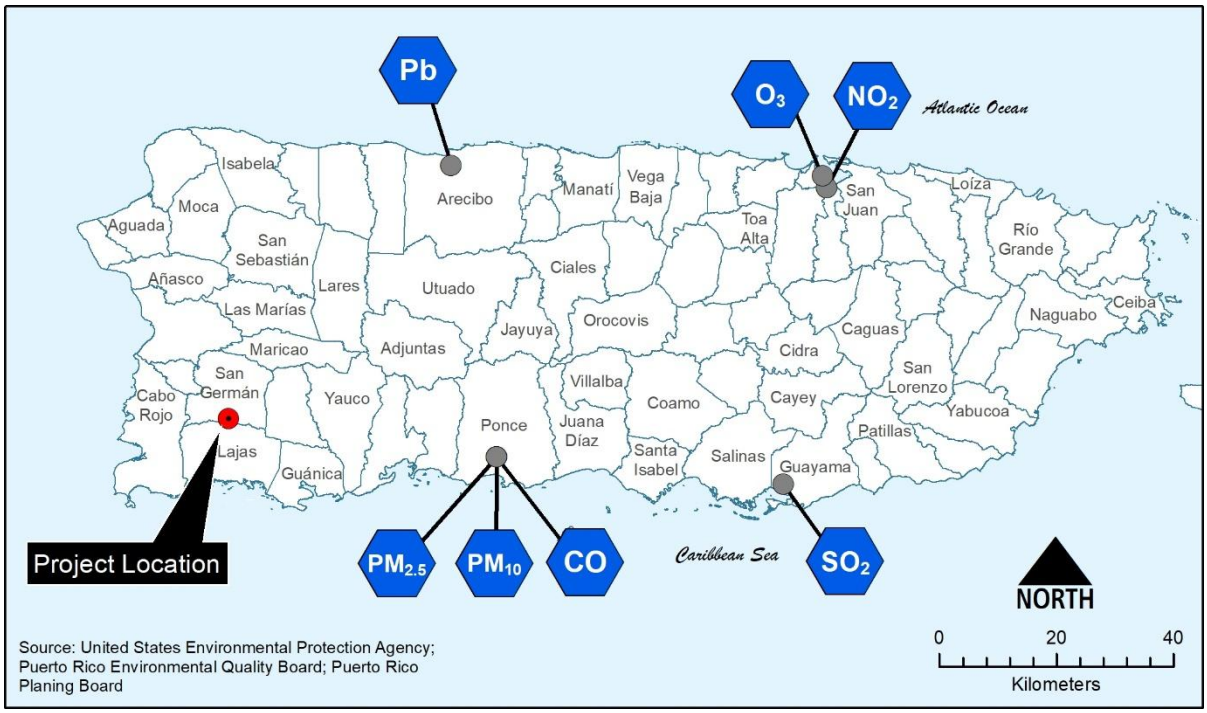



**Figure 5: Representative Air Quality Monitoring Locations**

A summary of the ambient air quality concentrations is presented in **Table 5**.

## Table 5: Observed Ambient Air Quality Concentrations

| Pollutant | Averaging Time | Form | 2017 | 2018 | 2019 | NAAQS (µg/m³) | County |
|---|---|---|---|---|---|---|---|
| CO [1] | 1-Hr | H2H | 12882 | 8664 | 1482 | 39900 | Ponce |
| | 8-Hr | H2H | 2508 | 1824 | 684 | 10260 | Ponce |
| Pb | 3-Mo [5] | H | 0.417 | 1.383 | 0.365 | 0.15 | Arecibo |
| $NO_2$ [2] | 1-Hr [6] | 98th % | 45.12 | 39.292 | 175.404 | 188 | Guaynabo |
| | Anual | AM | 18.9316 | 12.7276 | 27.542 | 99.64 | Guaynabo |
| $O_3$ [3] | 8-Hr [7] | H4H | 72.89 | 33.49 | 516.14 | 137.9 | Cataño |
| $PM_{2.5}$ | 24-Hr [8] | 98th % | 183.6 | 38.5 | 15 | 35 | Ponce |
| | Anual [9] | AM | 11.79 | 7.21 | 5.89 | 12 | Ponce |
| $PM_{10}$ | 24-Hr | H2H | 37 | 120 | 73 | 150 | Ponce |
| $SO_2$ [4] | 1-Hr | 99th % | 7.86 | 18.34 | 188.64 | 196.5 | Guayama |
| | 3-Hr | H2H | 7.86 | 18.34 | 55.02 | 1310 | Guayama |

Source: EPA Air Data Website (https://www.epa.gov/outdoor-air-quality-data)

[1] CO reported in ppm or ppb. Converted to µg/m³ using factor of 1 ppm = 1140 µg/m³.

[2] $NO_2$ reported in ppb. Converted to µg/m³ using factor of 1 ppb = 1.88 µg/m³.

[3] $O_3$ reported in ppm. Converted to µg/m³ using factor of 1 ppb = 1.97 µg/m³.

[4] $SO_2$ reported in ppb. Converted to µg/m³ using factor of 1 ppb = 2.62 µg/m³.

[5] The 3-month avg. statistic currently is not available from the AQS Data Mart. 4th Maximum 24-hour value used.

[6] Background level for 1-hour $NO_2$ is the average of the 98th percentile of the daily maximum 1-hour values over three years.

[7] Annual fourth-highest daily maximum 8-hr concentration, averaged over 3 years

[8] Background level for 24-hour PM-2.5 is the average concentration of the 98$^{th}$ percentile for three years.

[9] Background level for annual PM-2.5 is the average for three years.

# CHAPTER 4 : ENVIROMENTAL IMPACT OF THE PROPOSED PROJECT

An air quality analysis was conducted to determine the impact of pollutant emissions from mobile source activity related to the project. A regional emissions analysis is performed to determine whether and to what extent the project will increase the amount of pollutants in the area, as well as to determine if the project is consistent with the current State Implementation Plan (SIP).

The analysis was based on the existing and projected traffic data presented in the Traffic Study for the PR-122 Extension performed by BYA on August 24, 2018. The existing intersections traffic counts were collected on February 14, 15 and 16, and March 7, 2017.

## 4.1 PROPOSED PROJECT DESCRIPTION

The proposed action consists of extending the existing Highway PR-122 from its current intersection with highway PR-321 in Lajas until its intersection with the east end of highway PR-166 (South detour of San Germán), known as Casto Pérez Avenue. Continuing with the planning process conceptualized in 2003, this project intends to provide a road with greater capacity and better alignment to provide a fast and safe route to the current and future traffic volume. Completing this section of PR-122 to Lajas would have the effect of facilitating and improving the transport of goods, people and services between the town of Lajas and the PR-2 highway, thus fulfilling one of the main objectives of the project.

The proposed project is located within the Western Region of Puerto Rico; specifically between the towns of San Germán and Lajas. The alignment runs mostly parallel to Highway PR-101 and approximately one (1) kilometer (km) east of it, with a total length of 2.2 km and a minimum easement width of 33.5 meters (m.). The alignment passes

through El Retiro Community and an unnamed stream in San Germán and continues towards Lajas, crossing over Highway PR-321 at km 1.0.

## 4.2 EMISSIONS ANALYSES

Regional roadway emissions analysis is required to ensure that the proposed Project will not adversely impact the existing State Implementation Plan (SIP), which tracks how Puerto Rico intends to maintain compliance with the National Ambient Air Quality Standards (NAAQS) or plans for reductions in emissions to attain compliance in the future. The results of this analysis are evaluated in the context of attainment status, applicable regulatory requirements, and consistency with the National Ambient Air Quality Standards (NAAQS).

The analysis compares the future built condition to the no-action condition and, if emissions are greater for the build condition, evaluates reasonable and feasible mitigation measures. The pollutants of concern are carbon monoxide (CO), particulate matter (both $PM_{10}$ and $PM_{2.5}$), oxides of nitrogen ($NO_x$), and volatile organic compounds (VOC). Vehicular emissions of other pollutants ($SO_2$ and Pb) have significantly decreased over the past 40 years as a result of significant improvements in the internal combustion engine and the removal of sulfur and lead from petroleum fuels. Therefore, emissions of Pb and $SO_2$ are expected to be extremely low and are not presented. Emissions of carbon dioxide (as $CO_2$ equivalent), a greenhouse gas, are also estimated.

### 4.2.1 REGIONAL ROADWAY EMISSIONS ANALYSIS

A regional roadway analysis predicts the change in on-road vehicular emissions due to the project. The total vehicle pollutant burden was estimated from 2019 through 2040 based on the transportation analysis performed for the project.

The U.S. Environmental Protection Agency's (EPA's) MOVES computer program was used to estimate motor vehicle emission factors of $PM_{10}$, $PM_{2.5}$, VOC, CO, $CO_2$ e, and $NO_x$ on the roadway network. Emission factors derived from MOVES

are based on weekday conditions and default inputs for Puerto Rico – San Germán county area. EPA's age distribution worksheet was used to estimate age percentages for each year. Using vehicle count data, mileage between intersections, modeled signalized intersection delay times, and emission factors, daily and annual emission estimates were calculated. The links used in the no-action MOVES model are shown in **Figures 6 and 7** while the proposed condition links are shown in **Figures 8 and 9**. The links input data like length, volume, average speed and grade for the No Action and Proposed scenarios are included in **Appendices A** and **B**, respectively.

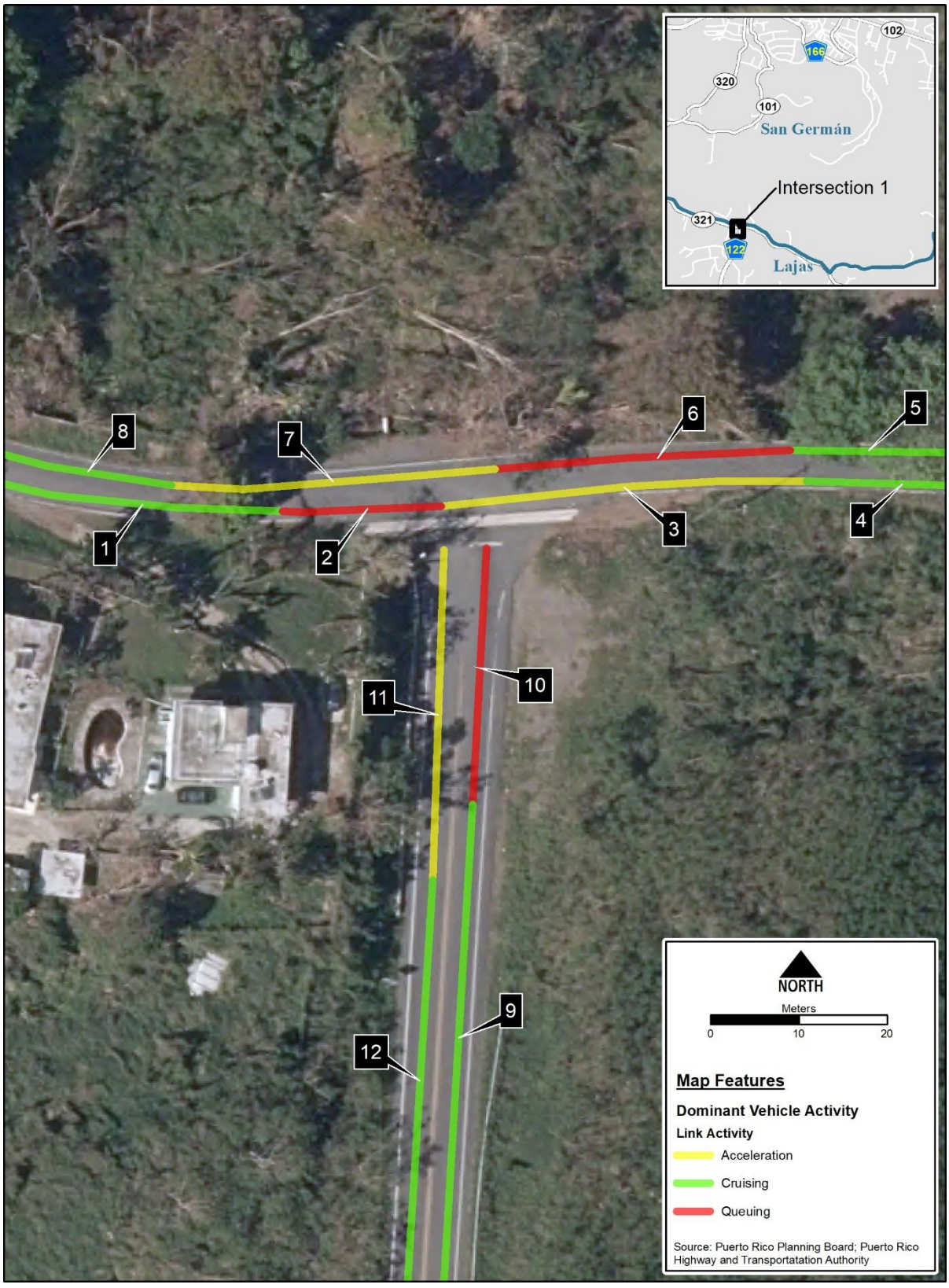



**Figure 6: Intersection 1 – Existing Condition**

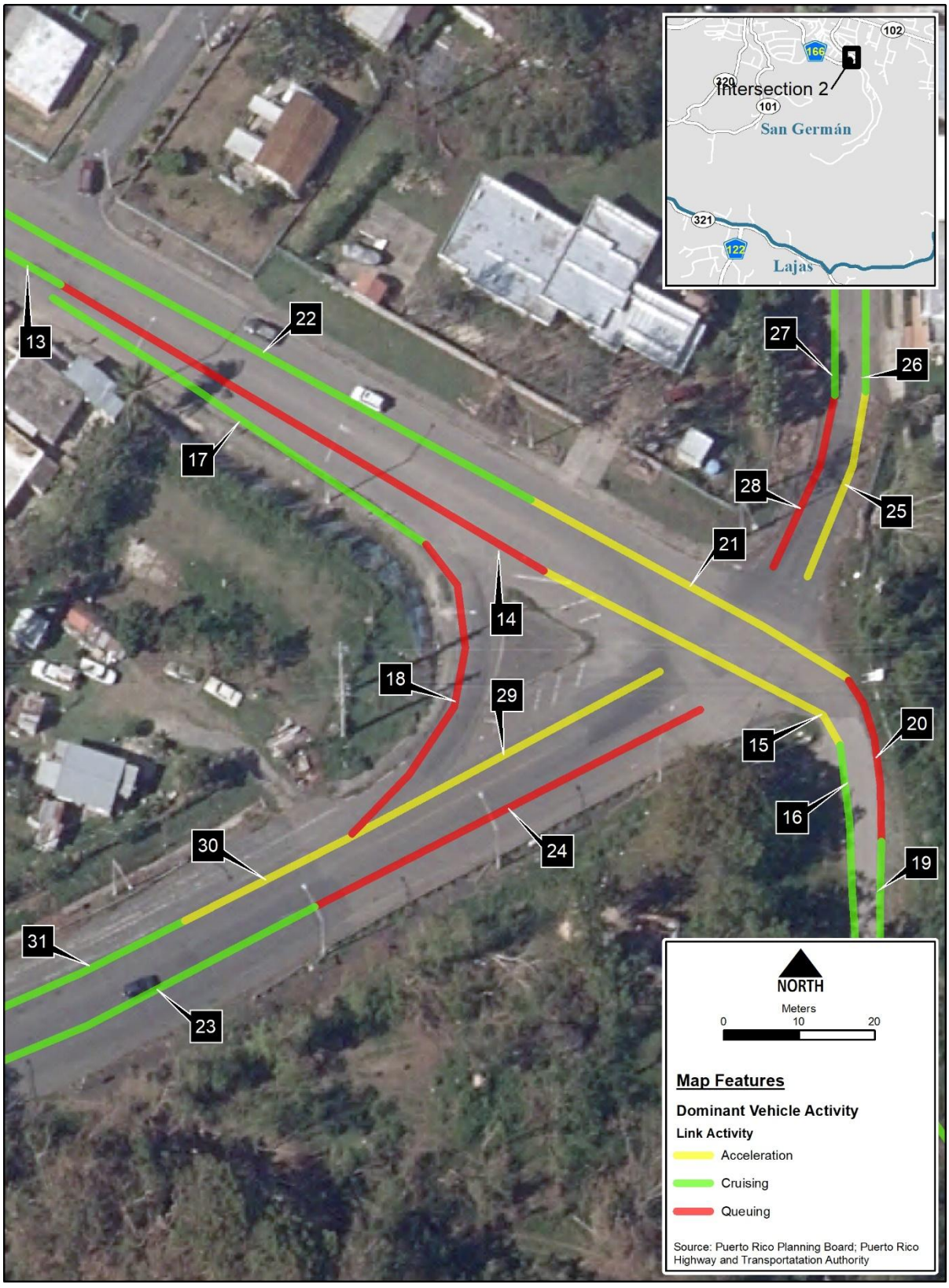



**Figure 7: Intersection 2 – Existing Condition**

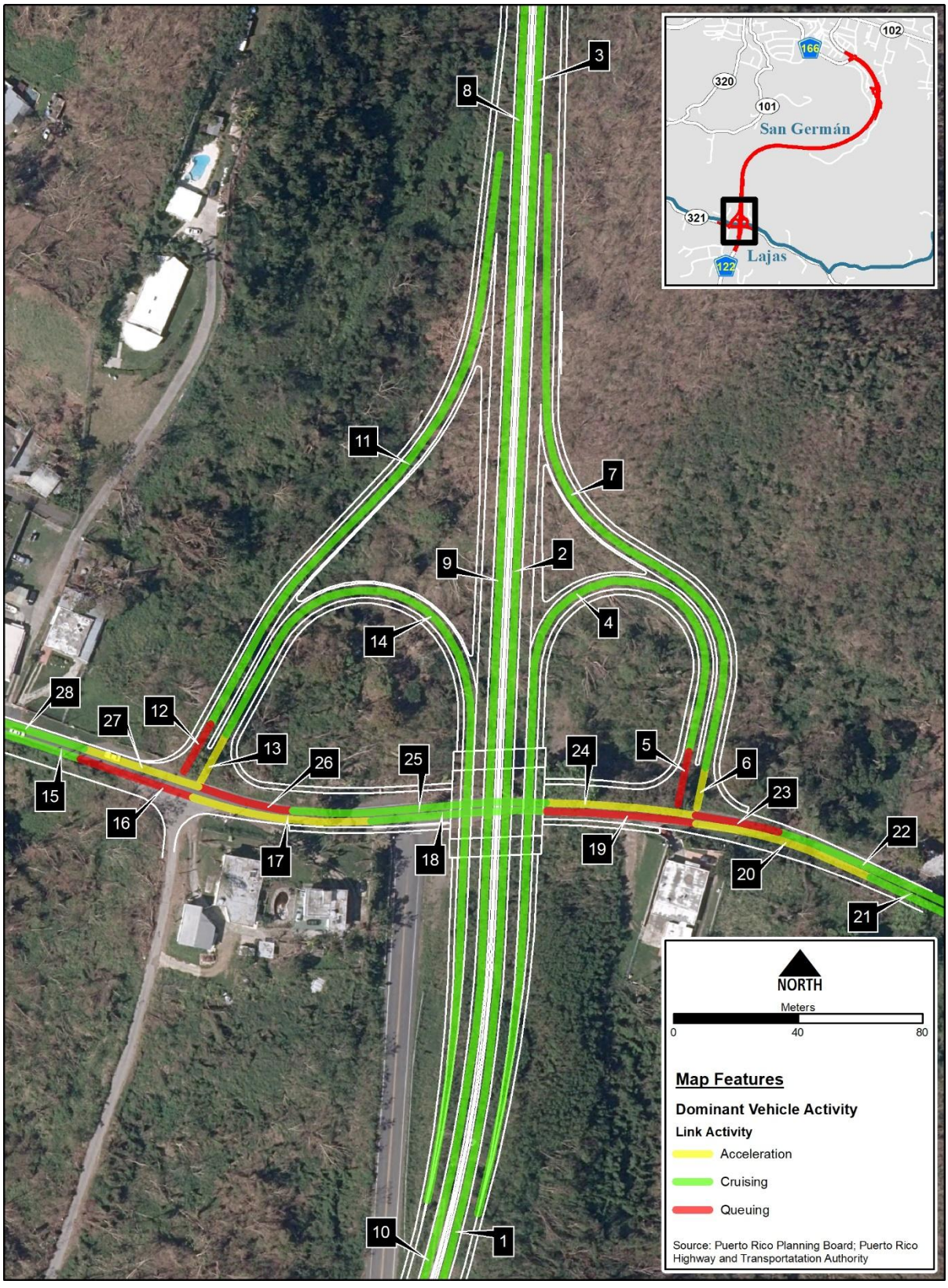



**Figure 8: Intersection 1 – Proposed Condition**

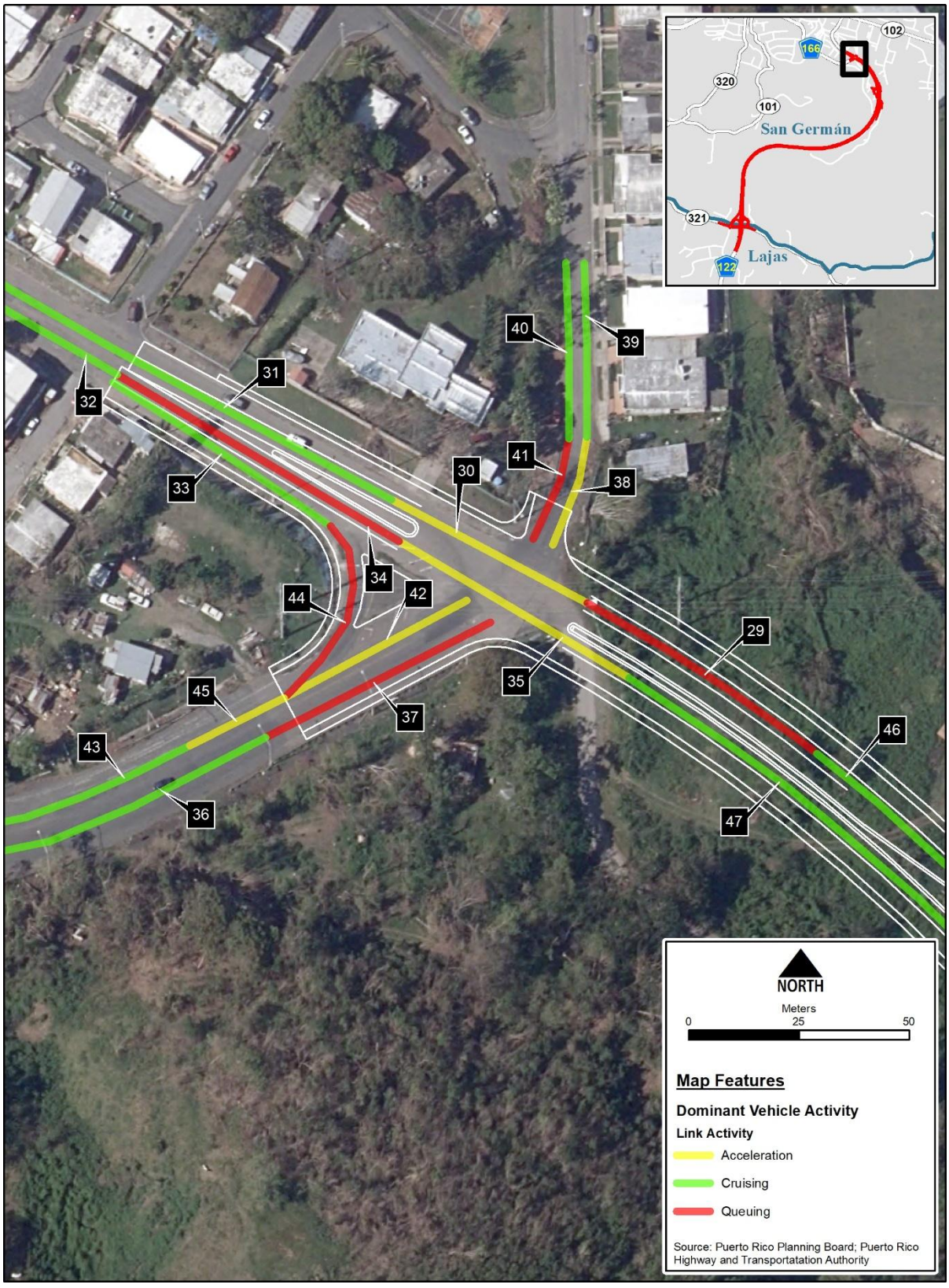



**Figure 9: Intersection 2 – Proposed Condition**

MOVES model results of the roadway emissions analysis are presented in **Table 6** through **Table 8**.

### Table 6: Roadway Vehicle Emissions (No Action Scenario)

| Emissions (TPY) | | | | | | |
|---|---|---|---|---|---|---|
| **Year** | **CO** | **$NO_X$** | **Total $PM_{10}$** | **Total $PM_{2.5}$** | **Total $CO_2$ e** | **VOC** |
| 2019 | 1.03 | 0.164 | 0.014 | 0.013 | 394.29 | 0.193 |
| 2020 | 0.861 | 0.145 | 0.014 | 0.012 | 389.652 | 0.173 |
| 2021 | 0.712 | 0.13 | 0.013 | 0.012 | 384.097 | 0.155 |
| 2022 | 0.593 | 0.118 | 0.013 | 0.012 | 378.492 | 0.142 |
| 2023 | 0.495 | 0.106 | 0.012 | 0.011 | 371.116 | 0.129 |
| 2024 | 0.416 | 0.096 | 0.012 | 0.011 | 364.07 | 0.118 |
| 2025 | 0.359 | 0.088 | 0.011 | 0.01 | 355.324 | 0.109 |
| 2026 | 0.315 | 0.08 | 0.011 | 0.01 | 348.217 | 0.101 |
| 2027 | 0.281 | 0.074 | 0.01 | 0.009 | 340.283 | 0.097 |
| 2028 | 0.254 | 0.067 | 0.01 | 0.009 | 334.681 | 0.093 |
| 2029 | 0.231 | 0.062 | 0.009 | 0.008 | 329.294 | 0.09 |
| 2030 | 0.212 | 0.056 | 0.008 | 0.008 | 325.296 | 0.088 |
| 2031 | 0.194 | 0.049 | 0.008 | 0.007 | 321.586 | 0.085 |
| 2032 | 0.182 | 0.043 | 0.007 | 0.006 | 318.955 | 0.085 |
| 2033 | 0.172 | 0.036 | 0.007 | 0.006 | 316.659 | 0.085 |
| 2034 | 0.164 | 0.034 | 0.006 | 0.006 | 315.319 | 0.085 |
| 2035 | 0.157 | 0.032 | 0.006 | 0.005 | 314.907 | 0.084 |
| 2036 | 0.151 | 0.029 | 0.005 | 0.005 | 314.868 | 0.084 |
| 2037 | 0.145 | 0.027 | 0.005 | 0.004 | 315.652 | 0.083 |
| 2038 | 0.142 | 0.025 | 0.005 | 0.004 | 317.226 | 0.083 |
| 2039 | 0.14 | 0.024 | 0.005 | 0.004 | 318.963 | 0.082 |
| 2040 | 0.139 | 0.023 | 0.005 | 0.004 | 321.85 | 0.082 |

## Table 7: Roadway Vehicle Emissions (Proposed Condition)

| Emissions (TPY) | | | | | | |
|---|---|---|---|---|---|---|
| Year | CO | $NO_X$ | Total $PM_{10}$ | Total $PM_{2.5}$ | Total $CO_2$ e | VOC |
| 2019 | 2.23 | 0.215 | 0.02 | 0.018 | 842.66 | 0.422 |
| 2020 | 1.853 | 0.181 | 0.019 | 0.017 | 830.62 | 0.377 |
| 2021 | 1.521 | 0.153 | 0.018 | 0.016 | 816.252 | 0.338 |
| 2022 | 1.256 | 0.129 | 0.017 | 0.016 | 800.659 | 0.307 |
| 2023 | 1.041 | 0.11 | 0.017 | 0.015 | 784.078 | 0.28 |
| 2024 | 0.865 | 0.094 | 0.016 | 0.015 | 765.268 | 0.255 |
| 2025 | 0.741 | 0.081 | 0.016 | 0.014 | 745.463 | 0.235 |
| 2026 | 0.642 | 0.07 | 0.015 | 0.013 | 726.769 | 0.217 |
| 2027 | 0.572 | 0.062 | 0.014 | 0.013 | 709.06 | 0.209 |
| 2028 | 0.516 | 0.059 | 0.014 | 0.012 | 695.608 | 0.202 |
| 2029 | 0.47 | 0.057 | 0.014 | 0.012 | 683.861 | 0.196 |
| 2030 | 0.431 | 0.054 | 0.013 | 0.012 | 673.768 | 0.192 |
| 2031 | 0.396 | 0.05 | 0.013 | 0.011 | 665.117 | 0.187 |
| 2032 | 0.374 | 0.047 | 0.012 | 0.011 | 658.801 | 0.188 |
| 2033 | 0.355 | 0.042 | 0.012 | 0.01 | 653.389 | 0.187 |
| 2034 | 0.339 | 0.041 | 0.011 | 0.01 | 649.674 | 0.187 |
| 2035 | 0.326 | 0.04 | 0.011 | 0.01 | 647.867 | 0.187 |
| 2036 | 0.315 | 0.039 | 0.01 | 0.009 | 647.592 | 0.186 |
| 2037 | 0.305 | 0.037 | 0.01 | 0.008 | 648.601 | 0.185 |
| 2038 | 0.298 | 0.036 | 0.009 | 0.008 | 651.023 | 0.183 |
| 2039 | 0.294 | 0.035 | 0.009 | 0.008 | 654.882 | 0.183 |
| 2040 | 0.291 | 0.035 | 0.01 | 0.008 | 659.808 | 0.182 |

## Table 8: Roadway Vehicle Emissions Difference

| Emissions (TPY) | | | | | | |
|---|---|---|---|---|---|---|
| Year | CO | $NO_X$ | Total $PM_{10}$ | Total $PM_{2.5}$ | Total $CO_2$ e | VOC |
| 2019 | 1.2 | 0.051 | 0.006 | 0.005 | 448.37 | 0.229 |
| 2020 | 0.992 | 0.036 | 0.005 | 0.005 | 440.968 | 0.204 |
| 2021 | 0.809 | 0.023 | 0.005 | 0.004 | 432.155 | 0.183 |
| 2022 | 0.663 | 0.011 | 0.004 | 0.004 | 422.167 | 0.165 |
| 2023 | 0.546 | 0.004 | 0.005 | 0.004 | 412.962 | 0.151 |
| 2024 | 0.449 | -0.002 | 0.004 | 0.004 | 401.198 | 0.137 |
| 2025 | 0.382 | -0.007 | 0.005 | 0.004 | 390.139 | 0.126 |
| 2026 | 0.327 | -0.01 | 0.004 | 0.003 | 378.552 | 0.116 |
| 2027 | 0.291 | -0.012 | 0.004 | 0.004 | 368.777 | 0.112 |
| 2028 | 0.262 | -0.008 | 0.004 | 0.003 | 360.927 | 0.109 |
| 2029 | 0.239 | -0.005 | 0.005 | 0.004 | 354.567 | 0.106 |
| 2030 | 0.219 | -0.002 | 0.005 | 0.004 | 348.472 | 0.104 |
| 2031 | 0.202 | 0.001 | 0.005 | 0.004 | 343.531 | 0.102 |
| 2032 | 0.192 | 0.004 | 0.005 | 0.005 | 339.846 | 0.103 |
| 2033 | 0.183 | 0.006 | 0.005 | 0.004 | 336.73 | 0.102 |
| 2034 | 0.175 | 0.007 | 0.005 | 0.004 | 334.355 | 0.102 |
| 2035 | 0.169 | 0.008 | 0.005 | 0.005 | 332.96 | 0.103 |
| 2036 | 0.164 | 0.01 | 0.005 | 0.004 | 332.724 | 0.102 |
| 2037 | 0.16 | 0.01 | 0.005 | 0.004 | 332.949 | 0.102 |
| 2038 | 0.156 | 0.011 | 0.004 | 0.004 | 333.797 | 0.1 |
| 2039 | 0.154 | 0.011 | 0.004 | 0.004 | 335.919 | 0.101 |
| 2040 | 0.152 | 0.012 | 0.005 | 0.004 | 337.958 | 0.1 |

**Appendices C** and **D** include the detailed results and calculations of the No Action and Proposed scenario, respectively.

### 4.2.2 Discussion of Results and Compliance with Air Quality Standards

The results of the regional emissions analysis indicate that emissions of all evaluated pollutants increase under the Build condition compared to the No-Action condition, particularly during the early years of operation (2019–2025), due to increased traffic activity associated with the new roadway. Over time, emissions for most pollutants decrease as a result of improvements in vehicle technology, more stringent fuel standards, and fleet turnover, consistent with U.S. Environmental Protection Agency (EPA) projections incorporated in the MOVES model.

It is important to note that the analysis presented herein is a regional emissions analysis, which estimates total pollutant emissions (in tons per year) from mobile sources. These emissions estimates do not directly represent ambient air pollutant concentrations, which are the basis of the National Ambient Air Quality Standards (NAAQS). The NAAQS are expressed as pollutant concentrations (e.g., $\mu g/m^3$ or ppm), while the emissions analysis quantifies total mass emissions. Therefore, increases in emissions do not directly translate into violations of the NAAQS; instead, compliance is evaluated within the broader regulatory framework, including attainment status, existing ambient air quality conditions, and consistency with applicable air quality plans.

In attainment areas, increases in emissions from transportation projects are considered acceptable under federal regulations provided that they do not interfere with the maintenance of the NAAQS or conflict with the applicable State Implementation Plan (SIP).

According to EPA designations (see Table 2), the project area is classified as attainment/unclassifiable for all criteria pollutants. This conclusion is supported by the ambient air quality data presented in Section 3.3 (Table 5), which indicate that monitored pollutant concentrations are generally below the applicable NAAQS. The incremental increases in emissions identified under the Build

condition are relatively small in magnitude and occur within an area that is currently meeting federal air quality standards. Additionally, long-term emission trends show overall reductions due to regulatory controls and fleet improvements.

Consistent with Clean Air Act requirements, the regional emissions analysis demonstrates that the proposed action does not conflict with the goals of the applicable State Implementation Plan (SIP), which establishes the framework for maintaining compliance with the NAAQS. The project does not introduce conditions that would be expected to cause or contribute to a violation of any air quality standard.

Based on the results of the emissions analysis, the attainment status of the project area, and the existing ambient air quality conditions, the proposed PR-122 Extension Project is not expected to cause or contribute to any violation of the NAAQS, increase the frequency or severity of any existing violation, or delay timely attainment or maintenance of the standards. Therefore, the project is consistent with federal air quality requirements and regional air quality planning objectives.

# APPENDIX 4:

## RADON - Memorandum to File and Supporting documentation,

## ECHO Reports,
## Asbestos Containing Materials and Lead Based Paint Report

DEPARTMENT OF
HOUSING
GOVERNMENT OF PUERTO RICO

CDBG-DR FUNDS
CDBG-MIT FUNDS

**Memorandum to File**

**Date:** December 5, 2025



**From:** Yazmin M Acevedo Ortiz
Senior Environmental Specialist
Behar Ybarra & Associates LLC
CDBG-MIT Program
INFRASTRUCTURE Mitigation Program
Puerto Rico Department of Housing

**Application Number:** PR-INFRA-0004
**Project:** PR-122 Lajas-San German Connector

**Re: Justification for the Infeasibility and Impracticability of Radon Testing**

After reviewing Application Number PR-INFRA-0004 under the INFRASTRUCTURE Mitigation Program, administered by the Puerto Rico Department of Housing (**PRDOH**), to complete the property's contamination analysis in accordance with 24 C.F.R. § 50.3(i) and 24 C.F.R. § 58.5(i), we have determined that testing the property's radon levels is infeasible and impracticable.

Per the U.S. Department of Housing and Urban Development's (**HUD**) CPD Notice 23-103, the recommended best practices and alternative options for radon testing are infeasible and impracticable in this case due to the following reasons:

- As required by the CPD Notice 23-103, the scientific data reviewed in lieu of testing must consist of a minimum of ten documented test results over the previous ten years. If there are less than ten documented results over this period, it is understood that there is a lack of scientific data. The latest report

for radon testing in Puerto Rico was prepared in 1995 by the U.S. Department of the Interior in Cooperation with the U.S. Environmental Protection Agency. No other completed studies and reports on radon testing are available in Puerto Rico.

- There is no available science-based or state-generated information for Puerto Rico for the last ten years that can be used to determine whether the project site is in a high-risk area. The Department of Health and Human Services, Centers for Disease Control and Prevention (**CDC**), National Environmental Public Health Tracking, and Radon Testing map do not include Puerto Rico data.

- There are only two (2) licensed professionals in Puerto Rico who can conduct radon testing using the American National Standards Institute/American Association of Radon Scientists and Technologists (**ANSI/AARST**) testing standards, which makes it difficult, time-consuming, and highly expensive to coordinate and secure a site visit for the contamination evaluation.

- Do-it-yourself (**DIY**) radon test kits are known to be unreliable in assuring and controlling the quality of the test results; they are not readily available in Puerto Rico, and the cost and time required for purchasing and sending them for analysis are unreasonable when weighed against the results' reliability and the need for prompt results.

- Local authorities in Puerto Rico do not have the specialized radon monitoring equipment or trained staff needed to conduct the radon testing analysis and ensure proper quality control and quality assurance practices are adhered to. We also do not have a radiation laboratory certified for radon testing.

- Local authorities in Puerto Rico do not have the specialized radon monitoring equipment or trained staff needed to conduct the radon testing analysis and ensure proper quality control and quality assurance practices are adhered to. We also do not have a radiation laboratory certified for radon testing.

As part of the evaluation for this determination, PRDOH sent information requests to six (6) local agencies at the state and federal levels. We received responses from the following agencies:

- United States Geological Survey;
- Centers for Disease Control and Prevention;
- Puerto Rico Department of Health; and
- United States Environmental Protection Agency.

The agencies mentioned above confirmed the lack of scientific data on Radon testing for Puerto Rico and the technical difficulties that we face to comply with HUD's Radon testing requirement. For the above-mentioned reasons, Radon testing is infeasible and impracticable for this property, and no further consideration of Radon is needed for the environmental review.

# ECHO Reports

# Detailed Facility Report

Facility Summary

**AC-010118 PAV REH SAFETY IMPROV PR 101 KM 0.0 @ 10.0 SAN GERMAN**

**CARRETERA PR-101 KM 0.0 TO KM 10.0, SAN GERMAN, PR 00683**

**FRS (Facility Registry Service) ID:** 110071709513

**EPA Region:** 02

**Latitude:** 18.0756

**Longitude:** -67.0415

**Locational Data Source:** NPDES

**Industries:** --

**Indian Country:** N

## Enforcement and Compliance Summary

| Statute | CWA |
|---|---|
| Compliance Monitoring Activities (5 years) | -- |
| Date of Last Compliance Monitoring Activity | -- |
| Compliance Status | No Violation Identified |
| Qtrs in Noncompliance (of 12) | 0 |
| Qtrs with Significant Violation | 0 |
| Informal Enforcement Actions (5 years) | -- |
| Formal Enforcement Actions (5 years) | -- |
| Penalties from Formal Enforcement Actions (5 years) | -- |
| EPA Cases (5 years) | -- |
| Penalties from EPA Cases (5 years) | -- |

## Regulatory Information

**Clean Air Act (CAA):** No Information

**Clean Water Act (CWA):** Non-Major, Permit Effective (PRR1000JA)

**Resource Conservation and Recovery Act (RCRA):** No Information

**Safe Drinking Water Act (SDWA):** No Information

## Other Regulatory Reports

**Air Emissions Inventory (EIS):** No Information

**Greenhouse Gas Emissions (eGGRT):** No Information

**Toxic Releases (TRI):** No Information

**Compliance and Emissions Data Reporting Interface (CEDRI):** No Information

Go To Enforcement/Compliance Details

Known Data Problems <https://epa.gov/resources/echo-data/known-data-problems>

Facility/System Characteristics

## Facility/System Characteristics

| System | Statute | Identifier | Universe | Status | Areas | Permit Expiration Date | Indian Country | Latitude | Longitude |
|---|---|---|---|---|---|---|---|---|---|
| FRS | | 110071709513 | | | | | N | 18.0756 | -67.0415 |
| ICIS-NPDES | CWA | PRR1000JA | Non-Major: General Permit Covered Facility | Effective | Construction Stormwater | 02/16/2027 | N | 18.0756 | -67.0415 |

## Facility Address

| System | Statute | Identifier | Facility Name | Facility Address | Facility County |
|---|---|---|---|---|---|
| FRS | | 110071709513 | AC-010118 PAV REH SAFETY IMPROV PR 101 KM 0.0 @ 10.0 SAN GERMAN | CARRETERA PR-101 KM 0.0 TO KM 10.0, SAN GERMAN, PR 00683 | |
| ICIS-NPDES | CWA | PRR1000JA | AC-010118 PAV REH SAFETY IMPROV PR 101 KM 0.0 @ 10.0 SAN GERMAN | CARRETERA PR-101 KM 0.0 TO KM 10.0, SAN GERMAN, PR 00683 | |

## Facility SIC (Standard Industrial Classification) Codes

| System | Identifier | SIC Code | SIC Description |
|---|---|---|---|

No data records returned

## Facility NAICS (North American Industry Classification System) Codes

| System | Identifier | NAICS Code | NAICS Description |
|---|---|---|---|

No data records returned

## Facility Industrial Effluent Guidelines

| Identifier | Effluent Guideline (40 CFR Part) | Effluent Guideline Description |
|---|---|---|
| No data records returned | | |

## Facility Tribe Information

| Reservation Name | Tribe Name | EPA Tribal ID | Distance to Tribe (miles) |
|---|---|---|---|
| No data records returned | | | |

Enforcement and Compliance

## Compliance Monitoring History

Last 5 Years

| Statute | Source ID | System | Activity Type | Compliance Monitoring Type | Lead Agency | Date | Finding (if applicable) |
|---|---|---|---|---|---|---|---|
| No data records returned | | | | | | | |

*Entries in italics are not included in ECHO's Compliance Monitoring Activity counts because they are not compliance monitoring strategy* <https://www.epa.gov/compliance/compliance-monitoring-programs> *activities or because they are not counted as inspections within EPA's Annual Results* <https://www.epa.gov/enforcement/enforcement-data-and-results>.

## Compliance Summary Data

| Statute | Source ID | Current SNC (Significant Noncompliance)/HPV (High Priority Violation) | Current As Of | Qtrs with NC (Noncompliance) (of 12) | Data Last Refreshed |
|---|---|---|---|---|---|
| CWA | PRR1000JA | No | 06/30/2025 | 0 | 11/28/2025 |

## Three-Year Compliance History by Quarter

| Statute | Program/ Pollutant/ Violation Type | QTR 1 | QTR 2 | QTR 3 | QTR 4 | QTR 5 | QTR 6 | QTR 7 | QTR 8 | QTR 9 | QTR 10 | QTR 11 | QTR 12 | QTR 13+ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CWA (Source ID: PRR1000JA) | | 07/01-09/30/22 | 10/01-12/31/22 | 01/01-03/31/23 | 04/01-06/30/23 | 07/01-09/30/23 | 10/01-12/31/23 | 01/01-03/31/24 | 04/01-06/30/24 | 07/01-09/30/24 | 10/01-12/31/24 | 01/01-03/31/25 | 04/01-06/30/25 | 07/01-11/28/25 |
| | Facility-Level Status | No Violation Identified | No Violation Identified | No Violation Identified | No Violation Identified | No Violation Identified | No Violation Identified | No Violation Identified | No Violation Identified | No Violation Identified | No Violation Identified | No Violation Identified | No Violation Identified | Undetermined |
| | Quarterly Noncompliance Report History | | | | | | | | | | | | | |

## Informal Enforcement Actions

Last 5 Years

| Statute | System | Source ID | Type of Action | Lead Agency | Date |
|---|---|---|---|---|---|
| No data records returned | | | | | |

*Entries in italics are not counted as "informal enforcement actions" in EPA policies pertaining to enforcement response tools.*

## Formal Enforcement Actions

Last 5 Years

| Statute | System | Law/ Section | Source ID | Type of Action | Case No. | Lead Agency | Case Name | Issued/ Filed Date | Settlements/ Actions | Settlement/ Action Date | Federal Penalty Assessed | State/ Local Penalty Assessed | Penalty Amount Collected | SEP Value | Comp Action Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| No data records returned | | | | | | | | | | | | | | | |

Environmental Conditions

## Watersheds

| 12-Digit WBD (Watershed Boundary Dataset) HUC (RAD (Reach Address Database)) | WBD (Watershed Boundary Dataset) Subwatershed Name (RAD (Reach Address Database)) | State Water Body Name (ICIS (Integrated Compliance Information System)) | Beach Closures Within Last Year | Beach Closures Within Last Two Years | Pollutants Potentially Related to Impairment | Watershed with ESA (Endangered Species Act)-listed Aquatic Species? |
|---|---|---|---|---|---|---|
| 210100030409 | Rio Guanajibo at mouth | RIVER | No | No | -- | No |

## Assessed Waters From Latest State Submission (ATTAINS)

| State | Report Cycle | Assessment Unit ID | Assessment Unit Name | Water Condition | Cause Groups Impaired | Drinking Water Use | Ecological Use | Fish Consumption Use | Recreation Use | Other Use |
|---|---|---|---|---|---|---|---|---|---|---|
| PR | 2024 | PRWR77A | RIO GUANAJIBO | Impaired - 303(d) Listed - With Restoration Plan | METALS (OTHER THAN MERCURY) \| NUTRIENTS \| ORGANIC ENRICHMENT/OXYGEN DEPLETION \| PATHOGENS \| TOXIC INORGANICS \| TURBIDITY | Not Supporting | Not Supporting | -- | Not Supporting | -- |

## Air Quality Nonattainment Areas

| Pollutant | Within Nonattainment Status Area? | Nonattainment Status Applicable Standard(s) | Within Maintenance Status Area? | Maintenance Status Applicable Standard(s) |
|---|---|---|---|---|
| No data records returned | | | | |

Pollutants

## Toxics Release Inventory History of Reported Chemicals Released or Transferred in Pounds per Year at Site

| TRI Facility ID | Year | Air Emissions | Surface Water Discharges | Off-Site Transfers to POTWs (Publicly Owned Treatment Works) | Underground Injections | Disposal to Land | Total On-Site Releases | Total Off-Site Transfers |
|---|---|---|---|---|---|---|---|---|
| No data records returned | | | | | | | | |

## Toxics Release Inventory Total Releases and Transfers in Pounds by Chemical and Year

| Chemical Name |
|---|
| No data records returned |

## CWA (Clean Water Act) Discharge Monitoring Report (DMR) Pollutant Loadings

DMR and TRI Multi-Year Loading Report

| NPDES ID | Description |
|---|---|
| No data records returned | |

Community

## Demographic Profile of Surrounding Area (1-Mile Radius)

This section provides demographic information regarding the community surrounding the facility. ECHO compliance data alone are not sufficient to determine whether violations at a particular facility had negative impacts on public health or the environment. Statistics are based upon the 2023 American Community Survey (ACS) 5-year Summary and are accurate to the extent that the facility latitude and longitude listed below are correct. Census boundaries and demographic data for U.S. Territories are based on the "2020 Island Areas Demographic Profiles" from the U.S. Census Bureau. EPA's spatial processing methodology considers the overlap between the selected radii and ACS census block groups in determining the demographics surrounding the facility. For more detail about this methodology, see the DFR Data Dictionary <https://epa.gov/help/reports/dfr-data-dictionary#demographic>.

| General Statistics (ACS (American Community Survey)) | |
|---|---|
| Total Persons | 4,963 |
| Population Density | 1,581/sq.mi. |
| Housing Units in Area | 3,694 |
| Percent People of Color | 96% |
| Households in Area | 2,560 |
| Households on Public Assistance | 109 |
| Persons With Low Income | 2,326 |
| Percent With Low Income | 47% |

| Geography | |
|---|---|
| Radius of Selected Area | 1 mi. |
| Center Latitude | 18.0756 |
| Center Longitude | -67.0415 |
| Total Area | 3.14 sq.mi. |
| Land Area | 100% |
| Water Area | 0% |

| Income Breakdown (ACS (American Community Survey)) - Households (%) | |
|---|---|
| Less than $15,000 | 480 (18.75%) |
| $15,000 - $25,000 | 349 (13.63%) |
| $25,000 - $50,000 | 630 (24.61%) |
| $50,000 - $75,000 | 228 (8.91%) |
| Greater than $75,000 | 873 (34.1%) |

| Age Breakdown (ACS (American Community Survey)) - Persons (%) | |
|---|---|
| Children 5 years and younger | 129 (3%) |
| Minors 17 years and younger | 417 (8%) |
| Adults 18 years and older | 4,545 (92%) |
| Seniors 65 years and older | 1,428 (29%) |

| Race Breakdown (ACS (American Community Survey)) - Persons (%) | |
|---|---|
| White | 1,659 (33%) |
| African-American | 620 (12%) |
| Hispanic-Origin | 4,639 (93%) |
| Asian | 33 (1%) |
| Hawaiian/Pacific Islander | 0 (0%) |
| American Indian | 4 (0%) |
| Other/Multiracial | 853 (17%) |

| Education Level (Persons 25 & older) (ACS (American Community Survey)) - Persons (%) | |
|---|---|
| Less than 9th Grade | 177 (4.23%) |
| 9th through 12th Grade | 154 (3.68%) |
| High School Diploma | 453 (10.82%) |
| Some College/2-year | 322 (7.69%) |
| B.S./B.A. (Bachelor of Science/Bachelor of Arts) or More | 2,744 (65.57%) |

# Detailed Facility Report

Facility Summary

**GE INDUSTRIAL OF PR, LLC (CARIBE GE)**

**EL RETIRO INDUSTRIAL PARK ST B, SAN GERMAN, PR 00683**

**FRS (Facility Registry Service) ID:** 110007807150

**EPA Region:** 02

**Latitude:** 18.075983

**Longitude:** -67.026226

**Locational Data Source:** TRIS

**Industries:** Electrical Equipment, Appliance, and Component Manufacturing

**Indian Country:** N

## Enforcement and Compliance Summary

| Statute | CAA |
|---|---|
| Compliance Monitoring Activities (5 years) | -- |
| Date of Last Compliance Monitoring Activity | 09/22/2015 |
| Compliance Status | No Violation Identified |
| Qtrs in Noncompliance (of 12) | 0 |
| Qtrs with Significant Violation | 0 |
| Informal Enforcement Actions (5 years) | -- |
| Formal Enforcement Actions (5 years) | -- |
| Penalties from Formal Enforcement Actions (5 years) | -- |
| EPA Cases (5 years) | -- |
| Penalties from EPA Cases (5 years) | -- |
| **Statute** | **CWA** |
| Compliance Monitoring Activities (5 years) | -- |
| Date of Last Compliance Monitoring Activity | -- |
| Compliance Status | Terminated Permit |
| Qtrs in Noncompliance (of 12) | 0 |
| Qtrs with Significant Violation | 0 |
| Informal Enforcement Actions (5 years) | -- |
| Formal Enforcement Actions (5 years) | -- |
| Penalties from Formal Enforcement Actions (5 years) | -- |
| EPA Cases (5 years) | -- |
| Penalties from EPA Cases (5 years) | -- |

| Statute | RCRA |
|---|---|
| Compliance Monitoring Activities (5 years) | -- |
| Date of Last Compliance Monitoring Activity | 02/08/2013 |
| Compliance Status | No Violation Identified |
| Qtrs in Noncompliance (of 12) | 0 |
| Qtrs with Significant Violation | 0 |
| Informal Enforcement Actions (5 years) | -- |
| Formal Enforcement Actions (5 years) | -- |
| Penalties from Formal Enforcement Actions (5 years) | -- |
| EPA Cases (5 years) | -- |
| Penalties from EPA Cases (5 years) | -- |

## Regulatory Information

**Clean Air Act (CAA):** Permanently Closed Major (PR0000007212500012)

**Clean Water Act (CWA):** Non-Major, Permit Terminated; Compliance Tracking Off (PRR053196)

**Resource Conservation and Recovery Act (RCRA):** Active SQG, (PRD091019224)

**Safe Drinking Water Act (SDWA):** No Information

Go To Enforcement/Compliance Details
Known Data Problems <https://epa.gov/resources/echo-data/known-data-problems>

## Other Regulatory Reports

**Air Emissions Inventory (EIS):** 6958811

**Greenhouse Gas Emissions (eGGRT):** No Information

**Toxic Releases (TRI):** 00753CRBGPELRET

**Compliance and Emissions Data Reporting Interface (CEDRI):** No Information

Facility/System Characteristics

## Facility/System Characteristics

| System | Statute | Identifier | Universe | Status | Areas | Permit Expiration Date | Indian Country | Latitude | Longitude |
|---|---|---|---|---|---|---|---|---|---|
| FRS | | 110007807150 | | | | | N | 18.075983 | -67.026226 |
| ICIS-Air | CAA | PR0000007212500012 | Major Emissions | Permanently Closed | | | N | 18.075983 | -67.026226 |
| EIS | CAA | 6958811 | | | | | N | 18.075 | -67.04166 |
| ICIS-NPDES | CWA | PRR053196 | Non-Major: General Permit Covered Facility | Terminated; Compliance Tracking Off | Industrial Stormwater | 06/03/2020 | N | 18.0756 | -67.0266 |
| TRI | EP313 | 00753CRBGPELRET | Toxics Release Inventory | Last Reported for 2016 | | | N | 18.075983 | -67.026226 |
| RCRAInfo | RCRA | PRD091019224 | SQG | Active (H ) | | | N | 18.075983 | -67.026226 |

## Facility Address

| System | Statute | Identifier | Facility Name | Facility Address | Facility County |
|---|---|---|---|---|---|
| FRS | | 110007807150 | GE INDUSTRIAL OF PR, LLC (CARIBE GE) | EL RETIRO INDUSTRIAL PARK ST B, SAN GERMAN, PR 00683 | |
| ICIS-Air | CAA | PR0000007212500012 | GE INDUSTRIAL OF PR, LLC (CARIBE GE) | EL RETIRO INDUSTRIAL PARK ST B, SAN GERMAN, PR 00683 | San Germán Municipio |
| EIS | CAA | 6958811 | CARIBE GE INTL ELECTRIC METERS CORP | INDUSTRIAL PARK EL RETIRO, SAN GERMAN, PR 00683 | San Germán Municipio |
| ICIS-NPDES | CWA | PRR053196 | CARIBE GE INDUSTRIAL OF PUERTO RICO, LLC | B-13 STREET EL RETIRO INDUSTRIAL PARK, SAN GERMÁN, PR 00683 | San Germán Municipio |
| TRI | EP313 | 00753CRBGPELRET | GE INDUSTRIAL OF PUERTO RICO LLC | EL RETIRO INDUSTRIAL PARK CALLE B, SAN GERMAN, PR 00683 | San Germán Municipio |
| RCRAInfo | RCRA | PRD091019224 | GE INDUSTRIAL OF PR LLC | EL RETIRO IND PARK ROAD #102, SAN GERMAN, PR 00753 | San Germán Municipio |

## Facility SIC (Standard Industrial Classification) Codes

| System | Identifier | SIC Code | SIC Description |
|---|---|---|---|
| TRI | 00753CRBGPELRET | 3613 | Switchgear And Switchboard Apparatus |
| TRI | 00753CRBGPELRET | 3643 | Current-Carrying Wiring Devices |
| ICIS-Air | PR0000007212500012 | 3613 | Switchgear And Switchboard Apparatus |
| ICIS-NPDES | PRR053196 | 3613 | Switchgear And Switchboard Apparatus |

## Facility NAICS (North American Industry Classification System) Codes

| System | Identifier | NAICS Code | NAICS Description |
|---|---|---|---|
| TRI | 00753CRBGPELRET | 335313 | Switchgear and Switchboard Apparatus Manufacturing |
| EIS | 6958811 | 335313 | Switchgear and Switchboard Apparatus Manufacturing |
| ICIS-Air | PR0000007212500012 | 335313 | Switchgear and Switchboard Apparatus Manufacturing |

## Facility Industrial Effluent Guidelines

| Identifier | Effluent Guideline (40 CFR Part) | Effluent Guideline Description |
|---|---|---|

No data records returned

## Facility Tribe Information

| Reservation Name | Tribe Name | EPA Tribal ID | Distance to Tribe (miles) |
|---|---|---|---|

No data records returned

Enforcement and Compliance

## Compliance Monitoring History

Last 5 Years

| Statute | Source ID | System | Activity Type | Compliance Monitoring Type | Lead Agency | Date | Finding (if applicable) |
|---|---|---|---|---|---|---|---|

No data records returned

*Entries in italics are not included in ECHO's Compliance Monitoring Activity counts because they are not compliance monitoring strategy* <https://www.epa.gov/compliance/compliance-monitoring-programs> *activities or because they are not counted as inspections within EPA's Annual Results* <https://www.epa.gov/enforcement/enforcement-data-and-results>.

## Compliance Summary Data

| Statute | Source ID | Current SNC (Significant Noncompliance)/HPV (High Priority Violation) | Current As Of | Qtrs with NC (Noncompliance) (of 12) | Data Last Refreshed |
|---|---|---|---|---|---|
| CAA | PR0000007212500012 | No | 06/28/2025 | 0 | 06/27/2025 |
| CWA | PRR053196 | No | 03/31/2025 | 0 | 06/27/2025 |
| RCRA | PRD091019224 | No | 06/28/2025 | 0 | 06/27/2025 |

## Three-Year Compliance History by Quarter

| Statute | Program/Pollutant/Violation Type | | | | QTR 1 | QTR 2 | QTR 3 | QTR 4 | QTR 5 | QTR 6 | QTR 7 | QTR 8 | QTR 9 | QTR 10 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CAA (Source ID: PR0000007212500012) | | | | | 07/01-09/30/22 | 10/01-12/31/22 | 01/01-03/31/23 | 04/01-06/30/23 | 07/01-09/30/23 | 10/01-12/31/23 | 01/01-03/31/24 | 04/01-06/30/24 | 07/01-09/30/24 | 10/01-12/31/24 | 01/0 |
| | Facility-Level Status | | | | No Violation Identified | No Violation Identified | No Violation Identified | No Violation Identified | No Violation Identified | No Violation Identified | No Violation Identified | No Violation Identified | No Violation Identified | No Violation Identified | No I |
| | HPV History | | | | | | | | | | | | | | |
| | Violation Type | Agency | Programs | Pollutants | | | | | | | | | | | |

| Statute | Program/Pollutant/Violation Type | QTR 1 | QTR 2 | QTR 3 | QTR 4 | QTR 5 | QTR 6 | QTR 7 | QTR 8 | QTR 9 | QTR 10 | QTR 11 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CWA (Source ID: PRR053196) | | 04/01-06/30/22 | 07/01-09/30/22 | 10/01-12/31/22 | 01/01-03/31/23 | 04/01-06/30/23 | 07/01-09/30/23 | 10/01-12/31/23 | 01/01-03/31/24 | 04/01-06/30/24 | 07/01-09/30/24 | 10/01-12/31/24 |
| | Facility-Level Status | Terminated Permit | Terminated Permit | Terminated Permit | Terminated Permit | Terminated Permit | Terminated Permit | Terminated Permit | Terminated Permit | Terminated Permit | Terminated Permit | Terminated Permit |
| | Quarterly Noncompliance Report History | | | | | | | | | | | |

| Statute | Program/Pollutant/Violation Type | QTR 1 | QTR 2 | QTR 3 | QTR 4 | QTR 5 | QTR 6 | QTR 7 | QTR 8 | QTR 9 | QTR 10 | QTR 11 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| RCRA (Source ID: PRD091019224) | | 07/01-09/30/22 | 10/01-12/31/22 | 01/01-03/31/23 | 04/01-06/30/23 | 07/01-09/30/23 | 10/01-12/31/23 | 01/01-03/31/24 | 04/01-06/30/24 | 07/01-09/30/24 | 10/01-12/31/24 | 01/01-03/31/25 |
| | Facility-Level Status | No Violation Identified | No Violation Identified | No Violation Identified | No Violation Identified | No Violation Identified | No Violation Identified | No Violation Identified | No Violation Identified | No Violation Identified | No Violation Identified | No Violation Identified |
| | Violation / Agency | | | | | | | | | | | |

## Informal Enforcement Actions

Last 5 Years

| Statute | System | Source ID | Type of Action | Lead Agency | Date |
|---|---|---|---|---|---|

No data records returned

*Entries in italics are not counted as "informal enforcement actions" in EPA policies pertaining to enforcement response tools.*

## Formal Enforcement Actions

Last 5 Years

| Statute | System | Law/ Section | Source ID | Type of Action | Case No. | Lead Agency | Case Name | Issued/ Filed Date | Settlements/ Actions | Settlement/ Action Date | Federal Penalty Assessed | State/ Local Penalty Assessed | Penalty Amount Collected | SEP Value | Comp Action Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|

No data records returned

Environmental Conditions

## Watersheds

| 12-Digit WBD (Watershed Boundary Dataset) HUC (RAD (Reach Address Database)) | WBD (Watershed Boundary Dataset) Subwatershed Name (RAD (Reach Address Database)) | State Water Body Name (ICIS (Integrated Compliance Information System)) | Beach Closures Within Last Year | Beach Closures Within Last Two Years | Pollutants Potentially Related to Impairment | Watershed with ESA (Endangered Species Act)-listed Aquatic Species? |
|---|---|---|---|---|---|---|
| 210100030409 | Rio Guanajibo at mouth | GUANAJIBO RIVER | No | No | Arsenic, total (as As) \| Coliform, fecal general \| Cyanide, total (as CN) \| Nitrogen, ammonia total (as N) \| Oxygen, dissolved percent saturation \| Turbidity | No |

## Assessed Waters From Latest State Submission (ATTAINS)

| State | Report Cycle | Assessment Unit ID | Assessment Unit Name | Water Condition | Cause Groups Impaired | Drinking Water Use | Ecological Use | Fish Consumption Use | Recreation Use | Other Use |
|---|---|---|---|---|---|---|---|---|---|---|
| PR | 2024 | PRWR77A | RIO GUANAJIBO | Impaired - 303(d) Listed - With Restoration Plan | METALS (OTHER THAN MERCURY) \| NUTRIENTS \| ORGANIC ENRICHMENT/OXYGEN DEPLETION \| PATHOGENS \| TOXIC INORGANICS \| TURBIDITY | Not Supporting | Not Supporting | -- | Not Supporting | -- |

## Air Quality Nonattainment Areas

| Pollutant | Within Nonattainment Status Area? | Nonattainment Status Applicable Standard(s) | Within Maintenance Status Area? | Maintenance Status Applicable Standard(s) |
|---|---|---|---|---|

No data records returned

Pollutants

## Toxics Release Inventory History of Reported Chemicals Released or Transferred in Pounds per Year at Site

Air Pollutant Report TRI Pollution Prevention Report

| TRI Facility ID | Year | Air Emissions | Surface Water Discharges | Off-Site Transfers to POTWs (Publicly Owned Treatment Works) | Underground Injections | Disposal to Land | Total On-Site Releases | Total Off-Site Transfers |
|---|---|---|---|---|---|---|---|---|
| 00753CRBGPELRET | 2016 | 11,036 | -- | 0 | -- | -- | 11,036 | 35,661 |
| 00753CRBGPELRET | 2015 | 17,800 | -- | 0 | -- | -- | 17,800 | 337,002 |
| 00753CRBGPELRET | 2014 | 17,122 | -- | 0 | -- | 5 | 17,127 | 344,805 |

## Toxics Release Inventory Total Releases and Transfers in Pounds by Chemical and Year

| Chemical Name | 2023 | 2022 | 2021 | 2020 | 2019 | 2018 | 2017 | 2016 | 2015 | 2014 |
|---|---|---|---|---|---|---|---|---|---|---|
| Copper | -- | -- | -- | -- | -- | -- | -- | 35,661 | 337,002 | 344,932 |
| Styrene | -- | -- | -- | -- | -- | -- | -- | 11,036 | 17,800 | 17,000 |

# CWA (Clean Water Act) Discharge Monitoring Report (DMR) Pollutant Loadings



| NPDES ID | Description |
|---|---|
| No data records returned | |

Community

# Demographic Profile of Surrounding Area (1-Mile Radius)

This section provides demographic information regarding the community surrounding the facility. ECHO compliance data alone are not sufficient to determine whether violations at a particular facility had negative impacts on public health or the environment. Statistics are based upon the 2022 American Community Survey (ACS) 5-year Summary and are accurate to the extent that the facility latitude and longitude listed below are correct. Census boundaries and demographic data for U.S. Territories are based on the "2020 Island Areas Demographic Profiles" from the U.S. Census Bureau. EPA's spatial processing methodology considers the overlap between the selected radii and ACS census block groups in determining the demographics surrounding the facility. For more detail about this methodology, see the DFR Data Dictionary <https://epa.gov/help/reports/dfr-data-dictionary#demographic>.

| General Statistics (ACS (American Community Survey)) | |
|---|---|
| Total Persons | 7,630 |
| Population Density | 2,446/sq.mi. |
| Housing Units in Area | 3,557 |
| Percent People of Color | 99% |
| Households in Area | 2,912 |
| Households on Public Assistance | 99 |
| Persons With Low Income | 6,323 |
| Percent With Low Income | 83% |

| Geography | |
|---|---|
| Radius of Selected Area | 1 mi. |
| Center Latitude | 18.075983 |
| Center Longitude | -67.026226 |
| Total Area | 3.121 sq.mi. |
| Land Area | 100% |
| Water Area | 0% |

| Income Breakdown (ACS (American Community Survey)) - Households (%) | |
|---|---|
| Less than $15,000 | 1,295 (44.5%) |
| $15,000 - $25,000 | 523 (17.97%) |
| $25,000 - $50,000 | 721 (24.78%) |
| $50,000 - $75,000 | 245 (8.42%) |
| Greater than $75,000 | 126 (4.33%) |

| Age Breakdown (ACS (American Community Survey)) - Persons (%) | |
|---|---|
| Children 5 years and younger | 256 (3%) |
| Minors 17 years and younger | 1,277 (17%) |
| Adults 18 years and older | 6,353 (83%) |
| Seniors 65 years and older | 2,024 (27%) |

| Race Breakdown (ACS (American Community Survey)) - Persons (%) | |
|---|---|
| White | 5,117 (67%) |
| African-American | 214 (3%) |
| Hispanic-Origin | 7,501 (98%) |
| Asian | 0 (0%) |
| Hawaiian/Pacific Islander | 34 (0%) |
| American Indian | 0 (0%) |
| Other/Multiracial | 1,515 (20%) |

| Education Level (Persons 25 & older) (ACS (American Community Survey)) - Persons (%) | |
|---|---|
| Less than 9th Grade | 606 (10.72%) |
| 9th through 12th Grade | 475 (8.4%) |
| High School Diploma | 2,317 (40.99%) |
| Some College/2-year | 499 (8.83%) |
| B.S./B.A. (Bachelor of Science/Bachelor of Arts) or More | 1,294 (22.89%) |

# Detailed Facility Report

Facility Summary

**INTERAMERICAN UNIV SAN GERMAN**

**CALLE LUNA, SAN GERMAN, PR 00683**

**FRS (Facility Registry Service) ID:** 110007810431

**EPA Region:** 02

**Latitude:** 18.080442

**Longitude:** -67.036833

**Locational Data Source:** RCRAINFO

**Industries:** Educational Services

**Indian Country:** N

## Enforcement and Compliance Summary

| Statute | RCRA |
|---|---|
| Compliance Monitoring Activities (5 years) | -- |
| Date of Last Compliance Monitoring Activity | 01/31/2012 |
| Compliance Status | No Violation Identified |
| Qtrs in Noncompliance (of 12) | 0 |
| Qtrs with Significant Violation | 0 |
| Informal Enforcement Actions (5 years) | -- |
| Formal Enforcement Actions (5 years) | -- |
| Penalties from Formal Enforcement Actions (5 years) | -- |
| EPA Cases (5 years) | -- |
| Penalties from EPA Cases (5 years) | -- |

## Regulatory Information

**Clean Air Act (CAA):** No Information

**Clean Water Act (CWA):** No Information

**Resource Conservation and Recovery Act (RCRA):** Active VSQG, (PRD987367604)

**Safe Drinking Water Act (SDWA):** No Information

## Other Regulatory Reports

**Air Emissions Inventory (EIS):** No Information

**Greenhouse Gas Emissions (eGGRT):** No Information

**Toxic Releases (TRI):** No Information

**Compliance and Emissions Data Reporting Interface (CEDRI):** No Information

Go To Enforcement/Compliance Details

Known Data Problems <https://epa.gov/resources/echo-data/known-data-problems>

Facility/System Characteristics

## Facility/System Characteristics

| System | Statute | Identifier | Universe | Status | Areas | Permit Expiration Date | Indian Country | Latitude | Longitude |
|---|---|---|---|---|---|---|---|---|---|
| FRS | | 110007810431 | | | | | N | 18.080442 | -67.036833 |
| ICIS | | 31964 | | | | | N | 18.080442 | -67.036833 |
| RCRAInfo | RCRA | PRD987367604 | VSQG | Active (H ) | | | N | 18.080442 | -67.036833 |

## Facility Address

| System | Statute | Identifier | Facility Name | Facility Address | Facility County |
|---|---|---|---|---|---|
| FRS | | 110007810431 | INTERAMERICAN UNIV SAN GERMAN | CALLE LUNA, SAN GERMAN, PR 00683 | San Germán Municipio |
| ICIS | | 31964 | INTERAMERICAN UNIV SAN GERMAN | CALLE LUNA, SAN GERMAN, PR 00683 | San Germán Municipio |
| RCRAInfo | RCRA | PRD987367604 | INTER AMERICAN UNIVERISTY OF PR - SAN GERMAN CAMPUS | RD 102 KM 30.6, SAN GERMAN, PR 00683 | San Germán Municipio |

## Facility SIC (Standard Industrial Classification) Codes

| System | Identifier | SIC Code | SIC Description |
|---|---|---|---|

No data records returned

## Facility NAICS (North American Industry Classification System) Codes

| System | Identifier | NAICS Code | NAICS Description |
|---|---|---|---|
| RCRAInfo | PRD987367604 | 611310 | Colleges, Universities, and Professional Schools |

## Facility Tribe Information

| Reservation Name | Tribe Name | EPA Tribal ID | Distance to Tribe (miles) |
|---|---|---|---|

No data records returned

---

Enforcement and Compliance

## Compliance Monitoring History

Last 5 Years

| Statute | Source ID | System | Activity Type | Compliance Monitoring Type | Lead Agency | Date | Finding (if applicable) |
|---|---|---|---|---|---|---|---|

No data records returned

*Entries in italics are not included in ECHO's Compliance Monitoring Activity counts because they are not compliance monitoring strategy* <https://www.epa.gov/compliance/compliance-monitoring-programs> *activities or because they are not counted as inspections within EPA's Annual Results* <https://www.epa.gov/enforcement/enforcement-data-and-results>.

## Compliance Summary Data

| Statute | Source ID | Current SNC (Significant Noncompliance)/HPV (High Priority Violation) | Current As Of | Qtrs with NC (Noncompliance) (of 12) | Data Last Refreshed |
|---|---|---|---|---|---|
| RCRA | PRD987367604 | No | 06/28/2025 | 0 | 06/27/2025 |

## Three-Year Compliance History by Quarter

| Statute | Program/Pollutant/Violation Type | | QTR 1 | QTR 2 | QTR 3 | QTR 4 | QTR 5 | QTR 6 | QTR 7 | QTR 8 | QTR 9 | QTR 10 | QTR 11 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| RCRA (Source ID: PRD987367604) | | | 07/01-09/30/22 | 10/01-12/31/22 | 01/01-03/31/23 | 04/01-06/30/23 | 07/01-09/30/23 | 10/01-12/31/23 | 01/01-03/31/24 | 04/01-06/30/24 | 07/01-09/30/24 | 10/01-12/31/24 | 01/01-03/31/25 |
| | Facility-Level Status | | No Violation Identified | No Violation Identified | No Violation Identified | No Violation Identified | No Violation Identified | No Violation Identified | No Violation Identified | No Violation Identified | No Violation Identified | No Violation Identified | No Violation Identified |
| | Violation | Agency | | | | | | | | | | | |

## Informal Enforcement Actions

Last 5 Years

| Statute | System | Source ID | Type of Action | Lead Agency | Date |
|---|---|---|---|---|---|

No data records returned

*Entries in italics are not counted as "informal enforcement actions" in EPA policies pertaining to enforcement response tools.*

## Formal Enforcement Actions

Last 5 Years

| Statute | System | Law/ Section | Source ID | Type of Action | Case No. | Lead Agency | Case Name | Issued/ Filed Date | Settlements/ Actions | Settlement/ Action Date | Federal Penalty Assessed | State/ Local Penalty Assessed | Penalty Amount Collected | SEP Value | Comp Action Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|

No data records returned

---

Environmental Conditions

## Watersheds

| 12-Digit WBD (Watershed Boundary Dataset) HUC (RAD (Reach Address Database)) | WBD (Watershed Boundary Dataset) Subwatershed Name (RAD (Reach Address Database)) | State Water Body Name (ICIS (Integrated Compliance Information System)) | Beach Closures Within Last Year | Beach Closures Within Last Two Years | Pollutants Potentially Related to Impairment | Watershed with ESA (Endangered Species Act)-listed Aquatic Species? |
|---|---|---|---|---|---|---|

No data records returned

## Assessed Waters From Latest State Submission (ATTAINS)

| State | Report Cycle | Assessment Unit ID | Assessment Unit Name | Water Condition | Cause Groups Impaired | Drinking Water Use | Ecological Use | Fish Consumption Use | Recreation Use | Other Use |
|---|---|---|---|---|---|---|---|---|---|---|

No data records returned

## Air Quality Nonattainment Areas

| Pollutant | Within Nonattainment Status Area? | Nonattainment Status Applicable Standard(s) | Within Maintenance Status Area? | Maintenance Status Applicable Standard(s) |
|---|---|---|---|---|

No data records returned

---

Pollutants

## Toxics Release Inventory History of Reported Chemicals Released or Transferred in Pounds per Year at Site

| TRI Facility ID | Year | Air Emissions | Surface Water Discharges | Off-Site Transfers to POTWs (Publicly Owned Treatment Works) | Underground Injections | Disposal to Land | Total On-Site Releases | Total Off-Site Transfers |
|---|---|---|---|---|---|---|---|---|

No data records returned

## Toxics Release Inventory Total Releases and Transfers in Pounds by Chemical and Year

| Chemical Name |
|---|

No data records returned

## e-Manifest Hazardous Waste History (Public)

### Hazardous Waste Shipped in Kilograms by Year (Through 3/29/2025)

| Source ID | Waste Description | 2022 | 2023 | 2024 | 2025 |
|---|---|---|---|---|---|
| PRD987367604 | Hazardous Waste | 282 | 408 | 168 | -- |
| PRD987367604 | Acute Hazardous Waste | 0 - 0 | 0 | 1 | -- |
| PRD987367604 | Pharmaceutical Hazardous Waste | 0 | 0 | 0 | -- |

“Pharmaceutical Hazardous Waste” refers to quantities managed under 40 CFR part 266 subpart P and thus excluded from the Hazardous and Acute Hazardous Waste quantities shown above.

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Community

## Demographic Profile of Surrounding Area (1-Mile Radius)

This section provides demographic information regarding the community surrounding the facility. ECHO compliance data alone are not sufficient to determine whether violations at a particular facility had negative impacts on public health or the environment. Statistics are based upon the 2022 American Community Survey (ACS) 5-year Summary and are accurate to the extent that the facility latitude and longitude listed below are correct. Census boundaries and demographic data for U.S. Territories are based on the "2020 Island Areas Demographic Profiles" from the U.S. Census Bureau. EPA’s spatial processing methodology considers the overlap between the selected radii and ACS census block groups in determining the demographics surrounding the facility. For more detail about this methodology, see the DFR Data Dictionary <https://epa.gov/help/reports/dfr-data-dictionary#demographic>.

| General Statistics (ACS (American Community Survey)) | |
|---|---|
| Total Persons | 7,757 |
| Population Density | 2,487/sq.mi. |
| Housing Units in Area | 4,030 |
| Percent People of Color | 99% |
| Households in Area | 3,068 |
| Households on Public Assistance | 130 |
| Persons With Low Income | 6,255 |
| Percent With Low Income | 82% |

| Geography | |
|---|---|
| Radius of Selected Area | 1 mi. |
| Center Latitude | 18.080442 |
| Center Longitude | -67.036833 |
| Total Area | 3.121 sq.mi. |
| Land Area | 100% |
| Water Area | 0% |

| Age Breakdown (ACS (American Community Survey)) - Persons (%) | |
|---|---|
| Children 5 years and younger | 267 (3%) |
| Minors 17 years and younger | 1,241 (16%) |
| Adults 18 years and older | 6,515 (84%) |
| Seniors 65 years and older | 2,235 (29%) |

| Race Breakdown (ACS (American Community Survey)) - Persons (%) | |
|---|---|
| White | 5,218 (67%) |
| African-American | 155 (2%) |
| Hispanic-Origin | 7,643 (99%) |
| Asian | 2 (0%) |
| Hawaiian/Pacific Islander | 23 (0%) |
| American Indian | 0 (0%) |
| Other/Multiracial | 1,571 (20%) |

| Education Level (Persons 25 & older) (ACS (American Community Survey)) - Persons (%) | |
|---|---|
| Less than 9th Grade | 599 (10.34%) |
| 9th through 12th Grade | 527 (9.1%) |
| High School Diploma | 2,125 (36.68%) |

# Detailed Facility Report

Facility Summary

**KMART #3896**

**AVE CASTO PEREZ INT CARR 2, SAN GERMAN, PR 00683**

**FRS (Facility Registry Service) ID:** 110004893848

**EPA Region:** 02

**Latitude:** 18.079932

**Longitude:** -67.03508

**Locational Data Source:** RCRAINFO

**Industries:** General Merchandise Stores

**Indian Country:** N

## Enforcement and Compliance Summary

| Statute | RCRA |
|---|---|
| Compliance Monitoring Activities (5 years) | -- |
| Date of Last Compliance Monitoring Activity | -- |
| Compliance Status | No Violation Identified |
| Qtrs in Noncompliance (of 12) | 0 |
| Qtrs with Significant Violation | 0 |
| Informal Enforcement Actions (5 years) | -- |
| Formal Enforcement Actions (5 years) | -- |
| Penalties from Formal Enforcement Actions (5 years) | -- |
| EPA Cases (5 years) | -- |
| Penalties from EPA Cases (5 years) | -- |

## Regulatory Information

**Clean Air Act (CAA):** No Information

**Clean Water Act (CWA):** No Information

**Resource Conservation and Recovery Act (RCRA):** Active VSQG, (PRR000008383)

**Safe Drinking Water Act (SDWA):** No Information

## Other Regulatory Reports

**Air Emissions Inventory (EIS):** No Information

**Greenhouse Gas Emissions (eGGRT):** No Information

**Toxic Releases (TRI):** No Information

**Compliance and Emissions Data Reporting Interface (CEDRI):** No Information

Go To Enforcement/Compliance Details

Known Data Problems <https://epa.gov/resources/echo-data/known-data-problems>

Facility/System Characteristics

## Facility/System Characteristics

| System | Statute | Identifier | Universe | Status | Areas | Permit Expiration Date | Indian Country | Latitude | Longitude |
|---|---|---|---|---|---|---|---|---|---|
| FRS | | 110004893848 | | | | | N | 18.079932 | -67.03508 |
| RCRAInfo | RCRA | PRR000008383 | VSQG | Active (H ) | | | N | 18.079932 | -67.03508 |

## Facility Address

| System | Statute | Identifier | Facility Name | Facility Address | Facility County |
|---|---|---|---|---|---|
| FRS | | 110004893848 | KMART #3896 | AVE CASTO PEREZ INT CARR 2, SAN GERMAN, PR 00683 | San Germán Municipio |
| RCRAInfo | RCRA | PRR000008383 | KMART #3896 | AVE CASTO PEREZ INT CARR 2, SAN GERMAN, PR 00683 | San Germán Municipio |

## Facility SIC (Standard Industrial Classification) Codes

| System | Identifier | SIC Code | SIC Description |
|---|---|---|---|

No data records returned

## Facility NAICS (North American Industry Classification System) Codes

| System | Identifier | NAICS Code | NAICS Description |
|---|---|---|---|
| RCRAInfo | PRR000008383 | 45299 | All Other General Merchandise Stores |

## Facility Tribe Information

| Reservation Name | Tribe Name | EPA Tribal ID | Distance to Tribe (miles) |
|---|---|---|---|

No data records returned

Enforcement and Compliance

## Compliance Monitoring History

Last 5 Years

| Statute | Source ID | System | Activity Type | Compliance Monitoring Type | Lead Agency | Date | Finding (if applicable) |
|---|---|---|---|---|---|---|---|

No data records returned

*Entries in italics are not included in ECHO's Compliance Monitoring Activity counts because they are not compliance monitoring strategy* <https://www.epa.gov/compliance/compliance-monitoring-programs> *activities or because they are not counted as inspections within EPA's Annual Results* <https://www.epa.gov/enforcement/enforcement-data-and-results>.

## Compliance Summary Data

| Statute | Source ID | Current SNC (Significant Noncompliance)/HPV (High Priority Violation) | Current As Of | Qtrs with NC (Noncompliance) (of 12) | Data Last Refreshed |
|---|---|---|---|---|---|
| RCRA | PRR000008383 | No | 06/28/2025 | 0 | 06/27/2025 |

## Three-Year Compliance History by Quarter

| Statute | Program/Pollutant/Violation Type | | QTR 1 | QTR 2 | QTR 3 | QTR 4 | QTR 5 | QTR 6 | QTR 7 | QTR 8 | QTR 9 | QTR 10 | QTR 11 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| RCRA (Source ID: PRR000008383) | | | 07/01-09/30/22 | 10/01-12/31/22 | 01/01-03/31/23 | 04/01-06/30/23 | 07/01-09/30/23 | 10/01-12/31/23 | 01/01-03/31/24 | 04/01-06/30/24 | 07/01-09/30/24 | 10/01-12/31/24 | 01/01-03/31/25 |
| | Facility-Level Status | | No Violation Identified | No Violation Identified | No Violation Identified | No Violation Identified | No Violation Identified | No Violation Identified | No Violation Identified | No Violation Identified | No Violation Identified | No Violation Identified | No Violation Identified |
| | Violation | Agency | | | | | | | | | | | |

## Informal Enforcement Actions

Last 5 Years

| Statute | System | Source ID | Type of Action | Lead Agency | Date |
|---|---|---|---|---|---|

No data records returned

*Entries in italics are not counted as "informal enforcement actions" in EPA policies pertaining to enforcement response tools.*

## Formal Enforcement Actions

Last 5 Years

| Statute | System | Law/ Section | Source ID | Type of Action | Case No. | Lead Agency | Case Name | Issued/ Filed Date | Settlements/ Actions | Settlement/ Action Date | Federal Penalty Assessed | State/ Local Penalty Assessed | Penalty Amount Collected | SEP Value | Comp Action Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|

No data records returned

Environmental Conditions

## Watersheds

| 12-Digit WBD (Watershed Boundary Dataset) HUC (RAD (Reach Address Database)) | WBD (Watershed Boundary Dataset) Subwatershed Name (RAD (Reach Address Database)) | State Water Body Name (ICIS (Integrated Compliance Information System)) | Beach Closures Within Last Year | Beach Closures Within Last Two Years | Pollutants Potentially Related to Impairment | Watershed with ESA (Endangered Species Act)-listed Aquatic Species? |
|---|---|---|---|---|---|---|

No data records returned

## Assessed Waters From Latest State Submission (ATTAINS)

| State | Report Cycle | Assessment Unit ID | Assessment Unit Name | Water Condition | Cause Groups Impaired | Drinking Water Use | Ecological Use | Fish Consumption Use | Recreation Use | Other Use |
|---|---|---|---|---|---|---|---|---|---|---|

No data records returned

## Air Quality Nonattainment Areas

| Pollutant | Within Nonattainment Status Area? | Nonattainment Status Applicable Standard(s) | Within Maintenance Status Area? | Maintenance Status Applicable Standard(s) |
|---|---|---|---|---|

No data records returned

Pollutants

## Toxics Release Inventory History of Reported Chemicals Released or Transferred in Pounds per Year at Site

| TRI Facility ID | Year | Air Emissions | Surface Water Discharges | Off-Site Transfers to POTWs (Publicly Owned Treatment Works) | Underground Injections | Disposal to Land | Total On-Site Releases | Total Off-Site Transfers |
|---|---|---|---|---|---|---|---|---|

No data records returned

## Toxics Release Inventory Total Releases and Transfers in Pounds by Chemical and Year

| Chemical Name |
|---|

No data records returned

Community

## Demographic Profile of Surrounding Area (1-Mile Radius)

This section provides demographic information regarding the community surrounding the facility. ECHO compliance data alone are not sufficient to determine whether violations at a particular facility had negative impacts on public health or the environment. Statistics are based upon the 2022 American Community Survey (ACS) 5-year Summary and are accurate to the extent that the facility latitude and longitude listed below are correct. Census boundaries and demographic data for U.S. Territories are based on the "2020 Island Areas Demographic Profiles" from the U.S. Census Bureau. EPA's spatial processing methodology considers the overlap between the selected radii and ACS census block groups in determining the demographics surrounding the facility. For more detail about this methodology, see the DFR Data Dictionary <https://epa.gov/help/reports/dfr-data-dictionary#demographic>.

| General Statistics (ACS (American Community Survey)) | |
|---|---|
| Total Persons | 7,877 |
| Population Density | 2,525/sq.mi. |
| Housing Units in Area | 4,005 |
| Percent People of Color | 99% |
| Households in Area | 3,092 |
| Households on Public Assistance | 129 |
| Persons With Low Income | 6,398 |
| Percent With Low Income | 82% |

| Geography | |
|---|---|
| Radius of Selected Area | 1 mi. |
| Center Latitude | 18.079932 |
| Center Longitude | -67.03508 |
| Total Area | 3.121 sq.mi. |
| Land Area | 100% |
| Water Area | 0% |

| Income Breakdown (ACS (American Community Survey)) - Households (%) | |
|---|---|
| Less than $15,000 | 1,404 (45.42%) |
| $15,000 - $25,000 | 557 (18.02%) |
| $25,000 - $50,000 | 728 (23.55%) |
| $50,000 - $75,000 | 246 (7.96%) |
| Greater than $75,000 | 156 (5.05%) |

| Age Breakdown (ACS (American Community Survey)) - Persons (%) | |
|---|---|
| Children 5 years and younger | 270 (3%) |
| Minors 17 years and younger | 1,274 (16%) |
| Adults 18 years and older | 6,604 (84%) |
| Seniors 65 years and older | 2,241 (28%) |

| Race Breakdown (ACS (American Community Survey)) - Persons (%) | |
|---|---|
| White | 5,284 (67%) |
| African-American | 173 (2%) |
| Hispanic-Origin | 7,756 (98%) |
| Asian | 2 (0%) |
| Hawaiian/Pacific Islander | 26 (0%) |
| American Indian | 0 (0%) |
| Other/Multiracial | 1,596 (20%) |

| Education Level (Persons 25 & older) (ACS (American Community Survey)) - Persons (%) | |
|---|---|
| Less than 9th Grade | 617 (10.5%) |
| 9th through 12th Grade | 529 (9%) |
| High School Diploma | 2,213 (37.65%) |
| Some College/2-year | 486 (8.27%) |
| B.S./B.A. (Bachelor of Science/Bachelor of Arts) or More | 1,518 (25.83%) |

# Detailed Facility Report

Facility Summary

**OLD MARKET PLAZA**

**96 INTERAMERICANA AVE, SAN GERMAN, PR 00683**

**FRS (Facility Registry Service) ID:** 110017614205

**EPA Region:** 02

**Latitude:** 18.08131

**Longitude:** -67.04141

**Locational Data Source:** RCRAINFO

**Industries:** Waste Management and Remediation Services

**Indian Country:** N

## Enforcement and Compliance Summary

| Statute | RCRA |
|---|---|
| Compliance Monitoring Activities (5 years) | -- |
| Date of Last Compliance Monitoring Activity | -- |
| Compliance Status | No Violation Identified |
| Qtrs in Noncompliance (of 12) | 0 |
| Qtrs with Significant Violation | 0 |
| Informal Enforcement Actions (5 years) | -- |
| Formal Enforcement Actions (5 years) | -- |
| Penalties from Formal Enforcement Actions (5 years) | -- |
| EPA Cases (5 years) | -- |
| Penalties from EPA Cases (5 years) | -- |

## Regulatory Information

**Clean Air Act (CAA):** No Information

**Clean Water Act (CWA):** No Information

**Resource Conservation and Recovery Act (RCRA):** Inactive Other, (PRR000017012)

**Safe Drinking Water Act (SDWA):** No Information

## Other Regulatory Reports

**Air Emissions Inventory (EIS):** No Information

**Greenhouse Gas Emissions (eGGRT):** No Information

**Toxic Releases (TRI):** No Information

**Compliance and Emissions Data Reporting Interface (CEDRI):** No Information

Go To Enforcement/Compliance Details

Known Data Problems <https://epa.gov/resources/echo-data/known-data-problems>

Facility/System Characteristics

## Facility/System Characteristics

| System | Statute | Identifier | Universe | Status | Areas | Permit Expiration Date | Indian Country | Latitude | Longitude |
|---|---|---|---|---|---|---|---|---|---|
| FRS | | 110017614205 | | | | | N | 18.08131 | -67.04141 |
| RCRAInfo | RCRA | PRR000017012 | Other | Inactive ( ) | | | N | 18.08131 | -67.04141 |

## Facility Address

| System | Statute | Identifier | Facility Name | Facility Address | Facility County |
|---|---|---|---|---|---|
| FRS | | 110017614205 | OLD MARKET PLAZA | 96 INTERAMERICANA AVE, SAN GERMAN, PR 00683 | San Germán Municipio |
| RCRAInfo | RCRA | PRR000017012 | OLD MARKET PLAZA | 96 INTERAMERICANA AVE, SAN GERMAN, PR 00683 | San Germán Municipio |

No data records returned

*Entries in italics are not included in ECHO's Compliance Monitoring Activity counts because they are not compliance monitoring strategy* <https://www.epa.gov/compliance/compliance-monitoring-programs> *activities or because they are not counted as inspections within EPA's Annual Results* <https://www.epa.gov/enforcement/enforcement-data-and-results>.

## Compliance Summary Data

| Statute | Source ID | Current SNC (Significant Noncompliance)/HPV (High Priority Violation) | Current As Of | Qtrs with NC (Noncompliance) (of 12) | Data Last Refreshed |
|---|---|---|---|---|---|
| RCRA | PRR000017012 | No | 12/06/2025 | 0 | 12/05/2025 |

## Three-Year Compliance History by Quarter

| Statute | Program/ Pollutant/ Violation Type | QTR 1 | QTR 2 | QTR 3 | QTR 4 | QTR 5 | QTR 6 | QTR 7 | QTR 8 | QTR 9 | QTR 10 | QTR 11 | QTR 12+ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| RCRA (Source ID: PRR000017012) | | 01/01-03/31/23 | 04/01-06/30/23 | 07/01-09/30/23 | 10/01-12/31/23 | 01/01-03/31/24 | 04/01-06/30/24 | 07/01-09/30/24 | 10/01-12/31/24 | 01/01-03/31/25 | 04/01-06/30/25 | 07/01-09/30/25 | 10/01-12/31/25 |
| | Facility-Level Status | No Violation Identified | No Violation Identified | No Violation Identified | No Violation Identified | No Violation Identified | No Violation Identified | No Violation Identified | No Violation Identified | No Violation Identified | No Violation Identified | No Violation Identified | No Violation Identified |
| | Violation Agency | | | | | | | | | | | | |

## Informal Enforcement Actions

Last 5 Years

| Statute | System | Source ID | Type of Action | Lead Agency | Date |
|---|---|---|---|---|---|

No data records returned

*Entries in italics are not counted as "informal enforcement actions" in EPA policies pertaining to enforcement response tools.*

## Formal Enforcement Actions

Last 5 Years

| Statute | System | Law/ Section | Source ID | Type of Action | Case No. | Lead Agency | Case Name | Issued/ Filed Date | Settlements/ Actions | Settlement/ Action Date | Federal Penalty Assessed | State/ Local Penalty Assessed | Penalty Amount Collected | SEP Value | Comp Action Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|

No data records returned

Environmental Conditions

## Watersheds

| 12-Digit WBD (Watershed Boundary Dataset) HUC (RAD (Reach Address Database)) | WBD (Watershed Boundary Dataset) Subwatershed Name (RAD (Reach Address Database)) | State Water Body Name (ICIS (Integrated Compliance Information System)) | Beach Closures Within Last Year | Beach Closures Within Last Two Years | Pollutants Potentially Related to Impairment | Watershed with ESA (Endangered Species Act)-listed Aquatic Species? |
|---|---|---|---|---|---|---|

No data records returned

## Assessed Waters From Latest State Submission (ATTAINS)

| State | Report Cycle | Assessment Unit ID | Assessment Unit Name | Water Condition | Cause Groups Impaired | Drinking Water Use | Ecological Use | Fish Consumption Use | Recreation Use | Other Use |
|---|---|---|---|---|---|---|---|---|---|---|

No data records returned

## Air Quality Nonattainment Areas

| Pollutant | Within Nonattainment Status Area? | Nonattainment Status Applicable Standard(s) | Within Maintenance Status Area? | Maintenance Status Applicable Standard(s) |
|---|---|---|---|---|

No data records returned

Pollutants

## Toxics Release Inventory History of Reported Chemicals Released or Transferred in Pounds per Year at Site

| TRI Facility ID | Year | Air Emissions | Surface Water Discharges | Off-Site Transfers to POTWs (Publicly Owned Treatment Works) | Underground Injections | Disposal to Land | Total On-Site Releases | Total Off-Site Transfers |
|---|---|---|---|---|---|---|---|---|

No data records returned

## Toxics Release Inventory Total Releases and Transfers in Pounds by Chemical and Year

| Chemical Name |
|---|

No data records returned

This section provides demographic information regarding the community surrounding the facility. ECHO compliance data alone are not sufficient to determine whether violations at a particular facility had negative impacts on public health or the environment. Statistics are based upon the 2023 American Community Survey (ACS) 5-year Summary and are accurate to the extent that the facility latitude and longitude listed below are correct. Census boundaries and demographic data for U.S. Territories are based on the "2020 Island Areas Demographic Profiles" from the U.S. Census Bureau. EPA's spatial processing methodology considers the overlap between the selected radii and ACS census block groups in determining the demographics surrounding the facility. For more detail about this methodology, see the DFR Data Dictionary <https://epa.gov/help/reports/dfr-data-dictionary#demographic>.

| General Statistics (ACS (American Community Survey)) | |
|---|---|
| Total Persons | 4,970 |
| Population Density | 1,584/sq.mi. |
| Housing Units in Area | 3,625 |
| Percent People of Color | 97% |
| Households in Area | 2,509 |
| Households on Public Assistance | 103 |
| Persons With Low Income | 2,310 |
| Percent With Low Income | 47% |

| Geography | |
|---|---|
| Radius of Selected Area | 1 mi. |
| Center Latitude | 18.08131 |
| Center Longitude | -67.04141 |
| Total Area | 3.14 sq.mi. |
| Land Area | 100% |
| Water Area | 0% |

| Income Breakdown (ACS (American Community Survey)) - Households (%) | |
|---|---|
| Less than $15,000 | 478 (19.06%) |
| $15,000 - $25,000 | 362 (14.43%) |
| $25,000 - $50,000 | 593 (23.64%) |
| $50,000 - $75,000 | 190 (7.58%) |
| Greater than $75,000 | 885 (35.29%) |

| Age Breakdown (ACS (American Community Survey)) - Persons (%) | |
|---|---|
| Children 5 years and younger | 113 (2%) |
| Minors 17 years and younger | 420 (8%) |
| Adults 18 years and older | 4,551 (92%) |
| Seniors 65 years and older | 1,488 (30%) |

| Race Breakdown (ACS (American Community Survey)) - Persons (%) | |
|---|---|
| White | 1,712 (34%) |
| African-American | 571 (11%) |
| Hispanic-Origin | 4,677 (94%) |
| Asian | 46 (1%) |
| Hawaiian/Pacific Islander | 0 (0%) |
| American Indian | 1 (0%) |
| Other/Multiracial | 907 (18%) |

| Education Level (Persons 25 & older) (ACS (American Community Survey)) - Persons (%) | |
|---|---|
| Less than 9th Grade | 204 (4.88%) |
| 9th through 12th Grade | 179 (4.28%) |
| High School Diploma | 463 (11.07%) |
| Some College/2-year | 337 (8.06%) |
| B.S./B.A. (Bachelor of Science/Bachelor of Arts) or More | 2,663 (63.68%) |

# Detailed Facility Report

Facility Summary

**PACE ANALYTICAL INC**

**B & C, SAN GERMAN, PR 00683**

**FRS (Facility Registry Service) ID:** 110007806320

**EPA Region:** 02

**Latitude:** 18.075618

**Longitude:** -67.027181

**Locational Data Source:** RCRAINFO

**Industries:** Professional, Scientific, and Technical Services

**Indian Country:** N

## Enforcement and Compliance Summary

| Statute | RCRA |
|---|---|
| Compliance Monitoring Activities (5 years) | 1 |
| Date of Last Compliance Monitoring Activity | 12/21/2023 |
| Compliance Status | No Violation Identified |
| Qtrs in Noncompliance (of 12) | 2 |
| Qtrs with Significant Violation | 0 |
| Informal Enforcement Actions (5 years) | 1 |
| Formal Enforcement Actions (5 years) | -- |
| Penalties from Formal Enforcement Actions (5 years) | -- |
| EPA Cases (5 years) | -- |
| Penalties from EPA Cases (5 years) | -- |

## Regulatory Information

**Clean Air Act (CAA):** No Information

**Clean Water Act (CWA):** No Information

**Resource Conservation and Recovery Act (RCRA):** Active LQG, (PRD090235227)

**Safe Drinking Water Act (SDWA):** No Information

## Other Regulatory Reports

**Air Emissions Inventory (EIS):** No Information

**Greenhouse Gas Emissions (eGGRT):** No Information

**Toxic Releases (TRI):** No Information

**Compliance and Emissions Data Reporting Interface (CEDRI):** No Information

Go To Enforcement/Compliance Details

Known Data Problems <https://epa.gov/resources/echo-data/known-data-problems>

Facility/System Characteristics

## Facility/System Characteristics

| System | Statute | Identifier | Universe | Status | Areas | Permit Expiration Date | Indian Country | Latitude | Longitude |
|---|---|---|---|---|---|---|---|---|---|
| FRS | | 110007806320 | | | | | N | 18.075618 | -67.027181 |
| RCRAInfo | RCRA | PRD090235227 | LQG | Active (H ) | | | N | 18.075618 | -67.027181 |

## Facility Address

| System | Statute | Identifier | Facility Name | Facility Address | Facility County |
|---|---|---|---|---|---|
| FRS | | 110007806320 | PACE ANALYTICAL INC | B & C, SAN GERMAN, PR 00683 | San Germán Municipio |
| RCRAInfo | RCRA | PRD090235227 | PACE ANALYTICAL INC | CALLE B & CALLE C - EL RETIRO INDUSTRIAL ZONE, SAN GERMAN, PR 00683 | San Germán Municipio |

## Facility SIC (Standard Industrial Classification) Codes

| System | Identifier | SIC Code | SIC Description |
|---|---|---|---|

No data records returned

## Facility NAICS (North American Industry Classification System) Codes

| System | Identifier | NAICS Code | NAICS Description |
|---|---|---|---|
| RCRAInfo | PRD090235227 | 541380 | Testing Laboratories and Services |

## Facility Tribe Information

| Reservation Name | Tribe Name | EPA Tribal ID | Distance to Tribe (miles) |
|---|---|---|---|

No data records returned

Enforcement and Compliance

# RCRA (Hazardous Waste (Resource Conservation and Recovery Act ) Compliance Pipeline (Compliance Monitoring → Violations → Enforcement Actions) (10 Years)

*This table shows how violations relate to compliance monitoring (CM) activities and enforcement. Currently available for CAA and RCRA only. Full CM history available below.*

| Compliance Monitoring | | | | Violations | | | | Enforcement Actions | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Source ID | Compliance Monitoring Type | Compliance Monitoring Agency | Compliance Monitoring Date | Violation Type | Violation Agency | Violation Determined Date | Return to Compliance Date | Enforcement Type | Enforcement Action Date | Penalty Assessed | Comp Action Cost |
| PRD090235227 | Compliance Evaluation Inspection | EPA | 12/21/2023 | 262.A: Generators - General<br>262.A: Generators - General | EPA<br>EPA | 01/16/2024<br>01/16/2024 | 06/26/2024<br>06/26/2024 | Written Informal | 03/06/2024 | -- | -- |
| PRD090235227 | Compliance Evaluation Inspection | EPA | 06/26/2019 | No Violation Identified | -- | -- | -- | | | | |

*Entries in italics are not counted as compliance monitoring strategy activities. For programs without compliance monitoring strategies, entries in italics are not counted as on-site activities within EPA's Annual Results.*

## Compliance Monitoring History

Last 5 Years

| Statute | Source ID | System | Activity Type | Compliance Monitoring Type | Lead Agency | Date | Finding (if applicable) |
|---|---|---|---|---|---|---|---|
| *RCRA* | *PRD090235227* | *ICIS* | *Information Request* | *Formal* | *EPA* | *03/06/2024* | |
| RCRA | PRD090235227 | RCRAInfo/ICIS | Inspection/Evaluation | Compliance Evaluation Inspection | EPA | 12/21/2023 | Violations Or Compliance Issues Were Found |

*Entries in italics are not included in ECHO's Compliance Monitoring Activity counts because they are not compliance monitoring strategy* <https://www.epa.gov/compliance/compliance-monitoring-programs> *activities or because they are not counted as inspections within EPA's Annual Results* <https://www.epa.gov/enforcement/enforcement-data-

and-results>.

## Compliance Summary Data

| Statute | Source ID | Current SNC (Significant Noncompliance)/HPV (High Priority Violation) | Current As Of | Qtrs with NC (Noncompliance) (of 12) | Data Last Refreshed |
|---|---|---|---|---|---|
| RCRA | PRD090235227 | No | 11/29/2025 | 2 | 11/28/2025 |

## Three-Year Compliance History by Quarter

| Statute | Program/ Pollutant/Violation Type | | QTR 1 | QTR 2 | QTR 3 | QTR 4 | QTR 5 | QTR 6 | QTR 7 | QTR 8 | QTR 9 | QTR 10 | QTR 11 | QTR 12+ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| RCRA (Source ID: PRD090235227) | | | 01/01-03/31/23 | 04/01-06/30/23 | 07/01-09/30/23 | 10/01-12/31/23 | 01/01-03/31/24 | 04/01-06/30/24 | 07/01-09/30/24 | 10/01-12/31/24 | 01/01-03/31/25 | 04/01-06/30/25 | 07/01-09/30/25 | 10/01-12/31/25 |
| | Facility-Level Status | | No Violation Identified | No Violation Identified | No Violation Identified | No Violation Identified | Violation Identified | Violation | No Violation Identified | No Violation Identified | No Violation Identified | No Violation Identified | No Violation Identified | No Violation Identified |
| | Violation | Agency | | | | | | | | | | | | |
| RCRA | 262.A: Generators - General | EPA | | | | | 01/16/2024 | 06/26/2024 | | | | | | |
| RCRA | 262.A: Generators - General | EPA | | | | | 01/16/2024 | 06/26/2024 | | | | | | |

## Informal Enforcement Actions

Last 5 Years

| Statute | System | Source ID | Type of Action | Lead Agency | Date |
|---|---|---|---|---|---|
| RCRA | RCRAInfo | PRD090235227 | WRITTEN INFORMAL | EPA | 03/06/2024 |

*Entries in italics are not counted as "informal enforcement actions" in EPA policies pertaining to enforcement response tools.*

## Formal Enforcement Actions

Last 5 Years

| Statute | System | Law/ Section | Source ID | Type of Action | Case No. | Lead Agency | Case Name | Issued/ Filed Date | Settlements/ Actions | Settlement/ Action Date | Federal Penalty Assessed | State/ Local Penalty Assessed | Penalty Amount Collected | SEP Value | Comp Action Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|

No data records returned

Environmental Conditions

## Watersheds

| 12-Digit WBD (Watershed Boundary Dataset) HUC (RAD (Reach Address Database)) | WBD (Watershed Boundary Dataset) Subwatershed Name (RAD (Reach Address Database)) | State Water Body Name (ICIS (Integrated Compliance Information System)) | Beach Closures Within Last Year | Beach Closures Within Last Two Years | Pollutants Potentially Related to Impairment | Watershed with ESA (Endangered Species Act)-listed Aquatic Species? |
|---|---|---|---|---|---|---|

No data records returned

## Assessed Waters From Latest State Submission (ATTAINS)

| State | Report Cycle | Assessment Unit ID | Assessment Unit Name | Water Condition | Cause Groups Impaired | Drinking Water Use | Ecological Use | Fish Consumption Use | Recreation Use | Other Use |
|---|---|---|---|---|---|---|---|---|---|---|

No data records returned

## Air Quality Nonattainment Areas

| Pollutant | Within Nonattainment Status Area? | Nonattainment Status Applicable Standard(s) | Within Maintenance Status Area? | Maintenance Status Applicable Standard(s) |
|---|---|---|---|---|

No data records returned

Pollutants

## Toxics Release Inventory History of Reported Chemicals Released or Transferred in Pounds per Year at Site

| TRI Facility ID | Year | Air Emissions | Surface Water Discharges | Off-Site Transfers to POTWs (Publicly Owned Treatment Works) | Underground Injections | Disposal to Land | Total On-Site Releases | Total Off-Site Transfers |
|---|---|---|---|---|---|---|---|---|

No data records returned

## Toxics Release Inventory Total Releases and Transfers in Pounds by Chemical and Year

| Chemical Name |
|---|

No data records returned

## e-Manifest Hazardous Waste History (Public)

### Hazardous Waste Shipped in Kilograms by Year (Through 30/8/2025)

| Source ID | Waste Description | 2022 | 2023 | 2024 | 2025 |
|---|---|---|---|---|---|
| PRD090235227 | Hazardous Waste | 3,307 | 2,978 | 2,027 | 1,255 |
| PRD090235227 | Acute Hazardous Waste | 0 - 780 | 0 - 871 | 0 - 205 | 1 - 2 |
| PRD090235227 | Pharmaceutical Hazardous Waste | 0 | 0 | 0 | 0 |

“Pharmaceutical Hazardous Waste” refers to quantities managed under 40 CFR part 266 subpart P and thus excluded from the Hazardous and Acute Hazardous Waste quantities shown above.

Community

# Demographic Profile of Surrounding Area (1-Mile Radius)

This section provides demographic information regarding the community surrounding the facility. ECHO compliance data alone are not sufficient to determine whether violations at a particular facility had negative impacts on public health or the environment. Statistics are based upon the 2023 American Community Survey (ACS) 5-year Summary and are accurate to the extent that the facility latitude and longitude listed below are correct. Census boundaries and demographic data for U.S. Territories are based on the "2020 Island Areas Demographic Profiles" from the U.S. Census Bureau. EPA’s spatial processing methodology considers the overlap between the selected radii and ACS census block groups in determining the demographics surrounding the facility. For more detail about this methodology, see the DFR Data Dictionary <https://epa.gov/help/reports/dfr-data-dictionary#demographic>.

| General Statistics (ACS (American Community Survey)) | |
|---|---|
| Total Persons | 5,666 |
| Population Density | 1,805/sq.mi. |
| Housing Units in Area | 4,266 |
| Percent People of Color | 94% |
| Households in Area | 3,163 |
| Households on Public Assistance | 130 |
| Persons With Low Income | 2,486 |
| Percent With Low Income | 44% |

| Geography | |
|---|---|
| Radius of Selected Area | 1 mi. |
| Center Latitude | 18.075618 |
| Center Longitude | -67.027181 |
| Total Area | 3.14 sq.mi. |
| Land Area | 100% |
| Water Area | 0% |

| Income Breakdown (ACS (American Community Survey)) - Households (%) | |
|---|---|
| Less than $15,000 | 634 (20.04%) |
| $15,000 - $25,000 | 365 (11.54%) |
| $25,000 - $50,000 | 669 (21.15%) |
| $50,000 - $75,000 | 307 (9.71%) |
| Greater than $75,000 | 1,188 (37.56%) |

| Age Breakdown (ACS (American Community Survey)) - Persons (%) | |
|---|---|
| Children 5 years and younger | 192 (3%) |
| Minors 17 years and younger | 485 (9%) |
| Adults 18 years and older | 5,179 (91%) |
| Seniors 65 years and older | 1,659 (29%) |

| Race Breakdown (ACS (American Community Survey)) - Persons (%) | |
|---|---|
| White | 2,310 (41%) |
| African-American | 275 (5%) |
| Hispanic-Origin | 5,144 (91%) |
| Asian | 134 (2%) |
| Hawaiian/Pacific Islander | 0 (0%) |
| American Indian | 9 (0%) |
| Other/Multiracial | 983 (17%) |

| Education Level (Persons 25 & older) (ACS (American Community Survey)) - Persons (%) | |
|---|---|
| Less than 9th Grade | 267 (5.49%) |
| 9th through 12th Grade | 259 (5.32%) |
| High School Diploma | 395 (8.12%) |
| Some College/2-year | 418 (8.59%) |
| B.S./B.A. (Bachelor of Science/Bachelor of Arts) or More | 3,193 (65.61%) |

# Detailed Facility Report

Facility Summary

**PAVEMENT REHABILITATION AND SAFETY IMPROVEMENTS, PR-101, FROM KM 0.0 TO KM 10.0**

**CARRETERA PR-101 KM 0.0 TO KM 10.0, SAN GERMAN, PR 00683**

**FRS (Facility Registry Service) ID:** 110071662085

**EPA Region:** 02

**Latitude:** 18.0756

**Longitude:** -67.0415

**Locational Data Source:** NPDES

**Industries:** --

**Indian Country:** N

## Enforcement and Compliance Summary

| Statute | CWA |
|---|---|
| Compliance Monitoring Activities (5 years) | -- |
| Date of Last Compliance Monitoring Activity | -- |
| Compliance Status | No Violation Identified |
| Qtrs in Noncompliance (of 12) | 0 |
| Qtrs with Significant Violation | 0 |
| Informal Enforcement Actions (5 years) | -- |
| Formal Enforcement Actions (5 years) | -- |
| Penalties from Formal Enforcement Actions (5 years) | -- |
| EPA Cases (5 years) | -- |
| Penalties from EPA Cases (5 years) | -- |

## Regulatory Information

**Clean Air Act (CAA):** No Information

**Clean Water Act (CWA):** Non-Major, Permit Effective (PRR1000IW)

**Resource Conservation and Recovery Act (RCRA):** No Information

**Safe Drinking Water Act (SDWA):** No Information

## Other Regulatory Reports

**Air Emissions Inventory (EIS):** No Information

**Greenhouse Gas Emissions (eGGRT):** No Information

**Toxic Releases (TRI):** No Information

**Compliance and Emissions Data Reporting Interface (CEDRI):** No Information

Go To Enforcement/Compliance Details

Known Data Problems <https://epa.gov/resources/echo-data/known-data-problems>

Facility/System Characteristics

## Facility/System Characteristics

| System | Statute | Identifier | Universe | Status | Areas | Permit Expiration Date | Indian Country | Latitude | Longitude |
|---|---|---|---|---|---|---|---|---|---|
| FRS | | 110071662085 | | | | | N | 18.0756 | -67.0415 |
| ICIS-NPDES | CWA | PRR1000IW | Non-Major: General Permit Covered Facility | Effective | Construction Stormwater | 02/16/2027 | N | 18.0756 | -67.0415 |

## Facility Address

| System | Statute | Identifier | Facility Name | Facility Address | Facility County |
|---|---|---|---|---|---|
| FRS | | 110071662085 | PAVEMENT REHABILITATION AND SAFETY IMPROVEMENTS, PR-101, FROM KM 0.0 TO KM 10.0 | CARRETERA PR-101 KM 0.0 TO KM 10.0, SAN GERMAN, PR 00683 | |
| ICIS-NPDES | CWA | PRR1000IW | PAVEMENT REHABILITATION AND SAFETY IMPROVEMENTS, PR-101, FROM KM 0.0 TO KM 10.0 | CARRETERA PR-101 KM 0.0 TO KM 10.0, SAN GERMAN, PR 00683 | |

## Facility SIC (Standard Industrial Classification) Codes

## Facility NAICS (North American Industry Classification System) Codes

| System | Identifier | SIC Code | SIC Description |
|---|---|---|---|

No data records returned

| System | Identifier | NAICS Code | NAICS Description |
|---|---|---|---|

No data records returned

## Facility Industrial Effluent Guidelines

| Identifier | Effluent Guideline (40 CFR Part) | Effluent Guideline Description |
|---|---|---|

No data records returned

## Facility Tribe Information

| Reservation Name | Tribe Name | EPA Tribal ID | Distance to Tribe (miles) |
|---|---|---|---|

No data records returned

Enforcement and Compliance

## Compliance Monitoring History

Last 5 Years

| Statute | Source ID | System | Activity Type | Compliance Monitoring Type | Lead Agency | Date | Finding (if applicable) |
|---|---|---|---|---|---|---|---|

No data records returned

*Entries in italics are not included in ECHO's Compliance Monitoring Activity counts because they are not compliance monitoring strategy* <https://www.epa.gov/compliance/compliance-monitoring-programs> *activities or because they are not counted as inspections within EPA's Annual Results* <https://www.epa.gov/enforcement/enforcement-data-and-results>.

## Compliance Summary Data

| Statute | Source ID | Current SNC (Significant Noncompliance)/HPV (High Priority Violation) | Current As Of | Qtrs with NC (Noncompliance) (of 12) | Data Last Refreshed |
|---|---|---|---|---|---|
| CWA | PRR1000IW | No | 06/30/2025 | 0 | 11/28/2025 |

## Three-Year Compliance History by Quarter

| Statute | Program/ Pollutant/ Violation Type | QTR 1 | QTR 2 | QTR 3 | QTR 4 | QTR 5 | QTR 6 | QTR 7 | QTR 8 | QTR 9 | QTR 10 | QTR 11 | QTR 12 | QTR 13+ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CWA (Source ID: PRR1000IW) | | 07/01-09/30/22 | 10/01-12/31/22 | 01/01-03/31/23 | 04/01-06/30/23 | 07/01-09/30/23 | 10/01-12/31/23 | 01/01-03/31/24 | 04/01-06/30/24 | 07/01-09/30/24 | 10/01-12/31/24 | 01/01-03/31/25 | 04/01-06/30/25 | 07/01-11/28/25 |
| | Facility-Level Status | No Violation Identified | No Violation Identified | No Violation Identified | No Violation Identified | No Violation Identified | No Violation Identified | No Violation Identified | No Violation Identified | No Violation Identified | No Violation Identified | No Violation Identified | No Violation Identified | Undetermined |
| | Quarterly Noncompliance Report History | | | | | | | | | | | | | |

## Informal Enforcement Actions

Last 5 Years

| Statute | System | Source ID | Type of Action | Lead Agency | Date |
|---|---|---|---|---|---|

No data records returned

*Entries in italics are not counted as "informal enforcement actions" in EPA policies pertaining to enforcement response tools.*

## Formal Enforcement Actions

Last 5 Years

| Statute | System | Law/ Section | Source ID | Type of Action | Case No. | Lead Agency | Case Name | Issued/ Filed Date | Settlements/ Actions | Settlement/ Action Date | Federal Penalty Assessed | State/ Local Penalty Assessed | Penalty Amount Collected | SEP Value | Comp Action Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|

No data records returned

Environmental Conditions

## Watersheds

| 12-Digit WBD (Watershed Boundary Dataset) HUC (RAD (Reach Address Database)) | WBD (Watershed Boundary Dataset) Subwatershed Name (RAD (Reach Address Database)) | State Water Body Name (ICIS (Integrated Compliance Information System)) | Beach Closures Within Last Year | Beach Closures Within Last Two Years | Pollutants Potentially Related to Impairment | Watershed with ESA (Endangered Species Act)-listed Aquatic Species? |
|---|---|---|---|---|---|---|
| 210100030409 | Rio Guanajibo at mouth | EL CHORRO RIVER (TRIBUTARY OF GUANAJIBO RIVER), MARESUA RIVER (TRIBUTARY OF GUANAJIBO RIVER), MARGARA RIVER (TRIBUTARY OF GUANAJIBO RIVER), PLANTINA RIVER (TRIBUTARY OF GUANAJIBO RIVER), PRINCIPAL WATER IRRIGATION | No | No | -- | No |

## Assessed Waters From Latest State Submission (ATTAINS)

| State | Report Cycle | Assessment Unit ID | Assessment Unit Name | Water Condition | Cause Groups Impaired | Drinking Water Use | Ecological Use | Fish Consumption Use | Recreation Use | Other Use |
|---|---|---|---|---|---|---|---|---|---|---|
| PR | 2024 | PRWR77A | RIO GUANAJIBO | Impaired - 303(d) Listed - With Restoration Plan | METALS (OTHER THAN MERCURY) \| NUTRIENTS \| ORGANIC ENRICHMENT/OXYGEN DEPLETION \| PATHOGENS \| TOXIC INORGANICS \| TURBIDITY | Not Supporting | Not Supporting | -- | Not Supporting | -- |

## Air Quality Nonattainment Areas

| Pollutant | Within Nonattainment Status Area? | Nonattainment Status Applicable Standard(s) | Within Maintenance Status Area? | Maintenance Status Applicable Standard(s) |
|---|---|---|---|---|

No data records returned

Pollutants

## Toxics Release Inventory History of Reported Chemicals Released or Transferred in Pounds per

## Year at Site

| TRI Facility ID | Year | Air Emissions | Surface Water Discharges | Off-Site Transfers to POTWs (Publicly Owned Treatment Works) | Underground Injections | Disposal to Land | Total On-Site Releases | Total Off-Site Transfers |
|---|---|---|---|---|---|---|---|---|

No data records returned

## Toxics Release Inventory Total Releases and Transfers in Pounds by Chemical and Year

| Chemical Name |
|---|

No data records returned

## CWA (Clean Water Act) Discharge Monitoring Report (DMR) Pollutant Loadings

DMR and TRI Multi-Year Loading Report

| NPDES ID | Description |
|---|---|

No data records returned

Community

## Demographic Profile of Surrounding Area (1-Mile Radius)

This section provides demographic information regarding the community surrounding the facility. ECHO compliance data alone are not sufficient to determine whether violations at a particular facility had negative impacts on public health or the environment. Statistics are based upon the 2023 American Community Survey (ACS) 5-year Summary and are accurate to the extent that the facility latitude and longitude listed below are correct. Census boundaries and demographic data for U.S. Territories are based on the "2020 Island Areas Demographic Profiles" from the U.S. Census Bureau. EPA's spatial processing methodology considers the overlap between the selected radii and ACS census block groups in determining the demographics surrounding the facility. For more detail about this methodology, see the DFR Data Dictionary <https://epa.gov/help/reports/dfr-data-dictionary#demographic>.

| General Statistics (ACS (American Community Survey)) | |
|---|---|
| Total Persons | 4,963 |
| Population Density | 1,581/sq.mi. |
| Housing Units in Area | 3,694 |
| Percent People of Color | 96% |
| Households in Area | 2,560 |
| Households on Public Assistance | 109 |
| Persons With Low Income | 2,326 |
| Percent With Low Income | 47% |

| Geography | |
|---|---|
| Radius of Selected Area | 1 mi. |
| Center Latitude | 18.0756 |
| Center Longitude | -67.0415 |
| Total Area | 3.14 sq.mi. |
| Land Area | 100% |
| Water Area | 0% |

| Income Breakdown (ACS (American Community Survey)) - Households (%) | |
|---|---|
| Less than $15,000 | 480 (18.75%) |
| $15,000 - $25,000 | 349 (13.63%) |
| $25,000 - $50,000 | 630 (24.61%) |
| $50,000 - $75,000 | 228 (8.91%) |
| Greater than $75,000 | 873 (34.1%) |

| Age Breakdown (ACS (American Community Survey)) - Persons (%) | |
|---|---|
| Children 5 years and younger | 129 (3%) |
| Minors 17 years and younger | 417 (8%) |
| Adults 18 years and older | 4,545 (92%) |
| Seniors 65 years and older | 1,428 (29%) |

| Race Breakdown (ACS (American Community Survey)) - Persons (%) | |
|---|---|
| White | 1,659 (33%) |
| African-American | 620 (12%) |
| Hispanic-Origin | 4,639 (93%) |
| Asian | 33 (1%) |
| Hawaiian/Pacific Islander | 0 (0%) |
| American Indian | 4 (0%) |
| Other/Multiracial | 853 (17%) |

| Education Level (Persons 25 & older) (ACS (American Community Survey)) - Persons (%) | |
|---|---|
| Less than 9th Grade | 177 (4.23%) |
| 9th through 12th Grade | 154 (3.68%) |
| High School Diploma | 453 (10.82%) |
| Some College/2-year | 322 (7.69%) |
| B.S./B.A. (Bachelor of Science/Bachelor of Arts) or More | 2,744 (65.57%) |

# Detailed Facility Report

Facility Summary

**PEP BOYS MANNY MOE & JACK THE 907**

**PR-122 KM 1.1, SAN GERMAN, PR 00683**

**FRS (Facility Registry Service) ID:** 110004891706

**EPA Region:** 02

**Latitude:** 18.052446

**Longitude:** -67.0491

**Locational Data Source:** RCRAINFO

**Industries:** --

**Indian Country:** N

## Enforcement and Compliance Summary

| Statute | RCRA |
|---|---|
| Compliance Monitoring Activities (5 years) | -- |
| Date of Last Compliance Monitoring Activity | -- |
| Compliance Status | No Violation Identified |
| Qtrs in Noncompliance (of 12) | 0 |
| Qtrs with Significant Violation | 0 |
| Informal Enforcement Actions (5 years) | -- |
| Formal Enforcement Actions (5 years) | -- |
| Penalties from Formal Enforcement Actions (5 years) | -- |
| EPA Cases (5 years) | -- |
| Penalties from EPA Cases (5 years) | -- |

## Regulatory Information

**Clean Air Act (CAA):** No Information

**Clean Water Act (CWA):** No Information

**Resource Conservation and Recovery Act (RCRA):** Inactive Other, (PRR000000869)

**Safe Drinking Water Act (SDWA):** No Information

## Other Regulatory Reports

**Air Emissions Inventory (EIS):** No Information

**Greenhouse Gas Emissions (eGGRT):** No Information

**Toxic Releases (TRI):** No Information

**Compliance and Emissions Data Reporting Interface (CEDRI):** No Information

Go To Enforcement/Compliance Details

Known Data Problems <https://epa.gov/resources/echo-data/known-data-problems>

Facility/System Characteristics

## Facility/System Characteristics

| System | Statute | Identifier | Universe | Status | Areas | Permit Expiration Date | Indian Country | Latitude | Longitude |
|---|---|---|---|---|---|---|---|---|---|
| FRS | | 110004891706 | | | | | N | 18.052446 | -67.0491 |
| RCRAInfo | RCRA | PRR000000869 | Other | Inactive ( ) | | | N | 18.052446 | -67.0491 |

## Facility Address

| System | Statute | Identifier | Facility Name | Facility Address | Facility County |
|---|---|---|---|---|---|
| FRS | | 110004891706 | PEP BOYS MANNY MOE & JACK THE 907 | PR-122 KM 1.1, SAN GERMAN, PR 00683 | San Germán Municipio |
| RCRAInfo | RCRA | PRR000000869 | PEP BOYS MANNY MOE & JACK THE #907 | CARRETERA ESTATAL #122 KM 1.1, SAN GERMAN, PR 00683 | San Germán Municipio |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | | | | |

No data records returned

*Entries in italics are not included in ECHO's Compliance Monitoring Activity counts because they are not compliance monitoring strategy* <https://www.epa.gov/compliance/compliance-monitoring-programs> *activities or because they are not counted as inspections within EPA's Annual Results* <https://www.epa.gov/enforcement/enforcement-data-and-results>.

## Compliance Summary Data

| Statute | Source ID | Current SNC (Significant Noncompliance)/HPV (High Priority Violation) | Current As Of | Qtrs with NC (Noncompliance) (of 12) | Data Last Refreshed |
|---|---|---|---|---|---|
| RCRA | PRR000000869 | No | 12/06/2025 | 0 | 12/05/2025 |

## Three-Year Compliance History by Quarter

| Statute | Program/ Pollutant/ Violation Type | QTR 1 | QTR 2 | QTR 3 | QTR 4 | QTR 5 | QTR 6 | QTR 7 | QTR 8 | QTR 9 | QTR 10 | QTR 11 | QTR 12+ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| RCRA (Source ID: PRR000000869) | | 01/01-03/31/23 | 04/01-06/30/23 | 07/01-09/30/23 | 10/01-12/31/23 | 01/01-03/31/24 | 04/01-06/30/24 | 07/01-09/30/24 | 10/01-12/31/24 | 01/01-03/31/25 | 04/01-06/30/25 | 07/01-09/30/25 | 10/01-12/31/25 |
| | Facility-Level Status | No Violation Identified | No Violation Identified | No Violation Identified | No Violation Identified | No Violation Identified | No Violation Identified | No Violation Identified | No Violation Identified | No Violation Identified | No Violation Identified | No Violation Identified | No Violation Identified |
| | Violation Agency | | | | | | | | | | | | |

## Informal Enforcement Actions

Last 5 Years

| Statute | System | Source ID | Type of Action | Lead Agency | Date |
|---|---|---|---|---|---|

No data records returned

*Entries in italics are not counted as "informal enforcement actions" in EPA policies pertaining to enforcement response tools.*

## Formal Enforcement Actions

Last 5 Years

| Statute | System | Law/ Section | Source ID | Type of Action | Case No. | Lead Agency | Case Name | Issued/ Filed Date | Settlements/ Actions | Settlement/ Action Date | Federal Penalty Assessed | State/ Local Penalty Assessed | Penalty Amount Collected | SEP Value | Comp Action Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|

No data records returned

Environmental Conditions

## Watersheds

| 12-Digit WBD (Watershed Boundary Dataset) HUC (RAD (Reach Address Database)) | WBD (Watershed Boundary Dataset) Subwatershed Name (RAD (Reach Address Database)) | State Water Body Name (ICIS (Integrated Compliance Information System)) | Beach Closures Within Last Year | Beach Closures Within Last Two Years | Pollutants Potentially Related to Impairment | Watershed with ESA (Endangered Species Act)-listed Aquatic Species? |
|---|---|---|---|---|---|---|

No data records returned

## Assessed Waters From Latest State Submission (ATTAINS)

| State | Report Cycle | Assessment Unit ID | Assessment Unit Name | Water Condition | Cause Groups Impaired | Drinking Water Use | Ecological Use | Fish Consumption Use | Recreation Use | Other Use |
|---|---|---|---|---|---|---|---|---|---|---|

No data records returned

## Air Quality Nonattainment Areas

| Pollutant | Within Nonattainment Status Area? | Nonattainment Status Applicable Standard(s) | Within Maintenance Status Area? | Maintenance Status Applicable Standard(s) |
|---|---|---|---|---|

No data records returned

Pollutants

## Toxics Release Inventory History of Reported Chemicals Released or Transferred in Pounds per Year at Site

| TRI Facility ID | Year | Air Emissions | Surface Water Discharges | Off-Site Transfers to POTWs (Publicly Owned Treatment Works) | Underground Injections | Disposal to Land | Total On-Site Releases | Total Off-Site Transfers |
|---|---|---|---|---|---|---|---|---|

No data records returned

## Toxics Release Inventory Total Releases and Transfers in Pounds by Chemical and Year

| Chemical Name |
|---|

No data records returned

# Demographic Profile of Surrounding Area (1-Mile Radius)

This section provides demographic information regarding the community surrounding the facility. ECHO compliance data alone are not sufficient to determine whether violations at a particular facility had negative impacts on public health or the environment. Statistics are based upon the 2023 American Community Survey (ACS) 5-year Summary and are accurate to the extent that the facility latitude and longitude listed below are correct. Census boundaries and demographic data for U.S. Territories are based on the "2020 Island Areas Demographic Profiles" from the U.S. Census Bureau. EPA's spatial processing methodology considers the overlap between the selected radii and ACS census block groups in determining the demographics surrounding the facility. For more detail about this methodology, see the DFR Data Dictionary <https://epa.gov/help/reports/dfr-data-dictionary#demographic>.

| General Statistics (ACS (American Community Survey)) | |
|---|---|
| Total Persons | 7,950 |
| Population Density | 2,532/sq.mi. |
| Housing Units in Area | 3,244 |
| Percent People of Color | 100% |
| Households in Area | 2,577 |
| Households on Public Assistance | 28 |
| Persons With Low Income | 6,335 |
| Percent With Low Income | 80% |

| Geography | |
|---|---|
| Radius of Selected Area | 1 mi. |
| Center Latitude | 18.052446 |
| Center Longitude | -67.0491 |
| Total Area | 3.14 sq.mi. |
| Land Area | 100% |
| Water Area | 0% |

| Income Breakdown (ACS (American Community Survey)) - Households (%) | |
|---|---|
| Less than $15,000 | 1,032 (40.06%) |
| $15,000 - $25,000 | 388 (15.06%) |
| $25,000 - $50,000 | 618 (23.99%) |
| $50,000 - $75,000 | 332 (12.89%) |
| Greater than $75,000 | 206 (8%) |

| Age Breakdown (ACS (American Community Survey)) - Persons (%) | |
|---|---|
| Children 5 years and younger | 305 (4%) |
| Minors 17 years and younger | 1,560 (20%) |
| Adults 18 years and older | 6,392 (80%) |
| Seniors 65 years and older | 1,868 (23%) |

| Race Breakdown (ACS (American Community Survey)) - Persons (%) | |
|---|---|
| White | 2,343 (29%) |
| African-American | 1,136 (14%) |
| Hispanic-Origin | 7,900 (99%) |
| Asian | 10 (0%) |
| Hawaiian/Pacific Islander | 0 (0%) |
| American Indian | 1 (0%) |
| Other/Multiracial | 3,980 (50%) |

| Education Level (Persons 25 & older) (ACS (American Community Survey)) - Persons (%) | |
|---|---|
| Less than 9th Grade | 1,137 (19.76%) |
| 9th through 12th Grade | 284 (4.93%) |
| High School Diploma | 1,800 (31.28%) |
| Some College/2-year | 521 (9.05%) |
| B.S./B.A. (Bachelor of Science/Bachelor of Arts) or More | 1,303 (22.64%) |

# Detailed Facility Report

Facility Summary

**PR INDUSTRIAL DEVELOPMENT CO**

**RD 102 KM 33.2, SAN GERMAN, PR 00683**

**FRS (Facility Registry Service) ID:** 110007820563

**EPA Region:** 02

**Latitude:** 18.078796

**Longitude:** -67.030578

**Locational Data Source:** RCRAINFO

**Industries:** --

**Indian Country:** N

## Enforcement and Compliance Summary

| Statute | RCRA |
|---|---|
| Compliance Monitoring Activities (5 years) | -- |
| Date of Last Compliance Monitoring Activity | -- |
| Compliance Status | No Violation Identified |
| Qtrs in Noncompliance (of 12) | 0 |
| Qtrs with Significant Violation | 0 |
| Informal Enforcement Actions (5 years) | -- |
| Formal Enforcement Actions (5 years) | -- |
| Penalties from Formal Enforcement Actions (5 years) | -- |
| EPA Cases (5 years) | -- |
| Penalties from EPA Cases (5 years) | -- |

## Regulatory Information

**Clean Air Act (CAA):** No Information

**Clean Water Act (CWA):** No Information

**Resource Conservation and Recovery Act (RCRA):** Inactive Other, (PRR000007591)

**Safe Drinking Water Act (SDWA):** No Information

## Other Regulatory Reports

**Air Emissions Inventory (EIS):** No Information

**Greenhouse Gas Emissions (eGGRT):** No Information

**Toxic Releases (TRI):** No Information

**Compliance and Emissions Data Reporting Interface (CEDRI):** No Information

Go To Enforcement/Compliance Details

Known Data Problems <https://epa.gov/resources/echo-data/known-data-problems>

Facility/System Characteristics

## Facility/System Characteristics

| System | Statute | Identifier | Universe | Status | Areas | Permit Expiration Date | Indian Country | Latitude | Longitude |
|---|---|---|---|---|---|---|---|---|---|
| FRS | | 110007820563 | | | | | N | 18.078796 | -67.030578 |
| RCRAInfo | RCRA | PRR000007591 | Other | Inactive ( ) | | | N | 18.078796 | -67.030578 |

## Facility Address

| System | Statute | Identifier | Facility Name | Facility Address | Facility County |
|---|---|---|---|---|---|
| FRS | | 110007820563 | PR INDUSTRIAL DEVELOPMENT CO | RD 102 KM 33.2, SAN GERMAN, PR 00683 | San Germán Municipio |
| RCRAInfo | RCRA | PRR000007591 | PR INDUSTRIAL DEVELOPMENT CO | RD 102 KM 33.2, SAN GERMAN, PR 00683 | San Germán Municipio |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | | | | | | |

No data records returned

*Entries in italics are not included in ECHO's Compliance Monitoring Activity counts because they are not compliance monitoring strategy* <https://www.epa.gov/compliance/compliance-monitoring-programs> *activities or because they are not counted as inspections within EPA's Annual Results* <https://www.epa.gov/enforcement/enforcement-data-and-results>.

## Compliance Summary Data

| Statute | Source ID | Current SNC (Significant Noncompliance)/HPV (High Priority Violation) | Current As Of | Qtrs with NC (Noncompliance) (of 12) | Data Last Refreshed |
|---|---|---|---|---|---|
| RCRA | PRR000007591 | No | 11/29/2025 | 0 | 11/28/2025 |

## Three-Year Compliance History by Quarter

| Statute | Program/ Pollutant/ Violation Type | QTR 1 | QTR 2 | QTR 3 | QTR 4 | QTR 5 | QTR 6 | QTR 7 | QTR 8 | QTR 9 | QTR 10 | QTR 11 | QTR 12+ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| RCRA (Source ID: PRR000007591) | | 01/01-03/31/23 | 04/01-06/30/23 | 07/01-09/30/23 | 10/01-12/31/23 | 01/01-03/31/24 | 04/01-06/30/24 | 07/01-09/30/24 | 10/01-12/31/24 | 01/01-03/31/25 | 04/01-06/30/25 | 07/01-09/30/25 | 10/01-12/31/25 |
| | Facility-Level Status | No Violation Identified | No Violation Identified | No Violation Identified | No Violation Identified | No Violation Identified | No Violation Identified | No Violation Identified | No Violation Identified | No Violation Identified | No Violation Identified | No Violation Identified | No Violation Identified |
| | Violation Agency | | | | | | | | | | | | |

## Informal Enforcement Actions

Last 5 Years

| Statute | System | Source ID | Type of Action | Lead Agency | Date |
|---|---|---|---|---|---|

No data records returned

*Entries in italics are not counted as "informal enforcement actions" in EPA policies pertaining to enforcement response tools.*

## Formal Enforcement Actions

Last 5 Years

| Statute | System | Law/ Section | Source ID | Type of Action | Case No. | Lead Agency | Case Name | Issued/ Filed Date | Settlements/ Actions | Settlement/ Action Date | Federal Penalty Assessed | State/ Local Penalty Assessed | Penalty Amount Collected | SEP Value | Comp Action Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|

No data records returned

Environmental Conditions

## Watersheds

| 12-Digit WBD (Watershed Boundary Dataset) HUC (RAD (Reach Address Database)) | WBD (Watershed Boundary Dataset) Subwatershed Name (RAD (Reach Address Database)) | State Water Body Name (ICIS (Integrated Compliance Information System)) | Beach Closures Within Last Year | Beach Closures Within Last Two Years | Pollutants Potentially Related to Impairment | Watershed with ESA (Endangered Species Act)-listed Aquatic Species? |
|---|---|---|---|---|---|---|

No data records returned

## Assessed Waters From Latest State Submission (ATTAINS)

| State | Report Cycle | Assessment Unit ID | Assessment Unit Name | Water Condition | Cause Groups Impaired | Drinking Water Use | Ecological Use | Fish Consumption Use | Recreation Use | Other Use |
|---|---|---|---|---|---|---|---|---|---|---|

No data records returned

## Air Quality Nonattainment Areas

| Pollutant | Within Nonattainment Status Area? | Nonattainment Status Applicable Standard(s) | Within Maintenance Status Area? | Maintenance Status Applicable Standard(s) |
|---|---|---|---|---|

No data records returned

Pollutants

## Toxics Release Inventory History of Reported Chemicals Released or Transferred in Pounds per Year at Site

| TRI Facility ID | Year | Air Emissions | Surface Water Discharges | Off-Site Transfers to POTWs (Publicly Owned Treatment Works) | Underground Injections | Disposal to Land | Total On-Site Releases | Total Off-Site Transfers |
|---|---|---|---|---|---|---|---|---|

No data records returned

## Toxics Release Inventory Total Releases and Transfers in Pounds by Chemical and Year

| Chemical Name |
|---|

No data records returned

# Demographic Profile of Surrounding Area (1-Mile Radius)

This section provides demographic information regarding the community surrounding the facility. ECHO compliance data alone are not sufficient to determine whether violations at a particular facility had negative impacts on public health or the environment. Statistics are based upon the 2023 American Community Survey (ACS) 5-year Summary and are accurate to the extent that the facility latitude and longitude listed below are correct. Census boundaries and demographic data for U.S. Territories are based on the "2020 Island Areas Demographic Profiles" from the U.S. Census Bureau. EPA's spatial processing methodology considers the overlap between the selected radii and ACS census block groups in determining the demographics surrounding the facility. For more detail about this methodology, see the DFR Data Dictionary <https://epa.gov/help/reports/dfr-data-dictionary#demographic>.

| General Statistics (ACS (American Community Survey)) | |
|---|---|
| Total Persons | 5,792 |
| Population Density | 1,846/sq.mi. |
| Housing Units in Area | 4,362 |
| Percent People of Color | 94% |
| Households in Area | 3,170 |
| Households on Public Assistance | 133 |
| Persons With Low Income | 2,552 |
| Percent With Low Income | 44% |

| Geography | |
|---|---|
| Radius of Selected Area | 1 mi. |
| Center Latitude | 18.078796 |
| Center Longitude | -67.030578 |
| Total Area | 3.14 sq.mi. |
| Land Area | 100% |
| Water Area | 0% |

| Income Breakdown (ACS (American Community Survey)) - Households (%) | |
|---|---|
| Less than $15,000 | 634 (20.01%) |
| $15,000 - $25,000 | 371 (11.71%) |
| $25,000 - $50,000 | 663 (20.93%) |
| $50,000 - $75,000 | 289 (9.12%) |
| Greater than $75,000 | 1,211 (38.23%) |

| Age Breakdown (ACS (American Community Survey)) - Persons (%) | |
|---|---|
| Children 5 years and younger | 175 (3%) |
| Minors 17 years and younger | 509 (9%) |
| Adults 18 years and older | 5,282 (91%) |
| Seniors 65 years and older | 1,688 (29%) |

| Race Breakdown (ACS (American Community Survey)) - Persons (%) | |
|---|---|
| White | 2,314 (40%) |
| African-American | 344 (6%) |
| Hispanic-Origin | 5,290 (91%) |
| Asian | 120 (2%) |
| Hawaiian/Pacific Islander | 0 (0%) |
| American Indian | 5 (0%) |
| Other/Multiracial | 1,055 (18%) |

| Education Level (Persons 25 & older) (ACS (American Community Survey)) - Persons (%) | |
|---|---|
| Less than 9th Grade | 274 (5.55%) |
| 9th through 12th Grade | 258 (5.23%) |
| High School Diploma | 434 (8.79%) |
| Some College/2-year | 425 (8.61%) |
| B.S./B.A. (Bachelor of Science/Bachelor of Arts) or More | 3,191 (64.63%) |

# Detailed Facility Report

Facility Summary

**TEXACO PR INC SAN GERMAN SS**

**PR-102 KM 33.6, SAN GERMAN, PR 00683**

**FRS (Facility Registry Service) ID:** 110007821697

**EPA Region:** 02

**Latitude:** 18.077714

**Longitude:** -67.026969

**Locational Data Source:** RCRAINFO

**Industries:** --

**Indian Country:** N

## Enforcement and Compliance Summary

| Statute | RCRA |
|---|---|
| Compliance Monitoring Activities (5 years) | -- |
| Date of Last Compliance Monitoring Activity | -- |
| Compliance Status | No Violation Identified |
| Qtrs in Noncompliance (of 12) | 0 |
| Qtrs with Significant Violation | 0 |
| Informal Enforcement Actions (5 years) | -- |
| Formal Enforcement Actions (5 years) | -- |
| Penalties from Formal Enforcement Actions (5 years) | -- |
| EPA Cases (5 years) | -- |
| Penalties from EPA Cases (5 years) | -- |

## Regulatory Information

**Clean Air Act (CAA):** No Information

**Clean Water Act (CWA):** No Information

**Resource Conservation and Recovery Act (RCRA):** Inactive Other, (PRR000010298)

**Safe Drinking Water Act (SDWA):** No Information

## Other Regulatory Reports

**Air Emissions Inventory (EIS):** No Information

**Greenhouse Gas Emissions (eGGRT):** No Information

**Toxic Releases (TRI):** No Information

**Compliance and Emissions Data Reporting Interface (CEDRI):** No Information

Go To Enforcement/Compliance Details

Known Data Problems <https://epa.gov/resources/echo-data/known-data-problems>

Facility/System Characteristics

## Facility/System Characteristics

| System | Statute | Identifier | Universe | Status | Areas | Permit Expiration Date | Indian Country | Latitude | Longitude |
|---|---|---|---|---|---|---|---|---|---|
| FRS | | 110007821697 | | | | | N | 18.077714 | -67.026969 |
| RCRAInfo | RCRA | PRR000010298 | Other | Inactive ( ) | | | N | 18.077714 | -67.026969 |

## Facility Address

| System | Statute | Identifier | Facility Name | Facility Address | Facility County |
|---|---|---|---|---|---|
| FRS | | 110007821697 | TEXACO PR INC SAN GERMAN SS | PR-102 KM 33.6, SAN GERMAN, PR 00683 | San Germán Municipio |
| RCRAInfo | RCRA | PRR000010298 | TEXACO PR INC SAN GERMAN SS | RD 102 KM 33.6, SAN GERMAN, PR 00683 | San Germán Municipio |

## Facility SIC (Standard Industrial Classification) Codes

| System | Identifier | SIC Code | SIC Description |
|---|---|---|---|

No data records returned

## Facility NAICS (North American Industry Classification System) Codes

| System | Identifier | NAICS Code | NAICS Description |
|---|---|---|---|

No data records returned

## Facility Tribe Information

| Reservation Name | Tribe Name | EPA Tribal ID | Distance to Tribe (miles) |
|---|---|---|---|

No data records returned

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | | | | | | |

No data records returned

*Entries in italics are not included in ECHO's Compliance Monitoring Activity counts because they are not compliance monitoring strategy* <https://www.epa.gov/compliance/compliance-monitoring-programs> *activities or because they are not counted as inspections within EPA's Annual Results* <https://www.epa.gov/enforcement/enforcement-data-and-results>.

## Compliance Summary Data

| Statute | Source ID | Current SNC (Significant Noncompliance)/HPV (High Priority Violation) | Current As Of | Qtrs with NC (Noncompliance) (of 12) | Data Last Refreshed |
|---|---|---|---|---|---|
| RCRA | PRR000010298 | No | 11/29/2025 | 0 | 11/28/2025 |

## Three-Year Compliance History by Quarter

| Statute | Program/ Pollutant/ Violation Type | QTR 1 | QTR 2 | QTR 3 | QTR 4 | QTR 5 | QTR 6 | QTR 7 | QTR 8 | QTR 9 | QTR 10 | QTR 11 | QTR 12+ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| RCRA (Source ID: PRR000010298) | | 01/01-03/31/23 | 04/01-06/30/23 | 07/01-09/30/23 | 10/01-12/31/23 | 01/01-03/31/24 | 04/01-06/30/24 | 07/01-09/30/24 | 10/01-12/31/24 | 01/01-03/31/25 | 04/01-06/30/25 | 07/01-09/30/25 | 10/01-12/31/25 |
| | Facility-Level Status | No Violation Identified | No Violation Identified | No Violation Identified | No Violation Identified | No Violation Identified | No Violation Identified | No Violation Identified | No Violation Identified | No Violation Identified | No Violation Identified | No Violation Identified | No Violation Identified |
| | Violation Agency | | | | | | | | | | | | |

## Informal Enforcement Actions

Last 5 Years

| Statute | System | Source ID | Type of Action | Lead Agency | Date |
|---|---|---|---|---|---|

No data records returned

*Entries in italics are not counted as "informal enforcement actions" in EPA policies pertaining to enforcement response tools.*

## Formal Enforcement Actions

Last 5 Years

| Statute | System | Law/ Section | Source ID | Type of Action | Case No. | Lead Agency | Case Name | Issued/ Filed Date | Settlements/ Actions | Settlement/ Action Date | Federal Penalty Assessed | State/ Local Penalty Assessed | Penalty Amount Collected | SEP Value | Comp Action Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|

No data records returned

Environmental Conditions

## Watersheds

| 12-Digit WBD (Watershed Boundary Dataset) HUC (RAD (Reach Address Database)) | WBD (Watershed Boundary Dataset) Subwatershed Name (RAD (Reach Address Database)) | State Water Body Name (ICIS (Integrated Compliance Information System)) | Beach Closures Within Last Year | Beach Closures Within Last Two Years | Pollutants Potentially Related to Impairment | Watershed with ESA (Endangered Species Act)-listed Aquatic Species? |
|---|---|---|---|---|---|---|

No data records returned

## Assessed Waters From Latest State Submission (ATTAINS)

| State | Report Cycle | Assessment Unit ID | Assessment Unit Name | Water Condition | Cause Groups Impaired | Drinking Water Use | Ecological Use | Fish Consumption Use | Recreation Use | Other Use |
|---|---|---|---|---|---|---|---|---|---|---|

No data records returned

## Air Quality Nonattainment Areas

| Pollutant | Within Nonattainment Status Area? | Nonattainment Status Applicable Standard(s) | Within Maintenance Status Area? | Maintenance Status Applicable Standard(s) |
|---|---|---|---|---|

No data records returned

Pollutants

## Toxics Release Inventory History of Reported Chemicals Released or Transferred in Pounds per Year at Site

| TRI Facility ID | Year | Air Emissions | Surface Water Discharges | Off-Site Transfers to POTWs (Publicly Owned Treatment Works) | Underground Injections | Disposal to Land | Total On-Site Releases | Total Off-Site Transfers |
|---|---|---|---|---|---|---|---|---|

No data records returned

## Toxics Release Inventory Total Releases and Transfers in Pounds by Chemical and Year

| Chemical Name |
|---|

No data records returned

# Demographic Profile of Surrounding Area (1-Mile Radius)

This section provides demographic information regarding the community surrounding the facility. ECHO compliance data alone are not sufficient to determine whether violations at a particular facility had negative impacts on public health or the environment. Statistics are based upon the 2023 American Community Survey (ACS) 5-year Summary and are accurate to the extent that the facility latitude and longitude listed below are correct. Census boundaries and demographic data for U.S. Territories are based on the "2020 Island Areas Demographic Profiles" from the U.S. Census Bureau. EPA's spatial processing methodology considers the overlap between the selected radii and ACS census block groups in determining the demographics surrounding the facility. For more detail about this methodology, see the DFR Data Dictionary <https://epa.gov/help/reports/dfr-data-dictionary#demographic>.

| General Statistics (ACS (American Community Survey)) | |
|---|---|
| Total Persons | 5,615 |
| Population Density | 1,789/sq.mi. |
| Housing Units in Area | 4,222 |
| Percent People of Color | 94% |
| Households in Area | 3,118 |
| Households on Public Assistance | 132 |
| Persons With Low Income | 2,483 |
| Percent With Low Income | 44% |

| Geography | |
|---|---|
| Radius of Selected Area | 1 mi. |
| Center Latitude | 18.077714 |
| Center Longitude | -67.026969 |
| Total Area | 3.14 sq.mi. |
| Land Area | 100% |
| Water Area | 0% |

| Income Breakdown (ACS (American Community Survey)) - Households (%) | |
|---|---|
| Less than $15,000 | 635 (20.37%) |
| $15,000 - $25,000 | 360 (11.55%) |
| $25,000 - $50,000 | 647 (20.76%) |
| $50,000 - $75,000 | 292 (9.37%) |
| Greater than $75,000 | 1,183 (37.95%) |

| Age Breakdown (ACS (American Community Survey)) - Persons (%) | |
|---|---|
| Children 5 years and younger | 177 (3%) |
| Minors 17 years and younger | 484 (9%) |
| Adults 18 years and older | 5,132 (91%) |
| Seniors 65 years and older | 1,655 (29%) |

| Race Breakdown (ACS (American Community Survey)) - Persons (%) | |
|---|---|
| White | 2,304 (41%) |
| African-American | 270 (5%) |
| Hispanic-Origin | 5,101 (91%) |
| Asian | 134 (2%) |
| Hawaiian/Pacific Islander | 0 (0%) |
| American Indian | 8 (0%) |
| Other/Multiracial | 992 (18%) |

| Education Level (Persons 25 & older) (ACS (American Community Survey)) - Persons (%) | |
|---|---|
| Less than 9th Grade | 274 (5.69%) |
| 9th through 12th Grade | 266 (5.52%) |
| High School Diploma | 400 (8.31%) |
| Some College/2-year | 418 (8.68%) |
| B.S./B.A. (Bachelor of Science/Bachelor of Arts) or More | 3,122 (64.83%) |

# Detailed Facility Report

Facility Summary

**WALLACE SILVERSMITHS DE PR, LTD**

**EL RETIRO INDUSTRIAL PARK STREET B, SAN GERMÁN, PR 00683**

**FRS (Facility Registry Service) ID:** 110067184424

**EPA Region:** 02

**Latitude:** 18.0767

**Longitude:** -67.0283

**Locational Data Source:** NPDES

**Industries:** --

**Indian Country:** N

## Enforcement and Compliance Summary

| Statute | CWA |
|---|---|
| Compliance Monitoring Activities (5 years) | -- |
| Date of Last Compliance Monitoring Activity | -- |
| Compliance Status | Terminated Permit |
| Qtrs in Noncompliance (of 12) | 0 |
| Qtrs with Significant Violation | 0 |
| Informal Enforcement Actions (5 years) | -- |
| Formal Enforcement Actions (5 years) | -- |
| Penalties from Formal Enforcement Actions (5 years) | -- |
| EPA Cases (5 years) | -- |
| Penalties from EPA Cases (5 years) | -- |

## Regulatory Information

**Clean Air Act (CAA):** No Information

**Clean Water Act (CWA):** Non-Major, Permit Terminated; Compliance Tracking Off (PRR053251)

**Resource Conservation and Recovery Act (RCRA):** No Information

**Safe Drinking Water Act (SDWA):** No Information

Go To Enforcement/Compliance Details
Known Data Problems <https://epa.gov/resources/echo-data/known-data-problems>

## Other Regulatory Reports

**Air Emissions Inventory (EIS):** No Information

**Greenhouse Gas Emissions (eGGRT):** No Information

**Toxic Releases (TRI):** No Information

**Compliance and Emissions Data Reporting Interface (CEDRI):** No Information

Facility/System Characteristics

## Facility/System Characteristics

| System | Statute | Identifier | Universe | Status | Areas | Permit Expiration Date | Indian Country | Latitude | Longitude |
|---|---|---|---|---|---|---|---|---|---|
| FRS | | 110067184424 | | | | | N | 18.0767 | -67.0283 |
| ICIS-NPDES | CWA | PRR053251 | Non-Major: General Permit Covered Facility | Terminated; Compliance Tracking Off | Industrial Stormwater | 06/03/2020 | N | 18.0767 | -67.0283 |

## Facility Address

| System | Statute | Identifier | Facility Name | Facility Address | Facility County |
|---|---|---|---|---|---|
| FRS | | 110067184424 | WALLACE SILVERSMITHS DE PR, LTD | EL RETIRO INDUSTRIAL PARK STREET B, SAN GERMÁN, PR 00683 | |
| ICIS-NPDES | CWA | PRR053251 | WALLACE SILVERSMITHS DE PR, LTD | EL RETIRO INDUSTRIAL PARK STREET B, SAN GERMÁN, PR 00683 | San Germán Municipio |

## Facility SIC (Standard Industrial Classification) Codes

| System | Identifier | SIC Code | SIC Description |
|---|---|---|---|

## Facility NAICS (North American Industry Classification System) Codes

| System | Identifier | NAICS Code | NAICS Description |
|---|---|---|---|

| System | Identifier | SIC Code | SIC Description |
|---|---|---|---|
| ICIS-NPDES | PRR053251 | 3914 | Silverware And Plated Ware |

## Facility Industrial Effluent Guidelines

| Identifier | Effluent Guideline (40 CFR Part) | Effluent Guideline Description |
|---|---|---|

No data records returned

No data records returned

## Facility Tribe Information

| Reservation Name | Tribe Name | EPA Tribal ID | Distance to Tribe (miles) |
|---|---|---|---|

No data records returned

Enforcement and Compliance

## Compliance Monitoring History

Last 5 Years

| Statute | Source ID | System | Activity Type | Compliance Monitoring Type | Lead Agency | Date | Finding (if applicable) |
|---|---|---|---|---|---|---|---|

No data records returned

*Entries in italics are not included in ECHO's Compliance Monitoring Activity counts because they are not compliance monitoring strategy* <https://www.epa.gov/compliance/compliance-monitoring-programs> *activities or because they are not counted as inspections within EPA's Annual Results* <https://www.epa.gov/enforcement/enforcement-data-and-results>.

## Compliance Summary Data

| Statute | Source ID | Current SNC (Significant Noncompliance)/HPV (High Priority Violation) | Current As Of | Qtrs with NC (Noncompliance) (of 12) | Data Last Refreshed |
|---|---|---|---|---|---|
| CWA | PRR053251 | No | 06/30/2025 | 0 | 11/28/2025 |

## Three-Year Compliance History by Quarter

| Statute | Program/ Pollutant/ Violation Type | QTR 1 | QTR 2 | QTR 3 | QTR 4 | QTR 5 | QTR 6 | QTR 7 | QTR 8 | QTR 9 | QTR 10 | QTR 11 | QTR 12 | QTR 13+ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CWA (Source ID: PRR053251) | | 07/01-09/30/22 | 10/01-12/31/22 | 01/01-03/31/23 | 04/01-06/30/23 | 07/01-09/30/23 | 10/01-12/31/23 | 01/01-03/31/24 | 04/01-06/30/24 | 07/01-09/30/24 | 10/01-12/31/24 | 01/01-03/31/25 | 04/01-06/30/25 | 07/01-11/28/25 |
| | Facility-Level Status | Terminated Permit | Terminated Permit | Terminated Permit | Terminated Permit | Terminated Permit | Terminated Permit | Terminated Permit | Terminated Permit | Terminated Permit | Terminated Permit | Terminated Permit | Terminated Permit | Terminated Permit |
| | Quarterly Noncompliance Report History | | | | | | | | | | | | | |

## Informal Enforcement Actions

Last 5 Years

| Statute | System | Source ID | Type of Action | Lead Agency | Date |
|---|---|---|---|---|---|

No data records returned

*Entries in italics are not counted as "informal enforcement actions" in EPA policies pertaining to enforcement response tools.*

## Formal Enforcement Actions

Last 5 Years

| Statute | System | Law/ Section | Source ID | Type of Action | Case No. | Lead Agency | Case Name | Issued/ Filed Date | Settlements/ Actions | Settlement/ Action Date | Federal Penalty Assessed | State/ Local Penalty Assessed | Penalty Amount Collected | SEP Value | Comp Action Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|

No data records returned

Environmental Conditions

## Watersheds

| 12-Digit WBD (Watershed Boundary Dataset) HUC (RAD (Reach Address Database)) | WBD (Watershed Boundary Dataset) Subwatershed Name (RAD (Reach Address Database)) | State Water Body Name (ICIS (Integrated Compliance Information System)) | Beach Closures Within Last Year | Beach Closures Within Last Two Years | Pollutants Potentially Related to Impairment | Watershed with ESA (Endangered Species Act)-listed Aquatic Species? |
|---|---|---|---|---|---|---|
| 210100030409 | Rio Guanajibo at mouth | RIO GUANAJIBO | No | No | Aluminum, total (as Al) \| Coliform, total general \| Cyanide, total (as CN) \| Iron, total (as Fe) \| Nitrite Plus Nitrate Total \| Oxygen, dissolved percent saturation \| Turbidity \| Zinc, total (as Zn) | No |

## Assessed Waters From Latest State Submission (ATTAINS)

| State | Report Cycle | Assessment Unit ID | Assessment Unit Name | Water Condition | Cause Groups Impaired | Drinking Water Use | Ecological Use | Fish Consumption Use | Recreation Use | Other Use |
|---|---|---|---|---|---|---|---|---|---|---|
| PR | 2024 | PRWR77A | RIO GUANAJIBO | Impaired - 303(d) Listed - With Restoration Plan | METALS (OTHER THAN MERCURY) \| NUTRIENTS \| ORGANIC ENRICHMENT/OXYGEN DEPLETION \| PATHOGENS \| TOXIC INORGANICS \| TURBIDITY | Not Supporting | Not Supporting | -- | Not Supporting | -- |

## Air Quality Nonattainment Areas

| Pollutant | Within Nonattainment Status Area? | Nonattainment Status Applicable Standard(s) | Within Maintenance Status Area? | Maintenance Status Applicable Standard(s) |
|---|---|---|---|---|

No data records returned

Pollutants

## Toxics Release Inventory History of Reported Chemicals Released or Transferred in Pounds per Year at Site

| TRI Facility ID | Year | Air Emissions | Surface Water Discharges | Off-Site Transfers to POTWs (Publicly Owned Treatment Works) | Underground Injections | Disposal to Land | Total On-Site Releases | Total Off-Site Transfers |
|---|---|---|---|---|---|---|---|---|

No data records returned

## Toxics Release Inventory Total Releases and Transfers in Pounds by Chemical and Year

| Chemical Name |
|---|

No data records returned

## CWA (Clean Water Act) Discharge Monitoring Report (DMR) Pollutant Loadings

DMR and TRI Multi-Year Loading Report

| NPDES ID | Description |
|---|---|

No data records returned

Community

## Demographic Profile of Surrounding Area (1-Mile Radius)

This section provides demographic information regarding the community surrounding the facility. ECHO compliance data alone are not sufficient to determine whether violations at a particular facility had negative impacts on public health or the environment. Statistics are based upon the 2023 American Community Survey (ACS) 5-year Summary and are accurate to the extent that the facility latitude and longitude listed below are correct. Census boundaries and demographic data for U.S. Territories are based on the "2020 Island Areas Demographic Profiles" from the U.S. Census Bureau. EPA's spatial processing methodology considers the overlap between the selected radii and ACS census block groups in determining the demographics surrounding the facility. For more detail about this methodology, see the DFR Data Dictionary <https://epa.gov/help/reports/dfr-data-dictionary#demographic>.

| General Statistics (ACS (American Community Survey)) | |
|---|---|
| Total Persons | 5,731 |
| Population Density | 1,826/sq.mi. |
| Housing Units in Area | 4,310 |
| Percent People of Color | 94% |
| Households in Area | 3,175 |
| Households on Public Assistance | 131 |
| Persons With Low Income | 2,520 |
| Percent With Low Income | 44% |

| Geography | |
|---|---|
| Radius of Selected Area | 1 mi. |
| Center Latitude | 18.0767 |
| Center Longitude | -67.0283 |
| Total Area | 3.14 sq.mi. |
| Land Area | 100% |
| Water Area | 0% |

| Income Breakdown (ACS (American Community Survey)) - Households (%) | |
|---|---|
| Less than $15,000 | 636 (20.04%) |
| $15,000 - $25,000 | 369 (11.63%) |
| $25,000 - $50,000 | 668 (21.05%) |
| $50,000 - $75,000 | 304 (9.58%) |
| Greater than $75,000 | 1,197 (37.71%) |

| Age Breakdown (ACS (American Community Survey)) - Persons (%) | |
|---|---|
| Children 5 years and younger | 186 (3%) |
| Minors 17 years and younger | 498 (9%) |
| Adults 18 years and older | 5,234 (91%) |
| Seniors 65 years and older | 1,674 (29%) |

| Race Breakdown (ACS (American Community Survey)) - Persons (%) | |
|---|---|
| White | 2,318 (40%) |
| African-American | 299 (5%) |
| Hispanic-Origin | 5,215 (91%) |
| Asian | 130 (2%) |
| Hawaiian/Pacific Islander | 0 (0%) |
| American Indian | 8 (0%) |
| Other/Multiracial | 1,009 (18%) |

| Education Level (Persons 25 & older) (ACS (American Community Survey)) - Persons (%) | |
|---|---|
| Less than 9th Grade | 272 (5.54%) |
| 9th through 12th Grade | 262 (5.34%) |
| High School Diploma | 408 (8.31%) |
| Some College/2-year | 422 (8.59%) |
| B.S./B.A. (Bachelor of Science/Bachelor of Arts) or More | 3,202 (65.21%) |

# Detailed Facility Report

Facility Summary

**WALLACE SILVERSMITHS DE PR, LTD**

**EL RETIRO INDUSTRIAL PARK STREET B, SAN GERMÁN, PR 00683**

**FRS (Facility Registry Service) ID:** 110067184424

**EPA Region:** 02

**Latitude:** 18.0767

**Longitude:** -67.0283

**Locational Data Source:** NPDES

**Industries:** --

**Indian Country:** N

## Enforcement and Compliance Summary

| Statute | CWA |
|---|---|
| Compliance Monitoring Activities (5 years) | -- |
| Date of Last Compliance Monitoring Activity | -- |
| Compliance Status | Terminated Permit |
| Qtrs in Noncompliance (of 12) | 0 |
| Qtrs with Significant Violation | 0 |
| Informal Enforcement Actions (5 years) | -- |
| Formal Enforcement Actions (5 years) | -- |
| Penalties from Formal Enforcement Actions (5 years) | -- |
| EPA Cases (5 years) | -- |
| Penalties from EPA Cases (5 years) | -- |

## Regulatory Information

**Clean Air Act (CAA):** No Information

**Clean Water Act (CWA):** Non-Major, Permit Terminated; Compliance Tracking Off (PRR053251)

**Resource Conservation and Recovery Act (RCRA):** No Information

**Safe Drinking Water Act (SDWA):** No Information

Go To Enforcement/Compliance Details
Known Data Problems <https://epa.gov/resources/echo-data/known-data-problems>

## Other Regulatory Reports

**Air Emissions Inventory (EIS):** No Information

**Greenhouse Gas Emissions (eGGRT):** No Information

**Toxic Releases (TRI):** No Information

**Compliance and Emissions Data Reporting Interface (CEDRI):** No Information

Facility/System Characteristics

## Facility/System Characteristics

| System | Statute | Identifier | Universe | Status | Areas | Permit Expiration Date | Indian Country | Latitude | Longitude |
|---|---|---|---|---|---|---|---|---|---|
| FRS | | 110067184424 | | | | | N | 18.0767 | -67.0283 |
| ICIS-NPDES | CWA | PRR053251 | Non-Major: General Permit Covered Facility | Terminated; Compliance Tracking Off | Industrial Stormwater | 06/03/2020 | N | 18.0767 | -67.0283 |

## Facility Address

| System | Statute | Identifier | Facility Name | Facility Address | Facility County |
|---|---|---|---|---|---|
| FRS | | 110067184424 | WALLACE SILVERSMITHS DE PR, LTD | EL RETIRO INDUSTRIAL PARK STREET B, SAN GERMÁN, PR 00683 | |
| ICIS-NPDES | CWA | PRR053251 | WALLACE SILVERSMITHS DE PR, LTD | EL RETIRO INDUSTRIAL PARK STREET B, SAN GERMÁN, PR 00683 | San Germán Municipio |

## Facility SIC (Standard Industrial Classification) Codes

| System | Identifier | SIC Code | SIC Description |
|---|---|---|---|

## Facility NAICS (North American Industry Classification System) Codes

| System | Identifier | NAICS Code | NAICS Description |
|---|---|---|---|

| System | Identifier | SIC Code | SIC Description |
|---|---|---|---|
| ICIS-NPDES | PRR053251 | 3914 | Silverware And Plated Ware |

## Facility Industrial Effluent Guidelines

| Identifier | Effluent Guideline (40 CFR Part) | Effluent Guideline Description |
|---|---|---|

No data records returned

No data records returned

## Facility Tribe Information

| Reservation Name | Tribe Name | EPA Tribal ID | Distance to Tribe (miles) |
|---|---|---|---|

No data records returned

Enforcement and Compliance

## Compliance Monitoring History

Last 5 Years

| Statute | Source ID | System | Activity Type | Compliance Monitoring Type | Lead Agency | Date | Finding (if applicable) |
|---|---|---|---|---|---|---|---|

No data records returned

*Entries in italics are not included in ECHO's Compliance Monitoring Activity counts because they are not compliance monitoring strategy* <https://www.epa.gov/compliance/compliance-monitoring-programs> *activities or because they are not counted as inspections within EPA's Annual Results* <https://www.epa.gov/enforcement/enforcement-data-and-results>.

## Compliance Summary Data

| Statute | Source ID | Current SNC (Significant Noncompliance)/HPV (High Priority Violation) | Current As Of | Qtrs with NC (Noncompliance) (of 12) | Data Last Refreshed |
|---|---|---|---|---|---|
| CWA | PRR053251 | No | 06/30/2025 | 0 | 11/28/2025 |

## Three-Year Compliance History by Quarter

| Statute | Program/ Pollutant/ Violation Type | QTR 1 | QTR 2 | QTR 3 | QTR 4 | QTR 5 | QTR 6 | QTR 7 | QTR 8 | QTR 9 | QTR 10 | QTR 11 | QTR 12 | QTR 13+ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CWA (Source ID: PRR053251) | | 07/01-09/30/22 | 10/01-12/31/22 | 01/01-03/31/23 | 04/01-06/30/23 | 07/01-09/30/23 | 10/01-12/31/23 | 01/01-03/31/24 | 04/01-06/30/24 | 07/01-09/30/24 | 10/01-12/31/24 | 01/01-03/31/25 | 04/01-06/30/25 | 07/01-11/28/25 |
| | Facility-Level Status | Terminated Permit | Terminated Permit | Terminated Permit | Terminated Permit | Terminated Permit | Terminated Permit | Terminated Permit | Terminated Permit | Terminated Permit | Terminated Permit | Terminated Permit | Terminated Permit | Terminated Permit |
| | Quarterly Noncompliance Report History | | | | | | | | | | | | | |

## Informal Enforcement Actions

Last 5 Years

| Statute | System | Source ID | Type of Action | Lead Agency | Date |
|---|---|---|---|---|---|

No data records returned

*Entries in italics are not counted as "informal enforcement actions" in EPA policies pertaining to enforcement response tools.*

## Formal Enforcement Actions

Last 5 Years

| Statute | System | Law/ Section | Source ID | Type of Action | Case No. | Lead Agency | Case Name | Issued/ Filed Date | Settlements/ Actions | Settlement/ Action Date | Federal Penalty Assessed | State/ Local Penalty Assessed | Penalty Amount Collected | SEP Value | Comp Action Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|

No data records returned

Environmental Conditions

## Watersheds

| 12-Digit WBD (Watershed Boundary Dataset) HUC (RAD (Reach Address Database)) | WBD (Watershed Boundary Dataset) Subwatershed Name (RAD (Reach Address Database)) | State Water Body Name (ICIS (Integrated Compliance Information System)) | Beach Closures Within Last Year | Beach Closures Within Last Two Years | Pollutants Potentially Related to Impairment | Watershed with ESA (Endangered Species Act)-listed Aquatic Species? |
|---|---|---|---|---|---|---|
| 210100030409 | Rio Guanajibo at mouth | RIO GUANAJIBO | No | No | Aluminum, total (as Al) \| Coliform, total general \| Cyanide, total (as CN) \| Iron, total (as Fe) \| Nitrite Plus Nitrate Total \| Oxygen, dissolved percent saturation \| Turbidity \| Zinc, total (as Zn) | No |

## Assessed Waters From Latest State Submission (ATTAINS)

| State | Report Cycle | Assessment Unit ID | Assessment Unit Name | Water Condition | Cause Groups Impaired | Drinking Water Use | Ecological Use | Fish Consumption Use | Recreation Use | Other Use |
|---|---|---|---|---|---|---|---|---|---|---|
| PR | 2024 | PRWR77A | RIO GUANAJIBO | Impaired - 303(d) Listed - With Restoration Plan | METALS (OTHER THAN MERCURY) \| NUTRIENTS \| ORGANIC ENRICHMENT/OXYGEN DEPLETION \| PATHOGENS \| TOXIC INORGANICS \| TURBIDITY | Not Supporting | Not Supporting | -- | Not Supporting | -- |

## Air Quality Nonattainment Areas

| Pollutant | Within Nonattainment Status Area? | Nonattainment Status Applicable Standard(s) | Within Maintenance Status Area? | Maintenance Status Applicable Standard(s) |
|---|---|---|---|---|

No data records returned

Pollutants

## Toxics Release Inventory History of Reported Chemicals Released or Transferred in Pounds per Year at Site

| TRI Facility ID | Year | Air Emissions | Surface Water Discharges | Off-Site Transfers to POTWs (Publicly Owned Treatment Works) | Underground Injections | Disposal to Land | Total On-Site Releases | Total Off-Site Transfers |
|---|---|---|---|---|---|---|---|---|

No data records returned

## Toxics Release Inventory Total Releases and Transfers in Pounds by Chemical and Year

| Chemical Name |
|---|

No data records returned

## CWA (Clean Water Act) Discharge Monitoring Report (DMR) Pollutant Loadings

DMR and TRI Multi-Year Loading Report

| NPDES ID | Description |
|---|---|

No data records returned

Community

## Demographic Profile of Surrounding Area (1-Mile Radius)

This section provides demographic information regarding the community surrounding the facility. ECHO compliance data alone are not sufficient to determine whether violations at a particular facility had negative impacts on public health or the environment. Statistics are based upon the 2023 American Community Survey (ACS) 5-year Summary and are accurate to the extent that the facility latitude and longitude listed below are correct. Census boundaries and demographic data for U.S. Territories are based on the "2020 Island Areas Demographic Profiles" from the U.S. Census Bureau. EPA's spatial processing methodology considers the overlap between the selected radii and ACS census block groups in determining the demographics surrounding the facility. For more detail about this methodology, see the DFR Data Dictionary <https://epa.gov/help/reports/dfr-data-dictionary#demographic>.

| General Statistics (ACS (American Community Survey)) | |
|---|---|
| Total Persons | 5,731 |
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| Percent People of Color | 94% |
| Households in Area | 3,175 |
| Households on Public Assistance | 131 |
| Persons With Low Income | 2,520 |
| Percent With Low Income | 44% |

| Geography | |
|---|---|
| Radius of Selected Area | 1 mi. |
| Center Latitude | 18.0767 |
| Center Longitude | -67.0283 |
| Total Area | 3.14 sq.mi. |
| Land Area | 100% |
| Water Area | 0% |

| Income Breakdown (ACS (American Community Survey)) - Households (%) | |
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| $15,000 - $25,000 | 369 (11.63%) |
| $25,000 - $50,000 | 668 (21.05%) |
| $50,000 - $75,000 | 304 (9.58%) |
| Greater than $75,000 | 1,197 (37.71%) |

| Age Breakdown (ACS (American Community Survey)) - Persons (%) | |
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| Seniors 65 years and older | 1,674 (29%) |

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| Hispanic-Origin | 5,215 (91%) |
| Asian | 130 (2%) |
| Hawaiian/Pacific Islander | 0 (0%) |
| American Indian | 8 (0%) |
| Other/Multiracial | 1,009 (18%) |

| Education Level (Persons 25 & older) (ACS (American Community Survey)) - Persons (%) | |
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| 9th through 12th Grade | 262 (5.34%) |
| High School Diploma | 408 (8.31%) |
| Some College/2-year | 422 (8.59%) |
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# Detailed Facility Report

Facility Summary

**WALLACE SILVERSMITHS DE PR, LTD**

**EL RETIRO INDUSTRIAL PARK, STREET B, SAN GERMAN, PR 00683**

**FRS (Facility Registry Service) ID:** 110071357883

**EPA Region:** 02

**Latitude:** 18.077279

**Longitude:** -67.029145

**Locational Data Source:** NPDES

**Industries:** --

**Indian Country:** N

## Enforcement and Compliance Summary

| Statute | CWA |
|---|---|
| Compliance Monitoring Activities (5 years) | -- |
| Date of Last Compliance Monitoring Activity | -- |
| Compliance Status | Significant/Category I Noncompliance |
| Qtrs in Noncompliance (of 12) | 7 |
| Qtrs with Significant Violation | 7 |
| Informal Enforcement Actions (5 years) | -- |
| Formal Enforcement Actions (5 years) | -- |
| Penalties from Formal Enforcement Actions (5 years) | -- |
| EPA Cases (5 years) | -- |
| Penalties from EPA Cases (5 years) | -- |

## Regulatory Information

**Clean Air Act (CAA):** No Information

**Clean Water Act (CWA):** Non-Major, Permit Effective (PRR05J033)

**Resource Conservation and Recovery Act (RCRA):** No Information

**Safe Drinking Water Act (SDWA):** No Information

## Other Regulatory Reports

**Air Emissions Inventory (EIS):** No Information

**Greenhouse Gas Emissions (eGGRT):** No Information

**Toxic Releases (TRI):** No Information

**Compliance and Emissions Data Reporting Interface (CEDRI):** No Information

Go To Enforcement/Compliance Details
Known Data Problems <https://epa.gov/resources/echo-data/known-data-problems>

Facility/System Characteristics

## Facility/System Characteristics

| System | Statute | Identifier | Universe | Status | Areas | Permit Expiration Date | Indian Country | Latitude | Longitude |
|---|---|---|---|---|---|---|---|---|---|
| FRS | | 110071357883 | | | | | N | 18.077279 | -67.029145 |
| ICIS-NPDES | CWA | PRR05J033 | Non-Major: General Permit Covered Facility | Effective | Industrial Stormwater | 02/28/2026 | N | 18.077279 | -67.029145 |

## Facility Address

| System | Statute | Identifier | Facility Name | Facility Address | Facility County |
|---|---|---|---|---|---|
| FRS | | 110071357883 | WALLACE SILVERSMITHS DE PR, LTD | EL RETIRO INDUSTRIAL PARK, STREET B, SAN GERMAN, PR 00683 | San Germán Municipio |
| ICIS-NPDES | CWA | PRR05J033 | WALLACE SILVERSMITHS DE PR, LTD | EL RETIRO INDUSTRIAL PARK, STREET B, SAN GERMAN, PR 00683 | |

## Facility SIC (Standard Industrial Classification) Codes

| System | Identifier | SIC Code | SIC Description |
|---|---|---|---|
| ICIS-NPDES | PRR05J033 | 3914 | Silverware And Plated Ware |

## Facility NAICS (North American Industry Classification System) Codes

| System | Identifier | NAICS Code | NAICS Description |
|---|---|---|---|

No data records returned

## Facility Industrial Effluent Guidelines

| Identifier | Effluent Guideline (40 CFR Part) | Effluent Guideline Description |
|---|---|---|

No data records returned

## Facility Tribe Information

| Reservation Name | Tribe Name | EPA Tribal ID | Distance to Tribe (miles) |
|---|---|---|---|

No data records returned

Enforcement and Compliance

## Compliance Monitoring History

Last 5 Years

| Statute | Source ID | System | Activity Type | Compliance Monitoring Type | Lead Agency | Date | Finding (if applicable) |
|---|---|---|---|---|---|---|---|

No data records returned

*Entries in italics are not included in ECHO's Compliance Monitoring Activity counts because they are not compliance monitoring strategy* <https://www.epa.gov/compliance/compliance-monitoring-programs> *activities or because they are not counted as inspections within EPA's Annual Results* <https://www.epa.gov/enforcement/enforcement-data-and-results>.

## Compliance Summary Data

| Statute | Source ID | Current SNC (Significant Noncompliance)/HPV (High Priority Violation) | Current As Of | Qtrs with NC (Noncompliance) (of 12) | Data Last Refreshed |
|---|---|---|---|---|---|
| CWA | PRR05J033 | Yes | 06/30/2025 | 7 | 11/28/2025 |

## Three-Year Compliance History by Quarter

| Statute | Program/Pollutant/Violation Type | | | | QTR 1 | QTR 2 | QTR 3 | QTR 4 | QTR 5 | QTR 6 | QTR 7 | QTR 8 | QTR 9 | QTR 10 | QTR 11 | QTR 12 | QTR 13+ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | CWA (Source ID: PRR05J033) | | | | 07/01-09/30/22 | 10/01-12/31/22 | 01/01-03/31/23 | 04/01-06/30/23 | 07/01-09/30/23 | 10/01-12/31/23 | 01/01-03/31/24 | 04/01-06/30/24 | 07/01-09/30/24 | 10/01-12/31/24 | 01/01-03/31/25 | 04/01-06/30/25 | 07/01-11/28/25 |
| | Facility-Level Status | | | | No Violation Identified | No Violation Identified | No Violation Identified | No Violation Identified | No Violation Identified | Significant/ Category I Noncompliance | Significant/ Category I Noncompliance | Significant/ Category I Noncompliance | Significant/ Category I Noncompliance | Significant/ Category I Noncompliance | Significant/ Category I Noncompliance | Significant/ Category I Noncompliance | Undetermined |
| | Quarterly Noncompliance Report History | | | | | | | | | Failure to Report DMR - Not Received | Failure to Report DMR - Not Received | Failure to Report DMR - Not Received | Failure to Report DMR - Not Received | Failure to Report DMR - Not Received | Failure to Report DMR - Not Received | Failure to Report DMR - Not Received | |
| | Benchmark Threshold Exceedances (No Violation): Pollutant | Disch Point | Mon Loc | Freq | | | | | | | | | | | | | |
| CWA | Aluminum, total recoverable <effluent-charts#prr05j033/01104> [redacted] <https://epa.gov/effluent-charts#prr05j033/01104> | 001 - 11 | Effluent Gross | NMth | | | 461% | | | | | | | | | | 258% |
| | Late or Missing Discharge Monitoring Report (DMR) Measurements | | | | | | | | | | | | | | | | |
| | Counts of Late DMR Measurements | | | | | | | 3 | | | | | | | | | |
| | Counts of Missing DMR Measurements | | | | | | | | 3 | | 3 | 3 | | 3 | 3 | | |

## Informal Enforcement Actions

Last 5 Years

| Statute | System | Source ID | Type of Action | Lead Agency | Date |
|---|---|---|---|---|---|

No data records returned

*Entries in italics are not counted as "informal enforcement actions" in EPA policies pertaining to enforcement response tools.*

## Formal Enforcement Actions

Last 5 Years

| Statute | System | Law/ Section | Source ID | Type of Action | Case No. | Lead Agency | Case Name | Issued/ Filed Date | Settlements/ Actions | Settlement/ Action Date | Federal Penalty Assessed | State/ Local Penalty Assessed | Penalty Amount Collected | SEP Value | Comp Action Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|

No data records returned

Environmental Conditions

## Watersheds

| 12-Digit WBD (Watershed Boundary Dataset) HUC (RAD (Reach Address Database)) | WBD (Watershed Boundary Dataset) Subwatershed Name (RAD (Reach Address Database)) | State Water Body Name (ICIS (Integrated Compliance Information System)) | Beach Closures Within Last Year | Beach Closures Within Last Two Years | Pollutants Potentially Related to Impairment | Watershed with ESA (Endangered Species Act)-listed Aquatic Species? |
|---|---|---|---|---|---|---|
| 210100030409 | Rio Guanajibo at mouth | RIO GUANAJIBO | No | No | Aluminum, total recoverable \| Chromium, hexavalent (as Cr) \| Nitrite Plus Nitrate Total \| Oxygen, dissolved (DO) \| Phosphorus, total (as P) \| Turbidity \| Zinc, total recoverable | No |

## Assessed Waters From Latest State Submission (ATTAINS)

| State | Report Cycle | Assessment Unit ID | Assessment Unit Name | Water Condition | Cause Groups Impaired | Drinking Water Use | Ecological Use | Fish Consumption Use | Recreation Use | Other Use |
|---|---|---|---|---|---|---|---|---|---|---|
| PR | 2024 | PRWR77A | RIO GUANAJIBO | Impaired - 303(d) Listed - With Restoration Plan | METALS (OTHER THAN MERCURY) \| NUTRIENTS \| ORGANIC ENRICHMENT/OXYGEN DEPLETION \| PATHOGENS \| TOXIC INORGANICS \| TURBIDITY | Not Supporting | Not Supporting | -- | Not Supporting | -- |

## Air Quality Nonattainment Areas

| Pollutant | Within Nonattainment Status Area? | Nonattainment Status Applicable Standard(s) | Within Maintenance Status Area? | Maintenance Status Applicable Standard(s) |
|---|---|---|---|---|

No data records returned

Pollutants

## Toxics Release Inventory History of Reported Chemicals Released or Transferred in Pounds per Year at Site

| TRI Facility ID | Year | Air Emissions | Surface Water Discharges | Off-Site Transfers to POTWs (Publicly Owned Treatment Works) | Underground Injections | Disposal to Land | Total On-Site Releases | Total Off-Site Transfers |
|---|---|---|---|---|---|---|---|---|

No data records returned

## Toxics Release Inventory Total Releases and Transfers in Pounds by Chemical and Year

| Chemical Name |
|---|

No data records returned

## CWA (Clean Water Act) Discharge Monitoring Report (DMR) Pollutant Loadings

DMR and TRI Multi-Year Loading Report

| NPDES ID | Description |
|---|---|

No data records returned

Community

## Demographic Profile of Surrounding Area (1-Mile Radius)

This section provides demographic information regarding the community surrounding the facility. ECHO compliance data alone are not sufficient to determine whether violations at a particular facility had negative impacts on public health or the environment. Statistics are based upon the 2023 American Community Survey (ACS) 5-year Summary and are accurate to the extent that the facility latitude and longitude listed below are correct. Census boundaries and demographic data for U.S. Territories are based on the "2020 Island Areas Demographic Profiles" from the U.S. Census Bureau. EPA's spatial processing methodology considers the overlap between the selected radii and ACS census block groups in determining the demographics surrounding the facility. For more detail about this methodology, see the DFR Data Dictionary <https://epa.gov/help/reports/dfr-data-dictionary#demographic>.

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|---|---|
| Total Persons | 5,762 |
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| Housing Units in Area | 4,336 |
| Percent People of Color | 94% |
| Households in Area | 3,180 |
| Households on Public Assistance | 133 |
| Persons With Low Income | 2,532 |
| Percent With Low Income | 44% |

| Geography | |
|---|---|
| Radius of Selected Area | 1 mi. |
| Center Latitude | 18.077279 |
| Center Longitude | -67.029145 |
| Total Area | 3.14 sq.mi. |
| Land Area | 100% |
| Water Area | 0% |

| Income Breakdown (ACS (American Community Survey)) - Households (%) | |
|---|---|
| Less than $15,000 | 634 (19.96%) |
| $15,000 - $25,000 | 369 (11.61%) |
| $25,000 - $50,000 | 667 (20.99%) |
| $50,000 - $75,000 | 302 (9.51%) |
| Greater than $75,000 | 1,205 (37.93%) |

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| Adults 18 years and older | 5,261 (91%) |
| Seniors 65 years and older | 1,680 (29%) |

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| White | 2,319 (40%) |
| African-American | 317 (6%) |
| Hispanic-Origin | 5,251 (91%) |
| Asian | 126 (2%) |
| Hawaiian/Pacific Islander | 0 (0%) |
| American Indian | 7 (0%) |
| Other/Multiracial | 1,024 (18%) |

| Education Level (Persons 25 & older) (ACS (American Community Survey)) - Persons (%) | |
|---|---|
| Less than 9th Grade | 273 (5.54%) |
| 9th through 12th Grade | 260 (5.28%) |
| High School Diploma | 415 (8.42%) |
| Some College/2-year | 423 (8.58%) |
| B.S./B.A. (Bachelor of Science/Bachelor of Arts) or More | 3,210 (65.14%) |

An official website of the United States government



# Property Details for 1P

**On this page:**


- Profile Information
- Property Location
- Property Progress
- CAs Associated with this Property
- Assessment Activities at this Property
- Climate Adaption and Mitigation - Planning or Assessment
- Contaminants and Media
- Cleanup Activities
- Climate Adaption and Mitigation - Demolition or Cleanup
- Institutional & Engineering Controls
- Redevelopment and Other Leveraged Accomplishments
- Climate Adaption and Mitigation - Redevelopment
- Additional Property Attributes

# Profile Information

| | |
|---|---|
| Property Alias | |
| Property Owner | |
| ACRES Property ID | **150281** |
| Property Address | **PR 102 KM. 32.2 Interamerican Univ Ave San German, PR 00683** |
| Size | **0** |
| Parcel Numbers | |
| Latitude/ Longitude | **18.0808333 / -67.0408333** |
| Congressional District | **1** |
| Property Contact | **Rodriguez, Nancy**<br>**Rodriguez.Nancy@epa.gov**<br>**787-977-5887** |

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# Property Location

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# Property Progress

| | |
|---|---|
| Assessment | ✖ |
| Clean Up | ✖ |
| Institutional Controls in Place | ✖ |
| Engineering Controls in | ✖ |

Controls in Place

Ready for Anticipated Use

Redevelopment Underway

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# CAs Associated with this Property

| CA Name | CA # | State | Type | Announcement Year |
|---|---|---|---|---|
| Municipality of San Germ | BF97248907 | PR | Assessment | 2007 |

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# Assessment Activities at this Property

There are no current assessment activities.

Is Cleanup Necessary?
EPA Assessment Funding:
Leveraged Funding:
Total Funding:

Top of Page

# Climate Adaption and Mitigation – Planning or Assessment

There is no data for Climate Adaption and Mitigation - Planning or Assessment.

Top of Page

# Contaminants and Media

Contaminant Found

Media Affected

Remediating Action for Contaminants

Remediating Action for Media

Top of Page

# Cleanup Activities

There are no current cleanup activities.

Cleanup/Treatment Implemented:
Cleanup/Treatement Categories:
Addl Cleanup/Treatment info:
Address of Data Source:

Top of Page

# Climate Adaption and Mitigation –

# Climate Adaption and Mitigation - Demolition or Cleanup

There is no data for Climate Adaption and Mitigation - Demolition or Cleanup.

Top of Page

# Institutional and Engineering Controls

| |
|---|
| Indicate whether Institutional Controls are required |
| Categories of Controls |
| Additional Institutional Controls Information |
| Address of Data Source (URL if available) |
| Are Institutional Controls in Place |
| Date Institutional Controls were put in place |
| Indicate whether Engineering Controls are required |
| Categories of Controls |
| Additional Engineering controls information |
| Address of Data Source (URL if available) |

available)

Indicate whether Engineering Controls are in place

Date Engineering Controls were put in place

Top of Page

# Redevelopment and Other Leveraged Accomplishments

There are no current redevelopment activities.

Number of Redevelopment Jobs Leveraged:

Actual Acreage of Greenspace Created:

Leveraged Funding:

Top of Page

# Climate Adaption and Mitigation – Redevelopment

There is no data for Climate Adaption and Mitigation – Redevelopment

Top of Page

# Additional Property Attributes

| | |
|---|---|
| Property Highlights | |
| Predominant Past Usage | |
| What types of funding are being used on this property? | **Petroleum** |
| State and Tribal Program Information | |
| Date No Further Action Letter Received | |
| Date Letter/ Signed Report Received from a Qualified Professional | |
| Other Cleanup Documentation | |

Top of Page

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## EPA www Web Snapshots

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## No FEAR Act Data

<https://www.epa.gov/ocr/whistleblower-protections-epa-and-how-they-relate-non-disclosure-

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# Property Details for 2P

**On this page:**


- Profile Information
- Property Location
- Property Progress
- CAs Associated with this Property
- Assessment Activities at this Property
- Climate Adaption and Mitigation - Planning or Assessment
- Contaminants and Media
- Cleanup Activities
- Climate Adaption and Mitigation - Demolition or Cleanup
- Institutional & Engineering Controls
- Redevelopment and Other Leveraged Accomplishments
- Climate Adaption and Mitigation - Redevelopment
- Additional Property Attributes

# Profile Information

| | |
|---|---|
| Property Alias | |
| Property Owner | |
| ACRES Property ID | **150282** |
| Property Address | **PR 102 KM 28.1 Maresua San German, PR 00683** |
| Size | **0** |
| Parcel Numbers | |
| Latitude/ Longitude | **18.0784451 / -67.0412752** |
| Congressional District | **1** |
| Property Contact | **Rodriguez, Nancy**<br>**Rodriguez.Nancy@epa.gov**<br>**787-977-5887** |

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# Property Location

Top of Page

# Property Progress

| | |
|---|---|
| Assessment | ✖ |
| Clean Up | ✖ |
| Institutional Controls in Place | ✖ |
| Engineering Controls in | ✖ |

Controls in Place

Ready for Anticipated Use

Redevelopment Underway

Top of Page

# CAs Associated with this Property

| CA Name | CA # | State | Type | Announcement Year |
|---|---|---|---|---|
| Municipality of San Germ | BF97248907 | PR | Assessment | 2007 |

Top of Page

# Assessment Activities at this Property

There are no current assessment activities.

Is Cleanup Necessary?
EPA Assessment Funding:
Leveraged Funding:
Total Funding:

Top of Page

# Climate Adaption and Mitigation – Planning or Assessment

There is no data for Climate Adaption and Mitigation - Planning or Assessment.

Top of Page

# Contaminants and Media

Contaminant Found

Media Affected

Remediating Action for Contaminants

Remediating Action for Media

Top of Page

# Cleanup Activities

There are no current cleanup activities.

Cleanup/Treatment Implemented:
Cleanup/Treatement Categories:
Addl Cleanup/Treatment info:
Address of Data Source:

Top of Page

# Climate Adaption and Mitigation –

# Climate Adaption and Mitigation - Demolition or Cleanup

There is no data for Climate Adaption and Mitigation - Demolition or Cleanup.

Top of Page

# Institutional and Engineering Controls

| |
|---|
| Indicate whether Institutional Controls are required |
| Categories of Controls |
| Additional Institutional Controls Information |
| Address of Data Source (URL if available) |
| Are Institutional Controls in Place |
| Date Institutional Controls were put in place |
| Indicate whether Engineering Controls are required |
| Categories of Controls |
| Additional Engineering controls information |
| Address of Data Source (URL if available) |

available)

Indicate whether Engineering Controls are in place

Date Engineering Controls were put in place

Top of Page

# Redevelopment and Other Leveraged Accomplishments

There are no current redevelopment activities.

Number of Redevelopment Jobs Leveraged:

Actual Acreage of Greenspace Created:

Leveraged Funding:

Top of Page

# Climate Adaption and Mitigation – Redevelopment

There is no data for Climate Adaption and Mitigation – Redevelopment

Top of Page

# Additional Property Attributes

| | |
|---|---|
| Property Highlights | |
| Predominant Past Usage | |
| What types of funding are being used on this property? | **Petroleum** |
| State and Tribal Program Information | |
| Date No Further Action Letter Received | |
| Date Letter/ Signed Report Received from a Qualified Professional | |
| Other Cleanup Documentation | |

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<https://www.epa.gov/grants>

## No FEAR Act Data

<https://www.epa.gov/ocr/whistleblower-protections-epa-and-how-they-relate-non-disclosure-

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## Regulations.gov

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# Property Details for 3P

**On this page:**


- Profile Information
- Property Location
- Property Progress
- CAs Associated with this Property
- Assessment Activities at this Property
- Climate Adaption and Mitigation - Planning or Assessment
- Contaminants and Media
- Cleanup Activities
- Climate Adaption and Mitigation - Demolition or Cleanup
- Institutional & Engineering Controls
- Redevelopment and Other Leveraged Accomplishments
- Climate Adaption and Mitigation - Redevelopment
- Additional Property Attributes

# Profile Information

| | |
|---|---|
| Property Alias | |
| Property Owner | |
| ACRES Property ID | **150283** |
| Property Address | **#22 Interamerican University Ave San German, PR 00683** |
| Size | **0** |
| Parcel Numbers | |
| Latitude/ Longitude | **18.0808333 / -67.04083330000003** |
| Congressional District | **1** |
| Property Contact | **Rodriguez, Nancy**<br>**Rodriguez.Nancy@epa.gov**<br>**787-977-5887** |

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# Property Location

Top of Page

# Property Progress

| | |
|---|---|
| Assessment | ✖ |
| Clean Up | ✖ |
| Institutional Controls in Place | ✖ |
| Engineering Controls in | ✖ |

Controls in Place

Ready for Anticipated Use

Redevelopment Underway

Top of Page

# CAs Associated with this Property

| CA Name | CA # | State | Type | Announcement Year |
|---|---|---|---|---|
| Municipality of San Germ | BF97248907 | PR | Assessment | 2007 |

Top of Page

# Assessment Activities at this Property

There are no current assessment activities.

Is Cleanup Necessary?
EPA Assessment Funding:
Leveraged Funding:
Total Funding:

Top of Page

# Climate Adaption and Mitigation – Planning or Assessment

There is no data for Climate Adaption and Mitigation - Planning or Assessment.

Top of Page

# Contaminants and Media

Contaminant Found

Media Affected

Remediating Action for Contaminants

Remediating Action for Media

Top of Page

# Cleanup Activities

There are no current cleanup activities.

Cleanup/Treatment Implemented:
Cleanup/Treatement Categories:
Addl Cleanup/Treatment info:
Address of Data Source:

Top of Page

# Climate Adaption and Mitigation –

# Climate Adaption and Mitigation - Demolition or Cleanup

There is no data for Climate Adaption and Mitigation - Demolition or Cleanup.

Top of Page

# Institutional and Engineering Controls

| |
|---|
| Indicate whether Institutional Controls are required |
| Categories of Controls |
| Additional Institutional Controls Information |
| Address of Data Source (URL if available) |
| Are Institutional Controls in Place |
| Date Institutional Controls were put in place |
| Indicate whether Engineering Controls are required |
| Categories of Controls |
| Additional Engineering controls information |
| Address of Data Source (URL if available) |

available)

Indicate whether Engineering Controls are in place

Date Engineering Controls were put in place

Top of Page

# Redevelopment and Other Leveraged Accomplishments

There are no current redevelopment activities.

Number of Redevelopment Jobs Leveraged:

Actual Acreage of Greenspace Created:

Leveraged Funding:

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# Climate Adaption and Mitigation – Redevelopment

There is no data for Climate Adaption and Mitigation – Redevelopment

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# Additional Property Attributes

| | |
|---|---|
| Property Highlights | |
| Predominant Past Usage | |
| What types of funding are being used on this property? | **Petroleum** |
| State and Tribal Program Information | |
| Date No Further Action Letter Received | |
| Date Letter/ Signed Report Received from a Qualified Professional | |
| Other Cleanup Documentation | |

Top of Page

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<https://www.epa.gov/ocr/whistleblower-protections-epa-and-how-they-relate-non-disclosure-

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# Property Details for 5P

**On this page:**


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- CAs Associated with this Property
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- Climate Adaption and Mitigation - Planning or Assessment
- Contaminants and Media
- Cleanup Activities
- Climate Adaption and Mitigation - Demolition or Cleanup
- Institutional & Engineering Controls
- Redevelopment and Other Leveraged Accomplishments
- Climate Adaption and Mitigation - Redevelopment
- Additional Property Attributes

# Profile Information

| | |
|---|---|
| Property Alias | |
| Property Owner | |
| ACRES Property ID | **150285** |
| Property Address | **PR 122 Angel Casto Perez Ave San German, PR 00683** |
| Size | **0** |
| Parcel Numbers | |
| Latitude/ Longitude | **18.0808333 / -67.0408333** |
| Congressional District | **1** |
| Property Contact | **Rodriguez, Nancy**<br>**Rodriguez.Nancy@epa.gov**<br>**787-977-5887** |

Top of Page

# Property Location

Top of Page

# Property Progress

| | |
|---|---|
| Assessment | ✖ |
| Clean Up | ✖ |
| Institutional Controls in Place | ✖ |
| Engineering Controls in | ✖ |

Controls in Place

Ready for Anticipated Use

Redevelopment Underway

Top of Page

# CAs Associated with this Property

| CA Name | CA # | State | Type | Announcement Year |
|---|---|---|---|---|
| Municipality of San Germ | BF97248907 | PR | Assessment | 2007 |

Top of Page

# Assessment Activities at this Property

There are no current assessment activities.

Is Cleanup Necessary?
EPA Assessment Funding:
Leveraged Funding:
Total Funding:

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# Climate Adaption and Mitigation – Planning or Assessment

There is no data for Climate Adaption and Mitigation - Planning or Assessment.

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# Contaminants and Media

Contaminant Found

Media Affected

Remediating Action for Contaminants

Remediating Action for Media

Top of Page

# Cleanup Activities

There are no current cleanup activities.

Cleanup/Treatment Implemented:
Cleanup/Treatement Categories:
Addl Cleanup/Treatment info:
Address of Data Source:

Top of Page

# Climate Adaption and Mitigation –

# Climate Adaption and Mitigation - Demolition or Cleanup

There is no data for Climate Adaption and Mitigation - Demolition or Cleanup.

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# Institutional and Engineering Controls

| |
|---|
| Indicate whether Institutional Controls are required |
| Categories of Controls |
| Additional Institutional Controls Information |
| Address of Data Source (URL if available) |
| Are Institutional Controls in Place |
| Date Institutional Controls were put in place |
| Indicate whether Engineering Controls are required |
| Categories of Controls |
| Additional Engineering controls information |
| Address of Data Source (URL if available) |

available)

Indicate whether Engineering Controls are in place

Date Engineering Controls were put in place

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# Redevelopment and Other Leveraged Accomplishments

There are no current redevelopment activities.

Number of Redevelopment Jobs Leveraged:

Actual Acreage of Greenspace Created:

Leveraged Funding:

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# Climate Adaption and Mitigation – Redevelopment

There is no data for Climate Adaption and Mitigation – Redevelopment

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# Additional Property Attributes

| | |
|---|---|
| Property Highlights | |
| Predominant Past Usage | |
| What types of funding are being used on this property? | **Petroleum** |
| State and Tribal Program Information | |
| Date No Further Action Letter Received | |
| Date Letter/ Signed Report Received from a Qualified Professional | |
| Other Cleanup Documentation | |

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## No FEAR Act Data

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# Property Details for SG-0047 (2H) Abandoned House

**On this page:**


- Profile Information
- Property Location
- Property Progress
- CAs Associated with this Property
- Assessment Activities at this Property
- Climate Adaption and Mitigation - Planning or Assessment
- Contaminants and Media
- Cleanup Activities
- Climate Adaption and Mitigation - Demolition or Cleanup
- Institutional & Engineering Controls
- Redevelopment and Other Leveraged Accomplishments
- Climate Adaption and Mitigation - Redevelopment
- Additional Property Attributes


Legal Notices <https://www.epa.gov/cleanups/cimc-legal-notices>

# Profile Information

Property Alias

Property Owner **Private**

ACRES Property ID **149802**

| | |
|---|---|
| ACRES Property ID | **149802** |
| Property Address | **Km 31.8, Hm. 8 at the Interamerican University Avenue (Pueblo Central) San German, PR 00683** |
| Size | **0** |
| Parcel Numbers | **No info on parcel size. Structure occupies 80 of site** |
| Latitude/ Longitude | **18.0808333 / -67.04083330000003** |
| Congressional District | **1** |
| Property Contact | **Rodriguez, Nancy**<br>**Rodriguez.Nancy@epa.gov**<br>**787-977-5887** |

Top of Page

# Property Location

Top of Page

# Property Progress

| | |
|---|---|
| Assessment | ☑ |
| Clean Up | ✗ |
| Institutional Controls in Place | ✗ |
| Engineering Controls in Place | ✗ |
| Ready for Anticipated Use | ✗ |
| Redevelopment Underway | ✗ |

Top of Page

# CAs Associated with this Property

| CA Name | CA # | State | Type | Announcement Year |
|---|---|---|---|---|
| Municipality of San Germ | BF97248807 | PR | Assessment | 2007 |

Top of Page

# Assessment Activities at this Property

| Activity | EPA Funding | Start Date | Completion Date | CA | Accomplishment Counted? | Counted When? |
|---|---|---|---|---|---|---|
| Phase I Environmental Assessment | $2,900.00 | 11/15/2011 | 06/24/2013 | Municipality of San Germ | Y | FY13 |

Is Cleanup Necessary? **Unknown**
EPA Assessment Funding: **$2,900.00**
Leveraged Funding:
Total Funding: **$2,900.00**

Top of Page

# Climate Adaption and Mitigation - Planning or Assessment

There is no data for Climate Adaption and Mitigation - Planning or Assessment.

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# Contaminants and Media

Contaminant Found

Media Affected
**Unknown**

Remediating Action for Contaminants

Remediating Action for Media
**NOT Cleaned up**

Top of Page

# Cleanup Activities

There are no current cleanup activities.

Cleanup/Treatment Implemented:
Cleanup/Treatement Categories:
Addl Cleanup/Treatment info:
Address of Data Source:

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# Climate Adaption and Mitigation - Demolition or Cleanup

There is no data for Climate Adaption and Mitigation - Demolition or Cleanup.

Top of Page

# Institutional and Engineering Controls

| | |
|---|---|
| Indicate whether Institutional Controls are required | **U** |
| Categories of Controls | |
| Additional Institutional Controls Information | |

| | |
|---|---|
| Address of Data Source (URL if available) | |
| Are Institutional Controls in Place | **No** |
| Date Institutional Controls were put in place | |
| Indicate whether Engineering Controls are required | **U** |
| Categories of Controls | |
| Additional Engineering controls information | |
| Address of Data Source (URL if available) | |
| Indicate whether Engineering Controls are in place | **No** |
| Date Engineering Controls were put in place | |

Top of Page

# Redevelopment and Other Leveraged Accomplishments

There are no current redevelopment activities.

Number of Redevelopment Jobs Leveraged:

Actual Acreage of Greenspace Created:

Leveraged Funding:

Top of Page

# Climate Adaption and Mitigation - Redevelopment

–

There is no data for Climate Adaption and Mitigation – Redevelopment

Top of Page

# Additional Property Attributes

| | |
|---|---|
| Property Highlights | **San Germ&#65533;s urban core is a Historic Zone and District and in 1994 it was included in the National Register of Historic Places. The property evaluated is a one story concrete mansonry building of 20&#65533; height with a basement. The same source of information indicates two(2) different years of construction: 1890 and 1907. In 2010, as part of the inventory for the hazardous substances brownfields assessment grant&#65533;s this house was assigned the unique number SG-0047. The Municipality assigned the unique number 2H.** |
| Predominant Past Usage | |
| What types of funding are being used on this property? | **Hazardous** |
| State and Tribal Program Information | |
| Date No Further Action Letter Received | |
| Date Letter/Signed Report Received from a Qualified Professional | |
| Other Cleanup Documentation | |

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# Property Details for SG-0080 (4H) Abandoned Property

**On this page:**


- Profile Information
- Property Location
- Property Progress
- CAs Associated with this Property
- Assessment Activities at this Property
- Climate Adaption and Mitigation - Planning or Assessment
- Contaminants and Media
- Cleanup Activities
- Climate Adaption and Mitigation - Demolition or Cleanup
- Institutional & Engineering Controls
- Redevelopment and Other Leveraged Accomplishments
- Climate Adaption and Mitigation - Redevelopment
- Additional Property Attributes


Legal Notices <https://www.epa.gov/cleanups/cimc-legal-notices>

# Profile Information

Property Alias

Property Owner **Private**

ACRES Property ID **149804**

| | |
|---|---|
| ACRES Property ID | **149804** |
| Property Address | **Rama Street (Pueblo Oriental) San German, PR 00683** |
| Size | **.05** |
| Parcel Numbers | |
| Latitude/ Longitude | **18.0808333 / -67.0408333** |
| Congressional District | **1** |
| Property Contact | **Rodriguez, Nancy**<br>**Rodriguez.Nancy@epa.gov**<br>**787-977-5887** |

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# Property Location

Top of Page

# Property Progress

| | |
|---|---|
| Assessment | ☑ |
| Clean Up | ✗ |
| Institutional Controls in Place | ✗ |
| Engineering Controls in Place | ✗ |
| Ready for Anticipated Use | ✗ |
| Redevelopment Underway | ✗ |

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# CAs Associated with this Property

| CA Name | CA # | State | Type | Announcement Year |
|---|---|---|---|---|
| Municipality of San Germ | BF97248807 | PR | Assessment | 2007 |

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# Assessment Activities at this Property

| Activity | EPA Funding | Start Date | Completion Date | CA | Accomplishment Counted? | Counted When? |
|---|---|---|---|---|---|---|
| Phase I Environmental Assessment | $2,900.00 | 11/15/2011 | 06/24/2013 | Municipality of San Germ | Y | FY13 |

Is Cleanup Necessary? **Unknown**
EPA Assessment Funding: **$2,900.00**
Leveraged Funding:
Total Funding: **$2,900.00**

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# Climate Adaption and Mitigation - Planning or Assessment

There is no data for Climate Adaption and Mitigation - Planning or Assessment.

Top of Page

# Contaminants and Media

Contaminant Found

Media Affected
**Unknown**

Remediating Action for Contaminants

Remediating Action for Media
**NOT Cleaned up**

Top of Page

# Cleanup Activities

There are no current cleanup activities.

Cleanup/Treatment Implemented:

Cleanup/Treatement Categories:

Addl Cleanup/Treatment info:

Address of Data Source:

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# Climate Adaption and Mitigation - Demolition or Cleanup

There is no data for Climate Adaption and Mitigation - Demolition or Cleanup.

Top of Page

# Institutional and Engineering Controls

| | |
|---|---|
| Indicate whether Institutional Controls are required | **U** |
| Categories of Controls | |
| Additional Institutional Controls Information | |

| | |
|---|---|
| Address of Data Source (URL if available) | |
| Are Institutional Controls in Place | **No** |
| Date Institutional Controls were put in place | |
| Indicate whether Engineering Controls are required | **U** |
| Categories of Controls | |
| Additional Engineering controls information | |
| Address of Data Source (URL if available) | |
| Indicate whether Engineering Controls are in place | **No** |
| Date Engineering Controls were put in place | |

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# Redevelopment and Other Leveraged Accomplishments

There are no current redevelopment activities.

Number of Redevelopment Jobs Leveraged:

Actual Acreage of Greenspace Created:

Leveraged Funding:

Top of Page

# Climate Adaption and Mitigation - Redevelopment

There is no data for Climate Adaption and Mitigation – Redevelopment

Top of Page

# Additional Property Attributes

| | |
|---|---|
| Property Highlights | **Former Use: The owner of the property is the of Sucn. Eusebio L&#65533;pez Acosta: Daniel Earl L&#65533;pez Pritchard married with Amalia Ramos Gonz&#65533;z, Reynald Lee L&#65533;pez Pritchard married with Hebe Enriquez Palmer and Beatriz L&#65533;pez Pritchard A concrete building (real estate and legal offices) is to the north; an vacant building, recently used as temporary office for Early Head Start and SG-0082 (3H) house to the south; Rama Street on the eastern boundary; while a two story concrete building that is residential and commercial (Kaprichos&#65533; Beauty Salon and Luna Furniture Store) is to west of the subject property.** |
| Predominant Past Usage | |
| What types of funding are being used on this property? | **Hazardous** |
| State and Tribal Program Information | |
| Date No Further Action Letter Received | |
| Date Letter/Signed Report Received from a Qualified Professional | |
| Other Cleanup Documentation | |

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# Property Details for SG-0082 (3H) Abandoned House

**On this page:**


- Profile Information
- Property Location
- Property Progress
- CAs Associated with this Property
- Assessment Activities at this Property
- Climate Adaption and Mitigation - Planning or Assessment
- Contaminants and Media
- Cleanup Activities
- Climate Adaption and Mitigation - Demolition or Cleanup
- Institutional & Engineering Controls
- Redevelopment and Other Leveraged Accomplishments
- Climate Adaption and Mitigation - Redevelopment
- Additional Property Attributes


Legal Notices <https://www.epa.gov/cleanups/cimc-legal-notices>

# Profile Information

Property Alias

Property Owner **Private**

ACRES Property ID **149803**

| | |
|---|---|
| ACRES Property ID | **149803** |
| Property Address | **25 Interamerican University Avenue San German, PR 00683** |
| Size | **.05** |
| Parcel Numbers | |
| Latitude/ Longitude | **18.0808333 / -67.0408333** |
| Congressional District | **1** |
| Property Contact | **Rodriguez, Nancy**<br>**Rodriguez.Nancy@epa.gov**<br>**787-977-5887** |

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# Property Location

Top of Page

# Property Progress

| | |
|---|---|
| Assessment | ☑ |
| Clean Up | ✗ |
| Institutional Controls in Place | ✗ |
| Engineering Controls in Place | ✗ |
| Ready for Anticipated Use | ✗ |
| Redevelopment Underway | ✗ |

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# CAs Associated with this Property

| CA Name | CA # | State | Type | Announcement Year |
|---|---|---|---|---|
| Municipality of San Germ | BF97248807 | PR | Assessment | 2007 |

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# Assessment Activities at this Property

| Activity | EPA Funding | Start Date | Completion Date | CA | Accomplishment Counted? | Counted When? |
|---|---|---|---|---|---|---|
| Phase I Environmental Assessment | $2,900.00 | 11/15/2011 | 06/24/2013 | Municipality of San Germ | Y | FY13 |

Is Cleanup Necessary? **Unknown**
EPA Assessment Funding: **$2,900.00**
Leveraged Funding:
Total Funding: **$2,900.00**

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# Climate Adaption and Mitigation - Planning or Assessment

There is no data for Climate Adaption and Mitigation - Planning or Assessment.

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# Contaminants and Media

Contaminant Found

Media Affected
**Unknown**

Remediating Action for Contaminants

Remediating Action for Media
**NOT Cleaned up**

Top of Page

# Cleanup Activities

There are no current cleanup activities.

Cleanup/Treatment Implemented:

Cleanup/Treatement Categories:

Addl Cleanup/Treatment info:

Address of Data Source:

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# Climate Adaption and Mitigation - Demolition or Cleanup

There is no data for Climate Adaption and Mitigation - Demolition or Cleanup.

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# Institutional and Engineering Controls

| | |
|---|---|
| Indicate whether Institutional Controls are required | **U** |
| Categories of Controls | |
| Additional Institutional Controls Information | |

| | |
|---|---|
| Address of Data Source (URL if available) | |
| Are Institutional Controls in Place | **No** |
| Date Institutional Controls were put in place | |
| Indicate whether Engineering Controls are required | **U** |
| Categories of Controls | |
| Additional Engineering controls information | |
| Address of Data Source (URL if available) | |
| Indicate whether Engineering Controls are in place | **No** |
| Date Engineering Controls were put in place | |

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# Redevelopment and Other Leveraged Accomplishments

There are no current redevelopment activities.

Number of Redevelopment Jobs Leveraged:

Actual Acreage of Greenspace Created:

Leveraged Funding:

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# Climate Adaption and Mitigation - Redevelopment

There is no data for Climate Adaption and Mitigation – Redevelopment

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# Additional Property Attributes

| | |
|---|---|
| Property Highlights | **Former Use: In the approximately 0.0515 acres (208.25 square meters) there is only one (1) structure. The structure is a house built by Ms. Andre Alvarez who led the telephone company. The house was used as a residence and one of the rooms was used as the telephone company.** |
| Predominant Past Usage | **Commercial (.01) Residential (.04)** |
| What types of funding are being used on this property? | **Hazardous** |
| State and Tribal Program Information | |
| Date No Further Action Letter Received | |
| Date Letter/Signed Report Received from a Qualified Professional | |
| Other Cleanup Documentation | |

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# Property Details for SG-0084 (7H) Abandoned House

**On this page:**


- Profile Information
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- Property Progress
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- Climate Adaption and Mitigation - Demolition or Cleanup
- Institutional & Engineering Controls
- Redevelopment and Other Leveraged Accomplishments
- Climate Adaption and Mitigation - Redevelopment
- Additional Property Attributes


Legal Notices <https://www.epa.gov/cleanups/cimc-legal-notices>

# Profile Information

Property Alias

Property Owner **Private**

ACRES Property ID **149806**

| | |
|---|---|
| ACRES Property ID | **149806** |
| Property Address | **22 Ru&#65533;Belvis Street (Pueblo Central) San German, PR 00683** |
| Size | **.19** |
| Parcel Numbers | |
| Latitude/ Longitude | **18.0808333 / -67.04083330000003** |
| Congressional District | **1** |
| Property Contact | **Rodriguez, Nancy**<br>**Rodriguez.Nancy@epa.gov**<br>**787-977-5887** |

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# Property Location

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# Property Progress

| | |
|---|---|
| Assessment | ☑ |
| Clean Up | ✗ |
| Institutional Controls in Place | ✗ |
| Engineering Controls in Place | ✗ |
| Ready for Anticipated Use | ✗ |
| Redevelopment Underway | ✗ |

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# CAs Associated with this Property

| CA Name | CA # | State | Type | Announcement Year |
|---|---|---|---|---|
| Municipality of San Germ | BF97248807 | PR | Assessment | 2007 |

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# Assessment Activities at this Property

| Activity | EPA Funding | Start Date | Completion Date | CA | Accomplishment Counted? | Counted When? |
|---|---|---|---|---|---|---|
| Phase I Environmental Assessment | $2,900.00 | 11/15/2011 | 06/24/2013 | Municipality of San Germ | Y | FY13 |

Is Cleanup Necessary? **Unknown**
EPA Assessment Funding: **$2,900.00**
Leveraged Funding:
Total Funding: **$2,900.00**

Top of Page

# Climate Adaption and Mitigation - Planning or Assessment

There is no data for Climate Adaption and Mitigation - Planning or Assessment.

Top of Page

# Contaminants and Media

Contaminant Found

Media Affected
**Unknown**

Remediating Action for Contaminants

Remediating Action for Media
**NOT Cleaned up**

Top of Page

# Cleanup Activities

There are no current cleanup activities.

Cleanup/Treatment Implemented:

Cleanup/Treatement Categories:

Addl Cleanup/Treatment info:

Address of Data Source:

Top of Page

# Climate Adaption and Mitigation - Demolition or Cleanup

There is no data for Climate Adaption and Mitigation - Demolition or Cleanup.

Top of Page

# Institutional and Engineering Controls

| | |
|---|---|
| Indicate whether Institutional Controls are required | **U** |
| Categories of Controls | |
| Additional Institutional Controls Information | |

| | |
|---|---|
| Address of Data Source (URL if available) | |
| Are Institutional Controls in Place | **No** |
| Date Institutional Controls were put in place | |
| Indicate whether Engineering Controls are required | **U** |
| Categories of Controls | |
| Additional Engineering controls information | |
| Address of Data Source (URL if available) | |
| Indicate whether Engineering Controls are in place | **No** |
| Date Engineering Controls were put in place | |

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# Redevelopment and Other Leveraged Accomplishments

There are no current redevelopment activities.

Number of Redevelopment Jobs Leveraged:

Actual Acreage of Greenspace Created:

Leveraged Funding:

Top of Page

# Climate Adaption and Mitigation - Redevelopment

There is no data for Climate Adaption and Mitigation – Redevelopment

Top of Page

# Additional Property Attributes

| | |
|---|---|
| Property Highlights | **San Germ&#65533;s urban core is a Historic Zone and District and in 1994 it was included in the National Register of Historic Places. The property evaluated is two story concrete mansonry and woode house that based on records reviewed was constructed in 1874. In 2010, as part of the inventory for the hazardous substances brownfields assessment grant&#65533;s this house was assigned the unique number SG-0084. The Municipality assigned the unique number 7H** |
| Predominant Past Usage | |
| What types of funding are being used on this property? | **Hazardous** |
| State and Tribal Program Information | |
| Date No Further Action Letter Received | |
| Date Letter/Signed Report Received from a Qualified Professional | |
| Other Cleanup Documentation | |

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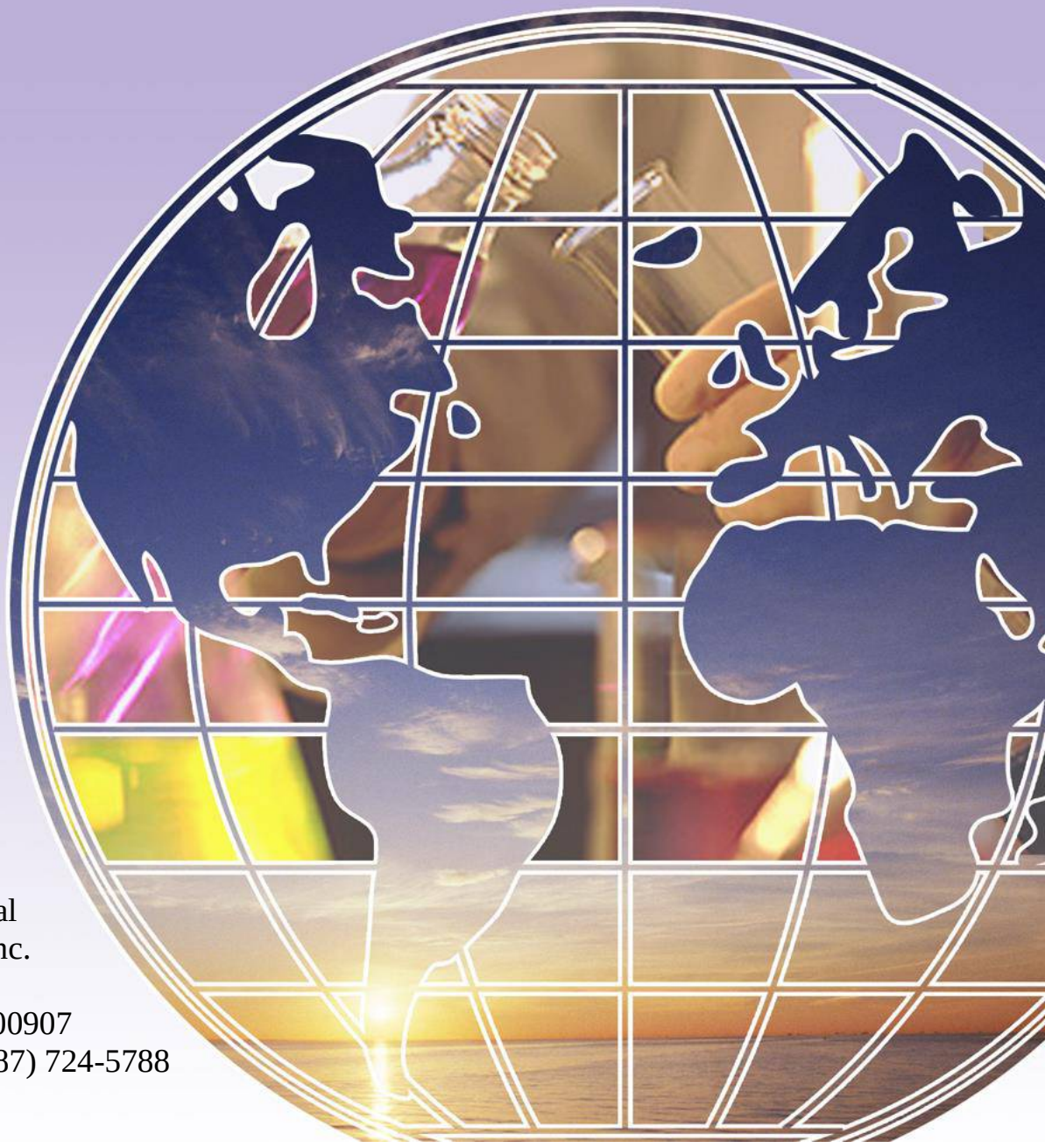
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554 Calle Perseo, Suite J-3, San Juan, P.R. 00920 Tel.(787)783-0290



# Asbestos Containing Materials and Lead Based Paint Study

# ENVIRONMENTAL SURVEY
# FOR
# LEAD BASED PAINTED (LBP) COMPONENTS
# AND
# ASBESTOS CONTAINING MATERIALS (ACM)
# FOR
# SEVEN (7) STRUCTURES LOCATED IN COMUNIDAD EL RETIRO, MUNICIPIO DE SAN GERMAN, PUERTO RICO



Prepared For:
Behar Ybarra

March 2025

Analytical Environmental
Services International, Inc.
611 Monserrate Street
2nd Floor, Santurce, PR 00907
(787) 722-0220 / Fax (787) 724-5788

AES International Inc.

# LEAD



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**2.0 TESTING PROCEDURES**

**3.0 LEAD BASED PAINT TESTING METHODOLOGY**

**4.0 RESULTS**

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APPENDIX I - AESI Credentials

APPENDIX II - PCS Data Sheet

APPENDIX III - XRF Data

APPENDIX IV - Site Location and Selective Photos

APPENDIX V - Schematic Distribution of LBP Components

# I. SUMMARY

AES International was contracted to perform a lead-based paint (LBP) survey for seven (7) structures located in Comunidad El Retiro, Municipio de San German, Puerto Rico. The subject of the study consists of seven (7) structures (Structures 2, 3, 4, 5, 6, 7 and 8) divided into functional spaces. Structures 2, 5 and 7 are being used as living spaces, structures 3, 4 and 8 as storage, and structure 6 as a gazebo.

The LBP investigation was conducted on 2/17/2025 and 2/18/2025 by Abraham Rodriguez, a DRNA/EPA Certified LBP Inspector.

The following components were found to be painted with LBP:

| Room | Substrate | Color | Component & Location | Quantity |
|---|---|---|---|---|
| **Structure #4** | | | | |
| Bathroom | Ceramic | Blue | Shower Wall A | 100sq.ft |
| | Ceramic | Blue | Shower Wall B | |
| | Ceramic | Blue | Shower Wall C | |
| | Ceramic | Blue | Dike | 60sq.ft |

*****Quantity presented is an approximate estimate.

If demolition, or renovation activities, are conducted in the nearest future it is recommended to establish a lead hazard control strategy that will account for the potential LBP risks present in the site.

# 1.0 INTRODUCTION

AES International was contracted to perform a lead-based paint (LBP) survey for seven (7) structures located in Comunidad El Retiro, Municipio de San German, Puerto Rico. The subject of the study consists of seven (7) structures (Structures 2, 3, 4, 5, 6, 7 and 8) divided into functional spaces. Structures 2, 5 and 7 are being used as living spaces, structures 3, 4 and 8 as storage, and structure 6 as a gazebo. The LBP investigation was conducted on 2/17/2025 and 2/18/2025 by Abraham Rodriguez, a DRNA/EPA Certified LBP Inspector. The credentials of AESI are attached in Appendix I. The survey was performed with an XRF instrument SciAps, Model X-550 (serial 02528) manufactured by SciAps. The survey was conducted using HUD protocol of 1997, revised in 2012.

# 2.0 TESTING PROCEDURES

The testing was performed with an XRF instrument manufactured by SciAps, Model X-550 (see PCS in Appendix II). The selected mode allows reference to the abatement level set at 1.0 mg/cm$^2$. The results are reported at 95% confidence levels.

# 3.0 LEAD BASED PAINT TESTING METHODOLOGY

The hazard level of lead in paint has been determined by the department of Housing & Urban development as 1.0 mg/cm$^2$, as measured by XRF, or AAS (Atomic Absorption Spectroscopy), or 0.5% be weight (or 5000 ppm) as measured by AAS, or Inductive Coupled Plasma (ICP). The same level was adopted by EPA regulations published in 1992, under Title X.

The only lead-based paint testing protocol officially available at this time was published by HUD initially in 1990, revised in 1991 and finalized in 1995 (see HUD reference above). A revised chapter 7 was published in 1997 and 2012. In accordance with the new protocol, almost all surfaces present in the units must be tested. The above guidelines were used to perform lead-based paint testing for this project.

The main steps involved in a single-family inspection are:

1. Perform inventory of all testing combinations;
2. Select painted area to be tested;
3. Perform XRF testing (including calibration checks);
4. Collect and analyze paint chip samples, for inconclusive results;
5. Classify XRF and paint chips results;

6. Review and evaluate the data;

7. Report findings.

AES International personnel classify each XRF lead reading as positive, negative, or inconclusive. This classification is based on manufacturer XRF performance characteristic sheet (PCS), for each substrate. Samples and/or additional readings are taken from inconclusive areas. Calibration verification of the instrument was performed prior to beginning of daily task, when the instrument was turned on, and at the end of the day. The verification was conducted on a NIST standard of 1.0 mg/cm$^2$. Acceptance criteria used was +-0.3 mg/cm$^2$. The data for calibration verification is attached in Appendix III.

The structure was divided into room equivalents and labeled accordingly (see Appendix III). One testing combination of similar components and four walls was tested for each room equivalent.

The identification of tested walls is based on HUD guidelines as follows:

Wall A - Entrance wall.
Walls B, C, and D - Sequential walls, clockwise from Wall A.

## 4.0 RESULTS

The results of the tested components are shown in Appendix III. Three hundred forty (340) XRF readings were taken. LBP components were detected and presented herein.

## 5.0 CONCLUSIONS

An LBP survey was conducted for seven (7) structures located in Comunidad El Retiro, Municipio de San German, Puerto Rico. LBP findings are presented herein.

Some painted surfaces may contain levels of lead below 1.0 mg/cm$^2$, which could create lead dust, or lead contaminated soil hazards if the paint is turned into dust by abrasion, scraping, or sanding.

This report shall be kept by the owner and all future owners. A copy of the relevant report shall be given to each tenant, buyer or lessor, to comply with federal requirements for disclosure under the lead disclosure rule of 1996 (see also section 1018 of Title X). The LBP survey relates to surfaces accessible and not covered by rigid barriers. Should any hidden painted surfaces or components be present, they must be assumed as LBP. Reported results are valid for the day of testing indicated in the reports. According to DNRA the LBP study is valid for a period of five years.

Abraham Rodríguez
Lead Inspector
DRNA Lic. LBPI-01725-015

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**JUNTA DE CALIDAD AMBIENTAL**

**Área de Calidad de Agua**

**Forma PGC-010**

# CERTIFICACION DE NO PRESENCIA DE PINTURA CON BASE DE PLOMO EN ESTRUCTURAS A DEMOLERSE

**(Deberá completarse en letra de molde o impresa)**

**NUM. PERMISO:** _____

Yo, Abraham Rodríguez (Inspector o Evaluador de Riesgos), mayor de edad, Soltero (Estado Civil), y vecino de Vega Baja (Municipio)

Dirección Postal Vega Baja Lakes Calle 2 B-33 Vega Baja (Pueblo) 00693 (Zip Code)

Teléfonos: Residencial ( 939 ) 642 - 2461 Oficina ( 787 ) 722 - 0220 Ext._____
Fax ( 787 ) 724 - 5788

**Certifico que:**

1. Estoy certificado por la Junta de Calidad Ambiental como ( ☒ Inspector / ☐ Evaluador de Riesgos) con Número de Certificación LBPI-01725-015, la cual se encuentra vigente.
2. La estructura localizada en Six (6) Structures (Structures 2, 3, 5, 6, 7 and 8) located in Comunidad El Retiro, San German, Puerto Rico, la cual será objeto de una demolición se encuentra libre de pintura con base de plomo.
3. La información antes indicada es cierta y correcta.
4. Afirmo y reconozco las consecuencias de incluir y someter información falsa en este documento.
5. Para que así conste, firmo la presente certificación en San Juan (Municipio) de Puerto Rico, hoy día 18 de febrero de 2025

* Esta certificación es exclusivamente para las areas muestreadas.

_____
Firma del Inspector o Evaluador de Riesgos (en original)

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Dirección Postal: Apartado 11488, Santurce, PR 00910-1488
Tel. (787) 767-8181 • Fax (787) 767-1962

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# Appendix I



# AIHA Laboratory Accreditation Programs, LLC

*acknowledges that*

## Analytical Environmental Services International, Inc.

### 611 Monserrate St. Suite 2 Santurce, PR 00907

**Laboratory ID: LAP-102702**

along with all premises from which key activities are performed, as listed above, has fulfilled the requirements of the AIHA Laboratory Accreditation Programs (AIHA LAP), LLC accreditation to the ISO/IEC 17025:2017 international standard, General Requirements for the Competence of Testing and Calibration Laboratories in the following:

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| | | |
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| ☑ | **ENVIRONMENTAL LEAD** | Accreditation Expires: July 01, 2025 |
| ☐ | **ENVIRONMENTAL MICROBIOLOGY** | Accreditation Expires: |
| ☐ | **FOOD** | Accreditation Expires: |
| ☐ | **UNIQUE SCOPES** | Accreditation Expires: |
| ☐ | **BERYLLIUM FIELD/MOBILE** | Accreditation Expires: |

Specific Field(s) of Testing (FoT)/Method(s) within each Accreditation Program for which the above named laboratory maintains accreditation is outlined on the attached Scope of Accreditation. Continued accreditation is contingent upon successful on-going compliance with ISO/IEC 17025:2017 and AIHA LAP, LLC requirements. This certificate is not valid without the attached Scope of Accreditation. Please review the AIHA LAP, LLC website (www.aihaaccreditedlabs.org) for the most current Scope.

Cheryl O. Morton

*Cheryl O Morton*
*Managing Director, AIHA Laboratory Accreditation Programs, LLC*

Revision21: 05/15/2023

Date Issued: 07/01/2023

# United States Environmental Protection Agency

## This is to certify that

AES International, Inc.

has fulfilled the requirements of the Toxic Substances Control Act (TSCA) Section 402, and has received certification to conduct lead-based paint renovation, repair, and painting activities pursuant to 40 CFR Part 745.89

## In the Jurisdiction of:

All EPA Administered States, Tribes, and Territories

This certification is valid from the date of issuance and expires November 15, 2025

NAT-87801-3

Certification #

September 04, 2020

Issued On

Michelle Price, Chief

Lead, Heavy Metals, and Inorganics Branch

# GOBIERNO DE PUERTO RICO

Departamento de Recursos Naturales y Ambientales

Este certificado es otorgado a:

## AES International Inc.

Por haber cumplido con los requisitos establecidos en el Capítulo VI, Regla 127 del Reglamento para el Manejo Adecuado de Actividades de Pintura con Base de Plomo. Se le otorga esta certificación como **Firma** para llevar a cabo actividades relacionadas a Mitigación de Pintura con base de plomo en la jurisdicción de Puerto Rico.

Número de Certificado

**LBPF-04425-014**

Fecha de emisión: Abril 6, 2025

Fecha de Expiración: Abril 5, 2026

Firma Autorizada
Departamento de Recursos Naturales
y Ambientales

# DRNA Lead Inspector Credential




LEAD-SAFE EPA CERTIFIED FIRM

AES International Inc.

# Appendix II



# Performance Characteristic Sheet

**EFFECTIVE DATE: February 1, 2022**

**MANUFACTURER AND MODEL:**

Make: ***SciAps***
Models: ***Model X-550***
X-Ray Source: ***Rhodium (Rh) or Gold (Au) Anode***

## FIELD OPERATION GUIDANCE

**ACTION LEVEL SETTING:**

1.0 mg/cm$^2$

**OPERATING PARAMETERS**:

Timed mode: fixed 10-second reading.

Quick mode: variable-time reading (approximately 2-6 seconds).

**XRF CALIBRATION CHECK LIMITS**:

| |
|---|
| 0.8 to 1.2 mg/cm$^2$ (inclusive) on NIST SRM 2579 (1.02 mg/cm$^2$)/NIST SRM 2573, or equivalent |

**SUBSTRATE CORRECTION:**

Not applicable

**INCONCLUSIVE RANGE OR THRESHOLD:**

| **Au Anode (quick)**<br>**READING DESCRIPTION** | **SUBSTRATE** | **THRESHOLD (mg/cm$^2$)** |
|---|---|---|
| Results not corrected for substrate bias on any substrate | Brick<br>Concrete<br>Drywall<br>Metal<br>Plaster<br>Wood | 1.0<br>1.0<br>1.0<br>1.0<br>1.0<br>1.0 |
| **Rh Anode (Timed or Quick), Au Anode (Timed)**<br>**READING DESCRIPTION** | **SUBSTRATE** | **THRESHOLD (mg/cm$^2$)** |
| Results not corrected for substrate bias on any substrate | Brick<br>Concrete<br>Drywall<br>Metal<br>Plaster<br>Wood | 0.9<br>0.9<br>0.9<br>0.9<br>0.9<br>0.9 |

## BACKGROUND INFORMATION

### EVALUATION DATA SOURCE AND DATE:

This sheet is supplemental information to be used in conjunction with Chapter 7 of the HUD *Guidelines for the Evaluation and Control of Lead-Based Paint Hazards in Housing*, 2012 Edition ("HUD Guidelines"). Performance parameters shown on this sheet are calculated using test results on building components in the HUD archive. Testing was conducted on 146 test samples in February 2022, with two separate instruments of each Anode type, operated in both Timed and Quick modes.

### OPERATING PARAMETERS

Performance parameters shown in this sheet are applicable only when properly operating the instrument using the manufacturer's instructions and procedures described in Chapter 7 of the HUD Guidelines.

### XRF CALIBRATION CHECK:

The calibration of the XRF instrument should be checked using the paint film nearest 1.0 mg/cm$^2$ in the NIST Standard Reference Material (SRM) used (e.g., for NIST SRM 2579, use the 1.02 mg/cm$^2$ film; for NIST SRM 2579a, use film 2573 (1.04 mg/cm$^2$).

If the average (rounded to 1 decimal place) of three readings is outside the acceptable calibration check range, follow the manufacturer's instructions to bring the instrument into control before XRF testing proceeds.

### EVALUATING THE QUALITY OF XRF TESTING:

Randomly select ten testing combinations for retesting from each house or from two randomly selected units in multifamily housing.

Conduct XRF re-testing at the ten testing combinations selected for retesting.

Determine if the XRF testing in the units or house passed or failed the test by applying the steps below. Compute the Retest Tolerance Limit by the following steps:

Determine XRF results for the original and retest XRF readings. In single-family and multi-family housing, a result is defined as a single reading. Therefore, there will be ten original and ten retest XRF results for each house or for the two selected units.

Calculate the average of the original XRF result and the retest XRF result for each testing combination.

Square the average for each testing combination.

Add the ten squared averages together. Call this quantity C.

Multiply the number C by 0.0072. Call this quantity D.

Add the number 0.032 to D. Call this quantity E.

Take the square root of E. Call this quantity F.

Multiply F by 1.645. The result is the Retest Tolerance Limit.

Compute the average of all ten original XRF readings.

Compute the average of all ten re-test XRF readings.

Find the absolute difference of the two averages.

If the difference is less than the Retest Tolerance Limit, the inspection has passed the retest. If the difference of the overall averages equals or exceeds the Retest Tolerance Limit, this

procedure should be repeated with ten new testing combinations. If the difference of the overall averages is equal to or greater than the Retest Tolerance Limit a second time, then the inspection should be considered deficient.

Use of this procedure is estimated to produce a spurious result approximately 1% of the time. That is, results of this procedure will call for further examination when no examination is warranted in approximately 1 out of 100 dwelling units tested.

**TESTING TIMES:**

The reading time in Archive tests was 10 seconds in Timed mode and from 2-6 seconds in Quick mode, for both the Rh Anode and Au Anode.

**CLASSIFICATION OF RESULTS:**

XRF results for the Au Anode in Quick mode are classified as **positive** if they are **greater than or equal** to 1.0 mg/cm$^2$ and ***negative*** if they are ***less than*** *to* 1.0 mg/cm$^2$. XRF results for the Au Anode in Timed mode and for the Rh Anode in Timed or Quick mode are classified as **positive** if they are **greater than or equal** to 0.9 mg/cm$^2$ and ***negative*** if they are ***less than*** *to* 0.9 mg/cm$^2$

**DOCUMENTATION:**

A report titled *Methodology for XRF Performance Characteristic Sheets* (EPA 747-R-95-008) provides an explanation of the statistical methodology used to develop Performance Characteristic Sheets at the Federal standard (Action Level) of 1.0 mg/cm$^2$ and provides empirical results from using the recommended inconclusive ranges or thresholds for specific XRF instruments. The report may be downloaded at http://www2.epa.gov/lead/methodology-xrf-performance-characteristic-sheets-epa-747-r-95-008-september-1997.

AES International Inc.

# Appendix III



ANALYTICAL ENVIRONMENTAL SERVICES INTERNATIONAL, INC.
611 Monserrate Street, 2nd Floor, Santurce, Puerto Rico 00907

# LEAD BASED PAINT TESTING DATA SHEET

**Client Name:** **Behar Ybarra & Associates**
**Project Name:** 7 Structures - El Retiro Community
**Address:** San Germán, Puerto Rico

Date: 2/18/2025
Inspector: Abraham Rodríguez
XRF Serial No.: 02528

| Reading # | Building | Room | Substrate | Color | Component & Location | XRF Reading ($mg/cm^2$) |
|---|---|---|---|---|---|---|
| 1 | | | | | Calibration | 1.0 |
| 2 | | | | | Calibration | 1.0 |
| 3 | | | | | Calibration | 1.0 |
| 4 | Structure 2 | Balcony 1 | Wood | Blue | Wall A | 0.2 |
| 5 | Structure 2 | Balcony 1 | Wood | Blue | Wall B | 0.0 |
| 6 | Structure 2 | Balcony 1 | Wood | Blue | Wall C | 0.0 |
| 7 | Structure 2 | Balcony 1 | Wood | Blue | Wall D | 0.1 |
| 8 | Structure 2 | Balcony 1 | Wood | Brown | Ceiling | 0.1 |
| 9 | Structure 2 | Balcony 1 | Wood | Not Painted | Floor | 0.0 |
| 10 | Structure 2 | Living Room / Kitchen | Wood | Blue | Door Frame | 0.2 |
| 11 | Structure 2 | Living Room / Kitchen | Wood | Blue | Door | 0.0 |
| 12 | Structure 2 | Living Room / Kitchen | Wood | Blue | Wall A | 0.0 |
| 13 | Structure 2 | Living Room / Kitchen | Wood | Blue | Wall B | 0.1 |
| 14 | Structure 2 | Living Room / Kitchen | Wood | Yellow | Wall C | 0.3 |
| 15 | Structure 2 | Living Room / Kitchen | Wood | Yellow | Wall D | 0.0 |

**Approved By: Ady Padan Ph.D.** **Date: 2/18/2025**

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**Project Name:** 7 Structures - El Retiro Community Inspector: Abraham Rodríguez
**Address:** San Germán, Puerto Rico XRF Serial No.: 02528

| Reading # | Building | Room | Substrate | Color | Component & Location | XRF Reading ($mg/cm^2$) |
|---|---|---|---|---|---|---|
| 16 | Structure 2 | Living Room / Kitchen | Wood | Blue | Ceiling Support | 0.3 |
| 17 | Structure 2 | Living Room / Kitchen | Wood | Blue | Wall D | 0.1 |
| 18 | Structure 2 | Living Room / Kitchen | Metal | White | Window | 0.3 |
| 19 | Structure 2 | Bedroom 1 | Wood | Blue | Door Frame | 0.0 |
| 20 | Structure 2 | Bedroom 1 | Wood | Blue | Door | 0.0 |
| 21 | Structure 2 | Bedroom 1 | Wood | White | Wall A | 0.2 |
| 22 | Structure 2 | Bedroom 1 | Wood | White | Wall B | 0.0 |
| 23 | Structure 2 | Bedroom 1 | Wood | White | Wall C | 0.0 |
| 24 | Structure 2 | Bedroom 1 | Wood | White | Wall D | 0.1 |
| 25 | Structure 2 | Bedroom 1 | Wood | White | Ceiling Support | 0.0 |
| 26 | Structure 2 | Bedroom 1 | Metal | White | Window | 0.4 |
| 27 | Structure 2 | Bedroom 1, Closet | Wood | White | Wall B | 0.2 |
| 28 | Structure 2 | Bedroom 1, Closet | Wood | White | Wall C | 0.0 |
| 29 | Structure 2 | Bedroom 1, Closet | Wood | White | Wall D | 0.0 |
| 30 | Structure 2 | Bedroom 1, Closet | Wood | White | Shelves | 0.1 |

**Approved By: Ady Padan Ph.D.** **Date: 2/18/2025**

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**Address:** San Germán, Puerto Rico XRF Serial No.: 02528

| Reading # | Building | Room | Substrate | Color | Component & Location | XRF Reading ($mg/cm^2$) |
|---|---|---|---|---|---|---|
| 31 | Structure 2 | Bedroom 1, Closet | Wood | White | Shelves Support | 0.3 |
| 32 | Structure 2 | Bedroom 2 | Wood | Blue | Door Frame | 0.2 |
| 33 | Structure 2 | Bedroom 2 | Wood | Blue | Door | 0.0 |
| 34 | Structure 2 | Bedroom 2 | Wood | White | Wall A | 0.0 |
| 35 | Structure 2 | Bedroom 2 | Wood | White | Wall B | 0.1 |
| 36 | Structure 2 | Bedroom 2 | Wood | White | Wall C | 0.2 |
| 37 | Structure 2 | Bedroom 2 | Wood | White | Wall D | 0.1 |
| 38 | Structure 2 | Bedroom 2 | Wood | White | Ceiling Support | 0.4 |
| 39 | Structure 2 | Bedroom 2, Closet | Wood | White | Wall B | 0.0 |
| 40 | Structure 2 | Bedroom 2, Closet | Wood | White | Wall C | 0.0 |
| 41 | Structure 2 | Bedroom 2, Closet | Wood | White | Wall D | 0.1 |
| 42 | Structure 2 | Bedroom 2, Closet | Wood | White | Shelves | 0.3 |
| 43 | Structure 2 | Bedroom 2, Closet | Wood | White | Shelves Support | 0.0 |
| 44 | Structure 2 | Balcony 2 | Wood | Pink | Handrail | 0.1 |
| 45 | Structure 2 | Balcony 2 | Wood | Pink | Riser | 0.1 |

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| Reading # | Building | Room | Substrate | Color | Component & Location | XRF Reading ($mg/cm^2$) |
|---|---|---|---|---|---|---|
| 46 | Structure 2 | Living Room 2 | Metal | White | Door Frame | 0.3 |
| 47 | Structure 2 | Living Room 2 | Metal | White | Door | 0.1 |
| 48 | Structure 2 | Living Room 2 | Wood | White | Wall A | 0.0 |
| 49 | Structure 2 | Living Room 2 | Wood | White | Wall B | 0.0 |
| 50 | Structure 2 | Living Room 2 | Wood | White | Wall C | 0.1 |
| 51 | Structure 2 | Living Room 2 | Wood | White | Wall D | 0.0 |
| 52 | Structure 2 | Living Room 2 | Wood | White | Ceiling | 0.3 |
| 53 | Structure 2 | Living Room 2 | Metal | White | Window | 0.2 |
| 54 | Structure 2 | Kitchen 2 | Wood | White | Wall A | 0.1 |
| 55 | Structure 2 | Kitchen 2 | Wood | White | Wall B | 0.1 |
| 56 | Structure 2 | Kitchen 2 | Wood | White | Wall C | 0.0 |
| 57 | Structure 2 | Kitchen 2 | Wood | White | Wall D | 0.2 |
| 58 | Structure 2 | Kitchen 2 | Wood | White | Ceiling Support | 0.1 |
| 59 | Structure 2 | Kitchen 2 | Metal | Black | Window | 0.1 |
| 60 | Structure 2 | Hallway | Wood | Not Painted | Walls | 0.0 |

**Approved By: Ady Padan Ph.D.** **Date: 2/18/2025**

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| Reading # | Building | Room | Substrate | Color | Component & Location | XRF Reading ($mg/cm^2$) |
|---|---|---|---|---|---|---|
| 61 | Structure 2 | Hallway | Wood | Not Painted | Floor | 0.0 |
| 62 | Structure 2 | Hallway | Wood | Not Painted | Ceiling | 0.0 |
| 63 | Structure 2 | Bathroom 2 | Wood | Not Painted | Door Frame | 0.0 |
| 64 | Structure 2 | Bathroom 2 | Wood | Not Painted | Door | 0.0 |
| 65 | Structure 2 | Bathroom 2 | Wood | White | Wall B | 0.2 |
| 66 | Structure 2 | Bathroom 2 | Wood | White | Wall C | 0.0 |
| 67 | Structure 2 | Bathroom 2 | Wood | White | Wall D | 0.1 |
| 68 | Structure 2 | Bathroom 2 | Wood | White | Ceiling | 0.4 |
| 69 | Structure 2 | Bathroom 2 | Ceramic | Gray | Floor | 0.0 |
| 70 | Structure 2 | Bathroom 2 | Ceramic | Cream | Floor | 0.2 |
| 71 | Structure 2 | Bathroom 2 | Ceramic | Gray | Dike | 0.2 |
| 72 | Structure 2 | Bathroom 2 | Ceramic | White | Shower Floor | 0.0 |
| 73 | Structure 2 | Bathroom 2 | Ceramic | Brown | Shower Floor | 0.1 |
| 74 | Structure 2 | Bathroom 2 | Ceramic | Gray | Shower Floor | 0.4 |
| 75 | Structure 2 | Bathroom 2 | Metal | Black | Window | 0.1 |

**Approved By: Ady Padan Ph.D.** **Date: 2/18/2025**

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| Reading # | Building | Room | Substrate | Color | Component & Location | XRF Reading ($mg/cm^2$) |
|---|---|---|---|---|---|---|
| 76 | Structure 2 | Bathroom 2 | Ceramic | White | Toilet | 0.0 |
| 77 | Structure 2 | Bathroom 2 | Ceramic | White | Sink | 0.0 |
| 78 | Structure 2 | Bedroom 3 | Wood | Brown | Door | 0.1 |
| 79 | Structure 2 | Bedroom 3 | Wood | Not Painted | Walls | 0.0 |
| 80 | Structure 2 | Bedroom 4 | Wood | Not Painted | Floor | 0.0 |
| 81 | Structure 2 | Bedroom 5 | Wood | Not Painted | Ceiling | 0.0 |
| 82 | Structure 2 | Bedroom 3 | Metal | Black | Window | 0.1 |
| 83 | Structure 2 | Bedroom 4 | Wood | Green | Wall A | 0.0 |
| 84 | Structure 2 | Bedroom 4 | Wood | Green | Wall D | 0.1 |
| 85 | Structure 2 | Bedroom 4 | Metal | Black | Window | 0.0 |
| 86 | Structure 2 | Bedroom 4 | Wood | Not Painted | Door | 0.0 |
| 87 | Structure 2 | Bedroom 4 | Wood | Not Painted | Wall B | 0.0 |
| 88 | Structure 2 | Bedroom 4 | Wood | Not Painted | Walls D | 0.0 |
| 89 | Structure 2 | Bedroom 4 | Wood | Not Painted | Floor | 0.0 |
| 90 | Structure 2 | Bedroom 4 | Wood | Not Painted | Ceiling | 0.0 |

**Approved By: Ady Padan Ph.D.** **Date: 2/18/2025**

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| Reading # | Building | Room | Substrate | Color | Component & Location | XRF Reading ($mg/cm^2$) |
|---|---|---|---|---|---|---|
| 91 | Structure 2 | Exterior | Wood | Green | Wall A | 0.2 |
| 92 | Structure 2 | Exterior | Wood | Green | Wall B | 0.0 |
| 93 | Structure 2 | Exterior | Wood | Green | Wall C | 0.1 |
| 94 | Structure 2 | Exterior | Wood | Green | Wall D | 0.1 |
| 95 | Structure 2 | Exterior | Wood | Pink | Window Decor | 0.0 |
| 96 | Structure 2 | Exterior | Wood | Pink | Panel Lines | 0.1 |
| 97 | Structure 2 | Exterior | Concrete | Green | Column | 0.2 |
| 98 | Structure 2 | Exterior | Wood | Pink | House Support | 0.2 |
| 99 | Structure 2 | Exterior | Wood | Pink | Corner | 0.1 |
| 100 | Structure 2 | Exterior | Wood | Pink | Ceiling Support | 0.3 |

**Approved By: Ady Padan Ph.D.** **Date: 2/18/2025**

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**Address:** San Germán, Puerto Rico

Date: 2/18/25
Inspector: Abraham Rodríguez
XRF Serial No.: 02528

| Reading # | Building | Room | Substrate | Color | Component & Location | XRF Reading ($mg/cm^2$) |
|---|---|---|---|---|---|---|
| 1 | Structure 3 | Storage | Wood | Blue | Door Frame | 0.2 |
| 2 | Structure 3 | Storage | Wood | Yellow | Door | 0.0 |
| 3 | Structure 3 | Storage | Wood | Not Painted | Wall A | 0.0 |
| 4 | Structure 3 | Storage | Wood | Not Painted | Wall B | 0.0 |
| 5 | Structure 3 | Storage | Wood | Not Painted | Wall C | 0.0 |
| 6 | Structure 3 | Storage | Wood | Not Painted | Wall D | 0.0 |
| 7 | Structure 3 | Storage | Wood | Not Painted | Ceiling Support | 0.0 |
| 8 | Structure 3 | Storage | Metal | Not Painted | Ceiling | 0.0 |
| 9 | Structure 3 | Storage | Concrete | Not Painted | Floor | 0.0 |
| 10 | Structure 3 | Exterior | Wood | Green | Wall A | 0.1 |
| 11 | Structure 3 | Exterior | Wood | Green | Wall B | 0.3 |
| 12 | Structure 3 | Exterior | Wood | Not Painted | Wall C | 0.0 |
| 13 | Structure 3 | Exterior | Wood | Not Painted | Wall D | 0.0 |

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**Project Name:** 7 Structures - El Retiro Community Inspector: Abraham Rodríguez
**Address:** San Germán, Puerto Rico XRF Serial No.: 02528

| Reading # | Building | Room | Substrate | Color | Component & Location | XRF Reading ($mg/cm^2$) |
|---|---|---|---|---|---|---|
| 1 | Structure 4 | Storage | Wood | Yellow | Door Frame | 0.2 |
| 2 | Structure 4 | Storage | Wood | Brown | Door | 0.0 |
| 3 | Structure 4 | Storage | Wood | Yellow | Wall A | 0.2 |
| 4 | Structure 4 | Storage | Concrete | Yellow | Wall B | 0.0 |
| 5 | Structure 4 | Storage | Wood | Yellow | Wall C | 0.1 |
| 6 | Structure 4 | Storage | Wood | Yellow | Wall D | 0.0 |
| 7 | Structure 4 | Storage | Concrete | Gray | Floor | 0.3 |
| 8 | Structure 4 | Storage | Wood | White | Ceiling | 0.2 |
| 9 | Structure 4 | Storage | Wood | Yellow | Ceiling Support | 0.1 |
| 10 | Structure 4 | Storage | Metal | Black | Window | 0.0 |
| 11 | Structure 4 | Bathroom | Wood | Green | Door Frame | 0.2 |
| 12 | Structure 4 | Bathroom | Wood | Not Painted | Door | 0.0 |
| 13 | Structure 4 | Bathroom | Concrete | Green | Wall A | 0.2 |
| 14 | Structure 4 | Bathroom | Concrete | Green | Wall B | 0.0 |
| 15 | Structure 4 | Bathroom | Concrete | Green | Wall C | 0.1 |

**Approved By: Ady Padan Ph.D.** **Date: 2/18/2025**

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Date: 2/18/25
Inspector: Abraham Rodríguez
XRF Serial No.: 02528

| Reading # | Building | Room | Substrate | Color | Component & Location | XRF Reading ($mg/cm^2$) |
|---|---|---|---|---|---|---|
| 16 | Structure 4 | Bathroom | Concrete | Green | Wall D | 0.3 |
| 17 | Structure 4 | Bathroom | Concrete | Gray | Floor | 0.4 |
| 18 | Structure 4 | Bathroom | Wood | White | Ceiling Support | 0.2 |
| 19 | Structure 4 | Bathroom | Ceramic | Blue | Shower Wall A | **1.5** |
| 20 | Structure 4 | Bathroom | Ceramic | Blue | Shower Wall B | **1.4** |
| 21 | Structure 4 | Bathroom | Ceramic | Blue | Shower Wall C | **1.5** |
| 22 | Structure 4 | Bathroom | Ceramic | Blue | Dike | **1.5** |
| 23 | Structure 4 | Bathroom | Ceramic | Blue | Shower Floor | 0.2 |
| 24 | Structure 4 | Bathroom | Ceramic | White | Shower Floor | 0.0 |
| 25 | Structure 4 | Bathroom | Ceramic | Blue | Toilet | 0.5 |
| 26 | Structure 4 | Bathroom | Ceramic | White | Sink | 0.2 |
| 27 | Structure 4 | Exterior | Concrete | Green | Wall A | 0.1 |
| 28 | Structure 4 | Bathroom | Wood | Green | Wall A | 0.1 |
| 29 | Structure 4 | Bathroom | Concrete | Green | Wall B | 0.2 |
| 30 | Structure 4 | Bathroom | Concrete | Green | Wall C | 0.2 |

**Approved By: Ady Padan Ph.D.** **Date: 2/18/2025**

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**Address:** San Germán, Puerto Rico XRF Serial No.: 02528

| Reading # | Building | Room | Substrate | Color | Component & Location | XRF Reading ($mg/cm^2$) |
|---|---|---|---|---|---|---|
| 31 | Structure 4 | Bathroom | Wood | Green | Wall C | 0.0 |
| 32 | Structure 4 | Bathroom | Wood | Green | Wall D | 0.1 |
| 33 | Structure 4 | Bathroom | Wood | Gray | Underhang | 0.2 |
| 34 | Structure 4 | Bathroom | Wood | Pink | Door to Back | 0.2 |

**Approved By: Ady Padan Ph.D.** **Date: 2/18/2025**

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Date: 2/18/2025
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| Reading # | Building | Room | Substrate | Color | Component & Location | XRF Reading ($mg/cm^2$) |
|---|---|---|---|---|---|---|
| 1 | Structure 5 | Balcony | Wood | Not Painted | Floor | 0.0 |
| 2 | Structure 5 | Balcony | Wood | Not Painted | Handrail | 0.0 |
| 3 | Structure 5 | Balcony | Metal | Not Painted | Ceiling | 0.0 |
| 4 | Structure 5 | Kitchen / Living Room | Metal | White | Door Frame | 0.2 |
| 5 | Structure 5 | Kitchen / Living Room | Metal | White | Door | 0.0 |
| 6 | Structure 5 | Kitchen / Living Room | Wood | Yellow | Wall A | 0.2 |
| 7 | Structure 5 | Kitchen / Living Room | Wood | Yellow | Wall B | 0.0 |
| 8 | Structure 5 | Kitchen / Living Room | Wood | Yellow | Wall C | 0.0 |
| 9 | Structure 5 | Kitchen / Living Room | Wood | Yellow | Wall D | 0.1 |
| 10 | Structure 5 | Kitchen / Living Room | Wood | White | Ceiling Support | 0.3 |
| 11 | Structure 5 | Kitchen / Living Room | Metal | White | Window | 0.3 |
| 12 | Structure 5 | Bedroom 1 | Wood | Yellow | Wall A | 0.2 |
| 13 | Structure 5 | Bedroom 1 | Wood | Yellow | Wall B | 0.0 |
| 14 | Structure 5 | Bedroom 1 | Wood | Yellow | Wall C | 0.1 |
| 15 | Structure 5 | Bedroom 1 | Wood | Yellow | Wall D | 0.3 |

**Approved By: Ady Padan Ph.D.** **Date: 2/18/2025**

ANALYTICAL ENVIRONMENTAL SERVICES INTERNATIONAL, INC.
611 Monserrate Street, 2nd Floor, Santurce, Puerto Rico 00907

# LEAD BASED PAINT TESTING DATA SHEET

**Client Name:** **Behar Ybarra & Associates**
**Project Name:** 7 Structures - El Retiro Community
**Address:** San Germán, Puerto Rico

Date: 2/18/2025
Inspector: Abraham Rodríguez
XRF Serial No.: 02528

| Reading # | Building | Room | Substrate | Color | Component & Location | XRF Reading ($mg/cm^2$) |
|---|---|---|---|---|---|---|
| 16 | Structure 5 | Bedroom 1 | Wood | Yellow | Ceiling Support | 0.3 |
| 17 | Structure 5 | Bedroom 1 | Metal | White | Window | 0.1 |
| 18 | Structure 5 | Bedroom 1 | Wood | Gray | Floor | 0.0 |
| 19 | Structure 5 | Bedroom 2 | Wood | Not Painted | Door | 0.0 |
| 20 | Structure 5 | Bedroom 2 | Wood | White | Wall A | 0.1 |
| 21 | Structure 5 | Bedroom 2 | Wood | White | Wall B | 0.0 |
| 22 | Structure 5 | Bedroom 2 | Wood | White | Wall C | 0.3 |
| 23 | Structure 5 | Bedroom 2 | Wood | White | Wall D | 0.2 |
| 24 | Structure 5 | Bedroom 2 | Wood | Gray | Floor | 0.1 |
| 25 | Structure 5 | Bedroom 2 | Metal | White | Window | 0.1 |
| 26 | Structure 5 | Bedroom 2 | Metal | White | Ceiling Support | 0.0 |
| 27 | Structure 5 | Exterior | Wood | Gray | Wall A | 0.2 |
| 28 | Structure 5 | Exterior | Wood | Green | Wall B | 0.1 |
| 29 | Structure 5 | Exterior | Wood | Green | Wall C | 0.1 |
| 30 | Structure 5 | Exterior | Wood | Green | Wall D | 0.4 |

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Date: 2/18/2025
Inspector: Abraham Rodríguez
XRF Serial No.: 02528

| Reading # | Building | Room | Substrate | Color | Component & Location | XRF Reading ($mg/cm^2$) |
|---|---|---|---|---|---|---|
| 31 | Structure 5 | Exterior | Wood | White | Corners | 0.2 |
| 32 | Structure 5 | Exterior | Wood | White | Ceiling Support | 0.3 |
| 33 | Structure 5 | Exterior | Wood | White | Window Decor | 0.2 |

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**Address:** San Germán, Puerto Rico

Date: 2/17/25
Inspector: Abraham Rodríguez
XRF Serial No.: 02528

| Reading # | Building | Room | Substrate | Color | Component & Location | XRF Reading ($mg/cm^2$) |
|---|---|---|---|---|---|---|
| 1 | | | | | Calibration | 1.0 |
| 2 | | | | | Calibration | 1.0 |
| 3 | | | | | Calibration | 1.0 |
| 4 | Structure 6 | Area 1 | Wood | Cream | Columns | 0.0 |
| 5 | Structure 6 | Area 1 | Wood | Blue | Columns | 0.1 |
| 6 | Structure 6 | Area 1 | Wood | Orange | Columns | 0.1 |
| 7 | Structure 6 | Area 1 | Wood | Pink | Columns | 0.3 |
| 8 | Structure 6 | Area 1 | Wood | Orange | Beam | 0.0 |
| 9 | Structure 6 | Area 1 | Metal | Gray | Ceiling | 0.0 |
| 10 | Structure 6 | Area 1 | Wood | Gray | Wall C | 0.2 |
| 11 | Structure 6 | Area 1 | Wood | Not Painted | Floor | 0.0 |
| 12 | Structure 6 | Area 1 | Concrete | Not Painted | Floor | 0.0 |
| 13 | Structure 6 | Exterior | Wood | Blue | Wall A | 0.2 |
| 14 | Structure 6 | Exterior | Wood | Green | Wall A | 0.0 |
| 15 | Structure 6 | Exterior | Wood | Pink | Wall A | 0.1 |

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Date: 2/18/25
Inspector: Abraham Rodríguez
XRF Serial No.: 02528

| Reading # | Building | Room | Substrate | Color | Component & Location | XRF Reading ($mg/cm^2$) |
|---|---|---|---|---|---|---|
| 1 | Structure 7 | Dining Room | Metal | White | Door Frame | 0.2 |
| 2 | Structure 7 | Dining Room | Metal | White | Door | 0.0 |
| 3 | Structure 7 | Dining Room | Wood | White | Wall A | 0.2 |
| 4 | Structure 7 | Dining Room | Wood | White | Wall B | 0.0 |
| 5 | Structure 7 | Dining Room | Wood | White | Wall C | 0.1 |
| 6 | Structure 7 | Dining Room | Wood | White | Wall D | 0.3 |
| 7 | Structure 7 | Dining Room | Wood | White | Ceiling Support | 0.3 |
| 8 | Structure 7 | Dining Room | Metal | White | Window | 0.2 |
| 9 | Structure 7 | Porch | Wood | White | Door Frame | 0.1 |
| 10 | Structure 7 | Porch | Wood | White | Door | 0.0 |
| 11 | Structure 7 | Porch | Wood | Pink | Wall A | 0.2 |
| 12 | Structure 7 | Porch | Wood | Pink | Wall D | 0.0 |
| 13 | Structure 7 | Porch | Wood | White | Roof | 0.1 |
| 14 | Structure 7 | Porch | Wood | White | Ceiling Support | 0.0 |
| 15 | Structure 7 | Living Room | Wood | Cream | Wall A | 0.0 |

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Date: 2/18/25
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XRF Serial No.: 02528

| Reading # | Building | Room | Substrate | Color | Component & Location | XRF Reading ($mg/cm^2$) |
|---|---|---|---|---|---|---|
| 16 | Structure 7 | Living Room | Wood | White | Wall B | 0.1 |
| 17 | Structure 7 | Living Room | Wood | White | Wall C | 0.0 |
| 18 | Structure 7 | Living Room | Concrete | Cream | Wall D | 0.3 |
| 19 | Structure 7 | Living Room | Wood | White | Ceiling Support | 0.2 |
| 20 | Structure 7 | Living Room | Metal | White | Window | 0.1 |
| 21 | Structure 7 | Living Room | Wood | White | Door Frame | 0.1 |
| 22 | Structure 7 | Living Room | Wood | White | Exit Door | 0.0 |
| 23 | Structure 7 | Living Room | Wood | Gray | Window Frame | 0.2 |
| 24 | Structure 7 | Hallway | Concrete | White | Wall B | 0.1 |
| 25 | Structure 7 | Hallway | Concrete | White | Wall C | 0.1 |
| 26 | Structure 7 | Hallway | Concrete | White | Wall D | 0.2 |
| 27 | Structure 7 | Bathroom | Wood | White | Door Frame | 0.1 |
| 28 | Structure 7 | Bathroom | Wood | White | Door | 0.2 |
| 29 | Structure 7 | Bathroom | Concrete | Pink | Wall A | 0.2 |
| 30 | Structure 7 | Bathroom | Concrete | Pink | Wall B | 0.0 |

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**Address:** San Germán, Puerto Rico

Date: 2/18/25
Inspector: Abraham Rodríguez
XRF Serial No.: 02528

| Reading # | Building | Room | Substrate | Color | Component & Location | XRF Reading ($mg/cm^2$) |
|---|---|---|---|---|---|---|
| 31 | Structure 7 | Bathroom | Concrete | Pink | Wall C | 0.0 |
| 32 | Structure 7 | Bathroom | Concrete | Pink | Wall D | 0.1 |
| 33 | Structure 7 | Bathroom | Concrete | Pink | Dike | 0.2 |
| 34 | Structure 7 | Bathroom | Wood | White | Ceiling Support | 0.2 |
| 35 | Structure 7 | Bathroom | Ceramic | Cream | Toilet | 0.2 |
| 36 | Structure 7 | Kitchen | Wood | Not Painted | Wall A | 0.0 |
| 37 | Structure 7 | Kitchen | Concrete | Pink | Wall B | 0.2 |
| 38 | Structure 7 | Kitchen | Concrete | Pink | Wall C | 0.0 |
| 39 | Structure 7 | Kitchen | Concrete | Pink | Wall D | 0.1 |
| 40 | Structure 7 | Kitchen | Concrete | Pink | Floor | 0.2 |
| 41 | Structure 7 | Kitchen | Metal | White | Window | 0.2 |
| 42 | Structure 7 | Kitchen | Wood | White | Ceiling Support | 0.1 |
| 43 | Structure 7 | Bedroom | Wood | White | Door Frame | 0.2 |
| 44 | Structure 7 | Bedroom | Wood | White | Wall A | 0.0 |
| 45 | Structure 7 | Bedroom | Wood | White | Wall B | 0.1 |

**Approved By: Ady Padan Ph.D.** **Date: 2/18/2025**

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# LEAD BASED PAINT TESTING DATA SHEET

**Client Name:** **Behar Ybarra & Associates** Date: 2/18/25
**Project Name:** 7 Structures - El Retiro Community Inspector: Abraham Rodríguez
**Address:** San Germán, Puerto Rico XRF Serial No.: 02528

| Reading # | Building | Room | Substrate | Color | Component & Location | XRF Reading ($mg/cm^2$) |
|---|---|---|---|---|---|---|
| 46 | Structure 7 | Bedroom | Wood | White | Wall C | 0.0 |
| 47 | Structure 7 | Bedroom | Wood | White | Wall D | 0.0 |
| 48 | Structure 7 | Bedroom | Wood | Gray | Wall Support | 0.3 |
| 49 | Structure 7 | Bedroom | Wood | White | Ceiling Support | 0.1 |
| 50 | Structure 7 | Bedroom | Metal | White | Window | 0.2 |
| 51 | Structure 7 | Bedroom | Wood | White | Window Frame | 0.2 |
| 52 | Structure 7 | Bedroom | Wood | Not Painted | Floor | 0.0 |
| 53 | Structure 7 | Exterior | Wood | Pink | Wall A | 0.2 |
| 54 | Structure 7 | Exterior | Wood | Pink | Wall B | 0.0 |
| 55 | Structure 7 | Exterior | Concrete | Pink | Wall B | 0.1 |
| 56 | Structure 7 | Exterior | Concrete | Not Painted | Wall C | 0.0 |
| 57 | Structure 7 | Exterior | Concrete | Pink | Wall D | 0.0 |
| 58 | Structure 7 | Exterior | Wood | Pink | Wall D | 0.2 |
| 59 | Structure 7 | Exterior | Wood | White | Underhang | 0.1 |

**RE-TESTING**

**Approved By: Ady Padan Ph.D.** **Date: 2/18/2025**

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**Client Name:** **Behar Ybarra & Associates**
**Project Name:** 7 Structures - El Retiro Community
**Address:** San Germán, Puerto Rico

Date: 2/18/25
Inspector: Abraham Rodríguez
XRF Serial No.: 02528

| Reading # | Building | Room | Substrate | Color | Component & Location | XRF Reading ($mg/cm^2$) |
|---|---|---|---|---|---|---|
| 60 | Structure 7 | Bedroom | Wood | Gray | Wall Support | 0.3 |
| 61 | Structure 7 | Bedroom | Wood | White | Ceiling Support | 0.1 |
| 62 | Structure 7 | Bedroom | Metal | White | Window | 0.2 |
| 63 | Structure 7 | Bedroom | Wood | White | Window Frame | 0.0 |
| 64 | Structure 7 | Exterior | Wood | Pink | Wall A | 0.2 |
| 65 | Structure 7 | Exterior | Concrete | Pink | Wall B | 0.0 |
| 66 | Structure 7 | Exterior | Concrete | Pink | Wall B | 0.1 |
| 67 | Structure 7 | Exterior | Concrete | Not Painted | Wall C | 0.0 |
| 68 | Structure 7 | Exterior | Wood | Pink | Wall D | 0.0 |
| 69 | Structure 7 | Exterior | Wood | Pink | Wall D | 0.2 |
| 70 | Structure 7 | Exterior | Wood | White | Underhang | 0.1 |
| 71 | | | | | Calibration | 1.0 |
| 72 | | | | | Calibration | 1.1 |
| 73 | | | | | Calibration | 1.0 |

**Approved By: Ady Padan Ph.D.** **Date: 2/18/2025**

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**Client Name:** **Behar Ybarra & Associates**
**Project Name:** 7 Structures - El Retiro Community
**Address:** San Germán, Puerto Rico

Date: 2/17/25
Inspector: Abraham Rodríguez
XRF Serial No.: 02528

| Reading # | Building | Room | Substrate | Color | Component & Location | XRF Reading ($mg/cm^2$) |
|---|---|---|---|---|---|---|
| 1 | | | | | Calibration | 1.0 |
| 2 | | | | | Calibration | 1.0 |
| 3 | | | | | Calibration | 1.0 |
| 4 | Structure 8 | Open Space 1 | Wood | Gray | Wall B | 0.2 |
| 5 | Structure 8 | Open Space 1 | Wood | Yellow | Wall C | 0.2 |
| 6 | Structure 8 | Open Space 1 | Wood | White | Wal D | 0.1 |
| 7 | Structure 8 | Open Space 1 | Metal | Gray | Ceiling | 0.0 |
| 8 | Structure 8 | Open Space 1 | Concrete | Not Painted | Floor | 0.0 |
| 9 | Structure 8 | Kitchen / Balcony | Wood | Pink | Lower Wall B | 0.2 |
| 10 | Structure 8 | Kitchen / Balcony | Wood | Pink | Lower Wall C | 0.0 |
| 11 | Structure 8 | Kitchen / Balcony | Wood | Green | Wall D | 0.1 |
| 12 | Structure 8 | Kitchen / Balcony | Wood | Pink | Door Frame | 0.0 |
| 13 | Structure 8 | Kitchen / Balcony | Metal | Gray | Ceiling | 0.0 |
| 14 | Structure 8 | Kitchen / Balcony | Wood | Pink | Ceiling Support | 0.2 |
| 15 | Structure 8 | Kitchen / Balcony | Concrete | Not Painted | Floor | 0.0 |

**Approved By: Ady Padan Ph.D.** **Date: 2/3/2025**

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611 Monserrate Street, 2nd Floor, Santurce, Puerto Rico 00907

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**Client Name:** **Behar Ybarra & Associates**
**Project Name:** 7 Structures - El Retiro Community
**Address:** San Germán, Puerto Rico

Date: 2/17/25
Inspector: Abraham Rodríguez
XRF Serial No.: 02528

| Reading # | Building | Room | Substrate | Color | Component & Location | XRF Reading ($mg/cm^2$) |
|---|---|---|---|---|---|---|
| 16 | Structure 8 | Kitchen / Balcony | Wood | Green | Door Frame | 0.2 |
| 17 | Structure 8 | Kitchen / Balcony | Wood | Gray | Door | 0.0 |
| 18 | Structure 8 | Kitchen / Balcony | Wood | White | Wall A | 0.2 |
| 19 | Structure 8 | Kitchen / Balcony | Wood | Green | Wall B | 0.0 |
| 20 | Structure 8 | Kitchen / Balcony | Wood | White | Wall C | 0.1 |
| 21 | Structure 8 | Kitchen / Balcony | Wood | White | Wall D | 0.0 |
| 22 | Structure 8 | Kitchen / Balcony | Wood | Yellow | Window Decor | 0.3 |
| 23 | Structure 8 | Kitchen / Balcony | Metal | White | Window | 0.2 |
| 24 | Structure 8 | Kitchen / Balcony | Wood | White | Ceiling | 0.0 |
| 25 | Structure 8 | Kitchen / Balcony | Concrete | Not Painted | Floor | 0.0 |
| 26 | Structure 8 | Open Space 2 | Wood | Not Painted | Wall A | 0.0 |
| 27 | Structure 8 | Open Space 2 | Wood | Not Painted | Wall B | 0.0 |
| 28 | Structure 8 | Open Space 2 | Wood | Not Painted | Wall C | 0.0 |
| 29 | Structure 8 | Open Space 2 | Wood | Cream | Wall D | 0.2 |
| 30 | Structure 8 | Open Space 2 | Concrete | Black | Floor | 0.2 |

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| Reading # | Building | Room | Substrate | Color | Component & Location | XRF Reading ($mg/cm^2$) |
|---|---|---|---|---|---|---|
| 31 | Structure 8 | Storage 1 | Wood | Not Painted | Walls | 0.0 |
| 32 | Structure 8 | Storage 1 | Metal | Not Painted | Ceiling | 0.0 |
| 33 | Structure 8 | Storage 1 | Concrete | Not Painted | Floor | 0.0 |
| 34 | Structure 8 | Storage 2 | Wood | Not Painted | Walls | 0.0 |
| 35 | Structure 8 | Storage 2 | Metal | Not Painted | Ceiling | 0.0 |
| 36 | Structure 8 | Storage 2 | Concrete | Not Painted | Floor | 0.0 |
| 37 | Structure 8 | Storage 3 | Wood | Not Painted | Door Frame | 0.0 |
| 38 | Structure 8 | Storage 3 | Wood | Red | Door | 0.3 |
| 39 | Structure 8 | Storage 3 | Wood | Gray | Wall B | 0.1 |
| 40 | Structure 8 | Storage 3 | Wood | Not Painted | Wall A | 0.0 |
| 41 | Structure 8 | Storage 3 | Wood | Not Painted | Wall C | 0.0 |
| 42 | Structure 8 | Storage 3 | Wood | Not Painted | Wall D | 0.0 |
| 43 | Structure 8 | Storage 3 | Metal | Gray | Ceiling | 0.0 |
| 44 | Structure 8 | Storage 4 | Wood | Not Painted | Door Frame | 0.0 |
| 45 | Structure 8 | Storage 4 | Wood | Not Painted | Door | 0.0 |

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| Reading # | Building | Room | Substrate | Color | Component & Location | XRF Reading ($mg/cm^2$) |
|---|---|---|---|---|---|---|
| 46 | Structure 8 | Storage 4 | Wood | Not Painted | Wall A | 0.0 |
| 47 | Structure 8 | Storage 4 | Wood | Not Painted | Wall B | 0.0 |
| 48 | Structure 8 | Storage 4 | Wood | Not Painted | Wall C | 0.0 |
| 49 | Structure 8 | Storage 4 | Wood | Not Painted | Wall D | 0.0 |
| 50 | Structure 8 | Storage 4 | Metal | White | Window | 0.3 |
| 51 | Structure 8 | Storage 5 | Wood | Not Painted | Door Frame | 0.0 |
| 52 | Structure 8 | Storage 5 | Wood | Not Painted | Door | 0.0 |
| 53 | Structure 8 | Storage 5 | Wood | Not Painted | Wall A | 0.0 |
| 54 | Structure 8 | Storage 5 | Wood | Not Painted | Wall B | 0.0 |
| 55 | Structure 8 | Storage 5 | Wood | Not Painted | Wall C | 0.0 |
| 56 | Structure 8 | Storage 5 | Wood | Not Painted | Wall D | 0.0 |
| 57 | Structure 8 | Storage 5 | Wood | Not Painted | Floor | 0.0 |
| 58 | Structure 8 | Storage 6 | Wood | Not Painted | Wall A | 0.0 |
| 59 | Structure 8 | Storage 6 | Wood | Not Painted | Wall B | 0.0 |
| 60 | Structure 8 | Storage 6 | Wood | Not Painted | Wall C | 0.0 |

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| Reading # | Building | Room | Substrate | Color | Component & Location | XRF Reading ($mg/cm^2$) |
|---|---|---|---|---|---|---|
| 61 | Structure 8 | Storage 6 | Wood | Not Painted | Wall D | 0.0 |
| 62 | Structure 8 | Storage 6 | Metal | White | Window | 0.0 |
| 63 | Structure 8 | Storage 6 | Wood | Blue | Window 2 | 0.3 |
| 64 | Structure 8 | Storage 6 | Wood | White | Window 2 | 0.1 |
| 65 | Structure 8 | Cages 1 - 8 | Metal | Not Painted | Wall B | 0.0 |
| 66 | Structure 8 | Cages 1 - 8 | Metal | Not Painted | Wall C | 0.0 |
| 67 | Structure 8 | Cages 1 - 8 | Metal | Not Painted | Wall D | 0.0 |
| 68 | Structure 8 | Cages 1 - 8 | Metal | Not Painted | Ceiling | 0.0 |
| 69 | Structure 8 | Cages 1 - 8 | Soil | Not Painted | Floor | 0.0 |
| 70 | Structure 8 | Exterior Storage 5 | Wood | Gray | Wall A | 0.1 |
| 71 | Structure 8 | Bathroom | Metal | White | Door Frame | 0.0 |
| 72 | Structure 8 | Bathroom | Metal | White | Door | 0.1 |
| 73 | Structure 8 | Bathroom | Wood | Cream | Wall A | 0.1 |
| 74 | Structure 8 | Bathroom | Wood | Cream | Wall B | 0.0 |
| 75 | Structure 8 | Bathroom | Wood | Cream | Wall C | 0.3 |

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| Reading # | Building | Room | Substrate | Color | Component & Location | XRF Reading ($mg/cm^2$) |
|---|---|---|---|---|---|---|
| 76 | Structure 8 | Bathroom | Wood | Cream | Wall D | 0.0 |
| 77 | Structure 8 | Bathroom | Metal | Not Painted | Ceiling | 0.0 |
| 78 | Structure 8 | Bathroom | Wood | Cream | Ceiling Support | 0.1 |
| 79 | Structure 8 | Bathroom | Ceramic | White | Toilet | 0.2 |
| 80 | Structure 8 | Bathroom | Ceramic | Cream | Sink | 0.0 |
| 81 | Structure 8 | Bathroom | Concrete | Not Painted | Floor | 0.0 |
| 82 | Structure 8 | Exterior Bathroom | Wood | Gray | Wall A | 0.2 |
| 83 | Structure 8 | Exterior Bathroom | Wood | Gray | Wall B | 0.0 |
| 84 | Structure 8 | Exterior Bathroom | Wood | Gray | Wall C | 0.1 |
| 85 | Structure 8 | Exterior Bathroom | Wood | Gray | Wall D | 0.3 |
| 86 | Structure 8 | Exterior Kitchen | Wood | Pink | Wall A | 0.2 |
| 87 | Structure 8 | Exterior Kitchen | Wood | Yellow | Wall B | 0.0 |
| **RE-TESTING** | | | | | | |
| 88 | Structure 8 | Bathroom | Metal | Not Painted | Ceiling | 0.0 |
| 89 | Structure 8 | Bathroom | Wood | Cream | Ceiling Support | 0.1 |

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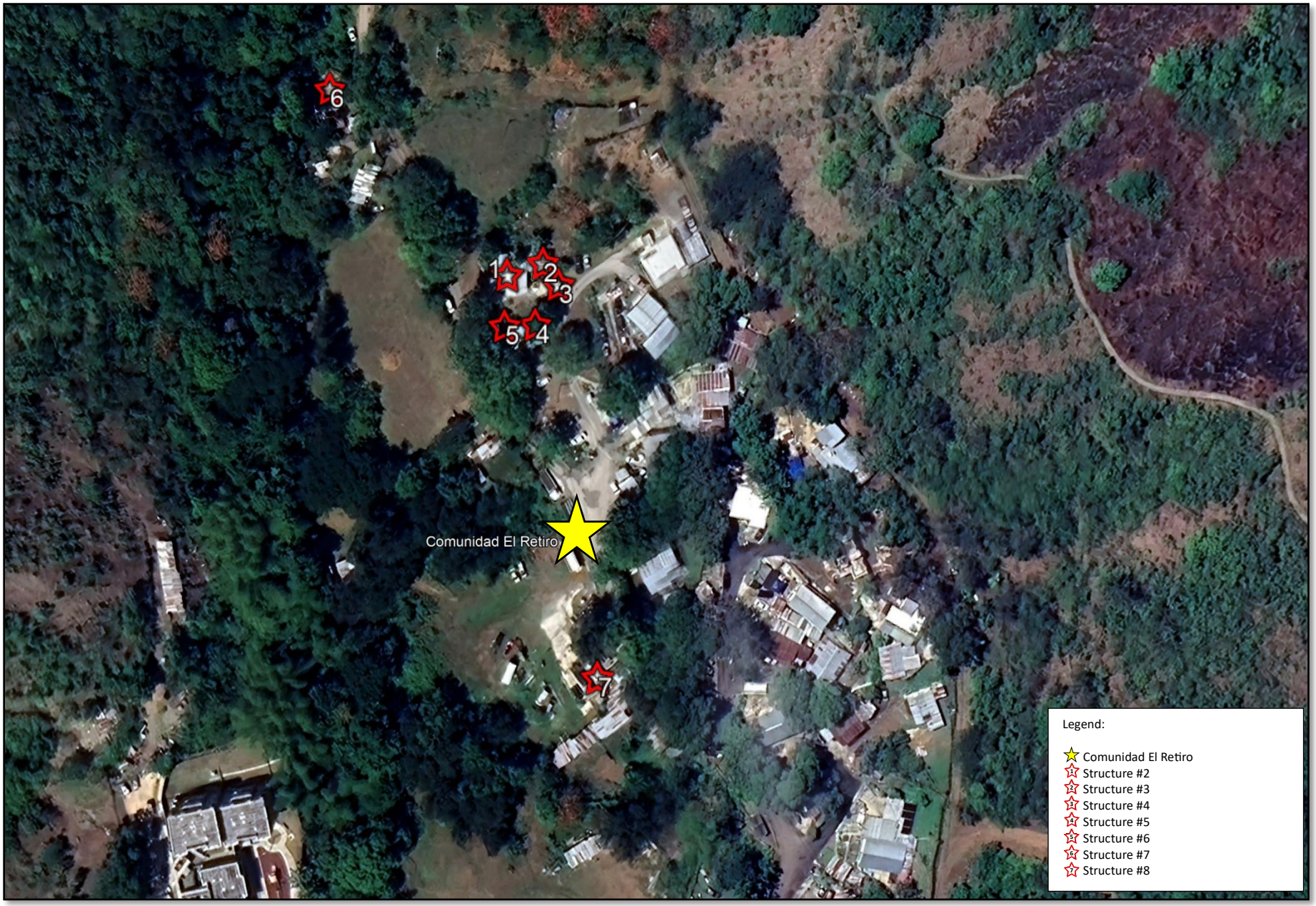
| Reading # | Building | Room | Substrate | Color | Component & Location | XRF Reading ($mg/cm^2$) |
|---|---|---|---|---|---|---|
| 90 | Structure 8 | Bathroom | Ceramic | White | Toilet | 0.2 |
| 91 | Structure 8 | Bathroom | Ceramic | Cream | Sink | 0.0 |
| 92 | Structure 8 | Exterior Bathroom | Wood | Gray | Wall A | 0.2 |
| 93 | Structure 8 | Exterior Bathroom | Wood | Gray | Wall B | 0.0 |
| 94 | Structure 8 | Exterior Bathroom | Wood | Gray | Wall C | 0.1 |
| 95 | Structure 8 | Exterior Bathroom | Wood | Gray | Wall D | 0.3 |
| 96 | Structure 8 | Exterior Kitchen | Wood | Pink | Wall A | 0.2 |
| 97 | Structure 8 | Exterior Kitchen | Wood | Yellow | Wall B | 0.0 |
| 98 | | | | | Calibration | 1.0 |
| 99 | | | | | Calibration | 1.0 |
| 100 | | | | | Calibration | 1.0 |

**Approved By: Ady Padan Ph.D.** **Date: 2/3/2025**

# Appendix IV



# Seven (7) Structures located in Comunidad El Retiro
# San German, Puerto Rico



# SELECTIVE PHOTOS

## STRUCTURE #2 LOCATED IN COMUNIDAD EL RETIRO
## SAN GERMAN, PUERTO RICO




**GENERAL VIEW**
**Structure #2**

# SELECTIVE PHOTOS

## STRUCTURE #3 LOCATED IN COMUNIDAD EL RETIRO
## SAN GERMAN, PUERTO RICO



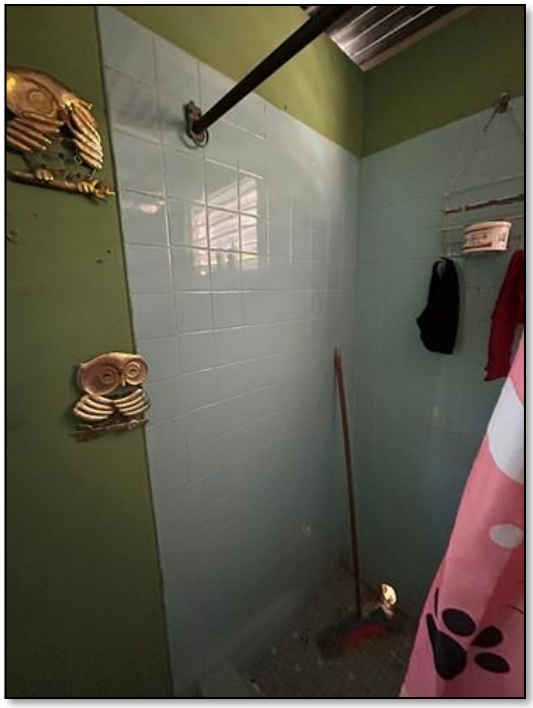
**GENERAL VIEW**
**Structure #3**

# SELECTIVE PHOTOS

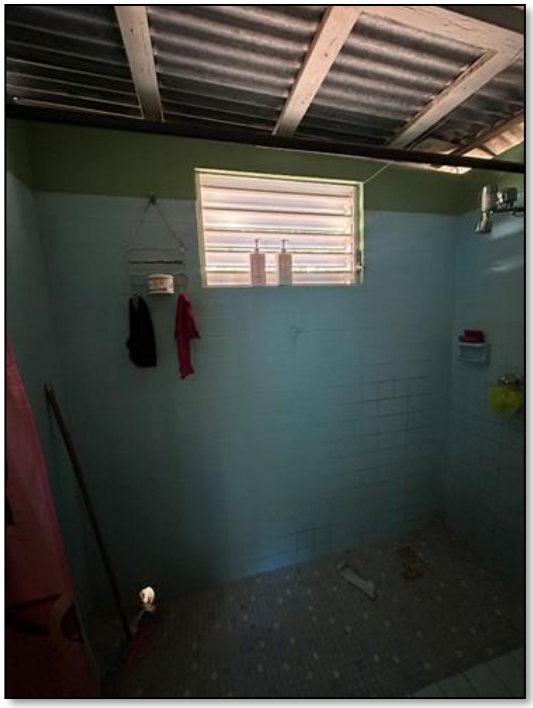
## STRUCTURE #4 LOCATED IN COMUNIDAD EL RETIRO
## SAN GERMAN, PUERTO RICO



**GENERAL VIEW**
**Structure #4**



**LBP Blue Ceramic Shower Wall A, Bathroom, Structure #4**



**LBP Blue Ceramic Shower Wall B, Bathroom, Structure #4**

# SELECTIVE PHOTOS

## STRUCTURE #4 LOCATED IN COMUNIDAD EL RETIRO
## SAN GERMAN, PUERTO RICO



**LBP Blue Ceramic Shower Wall C & Dike, Bathroom, Structure #4**

# SELECTIVE PHOTOS

## STRUCTURE #5 LOCATED IN COMUNIDAD EL RETIRO
## SAN GERMAN, PUERTO RICO



**GENERAL VIEW**
**Structure #5**

# SELECTIVE PHOTOS

## STRUCTURE #6 LOCATED IN COMUNIDAD EL RETIRO
## SAN GERMAN, PUERTO RICO



**GENERAL VIEW**
**Structure #6**

# SELECTIVE PHOTOS

## STRUCTURE #7 LOCATED IN COMUNIDAD EL RETIRO
## SAN GERMAN, PUERTO RICO



**GENERAL VIEW**
**Structure #7**

# SELECTIVE PHOTOS

## STRUCTURE #8 LOCATED IN COMUNIDAD EL RETIRO
## SAN GERMAN, PUERTO RICO



**GENERAL VIEW**
**Structure #8**

# Appendix V

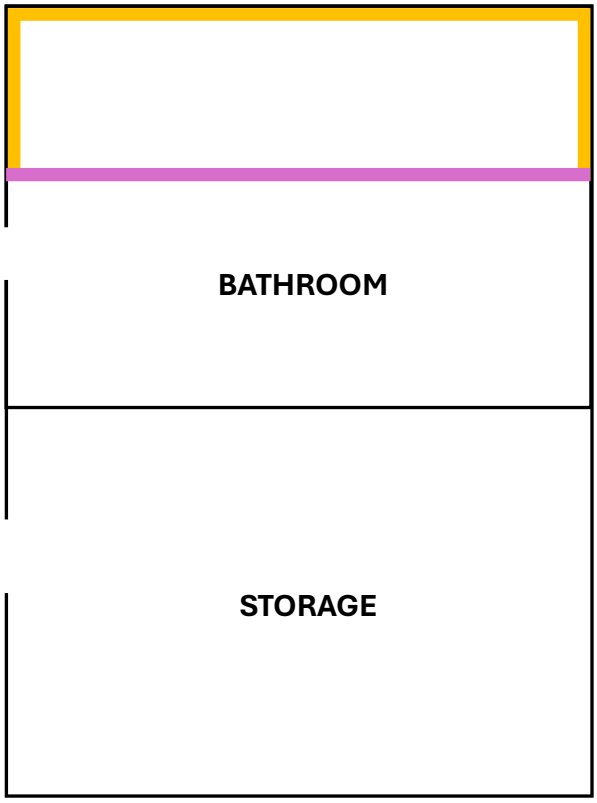





**STRUCTURE #3**



**STRUCTURE #4**




**DISTRIBUTION OF LBP COMPONENTS**
**Structure #3 & #4 Comunidad El Retiro**
**San German, Puerto Rico**

**Not at Scale**

**LEGEND:**

- LBP Ceramic Shower Walls
- LBP Ceramic Dike

AES International Inc
Environmental Consulting, Training, and Laboratory Services
(787) 722-0220 / (787) 724-5788

AES International Inc.

# ASBESTOS



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# I. SUMMARY

A survey for Asbestos Containing Materials (ACM) was conducted by Analytical Environmental Services International (AES International), Inc. for the exterior and interior surfaces of seven (7) structures located in Comunidad El Retiro, Municipio de San German, Puerto Rico. The subject of the study consists of seven (7) structures (Structures 2, 3, 4, 5, 6, 7 and 8) divided into functional spaces. Structures 2, 5 and 7 are being used as living spaces, structures 3, 4 and 8 as storage, and structure 6 as a gazebo.

The inspection was conducted on 2/17/2025 and 2/18/2025 by Abraham Rodriguez, a DRNA/AHERA Certified Asbestos Inspector. The scope of the survey included sampling and physical assessments of ACM suspected materials.

No suspected materials were observed during the inspection of three (3) structures (Structure 3, 4 and 6). Accordingly samples were not collected.

Twenty-eight (28) samples were collected from suspected ACM building materials located in four (4) structures (Structure 2, 5, 7 and 8). Asbestos fibers were not detected in any of the samples collected and analyzed.

# 1.0 INTRODUCTION

A survey for Asbestos Containing Materials (ACM) was conducted by Analytical Environmental Services International, Inc. (AES International) for the exterior and interior surfaces of seven (7) structures located in Comunidad El Retiro, Municipio de San German, Puerto Rico. The subject of the study consists of seven (7) structures (Structures 2, 3, 4, 5, 6, 7 and 8) divided into functional spaces. Structures 2, 5 and 7 are being used as living spaces, structures 3, 4 and 8 as storage, and structure 6 as a gazebo.

The survey was conducted on 2/17/2025 and 2/18/2025 by Abraham Rodriguez, a DRNA/AHERA Certified Asbestos Building Inspector (see Appendix I for credentials).

The scope of the survey included sampling, analysis, and physical assessments of suspected ACM present. Samples collected during the survey were sent to AES International Inc., a NVLAP accredited laboratory located in Santurce, Puerto Rico. Samples were analyzed by Polarized Light Microscopy method (PLM), in accordance with EPA recommended procedures. The samples are defined as asbestos containing materials (ACM) if they contain more than 1% asbestos.

# 2.0 GENERAL BACKGROUND

Asbestos was used in the construction industry from 1900 to 1989. It is still being used today in various products. The health effects of asbestos have been studied since the 1930's. More health studies have been conducted in asbestos than any other natural substance. The mere presence of asbestos containing materials does not necessarily constitute a health hazard. However, when these materials become disturbed from building renovation, maintenance, or other everyday activities that allow fibers to be released into the environment, a potential hazard does exist.

The relationship between exposure level and health risk is very complex. Although this relationship is not completely understood, asbestos exposure has been associated with various types of lung diseases including a debilitating lung disease called ASBESTOSIS; a rare cancer of chest called MESOTHELIOMA; and cancers of the esophagus, stomach, colon and other organs. Asbestosis is not fatal; it is, however, incurable. One who has it cannot breathe easily and physical activity becomes limited. MESOTHELIOMA is 100% fatal, as there is no cure. These diseases can be directly linked to asbestos because of the mineral particles that can be found in the lining of the lungs and stomach, since the body cannot absorb these minerals. Tests have determined that asbestos can cause cancer, but scientists disagree on the amount of asbestos fibers that must be inhaled to cause cancer. The nose filters out all visible particles. Therefore, only the microscopic fibers are the ones who cause the problems.

Studies indicate different health effects resulting from exposure to chrysotile asbestos versus exposure to the amphibole form of asbestos. The later, which include tremolite, amosite, actinolite, anthophyllite and crocidolite have more significant health impact than chrysotile. Some scientists cite studies concluding that is the size of the fibers deposited in the lungs that result in cancer. Long, thin fibers, greater than 8 microns in length and less than 0.25 microns in diameter show the highest potential of cancer development.

### 2.1 National Emission Standards for Hazardous Air Pollutants (NESHAP)

The EPA's rules concerning the application, removal, and disposal of ACM, as well as manufacturing, spraying and fabricating of ACM were issued under the asbestos NESHAP regulation (U.S. EPA National Emission Standards for Hazardous Air Pollutants, 40 CFR 61 Subpart M, October 30, 1987). The asbestos NESHAP regulation governs asbestos demolition and renovation projects in all facilities. The NESHAP rule usually requires owners or operators to have all friable ACM removed before the building is demolished and may require its removal before renovation. If friable ACM shall be disturbed, the NESHAP rule may require appropriate work practices, or procedures for emission control. The rule states that any ACM, which may become friable, poses a potential hazard that should be addressed. A revised NESHAP ruling was released on November 20, 1990, effective February 20, 1991 which includes as the responsibility of the owner, or operator, to "prior to the commencement of the demolition or renovation, thoroughly inspect the affected facility or part of the facility where demolition or renovation operation will occur for the presence of asbestos, including Category I and Category II non-friable ACM." (40 CFR, Part 61, National Emission Standards for hazardous Air Pollutants, Asbestos NESHAP Revision, Final Rule, November 20, 1990).

## 3.0 PROJECT IDENTIFICATION/DESCRIPTION

The study was conducted for seven (7) structures located in Comunidad El Retiro, Municipio de San German, Puerto Rico. The subject of the study consists of seven (7) structures (Structures 2, 3, 4, 5, 6, 7 and 8) divided into functional spaces. Structures 2, 5 and 7 are being used as living spaces, structures 3, 4 and 8 as storage, and structure 6 as a gazebo.

## 4.0 METHODS OF BUILDING INSPECTION

Samples collected were classified according to the condition of Asbestos Containing Materials (ACM) in that location and the potential for material disturbance. All the areas were visually inspected.

## 5.0 SAMPLING METHODS

No suspected materials were observed during the inspection of three (3) structures (Structure 3, 4 and 6). Accordingly samples were not collected.

Samples were collected from suspected ACM building materials located in four (4) structures (Structure 2, 5, 7 and 8). Twenty-eight (28) samples were collected from vinyl floor tiles, roofing material, and under ceramic tiles. The sampling was conducted according to a modified AHERA protocol.

# 6.0 INSPECTION RESULTS

Results of physical assessment are presented in Appendix II. Analytical results are presented in Appendix III. Selective photos of ACM are presented in Appendix IV. Floor plans with distribution of sampling points in Appendix V.

Suspected materials were not observed during visual inspection.

Asbestos fibers above 1% area (ACM) were not detected in any of the samples collected and analyzed.

# 7.0 CONCLUSIONS

A survey for ACM was conducted for seven (7) structures located in Comunidad El Retiro, Municipio de San German, Puerto Rico. No suspected ACM were observed. No ACM were detected.

The ACM survey results do not include materials which are non-accessible, non-visible and may be present inside the walls, or covered by other materials. These materials must be assessed at the time of the disturbance and assumed as positive for the time being.



Abraham Rodríguez
Asbestos Inspector
DRNA Lic. ASB-1024-0429-SI

# CERTIFICACION DE NO PRESENCIA DE ASBESTO EN ESTRUCTURAS A DEMOLERSE

**(Deberá completarse en letra de molde o impresa)**

**PGC-_____**
**PARA USO OFICIAL**

Yo, Abraham Rodríguez (Nombre), mayor de edad, Soltero (Estado Civil), y vecino de Vega Baja (Municipio)

Dirección Postal Vega Baja Lakes Calle 2 B-33 Vega Baja (Pueblo) 00693 (Zip Code)

Teléfonos: Residencial ( 939 ) 642 - 2461 Oficina ( 787 ) 722 - 0220 Ext._____
Fax ( 787 ) 724 - 5788

**Certifico que:**

1. La estructura localizada en Seven (7) Structures, located in Comunidad El Retiro, San German, Puerto Rico, la cual será objeto de una demolición se encuentra libre de asbesto.
2. La información antes indicada es cierta y correcta.
3. Afirmo y reconozco las consecuencias de incluir y someter información falsa en este documento.
4. Para que así conste, firmo la presente certificación en San Juan (Municipio) de Puerto Rico, hoy día 18 de febrero de 2025

* Esta certificacion es exclusivamente para las areas muestreadas.

_____
Firma y Sello del Profesional o
Firma del Inspector de Asbesto registrado por la JCA (Original)

**Nota: Ingenieros o Arquitectos deberán someter evidencia de que se encuentra al día en el pago de sus cuotas de colegiación e Inspectores de Asbesto deberán someter evidencia de la tarjeta de registro provista por la JCA.**

# Appendix I



# National Voluntary Laboratory Accreditation Program

## SCOPE OF ACCREDITATION TO ISO/IEC 17025:2017

**AES International**
611 Monserrate
Santurce, PR 00907
Mr. Ady Padan
Phone: 787-722-0220 Fax: 787-724-5788
Email: yota1@bellsouth.net
http://www.aesipr.org

**ASBESTOS FIBER ANALYSIS** **NVLAP LAB CODE 200051-0**

### Bulk Asbestos Analysis

| *Code* | *Description* |
|---|---|
| 18/A01 | EPA -- 40 CFR Appendix E to Subpart E of Part 763, Interim Method of the Determination of Asbestos in Bulk Insulation Samples |
| 18/A03 | EPA 600/R-93/116: Method for the Determination of Asbestos in Bulk Building Materials |

*For the National Voluntary Laboratory Accreditation Program*

*Effective 2024-01-01 through 2024-12-31*

**United States Department of Commerce**
**National Institute of Standards and Technology**

# Certificate of Accreditation to ISO/IEC 17025:2017

**NVLAP LAB CODE: 200051-0**

## AES International

Santurce, PR

*is accredited by the National Voluntary Laboratory Accreditation Program for specific services, listed on the Scope of Accreditation, for:*

## Asbestos Fiber Analysis

*This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2017. This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (refer to joint ISO-ILAC-IAF Communique dated January 2009).*

2024-01-01 through 2024-12-31

*Effective Dates*

*For the National Voluntary Laboratory Accreditation Program*

# DRNA Asbestos Inspector Credential



TARJETA DE REGISTRO
PARA LA REMOCION DE ASBESTO

Esta tarjeta autoriza a:

***Abraham Rodríguez Jr.***

**Inspector**

A trabajar en la remoción de asbesto en Puerto Rico. Esta persona **NO** es un empleado del DRNA.

**ASB-1024-0429-SI**
Número de Registro

**20-sept-2025**
Fecha de vencimiento

Firma Autorizada - Departamento Recursos Naturales y Ambientales

# Appendix II



**ANALYTICAL ENVIRONMENTAL SERVICES INTERNATIONAL, INC.**

# ASBESTOS SAMPLE INSPECTION FORM FOR PHYSICAL & HAZARD ASSESSMENT

Client Name: **Behar Ybarra** Building/Unit: Structure #2

Project Name: 7 Structures - Comunidad el Retiro San Germna, PR

Inspection Date: 2/18/2025 Page: 1 of 2

| Homogeneous Material Description | | Material Category | Asbestos Content | Friability | Location of Materials | Asbestos Contents | Total $Ft^2$ of ACM | AHERA Assessment Category (1-7, X, None) | Hazard Ranking (5-7) |
|---|---|---|---|---|---|---|---|---|---|
| I.D. Number | Material Description | | | | | | | | |
| ST2 - ARS - 1 | 12"x12" Cream/Brown Vinyl Floor Tile, Bedroom Entance / Hallway | Misc. | No | NF | Living Room 2, Kitchen, Bedroom 3 & Hallway | ND | | X | |
| ST2 - ARS - 2 | 12"x12" Cream/Brown Vinyl Floor Tile, Living Room 2 | Misc. | No | NF | | ND | | X | |
| ST2 - ARS - 3 | Roofing Material, Center of Roof | Misc. | No | NF | | ND | | X | |
| ST2 - ARS - 4 | 12"x12" Cream/Brown Vinyl Floor Tile, Bedroom 3 | Misc. | No | NF | | ND | | X | |
| ST2 - ARS - 5 | Roofing Material, West | Misc. | No | NF | | ND | | X | |
| ST2 - ARS - 6 | Roofing Material, East | Misc. | No | NF | | ND | | X | |

Inspected by: Elme Rivera Date: 2/18/2025

Friability: F = friable, NF = nonfriable, X = not applicable (material is non-ACBM)

AHERA Assessment Category: 1 = Damaged of significantly damaged TSI ACBM; 2 = Damaged friable surfacing ACBM; 3 = Significantly damaged friable surfacing ACBM; 4 = Damaged or significantly damaged friable miscellaneous ACBM; 5 = ACBM with potential for damage; 6 = ACBM with potential for significant damage; 7 = Any remaining friable ACBM or friable suspected ACBM; X = Not applicable (material is non-ACBM, non-friable surfacing or miscellaneous materials); None = No assessment category provided in original inspection.

Hazard Ranking Category: 1 = Significantly damaged; 2 = Damaged and potential of significant damage; 3 = Damaged and potential for damage; 4 = Damaged; 5 = Potential for significant damage; 6 = Potential for damage; 7 = All remaining ACBM

*** - Unless Specified, the Asbestos Type is Chrysotile; ND - None Detected**

**ANALYTICAL ENVIRONMENTAL SERVICES INTERNATIONAL, INC.**

# ASBESTOS SAMPLE INSPECTION FORM FOR PHYSICAL & HAZARD ASSESSMENT

Client Name: **Behar Ybarra** Building/Unit: Structure #2

Project Name: 7 Structures - Comunidad el Retiro San Germna, PR

Inspection Date: 2/18/2025 Page: 2 of 2

| Homogeneous Material Description | | Material Category | Asbestos Content | Friability | Location of Materials | Asbestos Contents | Total $Ft^2$ of ACM | AHERA Assessment Category (1-7, X, None) | Hazard Ranking (5-7) |
|---|---|---|---|---|---|---|---|---|---|
| I.D. Number | Material Description | | | | | | | | |
| ST2 - ARS - 7 | 12"x12" Brown Vinyl Floor Tile, Kitchen / Living Room | Misc. | No | NF | Kitchen / Living Room | ND | | X | |
| ST2 - ARS - 8 | 12"x12" Brown Vinyl Floor Tile, Kitchen / Living Room | Misc. | No | NF | | ND | | X | |
| ST2 - ARS - 9 | 12"x12" Light Brown Vinyl Floor Tile, Bedroom 1 | Misc. | No | NF | Bedroom 1 & 2 | ND | | X | |
| ST2 - ARS - 10 | 12"x12" Light Brown Vinyl Floor Tile, Bedroom 2 | Misc. | No | NF | | ND | | X | |
| | | | | | | | | | |
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Inspected by: Elme Rivera Date: 2/18/2025

Friability: F = friable, NF = nonfriable, X = not applicable (material is non-ACBM)

AHERA Assessment Category: 1 = Damaged of significantly damaged TSI ACBM; 2 = Damaged friable surfacing ACBM; 3 = Significantly damaged friable surfacing ACBM; 4 = Damaged or significantly damaged friable miscellaneous ACBM; 5 = ACBM with potential for damage; 6 = ACBM with potential for significant damage; 7 = Any remaining friable ACBM or friable suspected ACBM; X = Not applicable (material is non-ACBM, non-friable surfacing or miscellaneous materials); None = No assessment category provided in original inspection.

Hazard Ranking Category: 1 = Significantly damaged; 2 = Damaged and potential of significant damage; 3 = Damaged and potential for damage; 4 = Damaged; 5 = Potential for significant damage; 6 = Potential for damage; 7 = All remaining ACBM

*** - Unless Specified, the Asbestos Type is Chrysotile; ND - None Detected**

**ANALYTICAL ENVIRONMENTAL SERVICES INTERNATIONAL, INC.**

# ASBESTOS SAMPLE INSPECTION FORM FOR PHYSICAL & HAZARD ASSESSMENT

Client Name: **Behar Ybarra** Building/Unit: Structure #3

Project Name: 7 Structures - Comunidad el Retiro San Germna, PR

Inspection Date: 2/18/2025 Page: 1 of 1

| Homogeneous Material Description | | Material Category | Asbestos Content | Friability | Location of Materials | Asbestos Contents | Total $Ft^2$ of ACM | AHERA Assessment Category (1-7, X, None) | Hazard Ranking (5-7) |
|---|---|---|---|---|---|---|---|---|---|
| I.D. Number | Material Description | | | | | | | | |
| | NO SUSPECTED ACM | | | | | | | | |
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Inspected by: Elme Rivera Date: 2/18/2025

Friability: F = friable, NF = nonfriable, X = not applicable (material is non-ACBM)

AHERA Assessment Category: 1 = Damaged of significantly damaged TSI ACBM; 2 = Damaged friable surfacing ACBM; 3 = Significantly damaged friable surfacing ACBM; 4 = Damaged or significantly damaged friable miscellaneous ACBM; 5 = ACBM with potential for damage; 6 = ACBM with potential for significant damage; 7 = Any remaining friable ACBM or friable suspected ACBM; X = Not applicable (material is non-ACBM, non-friable surfacing or miscellaneous materials); None = No assessment category provided in original inspection.

Hazard Ranking Category: 1 = Significantly damaged; 2 = Damaged and potential of significant damage; 3 = Damaged and potential for damage; 4 = Damaged; 5 = Potential for significant damage; 6 = Potential for damage; 7 = All remaining ACBM

*** - Unless Specified, the Asbestos Type is Chrysotile; ND - None Detected**

**ANALYTICAL ENVIRONMENTAL SERVICES INTERNATIONAL, INC.**

# ASBESTOS SAMPLE INSPECTION FORM FOR PHYSICAL & HAZARD ASSESSMENT

Client Name: **Behar Ybarra** Building/Unit: Structure #4

Project Name: 7 Structures - Comunidad el Retiro San Germna, PR

Inspection Date: 2/18/2025 Page: 1 of 1

| Homogeneous Material Description | | Material Category | Asbestos Content | Friability | Location of Materials | Asbestos Contents | Total $Ft^2$ of ACM | AHERA Assessment Category (1-7, X, None) | Hazard Ranking (5-7) |
|---|---|---|---|---|---|---|---|---|---|
| I.D. Number | Material Description | | | | | | | | |
| | NO SUSPECTED ACM | | | | | | | | |
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Inspected by: Elme Rivera Date: 2/18/2025

Friability: F = friable, NF = nonfriable, X = not applicable (material is non-ACBM)

AHERA Assessment Category: 1 = Damaged of significantly damaged TSI ACBM; 2 = Damaged friable surfacing ACBM; 3 = Significantly damaged friable surfacing ACBM; 4 = Damaged or significantly damaged friable miscellaneous ACBM; 5 = ACBM with potential for damage; 6 = ACBM with potential for significant damage; 7 = Any remaining friable ACBM or friable suspected ACBM; X = Not applicable (material is non-ACBM, non-friable surfacing or miscellaneous materials); None = No assessment category provided in original inspection.

Hazard Ranking Category: 1 = Significantly damaged; 2 = Damaged and potential of significant damage; 3 = Damaged and potential for damage; 4 = Damaged; 5 = Potential for significant damage; 6 = Potential for damage; 7 = All remaining ACBM

*** - Unless Specified, the Asbestos Type is Chrysotile; ND - None Detected**

**ANALYTICAL ENVIRONMENTAL SERVICES INTERNATIONAL, INC.**

# ASBESTOS SAMPLE INSPECTION FORM FOR PHYSICAL & HAZARD ASSESSMENT

Client Name: **Behar Ybarra** Building/Unit: Structure #5

Project Name: 7 Structures - Comunidad el Retiro San Germna, PR

Inspection Date: 2/18/2025 Page: 1 of 1

| Homogeneous Material Description | | Material Category | Asbestos Content | Friability | Location of Materials | Asbestos Contents | Total $Ft^2$ of ACM | AHERA Assessment Category (1-7, X, None) | Hazard Ranking (5-7) |
|---|---|---|---|---|---|---|---|---|---|
| I.D. Number | Material Description | | | | | | | | |
| ST5 - ARS - 1 | Roofing Material, South-West of Structure | Misc. | No | NF | Roof | ND | | X | |
| ST5 - ARS - 2 | Roofing Material, West of Structure | Misc. | No | NF | | ND | | X | |
| ST5 - ARS - 3 | Roofing Material, North of Structure | Misc. | No | NF | | ND | | X | |
| ST5 - ARS - 4 | 12"x12" Brown/Gray Vinyl Floor Tile, Kitchen / Living Room | Misc. | No | NF | Kitchen / Living Room | ND | | X | |
| ST5 - ARS - 5 | 12"x12" Brown/Gray Vinyl Floor Tile, Kitchen / Living Room | Misc. | No | NF | | ND | | X | |
| | | | | | | | | | |

Inspected by: Elme Rivera Date: 2/18/2025

Friability: F = friable, NF = nonfriable, X = not applicable (material is non-ACBM)

AHERA Assessment Category: 1 = Damaged of significantly damaged TSI ACBM; 2 = Damaged friable surfacing ACBM; 3 = Significantly damaged friable surfacing ACBM; 4 = Damaged or significantly damaged friable miscellaneous ACBM; 5 = ACBM with potential for damage; 6 = ACBM with potential for significant damage; 7 = Any remaining friable ACBM or friable suspected ACBM; X = Not applicable (material is non-ACBM, non-friable surfacing or miscellaneous materials); None = No assessment category provided in original inspection.

Hazard Ranking Category: 1 = Significantly damaged; 2 = Damaged and potential of significant damage; 3 = Damaged and potential for damage; 4 = Damaged; 5 = Potential for significant damage; 6 = Potential for damage; 7 = All remaining ACBM

*** - Unless Specified, the Asbestos Type is Chrysotile; ND - None Detected**

AES International Inc.

**ANALYTICAL ENVIRONMENTAL SERVICES INTERNATIONAL, INC.**

# ASBESTOS SAMPLE INSPECTION FORM FOR PHYSICAL & HAZARD ASSESSMENT

Client Name: **Behar Ybarra** Building/Unit: Structure #6

Project Name: 7 Structures - Comunidad el Retiro San Germna, PR

Inspection Date: 2/17/2025 Page: 1 of 1

| Homogeneous Material Description | | Material Category | Asbestos Content | Friability | Location of Materials | Asbestos Contents | Total $Ft^2$ of ACM | AHERA Assessment Category (1-7, X, None) | Hazard Ranking (5-7) |
|---|---|---|---|---|---|---|---|---|---|
| I.D. Number | Material Description | | | | | | | | |
| | NO SUSPECTED ACM | | | | | | | | |
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Inspected by: Elme Rivera Date: 2/17/2025

Friability: F = friable, NF = nonfriable, X = not applicable (material is non-ACBM)

AHERA Assessment Category: 1 = Damaged of significantly damaged TSI ACBM; 2 = Damaged friable surfacing ACBM; 3 = Significantly damaged friable surfacing ACBM; 4 = Damaged or significantly damaged friable miscellaneous ACBM; 5 = ACBM with potential for damage; 6 = ACBM with potential for significant damage; 7 = Any remaining friable ACBM or friable suspected ACBM; X = Not applicable (material is non-ACBM, non-friable surfacing or miscellaneous materials); None = No assessment category provided in original inspection.

Hazard Ranking Category: 1 = Significantly damaged; 2 = Damaged and potential of significant damage; 3 = Damaged and potential for damage; 4 = Damaged; 5 = Potential for significant damage; 6 = Potential for damage; 7 = All remaining ACBM

*** - Unless Specified, the Asbestos Type is Chrysotile; ND - None Detected**

**ANALYTICAL ENVIRONMENTAL SERVICES INTERNATIONAL, INC.**

# ASBESTOS SAMPLE INSPECTION FORM FOR PHYSICAL & HAZARD ASSESSMENT

Client Name: **Behar Ybarra** Building/Unit: Structure #7

Project Name: 7 Structures - Comunidad el Retiro San Germna, PR

Inspection Date: 2/18/2025 Page: 1 of 2

| Homogeneous Material Description | | Material Category | Asbestos Content | Friability | Location of Materials | Asbestos Contents | Total $Ft^2$ of ACM | AHERA Assessment Category (1-7, X, None) | Hazard Ranking (5-7) |
|---|---|---|---|---|---|---|---|---|---|
| I.D. Number | Material Description | | | | | | | | |
| ST7 - ARS - 1 | 12"x12" Cream Vinyl Floor Tile, Kitchen Area | Misc. | No | NF | Kitchen, Hallway & Bathroom | ND | | X | |
| ST7 - ARS - 2 | 12"x12" Cream Vinyl Floor Tile, Hallway Area | Misc. | No | NF | | ND | | X | |
| ST7 - ARS - 3 | 12"x12" Cream Vinyl Floor Tile, Bathroom Area | Misc. | No | NF | | ND | | X | |
| ST7 - ARS - 4 | 12"x12" Cream & Gray Vinyl Floor Tile, Living Room | Misc. | No | NF | Porch, Dinning Room & Living Room | ND | | X | |
| ST7 - ARS - 5 | 12"x12" Cream & Gray Vinyl Floor Tile, Dinning Room | Misc. | No | NF | | ND | | X | |
| ST7 - ARS - 6 | 12"x12" Cream & Gray Vinyl Floor Tile, Porch | Misc. | No | NF | | ND | | X | |

Inspected by: Elme Rivera Date: 2/18/2025

Friability: F = friable, NF = nonfriable, X = not applicable (material is non-ACBM)

AHERA Assessment Category: 1 = Damaged of significantly damaged TSI ACBM; 2 = Damaged friable surfacing ACBM; 3 = Significantly damaged friable surfacing ACBM; 4 = Damaged or significantly damaged friable miscellaneous ACBM; 5 = ACBM with potential for damage; 6 = ACBM with potential for significant damage; 7 = Any remaining friable ACBM or friable suspected ACBM; X = Not applicable (material is non-ACBM, non-friable surfacing or miscellaneous materials); None = No assessment category provided in original inspection.

Hazard Ranking Category: 1 = Significantly damaged; 2 = Damaged and potential of significant damage; 3 = Damaged and potential for damage; 4 = Damaged; 5 = Potential for significant damage; 6 = Potential for damage; 7 = All remaining ACBM

*** - Unless Specified, the Asbestos Type is Chrysotile; ND - None Detected**

**ANALYTICAL ENVIRONMENTAL SERVICES INTERNATIONAL, INC.**

# ASBESTOS SAMPLE INSPECTION FORM FOR PHYSICAL & HAZARD ASSESSMENT

Client Name: **Behar Ybarra** Building/Unit: Structure #7

Project Name: 7 Structures - Comunidad el Retiro San Germna, PR

Inspection Date: 2/18/2025 Page: 2 of 2

| Homogeneous Material Description | | Material Category | Asbestos Content | Friability | Location of Materials | Asbestos Contents | Total $Ft^2$ of ACM | AHERA Assessment Category (1-7, X, None) | Hazard Ranking (5-7) |
|---|---|---|---|---|---|---|---|---|---|
| I.D. Number | Material Description | | | | | | | | |
| ST7 - ARS - 7 | Roofing Material, Metal Roof West of Structure | Misc. | No | NF | Roof | ND | | X | |
| ST7 - ARS - 8 | Roofing Material, Metal Roof Center of Structure | Misc. | No | NF | | ND | | X | |
| ST7 - ARS - 9 | Roofing Material, Metal Roof Northeast of Structure | Misc. | No | NF | | ND | | X | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |

Inspected by: Elme Rivera Date: 2/18/2025

Friability: F = friable, NF = nonfriable, X = not applicable (material is non-ACBM)

AHERA Assessment Category: 1 = Damaged of significantly damaged TSI ACBM; 2 = Damaged friable surfacing ACBM; 3 = Significantly damaged friable surfacing ACBM; 4 = Damaged or significantly damaged friable miscellaneous ACBM; 5 = ACBM with potential for damage; 6 = ACBM with potential for significant damage; 7 = Any remaining friable ACBM or friable suspected ACBM; X = Not applicable (material is non-ACBM, non-friable surfacing or miscellaneous materials); None = No assessment category provided in original inspection.

Hazard Ranking Category: 1 = Significantly damaged; 2 = Damaged and potential of significant damage; 3 = Damaged and potential for damage; 4 = Damaged; 5 = Potential for significant damage; 6 = Potential for damage; 7 = All remaining ACBM

*** - Unless Specified, the Asbestos Type is Chrysotile; ND - None Detected**

AES International Inc.

**ANALYTICAL ENVIRONMENTAL SERVICES INTERNATIONAL, INC.**

# ASBESTOS SAMPLE INSPECTION FORM FOR PHYSICAL & HAZARD ASSESSMENT

Client Name: **Behar Ybarra** Building/Unit: Structure #8

Project Name: 7 Structures - Comunidad el Retiro San Germna, PR

Inspection Date: 2/17/2025 Page: 1 of 1

| Homogeneous Material Description | | Material Category | Asbestos Content | Friability | Location of Materials | Asbestos Contents | Total $Ft^2$ of ACM | AHERA Assessment Category (1-7, X, None) | Hazard Ranking (5-7) |
|---|---|---|---|---|---|---|---|---|---|
| I.D. Number | Material Description | | | | | | | | |
| ST8 - ARS - 1 | Roofing Material, Southeast of Structure | Misc. | No | NF | Roof | ND | | X | |
| ST8 - ARS - 2 | Roofing Material, West of Structure | Misc. | No | NF | | ND | | X | |
| ST8 - ARS - 3 | Roofing Material, East of Structure | Misc. | No | NF | | ND | | X | |
| ST8 - ARS - 4 | Gray Under Sink, Kitchen Area | Surf. | No | NF | Kitchen | ND | | X | |
| | | | | | | | | | |
| | | | | | | | | | |

Inspected by: Elme Rivera Date: 2/17/2025

Friability: F = friable, NF = nonfriable, X = not applicable (material is non-ACBM)

AHERA Assessment Category: 1 = Damaged of significantly damaged TSI ACBM; 2 = Damaged friable surfacing ACBM; 3 = Significantly damaged friable surfacing ACBM; 4 = Damaged or significantly damaged friable miscellaneous ACBM; 5 = ACBM with potential for damage; 6 = ACBM with potential for significant damage; 7 = Any remaining friable ACBM or friable suspected ACBM; X = Not applicable (material is non-ACBM, non-friable surfacing or miscellaneous materials); None = No assessment category provided in original inspection.

Hazard Ranking Category: 1 = Significantly damaged; 2 = Damaged and potential of significant damage; 3 = Damaged and potential for damage; 4 = Damaged; 5 = Potential for significant damage; 6 = Potential for damage; 7 = All remaining ACBM

*** - Unless Specified, the Asbestos Type is Chrysotile; ND - None Detected**

AES International Inc.

# Appendix III



ANALYTICAL ENVIRONMENTAL SERVICES INTERNATIONAL, INC.
611 Monserrate Street, 2nd. Floor, Santurce, P.R. 00907
PH. (787) 722-0220 Fax (787) 724-5788

NVLAP LAB CODE 200051-0
TESTING

Job ID: B25020038

## REPORT NUMBER

RP25022412

## POLARIZED LIGHT MICROSCOPY (PLM) BULK SAMPLE ANALYSIS REPORT

| | | | |
|---|---|---|---|
| Client Name: | Behar Ybarra | Date Collected: | 02/17/2025 |
| Project Name: | 7 Structures - Comunidad el Retiro | Date Received: | 02/19/2025 |
| Project ID: | | | |

RESULT OF ANALYSIS (BY % AREA VISUAL ESTIMATE)

| Lab Sample ID / Client Sample ID | Sample Description | Asbestos Detected | Asbestos Fibers | Other Fibers | Non - Fibrous Material |
|---|---|---|---|---|---|
| **B25020038.01**<br>B25020038.01.A<br>ST8-ARS-1<br>Layer % of Total :100%<br>Date Analyzed: 02/19/2025<br>Sample Location: Roofing Material from Southeast of Structure<br>Comments: | Semi Hard, Bituminous with Fibers<br>Black | No | | Cellulose 7<br>Glass Fibers 3 | Bitumen 90 |
| **B25020038.02**<br>B25020038.02.A<br>ST8-ARS-2<br>Layer % of Total :100%<br>Date Analyzed: 02/19/2025<br>Sample Location: Roofing Material from West of Structure<br>Comments: | Semi Hard, Bituminous with Fibers<br>Black | No | | Cellulose 10<br>Glass Fibers 2 | Bitumen 88 |
| **B25020038.03**<br>B25020038.03.A<br>ST8-ARS-3<br>Layer % of Total :100%<br>Date Analyzed: 02/19/2025<br>Sample Location: Roofing Material from East of Structure<br>Comments: | Semi Hard, Bituminous with Fibers<br>Black | No | | Cellulose 15<br>Glass Fibers 3 | Binders/Paint 82 |
| **B25020038.04**<br>B25020038.04.A<br>ST8-ARS-4<br>Layer % of Total :100%<br>Date Analyzed: 02/19/2025 | Semi Hard, Glue with Fibers<br>Gray | No | | Cellulose 2 | Glue 98 |

MICROANALYST: _____
Jessica Garcia

QUALITY CONTROL: _____
Elme Rivera

PLM is not consistently reliable in detecting small concentrations of asbestos in floor tiles and similar nonfriable materials. Quantitative TEM is currently the only method that can be used to get the conclusive asbestos content. This report relates only to the items tested as received. This report shall not be reproduced except in full and not without written approval of the laboratory. This report shall not be used to claim endorsement by NVLAP or any agency of the US Government. Methods used for determination of asbestos in bulk samples are found in both methods App. E to Sub. E of 40 CFR Part 763 and EPA/600/R-93/116.

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## REPORT NUMBER

RP25022412

## POLARIZED LIGHT MICROSCOPY (PLM) BULK SAMPLE ANALYSIS REPORT

| | | | |
|---|---|---|---|
| Client Name: | Behar Ybarra | Date Collected: | 02/17/2025 |
| Project Name: | 7 Structures - Comunidad el Retiro | Date Received: | 02/19/2025 |
| Project ID: | | | |

RESULT OF ANALYSIS (BY % AREA VISUAL ESTIMATE)

| Lab Sample ID / Client Sample ID | Sample Description | Asbestos Detected | Asbestos Fibers | Other Fibers | Non - Fibrous Material |
|---|---|---|---|---|---|

Sample Location: Gray Under Sink from Kitchen Area

Comments:

Comments:

For all heterogeneous and layered samples easily separated into sublayers, each component is analyzed and reported separately.

Samples are analyzed by PLM using dispersion staining techniques in accordance with US EPA methods App. E to Sub. E of 40 CFR Part 763 and EPA/600/R-93/116.

MICROANALYST: Jessica Garcia

QUALITY CONTROL: Elme Rivera

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NVLAP LAB CODE 200051-0
TESTING

# Transmittal Sheet for Bulk Sample Analysis

**Client Name:** Behar Ybarra
**Address:**
**Contact:** Eng. Miguel Pérez
**Phone/Fax:** 787-783-0290

**Project Name:** 7 Structures Comunidad El Retiro
**Site Location:** San Germán, Puerto Rico
**Samplers Name:** Abraham Rodríguez
**Company:** AESI

## Chain of Custody Record

| Sample I. D. | Sample Description (i.e. Location, Name, etc.) | Collected | | Analysis Required | | Comments | Laboratory I.D. 25020038 |
|---|---|---|---|---|---|---|---|
| | | Date | Time | PLM | Other | | |
| STR-ARS-1 | -See hazard assessment- | 2-17-25 | | X | | | 01 |
| STR-ARS-2 | " | 2-17-25 | | X | | | 02 |
| STR-ARS-3 | " | 2-17-25 | | X | | | 03 |
| STR-ARS-4 | - See hazard assessment - | 2-17-25 | | X | | | 04 |
| | | | | | | | |
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Turnaround Time: Normal: ☐ Rush: ☐

| | |
|---|---|
| **Relinquished By:** | |
| **Date/ Time:** | 2-19-25 / 7:56 |
| **Received By:** | |
| **Date/ Time:** | 2/19/25 8:00 |
| **Relinquished By:** | |
| **Date/ Time:** | |
| **Received By:** | |
| **Date/ Time:** | |

**Delivered Directly to I**
**Method of Shipment:**
**Lab. Recipient:**
**Date:**

*Job ID:B25020038
Behar Ybarra

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NVLAP LAB CODE 200051-0
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Job ID: B25020039

## REPORT NUMBER

RP25022413

## POLARIZED LIGHT MICROSCOPY (PLM) BULK SAMPLE ANALYSIS REPORT

| | | | |
|---|---|---|---|
| Client Name: | Behar Ybarra | Date Collected: | 02/18/2025 |
| Project Name: | 7 Structures - Comunidad el Retiro | Date Received: | 02/19/2025 |
| Project ID: | | | |

RESULT OF ANALYSIS (BY % AREA VISUAL ESTIMATE)

| Lab Sample ID / Client Sample ID | Sample Description | Asbestos Detected | Asbestos Fibers | Other Fibers | Non - Fibrous Material |
|---|---|---|---|---|---|
| **B25020039.01**<br>B25020039.01.A<br>ST2-ARS-1<br>Layer % of Total :100% | Semi Hard, Vinyl with Plastic, Glue and Fibers<br>Brown/Cream | No | | Cellulose 2 | Glue 28<br>Vinyl 50<br>Binders/Paint 20 |
| Date Analyzed: 02/21/2025<br>Sample Location: 12" x 12" VFT Cream, Brown from Bathroom Entrance, Hallway<br>Comments:<br>Plastic included as binder. | | | | | |
| **B25020039.02**<br>B25020039.02.A<br>ST2-ARS-2<br>Layer % of Total :100% | Semi Hard, Vinyl with Plastic, Glue and Fibers<br>Brown/Cream | No | | Cellulose 3 | Binders/Paint 7<br>Glue 30<br>Vinyl 60 |
| Date Analyzed: 02/21/2025<br>Sample Location: 12" x 12" VFT Cream, Brown from Living Room 2<br>Comments:<br>Plastic included as binder. | | | | | |
| **B25020039.03**<br>B25020039.03.A<br>ST2-ARS-3<br>Layer % of Total :100% | Semi Hard, Bituminous with Fibers<br>Black | No | | Cellulose 20 | Bitumen 80 |
| Date Analyzed: 02/21/2025<br>Sample Location: Roofing Material from Center of Roof<br>Comments: | | | | | |

MICROANALYST: Jessica Garcia

QUALITY CONTROL: Elme Rivera

PLM is not consistently reliable in detecting small concentrations of asbestos in floor tiles and similar nonfriable materials. Quantitative TEM is currently the only method that can be used to get the conclusive asbestos content. This report relates only to the items tested as received. This report shall not be reproduced except in full and not without written approval of the laboratory. This report shall not be used to claim endorsement by NVLAP or any agency of the US Government. Methods used for determination of asbestos in bulk samples are found in both methods App. E to Sub. E of 40 CFR Part 763 and EPA/600/R-93/116.

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NVLAP LAB CODE 200051-0
TESTING

Job ID: B25020039

## REPORT NUMBER

RP25022413

## POLARIZED LIGHT MICROSCOPY (PLM) BULK SAMPLE ANALYSIS REPORT

| | | | |
|---|---|---|---|
| Client Name: | Behar Ybarra | Date Collected: | 02/18/2025 |
| Project Name: | 7 Structures - Comunidad el Retiro | Date Received: | 02/19/2025 |
| Project ID: | | | |

RESULT OF ANALYSIS (BY % AREA VISUAL ESTIMATE)

| Lab Sample ID / Client Sample ID | Sample Description | Asbestos Detected | Asbestos Fibers | Other Fibers | Non - Fibrous Material |
|---|---|---|---|---|---|
| **B25020039.04**<br>B25020039.04.A<br>ST2-ARS-4<br>Layer % of Total :100% | Semi Hard, Vinyl with Plastic, Glue and Fibers<br>Brown/Cream | No | | Cellulose 2 | Glue 10<br>Vinyl 55<br>Binders/Paint 33 |
| Date Analyzed: 02/21/2025<br>Sample Location: 12" x 12" VFT Cream, Brown from Bedroom 3<br>Comments:<br>Plastic included as binder. | | | | | |
| **B25020039.05**<br>B25020039.05.A<br>ST2-ARS-5<br>Layer % of Total :100% | Semi Hard, Bituminous with Fibers<br>Black | No | | Cellulose 25 | Bitumen 75 |
| Date Analyzed: 02/21/2025<br>Sample Location: Roofing Material from West<br>Comments: | | | | | |
| **B25020039.06**<br>B25020039.06.A<br>ST2-ARS-6<br>Layer % of Total :100% | Semi Hard, Bituminous with Fibers<br>Black | No | | Cellulose 18 | Bitumen 82 |
| Date Analyzed: 02/21/2025<br>Sample Location: Roofing Material from East<br>Comments: | | | | | |
| **B25020039.07**<br>B25020039.07.A<br>ST2-ARS-7<br>Layer % of Total :100% | Semi Hard, Vinyl with Plastic, Glue and Fibers<br>Brown | No | | Cellulose 3 | Binders/Paint 15<br>Glue 22<br>Vinyl 60 |

MICROANALYST: Jessica Garcia

QUALITY CONTROL: Elme Rivera

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## REPORT NUMBER

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## POLARIZED LIGHT MICROSCOPY (PLM) BULK SAMPLE ANALYSIS REPORT

| | | | |
|---|---|---|---|
| Client Name: | Behar Ybarra | Date Collected: | 02/18/2025 |
| Project Name: | 7 Structures - Comunidad el Retiro | Date Received: | 02/19/2025 |
| Project ID: | | | |

RESULT OF ANALYSIS (BY % AREA VISUAL ESTIMATE)

| Lab Sample ID / Client Sample ID | Sample Description | Asbestos Detected | Asbestos Fibers | Other Fibers | Non - Fibrous Material |
|---|---|---|---|---|---|
| Date Analyzed: 02/21/2025<br>Sample Location: 12" x 12" Brown VFT From Kitchen/Living Room<br>Comments:<br>Plastic included as binder. | | | | | |
| **B25020039.08**<br>B25020039.08.A<br>ST2-ARS-8<br>Layer % of Total :100% | Semi Hard, Vinyl with Plastic, Glue and Fibers<br>Brown | No | | Cellulose 2 | Binders/Paint 8<br>Vinyl 65<br>Glue 25 |
| Date Analyzed: 02/21/2025<br>Sample Location: 12" x 12" Brown VFT From Kitchen/Living Room<br>Comments:<br>Plastic included as binder. | | | | | |
| **B25020039.09**<br>B25020039.09.A<br>ST2-ARS-9<br>Layer % of Total :100% | Semi Hard, Vinyl with Plastic, Glue and Fibers<br>Lt brown | No | | Cellulose 2 | Binders/Paint 18<br>Vinyl 70<br>Glue 10 |
| Date Analyzed: 02/21/2025<br>Sample Location: 12" x 12" Light Brown VFT from Bedroom 1<br>Comments:<br>Plastic included as binder. | | | | | |
| **B25020039.10**<br>B25020039.10.A<br>ST2-ARS-10<br>Layer % of Total :100% | Semi Hard, Vinyl with Plastic, Glue and Fibers<br>Lt brown | No | | Cellulose 2 | Glue 20<br>Vinyl 55<br>Binders/Paint 23 |
| Date Analyzed: 02/21/2025<br>Sample Location: 12" x 12" Light Brown VFT from Bedroom 2 | | | | | |

MICROANALYST: Jessica Garcia

QUALITY CONTROL: Elme Rivera

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NVLAP LAB CODE 200051-0
TESTING

Job ID: B25020039

## REPORT NUMBER

RP25022413

## POLARIZED LIGHT MICROSCOPY (PLM) BULK SAMPLE ANALYSIS REPORT

| | | | |
|---|---|---|---|
| Client Name: | Behar Ybarra | Date Collected: | 02/18/2025 |
| Project Name: | 7 Structures - Comunidad el Retiro | Date Received: | 02/19/2025 |
| Project ID: | | | |

RESULT OF ANALYSIS (BY % AREA VISUAL ESTIMATE)

| Lab Sample ID / Client Sample ID | Sample Description | Asbestos Detected | Asbestos Fibers | Other Fibers | Non - Fibrous Material |
|---|---|---|---|---|---|
| Comments: Plastic included as binder. | | | | | |
| **B25020039.11**<br>B25020039.11.A<br>ST5-ARS-1<br>Layer % of Total :100%<br>Date Analyzed: 02/21/2025<br>Sample Location: Roofing Material from Southwest of Structure<br>Comments: | Semi Hard, Bituminous with Fibers<br>Black | No | | Cellulose 28 | Bitumen 72 |
| **B25020039.12**<br>B25020039.12.A<br>ST5-ARS-2<br>Layer % of Total :100%<br>Date Analyzed: 02/21/2025<br>Sample Location: Roofing Material from West of Structure<br>Comments: | Semi Hard, Bituminous with Fibers<br>Black | No | | Cellulose 20 | Bitumen 80 |
| **B25020039.13**<br>B25020039.13.A<br>ST5-ARS-3<br>Layer % of Total :100%<br>Date Analyzed: 02/21/2025<br>Sample Location: Roofing Material from North of Structure<br>Comments: | Semi Hard, Bituminous with Fibers<br>Black | No | | Cellulose 25 | Bitumen 75 |

MICROANALYST: Jessica Garcia

QUALITY CONTROL: Elme Rivera

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NVLAP LAB CODE 200051-0
TESTING

Job ID: B25020039

## REPORT NUMBER

RP25022413

## POLARIZED LIGHT MICROSCOPY (PLM) BULK SAMPLE ANALYSIS REPORT

| | | | |
|---|---|---|---|
| Client Name: | Behar Ybarra | Date Collected: | 02/18/2025 |
| Project Name: | 7 Structures - Comunidad el Retiro | Date Received: | 02/19/2025 |
| Project ID: | | | |

RESULT OF ANALYSIS (BY % AREA VISUAL ESTIMATE)

| Lab Sample ID / Client Sample ID | Sample Description | Asbestos Detected | Asbestos Fibers | Other Fibers | Non - Fibrous Material |
|---|---|---|---|---|---|
| **B25020039.14**<br>B25020039.14.A<br>ST5-ARS-4<br>Layer % of Total :100% | Semi Hard, Vinyl with Plastic, Glue and Fibers<br>Brown/Gray | No | | Cellulose 2 | Glue 20<br>Vinyl 63<br>Binders/Paint 15 |
| Date Analyzed: 02/21/2025<br>Sample Location: 12" x 12" Brown/Gray VFT From Kitchen/Living Room<br>Comments:<br>Plastic included as binder. | | | | | |
| **B25020039.15**<br>B25020039.15.A<br>ST5-ARS-5<br>Layer % of Total :100% | Semi Hard, Vinyl with Plastic, Glue and Fibers<br>Brown/Gray | No | | Cellulose 3 | Vinyl 60<br>Glue 20<br>Binders/Paint 17 |
| Date Analyzed: 02/21/2025<br>Sample Location: 12" x 12" Brown/Gray VFT From Kitchen/Living Room<br>Comments:<br>Plastic included as binder. | | | | | |
| **B25020039.16**<br>B25020039.16.A<br>ST7-ARS-1<br>Layer % of Total :100% | Hard, Compact Partly Granular with Glue and Fibers<br>Cream | No | | Cellulose 3 | Sand/Aggregates 36<br>Glue 12<br>Binders/Paint 49 |
| Date Analyzed: 02/21/2025<br>Sample Location: 12" x 12" Cream VFT from Kitchen Area<br>Comments: | | | | | |

MICROANALYST: Jessica Garcia

QUALITY CONTROL: Elme Rivera

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Job ID: B25020039

## REPORT NUMBER

RP25022413

## POLARIZED LIGHT MICROSCOPY (PLM) BULK SAMPLE ANALYSIS REPORT

| | | | |
|---|---|---|---|
| Client Name: | Behar Ybarra | Date Collected: | 02/18/2025 |
| Project Name: | 7 Structures - Comunidad el Retiro | Date Received: | 02/19/2025 |
| Project ID: | | | |

RESULT OF ANALYSIS (BY % AREA VISUAL ESTIMATE)

| Lab Sample ID / Client Sample ID | Sample Description | Asbestos Detected | Asbestos Fibers | Other Fibers | Non - Fibrous Material |
|---|---|---|---|---|---|
| **B25020039.17**<br>B25020039.17.A<br>ST7-ARS-2<br>Layer % of Total :100% | Hard, Compact Partly Granular with Glue and Fibers<br>Cream | No | | Cellulose 2 | Sand/Aggregates 35<br>Glue 15<br>Binders/Paint 48 |
| Date Analyzed: 02/21/2025<br>Sample Location: 12" x 12" Cream VFT from Hallway Area<br>Comments: | | | | | |
| **B25020039.18**<br>B25020039.18.A<br>ST7-ARS-3<br>Layer % of Total :100% | Hard, Compact Partly Granular with Glue and Fibers<br>Cream | No | | Cellulose 2 | Binders/Paint 43<br>Sand/Aggregates 35<br>Glue 20 |
| Date Analyzed: 02/21/2025<br>Sample Location: 12" x 12" Cream VFT from Bathroom Area<br>Comments: | | | | | |
| **B25020039.19**<br>B25020039.19.A<br>ST7-ARS-4<br>Layer % of Total :100% | Semi Hard, Vinyl with Plastic, Glue and Fibers<br>Gray/Cream | No | | Cellulose 2 | Binders/Paint 15<br>Glue 18<br>Vinyl 65 |
| Date Analyzed: 02/21/2025<br>Sample Location: 12" x 12" Cream and Gray VFT from Living Room<br>Comments:<br>Plastic included as binder. | | | | | |
| **B25020039.20**<br>B25020039.20.A<br>ST7-ARS-5<br>Layer % of Total :100% | Semi Hard, Vinyl with Plastic, Glue and Fibers<br>Gray/Cream | No | | Cellulose 3 | Binders/Paint 15<br>Vinyl 75<br>Glue 7 |

MICROANALYST: Jessica Garcia

QUALITY CONTROL: Elme Rivera

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PH. (787) 722-0220 Fax (787) 724-5788

NVLAP LAB CODE 200051-0
TESTING

Job ID: B25020039

## REPORT NUMBER

RP25022413

## POLARIZED LIGHT MICROSCOPY (PLM) BULK SAMPLE ANALYSIS REPORT

| | | | |
|---|---|---|---|
| Client Name: | Behar Ybarra | Date Collected: | 02/18/2025 |
| Project Name: | 7 Structures - Comunidad el Retiro | Date Received: | 02/19/2025 |
| Project ID: | | | |

RESULT OF ANALYSIS (BY % AREA VISUAL ESTIMATE)

| Lab Sample ID / Client Sample ID | Sample Description | Asbestos Detected | Asbestos Fibers | Other Fibers | Non - Fibrous Material |
|---|---|---|---|---|---|
| Date Analyzed: 02/21/2025<br>Sample Location: 12" x 12" Cream and Gray VFT from Dinning Room<br>Comments:<br>Plastic included as binder. | | | | | |
| **B25020039.21**<br>B25020039.21.A<br>ST7-ARS-6<br>Layer % of Total :100% | Semi Hard, Vinyl with Plastic, Glue and Fibers<br>Gray/Cream | No | | Cellulose 2 | Binders/Paint 18<br>Glue 20<br>Vinyl 60 |
| Date Analyzed: 02/21/2025<br>Sample Location: 12" x 12" Cream and Gray VFT from Porch<br>Comments:<br>Plastic included as binder. | | | | | |
| **B25020039.22**<br>B25020039.22.A<br>ST7-ARS-7<br>Layer % of Total :100% | Semi Hard, Bituminous with Fibers<br>Black | No | | Cellulose 17 | Bitumen 83 |
| Date Analyzed: 02/21/2025<br>Sample Location: Roofing Material from Metal Roof, West of Structure<br>Comments: | | | | | |
| **B25020039.23**<br>B25020039.23.A<br>ST7-ARS-8<br>Layer % of Total :100% | Semi Hard, Bituminous with Fibers<br>Black | No | | Cellulose 25 | Bitumen 75 |
| Date Analyzed: 02/21/2025<br>Sample Location: Roofing Material from Metal Roof, Center of Structure<br>Comments: | | | | | |

MICROANALYST: Jessica Garcia

QUALITY CONTROL: Elme Rivera

PLM is not consistently reliable in detecting small concentrations of asbestos in floor tiles and similar nonfriable materials. Quantitative TEM is currently the only method that can be used to get the conclusive asbestos content. This report relates only to the items tested as received. This report shall not be reproduced except in full and not without written approval of the laboratory. This report shall not be used to claim endorsement by NVLAP or any agency of the US Government. Methods used for determination of asbestos in bulk samples are found in both methods App. E to Sub. E of 40 CFR Part 763 and EPA/600/R-93/116.

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PH. (787) 722-0220 Fax (787) 724-5788

NVLAP LAB CODE 200051-0
TESTING

Job ID: B25020039

## REPORT NUMBER

RP25022413

## POLARIZED LIGHT MICROSCOPY (PLM) BULK SAMPLE ANALYSIS REPORT

| | | | |
|---|---|---|---|
| Client Name: | Behar Ybarra | Date Collected: | 02/18/2025 |
| Project Name: | 7 Structures - Comunidad el Retiro | Date Received: | 02/19/2025 |
| Project ID: | | | |

RESULT OF ANALYSIS (BY % AREA VISUAL ESTIMATE)

| Lab Sample ID / Client Sample ID | Sample Description | Asbestos Detected | Asbestos Fibers | Other Fibers | Non - Fibrous Material |
|---|---|---|---|---|---|
| **B25020039.24**<br>B25020039.24.A<br>ST7-ARS-9<br>Layer % of Total :100% | Semi Hard, Bituminous with Fibers<br>Black | No | | Cellulose 20 | Bitumen 80 |

Date Analyzed: 02/21/2025

Sample Location: Roofing Material from Metal Roof, Northeast of Structure

Comments:

Comments:

For all heterogeneous and layered samples easily separated into sublayers, each component is analyzed and reported separately.

Samples are analyzed by PLM using dispersion staining techniques in accordance with US EPA methods App. E to Sub. E of 40 CFR Part 763 and EPA/600/R-93/116.

MICROANALYST: Jessica Garcia

QUALITY CONTROL: Elme Rivera

PLM is not consistently reliable in detecting small concentrations of asbestos in floor tiles and similar nonfriable materials. Quantitative TEM is currently the only method that can be used to get the conclusive asbestos content. This report relates only to the items tested as received. This report shall not be reproduced except in full and not without written approval of the laboratory. This report shall not be used to claim endorsement by NVLAP or any agency of the US Government. Methods used for determination of asbestos in bulk samples are found in both methods App. E to Sub. E of 40 CFR Part 763 and EPA/600/R-93/116.

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Ph: (787) 722-0220 Fax: (787) 724-5788

NVLAP LAB CODE 200051-0
TESTING

# Transmittal Sheet for Bulk Sample Analysis

**Client Name:** Behar Ybarra
**Address:**
**Contact:** Eng. Miguel Pérez
**Phone/Fax:** 787-783-0290

**Project Name:** 7 Structures Comunidad El Retiro
**Site Location:** San Germán, Puerto Rico
**Samplers Name:** Abraham Rodríguez
**Company:** AESI

## Chain of Custody Record

| Sample I. D. | Sample Description (i.e. Location, Name, etc.) | Collected | | Analysis Required | | Comments | Laboratory I.D. 25020039 |
|---|---|---|---|---|---|---|---|
| | | Date | Time | PLM | Other | | |
| STJ-ARS-1 | -See hazard assessment- | 2-18-25 | | X | | | ·01 |
| STJ-ARS-2 | | | | X | | | ·02 |
| STJ-ARS-3 | | | | X | | | ·03 |
| STJ-ARS-4 | | | | X | | | ·04 |
| STJ-ARS-5 | | | | X | | | ·05 |
| STJ-ARS-6 | | | | X | | | ·06 |
| STJ-ARS-7 | | | | X | | | ·07 |
| STJ-ARS-8 | | | | X | | | ·08 |
| STJ-ARS-9 | | | | X | | | ·09 |
| STJ-ARS-10 | | | | X | | | ·10 |
| STS-ARS-1 | | | | X | | | ·11 |
| STS-ARS-2 | | | | X | | | ·12 |
| STS-ARS-3 | -See hazard assessment- | 2-18-25 | | X | | | ·13 |

Turnaround Time: Normal: ☐ Rush: X

| | | | |
|---|---|---|---|
| **Relinquished By:** | | **Delivered Directly to Lab:** | |
| **Date/ Time:** | 2-19-25 | | |
| **Received By:** | | **Method of Shipment:** | |
| **Date/ Time:** | 2/19/25 8:00 | | |
| **Relinquished By:** | | **Lab. Recipient:** | |
| **Date/ Time:** | | | |
| **Received By:** | | **Date:** | |
| **Date/ Time:** | | | |

*Job ID:B25020039
Behar Ybarra

ANALYTICAL ENVIRONMENTAL SERVICES INTERNATIONAL, IN
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Ph: (787) 722-0220 Fax: (787) 724-5788

NVLAP®
NVLAP LAB CODE 200051-0
TESTING

# Transmittal Sheet for Bulk Sample Analysis

**Client Name:** Behar Ybarra
**Address:**
**Contact:** Eng. Miguel Pérez
**Phone/Fax:** 787-783-0290

**Project Name:** 7 Structures Comunidad El Retiro
**Site Location:** San Germán, Puerto Rico
**Samplers Name:** Abraham Rodríguez
**Company:** AESI

## Chain of Custody Record

| Sample I. D. | Sample Description (i.e. Location, Name, etc.) | Collected | | Analysis Required | | Comments | Laboratory I.D. B25020039 |
|---|---|---|---|---|---|---|---|
| | | Date | Time | PLM | Other | | |
| ST5-ARS-4 | - See hazard assessment - | 2-18-25 | | X | | | .14 |
| ST5-ARS-5 | | | | X | | | .15 |
| ST7-ARS-1 | | | | X | | | .16 |
| ST7-ARS-2 | | | | X | | | .17 |
| ST7-ARS-3 | | | | X | | | .18 |
| ST7-ARS-4 | | | | X | | | .19 |
| ST7-ARS-5 | | | | X | | | .20 |
| ST7-ARS-6 | | | | X | | | .21 |
| ST7-ARS-7 | | | | X | | | .22 |
| ST7-ARS-8 | | | | X | | | .23 |
| ST7-ARS-9 | - See hazard assessment - | 2-18-25 | | X | | | .24 |
| ARS- 2/19/25 ~~ST7-ARS-10~~ | | | | | | | |
| | | | | | | | |

Turnaround Time: Normal: ☐ Rush: X

| | |
|---|---|
| **Relinquished By:** | |
| **Date/ Time:** | 2-19-25 / 7:56 |
| **Received By:** | |
| **Date/ Time:** | 2/19/25 8:00 |
| **Relinquished By:** | |
| **Date/ Time:** | |
| **Received By:** | |
| **Date/ Time:** | |

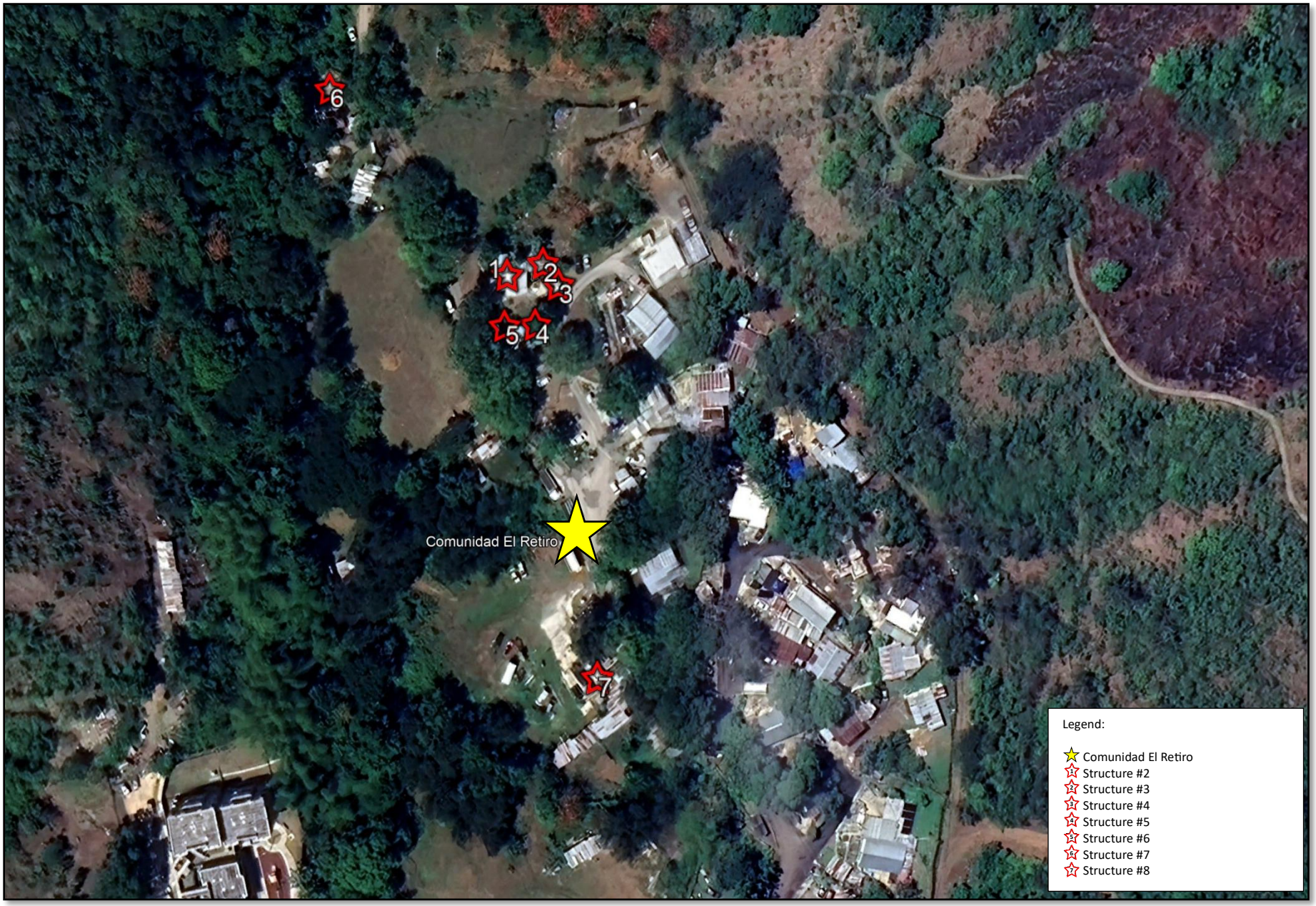
**Delivered Directly to Lab**
**Method of Shipment:**
**Lab. Recipient:**
**Date:**

*Job ID:B25020039
Behar Ybarra

# Appendix IV



# Seven (7) Structures located in Comunidad El Retiro
# San German, Puerto Rico



# SELECTIVE PHOTOS

## STRUCTURE #2 LOCATED IN COMUNIDAD EL RETIRO
## SAN GERMAN, PUERTO RICO




**GENERAL VIEW**
**Structure #2**

# SELECTIVE PHOTOS

## STRUCTURE #3 LOCATED IN COMUNIDAD EL RETIRO
## SAN GERMAN, PUERTO RICO



**GENERAL VIEW**
**Structure #3**

# SELECTIVE PHOTOS

## STRUCTURE #4 LOCATED IN COMUNIDAD EL RETIRO
## SAN GERMAN, PUERTO RICO



**GENERAL VIEW**
**Structure #4**

# SELECTIVE PHOTOS

## STRUCTURE #5 LOCATED IN COMUNIDAD EL RETIRO
## SAN GERMAN, PUERTO RICO



**GENERAL VIEW**
**Structure #5**

# SELECTIVE PHOTOS

## STRUCTURE #6 LOCATED IN COMUNIDAD EL RETIRO
## SAN GERMAN, PUERTO RICO



**GENERAL VIEW**
**Structure #6**

# SELECTIVE PHOTOS

## STRUCTURE #7 LOCATED IN COMUNIDAD EL RETIRO
## SAN GERMAN, PUERTO RICO



**GENERAL VIEW**
**Structure #7**

# SELECTIVE PHOTOS

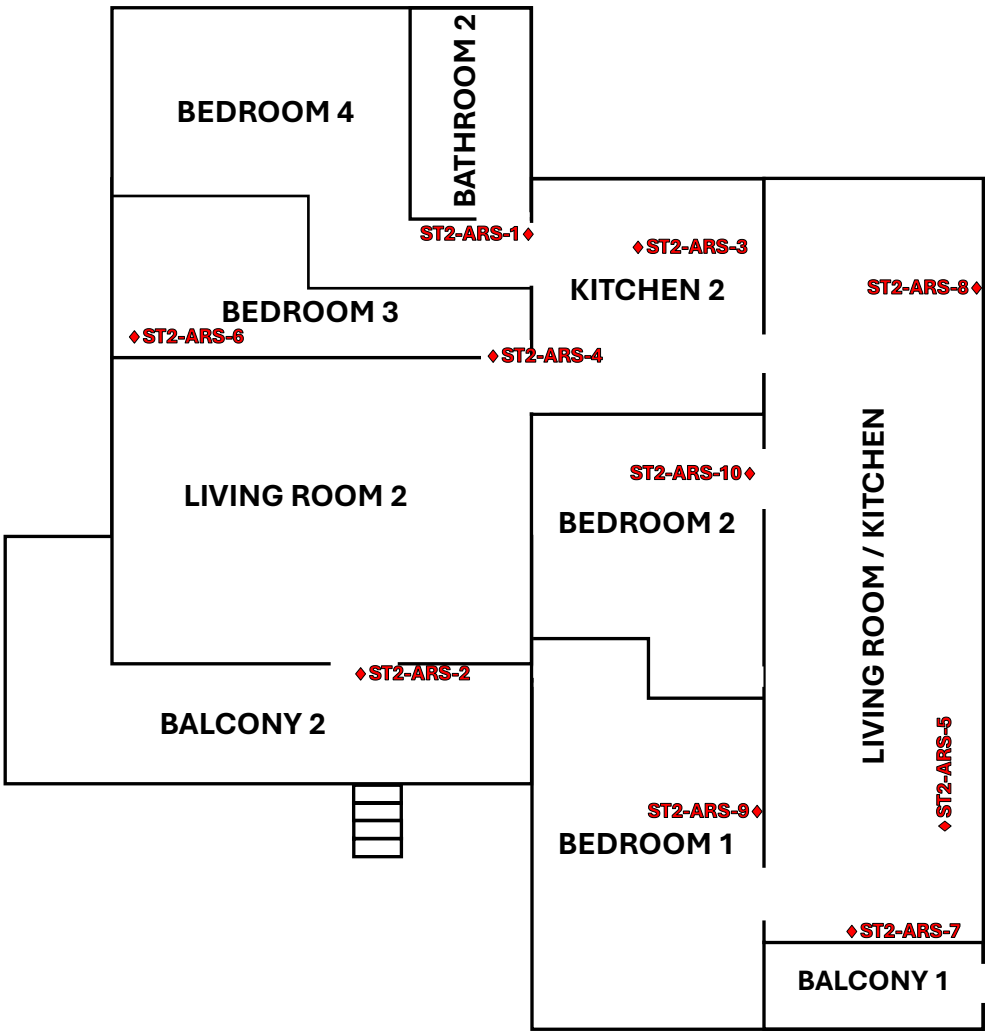
## STRUCTURE #8 LOCATED IN COMUNIDAD EL RETIRO
## SAN GERMAN, PUERTO RICO



**GENERAL VIEW**
**Structure #8**

# Appendix V






**DISTRIBUTION OF ACM SAMPLING POINTS**
**Structure #2 Comunidad El Retiro**
**San German, Puerto Rico**

**Not at Scale**

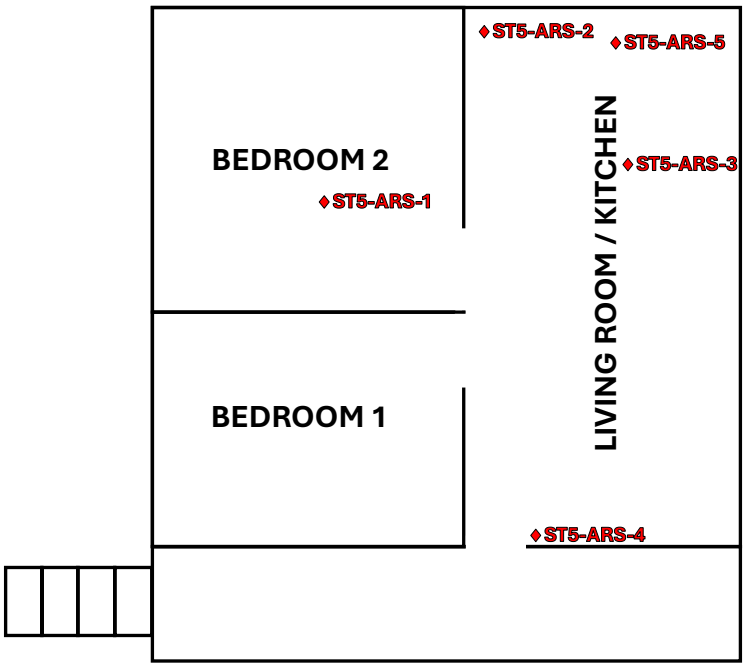
**LEGEND**:

♦ST2-ARS-# ACM Sampling Points

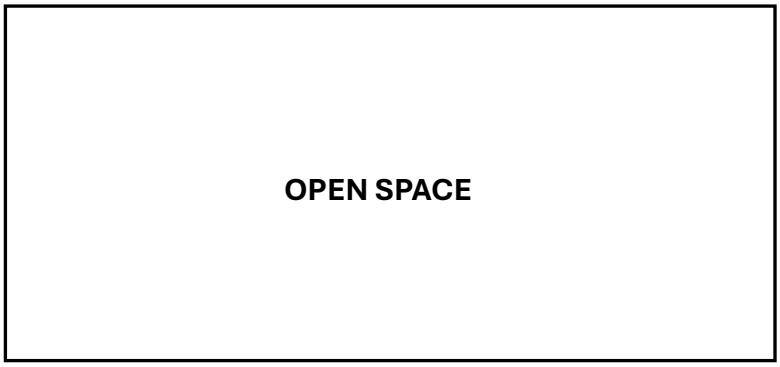

**Environmental Consulting, Training, and Laboratory Services**
**(787) 722-0220 / (787) 724-5788**

N

## STRUCTURE #5




## STRUCTURE #6



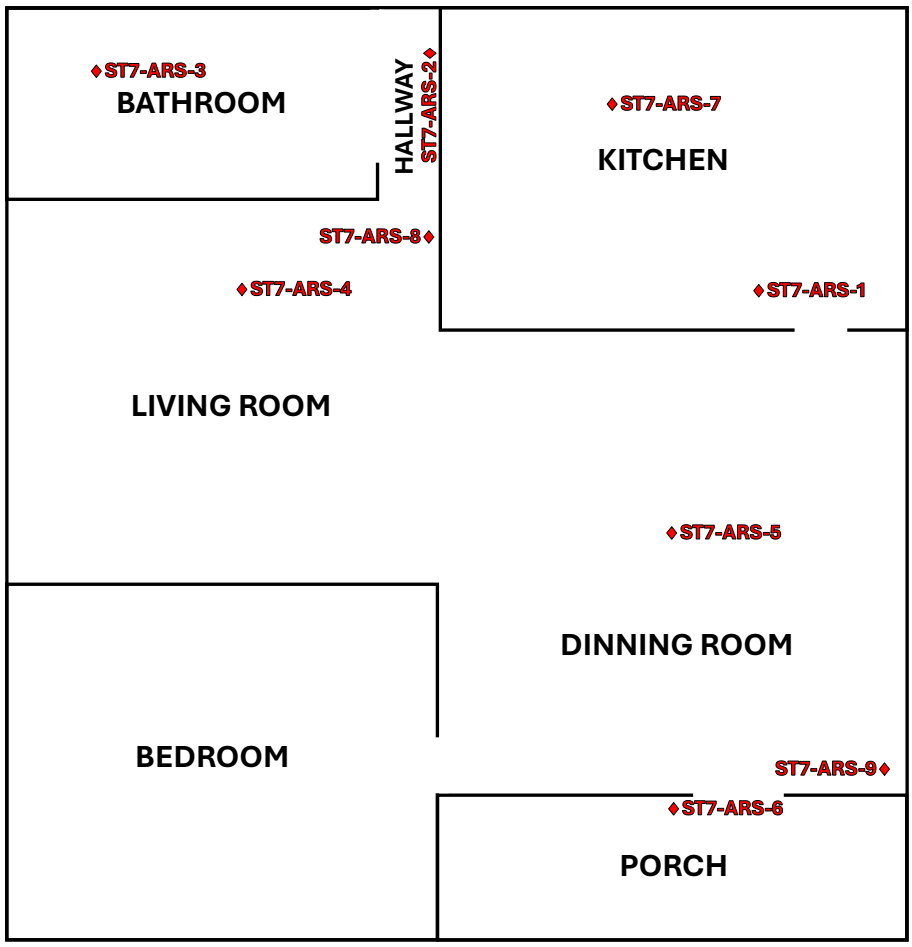

**DISTRIBUTION OF ACM SAMPLING POINTS**
**Structure #5 & #6 Comunidad El Retiro**
**San German, Puerto Rico**

**LEGEND**:

♦ST5-ARS-# ACM Sampling Points

**Not at Scale**


**Environmental Consulting, Training, and Laboratory Services**
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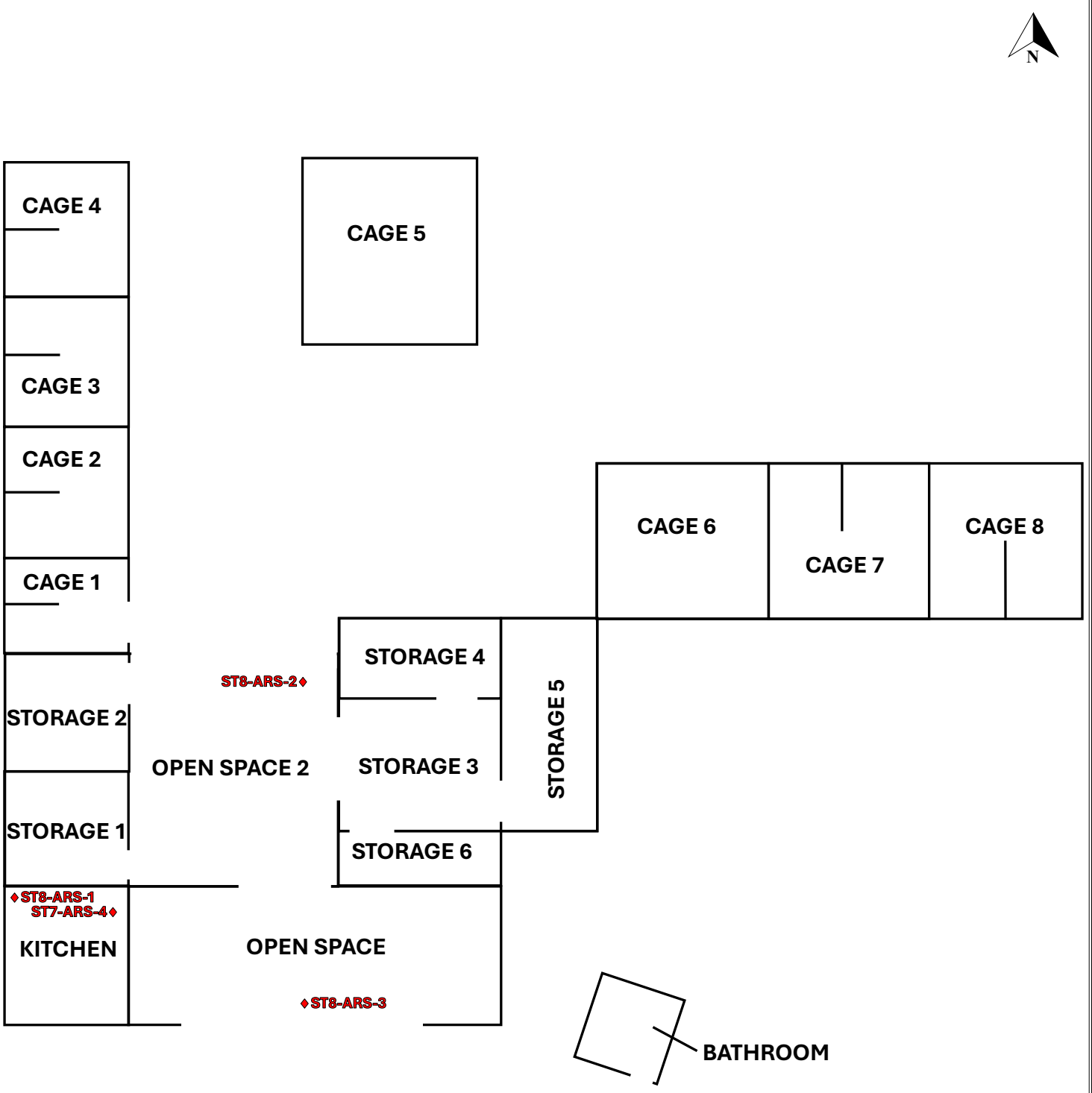

**DISTRIBUTION OF ACM SAMPLING POINTS**
**Structure #7 Comunidad El Retiro**
**San German, Puerto Rico**

**LEGEND**:

ST7-ARS-# ACM Sampling Points

**Not at Scale**


**Environmental Consulting, Training, and Laboratory Services**
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**DISTRIBUTION OF ACM SAMPLING POINTS**
**Structure #8 Comunidad El Retiro**
**San German, Puerto Rico**

**LEGEND**:

ST8-ARS-# ACM Sampling Points

**Not at Scale**


Environmental Consulting, Training, and Laboratory Services
(787) 722-0220 / (787) 724-5788

# APPENDIX 5: USFWS consultation package

# United States Department of the Interior

FISH AND WILDLIFE SERVICE
Caribbean Ecological Services Field Office
Bayamón | Mayagüez | Maricao | Río Grande | St Croix
P.O. Box 491
Boquerón, Puerto Rico 00622


In Reply Refer To:
FWS/R4/CESFO/72125-001

Submitted Via Electronic Mail: lurodriguez@act.pr.gov

Luis E. Rodríguez Rosa
Interim Program Development Division Manager
and Senior assistant to the Executive Director
Puerto Rico Highway and Transportation Authority
PO Box 42007
San Juan, PR 00940-2007

Re: Amendment Extension of State Road PR-122, from PR-321 to PR-166 (AC-012201), San Germán and Lajas

Dear Mr. Rodríguez:

Thank you for your letter dated February 18, 2026, requesting an amendment to the initial informal consultation of February 19, 2021, due to a reduction in the impact area. As per your request, our comments are provided under the Endangered Species Act (Act) (87 Stat. 884, as amended; 16 United States Code 1531 et seq.), and the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661 et seq.).

The Puerto Rico Highway and Transportation Authority (PRHTA), the U.S. Department of Transportation (USDOT), through the Federal Highway Administration (FHWA) and the U.S. Department of Housing and Urban Development (HUD) propose to extend the Angel Castro Perez Avenue (PR-122), from road PR-321 to road PR-166 (San Germán South Bypass), within the boundaries of the municipalities of San Germán and Lajas, Puerto Rico. The scope of the project remains the same and the alignment has not had any significant changes; however, the area of potential effect area was reduced.

On the previous consultation, according to PRHTA, the U.S. Fish and Wildlife Service's (Service) Information for Planning and Consultation (IPaC) system identified the proposed project (04EC1000-2021-E-00315) lies within the range of Puerto Rican boa (*Chilabothrus inornatus*), Puerto Rican nighjar (*Antrostomus noctitherus*), Puerto Rican yellow-shouldered blackbird (*Agelaius xanthomus*) and its critical habitat (CH).

An updated IPaC species list was requested (Project code: 2026-0029830) where the new project footprint lies within the range of one additional threatened species, the plant palo de rosa (*Ottoschulzia rhodoxylon*) and the proposed CH for Puerto Rican skink (*Spondylurus nitidus*). Also, the new impact area falls outside the yellow-shouldered blackbird and its critical habitat.

After the evaluation of the changes in impact area, PRHTA has still determined that the proposed project may affect but is not likely to adversely affect (NLAA) the Puerto Rican boa and Puerto Rican nightjar with the implementation of conservation measures in case an encounter occurs. As for palo de rosa and the proposed CH for the Puerto Rican skink, PRHTA has determined that the proposed project is NLAA these species. As in the previous consultation, the PRHTA will recommend the following best management practices (BMP's) to reduce or avoid impacts to the flora and fauna related to the construction:

- Preparing a protocol for the protection of the Puerto Rican boa (USFWS conservation measures) and implementing it during project construction.
- Carrying out a survey to confirm the absence of the yellow-shouldered blackbird before project construction begins. If this species is seen using project site as habitat, identification and characterization of these areas shall be included. Project construction shall be avoided during the reproductive season of this species.
- Performing additional bird census to determine the presence of migratory bird species that visit project site and other bird species that were not detected during this study.
- Implementing erosion and sedimentation controls during construction phase to avoid or reduce sediment loads to the creeks that exist within project site.
- Reforesting the areas that were impacted by project construction with species that are typical to existing habitat, including species that produce food to wildlife.

We have reviewed the information provided in your letter and our files, and the Service's concurrence with the NLAA determination for the Puerto Rican boa and Puerto Rican nightjar on March 24, 2021, still stands. As for palo de rosa, since the project area has been previously used for agriculture (cattle) and urban development, the Service also concurs with the NLAA for this species with the implementation of the BMPs.

As for the Puerto Rican skink's proposed CH although it overlaps with the project area, there is no need to make an effects determination since it is not yet a final CH. Nonetheless, we encourage the implementation of the habitat management BMP since they are also beneficial for the other species that may occur within the action area. If a skink is detected during the proposed actions, we would appreciate if you could share the information and ideally a photo as well of any skink sightings at your project site.

In view of this, we believe that requirements of section 7 of the Endangered Species Act (Act) have been satisfied. However, obligations under section 7 of the Act must be reconsidered if: (1) new information reveals impact of this identified action that may affect listed species or critical habitat in a manner that was not previously considered; (2) this action is subsequently modified in a manner not previously considered in this assessment; or (3) a new species is listed, or critical habitat determined that may be affected by the identified action.

Thank you for the opportunity to comment on this project. If you have any questions or require additional information, please contact Damaris Román of my staff at (939) 320-3135 or by email at damaris_roman@fws.gov; or contact us via email at caribbean_es@fws.gov or via phone at (786) 244-0081.

Sincerely,

LOURDES MENA

Digitally signed by LOURDES MENA
Date: 2026.04.23 15:30:06 -04'00'

Lourdes Mena
Field Supervisor

DRR

cc:
DNER, San Juan
PRPB, San Juan
Atkins

PUERTO RICO HIGHWAY AND TRANSPORTATION AUTHORITY
PRHTA
GOVERNMENT OF PUERTO RICO

Ms. Lourdes Mena
Field Supervisor
Caribbean Ecological Services Field Office
U.S. Fish and Wildlife Service
Office Park I, Suite 303
State Road #2 Km 156.5
Mayagüez, Puerto Rico 00680

**INFORMAL CONSULTATION UNDER SECTION 7 OF THE ENDANGERED SPECIES ACT**
**ANGEL CASTRO PÉREZ AVENUE (PR-122) EXTENSION PROJECT**
**FROM ROAD PR-321 TO ROAD PR-166**
**MUNICIPALITIES OF SAN GERMAN AND LAJAS, PUERTO RICO**
**AC-012201**

Dear Mrs. Mena:

The Puerto Rico Highway and Transportation Authority (PRHTA), the U.S. Department of Transportation (USDOT), through the Federal Highway Administration (FHWA) and the U.S. Department of Housing and Urban Development (HUD) propose to extend the Angel Castro Perez Avenue (PR-122), from road PR-321 to road PR-166 (San Germán South Bypass), within the boundaries of the municipalities of San Germán and Lajas in the Commonwealth of Puerto Rico. This project intents to complete the Lajas-San Germán Corridor effectiveness by providing better strategic highway network mobility and accessibility for people and freight. The project is approximately 2.7 kilometers long and the vicinity area is shown on Figure 1: Location Map and Figure 2: Aerial Photo included in Appendix 1.

On February 19, 2021, PRHTA, through FHWA, consulted the U.S. Fish and Wildlife Service (FWS) regarding the aforementioned project. Based on a review of the information obtained from the Information for Planning and Consultation System (IPaC) on that date, the proposed project was found to be within the range of the endangered Puerto Rican Boa (*Epicrates inornatus*, now known as *Chilabothrus inornatus*), Puerto Rican nightjar (*Caprimulgus noctitherus*) and the yellow-shouldered blackbird (*Angelaius xanthomus*). Furthermore, the proposed project would impact designated critical habitat for the yellow-shouldered blackbird, an endangered species, in the Municipality of San Germán. The PRHTA proposed implementing the Best Management Practices (BMP's)

and conservation measures provided by the Service prior to and during the road extension to avoid or minimize impacts to the above-mentioned species. Therefore, the PRHTA determined that the project's actions may affect, but are not likely to adversely affect the Puerto Rican nightjar, yellow-shouldered blackbird and the Puerto Rican boa or their critical habitats.

According to the response letter from FWS dated March 24, 2021 (see Appendix 2), they concurred with PRHTA determination's that the "proposed action may affect but is not likely to adversely affect the Puerto Rican nightjar, yellow-shouldered blackbird and the Puerto Rican boa. Although the area is designated as critical habitat for the endangered, yellow-shouldered blackbird, the impacts do not rise to the level of adverse modification of critical habitat. The proposed project will eliminate approximately 14 acres of critical habitat that have been previously used for agriculture (cattle) and urban development. Thus, no adverse impacts to designated critical habitat are anticipated."

As of today, the scope of the project remains the same and the alignment has not had any significant changes (see Appendix 4: Plans and Profile). During the development of the project plans, the area of potential effect area was reduced, thus, an updated IPaC was requested to verify whether the project remained within the area designated as critical habitat for the yellow-shouldered blackbird. With the new project footprint, the potential effect area falls outside the species' critical habitat, as illustrated in Figure 3: Critical Habitat.

However, according to the updated IPaC dated December 22, 2025, included in Appendix 3, the proposed project lies within the range of one additional threatened species and outside the range of the yellow-shouldered blackbird. The new species is the Palo De Rosa (*Ottoschulzia rhodoxylon*). No critical habitat has been designated for this species.

In addition, the updated IPaC alerted about a proposed designation of critical habitat, in whole or in part, within the project area for the Puerto Rican skink (*Spondylurus nitidus*).

It is our promise to preserve all the commitments made previously in the consultation held in 2021, including the implementation of Best Management Practices (BMP's) and conservation measures provided by the Service prior to and during the road extension to avoid or minimize impacts to the above mentioned species.

As in the previous consultation, the PRHTA will recommend the following measures to reduce or avoid impacts to the flora and fauna related to the construction of the Project:

- Preparing a protocol for the protection of the boa de Puerto Rico and implementing it during Project construction.

- Carrying out a survey to confirm the absence of the mariquita before Project construction begins. If this species is using Project site as habitat, identification and characterization of these areas shall be included. Project construction shall be avoided during the reproductive season of this species.
- Performing additional bird census to determine the presence of migratory bird species that visit Project site and other bird species that were not detected during this study.
- Implementing erosion and sedimentation controls during construction phase to avoid or reduce sediment loads to the creeks that exist within Project site.
- Reforesting the areas that were impacted by Project construction with species that are typical to existing habitat, including species that produce food to wildlife.

According to the nature of the project, habitat characteristics, and the implementation of conservation measures, is our determination that the project actions may affect, but are ***Not Likely to Adversely Affect*** the Palo De Rosa (*Ottoschulzia rhodoxylon*), and the Puerto Rican Skink (*Spondylurus nitidus*) or their critical habitats and we request your concurrence with this determination.

If you have any questions or need additional information, please contact me at the telephone number (787) 721-8787, extension 51503.

Sincerely,

Luis E. Rodríguez Rosa

Senior Assistant to the Executive Director

Puerto Rico Highway and Transportation Authority

Enclosures

# Appendix 1: Figures

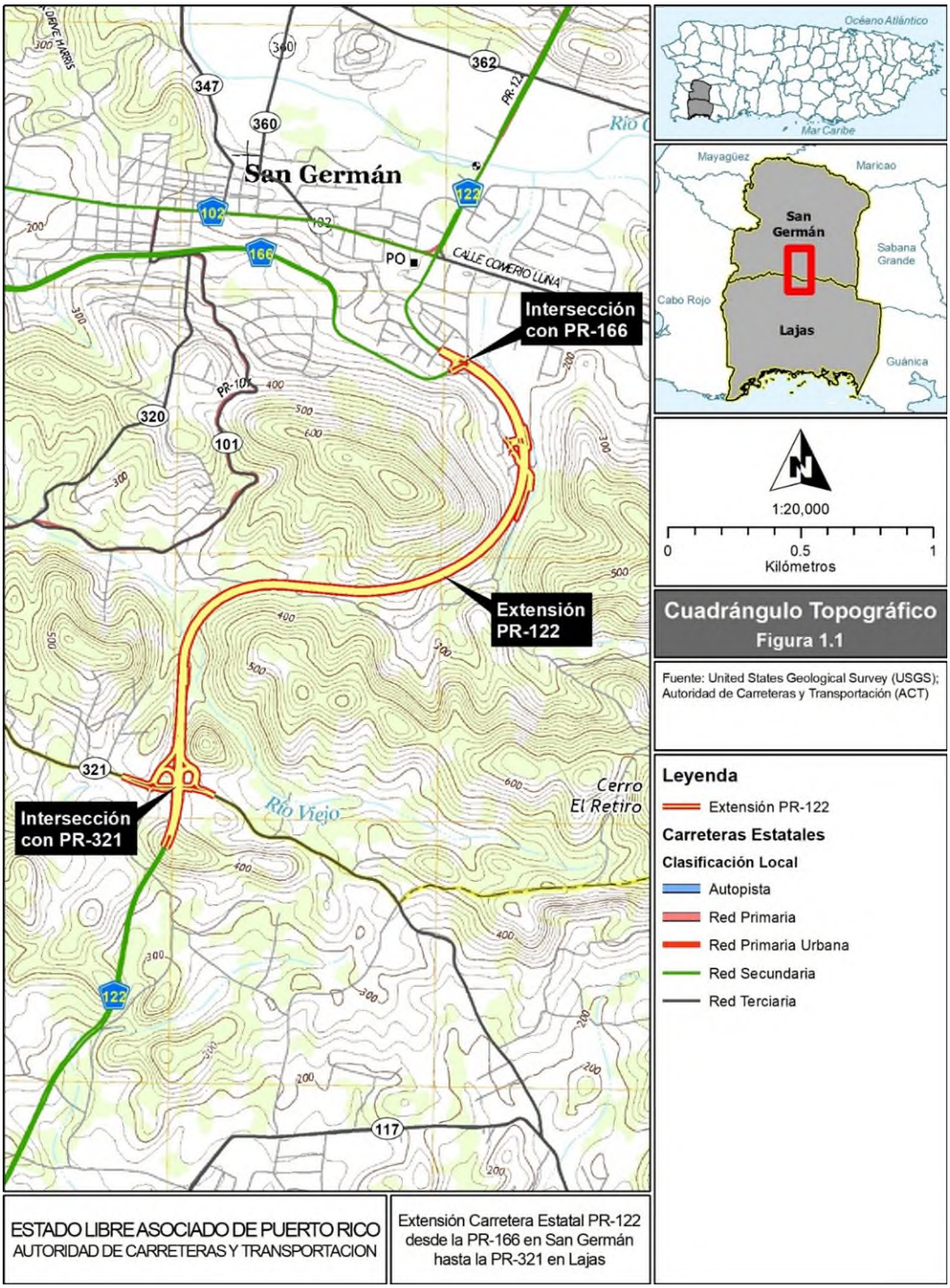



**Figure 1: Location Map**

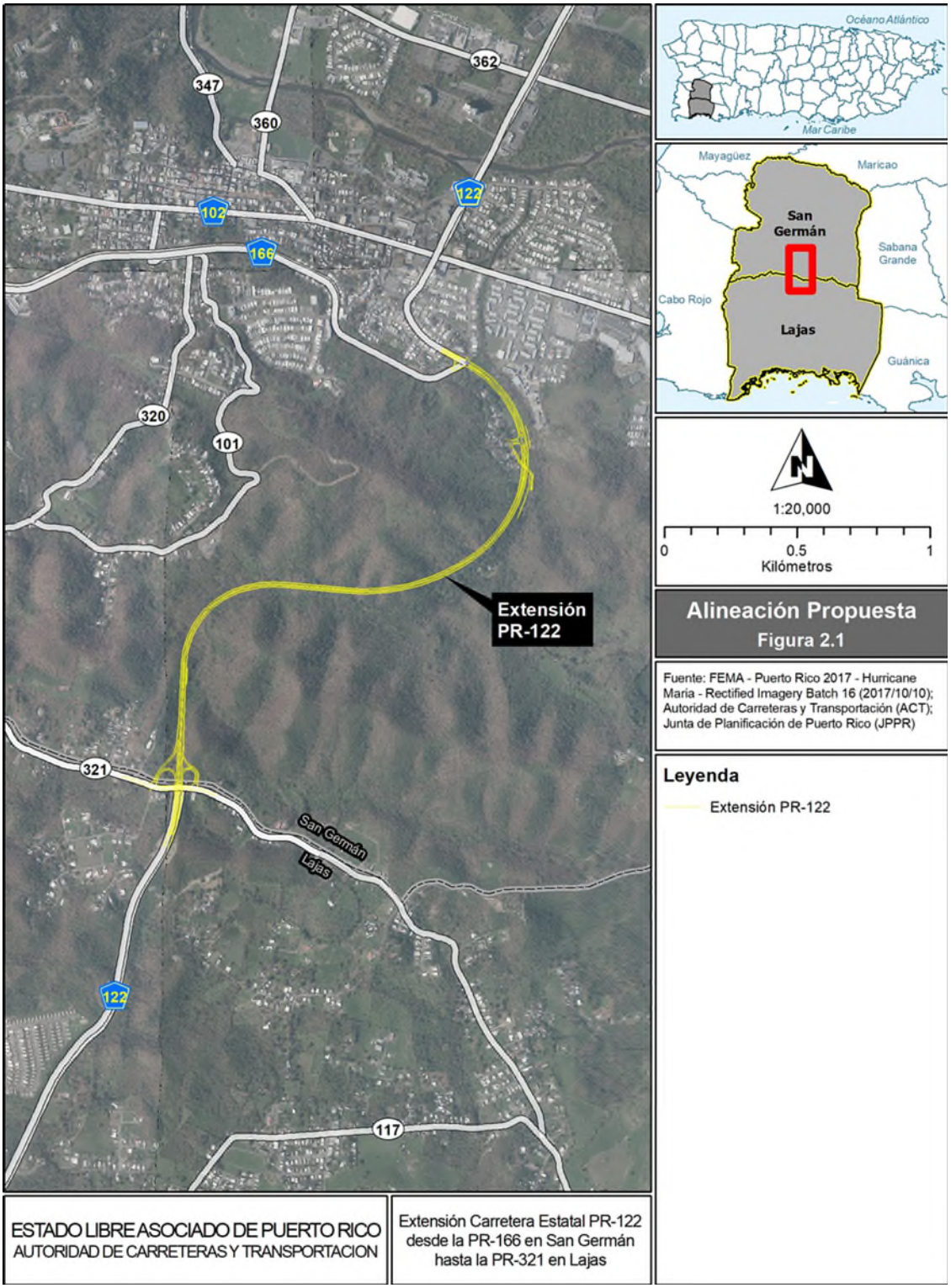



**Figure 2: Aerial Photo**

Figure:

## Critical Habitat for Threatened & Endangered Species

PR-122 Extension Project from PR-321 to PR-166

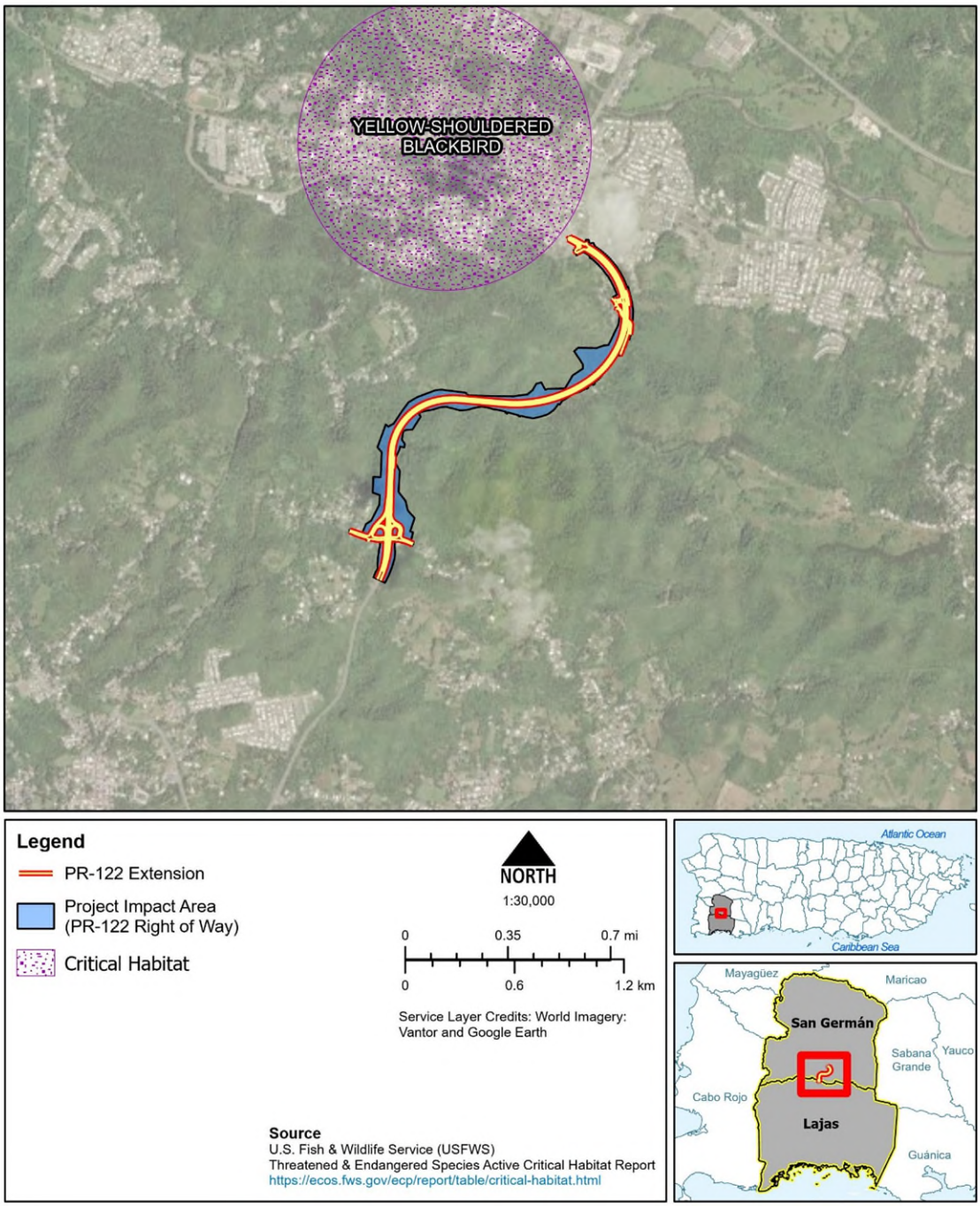



**Figure 3: Critical Habitat**

# Appendix 2: Letter of Concurrence dated March 24, 2021

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Caribbean Ecological Services Field Office
PO Box 491
Boquerón, PR 00622

In Reply Refer to:
FWS/R4/CESFO/MM-141

Luis E. Rodríguez Rosa
Deputy Executive Director
Puerto Rico Highway and Transportation Authority
PO Box 42007
San Juan, Puerto Rico 00940-2007

Re: Extension of State Road PR-122,
from PR-321 to PR-166 (AC012201),
San Germán and Lajas

Dear Mr. Rodríguez Rosa:

Thank you for your letter dated February 19, 2021, requesting comments on the above referenced project. As per your request, our comments are provided under the Endangered Species Act (Act) (87 Stat. 884, as amended; 16 United States Code 1531 et seq.), and the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661 et seq.).

The Puerto Rico Department of Transportation and Public Works (DTPW), through its Puerto Rico Highway and Transportation Authority (PRHTA), proposes to extend the Angel Castro Perez Avenue (PR-122), from road PR-321 to road PR-166 (San German South Bypass), within the boundaries of the municipalities of San German and Lajas, Puerto Rico. The proposed road extension will include the following actions:

- Construction of road segment (2.77 kilometers)
- Construction of a new bridge over PR-321
- Paving
- Installation of pavement markings, drains, utilities, signage and other miscellaneous works.

Based on the review of information provided by PRHTA and obtained from the Information for Planning and Consultation System (IPaC), the proposed project lies within the range of the endangered Puerto Rican boa *(Epicrates inornatus* now known as *Chilabothrus inornatus),* Puerto Rican nightjar (*Caprimulgus noctitherus*) and the yellow-shouldered blackbird (*Agelaius xanthomus*). In addition, according to the PRHTA, the proposed project impacts the designated

critical habitat for the endangered yellow-shouldered blackbird in the municipality of San Germán.

The PRHTA is proposing to implement Best Management Practices (BMP's) and conservation measures provided by the Service prior to and during the road extension to avoid or minimize impacts to the above mentioned species. Therefore, PRHTA determines that the project actions may affect, but are not likely to adversely affect the Puerto Rican nightjar, yellow-shouldered blackbird and the Puerto Rican boa or their critical habitats.

The extension of State road PR-122 from San Germán to Lajas will be impacting areas that have been previously used for agriculture and urban development. However, the project description indicates the construction of a new bridge over a creek that is a tributary to the Viejo River. For any proposed road crossing and bridge, we recommend the use of guidelines for bridge and culvert design found at (https://www.fws.gov/southeast/pdf/guidelines/post-disaster-guidance-for-projects-in-streams-and-waterways-of-puerto-rico.pdf).

According to the information provided, the flora and fauna study for the proposed project area did not detect the present of yellow-shouldered blackbird and Puerto Rican nightjar. However, the Puerto Rican nightjar has been reported in the 5 Year Review of the species (Puerto Rican nightjar or guabairo (*Caprimulgus noctitherus*) 5-Year Review: Summary and Evaluation) in adjacent forested areas of the proposed project. If forested areas will be cleared during Puerto Rican nightjar nesting season (April to July), we recommend experienced and qualified biologists should search for nightjar nests prior to vegetation removal. If nests are found, contact the Service immediately and postpone the activity until the nightjar fledges.

We have reviewed the information provided in your letter and our files, and according to the nature of the project, habitat characteristics, and the implementation conservation measures for the above mentioned species, we concur with your determination that the proposed action may affect, but is not likely to adversely affect the Puerto Rican nightjar, yellow-shouldered blackbird and the Puerto Rican boa. Although the area is designated as critical habitat for the endangered yellow-shouldered blackbird, the impacts do not rise to the level of adverse modification of critical habitat. The proposed project will eliminate approximately 14 acres of critical habitat have been previously used for agriculture (cattle) and urban development. Thus, no adverse impacts to designated critical habitat are anticipated.

However, obligations under section 7 of the Act must be reconsidered if: (1) new information reveals impacts of this identified action that may affect listed species or critical habitat in a manner that was not previously considered; (2) this action is subsequently modified in a manner not previously considered in this assessment; or, (3) a new species is listed or critical habitat determined that may be affected by the identified action.

Thank you for the opportunity to comment on this project. If you have any questions or require

additional information, please contact Marelisa Rivera at marelisa_rivera@fws.gov.

Sincerely,

EDWIN MUNIZ
Digitally signed by EDWIN MUNIZ
Date: 2021.03.24 08:54:29 -04'00'

Edwin E. Muñiz
Field Supervisor

jgm

cc:
DRNA, San Juan
PRPB, San Juan

# Appendix 3: Updated USFWS IPaC Official list dated December 22, 2025

# United States Department of the Interior

FISH AND WILDLIFE SERVICE
Caribbean Ecological Services Field Office
Post Office Box 491
Boqueron, PR 622-0491
Phone: (939) 320-3135 Fax: (787) 851-7440
Email Address: CARIBBEAN_ES@FWS.GOV

In Reply Refer To: 12/22/2025 17:37:47 UTC
Project Code: 2026-0029830
Project Name: PR-122 Lajas San German

Subject: List of threatened and endangered species that may occur in your proposed project location or may be affected by your proposed project

To Whom It May Concern:

***THE FOLLOWING SPECIES LIST IS NOT A SECTION 7 CONSULTATION. PLEASE CONTACT OUR OFFICE TO COMPLETE THE CONSULTATION PROCESS***

The purpose of the Endangered Species Act (Act) is to provide a means whereby threatened, and endangered species and the ecosystems upon which they depend may be conserved. Under sections 7(a)(1) and 7(a)(2) of the Act and its implementing regulations (50 CFR 402 et seq.), Federal agencies are required to utilize their authorities to carry out programs for the conservation of threatened and endangered species and to determine whether projects may affect those species and/or their designated critical habitat.

Federal agencies are required to "request of the Secretary of Interior information whether any species which is listed or proposed to be listed may be present in the area of a proposed action". The enclosed species list provides information to assist with the U.S. Fish and Wildlife Service (Service) consultation process under section 7 of the Act. However, **the enclosed species list does not complete the required consultation process.** The species list identifies threatened, endangered, proposed and candidate species, as well as proposed and designated critical habitats, that may occur within the boundary of your proposed project and/or may be affected by your proposed project. A discussion between the Federal agency and the Service should include what types of listed species may occur in the proposed action area and what effect the proposed action may have on those species. This process initiates informal consultation.

Once a species list is obtained for the proposed project, an effect determination for endangered and threatened species should be made. The applicant could make an effect determination by using available keys on IPaC for specific species. For species with no determination keys, the applicant should request concurrence from the Service by sending a project package

to caribbean_es@fws.gov. To obtain guidance for completing this process and the minimum requirements for project packages, please visit:

https://www.fws.gov/sites/default/files/documents/consultation-under-section-7-of-the-endangered-species-act-with-the-caribbean-ecological%20Services-field-office-template-letter.pdf

When a federal agency, after discussions with the Service, determines that the proposed action is not likely to adversely affect any listed species, or adversely modify any designated critical habitat, and the Service concurs, the informal consultation is complete, and the proposed project moves ahead. If the proposed action is suspected to affect a listed species or modify designated critical habitat, the Federal agency may then prepare a Biological Assessment (B.A.) to assist in its determination of the project's effects on species and their habitat. However, a B.A. is required for construction projects (or other undertakings having similar physical impacts) that are major Federal actions significantly affecting the quality of the human environment as defined in the National Environmental Policy Act (42 U.S.C. 4332(2) (c)). For projects other than major construction activities, the Service suggests that a biological evaluation similar to a B.A. where the agency provides the Service with an evaluation on the likely effects of the action to determine whether the project may affect listed or proposed species and/or designated or proposed critical habitat. Recommended contents of a B.A. are described at 50 CFR 402.12.

If a federal agency determines, based on its B.A. or biological evaluation, that listed species and/or designated critical habitat may be affected by the proposed project, the agency is required to further consult with the Service pursuant to 50 CFR 402. In addition, the Service recommends that candidate species, proposed species, and proposed critical habitat be addressed within the consultation process. More information on the regulations and procedures for section 7 consultation, including the role of permit or license applicants, can be found in the "Endangered Species Consultation Handbook" at:

https://www.fws.gov/sites/default/files/documents/endangered-species-consultation-handbook.pdf

New information based on updated surveys, changes in the abundance and distribution of species, changed habitat conditions, or other factors could change this list. Please feel free to contact us if you need more current information or assistance regarding the potential impacts to federally proposed, listed, and candidate species.

This list is provided pursuant to Section 7 of the Endangered Species Act and fulfills the requirement for Federal agencies to "request of the Secretary of the Interior information whether any species which is listed or proposed to be listed may be present in the area of a proposed action". Please use this list to determine whether your project requires consultation and to make your effects determination. For more guidance, use the Guideline for Consultation under Section 7 of the Endangered Species Act with the Caribbean Ecological Services Field Office by clicking here.

This species list is provided by:

Caribbean Ecological Services Field Office
caribbean_es@fws.gov
Post Office Box 491
Boqueron, PR 00622-0491
(786) 244-0081

Attachment(s):

- Official Species List
- USFWS National Wildlife Refuges and Fish Hatcheries
- Bald & Golden Eagles
- Migratory Birds
- Wetlands

# OFFICIAL SPECIES LIST

This list is provided pursuant to Section 7 of the Endangered Species Act, and fulfills the requirement for Federal agencies to "request of the Secretary of the Interior information whether any species which is listed or proposed to be listed may be present in the area of a proposed action".

This species list is provided by:

**Caribbean Ecological Services Field Office**
Post Office Box 491
Boqueron, PR 622-0491
(939) 320-3135

# PROJECT SUMMARY

Project Code: 2026-0029830
Project Name: PR-122 Lajas San German
Project Type: Road/Hwy - New Construction
Project Description: Lista fechada Diciembre 22, 2025
Project Location:

The approximate location of the project can be viewed in Google Maps: https://www.google.com/maps/@18.06819535,-67.03700971334014,14z




Counties: Lajas and San Germán counties, Puerto Rico

# ENDANGERED SPECIES ACT SPECIES

There is a total of 3 threatened, endangered, or candidate species on this species list.

Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species.

IPaC does not display listed species or critical habitats under the sole jurisdiction of NOAA Fisheries[1], as USFWS does not have the authority to speak on behalf of NOAA and the Department of Commerce.

See the "Critical habitats" section below for those critical habitats that lie wholly or partially within your project area under this office's jurisdiction. Please contact the designated FWS office if you have questions.

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1. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

## BIRDS

| NAME | STATUS |
|---|---|
| Puerto Rican Nightjar *Antrostomus noctitherus* | Endangered |

No critical habitat has been designated for this species.
Species profile: https://ecos.fws.gov/ecp/species/6972

## REPTILES

| NAME | STATUS |
|---|---|
| Puerto Rican Boa *Chilabothrus inornatus* | Endangered |

No critical habitat has been designated for this species.
Species profile: https://ecos.fws.gov/ecp/species/6628
General project design guidelines:
https://ipac.ecosphere.fws.gov/project/F2RSVECGBVCHTI3QOZU6UNFCIQ/documents/generated/7159.pdf

## FLOWERING PLANTS

| NAME | STATUS |
|---|---|
| Palo De Rosa *Ottoschulzia rhodoxylon* | Threatened |

No critical habitat has been designated for this species.
Species profile: https://ecos.fws.gov/ecp/species/5741

## CRITICAL HABITATS

There is 1 critical habitat wholly or partially within your project area under this office's jurisdiction.

| NAME | STATUS |
|---|---|
| Puerto Rican Skink *Spondylurus nitidus* | Proposed |

For information on why this critical habitat appears for your project, even though Puerto Rican Skink is not on the list of potentially affected species at this location, contact the local field office.

# USFWS NATIONAL WILDLIFE REFUGE LANDS AND FISH HATCHERIES

Any activity proposed on lands managed by the National Wildlife Refuge system must undergo a 'Compatibility Determination' conducted by the Refuge. Please contact the individual Refuges to discuss any questions or concerns.

THERE ARE NO REFUGE LANDS OR FISH HATCHERIES WITHIN YOUR PROJECT AREA.

# BALD & GOLDEN EAGLES

Bald and Golden Eagles are protected under the Bald and Golden Eagle Protection Act [2] and the Migratory Bird Treaty Act (MBTA) [1]. Any person or organization who plans or conducts activities that may result in impacts to Bald or Golden Eagles, or their habitats, should follow appropriate regulations and consider implementing appropriate avoidance and minimization measures, as described in the various links on this page.

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1. The Bald and Golden Eagle Protection Act of 1940.
2. The Migratory Birds Treaty Act of 1918.
3. 50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)

Bald and Golden Eagles are protected under the Bald and Golden Eagle Protection Act and the Migratory Bird Treaty Act (MBTA). Any person or organization who plans or conducts activities that may result in impacts to Bald or Golden Eagles, or their nests, should follow appropriate regulations and implement required avoidance and minimization measures, as described in the various links on this page.

The data in this location indicates that no eagles have been observed in this area. This does not mean eagles are not present in your project area, especially if the area is difficult to survey. Please review the 'Steps to Take When No Results Are Returned' section of the Supplemental Information on Migratory Birds and Eagles document to determine if your project is in a poorly surveyed area. If it is, you may need to rely on other resources to determine if eagles may be present (e.g. your local FWS field office, state surveys, your own surveys).

Any person or organization who plans or conducts activities that may result in impacts to bald or golden eagles, or their habitats, should follow appropriate regulations and consider implementing appropriate conservation measures, as described in the links below. Specifically, please review the "Supplemental Information on Migratory Birds and Eagles".

# MIGRATORY BIRDS

The Migratory Bird Treaty Act (MBTA) [1] prohibits the take (including killing, capturing, selling, trading, and transport) of protected migratory bird species without prior authorization by the Department of Interior U.S. Fish and Wildlife Service (Service).

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1. The Migratory Birds Treaty Act of 1918.
2. The Bald and Golden Eagle Protection Act of 1940.
3. 50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)

THERE ARE NO FWS MIGRATORY BIRDS OF CONCERN WITHIN THE VICINITY OF YOUR PROJECT AREA.

# WETLANDS

Impacts to NWI wetlands and other aquatic habitats may be subject to regulation under Section 404 of the Clean Water Act, or other State/Federal statutes.

For more information please contact the Regulatory Program of the local U.S. Army Corps of Engineers District.

Please note that the NWI data being shown may be out of date. We are currently working to update our NWI data set. We recommend you verify these results with a site visit to determine the actual extent of wetlands on site.

RIVERINE

- R4SBC

## IPAC USER CONTACT INFORMATION

Agency: Private Entity
Name: Yazmin Acevedo
Address: Perseo St. 554 Cond. Iberia Suite J-3
Address Line 2: Altamira
City: San Juan
State: PR
Zip: 00920
Email yacevedo@byaea.com
Phone: 7877830290

## LEAD AGENCY CONTACT INFORMATION

Lead Agency: Autoridad de Carreteras y Transportación

GOVERNMENT OF PUERTO RICO
Puerto Rico Highway and Transportation Authority

February 19, 2021

Mr. Edwin E. Muñiz
Field Supervisor
United States Fish and Wildlife Service
Caribbean Ecological Services Field Office
PO Box 491
Boquerón, Puerto Rico 00622

**INFORMAL CONSULTATION UNDER SECTION 7 OF THE ENDANGERED SPECIES ACT**
**ANGEL CASTRO PÉREZ AVENUE (PR-122) EXTENSION PROJECT**
**FROM ROAD PR-321 TO ROAD PR-166**
**MUNICIPALITIES OF SAN GERMÁN AND LAJAS, PUERTO RICO**
**AC-012201/ ZP -122(5)**

Dear Mr. Muñiz:

The Puerto Rico Department of Transportation and Public Works (PRDTPW) through the Puerto Rico Highway and Transportation Authority (PRHTA), propose to extend the Angel Castro Pérez Avenue (PR-122), from road PR-321 to road PR-166 (San Germán South Bypass), within the boundaries of the municipalities of San Germán and Lajas, Puerto Rico. This project intents to complete the Lajas-San Germán Corridor effectiveness by providing better strategic highway network mobility and accessibility for people and freight. The project is approximately 2.7 kilometers long and the vicinity area is shown on **Figure 1:** Location Map and **Figure 2:** Aerial Photo.

The purpose of the proposed PR-122 Extension Project is to improve the mobility and connectivity in the project study area. The proposed Project will provide a direct link between road PR-2 in the Municipality of San Germán and the Municipality of Lajas and its tourist area. The extension of road PR-122 will provide an alternative route to PR-101, enhancing regional travel options and safety while protects the environment and promotes the economic development of the region. It would provide additional capacity in the project area.

The extension of road PR-122 from San Germán to Lajas will be designed to meet the requirements of a Design Class Code R-5, in accordance with the PRHTA's Design Manual. This section consists of four lanes of 3.65 meter wide each and will be divided by a concrete barrier or a central island, depending on the corresponding area, as illustrated in **Figure 3:** Typical Sections.

With the new construction of the proposed road extension, a wetland area related to an unnamed creek could be affected. Currently a Preliminary Jurisdictional Determination (JD) study is been evaluated to determine the potential impacts and mitigations that would apply.

The selected alternative proposes 0.51 kilometers of bridges over the road PR-321 at the beginning of the project and an approximate length of 2.77 kilometers.

The proposed project consists of the following elements:

1. Construction of road segment (2.77 kilometers)
2. Construction of a new bridge over PR-321
3. Paving
4. Installation of pavement markings, drains, utilities, signage and other miscellaneous works.

Refer to the attached drawings (plans and profiles) for location and structural details included in **Appendix A.**

Pursuant to Section 7 of the Endangered Species Act, the USFWS IPaC website was used to obtain an Official Species list identifying federally protected species which could occur within the environmental study area, and to make an anticipated Effects Determination for each species (attached). The USFWS IPaC Official lists, included in **Appendix B**, identify the following species as potentially affected by activities within the project area: Puerto Rican Boa (*Epicrates inornatus*), Puerto Rican Nightjar (*Caprimulgus noctitherus*), and Yellow-shouldered Blackbird (*Agelaius xanthomus*). There are final critical habitats designated for the Yellow-shouldered Blackbird (*Agelaius xanthomus*). The project location overlaps the critical habitat designated for this species. No critical habitat has been designated for the Puerto Rican Boa Epicrates inornatus and the Puerto Rican Nightjar Caprimulgus noctitherus.

During the Descriptive Study of Flora and Fauna prepared by Coll Rivera Environmental in August 2017 (See **Appendix C**), the Puerto Rican Boa was observed. The northern section of the Project is located within a zone designated as Critical Habitat (CH) for the Yellow-shouldered Blackbird (Mariquita)(*Agelaius xanthomus*), which is federally and locally designated as an endangered species, see Figure 4. However, this species was not observed during field work for this study.

Twelve faunal species endemics for Puerto Rico were observed. Among them, a federally and locally designated endangered species was found. These are:

- Birds:
  - Reina mora (Spindalis portoricensis, endemic),
  - Pájaro bobo mayor (Saurothera vieilloti, endemic),
  - Pájaro carpintero (Melanerpes portoricensis, endemic),
  - Come ñame de Puerto Rico (Loxigilla portoricensis, endemic),
  - San Pedrito (Todus mexicanus, endemic),
  - Juí de Puerto Rico (Myiarchus antillarum, endemic),
  - Bien te veo de Puerto Rico (Vireo latimeri, endemic),
  - Mucarito de Puerto Rico (Megascops nudipes, endemic), + Amphibians,
  - Coquí común (Eleutherodactylus caqui, endemic),
  - Coquí churí (Eleutherodactylus antillensis, endemic).
- Reptiles:
  - Boa de Puerto Rico (Chilabothrus inornatus, federally and locally designated as an endangered species).
- Arachnids
  - Araña peluda de Puerto Rico (Cyrthopolis portoricae, endemic).

In addition, the paloma cabeciblanca (*Patagioenas leucocephala*) was observed flying over the southern section (near Lajas) of Project site. This species is designated as a critical element by the Department of Natural and Environmental Resources (DNER). The DNER designated this species as a "critical element" due to a reduction of its populations and it is becoming scarce as a result of habitat loss, furtive hunting, and the introduction of predators. The DNER designates a species as a "critical element" when these conditions occur and their observations on the field diminish. The category "Deficiency of Data" has being assigned to this species due to a lack of information to estimate its current population.

To avoid or minimize any adverse impacts on the Puerto Rican boa, the following conservation measures would be implemented:

1. Inform all project personnel about the potential presence of the PR boa in areas where the proposed work will be conducted. A pre-construction meeting should be conducted to inform all project personnel about the need to avoid harming the species as well as penalties for harassing or harming PR boas. An educational poster or sign with photo or illustration of the species should be displayed at the project site.
2. Prior to any construction activity, including removal of vegetation and earth movements, the boundaries of the project and areas to be excluded and protected should be clearly marked in the project plan and in the field in order to avoid further habitat degradation into forested and conservation areas.
3. Once areas are clearly marked, and prior to the use of heavy machinery and any construction activity (including removal of vegetation and earth movement), a biologist or personnel with experience on this species should survey the areas to be cleared to verify the presence of any PR boa within the work area.
4. Once the area has been searched for PR boas, vegetation should first be cleared by hand to the maximum extent possible. Vegetation should be cut about one meter above ground prior to the use of heavy machinery for land clearing. Cutting vegetation by hand will allow boas present on site to move away on their own to adjacent available habitat. Any stone walls or naturally occurring rock piles must be carefully dismantled by hand as these are refuges for the snake. This will allow any boas present to vacate the site without injury. All personnel involved in site clearing must be informed of the potential presence of the snake, and the importance of protecting the snakes.
5. Before activities commence each workday during the vegetation clearing phase, the experienced personal in identifying and searching for boas should survey the areas to be cleared that day, to ensure that no boas are present or affected within the work area. If boas are found within the working area, activities should stop at the area where the boas are found until the boas move out of the area on their own. Activities at other work sites, where no boas have been found after surveying the area, may continue. If relocation of the species is necessary, any relocated boas should be transferred by authorized personnel of the Department of Natural and Environmental Resources (DNER) to appropriate habitat close to the project site. Any findings should be reported to the Service and to the DNER Ranger office so they can further assist you in

developing sound conservation measures and specific recommendations to avoid, minimize and/or compensate for any impacts to this species.

6. Strict measures should be established to minimize boa casualties by motor vehicles or other equipment. Before operating or moving equipment and vehicles in staging areas near potential boa habitats (within 25 meters of potential boa habitat), these should be thoroughly inspected to ensure that no boas are lodged in the standing equipment or vehicles. If boas are found within vehicles or equipment, authorized personnel of DNER must be notified immediately for proper handling and relocation. Any relocated boas should be transferred to appropriate habitat close to the project site.

7. For all boa sightings (dead or alive), record the time and date of the sighting and the specific location where it was found. PR boa data should also include a photo of the animal (dead or alive) relocation site GPS coordinates, the time and date of the relocation, and comments on how the animal was detected and its behavior.

8. If a PR boa is found within any of the working or construction areas, activities should stop at that area and information recorded (see #7). Do not capture the boa. If boas need to be moved out of harm's way, designated personnel shall immediately contact the Puerto Rico Department of Natural and Environmental Resources (PRDNER) Rangers for safe capture and relocation of the animal (PRDNER phone #s: 787-724-5700, 787-230-5550, 787-771-1124). If immediate relocation is not an option, project-related activities at this area must stop until the boa moves out of harm's way on its own. Activities at other work sites, where no boas have been found after surveying the area, may continue.

9. If a PR boa is captured by the PRDNER, record the name of the PRDNER staff and information on where the PR boa will be taken. This information should be reported to the Service.

10. Measures should be taken to avoid and minimize PR boa casualties by heavy machinery or motor vehicles being used on site. Any heavy machinery left on site (staging) or near potential PR boa habitat (within 50 meters of potential boa habitat), needs to be thoroughly inspected each morning before work starts to ensure that no boas have sheltered within engine compartments or other areas of the equipment. If PR boas are found within vehicles or equipment, do not capture the animal and let it move on its own or call PRDNER Rangers for safe capture and relocation of the animal (see #8). If not possible, the animal should be left alone until it leaves the vehicle on its own.

11. PR boas may seek shelter in debris piles. Measures should be taken to avoid and minimize boa casualties associated with sheltering in debris piles as a result of project activities. Debris piles should be placed far away from forested areas. Prior to moving, disposing or shredding, debris piles should be carefully inspected for the presence of boas. If debris piles will be left on site, we recommend they be placed in areas that will not be disturbed in the future.

12. If a dead PR boa is found, immediately cease all work in that area and record the information accordingly (see #7). If the PR boa was accidentally killed as part of the project actions, please include information on what conservation measures had been implemented and what actions that will be taken to avoid further killings. A dead boa report should be sent by email (see contacts below) to the Service within 48 hours of the event.

13. Projects must comply with all state laws and regulations. Please contact the PRDNER for further guidance.

    If you have any questions regarding the above conservation measures, please contact the Service:

    - Marelisa Rivera, Deputy Field Supervisor
        - Email: marelisa_rivera@fws.gov
        - Office phone 787-851-7297 ext. 206 or mobile 787-510-5219
    - José Cruz-Burgos, Endangered Species Coordinator
        - Email: jose_cruz-burgos@fws.gov
        - Office phone 787-851-7297 ext. 218 or mobile 787-510-5206

Copy of the conservation measures for the Puerto Rican boa are included in **Appendix D.**

To reduce or avoid impacts to the flora and fauna related to the construction of the Project, we recommend the following measures:

- Implementing a protocol for the protection of the boa de Puerto Rico during construction phase.
- Carrying out a survey to confirm the absence of the Yellow-shouldered Blackbird (Mariquita)(*Agelaius xanthomus*) before project construction begins. If this species is using project site as habitat, identification and characterization of these areas shall be included. Project construction shall be avoided during the reproductive season of this species.
- Implementing erosion and sedimentation controls during construction phase to avoid or reduce sediment loads to the creeks that exist within Project site.
- Reforesting the areas that were impacted by Project construction with species that are typical to existing habitat, including species that produce food to wildlife.

According to the nature of the project, habitat characteristics, and the implementation conservation measures for the species, we understand that the project qualifies under the determination of may affect, but not likely to adversely affect any federally listed species or their critical habitats and request your concurrence with this determination.

If you have any questions or need additional information, please contact with the Adm. Natalie Quiles Llanes from our Environmental Studies Office at the telephone number 787-721-8787, extension 1557.

Cordially,

Luis E. Rodríguez Rosa
Deputy Executive Director

6704/LER/NQLl/opc

Enclosures

# United States Department of the Interior

FISH AND WILDLIFE SERVICE
Caribbean Ecological Services Field Office
Post Office Box 491
Boqueron, PR 00622-0491
Phone: (787) 851-7297 Fax: (787) 851-7440
http://www.fws.gov/caribbean/es

In Reply Refer To: January 22, 2021
Consultation Code: 04EC1000-2021-SLI-0218
Event Code: 04EC1000-2021-E-00315
Project Name: Extension PR-122

Subject: List of threatened and endangered species that may occur in your proposed project location or may be affected by your proposed project

To Whom It May Concern:

***THE FOLLOWING SPECIES LIST IS NOT A SECTION 7 CONSULTATION. PLEASE CONTACT OUR OFFICE TO COMPLETE THE CONSULTATION PROCESS***

The purpose of the Endangered Species Act (Act) is to provide a means whereby threatened and endangered species and the ecosystems upon which they depend may be conserved. Under sections 7(a)(1) and 7(a)(2) of the Act and its implementing regulations (50 CFR 402 et seq.), Federal agencies are required to utilize their authorities to carry out programs for the conservation of threatened and endangered species and to determine whether projects may affect those species and/or their designated critical habitat.

Federal agencies are required to "request of the Secretary of Interior information whether any species which is listed or proposed to be listed may be present in the area of a proposed action". The enclosed species list provides information to assist with the consultation process with the U.S. Fish and Wildlife Service (Service) under section 7 of the Act. However, the enclosed species list **does not complete the required consultation process**. The species list identifies threatened, endangered, proposed and candidate species, as well as proposed and designated critical habitats, that may occur within the boundary of your proposed project and/or may be affected by your proposed project.

A discussion between the Federal agency and the Service should include what types of listed species may occur in the proposed action area, and what effect the proposed action may have on those species. This process initiates informal consultation.

When a Federal agency, after discussions with the Service, determines that the proposed action is not likely to adversely affect any listed species, or adversely modify any designated critical habitat, and the Service concurs, the informal consultation is complete and the proposed project

moves ahead. If the proposed action is suspected to affect a listed species or modify designated critical habitat, the Federal agency may then prepare a Biological Assessment (BA) to assist in its determination of the project's effects on species and their habitat.

However, a BA is required for construction projects (or other undertakings having similar physical impacts) that are major Federal actions significantly affecting the quality of the human environment as defined in the National Environmental Policy Act (42 U.S.C. 4332(2) (c)). For projects other than major construction activities, the Service suggests that a biological evaluation similar to a BA where the agency provides the Service with an evaluation on the likely effects of the action to determine whether the project may affect listed or proposed species and/or designated or proposed critical habitat. Recommended contents of a BA are described at 50 CFR 402.12.

If a Federal agency determines, based on its BA or biological evaluation, that listed species and/or designated critical habitat may be affected by the proposed project, the agency is required to further consult with the Service pursuant to 50 CFR 402. In addition, the Service recommends that candidate species, proposed species, and proposed critical habitat be addressed within the consultation process.

More information on the regulations and procedures for section 7 consultation, including the role of permit or license applicants, can be found in the "Endangered Species Consultation Handbook" at:

http://www.fws.gov/endangered/esa-library/pdf/TOC-GLOS.PDF

New information based on updated surveys, changes in the abundance and distribution of species, changed habitat conditions, or other factors could change this list. Please feel free to contact us if you need more current information or assistance regarding the potential impacts to federally proposed, listed, and candidate species and federally designated and proposed critical habitat. Please note that under 50 CFR 402.12(e) of the regulations implementing section 7 of the Act, the accuracy of this species list should be verified after 90 days. This verification can be completed formally or informally as desired. The Service recommends that verification be completed by visiting the ECOS-IPaC website at regular intervals during project planning and implementation for updates to species lists and information. An updated list may be requested through the ECOS-IPaC system by completing the same process used to receive the enclosed list.

Additionally, wind energy projects should follow the wind energy guidelines (http://www.fws.gov/windenergy/) for minimizing impacts to migratory birds and bats.

Guidance for minimizing impacts to migratory birds for projects including communications towers (e.g., cellular, digital television, radio, and emergency broadcast) can be found at:

http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/towers.htm; http://www.towerkill.com; and http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/comtow.html.

We appreciate your concern for threatened and endangered species. The Service encourages Federal agencies to include conservation of threatened and endangered species into their project planning to further the purposes of the Act. Please include the Consultation Tracking Number in

the header of this letter with any request for consultation or correspondence about your project that you submit to our office.

**For more information:**

**U.S. Fish and Wildlife Service**

**Caribbean Ecological Services Field Office**

**Road 301, Km. 5.1 / Bo. Corozo**

**Boquerón, PR 00622**

**Telephone: (787) 851-7297**

**Fax: (787) 851-7440**

**Email: caribbean_es@fws.gov**

**http://www.fws.gov/caribbean/es**

**Send all documents to:**

**U.S. Fish and Wildlife Service**

**P.O. Box 491**

**Boquerón, Puerto Rico 00622**

Attachment(s):

- Official Species List
- USFWS National Wildlife Refuges and Fish Hatcheries
- Migratory Birds
- Wetlands

# Official Species List

This list is provided pursuant to Section 7 of the Endangered Species Act, and fulfills the requirement for Federal agencies to "request of the Secretary of the Interior information whether any species which is listed or proposed to be listed may be present in the area of a proposed action".

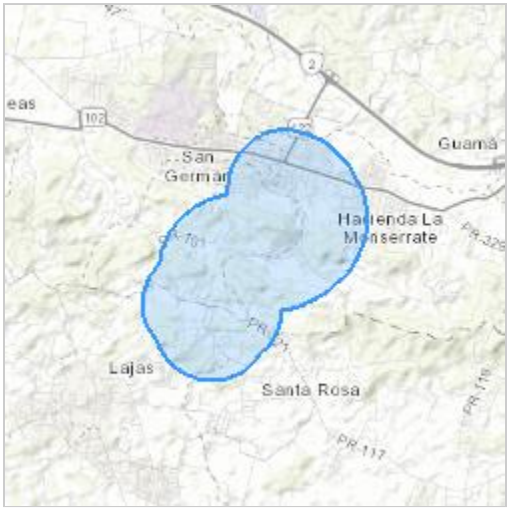
This species list is provided by:

**Caribbean Ecological Services Field Office**
Post Office Box 491
Boqueron, PR 00622-0491
(787) 851-7297

# Project Summary

Consultation Code: 04EC1000-2021-SLI-0218
Event Code: 04EC1000-2021-E-00315
Project Name: Extension PR-122
Project Type: TRANSPORTATION
Project Description: PR-122 Extension from PR-321 to PR-166
Project Location:

Approximate location of the project can be viewed in Google Maps: https://www.google.com/maps/@18.06823335,-67.03814794620322,14z




Counties: Lajas and San Germán counties, Puerto Rico

# Endangered Species Act Species

There is a total of 3 threatened, endangered, or candidate species on this species list.

Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species.

IPaC does not display listed species or critical habitats under the sole jurisdiction of NOAA Fisheries[1], as USFWS does not have the authority to speak on behalf of NOAA and the Department of Commerce.

See the "Critical habitats" section below for those critical habitats that lie wholly or partially within your project area under this office's jurisdiction. Please contact the designated FWS office if you have questions.

---

1. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

## Birds

| NAME | STATUS |
|---|---|
| Puerto Rican Nightjar *Caprimulgus noctitherus*<br>No critical habitat has been designated for this species.<br>Species profile: https://ecos.fws.gov/ecp/species/6972 | Endangered |
| Yellow-shouldered Blackbird *Agelaius xanthomus*<br>There is **final** critical habitat for this species. Your location overlaps the critical habitat.<br>Species profile: https://ecos.fws.gov/ecp/species/7383 | Endangered |

## Reptiles

| NAME | STATUS |
|---|---|
| Puerto Rican Boa *Epicrates inornatus*<br>No critical habitat has been designated for this species.<br>Species profile: https://ecos.fws.gov/ecp/species/6628<br>General project design guidelines:<br>https://ecos.fws.gov/docs/tess/ipac_project_design_guidelines/doc6757.pdf | Endangered |

## Critical habitats

There is 1 critical habitat wholly or partially within your project area under this office's jurisdiction.

| NAME | STATUS |
|---|---|
| Yellow-shouldered Blackbird *Agelaius xanthomus*<br>https://ecos.fws.gov/ecp/species/7383#crithab | Final |

# USFWS National Wildlife Refuge Lands And Fish Hatcheries

Any activity proposed on lands managed by the National Wildlife Refuge system must undergo a 'Compatibility Determination' conducted by the Refuge. Please contact the individual Refuges to discuss any questions or concerns.

THERE ARE NO REFUGE LANDS OR FISH HATCHERIES WITHIN YOUR PROJECT AREA.

# Migratory Birds

Certain birds are protected under the Migratory Bird Treaty Act[1] and the Bald and Golden Eagle Protection Act[2].

Any person or organization who plans or conducts activities that may result in impacts to migratory birds, eagles, and their habitats should follow appropriate regulations and consider implementing appropriate conservation measures, as described below.

---

1. The Migratory Birds Treaty Act of 1918.
2. The Bald and Golden Eagle Protection Act of 1940.
3. 50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)

THERE ARE NO FWS MIGRATORY BIRDS OF CONCERN WITHIN THE VICINITY OF YOUR PROJECT AREA.

## Migratory Birds FAQ

**Tell me more about conservation measures I can implement to avoid or minimize impacts to migratory birds.**

Nationwide Conservation Measures describes measures that can help avoid and minimize impacts to all birds at any location year round. Implementation of these measures is particularly important when birds are most likely to occur in the project area. When birds may be breeding in the area, identifying the locations of any active nests and avoiding their destruction is a very helpful impact minimization measure. To see when birds are most likely to occur and be breeding in your project area, view the Probability of Presence Summary. Additional measures or permits may be advisable depending on the type of activity you are conducting and the type of infrastructure or bird species present on your project site.

**What does IPaC use to generate the migratory birds potentially occurring in my specified location?**

The Migratory Bird Resource List is comprised of USFWS Birds of Conservation Concern (BCC) and other species that may warrant special attention in your project location.

The migratory bird list generated for your project is derived from data provided by the Avian Knowledge Network (AKN). The AKN data is based on a growing collection of survey, banding, and citizen science datasets and is queried and filtered to return a list of those birds reported as occurring in the 10km grid cell(s) which your project intersects, and that have been identified as warranting special attention because they are a BCC species in that area, an eagle (Eagle Act requirements may apply), or a species that has a particular vulnerability to offshore activities or development.

Again, the Migratory Bird Resource list includes only a subset of birds that may occur in your project area. It is not representative of all birds that may occur in your project area. To get a list of all birds potentially present in your project area, please visit the AKN Phenology Tool.

**What does IPaC use to generate the probability of presence graphs for the migratory birds potentially occurring in my specified location?**
The probability of presence graphs associated with your migratory bird list are based on data provided by the Avian Knowledge Network (AKN). This data is derived from a growing collection of survey, banding, and citizen science datasets .

Probability of presence data is continuously being updated as new and better information becomes available. To learn more about how the probability of presence graphs are produced and how to interpret them, go the Probability of Presence Summary and then click on the "Tell me about these graphs" link.

**How do I know if a bird is breeding, wintering, migrating or present year-round in my project area?**
To see what part of a particular bird's range your project area falls within (i.e. breeding, wintering, migrating or year-round), you may refer to the following resources: The Cornell Lab of Ornithology All About Birds Bird Guide, or (if you are unsuccessful in locating the bird of interest there), the Cornell Lab of Ornithology Neotropical Birds guide. If a bird on your migratory bird species list has a breeding season associated with it, if that bird does occur in your project area, there may be nests present at some point within the timeframe specified. If "Breeds elsewhere" is indicated, then the bird likely does not breed in your project area.

**What are the levels of concern for migratory birds?**
Migratory birds delivered through IPaC fall into the following distinct categories of concern:

1. "BCC Rangewide" birds are Birds of Conservation Concern (BCC) that are of concern throughout their range anywhere within the USA (including Hawaii, the Pacific Islands, Puerto Rico, and the Virgin Islands);
2. "BCC - BCR" birds are BCCs that are of concern only in particular Bird Conservation Regions (BCRs) in the continental USA; and
3. "Non-BCC - Vulnerable" birds are not BCC species in your project area, but appear on your list either because of the Eagle Act requirements (for eagles) or (for non-eagles) potential susceptibilities in offshore areas from certain types of development or activities (e.g. offshore energy development or longline fishing).

Although it is important to try to avoid and minimize impacts to all birds, efforts should be made, in particular, to avoid and minimize impacts to the birds on this list, especially eagles and BCC species of rangewide concern. For more information on conservation measures you can implement to help avoid and minimize migratory bird impacts and requirements for eagles, please see the FAQs for these topics.

**Details about birds that are potentially affected by offshore projects**
For additional details about the relative occurrence and abundance of both individual bird species and groups of bird species within your project area off the Atlantic Coast, please visit the Northeast Ocean Data Portal. The Portal also offers data and information about other taxa besides birds that may be helpful to you in your project review. Alternately, you may download the bird model results files underlying the portal maps through the NOAA NCCOS Integrative Statistical

Modeling and Predictive Mapping of Marine Bird Distributions and Abundance on the Atlantic Outer Continental Shelf project webpage.

Bird tracking data can also provide additional details about occurrence and habitat use throughout the year, including migration. Models relying on survey data may not include this information. For additional information on marine bird tracking data, see the Diving Bird Study and the nanotag studies or contact Caleb Spiegel or Pam Loring.

**What if I have eagles on my list?**
If your project has the potential to disturb or kill eagles, you may need to obtain a permit to avoid violating the Eagle Act should such impacts occur.

**Proper Interpretation and Use of Your Migratory Bird Report**
The migratory bird list generated is not a list of all birds in your project area, only a subset of birds of priority concern. To learn more about how your list is generated, and see options for identifying what other birds may be in your project area, please see the FAQ "What does IPaC use to generate the migratory birds potentially occurring in my specified location". Please be aware this report provides the "probability of presence" of birds within the 10 km grid cell(s) that overlap your project; not your exact project footprint. On the graphs provided, please also look carefully at the survey effort (indicated by the black vertical bar) and for the existence of the "no data" indicator (a red horizontal bar). A high survey effort is the key component. If the survey effort is high, then the probability of presence score can be viewed as more dependable. In contrast, a low survey effort bar or no data bar means a lack of data and, therefore, a lack of certainty about presence of the species. This list is not perfect; it is simply a starting point for identifying what birds of concern have the potential to be in your project area, when they might be there, and if they might be breeding (which means nests might be present). The list helps you know what to look for to confirm presence, and helps guide you in knowing when to implement conservation measures to avoid or minimize potential impacts from your project activities, should presence be confirmed. To learn more about conservation measures, visit the FAQ "Tell me about conservation measures I can implement to avoid or minimize impacts to migratory birds" at the bottom of your migratory bird trust resources page.

# Wetlands

Impacts to NWI wetlands and other aquatic habitats may be subject to regulation under Section 404 of the Clean Water Act, or other State/Federal statutes.

For more information please contact the Regulatory Program of the local U.S. Army Corps of Engineers District.

Please note that the NWI data being shown may be out of date. We are currently working to update our NWI data set. We recommend you verify these results with a site visit to determine the actual extent of wetlands on site.

FRESHWATER POND

- PUB

RIVERINE

- R4SBC
- R5UBH

# U.S. FISH AND WILDLIFE SERVICE
# CARIBBEAN ECOLOGICAL SERVICES FIELD OFFICE

**Conservation Measures for the Puerto Rican boa (*Chilabothrus inornatus*)**

Section 7 (a)(1) of the Endangered Species Act (ESA) charges Federal agencies to aid in the conservation of listed species, and section 7 (a)(2) requires the agencies, through consultation with the U.S. Fish and Wildlife Service (Service), to ensure their activities are not likely to jeopardize the continued existence of listed species or adversely modify designated critical habitats. Section 7 applies to the management of Federal lands as well as Federal actions that may affect listed species, such as Federal approval of private activities through the issuance of Federal funding, permits, licenses, or other actions. Any person that injures, captures, or kills a Puerto Rico boa is subject to penalties under the ESA. If Federal funds or permits are needed, the funding or permitting agency should initiate Section 7 consultation with the Service. To initiate a consultation under the Section 7 of the ESA, you must submit a project package with the established minimum requirements. These conservation measures should be incorporated into the project plans to minimize possible impacts to the species.

The endangered Puerto Rican (PR) boa (*Chilabothrus inornatus*, formerly *Epicrates inornatus*) is the largest endemic snake species that inhabits Puerto Rico. The PR boa is non-venomous and does not pose any life threatening danger to humans, but some individuals may try to bite if disturbed or during capture or handling. Its body color ranges from tan to dark brown with irregular diffuse marking on the dorsum, but some individuals lack marking and are uniformly dark. Juveniles may have a reddish color with more pronounced markings. In general, as they mature, their body color tends to darken.



Adult PR boa – *Chilabothrus inornatus*
Photo: Puerto Rico by JP Zegarra

**Last Revised: November 2020**

The Puerto Rican boa was federally listed in 1970. Currently, the species has an island-wide distribution and occurs in a wide variety of habitat types ranging from wet montane to subtropical dry forest, and can be found from mature forest to areas with different degrees of human disturbance like roadsides or houses, especially if near their habitat in rural areas. This boa is considered mostly nocturnal, remaining less active, concealed or basking under the sun during the day.

The Service has developed the following conservation measures with the purpose of assisting others to avoid or minimize adverse effects to the PR boa and its habitat. These recommendations may be incorporated into new project plans and under certain circumstances into existing projects. Depending on the project, additional conservation measures can be implemented besides the ones presented in this document.

Conservation Measures:

1. Inform all project personnel about the potential presence of the PR boa in areas where the proposed work will be conducted. A pre-construction meeting should be conducted to inform all project personnel about the need to avoid harming the species as well as penalties for harassing or harming PR boas. An educational poster or sign with photo or illustration of the species should be displayed at the project site.

2. Prior to any construction activity, including removal of vegetation and earth movements, the boundaries of the project and areas to be excluded and protected should be clearly marked in the project plan and in the field in order to avoid further habitat degradation into forested and conservation areas.

3. Once areas are clearly marked, and prior to the use of heavy machinery and any construction activity (including removal of vegetation and earth movement), a biologist or personnel with experience on this species should survey the areas to be cleared to verify the presence of any PR boa within the work area.

4. The PR boa is considered more active at night. Thus, in order to maximize its detection, the species should be searched at nights prior to habitat disturbance.

5. Once the area has been searched for PR boas, vegetation should first be cleared by hand to the maximum extent possible. Vegetation should be cut about one meter above ground prior to the use of heavy machinery for land clearing. Cutting vegetation by hand will allow boas present on site to move away on their own to adjacent available habitat. Any stone walls or naturally occurring rock piles must be carefully dismantled by hand as these are refuges for the snake. This will allow any boas present to vacate the site without injury.

6. For all boa sightings (dead or alive), record the time and date of the sighting and the specific location where it was found. PR boa data should also include a photo of the animal (dead or alive), site GPS coordinates, the time and date, and comments on how the animal was detected and its behavior.

7. If a PR boa is found within any of the working or construction areas, activities should stop at that area and information recorded (see #6). **Do not capture the boa.** If boas need to be moved out of harm's way, designated personnel shall immediately contact the Puerto Rico Department of Natural and Environmental Resources (PRDNER) Rangers for safe capture and relocation of the animal (PRDNER phone #s: 787-724-5700, 787-230-5550, 787-771-1124). If immediate relocation is not an option, project-related activities at this area must stop until the boa moves out of harm's way on its own. Activities at other work sites, where no boas have been found after surveying the area, may continue.

8. If a PR boa is captured by the PRDNER, record the name of the PRDNER staff and information on where the PR boa will be taken. This information should be reported to the Service.

9. Measures should be taken to avoid and minimize PR boa casualties by heavy machinery or motor vehicles being used on site. Any heavy machinery left on site (staging) or near potential PR boa habitat (within 50 meters of potential boa habitat), needs to be thoroughly inspected each morning before work starts to ensure that no boas have sheltered within engine compartments or other areas of the equipment. If PR boas are found within vehicles or equipment, do not capture the animal and let it move on its own or call PRDNER Rangers for safe capture and relocation of the animal (see #7). If not possible, the animal should be left alone until it leaves the vehicle on its own.

10. PR boas may seek shelter in debris piles. Measures should be taken to avoid and minimize boa casualties associated with sheltering in debris piles as a result of project activities. Debris piles should be placed far away from forested areas. Prior to moving, disposing or shredding, debris piles should be carefully inspected for the presence of boas. If debris piles will be left on site, we recommend they be placed in areas that will not be disturbed in the future.

11. If a dead PR boa is found, immediately cease all work in that area and record the information accordingly (see #6). If the PR boa was accidentally? killed as part of the project actions, please include information on what conservation measures had been implemented and what actions that will be taken to avoid further killings. A dead boa report should be sent by email (see contacts below) to the Service within 48 hours of the event.

12. Projects must comply with all state laws and regulations. Please contact the PRDNER for further guidance.

If you have any questions regarding the above conservation measures, please contact the Service:

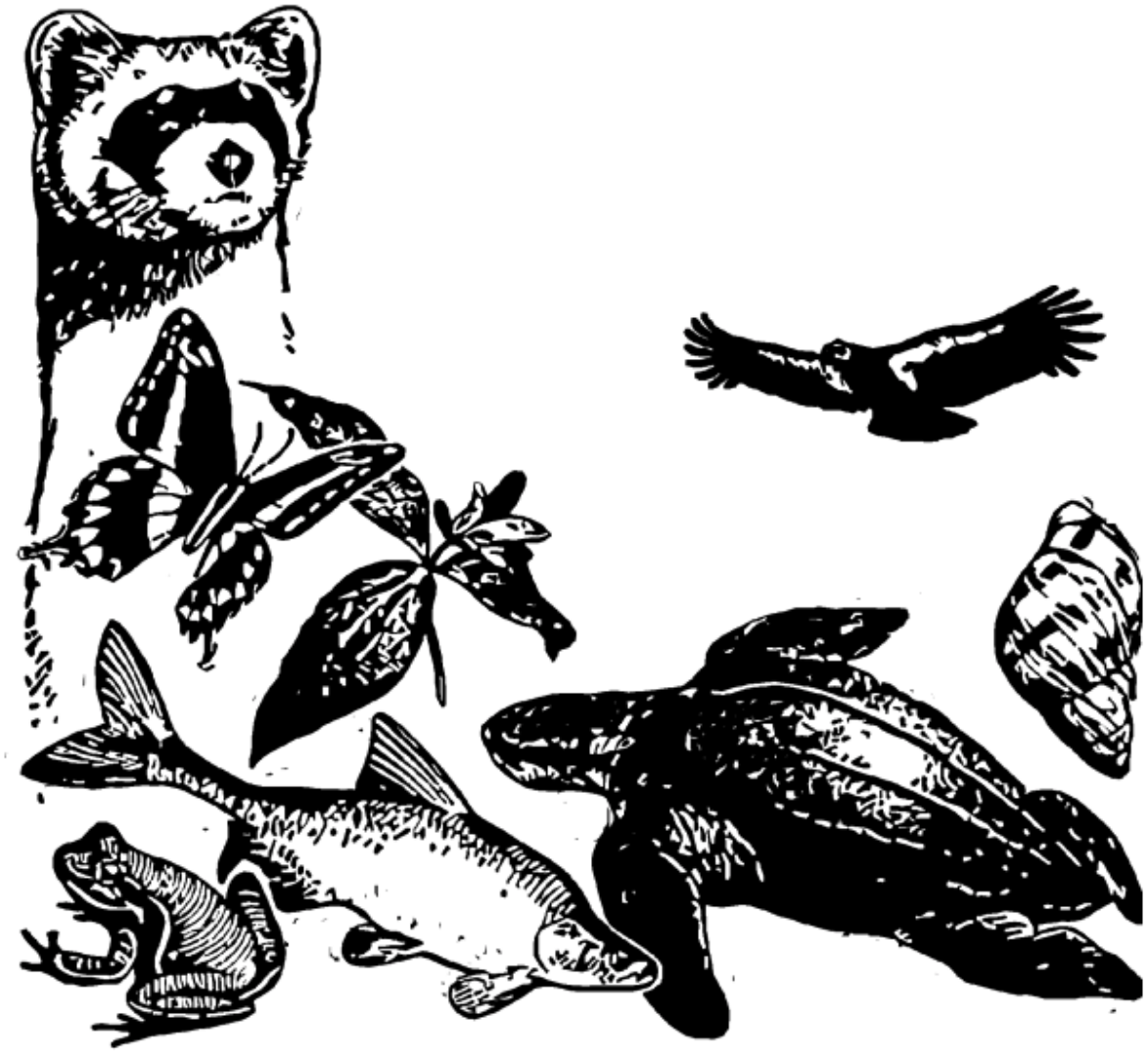
- Marelisa Rivera, Deputy Field Supervisor
    - Email: marelisa_rivera@fws.gov
    - Office phone 787-851-7297 ext. 206 or mobile 787-510-5219
- José Cruz-Burgos, Endangered Species Coordinator
    - Email: jose_cruz-burgos@fws.gov
    - Office phone 787-851-7297 ext. 218 or mobile 787-510-5206

U.S. Fish & Wildlife Service

# IPaC Project Design Guidelines

## *Puerto Rican Boa*

Generated September 30, 2020 12:53 PM MDT, IPaC vunspecified



IPaC - Information for Planning and Consultation (https://ecos.fws.gov/ipac/): A project planning tool to help streamline the U.S. Fish and Wildlife Service environmental review process.

# U.S. FISH AND WILDLIFE SERVICE
# CARIBBEAN ECOLOGICAL SERVICES FIELD OFFICE

## Conservation Measures for the Puerto Rican boa (*Chilabothrus inornatus*)

Section 7 (a)(1) of the Endangered Species Act (ESA) charges Federal agencies to aid in the conservation of listed species, and section 7 (a)(2) requires the agencies, through consultation with the U.S. Fish and Wildlife Service (Service), to ensure their activities are not likely to jeopardize the continued existence of listed species or adversely modify designated critical habitats. Section 7 applies to the management of Federal lands as well as Federal actions that may affect listed species, such as Federal approval of private activities through the issuance of Federal funding, permits, licenses, or other actions. Any person that injures, captures, or kills a Puerto Rico boa is subject to penalties under the ESA. If Federal funds or permits are needed, the funding or permitting agency should initiate Section 7 consultation with the Service. To initiate a consultation under the Section 7 of the ESA, you must submit a project package with the established minimum requirements. These conservation measures should be incorporated into the project plans to minimize possible impacts to the species. Download the project evaluations fact sheet to learn more about the requirements or visit our project evaluations webpage.

The endangered Puerto Rican (PR) boa (*Chilabothrus inornatus*, formerly *Epicrates inornatus*) is the largest endemic snake species that inhabits Puerto Rico. The PR boa is non-venomous and does not pose any life threatening danger to humans, but some individuals may try to bite if disturbed or during capture or handling. Its body color ranges from tan to dark brown with irregular diffuse marking on the dorsum, but some individuals lack marking and are uniformly dark. Juveniles may have a reddish color with more pronounced markings. In general, as they mature, their body color tends to darken.



Adult PR boa – *Chilabothrus inornatus*
Photo: Puerto Rico by JP Zegarra

**Last Revised: October 2020**

The Puerto Rican boa was federally listed in 1970. Currently, the species has an island-wide distribution and occurs in a wide variety of habitat types ranging from wet montane to subtropical dry forest, and can be found from mature forest to areas with different degrees of human disturbance like roadsides or houses, especially if near their habitat in rural areas. This boa is considered mostly nocturnal, remaining less active, concealed or basking under the sun during the day.

The Service has developed the following conservation measures with the purpose of assisting others to avoid or minimize adverse effects to the PR boa and its habitat. These recommendations may be incorporated into new project plans and under certain circumstances into existing projects. Depending on the project, additional recommendations can be made besides the ones presented in this document.

Conservation Measures:

1. Inform all project personnel about the potential presence of the PR boa in areas where the proposed work will be conducted. A pre-construction meeting should be conducted to inform all project personnel about the need to avoid harming the species as well as penalties for harassing or harming PR boas. An educational poster or sign with photo or illustration of the species should be displayed at the project site.

2. Prior to any construction activity, including removal of vegetation and earth movements, the boundaries of the project and areas to be excluded and protected should be clearly marked in the project plan and in the field in order to avoid further habitat degradation into forested and conservation areas.

3. Once areas are clearly marked, and prior to the use of heavy machinery and any construction activity (including removal of vegetation and earth movement), a biologist or personnel with experience on this species should survey the areas to be cleared to verify the presence of any PR boa within the work area.

4. The PR boa is considered more active at night. Thus, in order to maximize its detection, the species should be searched at nights prior to habitat disturbance.

5. Once the area has been searched for PR boas, vegetation should first be cleared by hand to the maximum extent possible. Vegetation should be cut about one meter above ground prior to the use of heavy machinery for land clearing. Cutting vegetation by hand will allow boas present on site to move away on their own to adjacent available habitat.

6. For all boa sightings (dead or alive), record the time and date of the sighting and the specific location where it was found. PR boa data should also include a photo of the animal (dead or alive), site GPS coordinates, the time and date, and comments on how the animal was detected and its behavior.

7. If a PR boa is found within any of the working or construction areas, activities should stop at that area and information recorded (see #6). Do not capture the boa. If boas need to be

captured immediately to continue work and avoid harming the boa during the project activities, designated personnel shall immediately contact the Puerto Rico DNER Rangers for safe capture and relocation (DNER phone #'s: 787-724-5700, 787-230-5550, 787-771-1124). If immediate relocation is not an option, project-related activities at this area must stop until the boa moves out of harm's way on its own. Activities at other work sites, where no boas have been found after surveying the area, may continue. Another option is to call DNER Rangers.

8. The potential use of the PRDNER staff for these purposes should be coordinated with them at least 30 days before the project starts. If a PR boa is captured by the PRDNER, record the name of the PRDNER staff and information on where the PR boa will be taken.

9. Measures should be taken to avoid and minimize PR boa casualties by heavy machinery or motor vehicles being used on site. Any heavy machinery left on site (staging) or near potential PR boa habitat (within 50 meters of potential boa habitat), needs to be thoroughly inspected each morning before work starts to ensure that no boas have sheltered within engine compartments or other areas of the equipment. If PR boas are found within vehicles or equipment, they need to be safely captured and relocated accordingly (see #7). If not possible, the animal should be left alone until it leaves the vehicle on its own.

10. PR boas may seek shelter in debris piles. Measures should be taken to avoid and minimize boa casualties associated with sheltering in debris piles as a result of project activities. Debris piles should be placed far away from forested areas. Prior to moving, disposing or shredding, debris piles should be carefully inspected for the presence of boas. If debris piles will be left on site, we recommend they be placed in areas that will not be disturbed in the future.

11. If a dead PR boa is found, immediately cease all work in that area and record the information accordingly (see #6). If the PR boa was killed as part of the project actions, please include information on what conservation measures had been implemented and what actions that will be taken to avoid further killings. A dead boa report should be sent by email (see contacts below) to the Service within 48 hours of the event.

12. Projects must comply with all state laws and regulations. Please contact the PRDNER for further guidance.

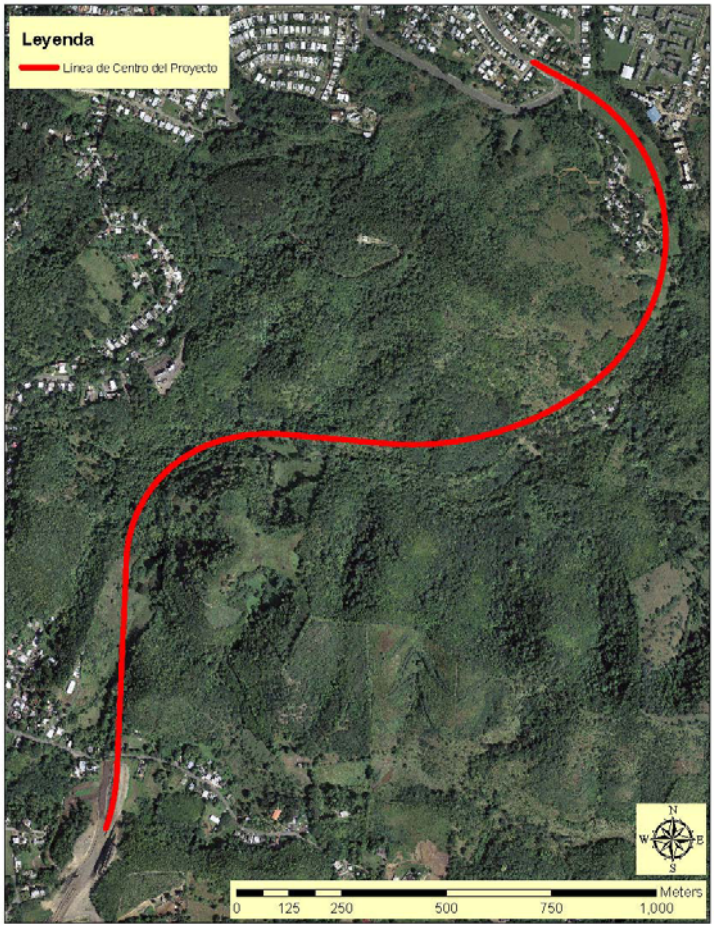
If you have any questions regarding the above conservation measures, please contact the Service:

- Marelisa Rivera, Deputy Field Supervisor
  - Email: marelisa_rivera@fws.gov
  - Office phone 787-851-7297 ext. 206 or mobile 787-510-5219
- José Cruz-Burgos, Endangered Species Coordinator
  - Email: jose_cruz-burgos@fws.gov
  - Office phone 787-851-7297 ext. 218 or mobile 787-510-5206

**Last Revised: October 2020**

# APPENDIX 6: Flora and Fauna Study

# DESCRIPTIVE STUDY OF FLORA Y FAUNA




EXTENSION OF ROAD PR-122
MUNICIPALITIES OF SAN GERMÁN and LAJAS, PUERTO RICO

Prepared for:
AUTORIDAD DE CARRETERAS Y TRANSPORTACIÓN

Prepared by:

COLL RIVERA ENVIRONMENTAL

Environmental Studies,
Permitting and Consulting

AUGUST 2017

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## Executive Summary

The Puerto Rico Highway and Transportation Authority (PRHTA) proposes the Extensión of Road PR-122, known as the Ángel Castro Pérez Avenue (the Proyect), from its existing intersection with the eastern extreme of Road PR-166 (southern detour of San Germán) to its intersection with Road PR-321 in the Municipality of Lajas (see **Appendix A**, **Figures 1** and **2**). Project's length is approximately 2.2 Km. and possesses a Right of Way width of 33.5 meters (see **Appendix A**, **Figures 3**).

This document constitutes the Descriptive Study of Flora and Fauna for the area proposed for this Project. The purpose of this study is:

- To evaluate and describe the general flora and fauna species within Project site,
- To describe the existing ecological associations, and
- To determine the presence of critical, threatened or endangered species.

The study area is dominated by trees. Among the most common are; the guara (*Cupania americana*), guayaba (*Psidium guajava*), cenizo (*Zanthoxylum martinicense*), corcho (*Guapira fragrans*), quenepo (*Meliccocus bijugatus*), campeche (*Haematoxylum campechianum*) and the cabo de hacha (*Trichilia hirta*). Dominant herbaceous species are; rabo de gato (*Achyranthes aspera*), *Kyllinga pumila* (no common name), anamú (*Petiveria aliacea*) and escobas (*Sida spp.*). Most common vines are; the bejuco de canasta (*Serjania polyphylla*), bejuco de nasa (*Trichostigma octandrum*), bejuco de caro (*Cissus verticillata*), nigua (*Tournefortia hirsutissima*) and the cundeamor (*Momordica charantia*).

The serrasuela (*Thouinia striata* var. *striata*), an endemic species for Puerto Rico, and the marunguey (*Zamia pumila*), which is a critical species designated by the Department of natural and Environmental Resources (DNER), were found. No threatened or endangered flora species was found. Total species of flora were 177, divided into 61 families.

In terms of the fauna, within Project site, dominant species are the Julián chiví (*Vireo altiloquus*), tórtola aliblanca (*Zenaida asiatica*), lagartijo común (*Ctenonotus cristatellus*) and three molusks (*Caracolus caracolla*, *Caracolus marginella* and *Polydontes lima*).

Total fauna species were 47, divided into 29 families. The boa of Puerto Rico (*Chilabothrus inornatus*) was observed. It is a federally and locally designated endangered species. The paloma cabeciblanca (*Patagioenas leucocephala*) was also observed. It is a species designated as critical element by the DNER.

Twelve faunal species endemic for Puerto Rico were observed. These are; the reina mora (*Spindalis portoricensis*), pájaro bobo mayor (*Saurothera vieilloti*), pájaro carpintero (*Melanerpes portoricensis*), come ñame de Puerto Rico (*Loxigilla portoricensis*), San Pedrito (*Todus mexicanus*), juí de Puerto Rico (*Myiarchus antillarum*), bien te veo de Puerto Rico (*Vireo latimeri*), mucarito de Puerto Rico (*Megascops nudipes*), coquí común (*Eleutherodactylus coqui*), coquí churí (*Eleutherodactylus antillensis*), araña peluda de Puerto Rico (*Cyrthopolis portoricae*) and the boa of Puerto Rico.

The northern section of the Project is located within a zone designated as Critical Habitat (CH) for the mariquita (*Agelaius xanthomus*), which is federally and locally designated as an endangered species. However, this species was not observed during field work for this study.

## Introduction

The Puerto Rico Highway and Transportation Authority (PRHTA) proposes the Extensión of Road PR-122, known as the Ángel Castro Pérez Avenue (the Proyect), from its existing intersection with the eastern extreme of Road PR-166 (southern detour of San Germán) to its intersection with Road PR-321 in the Municipality of Lajas (see **Appendix A**, **Figures 1** and **2**). Project's length is approximately 2.2 Km. and possesses a Right of Way width of 33.5 meters (see **Appendix A**, **Figures 3**).

The Project is located within the western region of Puerto Rico. Its alignment mostly runs parallel to Road PR-101 and approximately one (1) Km east of it. Its trajectory passes between the Retiro Community and an unnamed creek in San Germán, and then continues to Lajas crossing over Road PR-321 at Km 1.0.

This document constitutes the Descriptive Study of Flora and Fauna for the area proposed for this Project. The purpose of this study is:

- To evaluate and describe the general flora and fauna species within Project site,
- To describe the existing ecological associations, and
- To determine the presence of critical, threatened or endangered species.

This study was carried out according to the procedures recommended by the DNER and the United States Fish and Wildlife Service (USFWS), using the sampling methods that conformed to the characteristics and conditions of the study area. Steps taken before the fieldwork included a consultation to the Inventory of Critical Species of the Office of Natural Heritage of the DNER, the Environmental Sensitivity Index (ESI) of the National Oceanic and Atmospheric Administration (NOAA), NOAA's National Marine Fisheries Service Critical Habitat Maps, and the Caribbean Endangered Species Map of the USFWS.

This document presents the findings that resulted from the analysis of the data collected during field work, and consultation with the before mentioned local and federal sources of information and agencies.

Field work to gather the data for this study was conducted by biologist Jorge L. Coll Rivera and botanist Fabiola Areces in May and June 2017.

## Description of Study Area

As mentioned in the **Introduction** section above, the Project is proposed within the western region of Puerto Rico. Its alignment mostly runs parallel to Road PR-101 and approximately one (1) Km east of it. Its trajectory passes between the Retiro Community and an unnamed creek in San Germán, and then continues to Lajas crossing over Road PR-321 at Km 1.0 (see **Appendix A**, **Figures 1** and **2**).

The life zone on which the proposed Project is located is known as the Subtropical Moist Forest (Ewel and Whitmore, 1973). This life zone is the largest of the six life zones found in Puerto Rico. The Subtropical Moist Forest covers approximately 58% of the area of Puerto Rico. Annual rainfall within this life zone varies from 1000mm to 2200mm. Most of this life zone was deforested at one time or another, because the climatic conditions which define its boundaries also encompassed good conditions for a wide variety of crops.

With the exception of regions of serpentine or limestone-derived soils, most of the land in this life zone remains in some forms of non-forested use. The areas that have maintained its representative vegetation are characterized by trees 20 meters height, with rounded crowns, like for example the mango (*Mangifera indica*). Most woody species are deciduous during the dry season, and epiphytes are common. Sometimes they cover tree trunks and branches completely.

### Climatology

According to the Monthly Station Normals of Temperature, Precipitation, and Heating and Cooling Degree Days, 1981 - 2010, prepared by the national Oceanic and Atmospheric Administration (NOAA), mean annual precipitation of the region is approximately 47.98 inches (1,199.5 mm). Mean annual minimum temperature is approximately 67.0 F (19.4 C). Mean annual maximum temperature is approximately

89.4 F (31.9 C). Mean annual temperature is 78.2 F (25.7 C). This data was taken from the Lajas Substation with geographic coordinates of 18.0330° N, -67.0722° W.

**Hydrology**

The main hydrology includes the Maresúa Creek, which flows from east to west and crosses the south central section of the Project, and an unnamed creek that is located adjacent to the northeast of the Project, flowing from south to north. Both hydrographic features discharge into the Guanajibo River, which discharges into the Atlantic Ocean. In addition, some ephemeral creeks also exist along Project's route, which only manage storm water during heavy rain events. **Figure 4** (**Appendix A**) shows the main hydrography of the zone where the Project is located.

**Topography**

**Figure 1** (**Appendix A**) shows the Project's location over the topographic quadrangle of Lajas, prepared by the U.S. Geological Survey. From this figure it is observed that the topography of the area varies from steep to semi steep, given that the Project runs over valleys and mountains. According to this source, Project elevation ranges from 60 to 100 meters above mean sea level.

**Soils Description and Clasification**

According to the Soil Survey of the San Germán Area of Puerto Rico, of the Soil Conservation Service (Web Soil Survey, August 10, 2016), there are nine types of soil within Project site. These are the Descalabrado clay, 20 to 60% slopes (DsF); the Cacique-La Taína complex, 20 to 60% slopes (EcF); the Humatas clay, 20 to 40% slopes (HmE); the Montegrande clay, 2 to 12% slopes (MqC); the Mucará loam, 12 to 20% slopes (MuD); the Múcara loam, 20 to 40% slopes (MuE); the Múcara loam, 40 to 60% slopes (MuF), the San Germán-Duey complex, 20 to 60% slopes (SgF); and Urban land (Ua). **Figure 5** (**Appendix A**) shows the soils for the Project area.

The Descalabrado clay, 20 to 60% slopes (DsF), is found on volcanic hill slopes. They are well drained and of moderate permeability. The available water capacity is very low.

The Cacique-La Taína complex, 20 to 60% slopes (EcF), is found on the slopes of hills and mountains. They are well drained and of moderately slow permeability. The available water capacity is low.

The Humatas clay, 20 to 40% slopes (HmE), is found on the slopes of hills and mountains.. They are somewhat poorly drained and of moderately slow permeability. The available water capacity is high.

The Montegrande clay, 2 to 12% slopes (MqC), is found on alluvial fans and low hills. They are well drained and of moderately slow permeability. The available water capacity is high.

The Múcara loam, 12 to 20% slopes (MuD), is found on the slopes of hills and mountains. They are well drained and of moderate permeability. The available water capacity is moderate.

The Múcara loam, 20 to 40% slopes (MuE), is found on the slopes of hills and mountains. They are well drained and of moderate permeability. The available water capacity is moderate.

The Múcara loam, 40 to 60% slopes (MuF), is found on mountain slopes. They are well drained and of moderate permeability. The available water capacity is moderate.

The San Germán-Duey complex, 20 to 60% slopes (SgF), is found on hill slopes. They are well drained and of very slow permeability. The available water capacity is very low.

The Urban land (Ua), is found on flood plains, uplands and hill slopes. It consists of areas covered by streets, buildings, sidewalks, parking lots, playgrounds and residential development. The original soils have been highly disturbed by mechanical means.

**Wetlands**

According to the National Wetland Inventory (NWI), the study area was not photographed (NP).

## Methodology

### Reconnaissance Visit

A reconnaissance field visit of Project route was performed to conduct a general survey of Project, the comprise area and study limitations; characteristics and other natural features. This visit was very important for the design of the fieldwork plan and to allocate efforts.

### Consultation of Maps from the Office of the Program of Natural Heritage of the Department of Natural and Environmental Resources

After the preliminary survey of the Project area, a visit to the Office of the Program of National Heritage of the DNER was done in order to do a formal consultation of the maps which hold the records of the species that are critical, threatened or endangered (shown over the topographic quadrangles of Puerto Rico) along Project route. This consultation is a necessary and important tool because personnel from the DNER provided additional information about the records of these species. Moreover, they suggested additional efforts and consultations with other scientists and agencies who are working with protected species within the studied area such as; the Environmental Sensitivity Index (ESI) Maps of the National Oceanic and Atmospheric Administration (NOAA, 2000) and the Caribbean Endangered Species Map of the United States Fish & Wildlife Service (USF&WS, 2011)

### Consultation of the Environmental Sensitivity Index (ESI) Maps of the National Oceanic and Atmospheric Administration (NOAA, 2000)

The ESI is a study by the NOAA together with other organizations and agencies, among which are the USFWS and the DNER. This study shows the records of observations of species that are critical, threatened or endangered around the whole coast and basins of rivers and major streams in Puerto Rico.

**Consultation of the Caribbean Endangered Species Map of the United States Fish & Wildlife Service (USF&WS, 2011)**

This map includes at a federal level the species that are threatened or endangered, and the critical habitats for these species designated by municipality.

**Field Work**

The fieldwork for this study was performed in May and June, 2017. Species were documented according to the habitat where they were observed.

Flora species were recorded in the field. When a species was found hard to categorize, a specimen was collected to be identified at the Herbarium of the University of Puerto Rico, Río Piedras Campus.

For the identification of birds, a morning and an evening census were carried out using the point count method, in which the bird species observed and heard were recorded according to Wunderle's suggestion (1994). This method is very effective in documenting the presence of bird species.

For the identification of amphibians and reptiles, the method described by Rivero (1998) was used; searching in humid areas, trees, under tree trunks and fallen branches, rocks, tree bifurcations, dead vegetation, garbage, scrap metal, etc. In order to support the identification of amphibious species, a digital sound recorder was used. The sounds recorded were transferred to a computer, where they were compared with the sounds recorded in the Compact Disk included in the reference book Amphibians and Reptiles of Puerto Rico (Rivero, 1998).

## Results and Discussion

The Project consists in a section of 2.2 Km long and 33.5 meters wide. Its alignment mostly runs parallel to Road PR-101 and approximately one (1) Km east of it. Its trajectory passes between the Retiro Community and an unnamed creek in San Germán, and then continues to Lajas crossing over Road PR-321 at Km 1.0.

The study area is dominated by trees. Among the most common ones were the guara (*Cupania americana*), guayaba (*Psidium guajava*), cenizo (*Zanthoxylum martinicense*), corcho (*Guapira fragrans*), quenepo (*Meliccocus bijugatus*), campeche (*Haematoxylum campechianum*) and the cabo de hacha (*Trichilia hirta*). Dominant herbaceous species are the rabo de gato (*Achyranthes aspera*), *Kyllinga pumila* (no common name), anamú (*Petiveria aliacea*) and the escobas (*Sida spp.*). Most common vines are the bejuco de canasta (*Serjania polyphylla*), bejuco de nasa (*Trichostigma octandrum*), bejuco de caro (*Cissus verticillata*), nigua (*Tournefortia hirsutissima*) and the cundeamor (*Momordica charantia*).

Total species of flora were 177, divided into 61 families. The 177 species are distributed as follows: 73 trees, 58 herbs, 24 vines and 22 shrubs. 62% of all observed species are native to Puerto Rico. 38% are exotic or introduced ones. The serrasuela (*Thouinia striata* var. *striata*), which is an endemic species for Puerto Rico, and the marunguey (*Zamia pumila*), which is a critical species designated by the Department of Natural and Environmental Resources (DNER) were found. No threatened or endangered flora species was found.

The serrasuela (*Thouinia striata* var. *striata*), which is an endemic species for Puerto Rico, and the marunguey (*Zamia pumila*), which is a critical species designated by the Department of Natural and Environmental Resources (DNER) were found. No threatened or endangered flora species was found.

Dominant faunal species within Project site were the Julián chiví (*Vireo altiloquus*), tórtola aliblanca (*Zenaida asiatica*), lagartijo común (*Ctenonotus cristatellus*) and three molusks (*Caracolus caracolla, Caracolus marginella* and *Polydontes lima*). Total fauna species were 47, divided into 29 families. Most represented families of birds were the Columbidae and Tyrannidae.

The boa of Puerto Rico (*Chilabothrus inornatus*) was observed. It is a federally and locally designated endangered species. The paloma cabeciblanca (*Patagioenas leucocephala*) was also observed. It is a species designated as critical element by the DNER.

Twelve faunal species endemic for Puerto Rico were observed. Among them, a federally and locally designated endangered species was found. These are:

- Birds:
  - Reina mora (*Spindalis portoricensis*, endemic),
  - Pájaro bobo mayor (*Saurothera vieilloti*, endemic),
  - Pájaro carpintero (*Melanerpes portoricensis*, endemic),
  - Come ñame de Puerto Rico (*Loxigilla portoricensis*, endemic),
  - San Pedrito (*Todus mexicanus*, endemic),
  - Juí de Puerto Rico (*Myiarchus antillarum*, endemic),
  - Bien te veo de Puerto Rico (*Vireo latimeri*, endemic),
  - Mucarito de Puerto Rico (*Megascops nudipes*, endemic),
- Amphibians
  - Coquí común (*Eleutherodactylus caqui*, endemic),
  - Coquí churí (*Eleutherodactylus antillensis*, endemic),
- Reptiles
  - Boa de Puerto Rico (*Chilabothrus inornatus*, federally and locally designated as an endangered species).
- Arachnids
  - Araña peluda de Puerto Rico (*Cyrthopolis portoricae*, endemic).

In addition, the paloma cabeciblanca (*Patagioenas leucocephala*) was observed flying over the southern section (near Lajas) of Project site. This species is designated as a critical element by the DNER.

**Appendix B** includes the Caribbean Endangered Species tables for the municipalities of Lajas and San Germán. The Caribbean Endangered Species Map is prepared by the U.S. Fish and Wildlife Service. **Appendix C** includes the general flora and fauna inventory observed during fielded work for this study.

**Threatened or Endangered Species and their Suitable Habitat**

Boa de Puerto Rico (*Chilabothrus inornatus*)

The boa de Puerto Rico is a federally and locally designated endangered species. It belongs to the family of true boas (Boidae). Its genus (*Chilabothrus*) is distributed within South América, Central América and the Greater Antilles. The species *C. inornatus* is endemic to Puerto Rico. This species can reach a maximum length of nine feet and possesses between 70 and 80 dorsal spots (Rivero, 1998). This is the largest native snake species in Puerto Rico. The jaw area is wide, when compared to other snake species found in the Island. The boa de Puerto Rico may be found on the ground or in trees. Its diet consists of mice, rats, birds, small mammals and lizards.

Although the boa de Puerto Rico is extensively distributed around the Island of Puerto Rico, it seems to prefer the karst zone (haystacks), where it is more abundant. This zone provides forested areas, rocks and boulders areas, hollow trees, caves, etc. That is important for this species, given that it is mostly nocturnal or crepuscular, and is less active during the day, when it remains hidden. However, openings within forest canopy allow the sunlight to reach into the forest and this species may be basking in the sun during the day to obtain energy.

Reproduction of the boa de Puerto Rico occurs just before or at the beginning of the rainy season, between February and April. Gestation may last between 152 and 193 days. Juveniles (between 17 and 32) are born alive (viviparous) and measure about 1 foot.

**Critical Elements** (Department of Natural and Environmental Resources)

Marunguey (*Zamia pumila*)

The marunguey (*Zamia pumila*) is a plant species belonging to the Zamiaceae family. It contains reddish seed cones with acuminate tips. Leaves are composed and 60–120 cm (2.0–3.9 ft) long, with 5-30 pairs of leaflets. Each leaflet is linear to lanceolate or oblong-obovate, 8–25 cm long and 0.5–2 cm broad, with distinct teeth at the tip. They are often revolute, with prickly petioles.

This is a low-growing plant, with trunk that grows to 3–25 cm high and diameter, but is often subterranean. Over time, it forms a multi-branched cluster, with a large, tuberous root system, which is actually an extension of the above-ground stems.

*Zamia pumila* is dioecious, having male or female plants. The male cones are cylindrical, growing to 3–15 cm long; they are often clustered. The female cones are elongate-ovoid and grow to 6–15 cm long and 4–6 cm in diameter. Pollination is by certain insects. Formation of reproductive cones occurs from November to March and in June.

*Zamia pumila* inhabits a variety of habitats with well-drained sands or sandy loam soils. It prefers filtered sunlight to partial shade. In Puerto Rico, it is found at the foot of hills of the southeast (Salinas), Cerro de Las Cuevas, low lying lands of the southern coast (Santa Isabel) and southern coast karst region. It is found on elevations ranging from 10 to 575 meters over mean sea level

This species was included as a “critical element” in the October 2007 List of Critical Elements of the Natural Heritage Division of the DNER.

Paloma cabeciblanca (*Patagioenas leucocephala*)

The paloma cabeciblanca (*Patagioenas leucocephala*) was observed flying over the southern section (near Lajas) from west to east. This species is found in Puerto Rico, the Bahamas, Jamaica, Cuba, La Española, San Andrés, Providencia, Antigua and the Virgin Islands. In Puerto Rico, this is a relative common species within the region. It is also frequent to see it flying from side to side over Highway PR-22. It is also found in the north and east of Puerto Rico, Vieques, Culebra and in Mona Island. It is mostly observed within the northern and eastern coastal plains, in the mangroves and moist forests.

The DNER designated this species as a "critical element" due to a reduction of its populations and it is becoming scarce as a result of habitat loss, furtive hunting, and the introduction of predators. The DNER designates a species as a "critical element" when these conditions occur and their observations on the field diminish. The category "Deficiency of Data" has being assigned to this species due to a lack of information to estimate its current population.

**Additional Sources of Information**

The Environmental Sensitivity Maps (ESI) from the National Oceanic and Atmospheric Administration (NOAA) includes the northern section of the Project within a zone designated as Critical Habitat (CH) for the mariquita (*Agelaius xanthomus*), which is federally and locally designated as an endangered species. However, this species was not observed during field work for this study. This source does not include other critical elements, threatened or endangered species (see **Figures 6** and **7**, **Appendix A**).

The Caribbean Endangered Species Map (CESMP) from the U.S. Fish and Wildlife Service (USFWS, 2011) includes eleven endangered species, four threatened species, and one species delisted due to recovery of its population for the Municipality of Lajas. For the Municipality of San Germán, this source includes ten endangered species and one threatened species (see **Appendix B**).

**Table 1** includes a summary of the threatened and endangered species for the municipalities of Lajas and San Germán. Sources of information consulted are the Natural Heritage Division of the DNER, the ESI and the CESM.

Table 1. Federally and locally designated threatened and endangered species for municipalities of Lajas and San Germán

| Common Name | Scientific Name | Source of Information | Federal Status | DNER Status | Habitat | Municipality of Lajas | Municipality of San Germán |
|---|---|---|---|---|---|---|---|
| Mamíferos | | | | | | | |
| Manatí Antillano | *Trichecus manatus manatus* | DRNA, USFWS | E | E | Marine, estuarine, coastal zones | X | N/A |
| Reptiles | | | | | | | |
| Peje blanco o tortuga verde | *Chelonia mydas* | DRNA, ESI, USFWS | T, CH | T | Coastal zones | X | N/A |
| Carey | *Eretmochelys imbricata* | DRNA, ESI, USFWS | E, CH | E | Coastal zones | X | N/A |
| Boa de Puerto Rico | *Chilabothrus inornatus* | DRNA, USFWS | E | E | Forested volcanic and limestone (karst) hills | X | N/A |
| Birds | | | | | | | |
| Mariquita | *Agelaius xanthomus* | DRNA, ESI, USFWS | E, CH | E | Mangroves, coastal forests and thickets | X | N/A |
| Pelícano pardo | *Pelecanus occidentalis* | DRNA, USFWS | D | D | Bays, beaches, rivers, coastal zones | X | N/A |
| Guabairo | *Caprimulgus noctitherus* | DRNA, ESI, USFWS | E | E | Coastal forests | X | X |
| Playero melódico | *Charadrius melodus* | DRNA, USFWS | T | CE | Coastal zones | X | N/A |
| Palometa | *Sterna dougallii* | DRNA, USFWS | T | V | Coastal areas and offshore cays | X | N/A |
| Falcón de Sierra | *Accipiter striatus venator* | DRNA, USFWS | E | CE | Maricao State Forest | N/A | X |

| Common Name | Scientific Name | Source of Information | Federal Status | DNER Status | Habitat | Municipality of Lajas | Municipality of San Germán |
|---|---|---|---|---|---|---|---|
| Guaraguao de Bosque | *Buteo platypterus brunnescens* | DRNA, USFWS | E | CE | Maricao State Forest | N/A | X |
| Plants | | | | | | | |
| No tiene nombre común | *Aristida chaseae* | DRNA, ESI, USFWS | E | E | Sierra Bermeja, Cerro Mariquita, Cartagena National Wildlife Refuge (La Tinaja) | X (Sierra Bermeja, Cerro Mariquita, Refugio Nacional de Vida Silvestre de Laguna Cartagena (La Tinaja) | N/A |
| Pelos del Diablo | *Aristida portoricensis* | DRNA, ESI, USFWS | E | CE | Sierra Bermeja | X (Sierra Bermeja) | N/A |
| No tiene nombre común | *Eugenia woodburyana* | DRNA, ESI, USFWS | E | CE | Sierra Bermeja, Cerro Mariquita, Cartagena National Wildlife Refuge (La Tinaja) | X (Sierra Bermeja, Cerro Mariquita, Refugio Nacional de Vida Silvestre de Laguna Cartagena (La Tinaja) | N/A |
| No tiene nombre común | *Stahlia monosperma* | DRNA, ESI, USFWS | T | T | Sierra Bermeja, Lajas Experimental Station, Cartagena National Wildlife Refuge | X (Refugio Nacional de Vida Silvestre de Laguna Cartagena (La Tinaja), Parguera, Sierra | X (A lo largo de carreteras) |

| Common Name | Scientific Name | Source of Information | Federal Status | DNER Status | Habitat | Municipality of Lajas | Municipality of San Germán |
|---|---|---|---|---|---|---|---|
| | | | | | (La Tinaja) | Bermeja, Estación Experimental de Lajas) | |
| No tiene nombre común | *Lyona truncata* var *proctori* | DRNA, ESI, USFWS | E | CE | Sierra Bermeja (Cerro Mariquita) | X (Sierra Bermeja) | N/A |
| Palo de rosa | *Ottoschulzia rhodoxylon* | DRNA, USFWS | E | CE | Sierra Bermeja | X (Sierra Bermeja) | X (Maricao State Forest) |
| No tiene nombre común | *Vernonia proctori* | DRNA, ESI, USFWS | E | CE | Sierra Bermeja (Cerro Mariquita) | X (Sierra Bermeja) | N/A |
| No tiene nombre común | *Cordia bellonis* | DRNA, USFWS | E | E | Maricao State Forest | N/A | X (Maricao State Forest) |
| No tiene nombre común | *Cranichis ricartii* | DRNA, USFWS | E | CE | Maricao State Forest | N/A | X (Maricao State Forest) |
| Higüero de Sierra | *Crescentia portoricensis* | DRNA, USFWS | E | CE | Maricao State Forest | N/A | X (Maricao State Forest) |
| No tiene nombre común | *Gesneria pauciflora* | DRNA, USFWS | T | V | Maricao State Forest | N/A | X (Maricao State Forest) |
| Palo colorado | *Ternstroemis luquillensis* | DRNA, USFWS | E | CE | Maricao State Forest | N/A | X (Maricao State Forest) |

*Legend: CH: Critical Habitat; D: delisted from the list due to its recovery; E: endangered; CE: critically endangered; T: threatened; V: vulnerable.

In relation to the distribution of the species included in **Table 1**, the characteristics of the habitat of the manatí antillano, peje blanco (tortuga verde), carey, pelícano pardo, playero melódico, palometa, falcón de sierra, or the guaraguao de bosque is not present within Project site.

Plant species *Aristida chaseae* (no common name), pelos del diablo, la *Eugenia woodburyana* (no common name), la *Lyona truncata* var *proctori* (no common name) y la *Vernonia proctori* (no common name) are found in more arid areas to the south of Lajas (Subtropical dry Forest).

Plant species *Stahlia monosperma* (no common name), although has been reported in both municipalities, its natural environment is associated to mangroves and coastal forests. The Project area does not include these habitats.

Plan species *Cordia bellonis* (no common name), *Cranichis ricartii* (no common name), el higüero de sierra, la *Gesneria pauciflora* (no common name) and the palo colorado are found in the Maricao State Forest. Maricao State Forest is located more than 6 kilometers from the study area and at an elevation higher than 200 meters above mean sea level.

The habitat of the palo de rosa is very diverse. This species may grow in different types of soil; therefore, Project area may present the characteristics of the habitat of this species. Nevertheless, it was not observed during field work for this study.

Even though this study did not include a specific survey to detect the presence of the guabairo within Project site, this species was not found during field work for this study. In the same way, the mariquita  was neither found during field work for the Project.

The boa de Puerto Rico was the only species included in **Table 1** that was observed during field work. As mentioned above, it was found near the southern section during a nocturnal visit to the Project site. It was observed on the ground, to the side of a mango (*Mangifera indica*) tree.

**Wetlands**

As mentioned in the section **Description of Study Area**, Project site was not included (not photographed) in the National Wetland Inventory. Nevertheless, there are wetlands associated to the main hydrographic features (see the **Hydrology** section above) that runs within Project area

**Ecological Associations and Biodiversity**

Helmer et al. (2002) classifies the vegetative cover along Project in three types of vegetative classifications: These are: pastures, urban and barren, and lowland moist seasonal evergreen forest/shrub. The most abundant vegetative classification is pastures (see **Figure 8**, **Appendix A**). Nevertheless, in the present, the lowland moist seasonal evergreen forest/shrub classification occupies 52% of Project area.

The Maresúa Creek, an unnamed creek and some ephemeral creeks are present within Project site. These hydrographic features run within forested areas, developing riparian associations with typical flora species of this type of environment.

In terms of diversity of species, 177 flora species among 61 different families, and 49 species of fauna among 29 families were observed. The amount of flora species observed is proportioned to the type of vegetative cover that dominates the Project area, especially when it is considered that vegetative cover has increased from pastures to lowland moist seasonal evergreen forest/shrub, after agricultural practices were abandoned. Fauna species included 12 endemic ones for Puerto Rico. This also responds to the magnitude of the Project, to the ecological associations and the vegetative cover that exist along it.

**Critical Habitats, Forests and Nature Reserves within Project's Region**

The northern section of the Project is located within a designated Critical Habitat for the mariquita (*Agelaius xanthomus*). This species is listed federally and locally as an endangered species (see **Figures 6** and **7**, **Appendix A**). Maricao State Forest is located at approximately 6.3 kilometers to the northeast of Project area. Laguna Cartagena Reserve lies at approximately 6.3 kilometers to the southwest of the Project, while Sierra

Bermeja is located at approximately 7.5 kilometers, also to the southwest (see **Figure 9**, **Appendix A**).

## Conclusions and Recommendations

The area where the Project is proposed has been altered for anthropogenic uses, most of them associated to agricultural practices. However, given that agriculture within the region has diminished considerably the vegetative cover has increased since then.

Flora species found (41% trees, 33% herbs, 14% vines y 12% shrubs) in this study are relatively frequent and they represent common species (including the marunguey and the serrasuela) within the environment where the Project is proposed. As observed, 62% of flora species (including all strata) are native to Puerto Rico.

Twelve endemic fauna species for Puerto Rico were observed within Project site. These species are also relatively common in the areas with similar natural environmental characteristics to the Project site. Even the boa de Puerto Rico would be expected to be present in the area, although it is an endangered species and it is sometimes difficult to spot them.

To reduce or avoid impacts to the flora and fauna related to the construction of the Project, we recommend the following measures:

- ❖ Preparing a protocol for the protection of the boa de Puerto Rico and implement it during Project construction.
- ❖ Carrying out a survey to confirm the absence of the mariquita before Project construction begins. If this species is using Project site as habitat, identification and characterization of these areas shall be included. Project construction shall be avoided during the reproductive season of this species.
- ❖ Performing additional bird census to determine the presence of migratory bird species that visit Project site and other bird species that were not detected during this study.
- ❖ Implementing erosion and sedimentation controls during construction phase to avoid or reduce sediment loads to the creeks that exist within Project site.

- ❖ Reforesting the areas that were impacted by Project construction with species that are typical to existing habitat, including species that produce food to wildlife.

The Project should not have impacts to threatened or endangered species, as proposed, if the recommendations presented herein are followed.

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# APPENDICES

# APPENDIX A: FIGURES

Figure 1: Site Location Map (1: 20,000)

# FIGURE 1: SITE LOCATION MAP (1:20,000)

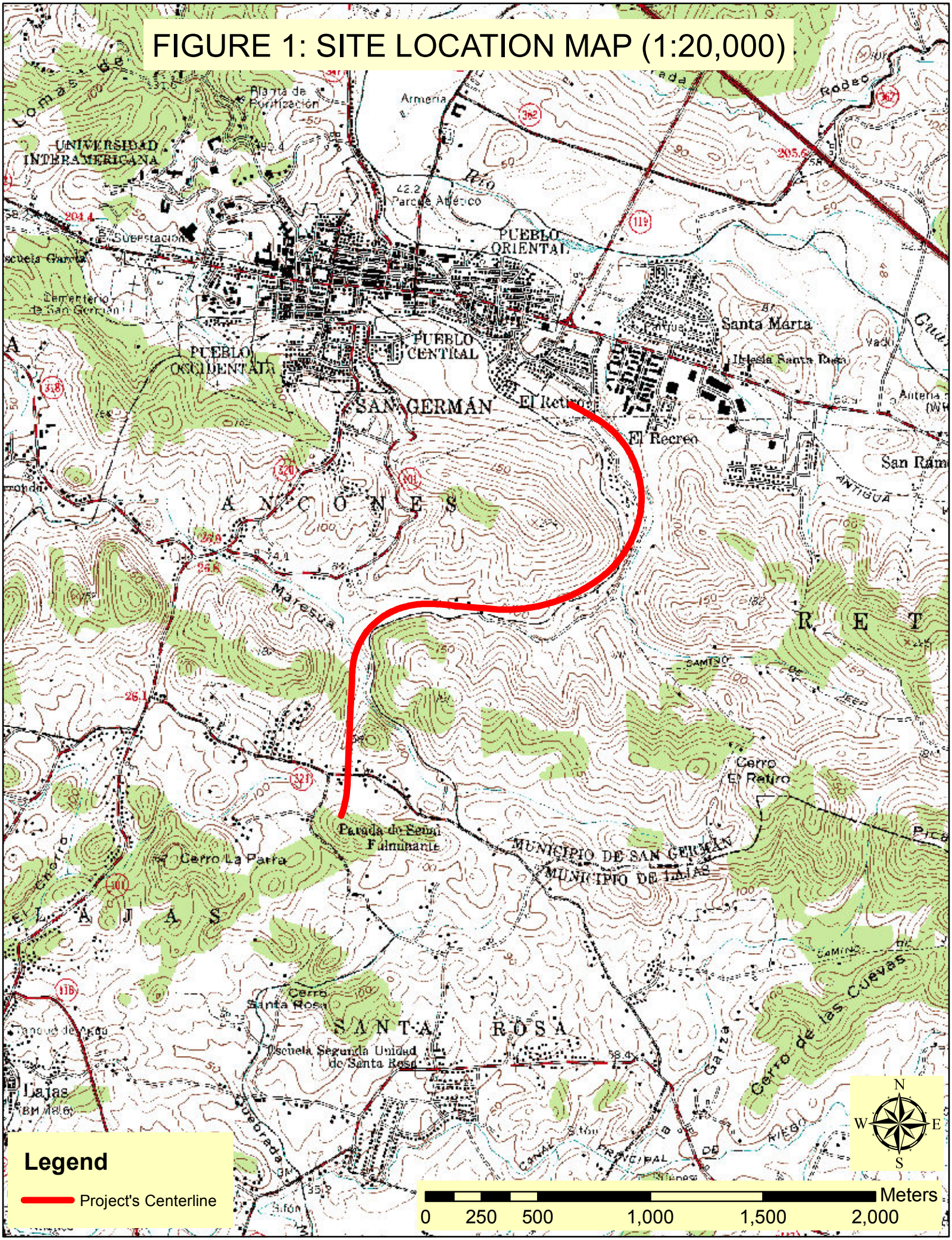


Figure 2: Aerial Photo (1:20,000)

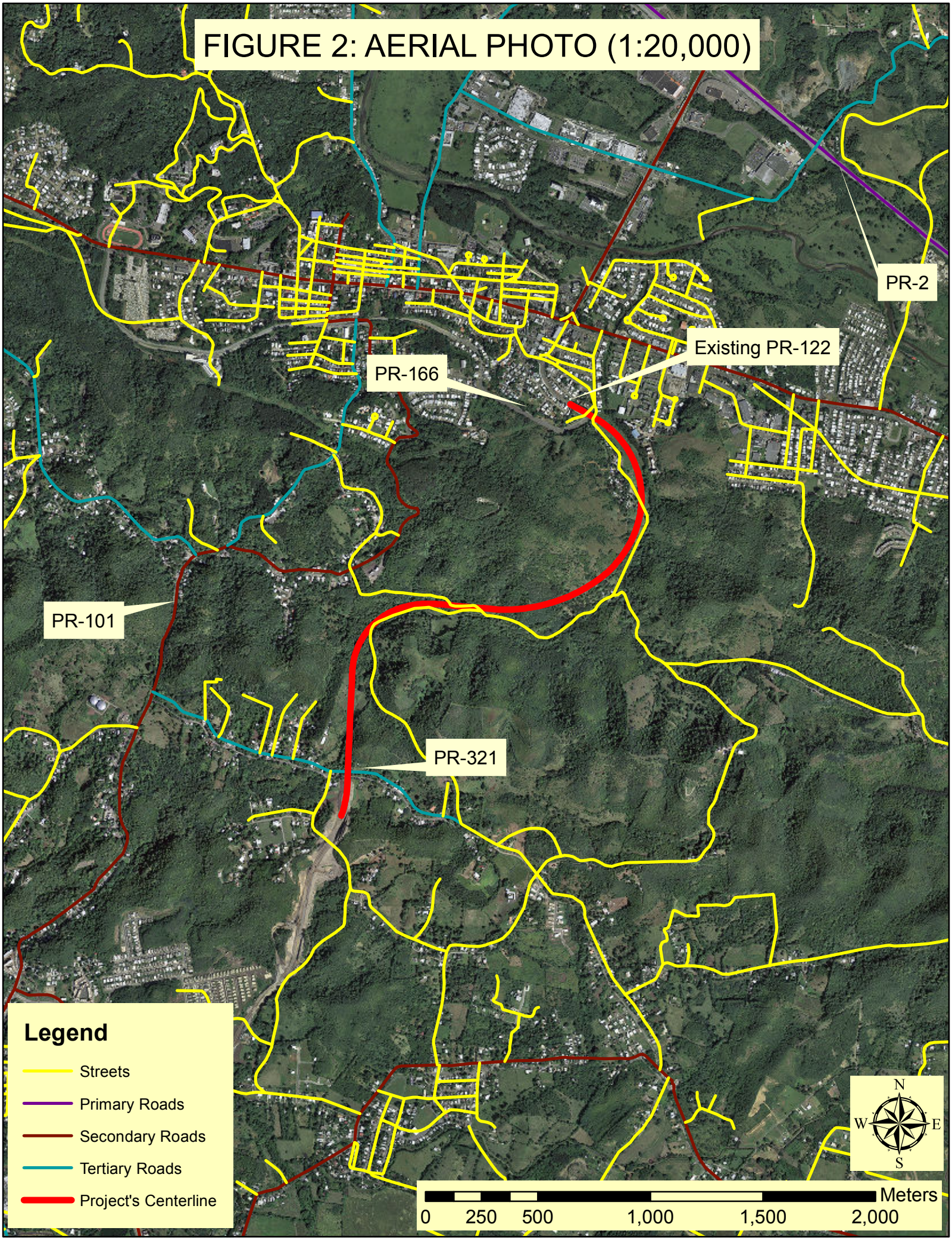

FIGURE 2: AERIAL PHOTO (1:20,000)
PR-2
Existing PR-122
PR-166
PR-101
PR-321
Legend
Streets
Primary Roads
Secondary Roads
Tertiary Roads
Project's Centerline
N
W
E
S
Meters
0
250
500
1,000
1,500
2,000

Figure 3: Aerial Photo (1:8,000)

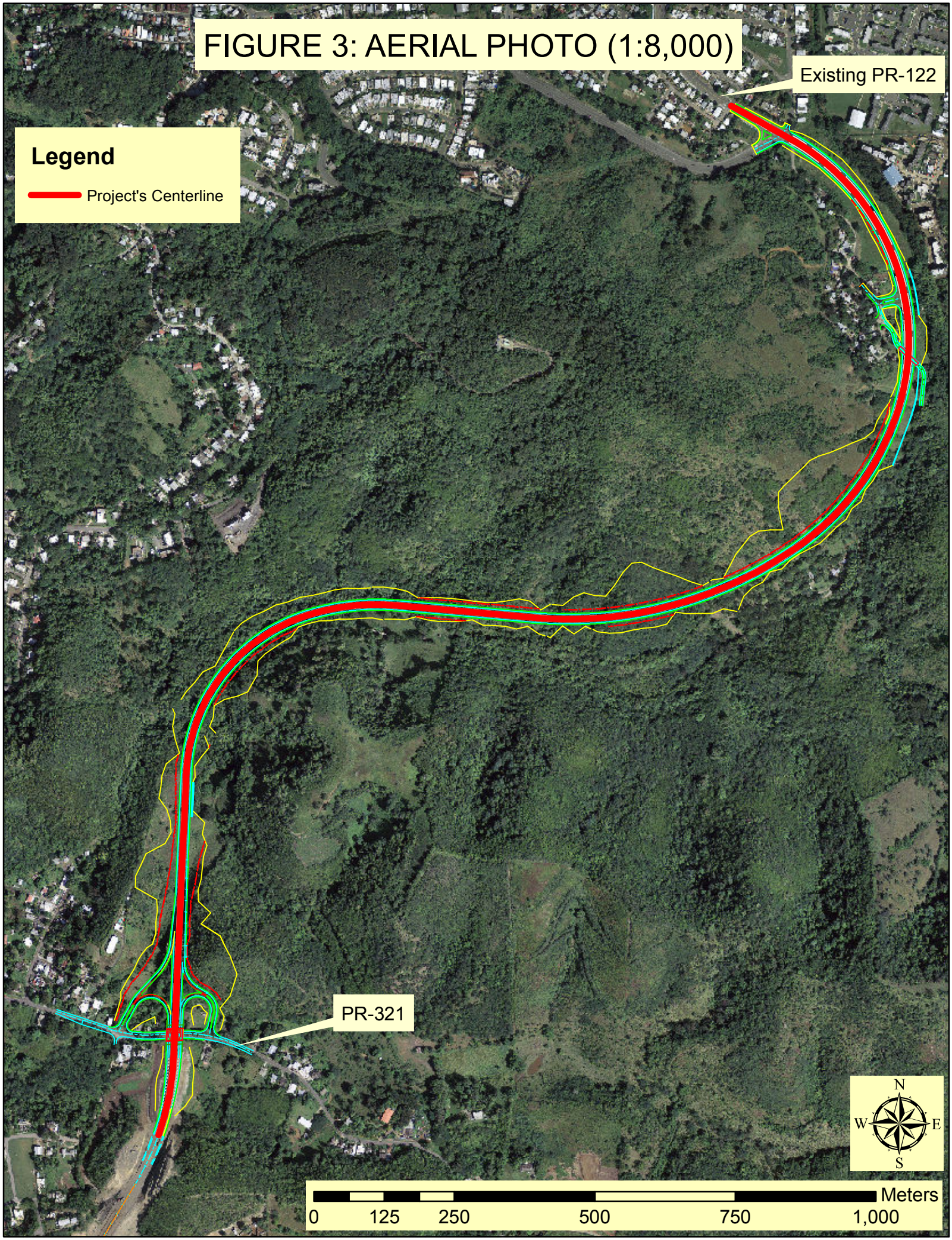

FIGURE 3: AERIAL PHOTO (1:8,000)
Existing PR-122
Legend
Project's Centerline
PR-321
N
W
E
S
Meters
0
125
250
500
750
1,000

Figure 4: Hydrographic Map

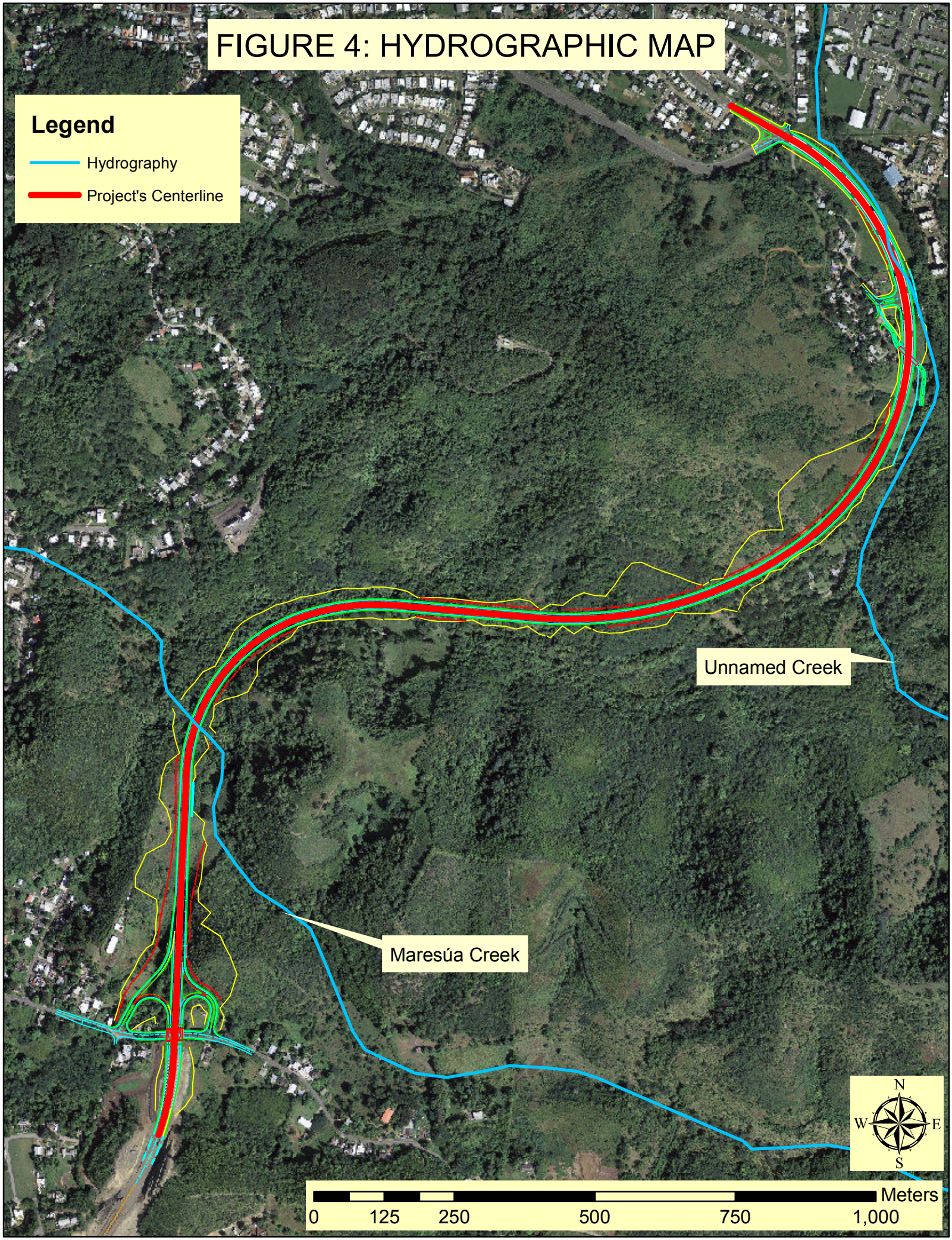

FIGURE 4: HYDROGRAPHIC MAP
Legend
Hydrography
Project's Centerline
Unnamed Creek
Maresúa Creek
N
W
E
S
Meters
0
125
250
500
750
1,000

Figure 5: Soils Map

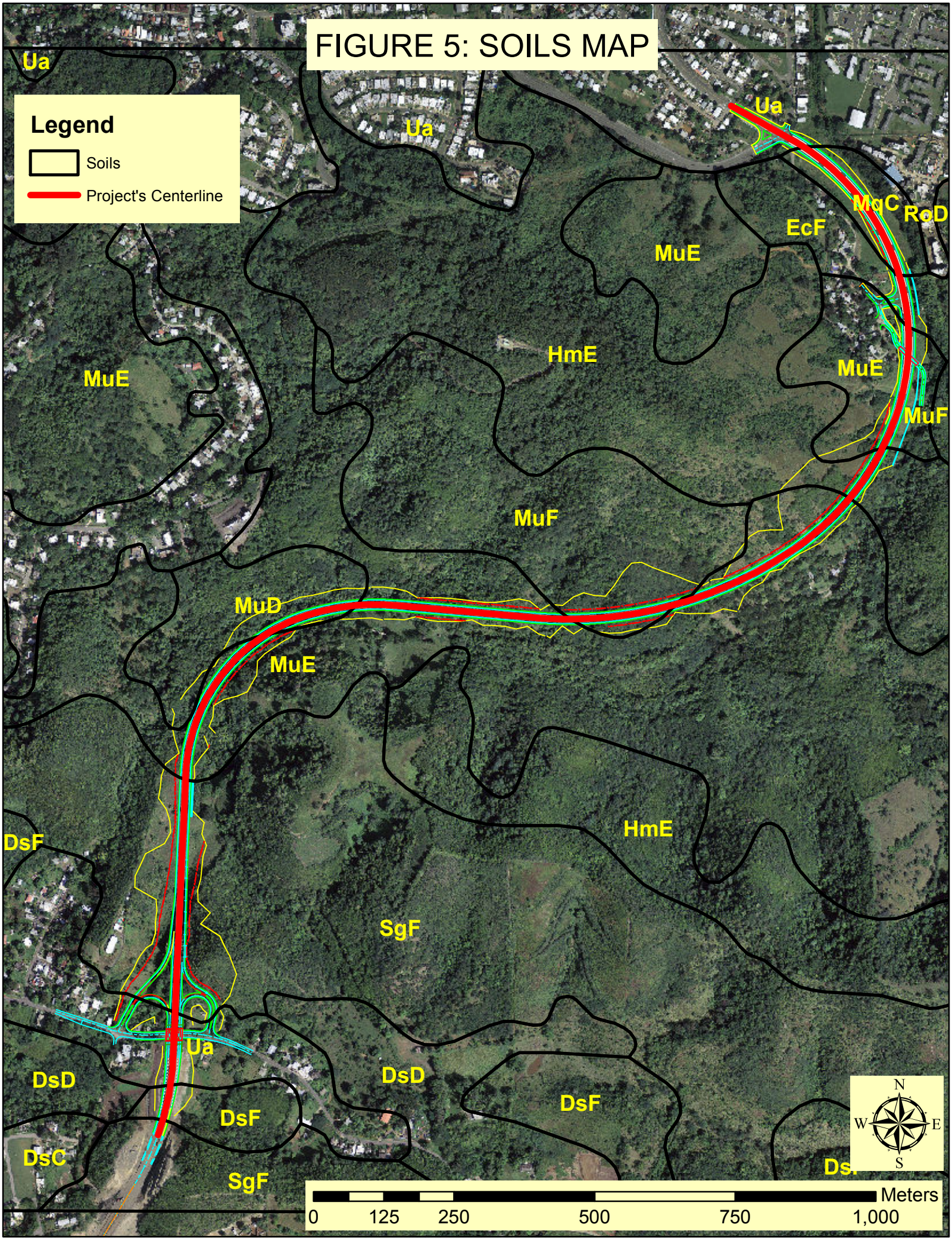
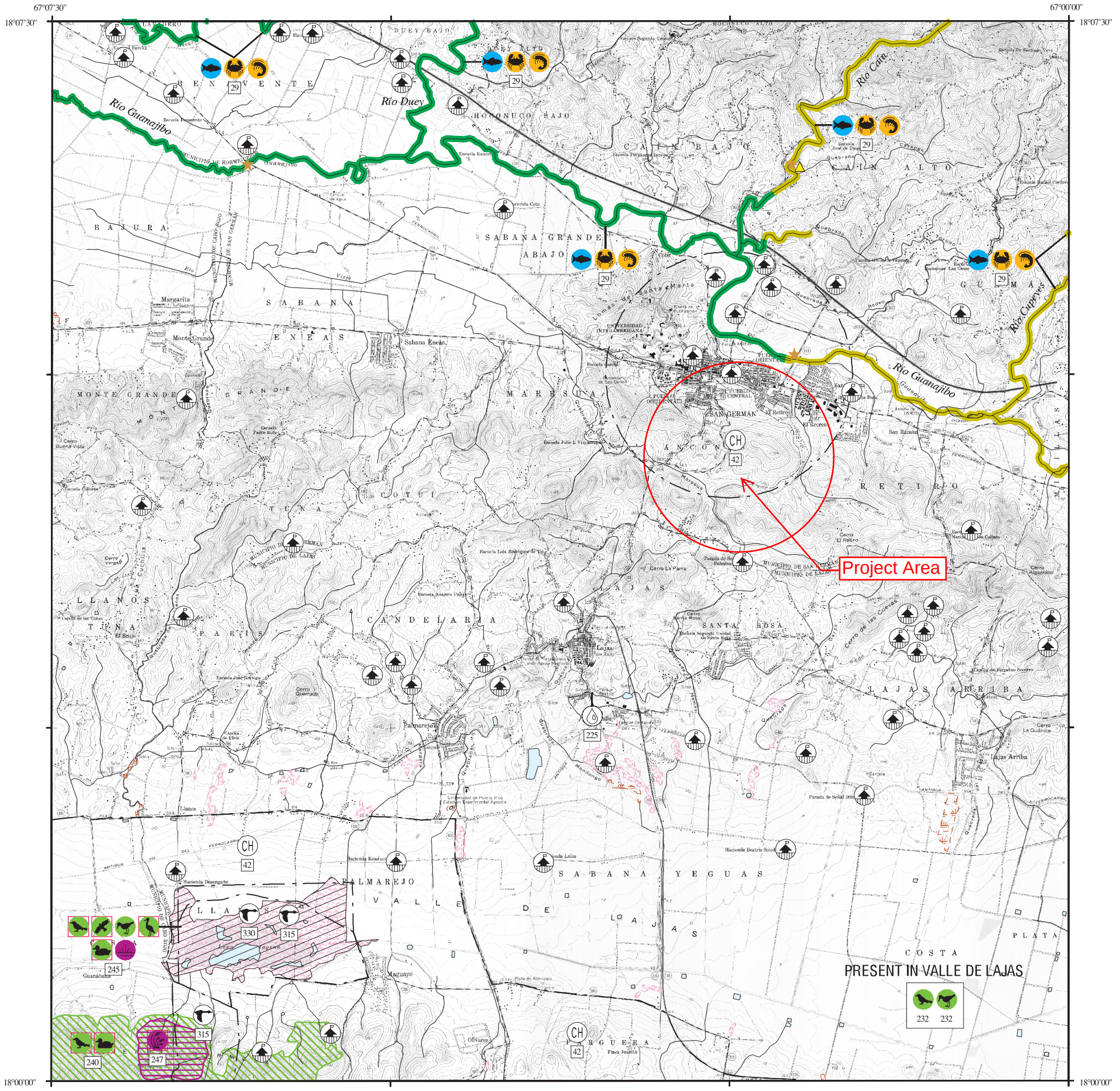

FIGURE 5: SOILS MAP
Legend
Soils
Project's Centerline
Ua
Ua
Ua
MgC
RoD
EcF
MuE
HmE
MuE
MuE
MuF
MuF
MuD
MuE
HmE
DsF
SgF
Ua
DsD
DsD
DsF
DsF
DsC
SgF
N
W
E
S
Meters
0
125
250
500
750
1,000

Figure 6: Environmental Sensitivity Index Map

# ENVIRONMENTAL SENSITIVITY INDEX MAP




## SHORELINE HABITATS (ESI)

- 1A EXPOSED ROCKY CLIFFS
- 1B EXPOSED, SOLID MAN–MADE STRUCTURES
- 2A EXPOSED WAVE–CUT PLATFORMS IN BEDROCK
- 2B SCARPS AND STEEP SLOPES IN MUDDY SEDIMENTS
- 3A FINE– TO MEDIUM–GRAINED SAND BEACHES
- 4 COARSE–GRAINED SAND BEACHES
- 5 MIXED SAND AND GRAVEL BEACHES
- 6A GRAVEL BEACHES
- 6B RIPRAP
- 7 EXPOSED TIDAL FLATS
- 8A SHELTERED ROCKY SHORES
- 8B SHELTERED, SOLID MAN–MADE STRUCTURES
- 9A SHELTERED TIDAL FLATS
- 9B SHELTERED VEGETATED LOW BANKS
- 10D MANGROVES
- SALT– AND BRACKISH–WATER MARSHES
- FRESHWATER MARSHES
- FRESHWATER SWAMPS
- FRESHWATER SCRUB/SHRUB

## STREAM REACHES (RSI)

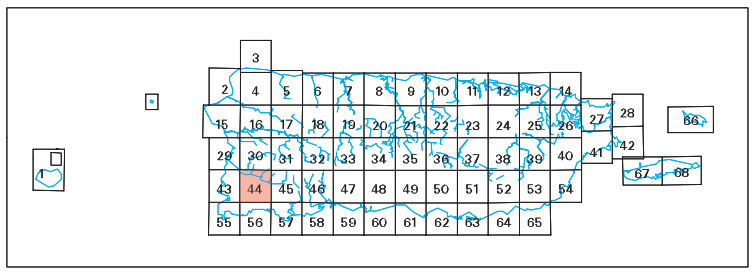
- 1 QUIET POOL; LOW–SENSITIVE BANKS
- 2 STRAIGHT CHANNEL WITH CURRENTS; LOW–SENSITIVE BANKS (MUD DOMINANT)
- 3 MEANDERING CHANNEL; SAND POINT BARS
- 4 MEANDERING CHANNEL; VEGETATED POINT BARS
- 5 RAPIDS OVER BEDROCK
- 6 MEANDERING CHANNEL; SAND AND GRAVEL POINT BARS
- 7 SPLIT CHANNEL WITH COARSE GRAVEL; SOME RAPIDS
- 8 SMALL FALLS; BOULDERS IN CHANNEL
- 9 LARGE FALLS; BOULDERS IN CHANNEL
- 10 CHANNELS WITH ASSOCIATED VULNERABLE WETLANDS
- KARST

N W E S

SCALE 1:55000

1 .5 0 1 KILOMETER

1 .5 0 1 MILE



Not For Navigation

Published: May 2000


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National Ocean Service
Office of Response and Restoration
Hazardous Materials Response Division


SAN GERMAN, P.R. (1966) **PR-44**

# PUERTO RICO - ESIMAP 44

## BIOLOGICAL RESOURCES:

### BIRD:

| RAR# | Species | S/F | T/E | Conc. | J | F | M | A | M | J | J | A | S | O | N | D | Nesting |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 232 | Common snipe | | | HIGH | X | X | X | X | | | | | | X | X | X | - |
| | Mourning dove | | | HIGH | X | X | X | X | X | X | X | X | X | X | X | X | MAR-AUG |
| | White-winged dove | | | HIGH | X | X | X | X | X | X | X | X | X | X | X | X | JAN-DEC |
| | Zenaida dove | | | HIGH | X | X | X | X | X | X | X | X | X | X | X | X | JAN-DEC |
| 240 | Puerto Rican nightjar | S/F | E/E | | X | X | X | X | X | X | X | X | X | X | X | X | FEB-JUL |
| | West Indian whistling-duck | S | T | POTENTIAL | X | X | X | X | X | X | X | X | X | X | X | X | JAN-DEC |
| 245 | Blue-winged teal | | | POTENTIAL | X | X | X | X | | | | | | X | X | X | - |
| | Caribbean coot | S | T | POTENTIAL | X | X | X | X | X | X | X | X | X | X | X | X | - |
| | Common moorhen | | | POTENTIAL | X | X | X | X | X | X | X | X | X | X | X | X | - |
| | Fulvous whistling-duck | | | POTENTIAL | X | X | X | X | X | X | X | X | X | X | X | X | - |
| | Glossy ibis | | | POTENTIAL | X | X | X | X | X | X | X | X | X | X | X | X | - |
| | Least grebe | S | T | POTENTIAL | X | X | X | X | X | X | X | X | X | X | X | X | APR-MAY<br>SEP-NOV |
| | Peregrine falcon | S | E | POTENTIAL | X | X | X | X | | | | | | X | X | X | - |
| | Purple gallinule | | | POTENTIAL | X | X | X | X | X | X | X | X | X | X | X | X | - |
| | Ruddy duck | S | T | POTENTIAL | X | X | X | X | X | X | X | X | X | X | X | X | - |
| | Shorebirds | | | POTENTIAL | X | X | X | X | X | | | X | X | X | X | X | - |
| | Wading birds | | | POTENTIAL | X | X | X | X | X | X | X | X | X | X | X | X | - |
| | West Indian whistling-duck | S | T | POTENTIAL | X | X | X | X | X | X | X | X | X | X | X | X | - |
| | White-cheeked pintail | | | POTENTIAL | X | X | X | X | X | X | X | X | X | X | X | X | FEB-JUN |
| | Yellow-breasted crake | S | T | POTENTIAL | X | X | X | X | X | X | X | X | X | X | X | X | MAR-JUN |
| | Yellow-shouldered blackbird | S/F | E/E | POTENTIAL | X | X | X | X | X | X | X | X | X | X | X | X | - |

### FISH:

| RAR# | Species | S/F | T/E | Conc. | J | F | M | A | M | J | J | A | S | O | N | D | Spawning | Eggs | Larvae | Juveniles | Adults |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 29 | Native stream fish | | | | X | X | X | X | X | X | X | X | X | X | X | X | APR-MAY<br>AUG-NOV | APR-MAY<br>AUG-NOV | APR-MAY<br>AUG-NOV | JAN-DEC | JAN-DEC |

### PLANT:

| RAR# | Species | S/F | T/E | Conc. | J | F | M | A | M | J | J | A | S | O | N | D |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 245 | Water hyacinth | | | | X | X | X | X | X | X | X | X | X | X | X | X |
| 247 | Aristida chaseae | S/F | E/E | | X | X | X | X | X | X | X | X | X | X | X | X |
| | Aristida portoricensis | S/F | E/E | | X | X | X | X | X | X | X | X | X | X | X | X |
| | Eugenia woodburyana | S/F | E/E | | X | X | X | X | X | X | X | X | X | X | X | X |
| | Lyonia truncata proctorii | S/F | E/E | | X | X | X | X | X | X | X | X | X | X | X | X |
| | Vernonia proctorii | S/F | E/E | | X | X | X | X | X | X | X | X | X | X | X | X |

### INVERTEBRATE:

| RAR# | Species | S/F | T/E | Conc. | J | F | M | A | M | J | J | A | S | O | N | D | Spawning | Eggs | Larvae | Juveniles | Adults |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 29 | Freshwater crab | | | | X | X | X | X | X | X | X | X | X | X | X | X | APR-MAY<br>AUG-NOV | APR-MAY<br>AUG-NOV | - | JAN-DEC | JAN-DEC |
| | Native stream shrimp | | | | X | X | X | X | X | X | X | X | X | X | X | X | APR-MAY<br>AUG-NOV | APR-MAY<br>AUG-NOV | APR-MAY<br>AUG-NOV | JAN-DEC | JAN-DEC |

## HUMAN USE RESOURCES:

### CRITICAL HABITAT:

| HUN# | Name | Owner/Manager | Contact | Phone |
|---|---|---|---|---|
| 42 | YELLOW-SHOULDERED BLACKBIRD DCH | USFWS | CARIBBEAN FIELD OFFICE | 787/851-7297 |

### WILDLIFE REFUGE:

| HUN# | Name | Owner/Manager | Contact | Phone |
|---|---|---|---|---|
| 315 | LAGUNA CARTAGENA NWR | USFWS | REFUGE MANAGER | 787/851-7258 |
| 330 | RESERVA NATURAL DE LA LAGUNA CARTAGENA | DRNA | DIVISION DE RESERVAS NATURALES Y REFUGIOS DE VIDA SILVESTRE | 787/724-2816 |

### WATER INTAKE:

| HUN# | Name | Owner/Manager | Location | Phone |
|---|---|---|---|---|
| 225 | LAJAS FILTER PLANT | PRASA | | |

Biological information shown on the maps represents known concentration areas or occurrences, but does not necessarily represent the full distribution or range of each species. This is particularly important to recognize when considering potential impacts to protected species.

Figure 7: Zoom in of the Environmental Sensitivity Index Map

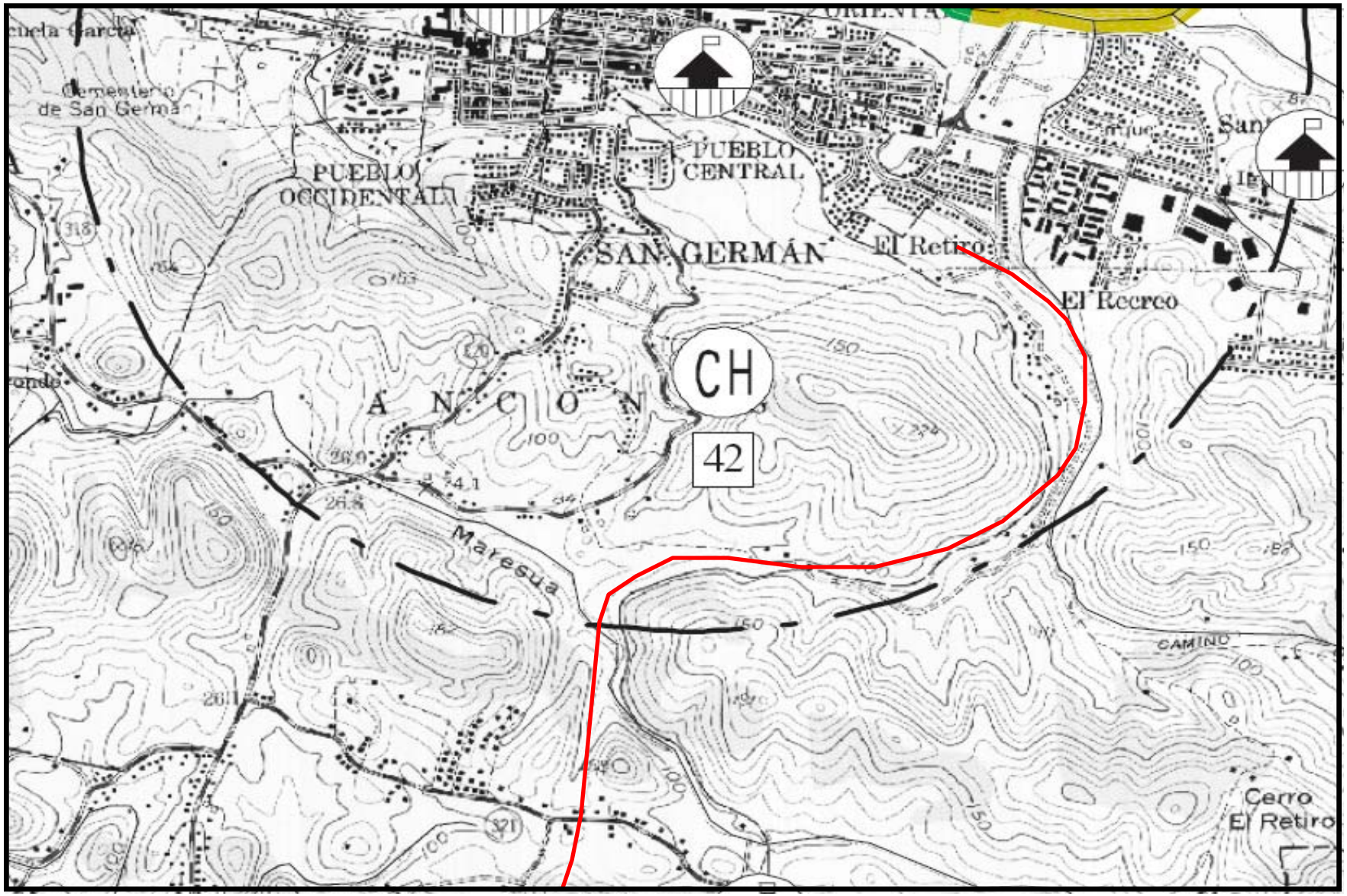



FIGURE 7
ZOOM IN OF THE ENVIRONMENTAL SENSI-
TIVITY INDEX MAP

---

EXTENSION TO ROAD PR-122
SAN GERMÁN - LAJAS

Figure 8: Helmer et al Vegetative Cover Map.

# FIGURE 8: VEGETATIVE COVER ACCORDING TO HELMER ET AL

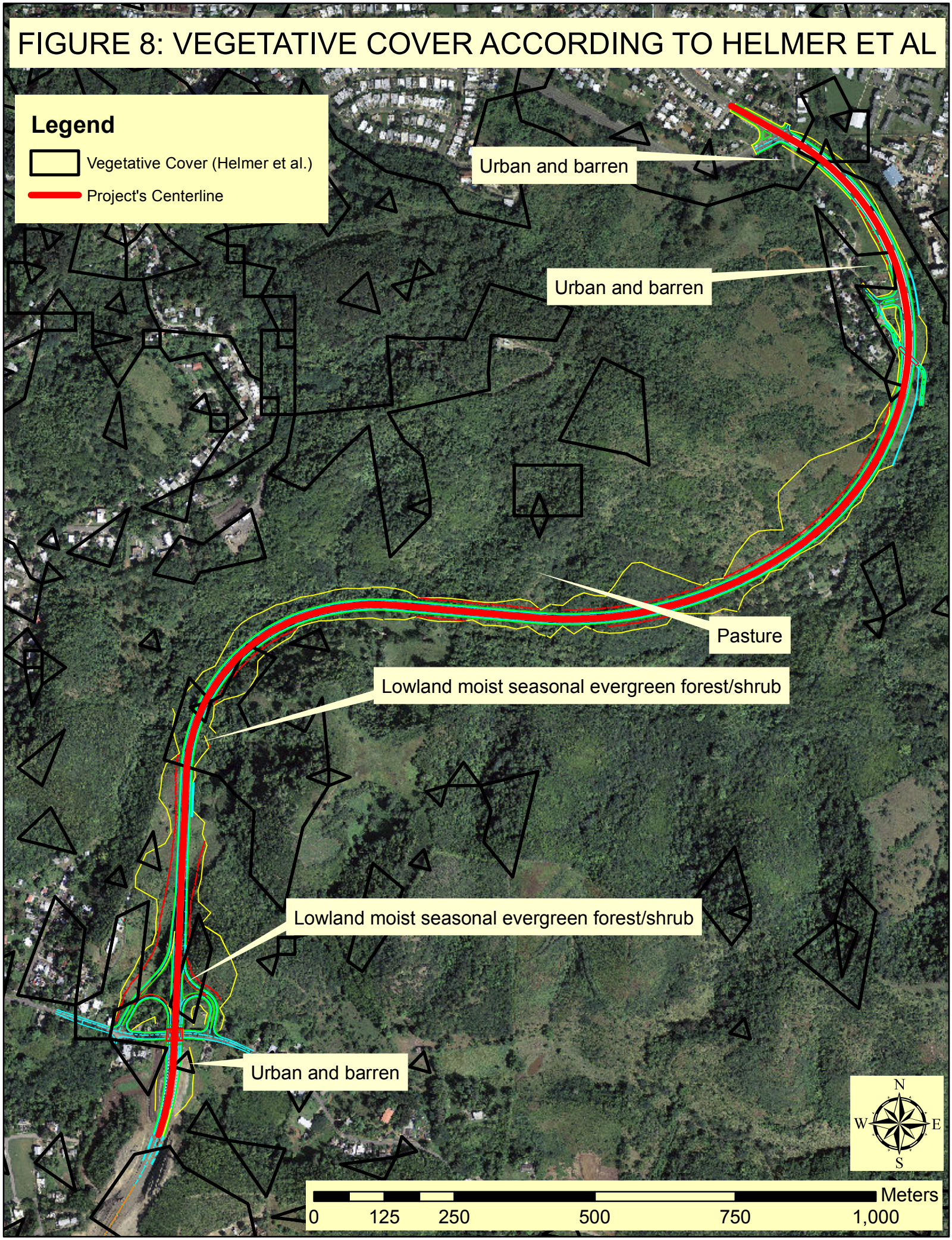
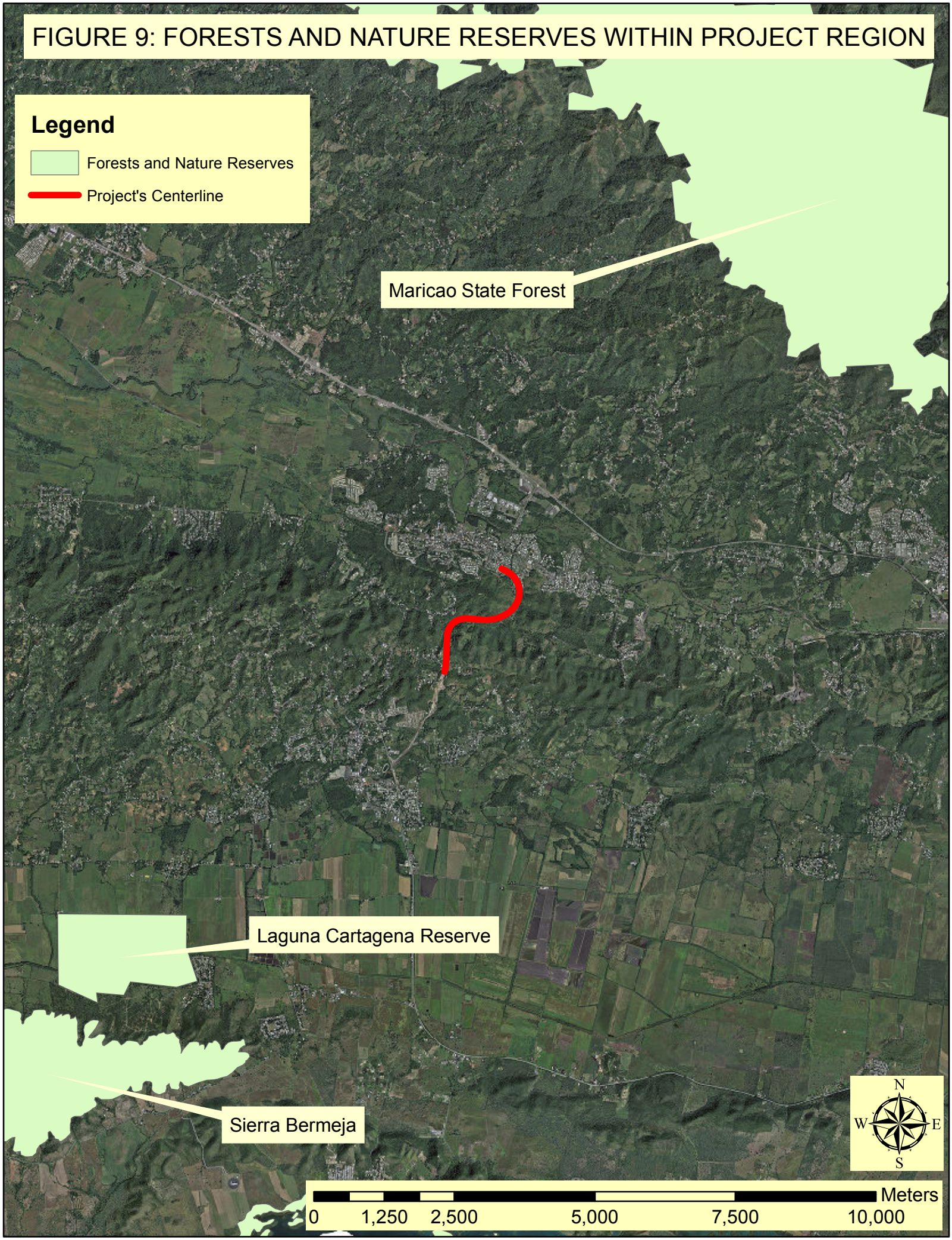


Figure 9: Forests and Nature Reserves within Project Region

# FIGURE 9: FORESTS AND NATURE RESERVES WITHIN PROJECT REGION



# APPENDIX B: CARIBBEAN ENDANGERED SPECIES MAP TABLES FOR THE MUNICIPALITIES OF LAJAS Y SAN GERMÁN

# LAJAS (1-2)

| SCIENTIFIC NAME | COMMON NAME | COMMON NAME SPANISH | GROUP | STATUS | DISTRIBUTION |
|---|---|---|---|---|---|
| Agelaius xanthomus | Yellow Shouldered Black Bird | Mariquita | Bird | E, CH | Coastal Forest |
| Aristida chaseae | No Common Name | No Tiene Nombre Comun | Plant | E | Sierra Bermeja, Cerro Mariquita, Cartagena National Wildlife Refuge (La Tinaja) |
| Aristida portoricensis | No Common Name | Pelos del Diablo | Plant | E | Sierra Bermeja (Cerro Mariquita) |
| Caprimulgus noctitherus | Puerto Rican Nightjar | Guabairo | Bird | E | Coastal Forest |
| Charadrius melodus | Piping Plover | Playero Melodico | Bird | T | Coastal Zones, No Nesting |
| Chelonia mydas | Green Sea Turtle | Peje Blanco | Reptile | T, CH | Coastal Zones |
| Epicrates inornatus | Puerto Rican Boa | Boa Puertorriqueña | Reptile | E | Forested Volcanic and Limestone (Karst) Hills |
| Eretmochelys imbricata | Hawksbill Sea Turtle | Carey | Reptile | E, CH | Coastal Zones |
| Eugenia woodburyana | No Common Name | No Tiene Nombre Comun | Plant | E | Sierra Bermeja, Cerro Mariquita, Cartagena National Wildlife Refuge (La Tinaja) |

****Continues on Next Page****

***Status***
E=Endangered
T=Threatened
CH=Critical Habitat

BACK CONTINUE

# LAJAS (2-2)

| SCIENTIFIC NAME | COMMON NAME | COMMON NAME SPANISH | GROUP | STATUS | DISTRIBUTION |
|---|---|---|---|---|---|
| Lyonia truncata var proctori | No Common Name | No Tiene Nombre Comun | Plant | E | Sierra Bermeja (Cerro Mariquita) |
| Ottoschulzia rhodoxylon | No Common Name | Palo de Rosa | Plant | E | Sierra Bermeja |
| Pelecanus occidentalis | Brown Pelican | Pelicano Pardo | Bird | D, MP | Coastal Zones, Nesting |
| Stahlia monosperma | No Common Name | Cobana Negra | Plant | T | Cartagena National Wildlife Refuge (La Tinaja), Parguera, Sierra Bermeja, Lajas Experimental Station |
| Sterna dougallii | Roseate Tern | Palometa | Bird | T | Coastal Areas and Offshore Cays, Nesting |
| Trichechus manatus manatus | Antillean Manatee | Manati Antillano | Mammal | E | Coastal Zones |
| Vernonia proctorii | No Common Name | No Tiene Nombre Comun | Plant | E | Sierra Bermeja (Cerro Mariquita) |

***Status***

E=Endangered
T=Threatened
CH=Critical Habitat
D=Delisted due to Recovery
MP= Monitoring Plan

**BACK** **PREVIOUS**

# SAN GERMAN

| SCIENTIFIC NAME | COMMON NAME | COMMON NAME SPANISH | GROUP | STATUS | DISTRIBUTION |
|---|---|---|---|---|---|
| Accipiter striatus venator | Puerto Rican Sharp-Shinned Hawk | Falcon de Sierra | Bird | E | Maricao State Forest |
| Agelaius xanthomus | Yellow Shouldered Black Bird | Mariquita | Bird | E, CH | Coastal Forest |
| Buteo platypterus brunnescens | Puerto Rican Broad-winged Hawk | Guaraguao de Bosque | Bird | E | Maricao State Forest |
| Caprimulgus noctitherus | Puerto Rican Nightjar | Guabairo | Bird | E | Coastal Forest |
| Cordia bellonis | No Common Name | No Tiene Nombre Comun | Plant | E | Maricao State Forest |
| Cranichis ricartii | No Common Name | No Tiene Nombre Comun | Plant | E | Maricao State Forest |
| Crescentia portoricensis | No Common Name | Higuero de Sierra | Plant | E | Maricao State Forest |
| Epicrates inornatus | Puerto Rican Boa | Boa Puertorriqueña | Reptile | E | Forested Volcanic and Limestone (Karst) Hills |
| Gesneria pauciflora | No Common Name | No Tiene Nombre Comun | Plant | T | Maricao State Forest |
| Ottoschulzia rhodoxylon | No Common Name | Palo de Rosa | Plant | E | Maricao State Forest |
| Stahlia monosperma | No Common Name | Cobana Negra | Plant | T | Along Road |
| Ternstroemia luquillensis | No Common Name | Palo Colorado | Plant | E | Maricao State Forest |

***Status***
E=Endangered
T=Threatened
CH=Critical Habitat

BACK

# APPENDIX C: FLORA AND FAUNA INVENTORY

| Flora Extension to Road PR-122 San Germán - Lajas | | | |
|---|---|---|---|
| | | | |
| **Familie** | **Scientific Name** | **Common name** | **Status** |
| Fabaceae-Faboideae | *Abrus precatorius* L. | Peronía | I |
| Amaranthaceae | *Achyranthes aspera* L.var. pubescens (Moq.) C.C. Towns | D | I |
| Euphorbiaceae | *Adelia ricinella* L. | Cotorro | N |
| Pteridaceae | *Adiantum pyramidale* (L.) Willd. | Helecho de pozo | N |
| Fabaceae-Mimosidae | *Albizia procera* (Roxb.) Benth. | Albicia | I |
| Araceae | *Alocasia macrorrhizos* (L.) G. Don in Sweet | Yautía cimarrona | I |
| Rutaceae | *Amyris elemifera* L. | Tea | N |
| Fabaceae-Mimosidae | *Anadenanthera peregrina* (L.) Speg. | Cojoba | N |
| Fabaceae-Faboideae | *Andira inermis* (W. Wright) Kunth ex DC. | Moca | N |
| Polygonaceae | *Antigonon leptopus* Hook. & Arn. | Coral | I |
| Myrsinaceae | *Ardisia obovata* Ham. | Bádula | N |
| Euphorbiaceae | *Argythamnia candicans* Sw. | D | N |
| Moraceae | *Artocarpus altilis* (Parkinson) Fosberg | Pana | I |
| Apocynaceae | *Asclepias curassavica* L. | Algodoncillo | I |
| Poaceae | *Bambusa vulgaris* Schrad. Ex J.C. Wendl. | Bambú | I |
| Asteraceae | *Bidens alba* (L.) DC. var. *radiata* (Sch. Bip.) R.E. Ballard ex Melchert | Margarita | N |
| Bixaceae | *Bixa orellana* L. | Achiote | I |
| Bromeliaceae | *Bromelia pinguin* L. | Maya | N |
| Burseraceae | *Bursera simaruba* (L.) Sarg. | Almácigo | N |
| Facaceae-Caesalpinioidea | *Caesalpinia pulcherrima* (L.) Sw. | Clavellina | I |
| Fabaceae-Faboideae | *Cajanus cajan* (L.) Millsp. | Gandúl | I |
| Callophylaceae | *Calophyllum antillanum* Britton in Britton & Wilson | María | N |
| Fabaceae-Faboideae | *Calopogonium caeruleum (* Benth.) C. Wright in Sauvalle | D | N |
| Annonaceae | *Cananga odorata* (Lam.) Hook. F. & Thomson | Ilán-ilán | I |
| Smilacaceae | *Capsicum annuum* L. var glabriusculum (Dunal) Heiser&Pickersgill | Ají picante | I |
| Caricaceae | *Carica papaya* L. | Papaya | N |
| Salicaceae | *Casearia aculeata* Jacq. | Cambrón | N |
| Salicaceae | *Casearia decandra* Jacq. | Caracolillo | N |
| Salicaceae | *Casearia guianensis* (Aublet) Urban | Cafeíllo | N |
| Salicaceae | *Casearia sylvestris* Sw. | Laurel espada | N |
| Urticaceae | *Cecropia schreberiana* Miq. Subsp. *Schreberiana* | Yagrumo hembra | N |
| Fabaceae-Faboideae | *Centrosema virginianum* (L.) Benth. | Conchita de Virginia | I |
| Solanaceae | *Cestrum citrifolium* Retz. in Hoffman | Galán del monte | N |
| Solanaceae | *Cestrum diurnum* L. | Galán de día | N |

| | | | |
|---|---|---|---|
| Rubiaceae | *Chiococca alba* (L.) Hitch. | Bejuco de berac. | N |
| Asteraceae | *Chromolaena odorata* (L.) R.M. King & H. Rob. | Cariaquillo Santa María | N |
| Sapotaceae | *Chrysophyllum cainito* L. | Caimito | N |
| Vitaceae | *Cissus verticillata (L.)* Nicolson & Jarvis | Bejuco de caro | N |
| Verbenaceae | *Citharexylum spinosum* L. | Péndula | N |
| Polygonaceae | *Coccoloba diversifolia* Jacq. | Cucubano | N |
| Palmae | *Cocos nucifera* L. | Palma de coco | I |
| Commelinaceae | *Commelina erecta* L. | Cohitre azul | N |
| Anacardiaceae | *Comocladia dodonaea* (L.) Urb. | Chicharrón | N |
| Boraginaceae | *Cordia collococca* L. | Palo de muñeca | N |
| Boraginaceae | *Cordia laevigata* Lam. | Capá colorado | N |
| Bignoniaceae | *Crescentia cujete* L. | Higüero | N |
| Fabaceae-Faboideae | *Crotolaria retusa* L. | Cascabelillo | I |
| Euphorbiaceae | *Croton flavens* L. | Adormidera | N |
| Apocynaceae | *Cryptostegia madagascarensis* Boger ex Decne. in A. de Candolle | Canario morado falso | I |
| Sapindaceae | *Cupania americana* L. | Guara | N |
| Asteraceae | *Cyanthillium cinereum* (L.) H. Rob. | Rabo de buey | I |
| Poaceae | *Cynodon dactylon* (L.) Pers. | Yerba de Bermuda | I |
| Poaceae | *Cynodon nlemfuensis* Vanderyst | Yerba de estrella | I |
| Euphorbiaceae | *Dalechampia scandens* L. | D | N |
| Facaceae-Caesalpinioidea | *Delonix regia* (Bojer) Raf. | Flamboyán | I |
| Fabaceae-Faboideae | *Desmodium axillare* (Sw.) DC. var. *axillare* | Zarzabacoa del monte | N |
| Araceae | *Dieffenbachia seguine* (Jacq.) Schott | Rábano cimarrón | N |
| Bignoniaceae | *Dolichandra ungis-cati* (L.) Miers | Uña de gato | N |
| Poaceae | *Eleusine Indica* (L.) Gaernt. | Pata de gallina | I |
| Asteraceae | *Emilia fosbergii* Nicolson | Clavelillo de cafetal | N |
| Araceae | *Epipremnum pinnatum 'Aureum'* Nicolson | Trepepalo amarillo | I |
| Erythroxylaceae | *Erythroxylum brevipes* DC. | Jibá | N |
| Myrtaceae | *Eugenia biflora* (L.) DC. | Hoja menuda | N |
| Myrtaceae | *Eugenia monticola* (Sw.) DC. | Birijí | N |
| Euphorbiaceae | *Euphorbia heterophylla* L. | Leche vana | N |
| Euphorbiaceae | *Euphorbia hirta L.* | Lechecillo | N |
| Moraceae | *Ficus citrifolia* Mill. | Jaguey | N |
| Fabaceae-Faboideae | *Galactia dubia* DC. | Salaíllo | N |
| Rubiaceae | *Genipa americana* L. | Jagua | N |
| Fabaceae-Faboideae | *Gliricidia sepium* (Jacq.) Kunth in Walpers | Mata ratón | I |
| Malvaceae | *Gossypium hirsutum* L. | Algodón | N |

| | | | |
|---|---|---|---|
| Nyctaginaceae | *Guapira fragrans* (Dum. Cours.) Little | Corcho | N |
| Meliaceae | *Guarea guidonia* (L.) Sleumer | Guaraguao | N |
| Malvaceae | *Guazuma ulmifolia* Lam. | Guácima | N |
| Rubiaceae | *Guettarda scabra* (L.) Vent. | Cucubano | N |
| Euphorbiaceae | *Gymnanthes lucida* Sw. | Yaití | N |
| Facaceae-Caesalpinioidea | *Haematoxylum campechianum* L. | Campeche | I |
| Poaceae | *Heteropogon contortus* (L.) P. Beauv. Ex Roem. & Schult. | Yerba torcida | N |
| Lamiaceae | *Hyptis capitata* Jacq. | Botoncillo negro | N |
| Facaceae-Caesalpinioidea | *Hymenaea courbaril* L. | Algarrobo | N |
| Fabaceae-Faboideae | *Indigofera suffruticosa* Mill. | Añil | N |
| Fabaceae-Mimosidae | *Inga laurina* (Sw.) Willd. | Guamá | I |
| Convolvulaceae | *Ipomoea tiliacea* (Willd.) Choisy **ex** DC. | Bejuco de puerco | I |
| Euphorbiaceae | *Jatropha curcas* L. | Tártago | I |
| Euphorbiaceae | *Jatropha gossypiifolia* L. | Higuereta cimarrona | N |
| Crassulaceae | *Kalanchoe pinnata* (Lam.) Pers. | Yerba bruja | I |
| Rhamnaceae | *Krugiodendron ferreum* (Vahl) Urb. | Palo de hierro | N |
| Cyperaceae | *Kyllinga pumila* Michx. | D | N |
| Lythraceae | *Lagerstroemia indica* L. | Astromelia | I |
| Lythraceae | *Lagerstroemia speciosa* (L.) Pers. | Reina de las flores | I |
| Verbenaceae | *Lantana camara* subsp. *portoricensis* | Cariaquillo | N |
| Verbenaceae | *Lantana involucrata* L. | Cariaquillo Santa María | N |
| Poaceae | *Lasiacis divaricata* (L.) Hitchc. | Pito | N |
| Brassiaceae | *Lepidium virginicum* L. | Lentejilla | I |
| Fabaceae-Mimosidae | *Leucaena leucocephala* (Lam.) DeWitt | Tamarindillo | I |
| Lauraceae | *Licaria parvifolia* (Lam.) Kosterm. | Cacaíllo | N |
| Fabaceae-Faboideae | *Macroptilium lathyroides* (L.) Urb. | Habichuela parada | I |
| Malvaceae | *Malvastrum americanum* (L.) Torr. In Emory | Malva silvestre | I |
| Calophyllaceae | *Mammea americana* L. | Mamey | N |
| Anacardiaceae | *Mangifera indica* L. | Mangó | I |
| Poaceae | *Megathyrsus maximus* (Jacq.) R. D. Webster | Yerba de Guinea | I |
| Sapindaceae | *Melicoccus bijugatus* Jacq, | Quenepa | I |
| Malvaceae | *Melochia nodiflora* Sw. | Bretónica prieta | I |
| Malvaceae | *Melochia pyramidata* L. | Bretónica piramidal | N |
| Convolvulaceae | *Merremia quinquefolia* (L.) Hallier f. | Batatilla blanca | I |
| Asteraceae | *Mikania micrantha* Kunth in Humboldt | Guaco falso | N |
| Fabaceae-Mimosidae | *Mimosa pudica* L. | Moriviví | N |
| Cucurbitaceae | *Momordica charantia* L. | Cundeamor | I |

| | | | |
|---|---|---|---|
| Rutaceae | *Murraya paniculata* (L.) Jacq | Café de la India | I |
| Myrtaceae | *Myrcia splendens* (Sw.) DC. | Hoja menuda | N |
| Lauraceae | *Nectandra coriacea* (Sw) Griseb. | Laurel | N |
| Lomariopsidaceae | Nephrolepis brownii (Sw.) Schott | D | I |
| Orchidaceae | *Oeceoclades maculata* (Lindl.) Lindl. | D | I |
| Poaceae | *Olyra latifolia* L. | Carrucillo | N |
| Asteraceae | *Parthenium hysterophorus* L. | Ajenjo cimarrón | I |
| Passifloraceae | *Passiflora edulis* Sims | Parcha yedra | I |
| Passifloraceae | *Passiflora suberosa* L. | Parcha yedra | N |
| Sapindaceae | *Paullinia pinnata* L. | Bejuco de costilla | N |
| Malvaceae | *Pavonia fruticosa* (Mill.) Facw. & Rendle | Cadillo pequeque | N |
| Malvaceae | *Pavonia spiniflex* (L.) Cav. | Cadillo espinoso | N |
| Lauraceae | *Persea americana* Mill. | Aguacate | I |
| Lamiaceae | *Petitia domingensis* Jacq. | Capá amarillo | N |
| Picramniaceae | *Petiveria alliacea* L. | Anamú | I |
| Poaceae | *Pharus latifolius* L. | Cortadora | N |
| Myrtaceae | Pimenta racemosa (Mill.) J.W. Moore var. racemosa | Malagueta | N |
| Piperaceae | *Piper aduncum* L. | Higuillo | N |
| Piperaceae | *Piper amalago* L. | Higuillo de limón | N |
| Fabaceae-Mimosidae | *Pithecellobium dulce* (Roxb.) Benth. | Guamá americano | I |
| Fabaceae-Mimosidae | *Prosopis juliflora* (Sw.) DC. | Bayahonda | N |
| Asteraceae | *Pseudoelephantopus spicatus* (B. Juss. ex Aubl) C.F. Baker | Yerba de burro | N |
| Myrtaceae | *Psidium guajava* L. | Guayaba | I |
| Rubiaceae | *Psychotria nervosa* Sw. | Bálsamo | N |
| Rubiaceae | *Randia aculeata* L. | Tintillo | N |
| Apocynaceae | *Rauvolfia nitida* Jacq. | Cachimbo | N |
| Fabaceae-Faboideae | *Rhynchosia reticulata* (Sw.) DC. | Frijolillo | N |
| Palmae | *Roystonea borinquena* O.F. Cook | Palma real | N |
| Fabaceae-Mimosidae | *Samanea saman* (Jacq.) Merr. | Samán | I |
| Asparagaceae | *Sansevieria hyacinthoides* (L.) Druce | Lengua de vaca | I |
| Fabaceae-Caesalpinioideae | *Senna occidentalis (L.) Link* | Hedionda | N |
| Fabaceae-Caesalpinioideae | *Senna siamea* (Lam.) H.S. Irwin & Barneby | Casia de Siam | I |
| Sapindaceae | *Serjania polyphylla* (L.) Radlk. | Bejuco de canastas | N |
| Malvaceae | *Sida acuta* Burm. f. | Escoba blanca | N |
| Malvaceae | *Sida rhombifolia* L. | Escoba clorada | N |
| Solanaceae | *Solanum torvum* Sw. | Berenjena cimarrona | I |
| Bignoniaceae | *Spathodea campanulata* Beauv. | Tulipán africano | I |

| | | | |
|---|---|---|---|
| Rubiaceae | *Spermacoce verticillata* L. | Botón blanco | I |
| Poaceae | *Sporobolus indicus* (L.) R. Br. | Cerrillo | N |
| Malvaceae | *Sterculia apetala* (Jacq.) H. Karst. | Anacagüita | I |
| Malpighiaceae | *Stigmaphyllon floribundum* (DC.) C.E. Anderson | Bejuco de menta | I |
| Meliaceae | *Swietenia mahagoni* (L.) Jacq. | Caoba Dominicana | I |
| Araceae | *Syngonium podophyllum* Schott. | Malanga trepadora | I |
| Bignoniaceae | *Tabebuia heterophylla* (DC.) Britton | Roble | N |
| Fabaceae-Caesalpinioideae | *Tamarindus indica* L. | Tamarindo | I |
| Bignoniaceae | *Tecoma stans* (L.) Juss. ex Kunth inHumboldt | Saúco amarillo | I |
| Combretaceae | *Terminalia catappa* L. | Almendro | I |
| Melastomataceae | *Tetrazygia elaeagnoides* (Sw.) DC. | Verdiseco | N |
| Malvaceae | *Thespesia grandiflora* DC. | Maga | N |
| Sapindaceae | *Thouinia striata* Radlk. var. *striata* in Engler & Prantl | Serrasuela | E |
| Acanthaceae | *Thunbergia fragans* Roxb. | Susana blanca | I |
| Bromeliaceae | *Tillandsia recurvata* (L.) L. | Nidos de gungulén | N |
| Bromeliaceae | *Tillandsia sp.* | D | D |
| Boraginaceae | *Tournefortia hirsutissima* L. | Nigua | N |
| Euphorbiaceae | *Tragia volubilis* L. | Pringamosa | N |
| Cannabaceae | *Trema micranthum* (L.) Blume | Guacimilla | N |
| Meliaceae | *Trichilia hirta* L. | Cabo de hacha | N |
| Phytolaccaceae | *Trichostigma octandrum* (L.) H. Walt. | Bejuco de nasa | N |
| Asteraceae | *Tridax procumbens* L. | Pancha | I |
| Malvaceae | *Triunfetta lappula* L. | Cadillo | N |
| Malvaceae | *Urena lobata* L. | Cadillo | N |
| Brassiaceae | *Varronia polycephala* Lam. | Basora | N |
| Fabaceae-Faboideae | *Vigna vexillata* (L.) Rich. in Sagra | Frijol cimarrón | N |
| Malvaceae | *Waltheria indica* L. | Basora prieta | N |
| Malvaceae | *Wissadula periplocifolia* (L.) C.Presl ex Thwaitesin Thwaites & Hooker | D | N |
| Zamiaceae | *Zamia pumila* L. | Marunguey | N, EC |
| Rutaceae | *Zanthoxylum martinicense* (Lam.) DC. | Cenizo | N |
| Rutaceae | *Zanthoxylum monophyllum* (Lam.) P. Wilson | Espino blanco | N |
| Fabaceae-Mimosidae | *Zapoteca portoricensis* (Jacq. H.M. Hern | Moriviví cimarrón | N |
| | | | |
| Legend: | | | |
| E: Endemic to Puerto Rico | | | |
| CE: Critical element (DNER) | | | |
| I: Introduced | | | |

| | | | |
|---|---|---|---|
| N: Native to Puerto Rico | | | |

| Fauna Extension to Road PR-12 San Germán - Lajas | | |
|---|---|---|
| | | |
| **Scientific Name** | **Common Name** | **Status** |
| **VERTEBRATES** | | |
| **Mamals** | | |
| **Herpestidae** | | |
| *Herpestes javanicus* | Mangosta | I |
| | | |
| **Birds** | | |
| **Accipitridae** | | |
| *Buteo jamaicensis* | Guaraguao colirrojo | R |
| **Ardeidae** | | |
| *Ardea alba* | Garza real | R |
| *Bubulcus ibis* | Garza ganadera | R |
| **Cathartidae** | | |
| *Cathartes aura* | Aura tiñosa | R |
| **Coerebidae** | | |
| *Coereba flaveola* | Reinita común | R |
| *Spindalis portoricensis* | Reina mora | E |
| *Tiaris bicolor* | Chamorro negro | R |
| **Columbidae** | | |
| *Columbina passerina* | Rolita | R |
| *Geotrygon montana* | Paloma perdiz roja | EC |
| *Patagioenas leucocephala* | Paloma cabeciblanca | EC |
| *Patagioenas squamosa* | Paloma turca | R |
| *Zenaida asiatica* | Tórtola aliblanca | R |
| *Zenaida aurita* | Tórtola cardosantera | R |
| **Cuculidae** | | |
| *Crotophaga ani* | Judío | R |
| *Saurothera vieilloti* | Pájaro bobo mayor | E |
| **Estrildidae** | | |
| *Lonchura malacca* | Monja tricolor | IE |
| **Fringillidae** | | |
| *Euphonia musica* | Jilguero | R |
| **Icteridae** | | |
| *Icterus icterus* | Turpial | R |

| | | |
|---|---|---|
| *Molothrus bonariensis* | Tordo lustroso | IE |
| *Quiscalus niger* | Chango | R |
| **Mimidae** | | |
| *Margarops fuscatus* | Zorzal pardo | |
| **Parullidae** | | |
| *Setophaga adelaidae* | Reinita mariposera | R |
| **Picidae** | | |
| *Melanerpes portoricensis* | Pájaro carpintero de P.R. | E |
| **Psittacidae** | | |
| *Brotogeris versicolurus* | Perico aliamarillo | IE |
| **Strigidae** | | |
| *Megascops nudipes* | Mucarito de P.R. | E |
| **Thraupidae** | | |
| *Loxigilla portoricensis* | Come ñame de P.R. | E |
| **Todidae** | | |
| *Todus mexicanus* | San Pedrito | E |
| **Tyrannidae** | | |
| *Contopus latirostris* | Bobito antillano menor | R |
| *Myiarchus antillarum* | Juí de P.R. | E |
| *Tyrannus dominicensis* | Pitirre | R |
| **Vireonidae** | | |
| *Vireo altiloquus* | Julián chiví | R |
| *Vireo latimeri* | Bien te veo de P.R. | E |
| | | |
| | | |
| **Reptiles** | | |
| **Boidae** | | |
| *Chilabothrus inornatus* | Boa de Puerto Rico | EE, EF |
| **Iguanidae** | | |
| *Ctenonotus cristatellus* | Lagartijo común | R |
| *Ctenonotus pulchellus* | Lagartijo de hierbas | R |
| **Sphaerodactylidae** | | |
| *Spaherodactylus macrolepis* | Geko | R |
| **Teiidae** | | |
| *Ameiva exsul* | Siguana | R |
| | | |
| **Amphibians** | | |

| | | |
|---|---|---|
| **Leptodactylidae** | | |
| *Eleutherodactylus antillensis* | Coquí churí | E |
| *Eleutherodactylus coqui* | Coquí común | E |
| | | |
| **INVERTEBRATES** | | |
| | | |
| **Chelicerata** | | |
| **Arachnida** | | |
| **Araneae** | | |
| **Nephilidae** | | |
| *Nephila clavipes* | Araña dorada | R |
| **Theraphociae** | | |
| *Cyrthopolis portoricae* | Araña peluda de P.R. | E |
| | | |
| | | |
| **Insects** | | |
| **Apoidea** | | |
| **Apidae** | | |
| **Blattoidea** | | |
| **Termitidae** | | |
| *Nasutitermes costalis* | Comején | N/A |
| **Pieridae** | | |
| *Aphrissa statira cubana* | Mariposa | N |
| | | |
| | | |
| **Molusks** | | |
| **Camaenidae** | | |
| *Caracolus caracolla* | Caracol | R |
| *Caracolus marginella* | Caracol | R |
| *Polydontes lima* | Caracol | R |
| | | |
| | | |
| Legend: | | |
| E: Endemic to Puerto Rico | | |
| CE: Critical element (DNER) | | |

| | | |
|---|---|---|
| EE: State designated endangered species | | |
| EF: Federally designated endangered species | | |
| I: Introduced | | |
| EI: Established Introduced | | |
| N: Native to Puerto Rico | | |
| R: Resident | | |

# APPENDIX D: PHOTOGRAPHIC DOCUMENTATION



Photo 1. General view from PR-321 (south section) to Project site entrance.



Photo 2. View from Project centerline towards PR-321.



Photo 3. General view towards the Maresúa Creek area, near Project's southern section,



Photo 4. View of the Maresúa Creek.



Photo 5. View of an area associated to the Maresúa Creek.



Photo 6. View of hills adjacent to the south central section of Project route.



Photo 7. Another view of hills adjacent to the south central section of Project route.



Photo 8. View of areas dominated by pasture within the central section of the Project.



Photo 9. View of other areas within the central section of the Project.



Photo 10. Another view of other areas within the central section of the Project.



Photo 11. View of an area within the northern section of the Project.



Photo 12. View of one of the ephemeral creeks within Project area.

# APPENDIX 7: Study to Determine the Presence of the Yellow-shouldered Blackbird and recommendations

# Estudio para la Determinación de la Presencia de la Mariquita de Puerto Rico (*Agelaius xanthomus*)



**Extensión de la Carretera PR-122 Municipios de Lajas y San Germán, Puerto Rico**

**Preparado para:**
**La Autoridad de Carreteras y Transportación**

**Preparado por:**

COLL RIVERA ENVIRONMENTAL

Environmental Studies,
Permitting and Consulting

**Julio 2020**
**San Juan, Puerto Rico**



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## Resumen Ejecutivo

La Autoridad de Carreteras y Transportación (ACT) propone la Extensión de la Carretera PR-122, conocida como Avenida Ángel Castro Pérez (el Proyecto), desde su actual intersección con el extremo este de la carretera PR-166 (Desvío Sur de San Germán) hasta su intersección con la carretera PR-621 en Lajas (**Apéndice A**, **Figuras 1** y **2**). El Proyecto comprende un largo de aproximadamente de 2.2 Km. y un ancho de servidumbre mínimo de 33.5 metros (**Apéndice A**, **Figura 3**).

Este documento constituye el Estudio para la Determinación de la Presencia de la mariquita de Puerto Rico (*Agelaius xanthomus*) en el área propuesta para este Proyecto. El propósito de este estudio es determinar si la mariquita está presente en el área propuesta para el Proyecto.

El área de estudio está dominado por árboles, entre los que se encuentran la guara (Cupania americana), la guayaba (*Psidium guajava*), el cenizo (*Zanthoxylum martinicense*), el corcho (*Guapira fragrans*), el quenepo (*Meliccocus bijugatus*), el campeche (*Haematoxylum campechianum*) y el cabo de hacha (*Trichilia hirta*). Entre las especies herbáceas dominan el rabo de gato (*Achyranthes aspera*), la *Kyllinga pumila* (no nombre común), el anamú (*Petiveria aliacea*) y las escobas (*Sida spp.*). Los bejucos más comunes son el bejuco de canasta (*Serjania polyphylla*), el bejuco de nasa (*Trichostigma octandrum*), el bejuco de caro (*Cissus verticillata*), la nigua (*Tournefortia hirsutissima*) y el cundeamor (*Momordica charantia*).

Por otro lado, las especies de fauna dominantes son el Julián chiví (*Vireo altiloquus*), la tórtola aliblanca (*Zenaida asiatica*), el lagartijo común (*Ctenonotus cristatellus*) y los caracoles (*Caracolus caracolla*, *Caracolus marginella* y *Polydontes lima*). Se observó a la Boa de Puerto Rico (*Chilabothrus inornatus*), especie en peligro de extinción a nivel federal y estatal. También se detectó a la paloma cabeciblanca (*Patagioenas leucocephala*), especie designada como elemento crítico por el Departamento de Recursos Naturales y Ambientales (DRNA).

Se observaron doce especies de fauna endémicas para Puerto Rico. Estas son la reina mora (*Spindalis portoricensis*), el pájaro bobo mayor (*Saurothera vieilloti*), el pájaro carpintero (*Melanerpes portoricensis*), el come ñame de Puerto Rico (*Loxigilla portoricensis*), el San Pedrito (*Todus mexicanus*), el juí de Puerto Rico (*Myiarchus antillarum*), el bien te veo de Puerto Rico (*Vireo latimeri*), el mucarito de Puerto Rico (*Megascops nudipes*), el coquí común (*Eleutherodactylus coqui*), el coquí churí (*Eleutherodactylus antillensis*), la araña peluda de Puerto Rico (*Cyrthopolis portoricae*) y la boa de Puerto Rico.

La sección norte del Proyecto se encuentra dentro de una zona designada como hábitat crítico para la mariquita de Puerto Rico, especie en peligro de extinción a nivel federal y estatal. Sin embargo, esta especie no fue observada durante el trabajo de campo para este estudio.

## Introducción

La Autoridad de Carreteras y Transportación (ACT) propone la Extensión de la Carretera PR-122, conocida como Avenida Ángel Castro Pérez (el Proyecto), desde su actual intersección con el extremo este de la carretera PR-166 (Desvío Sur de San Germán) hasta su intersección con la carretera PR-621 en Lajas (**Apéndice A**, **Figuras 1** y **2**). El Proyecto comprende un largo de aproximadamente de 2.2 Km. y un ancho de servidumbre mínimo de 33.5 metros (**Apéndice A**, **Figura 3**).

El Proyecto está ubicado dentro de la Región Oeste de Puerto Rico. Su alineación corre mayormente paralelo a la Carretera PR-101 y aproximadamente un (1) Km al este de la misma. En su trayectoria pasa entre la Comunidad El Retiro y una quebrada sin nombre en San Germán y continúa hacia Lajas, cruzando por encima de la Carretera PR-321 en el Km 1.0.

Este documento contiene las siguientes secciones:

- Descripción del área de Estudio,
- Metodología del Estudio,
- Resultados y Discusión,
- Conclusiones y Recomendaciones,
- Referencias y
- Apéndices

El trabajo de campo realizado para obtener los datos para este estudio se llevó a cabo del 16 al 18 de junio de 2017.

## Descripción del Área de Estudio

Según mencionado en la sección de **Introducción**, el Proyecto está propuesto en la Región Oeste de Puerto Rico. Su alineación corre mayormente paralelo a la Carretera PR-101 y aproximadamente un (1) Km al este de la misma. En su trayectoria pasa entre la Comunidad El Retiro y una quebrada sin nombre en San Germán y continúa hacia Lajas, cruzando por encima de la Carretera PR-321 en el Km 1.0 (**Apéndice A**, **Figuras 1**, **2** y **3**).

El área de estudio se encuentra dentro de la zona de vida conocida como Bosque Húmedo Subtropical (Ewel y Whitmore, 1973). La zona de vida del bosque húmedo subtropical es la más extensa de todas las zonas existentes en Puerto Rico. El Bosque húmedo subtropical cubre aproximadamente 5,500 Km² o un 58% del total del área de la Isla. En esta zona de vida la precipitación promedio anual es de 1,100mm a 2,200mm y una temperatura promedio de 18 a 24°C.

La mayoría del Bosque Húmedo subtropical ha sido deforestado en un momento u otro. Esto se debe a que las condiciones climáticas que lo definen son buenas condiciones para una gran cantidad de cosechas. Con la excepción de los suelos derivados de serpentina o piedra caliza, gran parte del terreno en esta zona de vida se mantiene en algún tipo de uso deforestado. Las áreas que han mantenido la vegetación representativa de la zona son caracterizadas por árboles de hasta 20 metros de altura, con coronas redondeadas, como por ejemplo el árbol de Mangó (*Mangifera indica*). Muchos de las especies leñosas son deciduas durante la temporada seca y las epífitas son comunes, y a veces cubren completamente los troncos y las ramas.

### Climatología

De acuerdo al “Monthly Station Normals of Temperature, Precipitation, and Heating and Cooling Degree Days, 1981 - 2010”, preparado por la Administración Oceánica y Atmosférica Nacional (NOAA, por sus siglas en inglés), la precipitación promedio anual en la región es aproximadamente 47.98 pulgadas (1,199.5 mm). La temperatura mínima

promedio anual es de 67.0 F (19.4 C). La temperatura máxima promedio anual es de 89.4 F (31.9 C). La temperatura promedio anual es de 78.2 F (25.7 C). Estos datos fueron tomados de la Subestación Lajas, PR con coordenadas geográficas 18.0330° N, -67.0722° W.

**Hidrografía**

La hidrografía principal incluye a la Quebrada Maresúa que discurre de este a oeste atravesando por la sección sur central del Proyecto y una quebrada sin nombre la cual se encuentra adyacente al Proyecto en su lado noreste y discurre de sur a norte. Ambas quebradas descargan en el Río Guanajibo, el cual descarga sus aguas en el Océano Atlántico. En adición, existen varias quebradas efímeras, las cuales manejan las aguas pluviales solo durante lluvia. La **Figura 4** (**Apéndice A**) muestra la hidrología principal de la zona en que se encuentra el Proyecto.

**Topografía**

La **Figura 1** (**Apéndice A**) muestra la localización del Proyecto sobre el cuadrángulo topográfico de San Germán, preparado por el Servicio Geológico de los Estados Unidos. De esta figura se puede observar que la topografía del área del Proyecto varía de semillana a semiescarpada, ya que este discurre por valles y montañas. Según esta fuente, la elevación del área del Proyecto está aproximadamente entre 100 y 60 metros sobre el nivel promedio del mar (AMSL, por sus siglas en inglés).

**Descripción y Clasificación de Suelos**

De acuerdo al Catastro de Suelos del Área de San Germán, del Servicio de Conservación de Suelos (Web Soil Survey, Agosto 10, 2016), en el área de estudio existen nueve tipos de suelos. Estos son el Descalabrado arcilloso, en pendientes de 20 a 60% (DsF); el complejo Cacique-La Taína, en pendientes de 20 a 60% (EcF); el Humatas arcilloso, en pendientes de20 a 40% (HmE); el Montegrande arcilloso, en pendientes de 2 a 12% (MqC); el Mucará lómico, en pendientes de 12 a 20% (MuD); el Mucará lómico, en pendientes de 20 a 40% (MuE); el Mucará lómico, en pendientes de 40 a 60% (MuF), el complejo San Germán-Duey, en pendientes de 20 a 60% (SgF) y el terreno urbano (Ua). La **Figura 5** muestra el mapa de suelos del área del Proyecto.

El suelo Descalabrado arcilloso, en pendientes de 20 a 60% (DsF) se encuentra en las crestas y pendientes de montañas y lomas. Son suelos bien drenados y de permeabilidad moderadamente baja. La capacidad de agua disponible es bien baja.

El complejo Cacique-La Taína, en pendientes de 20 a 60% (EcF) se encuentra en las crestas y pendientes de montañas y lomas. Son suelos bien drenados y de permeabilidad de moderadamente baja a moderadamente alta. La capacidad de agua disponible es bien baja.

El suelo Humatas arcilloso, en pendientes de20 a 40% (HmE) se encuentra en las pendientes de montañas y lomas. Son suelos bien drenados y de permeabilidad moderadamente baja. La capacidad de agua disponible es alta.

El suelo Montegrande arcilloso, en pendientes de 2 a 12% (MqC) se encuentra en los valles aluviales, terrazas y en los lados de los valles. Son suelos moderadamente bien drenados y de permeabilidad moderadamente baja. La capacidad de agua disponible es moderada.

El suelo Mucará lómico, en pendientes de 12 a 20% (MuD) se encuentra en las pendientes de montañas y lomas. Son suelos bien drenados y de permeabilidad moderadamente baja a moderadamente alta. La capacidad de agua disponible es baja.

El suelo Mucará lómico, en pendientes de 20 a 40% (MuE) se encuentra en las pendientes de montañas y lomas. Son suelos bien drenados y de permeabilidad moderadamente baja a moderadamente alta. La capacidad de agua disponible es baja.

El suelo Mucará lómico, en pendientes de 40 a 60% (MuF) se encuentra en las pendientes de montañas y lomas. Son suelos bien drenados y de permeabilidad moderadamente baja a moderadamente alta. La capacidad de agua disponible es baja.

El complejo San Germán-Duey, en pendientes de 20 a 60% (SgF) se encuentra en las pendientes de las crestas. Son suelos bien drenados y de permeabilidad moderadamente baja a moderadamente alta. La capacidad de agua disponible es bien baja.

El terreno urbano (Ua) se encuentra en los abanicos aluviales, llanos aluviales, playas, planicies aluviales, terrazas, llanos costeros, faldas de abanico, lomas, montañas, pendientes de mosntañas, valles, pendientes de lomas, valles de los ríos y lomas bajas. Consiste de áreas cubiertas por carreteras, edificios, aceras, estacionamientos, áreas de recreo y desarrollos residenciales.

## Metodología del Estudio

El esfuerzo de trabajo de campo se concentró en la sección norte del Proyecto, específicamente dentro del área designada como Hábitat Crítico para la mariquita de Puerto Rico (ver **Apéndice A**, **Figura 6**). El trabajo de campo se realizó del 16 al 18 de junio de 2020.

Se desarrolló una metodología modificada a la de Wunderle (1994). Se establecieron 24 puntos de muestreo a lo largo de la ruta propuesta para el Proyecto. La distancia entre los puntos de muestreo fue de 100 metros aproximadamente. La metodología consistió en detenerse por 10 minutos en cada punto de muestreo y anotar todas las aves observadas o escuchadas durante ese periodo de tiempo. Se realizaron visitas durante la mañana (de 5:30 AM a 10:00 AM) y visitas en la tarde (de 4:00 PM a 7:00 PM). No se incluyó la distancia aproximada en la que se observaron las aves o a la que se escuchó su canto.

En adición, se entrevistó a los residentes del área en cuanto a la presencia de esta especie. El esfuerzo total consistió en aproximadamente 38 horas/persona.

También se consultaron las siguientes fuentes de información:

**Consulta de los Mapas de Índice de Sensitividad Ambiental (ESI, por sus siglas en inglés) de la Administración Oceánica y Atmosférica Nacional (NOAA, por sus siglas en inglés)**

El ESI es un estudio realizado por la NOAA en colaboración con otras organizaciones y agencias, entre las cuales están USFWS y el DRNA. Este estudio muestra los records de observaciones de especies críticas, amenazadas o en peligro de extinción alrededor de toda la costa y en las cuencas de los ríos y quebradas principales de Puerto Rico.

**Información para la Planificación y Consulta (IPaC, por sus siglas en inglés) del Servicio de Pesca y Vida Silvestre de los Estados Unidos (USFWS, por sus siglas en inglés)**

El IPaC es una fuente de información sobre especies listadas a nivel federal, especies migratorias, refugios de vida silvestre, humedales, etc.

## Resultados y Discusión

El área del Proyecto consiste en un tramo de 2.2 Km de largo y 33.5 metros de ancho. Su alineación corre mayormente paralelo a la Carretera PR-101 y aproximadamente un (1) Km al este de la misma. En su trayectoria pasa entre la Comunidad El Retiro y una quebrada sin nombre en San Germán y continúa hacia Lajas, cruzando por encima de la Carretera PR-321 en el Km 1.0.

La sección norte del Proyecto se encuentra dentro de una zona designada como hábitat crítico para la mariquita de Puerto Rico (*Agelaius xanthomus*), especie en peligro de extinción a nivel federal y estatal (ver **Figura 6**).

**Descripción de la Mariquita de Puerto Rico (*Agelaius xanthomus*)**

La mariquita de Puerto Rico es un pájaro de aproximadamente 20 centímetros (8 pulgadas) de largo. Es de color negro lustroso con una mancha de color amarillo brillante en el hombro de cada ala. Existen dos subespecies en Puerto Rico: la mariquita de Puerto Rico (*Agelaius xanthomus xanthomus*), la cual se encuentra en la isla de Puerto Rico y en Vieques y la mariquita de la Isla de Mona (*Agelaius xanthomus monensis*), la cual se encuentra únicamente en la Isla de Mona y en la Isla de Monito.

La hembra de la mariquita de Puerto Rico es un poco más pequeña que el macho y los juveniles tienen el mismo color que los adultos, pero el color negro no es tan lustroso. Esta especie prefiere como hábitat las áreas de mangle y matorrales costeros, en donde anida sobre árboles de mangle (especialmente mangle negro, *Avicennia germinans*) y palmas de coco (*Cocos nucifera*). También puede anidar en otras especies de árboles que se encuentran en estas zonas costeras. El nido es en forma de copa, hecho de hierba seca y cubierto de material vegetal. Su periodo reproductivo es desde abril a agosto. Su distribución incluye la mayoría de los municipios de Puerto Rico, con excepción del área norte central (Barceloneta a Toa Baja) y el sureste (Ceiba a Arroyo). En cuanto a su dieta, esta especie es omnívora.

Las poblaciones de la mariquita de Puerto Rico se ven amenazadas por depredadores, tales como falcones (*Falco sparverius* y *Falco columbarius*), el guaraguao colirrojo (*Buteo jamaicensis*), el zorzal pardo (M*argarops fuscatus*), la mangosta (*Herpestes auropunctatus*), la iguana verde (*Iguana iguana*), ratas (*Rattus rattus*) y gatos (*Felis catus*). El tordo lustroso (*Molothrus bonariensis*) es un parásito de las crías de la mariquita de Puerto Rico. Algunos ácaros y piojos pueden ser parásitos de las crías y adultos. La viruela aviar puede causar lesiones que afectan a estas aves. Esta especie fue incluida en la lista de Especies en Peligro de Extinción en el 1976.

El trabajo de campo fue realizado durante la época reproductiva de la mariquita. Sin embargo, no se observó ni se escuchó esta especie. Las entrevistas realizadas a algunos residentes del área no fueron concluyentes, ya que al parecer estos confundían a la calandria de Puerto Rico (*Icterus dominicensis portoricencis*) con la mariquita de Puerto Rico.

Ruiz et al. (2001) encontró estos mismos resultados durante el estudio que realizaron para determinar la presencia de esta especie en las rutas de las alternativas propuestas para el Proyecto en el año 2001, las cuales incluían la ruta finalmente seleccionada, objeto de este estudio.

Coll Rivera Environmental (2017) no observó esta especie durante el trabajo de campo realizado para su Estudio Descriptivo de Flora y Fauna para este mismo Proyecto.

La **Tabla 1** muestra las especies de aves observadas o escuchadas en los puntos de muestreo (ver **Figura 7**).

Tabla 1. Aves observadas o escuchadas durante este estudio

| **Familia** | **Nombre Científico** | **Nombre Común** | **Punto de Muestreo Observada o Escuchada** |
|---|---|---|---|
| Ardeidae | *Bubulcus ibis* | Garza ganadera | PM3 |
| Cathartidae | *Cathartes aura* | Aura tiñosa | PM10, PM23 |

| Familia | Nombre Científico | Nombre Común | Punto de Muestreo Observada o Escuchada |
|---|---|---|---|
| Coerebidae | *Coereba flaveola* | Reinita común | PM1, PM2, PM5, PM6, PM7, PM23, PM24 |
| | *Tiaris bicolor* | Chamorro negro | PM6, PM23, PM24 |
| Columbidae | *Columba livia* | Paloma casera | PM2, PM3, PM23 |
| | *Columbina passerina* | Rolita | PM7, PM8, PM9, PM10, PM11, PM12, PM14, PM18, PM24 |
| | *Patagioenas leucocephala* | Paloma cabeciblanca | PM1, PM3, PM4, PM5 |
| | *Patagioenas squamosa* | Paloma turca | PM1, PM4, PM6, PM7, PM13, PM19, PM23, PM24 |
| | *Zenaida asiatica* | Tórtola aliblanca | PM2, PM4, PM6, PM8, PM14, PM15, PM23, PM24 |
| | *Zenaida aurita* | Tórtola cardosantera | PM2, PM3, PM5, PM7, PM10, PM15, PM17, PM22, PM23 |
| Cuculidae | *Crotophaga ani* | Judío | PM5, PM6 |
| | *Saurothera vieilloti* | Pájaro bobo mayor | PM4, PM5, PM8 |
| Icteridae | *Icterus dominicensis portoricensis* | Calandria de Puerto Rico | PM8 |
| | *Icterus icterus* | Turpial | PM3, PM7, PM16, PM21 |
| | *Molothrus bonariensis* | Tordo lustroso | PM4, PM23 |
| | *Quiscalus Níger* | Chango | PM1, PM2, PM3, PM4, PM5, PM6, PM7, PM9, PM22, PM23, PM24 |
| Mimidae | *Margarops fuscatus* | Zorzal pardo | PM2, PM4, PM5, PM8, PM9, PM13, PM20, PM22, PM23, PM24 |
| | *Mimus polyglotos* | Ruiseñor | PM1, PM2, PM3, PM5, PM6, PM10, PM23, PM24 |
| Parullidae | *Setophaga adelaidae* | Reinita mariposera | PM4, PM5, PM7, PM9, PM11, PM13, |

| Familia | Nombre Científico | Nombre Común | Punto de Muestreo Observada o Escuchada |
|---|---|---|---|
| | | | PM14, PM15, PM16, PM17, PM19, PM20, PM21, PM23, PM24 |
| Picidae | *Melanerpes portoricensis* | Pájaro carpintero de Puerto Rico | PM4, PM5, PM6, PM8, PM9, PM10, PM11, PM16, PM19, PM22, PM23 |
| Psittacidae | *Brotogeris versicolurus* | Perico aliamarillo | PM2, PM3, PM4, PM7, PM8, PM11 |
| Todidae | *Todus mexicanus* | San Pedrito | PM4, PM5, PM6, PM7, PM9, PM10, PM11, PM13, PM14, PM15, PM17, PM18, PM20, PM21, PM22, PM24 |
| Tyrannidae | *Elaenia martinico* | Juí blanco | PM6, PM7, PM11, PM18, PM23, PM24 |
| | *Tyrannus dominicencis* | Pitirre | PM2, PM6, PM11, PM12, PM23, PM24 |
| Vireonidae | *Vireo altiloquus* | Julián chiví | PM2, PM5, PM6, PM7, PM8, PM10, PM12, PM14, PM15, PM17, PM21, PM22, PM24 |
| | *Vireo latimeri* | Bien-te-veo | PM7, PM9, PM11, PM21 |

Según se observa en la **Tabla 1**, se detectaron cuatro especies de aves de la familia Icteridae, a la cual pertenece la mariquita de Puerto Rico. Estas son la calandria de Puerto Rico (*Icterus dominicencis portoricensis*), el turpial (*Icterus icterus*), el tordo lustroso (*Molothrus bonariensis*) y el chango (*Quiscalus niger*). La mariquita de Puerto Rico en ocasiones se puede observar junta al chango y al tordo lustroso. No obstante, la mariquita no fue detectada junta a estas otras especies en los puntos de muestreo.

**Fuentes Adicionales de Información**

Los Mapas del Índice de Sensitividad Ambiental (ESI, por sus siglas en inglés) de la Administración Oceánica y Atmosférica Nacional (NOAA, por sus siglas en inglés) incluye parte del área de estudio como hábitat crítico (CH) para la mariquita (*Agelaius*

*xanthomus*). Sin embargo, esta especie no fue avistada ni escuchada durante el trabajo de campo. Esta fuente de información no incluye la presencia de otras especies críticas, amenazadas o en peligro de extinción dentro del área de estudio (ver **Figuras 8** y **9**).

El IPaC (**Apéndice B**) incluye a dos especies en peligro de extinción para el área del Proyecto. Estas son el guabairo (*Antrostomus noctitherus*) y la boa de Puerto Rico (*Chilabothrus inornatus*). Esta fuente de información no incluye la presencia de la mariquita en el área de estudio.

## Conclusiones y Recomendaciones

La mariquita de Puerto Rico (*Agelaius xanthomus*) no fue detectada durante el trabajo de campo para este estudio. Ruiz et al. (2001) y Coll Rivera Environmental (2017) tuvieron los mismos resultados en el estudio para detectar esta especie en las distintas rutas alternas al Proyecto y para el estudio descriptivo de flora y fauna, respectivamente.

Sin embargo, no se descarta la presencia de la mariquita de Puerto Rico en el área del Proyecto, especialmente cuando una gran porción del Proyecto se encuentra dentro del hábitat crítico designado para esta especie.

Por lo tanto, para disminuir o evitar los impactos del Proyecto sobre la mariquita de Puerto Rico recomendamos las siguientes medidas:

- Antes de comenzar la construcción del Proyecto se recomienda llevar a cabo censos adicionales para detectar la presencia de la mariquita de Puerto Rico. De encontrar que esta especie utiliza el área del Proyecto, se debe incluir la identificación y caracterización de las áreas en donde esta especie es común.
- Evitar la construcción del Proyecto durante la época de anidaje de esta especie.
- Implementar controles de erosión y sedimentación durante la construcción del Proyecto para evitar o disminuir el aumento en sedimentación en las quebradas que se encuentran en el área del Proyecto.
- Reforestar las áreas impactadas por la construcción del Proyecto con especies típicas del tipo de hábitat existente y especies que produzcan alimento para la vida silvestre.

El Proyecto no debe tener impactos sobre especies amenazadas o en peligro de extinción, según propuesto, si se siguen las recomendaciones aquí incluidas.

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# APÉNDICES

# APÉNDICE A: FIGURAS

Figura 1: Mapa de Localización (1: 20,000)

# FIGURA 1: MAPA DE LOCALIZACION (1:20,000)

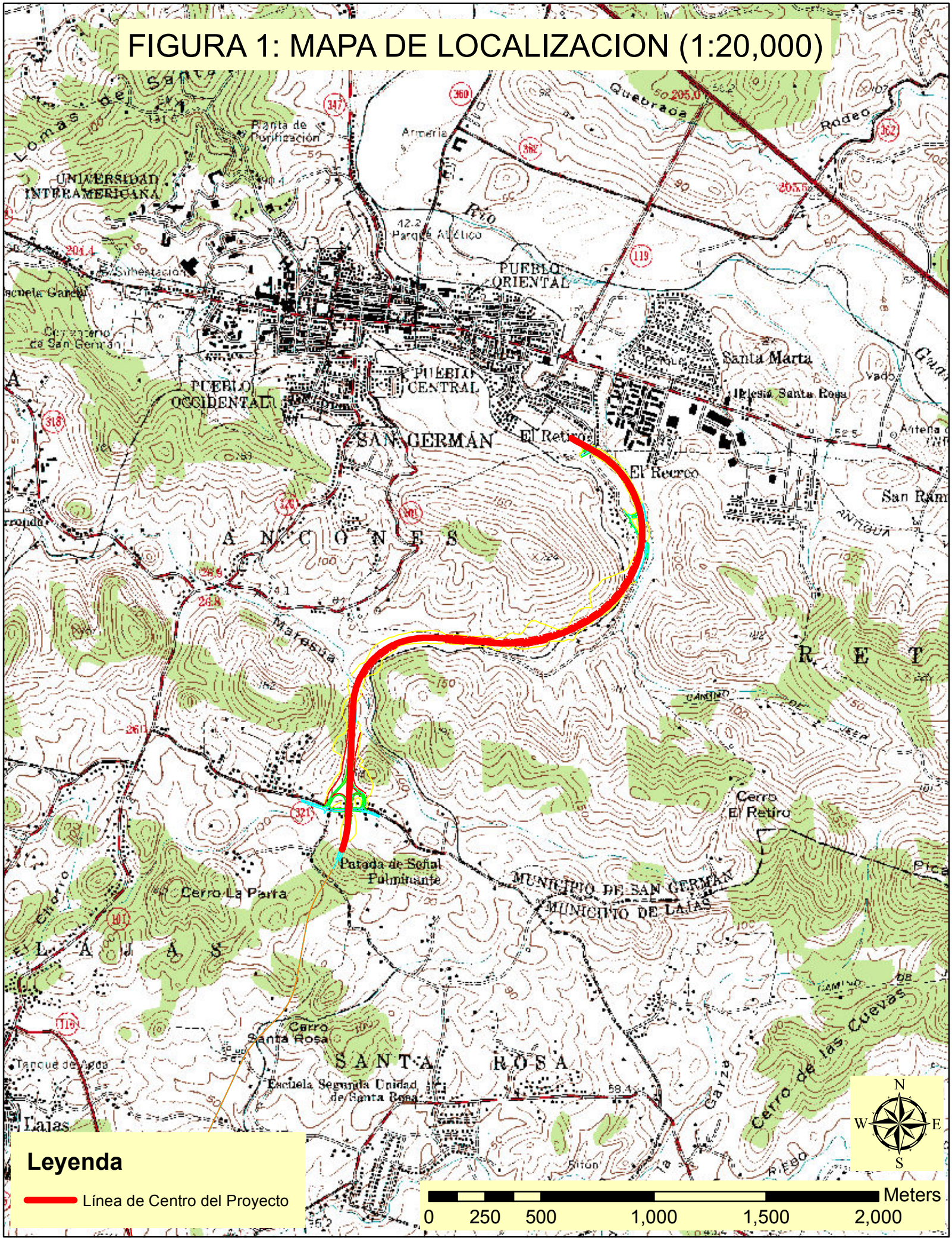


Figura 2: Foto Aérea (1:20,000)

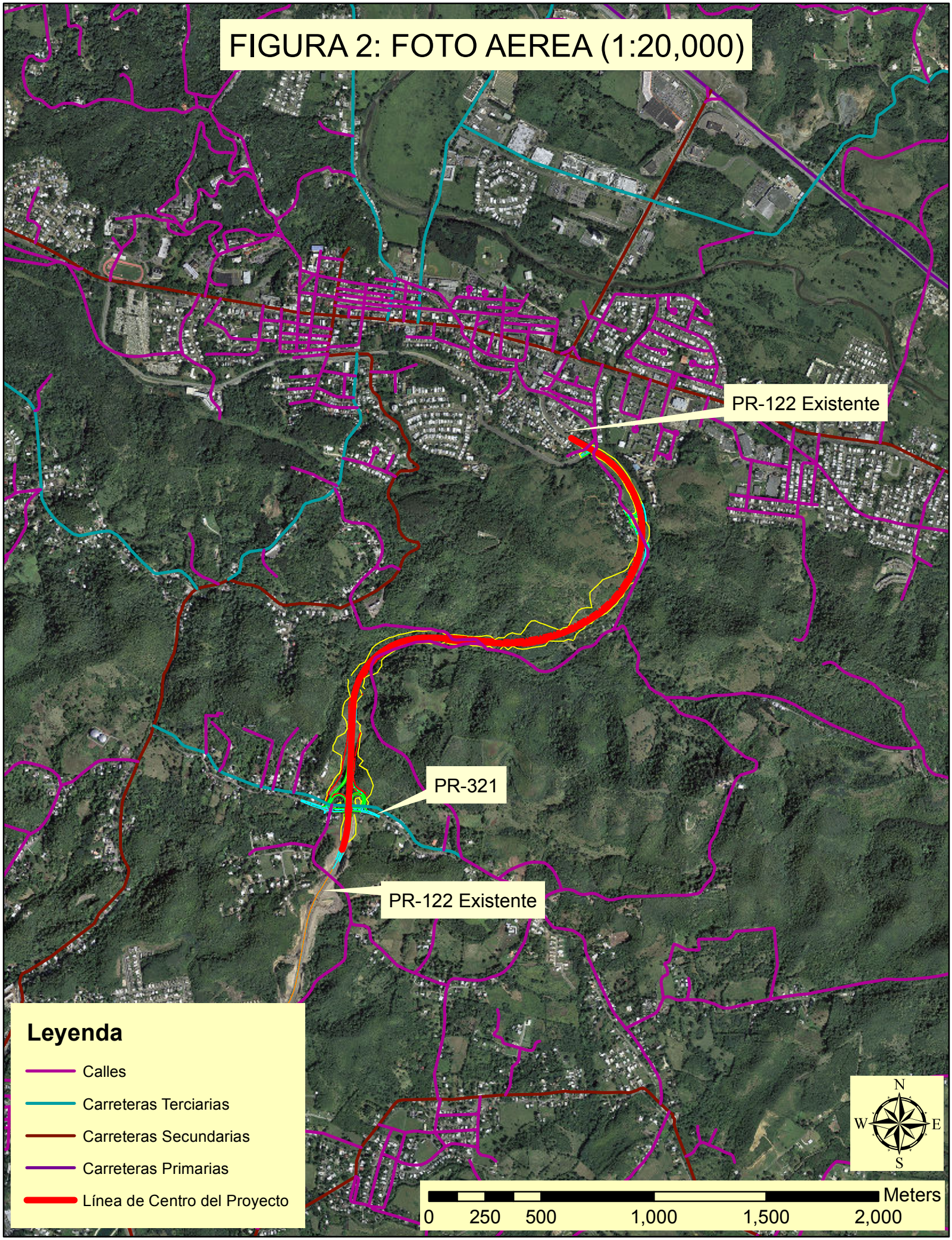

FIGURA 2: FOTO AEREA (1:20,000)
PR-122 Existente
PR-321
PR-122 Existente
Leyenda
Calles
Carreteras Terciarias
Carreteras Secundarias
Carreteras Primarias
Línea de Centro del Proyecto
N
W
E
S
Meters
0
250
500
1,000
1,500
2,000

Figura 3: Foto Aérea (1:8,000)

# FIGURA 3: FOTO AEREA (1:8,000)

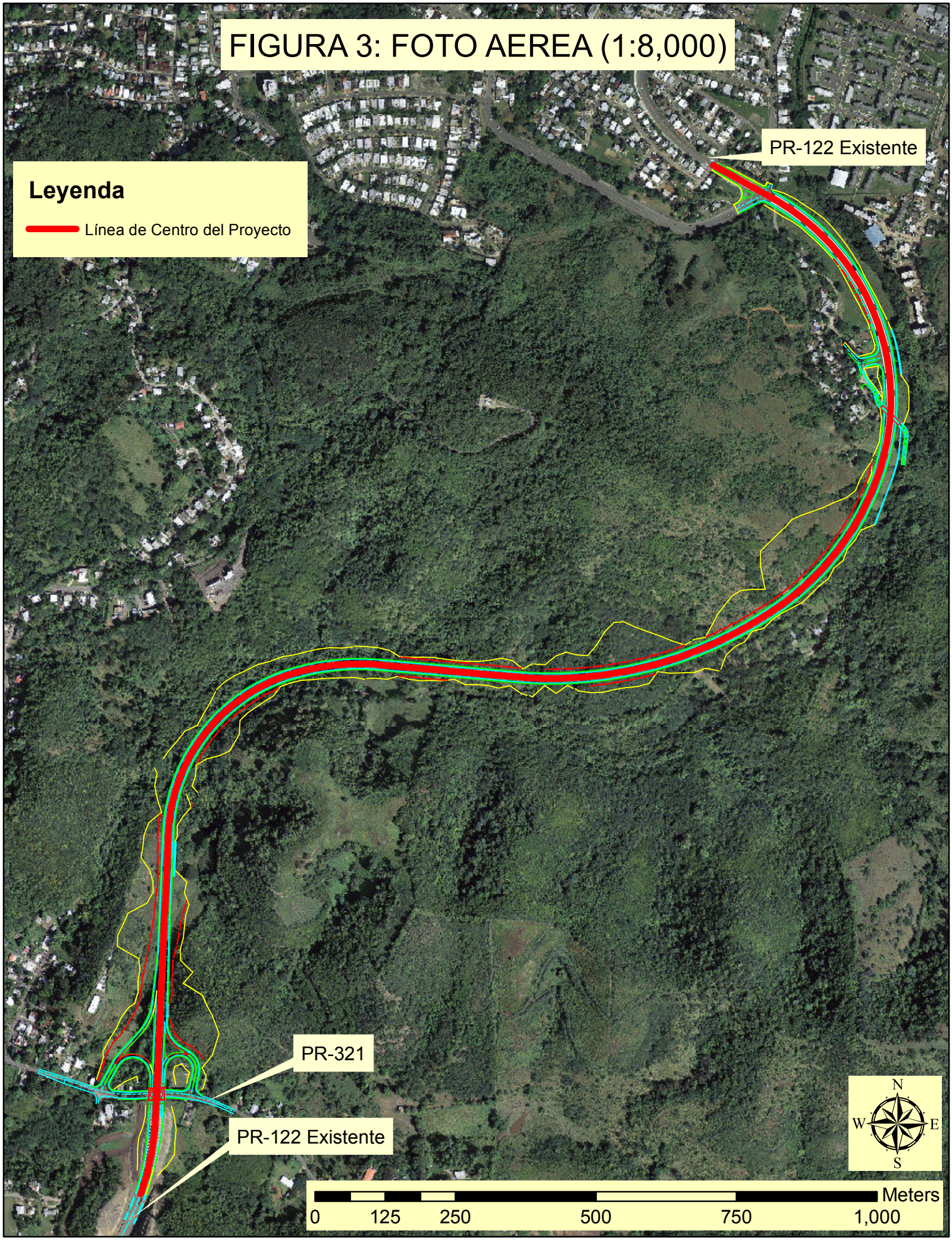


Figura 4: Mapa Hidrográfico

# FIGURA 4: MAPA HIDROGRAFICO

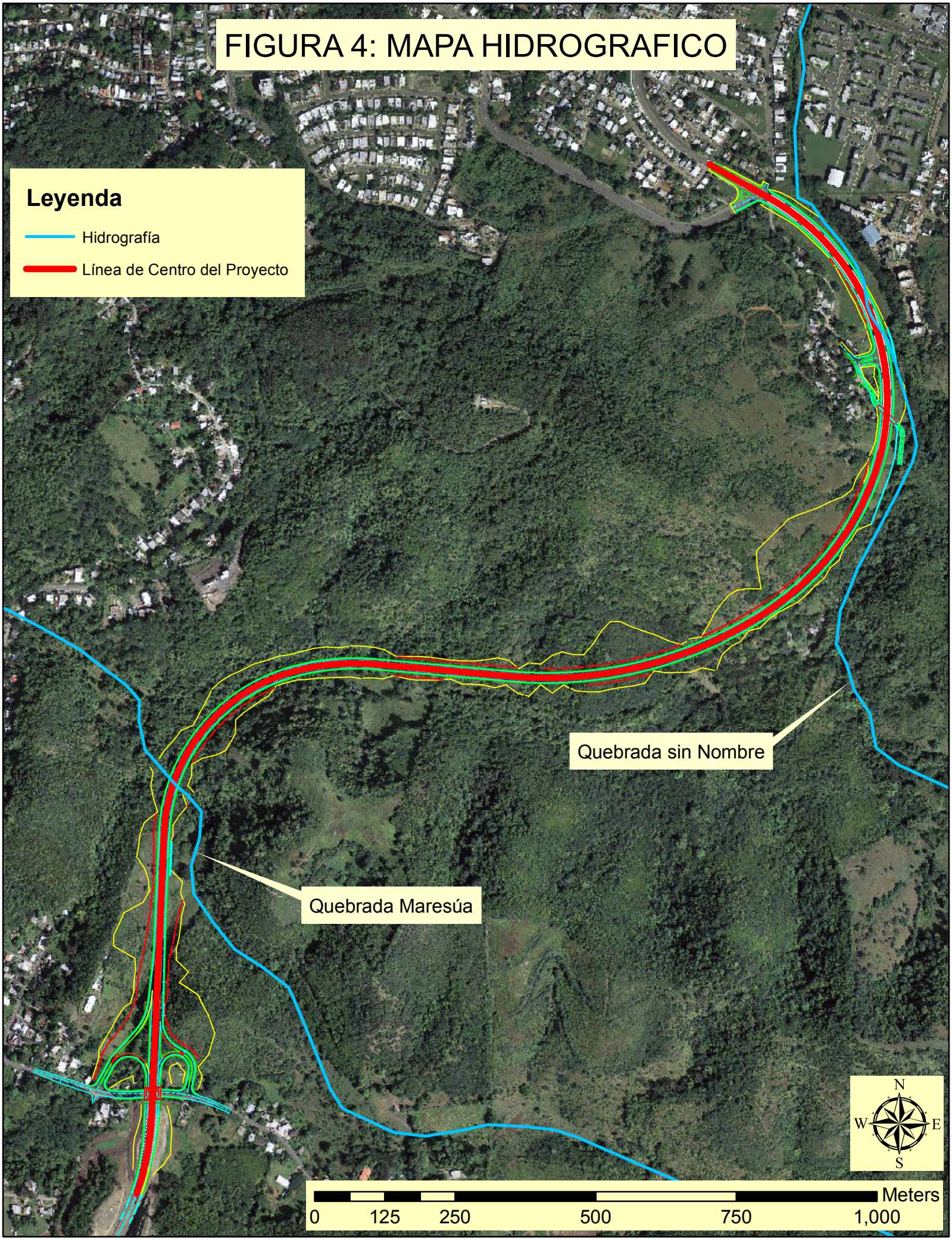


Figura 5: Mapa de Suelos

# FIGURA 5: MAPA DE SUELOS

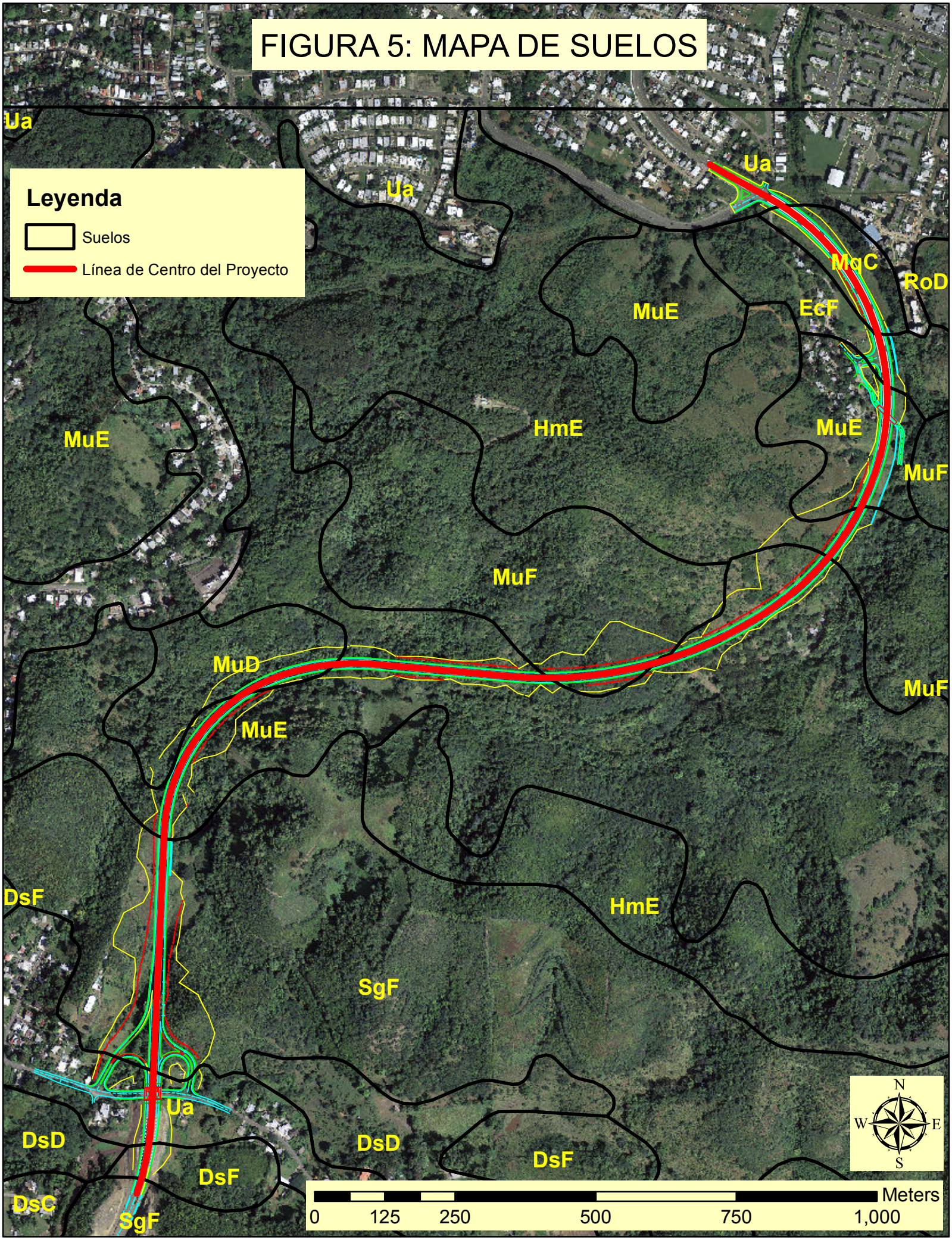


Figura 6: Hábitat Crítico Designado para la Mariquita de Puerto Rico en la Región del Proyecto

# FIGURA 6: HABITAT CRITICO DESIGNADO PARA LA MARIQUITA DE PUERTO RICO EN LA REGION DEL PROYECTO

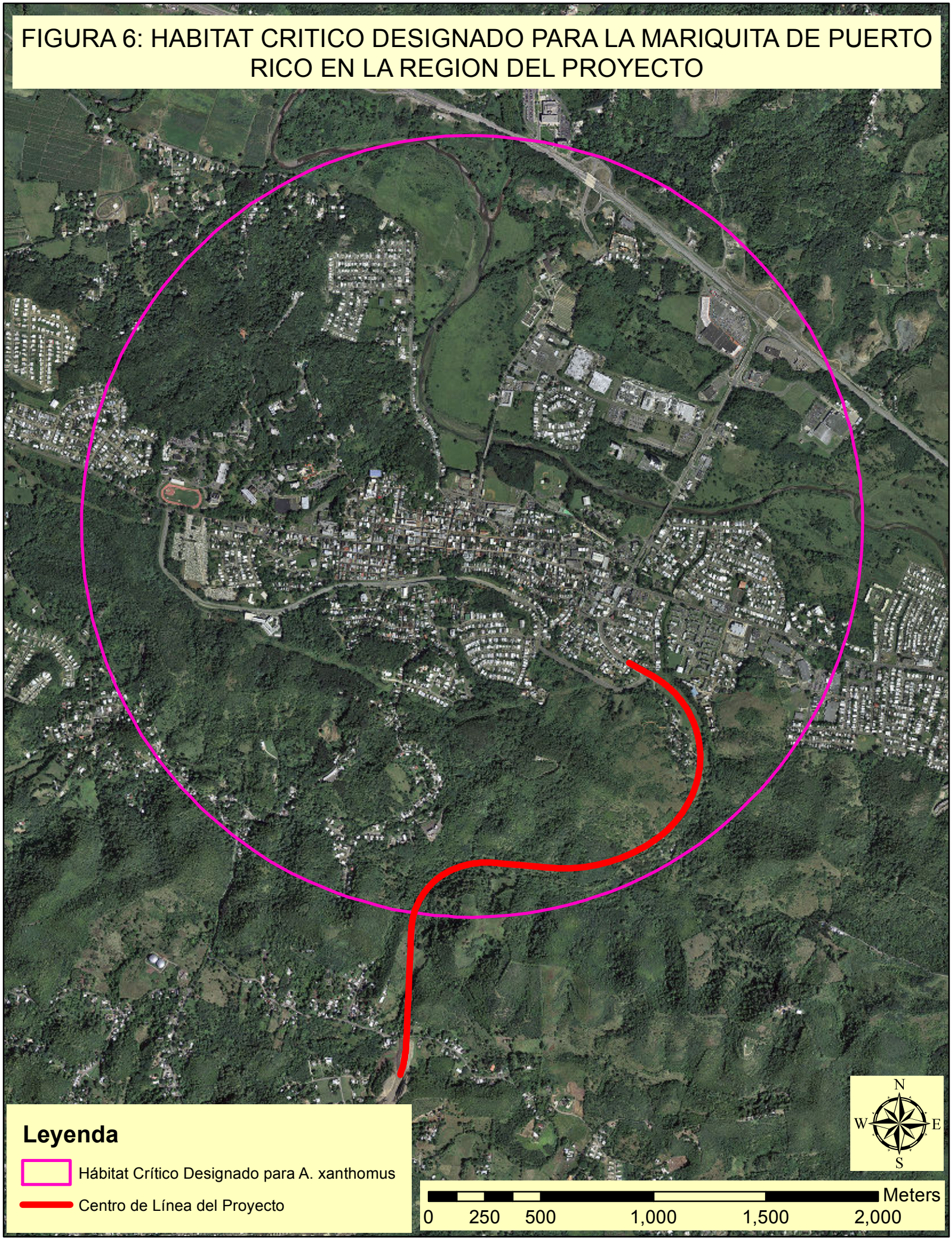


Figura 7: Puntos de Muestreo para la Detección de la Mariquita de Puerto Rico a lo Largo del Proyecto

# FIGURA 7: PUNTOS DE MUESTREO PARA LA DETECCION DE LA MARIQUITA DE PUERTO RICO A LO LARGO DEL PROYECTO

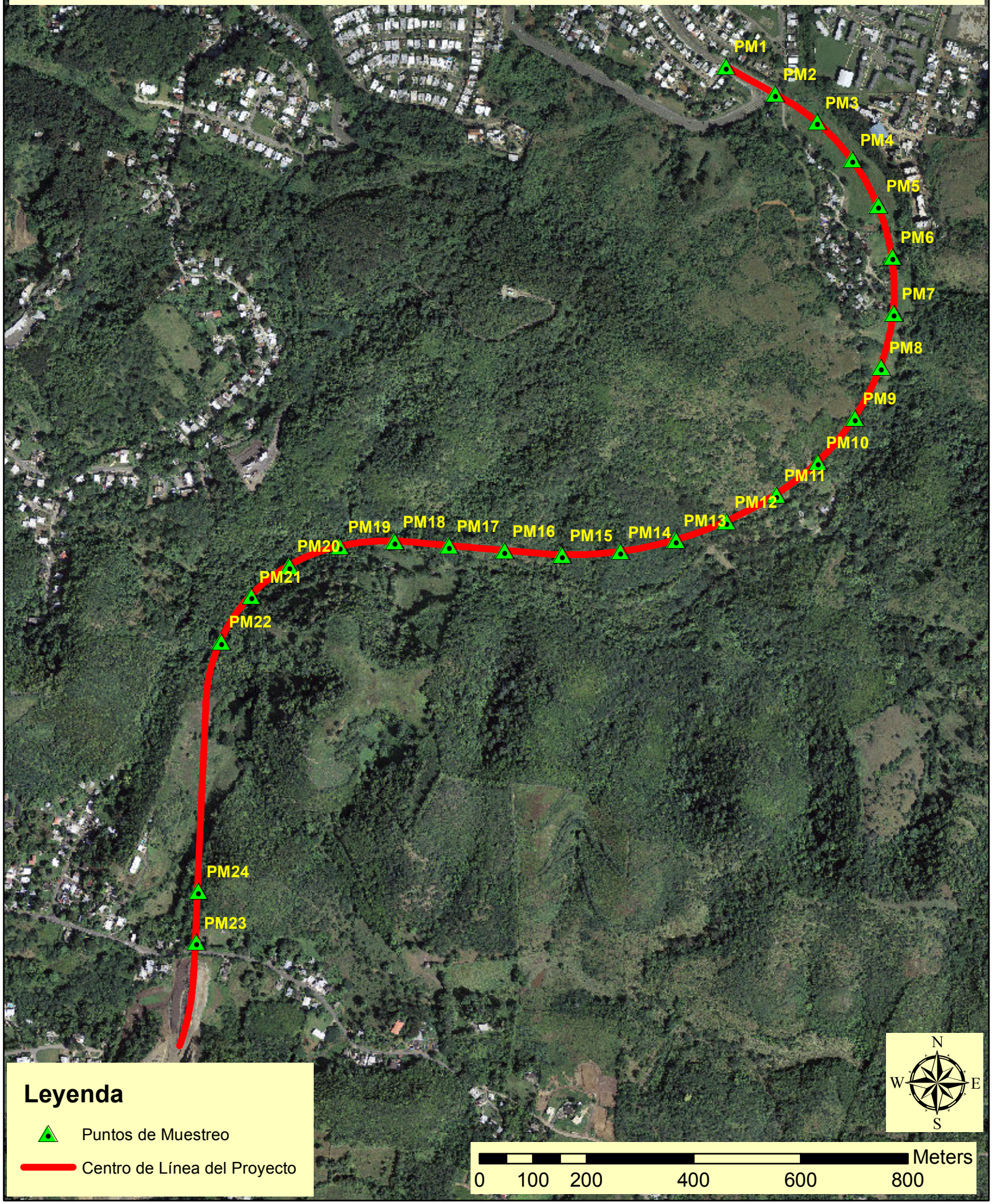
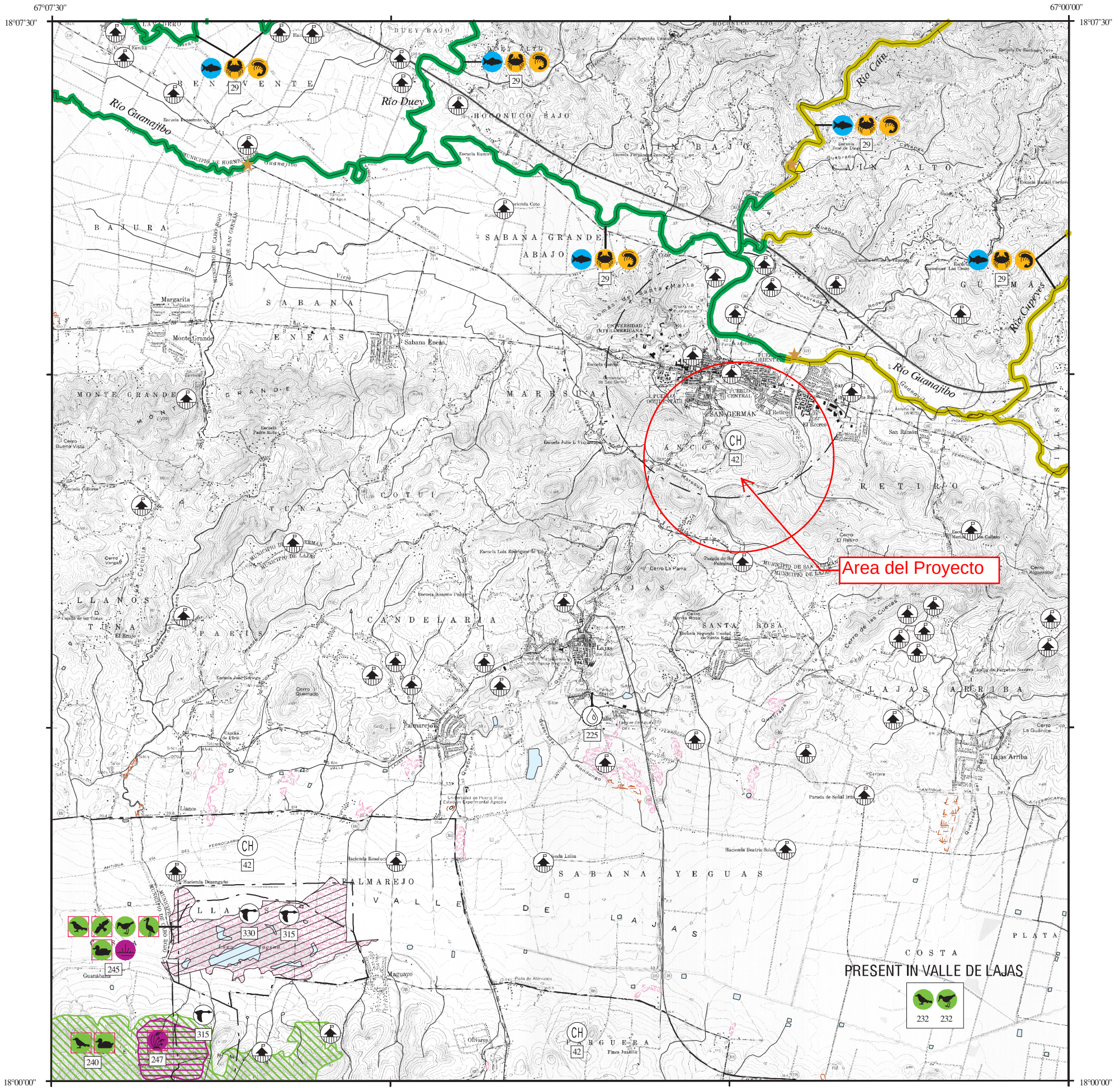


Figura 8: Índice de Sensitividad Ambiental

# ENVIRONMENTAL SENSITIVITY INDEX MAP




## SHORELINE HABITATS (ESI)

- 1A EXPOSED ROCKY CLIFFS
- 1B EXPOSED, SOLID MAN–MADE STRUCTURES
- 2A EXPOSED WAVE–CUT PLATFORMS IN BEDROCK
- 2B SCARPS AND STEEP SLOPES IN MUDDY SEDIMENTS
- 3A FINE– TO MEDIUM–GRAINED SAND BEACHES
- 4 COARSE–GRAINED SAND BEACHES
- 5 MIXED SAND AND GRAVEL BEACHES
- 6A GRAVEL BEACHES
- 6B RIPRAP
- 7 EXPOSED TIDAL FLATS
- 8A SHELTERED ROCKY SHORES
- 8B SHELTERED, SOLID MAN–MADE STRUCTURES
- 9A SHELTERED TIDAL FLATS
- 9B SHELTERED VEGETATED LOW BANKS
- 10D MANGROVES
- SALT– AND BRACKISH–WATER MARSHES
- FRESHWATER MARSHES
- FRESHWATER SWAMPS
- FRESHWATER SCRUB/SHRUB

## STREAM REACHES (RSI)

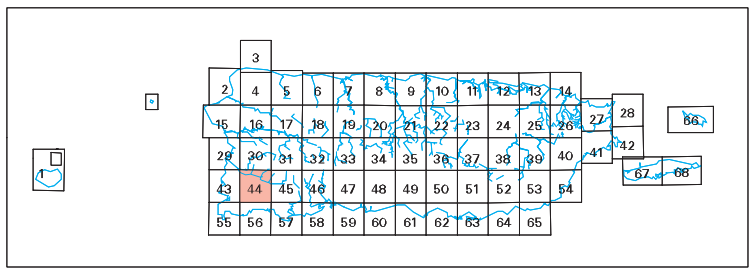
- 1 QUIET POOL; LOW–SENSITIVE BANKS
- 2 STRAIGHT CHANNEL WITH CURRENTS; LOW–SENSITIVE BANKS (MUD DOMINANT)
- 3 MEANDERING CHANNEL; SAND POINT BARS
- 4 MEANDERING CHANNEL; VEGETATED POINT BARS
- 5 RAPIDS OVER BEDROCK
- 6 MEANDERING CHANNEL; SAND AND GRAVEL POINT BARS
- 7 SPLIT CHANNEL WITH COARSE GRAVEL; SOME RAPIDS
- 8 SMALL FALLS; BOULDERS IN CHANNEL
- 9 LARGE FALLS; BOULDERS IN CHANNEL
- 10 CHANNELS WITH ASSOCIATED VULNERABLE WETLANDS
- KARST

N W E S

SCALE 1:55000

1 .5 0 1 KILOMETER

1 .5 0 1 MILE




**Not For Navigation**

Published: May 2000


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National Oceanic and Atmospheric Administration
National Ocean Service
Office of Response and Restoration
Hazardous Materials Response Division


SAN GERMAN, P.R. (1966) **PR-44**

# PUERTO RICO - ESIMAP 44

## BIOLOGICAL RESOURCES:

### BIRD:

| RAR# | Species | S/F | T/E | Conc. | J | F | M | A | M | J | J | A | S | O | N | D | Nesting |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 232 | Common snipe | | | HIGH | X | X | X | X | | | | | | X | X | X | - |
| | Mourning dove | | | HIGH | X | X | X | X | X | X | X | X | X | X | X | X | MAR-AUG |
| | White-winged dove | | | HIGH | X | X | X | X | X | X | X | X | X | X | X | X | JAN-DEC |
| | Zenaida dove | | | HIGH | X | X | X | X | X | X | X | X | X | X | X | X | JAN-DEC |
| 240 | Puerto Rican nightjar | S/F | E/E | | X | X | X | X | X | X | X | X | X | X | X | X | FEB-JUL |
| | West Indian whistling-duck | S | T | POTENTIAL | X | X | X | X | X | X | X | X | X | X | X | X | JAN-DEC |
| 245 | Blue-winged teal | | | POTENTIAL | X | X | X | X | | | | | | X | X | X | - |
| | Caribbean coot | S | T | POTENTIAL | X | X | X | X | X | X | X | X | X | X | X | X | - |
| | Common moorhen | | | POTENTIAL | X | X | X | X | X | X | X | X | X | X | X | X | - |
| | Fulvous whistling-duck | | | POTENTIAL | X | X | X | X | X | X | X | X | X | X | X | X | - |
| | Glossy ibis | | | POTENTIAL | X | X | X | X | X | X | X | X | X | X | X | X | - |
| | Least grebe | S | T | POTENTIAL | X | X | X | X | X | X | X | X | X | X | X | X | APR-MAY<br>SEP-NOV |
| | Peregrine falcon | S | E | POTENTIAL | X | X | X | X | | | | | | X | X | X | - |
| | Purple gallinule | | | POTENTIAL | X | X | X | X | X | X | X | X | X | X | X | X | - |
| | Ruddy duck | S | T | POTENTIAL | X | X | X | X | X | X | X | X | X | X | X | X | - |
| | Shorebirds | | | POTENTIAL | X | X | X | X | X | | | X | X | X | X | X | - |
| | Wading birds | | | POTENTIAL | X | X | X | X | X | X | X | X | X | X | X | X | - |
| | West Indian whistling-duck | S | T | POTENTIAL | X | X | X | X | X | X | X | X | X | X | X | X | - |
| | White-cheeked pintail | | | POTENTIAL | X | X | X | X | X | X | X | X | X | X | X | X | FEB-JUN |
| | Yellow-breasted crake | S | T | POTENTIAL | X | X | X | X | X | X | X | X | X | X | X | X | MAR-JUN |
| | Yellow-shouldered blackbird | S/F | E/E | POTENTIAL | X | X | X | X | X | X | X | X | X | X | X | X | - |

### FISH:

| RAR# | Species | S/F | T/E | Conc. | J | F | M | A | M | J | J | A | S | O | N | D | Spawning | Eggs | Larvae | Juveniles | Adults |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 29 | Native stream fish | | | | X | X | X | X | X | X | X | X | X | X | X | X | APR-MAY<br>AUG-NOV | APR-MAY<br>AUG-NOV | APR-MAY<br>AUG-NOV | JAN-DEC | JAN-DEC |

### PLANT:

| RAR# | Species | S/F | T/E | Conc. | J | F | M | A | M | J | J | A | S | O | N | D |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 245 | Water hyacinth | | | | X | X | X | X | X | X | X | X | X | X | X | X |
| 247 | Aristida chaseae | S/F | E/E | | X | X | X | X | X | X | X | X | X | X | X | X |
| | Aristida portoricensis | S/F | E/E | | X | X | X | X | X | X | X | X | X | X | X | X |
| | Eugenia woodburyana | S/F | E/E | | X | X | X | X | X | X | X | X | X | X | X | X |
| | Lyonia truncata proctorii | S/F | E/E | | X | X | X | X | X | X | X | X | X | X | X | X |
| | Vernonia proctorii | S/F | E/E | | X | X | X | X | X | X | X | X | X | X | X | X |

### INVERTEBRATE:

| RAR# | Species | S/F | T/E | Conc. | J | F | M | A | M | J | J | A | S | O | N | D | Spawning | Eggs | Larvae | Juveniles | Adults |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 29 | Freshwater crab | | | | X | X | X | X | X | X | X | X | X | X | X | X | APR-MAY<br>AUG-NOV | APR-MAY<br>AUG-NOV | - | JAN-DEC | JAN-DEC |
| | Native stream shrimp | | | | X | X | X | X | X | X | X | X | X | X | X | X | APR-MAY<br>AUG-NOV | APR-MAY<br>AUG-NOV | APR-MAY<br>AUG-NOV | JAN-DEC | JAN-DEC |

## HUMAN USE RESOURCES:

### CRITICAL HABITAT:

| HUN# | Name | Owner/Manager | Contact | Phone |
|---|---|---|---|---|
| 42 | YELLOW-SHOULDERED BLACKBIRD DCH | USFWS | CARIBBEAN FIELD OFFICE | 787/851-7297 |

### WILDLIFE REFUGE:

| HUN# | Name | Owner/Manager | Contact | Phone |
|---|---|---|---|---|
| 315 | LAGUNA CARTAGENA NWR | USFWS | REFUGE MANAGER | 787/851-7258 |
| 330 | RESERVA NATURAL DE LA LAGUNA CARTAGENA | DRNA | DIVISION DE RESERVAS NATURALES Y REFUGIOS DE VIDA SILVESTRE | 787/724-2816 |

### WATER INTAKE:

| HUN# | Name | Owner/Manager | Location | Phone |
|---|---|---|---|---|
| 225 | LAJAS FILTER PLANT | PRASA | | |

Biological information shown on the maps represents known concentration areas or occurrences, but does not necessarily represent the full distribution or range of each species. This is particularly important to recognize when considering potential impacts to protected species.

Figura 9: Ampliación del Índice de Sensitividad Ambiental

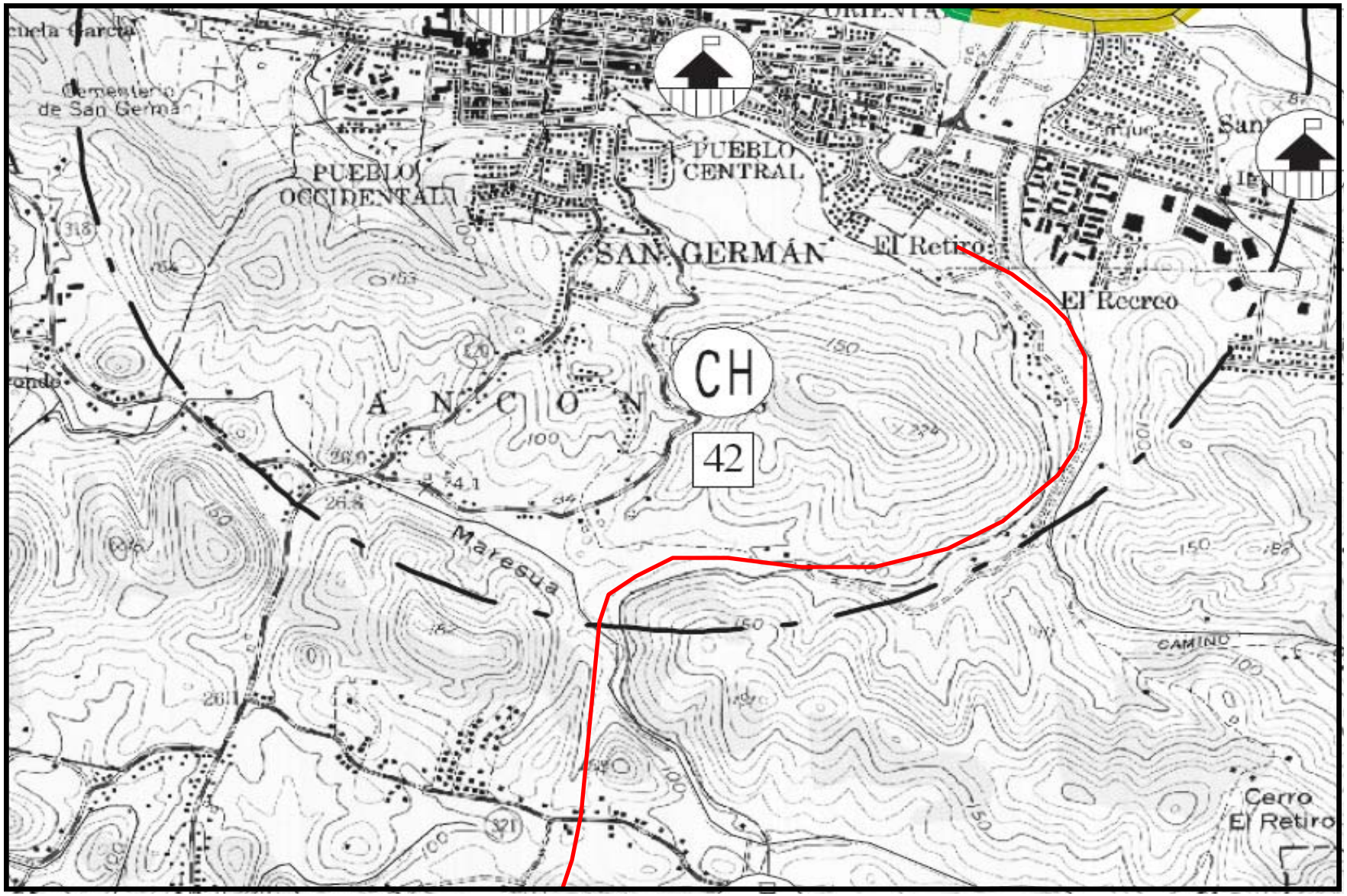



FIGURA 9
AMPLIACIÓN DEL ÍNDICE DE SENSITIVIDAD AMBIENTAL

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EXTENSIÓN DE LA CARRETERA PR-122
SAN GERMÁN - LAJAS

# APÉNDICE B: INFORMACIÓN PARA LA PLANIFICACIÓN Y CONSULTA DEL SERVICIO DE PESCA Y VIDA SILVESTRE DE LOS ESTADOS UNIDOS (IPAC)

**IPaC** **U.S. Fish & Wildlife Service**

# IPaC resource list

This report is an automatically generated list of species and other resources such as critical habitat (collectively referred to as *trust resources*) under the U.S. Fish and Wildlife Service's (USFWS) jurisdiction that are known or expected to be on or near the project area referenced below. The list may also include trust resources that occur outside of the project area, but that could potentially be directly or indirectly affected by activities in the project area. However, determining the likelihood and extent of effects a project may have on trust resources typically requires gathering additional site-specific (e.g., vegetation/species surveys) and project-specific (e.g., magnitude and timing of proposed activities) information.

Below is a summary of the project information you provided and contact information for the USFWS office(s) with jurisdiction in the defined project area. Please read the introduction to each section that follows (Endangered Species, Migratory Birds, USFWS Facilities, and NWI Wetlands) for additional information applicable to the trust resources addressed in that section.

NOT FOR CONSULTATION

## Location

Lajas and San Germán counties, Puerto Rico




## Local office

Caribbean Ecological Services Field Office

(787) 851-7297
(787) 851-7440

MAILING ADDRESS

Post Office Box 491
Boqueron, PR 00622-0491

PHYSICAL ADDRESS

Carr 301, Km 5.1, Bo Corozo

Boqueron, PR 00622-0510

http://www.fws.gov/caribbean/es

NOT FOR CONSULTATION

# Endangered species

**This resource list is for informational purposes only and does not constitute an analysis of project level impacts.**

The primary information used to generate this list is the known or expected range of each species. Additional areas of influence (AOI) for species are also considered. An AOI includes areas outside of the species range if the species could be indirectly affected by activities in that area (e.g., placing a dam upstream of a fish population, even if that fish does not occur at the dam site, may indirectly impact the species by reducing or eliminating water flow downstream). Because species can move, and site conditions can change, the species on this list are not guaranteed to be found on or near the project area. To fully determine any potential effects to species, additional site-specific and project-specific information is often required.

Section 7 of the Endangered Species Act **requires** Federal agencies to "request of the Secretary information whether any species which is listed or proposed to be listed may be present in the area of such proposed action" for any project that is conducted, permitted, funded, or licensed by any Federal agency. A letter from the local office and a species list which fulfills this requirement can **only** be obtained by requesting an official species list from either the Regulatory Review section in IPaC (see directions below) or from the local field office directly.

For project evaluations that require USFWS concurrence/review, please return to the IPaC website and request an official species list by doing the following:

1. Draw the project location and click CONTINUE.
2. Click DEFINE PROJECT.
3. Log in (if directed to do so).
4. Provide a name and description for your project.
5. Click REQUEST SPECIES LIST.

Listed species[1] and their critical habitats are managed by the Ecological Services Program of the U.S. Fish and Wildlife Service (USFWS) and the fisheries division of the National Oceanic and Atmospheric Administration (NOAA Fisheries[2]).

Species and critical habitats under the sole responsibility of NOAA Fisheries are **not** shown on this list. Please contact NOAA Fisheries for species under their jurisdiction.

NOT FOR CONSULTATION

1. Species listed under the Endangered Species Act are threatened or endangered; IPaC also shows species that are candidates, or proposed, for listing. See the listing status page for more information.
2. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

The following species are potentially affected by activities in this location:

## Birds

| NAME | STATUS |
|---|---|

| | |
|---|---|
| Puerto Rican Nightjar Caprimulgus noctitherus<br>No critical habitat has been designated for this species.<br>https://ecos.fws.gov/ecp/species/6972 | Endangered |

## Reptiles

| NAME | STATUS |
|---|---|
| Puerto Rican Boa Epicrates inornatus<br>No critical habitat has been designated for this species.<br>https://ecos.fws.gov/ecp/species/6628 | Endangered |

## Critical habitats

Potential effects to critical habitat(s) in this location must be analyzed along with the endangered species themselves.

THERE ARE NO CRITICAL HABITATS AT THIS LOCATION.

NOT FOR CONSULTATION

# Migratory birds

Certain birds are protected under the Migratory Bird Treaty Act[1] and the Bald and Golden Eagle Protection Act[2].

Any person or organization who plans or conducts activities that may result in impacts to migratory birds, eagles, and their habitats should follow appropriate regulations and consider implementing appropriate conservation measures, as described below.

1. The Migratory Birds Treaty Act of 1918.
2. The Bald and Golden Eagle Protection Act of 1940.

Additional information can be found using the following links:

- Birds of Conservation Concern http://www.fws.gov/birds/management/managed-species/birds-of-conservation-concern.php
- Measures for avoiding and minimizing impacts to birds http://www.fws.gov/birds/management/project-assessment-tools-and-guidance/conservation-measures.php
- Nationwide conservation measures for birds http://www.fws.gov/migratorybirds/pdf/management/nationwidestandardconservationmeasures.pdf

The birds listed below are birds of particular concern either because they occur on the USFWS Birds of Conservation Concern (BCC) list or warrant special attention in your project location. To learn more about the levels of concern for birds on your list and how this list is generated, see the FAQ below. This is not a list of every bird you may find in this location, nor a guarantee that every bird on this list will be found in your project area. To see exact locations of where birders and the general

public have sighted birds in and around your project area, visit the E-bird data mapping tool (Tip: enter your location, desired date range and a species on your list). For projects that occur off the Atlantic Coast, additional maps and models detailing the relative occurrence and abundance of bird species on your list are available. Links to additional information about Atlantic Coast birds, and other important information about your migratory bird list, including how to properly interpret and use your migratory bird report, can be found below.

For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to migratory birds on your list, click on the PROBABILITY OF PRESENCE SUMMARY at the top of your list to see when these birds are most likely to be present and breeding in your project area.

| NAME | BREEDING SEASON (IF A BREEDING SEASON IS INDICATED FOR A BIRD ON YOUR LIST, THE BIRD MAY BREED IN YOUR PROJECT AREA SOMETIME WITHIN THE TIMEFRAME SPECIFIED, WHICH IS A VERY LIBERAL ESTIMATE OF THE DATES INSIDE WHICH THE BIRD BREEDS ACROSS ITS ENTIRE RANGE. "BREEDS ELSEWHERE" INDICATES THAT THE BIRD DOES NOT LIKELY BREED IN YOUR PROJECT AREA.) |
|---|---|
| American Coot Fulica americana americana<br>This is a Bird of Conservation Concern (BCC) throughout its range in Puerto Rico and the Virgin Islands. | Breeds May 1 to Sep 15 |
| Antillean Mango Anthracothorax dominicus<br>This is a Bird of Conservation Concern (BCC) throughout its range in Puerto Rico and the Virgin Islands. | Breeds Mar 1 to Aug 20 |
| Black Rail Laterallus jamaicensis<br>This is a Bird of Conservation Concern (BCC) throughout its range in Puerto Rico and the Virgin Islands.<br>https://ecos.fws.gov/ecp/species/7717 | Breeds Mar 1 to Sep 15 |
| Black Swift Cypseloides niger<br>This is a Bird of Conservation Concern (BCC) throughout its range in Puerto Rico and the Virgin Islands.<br>https://ecos.fws.gov/ecp/species/8878 | Breeds Jun 15 to Sep 10 |
| Brown Booby Sula leucogaster<br>This is a Bird of Conservation Concern (BCC) throughout its range in Puerto Rico and the Virgin Islands. | Breeds Jan 1 to Oct 15 |

NOT FOR CONSULTATION

Cape May Warbler Setophaga tigrina — Breeds elsewhere
This is a Bird of Conservation Concern (BCC) throughout its range in Puerto Rico and the Virgin Islands.

Lesser Yellowlegs Tringa flavipes — Breeds elsewhere
This is a Bird of Conservation Concern (BCC) throughout its range in Puerto Rico and the Virgin Islands.
https://ecos.fws.gov/ecp/species/9679

Limpkin Aramus guarauna — Breeds Jan 15 to Aug 31
This is a Bird of Conservation Concern (BCC) throughout its range in Puerto Rico and the Virgin Islands.

Magnificent Frigatebird Fregata magnificens — Breeds Oct 1 to Apr 30
This is a Bird of Conservation Concern (BCC) throughout its range in Puerto Rico and the Virgin Islands.

Mangrove Cuckoo Coccyzus minor — Breeds Apr 20 to Aug 20
This is a Bird of Conservation Concern (BCC) throughout its range in Puerto Rico and the Virgin Islands.

Masked Duck Nomonyx dominicus — Breeds Jan 1 to Dec 31
This is a Bird of Conservation Concern (BCC) throughout its range in Puerto Rico and the Virgin Islands.

Puerto Rican Screech-owl Megascops nudipes newtoni — Breeds Apr 1 to Jun 30
This is a Bird of Conservation Concern (BCC) throughout its range in Puerto Rico and the Virgin Islands.

Puerto Rican Vireo Vireo latimeri — Breeds Apr 8 to Aug 1
This is a Bird of Conservation Concern (BCC) throughout its range in Puerto Rico and the Virgin Islands.

Ruddy Duck Oxyura jamaicensis jamaicensis — Breeds May 10 to Sep 5
This is a Bird of Conservation Concern (BCC) throughout its range in Puerto Rico and the Virgin Islands.
https://ecos.fws.gov/ecp/species/7385

Semipalmated Sandpiper Calidris pusilla — Breeds elsewhere
This is a Bird of Conservation Concern (BCC) throughout its range in Puerto Rico and the Virgin Islands.

Short-billed Dowitcher Limnodromus griseus — Breeds elsewhere
This is a Bird of Conservation Concern (BCC) throughout its range in Puerto Rico and the Virgin Islands.
https://ecos.fws.gov/ecp/species/9480

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West Indian Whistling Duck Dendrocygna arborea — Breeds Jan 1 to Dec 31
This is a Bird of Conservation Concern (BCC) throughout its range in Puerto Rico and the Virgin Islands.
https://ecos.fws.gov/ecp/species/6973

Whimbrel Numenius phaeopus — Breeds elsewhere
This is a Bird of Conservation Concern (BCC) throughout its range in Puerto Rico and the Virgin Islands.
https://ecos.fws.gov/ecp/species/9483

White-crowned Pigeon Patagioenas leucocephala — Breeds May 1 to Sep 30
This is a Bird of Conservation Concern (BCC) throughout its range in Puerto Rico and the Virgin Islands.
https://ecos.fws.gov/ecp/species/4047

White-tailed Tropicbird Phaethon lepturus catesbyi — Breeds Apr 15 to Jul 31
This is a Bird of Conservation Concern (BCC) throughout its range in Puerto Rico and the Virgin Islands.

Willet Tringa semipalmata — Breeds Apr 20 to Aug 5
This is a Bird of Conservation Concern (BCC) throughout its range in Puerto Rico and the Virgin Islands.

Wilson's Plover Charadrius wilsonia — Breeds Apr 1 to Aug 20
This is a Bird of Conservation Concern (BCC) throughout its range in Puerto Rico and the Virgin Islands.

Yellow-breasted Crake Porzana flaviventer — Breeds Jan 1 to Dec 31
This is a Bird of Conservation Concern (BCC) throughout its range in Puerto Rico and the Virgin Islands.

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# Probability of Presence Summary

The graphs below provide our best understanding of when birds of concern are most likely to be present in your project area. This information can be used to tailor and schedule your project activities to avoid or minimize impacts to birds. Please make sure you read and understand the FAQ "Proper Interpretation and Use of Your Migratory Bird Report" before using or attempting to interpret this report.

**Probability of Presence (■)**

Each green bar represents the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during a particular week of the year. (A year is represented as 12 4-week months.) A taller bar indicates a higher probability of species presence. The survey effort (see below) can be used to establish a level of confidence in the presence score. One can have higher confidence in the presence score if the corresponding survey effort is also high.

How is the probability of presence score calculated? The calculation is done in three steps:

1. The probability of presence for each week is calculated as the number of survey events in the week where the species was detected divided by the total number of survey events for that week. For example, if in week 12 there were 20 survey events and the Spotted Towhee was found in 5 of them, the probability of presence of the Spotted Towhee in week 12 is 0.25.
2. To properly present the pattern of presence across the year, the relative probability of presence is calculated. This is the probability of presence divided by the maximum probability of presence across all weeks. For example, imagine the probability of presence in week 20 for the Spotted Towhee is 0.05, and that the probability of presence at week 12 (0.25) is the maximum of any week of the year. The relative probability of presence on week 12 is 0.25/0.25 = 1; at week 20 it is 0.05/0.25 = 0.2.
3. The relative probability of presence calculated in the previous step undergoes a statistical conversion so that all possible values fall between 0 and 10, inclusive. This is the probability of presence score.

To see a bar's probability of presence score, simply hover your mouse cursor over the bar.

**Breeding Season** (▪)
Yellow bars denote a very liberal estimate of the time-frame inside which the bird breeds across its entire range. If there are no yellow bars shown for a bird, it does not breed in your project area.

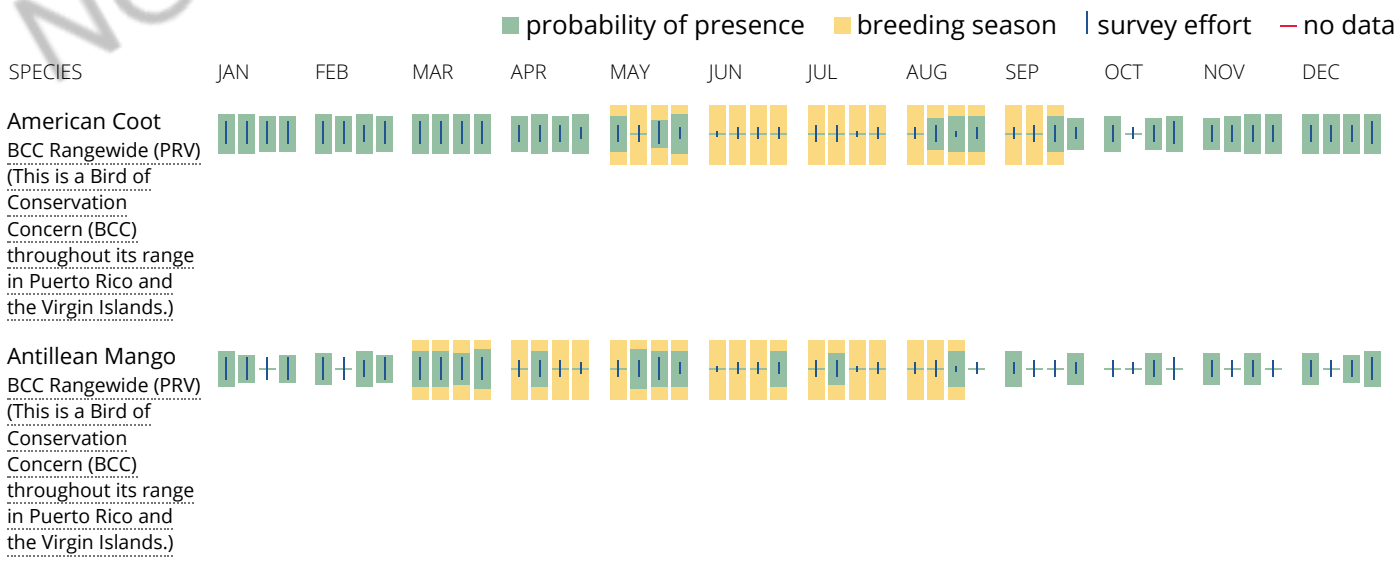
**Survey Effort** (|)
Vertical black lines superimposed on probability of presence bars indicate the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps. The number of surveys is expressed as a range, for example, 33 to 64 surveys.

To see a bar's survey effort range, simply hover your mouse cursor over the bar.

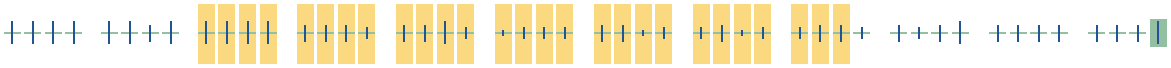
**No Data** (–)
A week is marked as having no data if there were no survey events for that week.

**Survey Timeframe**
Surveys from only the last 10 years are used in order to ensure delivery of currently relevant information. The exception to this is areas off the Atlantic coast, where bird returns are based on all years of available data, since data in these areas is currently much more sparse.

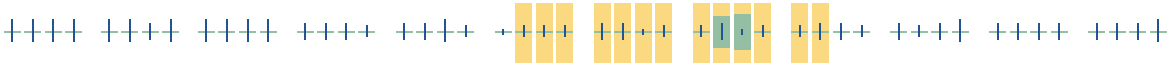
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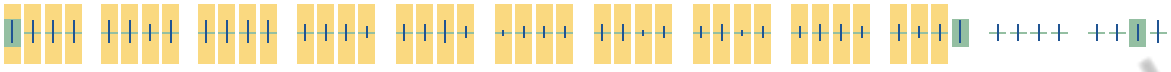
Black Rail
BCC Rangewide (PRV) (This is a Bird of Conservation Concern (BCC) throughout its range in Puerto Rico and the Virgin Islands.)



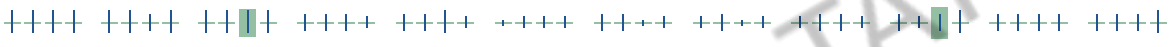
Black Swift
BCC Rangewide (PRV) (This is a Bird of Conservation Concern (BCC) throughout its range in Puerto Rico and the Virgin Islands.)



Brown Booby
BCC Rangewide (PRV) (This is a Bird of Conservation Concern (BCC) throughout its range in Puerto Rico and the Virgin Islands.)



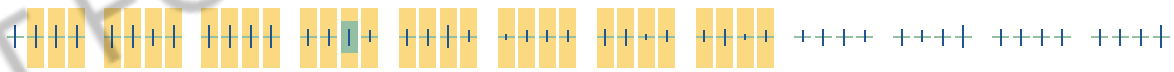
Cape May Warbler
BCC Rangewide (PRV) (This is a Bird of Conservation Concern (BCC) throughout its range in Puerto Rico and the Virgin Islands.)



Lesser Yellowlegs
BCC Rangewide (PRV) (This is a Bird of Conservation Concern (BCC) throughout its range in Puerto Rico and the Virgin Islands.)



Limpkin
BCC Rangewide (PRV) (This is a Bird of Conservation Concern (BCC) throughout its range in Puerto Rico and the Virgin Islands.)



Magnificent Frigatebird
BCC Rangewide (PRV) (This is a Bird of Conservation Concern (BCC) throughout its range in Puerto Rico and the Virgin Islands.)



Mangrove Cuckoo
BCC Rangewide (PRV) (This is a Bird of Conservation Concern (BCC) throughout its range in Puerto Rico and the Virgin Islands.)



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Masked Duck
BCC Rangewide (PRV) (This is a Bird of Conservation Concern (BCC) throughout its range in Puerto Rico and the Virgin Islands.)

Puerto Rican Screech-owl
BCC Rangewide (PRV) (This is a Bird of Conservation Concern (BCC) throughout its range in Puerto Rico and the Virgin Islands.)

SPECIES JAN FEB MAR APR MAY JUN JUL AUG SEP OCT NOV DEC

Puerto Rican Vireo
BCC Rangewide (PRV) (This is a Bird of Conservation Concern (BCC) throughout its range in Puerto Rico and the Virgin Islands.)

Ruddy Duck
BCC Rangewide (PRV) (This is a Bird of Conservation Concern (BCC) throughout its range in Puerto Rico and the Virgin Islands.)

Semipalmated Sandpiper
BCC Rangewide (PRV) (This is a Bird of Conservation Concern (BCC) throughout its range in Puerto Rico and the Virgin Islands.)

Short-billed Dowitcher
BCC Rangewide (PRV) (This is a Bird of Conservation Concern (BCC) throughout its range in Puerto Rico and the Virgin Islands.)

West Indian Whistling Duck
BCC Rangewide (PRV) (This is a Bird of Conservation Concern (BCC) throughout its range in Puerto Rico and the Virgin Islands.)

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Whimbrel
BCC Rangewide (PRV) (This is a Bird of Conservation Concern (BCC) throughout its range in Puerto Rico and the Virgin Islands.)

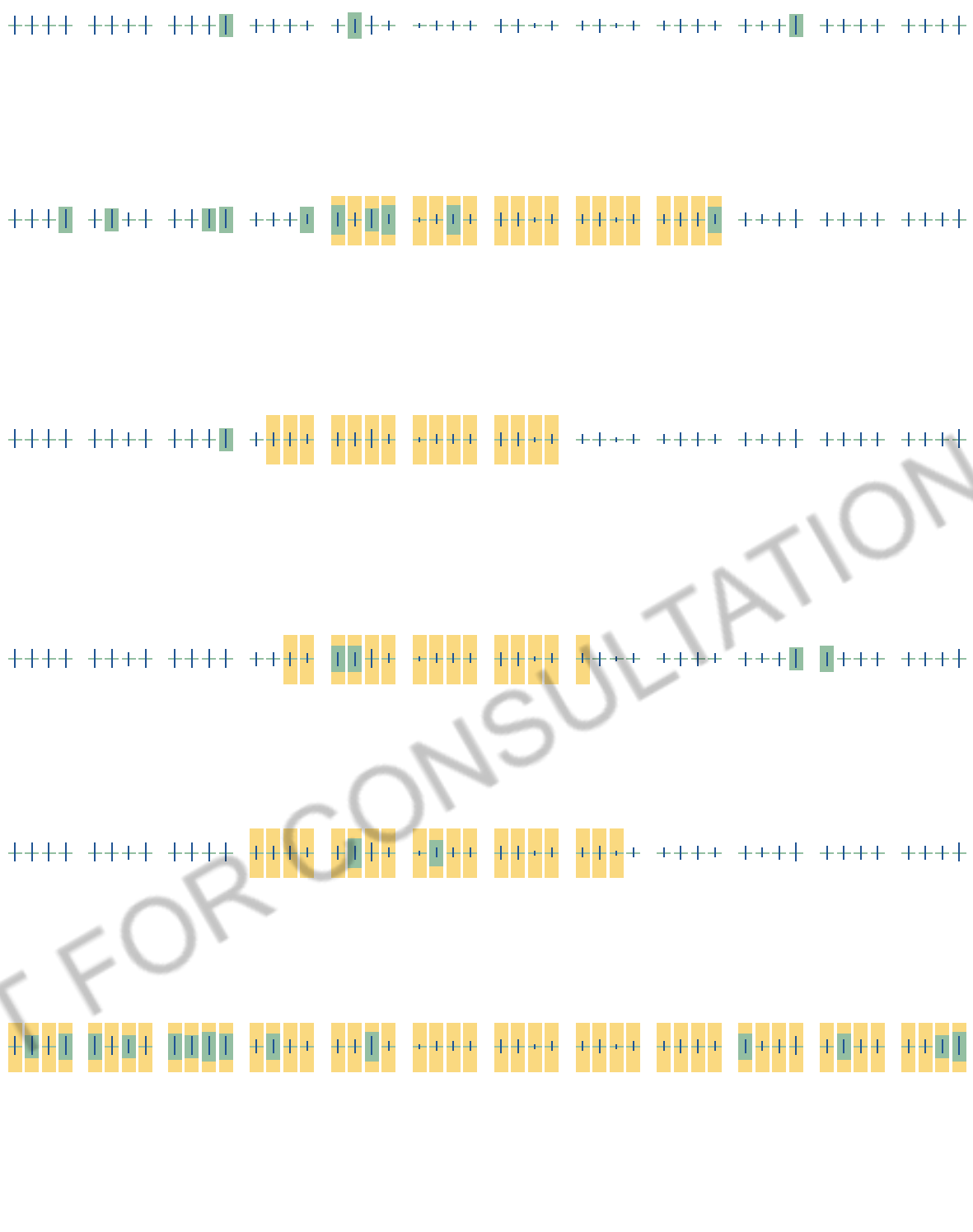
White-crowned Pigeon
BCC Rangewide (PRV) (This is a Bird of Conservation Concern (BCC) throughout its range in Puerto Rico and the Virgin Islands.)

White-tailed Tropicbird
BCC Rangewide (PRV) (This is a Bird of Conservation Concern (BCC) throughout its range in Puerto Rico and the Virgin Islands.)

Willet
BCC Rangewide (PRV) (This is a Bird of Conservation Concern (BCC) throughout its range in Puerto Rico and the Virgin Islands.)

Wilson's Plover
BCC Rangewide (PRV) (This is a Bird of Conservation Concern (BCC) throughout its range in Puerto Rico and the Virgin Islands.)

Yellow-breasted Crake
BCC Rangewide (PRV) (This is a Bird of Conservation Concern (BCC) throughout its range in Puerto Rico and the Virgin Islands.)



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**Tell me more about conservation measures I can implement to avoid or minimize impacts to migratory birds.**

Nationwide Conservation Measures describes measures that can help avoid and minimize impacts to all birds at any location year round. Implementation of these measures is particularly important when birds are most likely to occur in the project area. When birds may be breeding in the area, identifying the locations of any active nests and avoiding their destruction is a very helpful impact minimization measure. To see when birds are most likely to occur and be breeding in your project area, view the Probability of Presence Summary. Additional measures and/or permits may be advisable depending on the type of activity you are conducting and the type of infrastructure or bird species present on your project site.

**What does IPaC use to generate the migratory birds potentially occurring in my specified location?**

The Migratory Bird Resource List is comprised of USFWS Birds of Conservation Concern (BCC) and other species that may warrant special attention in your project location.

The migratory bird list generated for your project is derived from data provided by the Avian Knowledge Network (AKN). The AKN data is based on a growing collection of survey, banding, and citizen science datasets and is queried and filtered to return a list of those birds reported as occurring in the 10km grid cell(s) which your project intersects, and that have been identified as warranting special attention because they are a BCC species in that area, an eagle (Eagle Act requirements may apply), or a species that has a particular vulnerability to offshore activities or development.

Again, the Migratory Bird Resource list includes only a subset of birds that may occur in your project area. It is not representative of all birds that may occur in your project area. To get a list of all birds potentially present in your project area, please visit the AKN Phenology Tool.

**What does IPaC use to generate the probability of presence graphs for the migratory birds potentially occurring in my specified location?**

The probability of presence graphs associated with your migratory bird list are based on data provided by the Avian Knowledge Network (AKN). This data is derived from a growing collection of survey, banding, and citizen science datasets .

Probability of presence data is continuously being updated as new and better information becomes available. To learn more about how the probability of presence graphs are produced and how to interpret them, go the Probability of Presence Summary and then click on the "Tell me about these graphs" link.

**How do I know if a bird is breeding, wintering, migrating or present year-round in my project area?**

To see what part of a particular bird's range your project area falls within (i.e. breeding, wintering, migrating or year-round), you may refer to the following resources: The Cornell Lab of Ornithology All About Birds Bird Guide, or (if you are unsuccessful in locating the bird of interest there), the Cornell Lab of Ornithology Neotropical Birds guide. If a bird on your migratory bird species list has a breeding season associated with it, if that bird does occur in your project area, there may be nests present at some point within the timeframe specified. If "Breeds elsewhere" is indicated, then the bird likely does not breed in your project area.

**What are the levels of concern for migratory birds?**

Migratory birds delivered through IPaC fall into the following distinct categories of concern:

1. "BCC Rangewide" birds are Birds of Conservation Concern (BCC) that are of concern throughout their range anywhere within the USA (including Hawaii, the Pacific Islands, Puerto Rico, and the Virgin Islands);
2. "BCC - BCR" birds are BCCs that are of concern only in particular Bird Conservation Regions (BCRs) in the continental USA; and
3. "Non-BCC - Vulnerable" birds are not BCC species in your project area, but appear on your list either because of the Eagle Act requirements (for eagles) or (for non-eagles) potential susceptibilities in offshore areas from certain types of development or activities (e.g. offshore energy development or longline fishing).

Although it is important to try to avoid and minimize impacts to all birds, efforts should be made, in particular, to avoid and minimize impacts to the birds on this list, especially eagles and BCC species of rangewide concern. For more information on conservation measures you can implement to help avoid and minimize migratory bird impacts and requirements for eagles, please see the FAQs for these topics.

**Details about birds that are potentially affected by offshore projects**

For additional details about the relative occurrence and abundance of both individual bird species and groups of bird species within your project area off the Atlantic Coast, please visit the Northeast Ocean Data Portal. The Portal also offers data and information about other taxa besides birds that may be helpful to you in your project review.

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Alternately, you may download the bird model results files underlying the portal maps through the NOAA NCCOS Integrative Statistical Modeling and Predictive Mapping of Marine Bird Distributions and Abundance on the Atlantic Outer Continental Shelf project webpage.

Bird tracking data can also provide additional details about occurrence and habitat use throughout the year, including migration. Models relying on survey data may not include this information. For additional information on marine bird tracking data, see the Diving Bird Study and the nanotag studies or contact Caleb Spiegel or Pam Loring.

**What if I have eagles on my list?**

If your project has the potential to disturb or kill eagles, you may need to obtain a permit to avoid violating the Eagle Act should such impacts occur.

**Proper Interpretation and Use of Your Migratory Bird Report**

The migratory bird list generated is not a list of all birds in your project area, only a subset of birds of priority concern. To learn more about how your list is generated, and see options for identifying what other birds may be in your project area, please see the FAQ "What does IPaC use to generate the migratory birds potentially occurring in my specified location". Please be aware this report provides the "probability of presence" of birds within the 10 km grid cell(s) that overlap your project; not your exact project footprint. On the graphs provided, please also look carefully at the survey effort (indicated by the black vertical bar) and for the existence of the "no data" indicator (a red horizontal bar). A high survey effort is the key component. If the survey effort is high, then the probability of presence score can be viewed as more dependable. In contrast, a low survey effort bar or no data bar means a lack of data and, therefore, a lack of certainty about presence of the species. This list is not perfect; it is simply a starting point for identifying what birds of concern have the potential to be in your project area, when they might be there, and if they might be breeding (which means nests might be present). The list helps you know what to look for to confirm presence, and helps guide you in knowing when to implement conservation measures to avoid or minimize potential impacts from your project activities, should presence be confirmed. To learn more about conservation measures, visit the FAQ "Tell me about conservation measures I can implement to avoid or minimize impacts to migratory birds" at the bottom of your migratory bird trust resources page.

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# Facilities

## National Wildlife Refuge lands

Any activity proposed on lands managed by the National Wildlife Refuge system must undergo a 'Compatibility Determination' conducted by the Refuge. Please contact the individual Refuges to discuss any questions or concerns.

THERE ARE NO REFUGE LANDS AT THIS LOCATION.

## Fish hatcheries

THERE ARE NO FISH HATCHERIES AT THIS LOCATION.

# Wetlands in the National Wetlands Inventory

Impacts to NWI wetlands and other aquatic habitats may be subject to regulation under Section 404 of the Clean Water Act, or other State/Federal statutes.

For more information please contact the Regulatory Program of the local U.S. Army Corps of Engineers District.

Please note that the NWI data being shown may be out of date. We are currently working to update our NWI data set. We recommend you verify these results with a site visit to determine the actual extent of wetlands on site.

This location overlaps the following wetlands:

RIVERINE

R4SBC

A full description for each wetland code can be found at the National Wetlands Inventory website

**Data limitations**

The Service's objective of mapping wetlands and deepwater habitats is to produce reconnaissance level information on the location, type and size of these resources. The maps are prepared from the analysis of high altitude imagery. Wetlands are identified based on vegetation, visible hydrology and geography. A margin of error is inherent in the use of imagery; thus, detailed on-the-ground inspection of any particular site may result in revision of the wetland boundaries or classification established through image analysis.

The accuracy of image interpretation depends on the quality of the imagery, the experience of the image analysts, the amount and quality of the collateral data and the amount of ground truth verification work conducted. Metadata should be consulted to determine the date of the source imagery used and any mapping problems.

Wetlands or other mapped features may have changed since the date of the imagery or field work. There may be occasional differences in polygon boundaries or classifications between the information depicted on the map and the actual conditions on site.

**Data exclusions**

Certain wetland habitats are excluded from the National mapping program because of the limitations of aerial imagery as the primary data source used to detect wetlands. These habitats include seagrasses or submerged aquatic vegetation that are found in the intertidal and subtidal zones of estuaries and nearshore coastal waters. Some deepwater reef communities (coral or tuberficid worm reefs) have also been excluded from the inventory. These habitats, because of their depth, go undetected by aerial imagery.

**Data precautions**

Federal, state, and local regulatory agencies with jurisdiction over wetlands may define and describe wetlands in a different manner than that used in this inventory. There is no attempt, in either the design or products of this inventory, to define the limits of proprietary jurisdiction of any Federal, state, or local government or to establish the geographical scope of the regulatory programs of government agencies. Persons intending to engage in activities involving modifications within or adjacent to wetland areas should seek the advice of appropriate federal, state, or local agencies concerning specified agency regulatory programs and proprietary jurisdictions that may affect such activities.

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# APPENDIX 8: Farmland Protection Policy Act
# USDA-NRCS Consultation

United States Department of Agriculture

Natural Resources Conservation Service

Caribbean Area State Office

654 Muñoz Rivera Ave.
Suite 604
San Juan, PR
00918

787-766-5206

www.pr.nrcs.usda.gov

August 2, 2024

Juan Carlos Pérez Bofill, PE, MEng.
Director- Disaster Recovery, CDBG-DR/MIT Program

**SUBJECT:** Farmland Protection Policy Act Evaluation for PR-122 Lajas-San Germán Connector

Dear Mr.Pérez Bofill,

This letter is in response to your request for evaluation of the above-mentioned project. The project is located between the municipalities of San Germán and Lajas, Puerto Rico. As stated in the request letter, the proposed project may be entitled to federal funds from the Department of Housing and Urban Development (HUD) guidelines under the INFRAMIT Program for the CDBG-MIT funds.

The Farmland Protection Policy Act (FPPA) is intended to minimize the impact Federal programs have on the unnecessary and irreversible conversion of farmland to nonagricultural uses. It assures that, to the extent possible, federal programs are administered to be compatible with state, local units of government, and private programs and policies to protect farmland. The USDA Natural Resources Conservation Service (NRCS) is responsible for evaluating the site and conducting a Farmland Conversion Impact Rating.

Farmland means prime or unique farmlands as defined in section 1540(c)(1) of the FPPA or farmland that is determined by the appropriate state or unit of local government agency or agencies with concurrence of the Secretary of Agriculture to be farmland of statewide local importance. Farmland subject to FPPA requirements does not have to be currently used for cropland. It can be forestland, pastureland, cropland, or other land, but not water or urban built-upland

Farmland does not include land already in or committed to urban development or water storage. Farmland already in urban development or water storage includes all land with a density of 30 structures per 40-acre area, and includes lands identified as urbanized area.

Based on the information provided, the proposed project activities for the PR-122 Lajas-San Germán Connector would include:

- Extending the existing PR-122 road, known as Angel Castro Pérez Avenue, from its current intersection with the east end of the PR-166 (San Germán South Detour) to its intersection with the PR-321 in Lajas.

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- Continuing the typical Phase 2 section, which has 4 lanes, to complete the extension of PR-122, with a total length of 2.2 km and a minimum easement width of 33.5 meters.

NRCS uses a land evaluation and site assessment (LESA) system to establish a farmland conversion impact rating score on the proposed site of Federally funded and assisted projects. This score is used as an indicator for the project sponsor, in this case HUD (federal funds provider), to consider alternative sites if the potential adverse impacts on the farmland exceed the recommended allowable level. The assessment is completed on form AD-1006, Farmland Conversion Impact Rating. The sponsoring agency completes the site assessment portion of the AD-1006, which assesses non-soil related criteria such as the potential for impact on the local agricultural economy if the land is converted to non-farm use, and compatibility with existing agricultural use. The FPPA does not authorize the federal government to regulate the use of private or nonfederal land or, in any way, affect the property rights of owners.

According to the Web Soil Survey (WSS), the project area corresponds to the San Germán Area, Southwestern Puerto Rico (PR787). A WSS soil interpretation report was generated for farmland classification to evaluate map units subject to the Farmland Protection Policy Act (FPPA).

Based on the report, 11.4 percent of the project footprint area (Map Unit : Humatas clay, 20 to 40 percent slopes and Mucara loam, 12 to 20 percent slopes) are classified as farmland of statewide importance, 5.5 percent (Map Unit: Montegrande clay, 2 to 12 percent slopes) as Prime farmland and 83.1 percent (Map Unit : Descalabrado clay, 12 to 20 percent slopes, Descalabrado clay, 20 to 60 percent slopes, El Cacique-La Taina complex, 20 to 60 percent slopes, very stony, Mucara loam, 20 to 40 percent slopes, Mucara loam, 40 to 60 percent slopes, San German-Duey complex, 20 to 60 percent slopes and Urban land) are classified as Not prime farmland.

After evaluating the project footprint (refer to the attached maps and provided statement), including the WSS Farmland Classification map and 2020 US Census Bureau, it was determined that the area of interest contains land classified as prime farmland (both prime, and statewide importance). However, based on the 2020 US Census Bureau Urban area map shows that the area of interest is designated as Urban area.

According to FPPA provisions, urbanized areas or lands designated as urban-built up on USDA important farmland map are not subject to FPPA policy. Therefore, this project is not subject to the Farmland Protection Policy Act.

Other environmental considerations, such susceptibility to erosion, should be addressed as the AOI is classified as highly erodible land (HEL). During the construction phase, appropriate erosion and sediment control measures should be incorporated into your construction plan to ensure minimal environmental degradation.

This data used to make the evaluation is not designed for use as a primary regulatory tool in permitting or siting decisions but may be used as a reference source and for planning purposes. This is public information and may be interpreted by organizations, units of government or

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others based on needs; however, these entities are responsible for the appropriate use and application of these data. Digital and tabular data files are updated yearly, and users are responsible for obtaining the latest version of the data.

If you have any questions, please contact us at 787-766-5064 or by email: **manuel.matos@usda.gov.**

If we can be of further assistance, please do not hesitate to contact us.

Sincerely,

Jacqueline Vega-Perez

Jacqueline Vega Pérez
Resource Soil Scientist for the Caribbean Area

Enclosures

pc: Luis Cruz Arroyo, State Conservationist, USDA-NRCS Caribbean Area; Manuel Matos Rodríguez, State Soil Scientist for the Caribbean Area; Aldo A.Rivera Vázquez, Director for Program Management, Puerto Rico Department of Housing (Departamento de la Vivienda de Puerto Rico); Angel G. López Guzmán, Deputy Director, Puerto Rico Department of Housing (Departamento de la Vivienda de Puerto Rico)

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U.S. Department of Agriculture

# FARMLAND CONVERSION IMPACT RATING

| | | | |
|---|---|---|---|
| **PART I** *(To be completed by Federal Agency)* | | Date Of Land Evaluation Request 5/10/24 | |
| Name of Project PR-122 Lajas-San German Connector | | Federal Agency Involved PR Department of Housing(HUD) | |
| Proposed Land Use New Highway | | County and State San German and Lajas, PR | |
| **PART II** *(To be completed by NRCS)* | | Date Request Received By NRCS 7/1/2024 | Person Completing Form: Jacqueline Vega NRCS |
| Does the site contain Prime, Unique, Statewide or Local Important Farmland? *(If no, the FPPA does not apply - do not complete additional parts of this form)* | YES ☑ NO ☐ | Acres Irrigated 9,345 | Average Farm Size 88 |
| Major Crop(s) Plantains, Coffee, Vegetables | Farmable Land In Govt. Jurisdiction Acres: 46,765 % 45.60 | Amount of Farmland As Defined in FPPA Acres: 46.765 % 45.60 | |
| Name of Land Evaluation System Used LESA - Lajas | Name of State or Local Site Assessment System N/A | Date Land Evaluation Returned by NRCS 8/1/2024 | |

| **PART III** *(To be completed by Federal Agency)* | Alternative Site Rating | | | |
|---|---|---|---|---|
| | Site A | Site B | Site C | Site D |
| A. Total Acres To Be Converted Directly | | | | |
| B. Total Acres To Be Converted Indirectly | | | | |
| C. Total Acres In Site | 68.44 | | | |
| **PART IV** *(To be completed by NRCS)* Land Evaluation Information | | | | |
| A. Total Acres Prime And Unique Farmland | 4.40 | | | |
| B. Total Acres Statewide Important or Local Important Farmland | 9.20 | | | |
| C. Percentage Of Farmland in County Or Local Govt. Unit To Be Converted | 0.0120 | | | |
| D. Percentage Of Farmland in Govt. Jurisdiction With Same Or Higher Relative Value | 1.3 | | | |
| **PART V** (To be completed by NRCS) Land Evaluation Criterion Relative Value of Farmland To Be Converted (Scale of 0 to 100 Points) | 8 | | | |

| **PART VI** *(To be completed by Federal Agency)* Site Assessment Criteria *(Criteria are explained in 7 CFR 658.5 b. For Corridor project use form NRCS-CPA-106)* | **Maximum Points** | Site A | Site B | Site C | Site D |
|---|---|---|---|---|---|
| 1. Area In Non-urban Use | (15) | | | | |
| 2. Perimeter In Non-urban Use | (10) | | | | |
| 3. Percent Of Site Being Farmed | (20) | | | | |
| 4. Protection Provided By State and Local Government | (20) | | | | |
| 5. Distance From Urban Built-up Area | (15) | | | | |
| 6. Distance To Urban Support Services | (15) | | | | |
| 7. Size Of Present Farm Unit Compared To Average | (10) | | | | |
| 8. Creation Of Non-farmable Farmland | (10) | | | | |
| 9. Availability Of Farm Support Services | (5) | | | | |
| 10. On-Farm Investments | (20) | | | | |
| 11. Effects Of Conversion On Farm Support Services | (10) | | | | |
| 12. Compatibility With Existing Agricultural Use | (10) | | | | |
| TOTAL SITE ASSESSMENT POINTS | 160 | 0 | 0 | 0 | 0 |
| **PART VII** ***(To be completed by Federal Agency)*** | | | | | |
| Relative Value Of Farmland *(From Part V)* | 100 | 8 | 0 | 0 | 0 |
| Total Site Assessment *(From Part VI above or local site assessment)* | 160 | 0 | 0 | 0 | 0 |
| **TOTAL POINTS** ***(Total of above 2 lines)*** | 260 | 8 | 0 | 0 | 0 |

| Site Selected: | Date Of Selection | Was A Local Site Assessment Used? YES ☐ NO ☐ |
|---|---|---|

Reason For Selection:

| Name of Federal agency representative completing this form: | Date: |
|---|---|

***(See Instructions on reverse side)*** **Form AD-1006 (03-02)**

## STEPS IN THE PROCESSING THE FARMLAND AND CONVERSION IMPACT RATING FORM

Step 1 - Federal agencies (or Federally funded projects) involved in proposed projects that may convert farmland, as defined in the Farmland Protection Policy Act (FPPA) to nonagricultural uses, will initially complete Parts I and III of the form. For Corridor type projects, the Federal agency shall use form NRCS-CPA-106 in place of form AD-1006. The Land Evaluation and Site Assessment (LESA) process may also be accessed by visiting the FPPA website, http://fppa.nrcs.usda.gov/lesa/.

Step 2 - Originator (Federal Agency) will send one original copy of the form together with appropriate scaled maps indicating location(s)of project site(s), to the Natural Resources Conservation Service (NRCS) local Field Office or USDA Service Center and retain a copy for their files. (NRCS has offices in most counties in the U.S. The USDA Office Information Locator may be found at http://offices.usda.gov/scripts/ndISAPI.dll/oip_public/USA_map**,** or the offices can usually be found in the Phone Book under U.S. Government, Department of Agriculture. A list of field offices is available from the NRCS State Conservationist and State Office in each State.)

Step 3 - NRCS will, within 10 working days after receipt of the completed form, make a determination as to whether the site(s) of the proposed project contains prime, unique, statewide or local important farmland. (When a site visit or land evaluation system design is needed, NRCS will respond within 30 working days.

Step 4 - For sites where farmland covered by the FPPA will be converted by the proposed project, NRCS will complete Parts II, IV and V of the form.

Step 5 - NRCS will return the original copy of the form to the Federal agency involved in the project, and retain a file copy for NRCS records.

Step 6 - The Federal agency involved in the proposed project will complete Parts VI and VII of the form and return the form with the final selected site to the servicing NRCS office.

Step 7 - The Federal agency providing financial or technical assistance to the proposed project will make a determination as to whether the proposed conversion is consistent with the FPPA.

## INSTRUCTIONS FOR COMPLETING THE FARMLAND CONVERSION IMPACT RATING FORM

*(For Federal Agency)*

**Part I**: When completing the "County and State" questions, list all the local governments that are responsible for local land use controls where site(s) are to be evaluated.

**Part III**: When completing item B (Total Acres To Be Converted Indirectly), include the following:

1. Acres not being directly converted but that would no longer be capable of being farmed after the conversion, because the conversion would restrict access to them or other major change in the ability to use the land for agriculture.
2. Acres planned to receive services from an infrastructure project as indicated in the project justification (e.g. highways, utilities planned build out capacity) that will cause a direct conversion.

**Part VI**: Do not complete Part VI using the standard format if a State or Local site assessment is used. With local and NRCS assistance, use the local Land Evaluation and Site Assessment (LESA).

1. Assign the maximum points for each site assessment criterion as shown in § 658.5(b) of CFR. In cases of corridor-type project such as transportation, power line and flood control, criteria #5 and #6 will not apply and will, be weighted zero, however, criterion #8 will be weighed a maximum of 25 points and criterion #11 a maximum of 25 points.

2. Federal agencies may assign relative weights among the 12 site assessment criteria other than those shown on the FPPA rule after submitting individual agency FPPA policy for review and comment to NRCS. In all cases where other weights are assigned, relative adjustments must be made to maintain the maximum total points at 160. For project sites where the total points equal or exceed 160, consider alternative actions, as appropriate, that could reduce adverse impacts (e.g. Alternative Sites, Modifications or Mitigation).

**Part VII:** In computing the "Total Site Assessment Points" where a State or local site assessment is used and the total maximum number of points is other than 160, convert the site assessment points to a base of 160.
Example: if the Site Assessment maximum is 200 points, and the alternative Site "A" is rated 180 points:

$$\frac{\text{Total points assigned Site A}}{\text{Maximum points possible}} = \frac{180}{200} \text{ X } 160 = 144 \text{ points for Site A}$$

For assistance in completing this form or FPPA process, contact the local NRCS Field Office or USDA Service Center.

NRCS employees, consult the FPPA Manual and/or policy for additional instructions to complete the AD-1006 form.

# Explanatory Memorandum

# PR-122 Lajas-San Germán Connector

Since 1968, the need for an alternative route to the existing PR-101 highway between the municipalities of San Germán and Lajas had been identified. Puerto Rico Road 101, or PR-101, is a rural highway that leaves the municipality of Boquerón, Cabo Rojo and Lajas, to the Municipality of San Germán. The existing PR-101 is a steep two-lane road susceptible to flooding in some low-lying locations. The PR-101 does not have sufficient capacity to absorb the traffic density that has increased over the last four decades as a result of the growth of commercial and industrial activity in the region. Thus, the Puerto Rico Highway and Transportation Authority (PRHTA) conducted a route study that served as the basis for the development of the PR-122 extension project to address the region's transportation needs.

In 2003, PRHTA conducted a local Environmental Assessment (EA) to evaluate the potential impacts of a new highway with increased capacity and better alignment to accommodate current and future traffic volumes in a quick and safe manner. The PRHTA proposed the extension of the existing PR-122 highway from the urban area in the El Retiro neighborhood, at the point of intersection of PR-166 with Angel Castro Pérez Avenue, in San Germán, to the point of intersection with the PR-116, at an approximate distance of 15 kilometers from the urban center of the municipality of Lajas. This project is part of the Highway Transportation Plan for the Western Region of Puerto Rico. The project was divided into the following two phases: • Phase 1 - (AC-012201) - From the PR-166 highway in San Germán to the PR-321 highway in Lajas. • Phase 2 - (AC-012205) - From the PR-321 highway to the PR-116 highway in Lajas. Construction of Phase 2 of this project was completed in July 2010 as an access to the Municipality of San Germán, connecting the interstate PR-2, which is a main artery, with the PR-166 (minor artery) existing in the El Retiro community.

The proposed action consists in the extension of the existing PR-122 road, known as Angel Casto Pérez Avenue, from its current intersection with the east end of the PR-166 (San Germán South Detour) to its intersection with the PR-321 in Lajas. Continuing with

the planning process conceptualized in 2003, this project intends to provide a road of greater capacity and better alignment to accommodate the volume of current and future traffic in a way that is both fast and safe. Completing this stretch of PR-122 to Lajas would have the effect of facilitating and improving the transportation of goods, people, and services between the city of Lajas and the PR-2 highway.

The already built Phase 2 presents a typical section divided into 4 lanes that includes paved walks on both sides to facilitate and improve the transportation of goods, people and services between both municipalities. The proposed action will continue the typical Phase 2 section to complete the extension of PR-122, with a total length of 2.2 km and a minimum easement width of 33.5 meters (m).

The purpose of the proposed PR-122 Extension project is to improve mobility and connectivity in the project area. The proposed project would provide a direct link between road PR-2 in the Municipality of San Germán and the Municipality of Lajas and its tourist area. It would provide an alternate route to PR-101, enhancing regional travel options and safety while protecting the environment and promoting the economic development of the region. The proposed project would provide additional capacity in the project area.

Recently, the project Phase 1 was approved to begin environmental review in accordance with the US Department of Housing and Urban Development guidelines under the INFRAMIT Program for the CDBG-MIT funds. The proposed project is included as part of the highway projects committed to in the Final Report of the Island's 2045 Long-Term Transportation Plan approved in December 2018. This Plan was developed by the Metropolitan Planning Organization (MPO) of Puerto Rico to establish transportation priorities for the island nationwide by 2045.

The expected benefits of the project are as follows:

- Improve Highway PR-122 Lajas-San Germán Corridor effectiveness by providing better strategic highway network mobility and accessibility for people and freight.
- Improve Highway PR-122 Lajas-San Germán Corridor efficiency by reducing travel time.

- Enhance global and economic competitiveness by facilitating the efficient movement of freight, business, and tourism activity.
- Promote environmental sustainability by reducing the PR-122 trucks and car travel times. These reductions will create a smaller carbon footprint, greenhouse gas emissions and energy consumption, and improve air quality.

**INFRA-STR-004**

# Figure 1: Location - Aerial Map

PR-122 Lajas-San German Connector
Coordinates: 18.061759,-67.044357




## Legend

- PR-122 Extension
- Study Area (800 m Buffer)
- County or Equivalent

**Structures**

- Hospital
- School
- College University
- Post Office
- Cemetery

**NHDFlowline**

- Perennial Stream
- Canal/Ditch
- Intermittent Stream

**Roads**

- Expressway
- Local Connector
- Local Road
- Ramp
- 4WD

NORTH

1:30,000

0 0.3 0.6 mi

0 0.5 1 km

Service Layer Credits: World Imagery: Earthstar Geographics Google Satellite: © OpenStreetMap (and) contributors, CC-BY-SA and

**Source**

United States Geological Survey (USGS)
National Geologic Map Database
https://ngmdb.usgs.gov/ngmdb/ngmdb_home.html

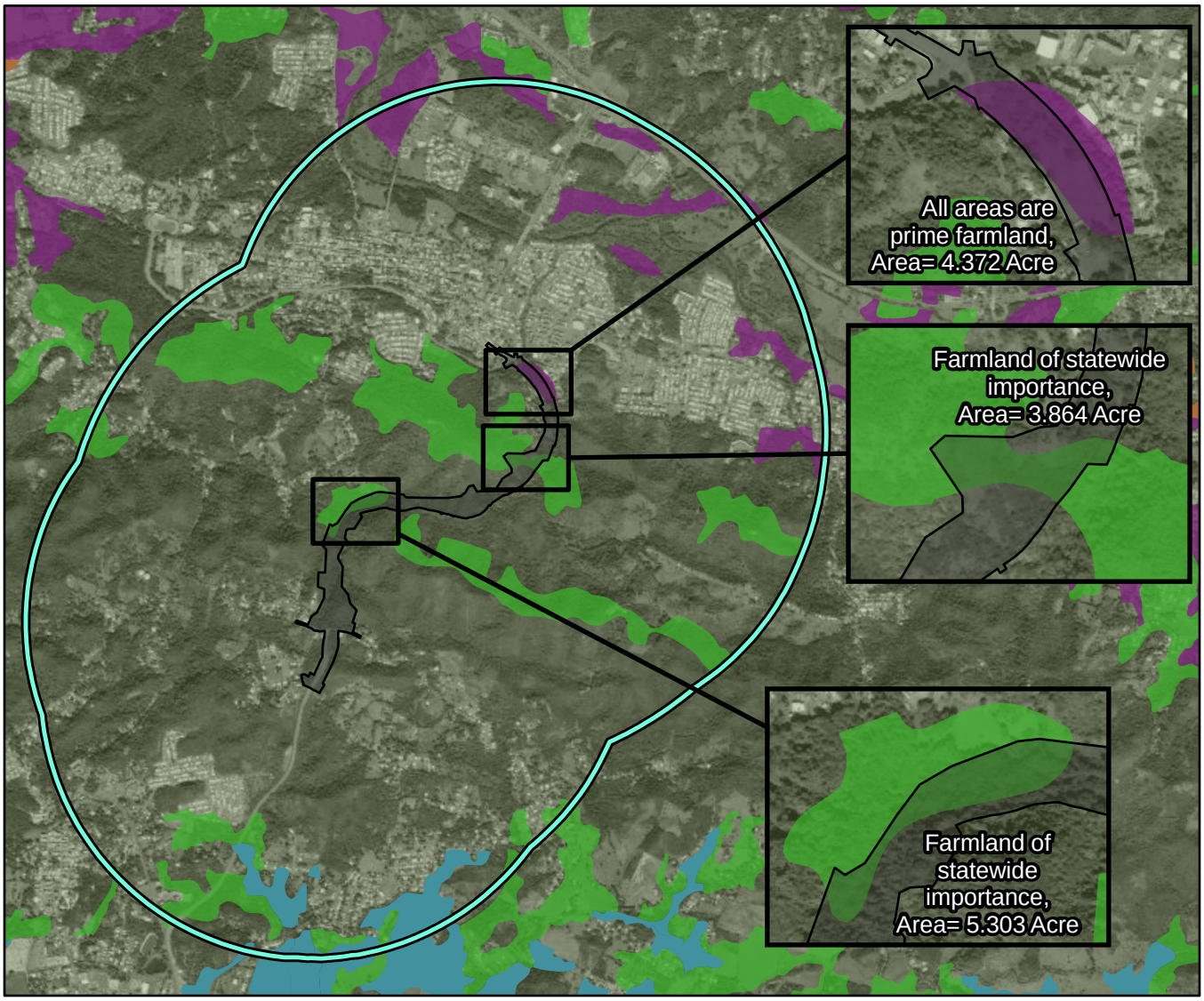





**INFRA-STR-004**

# Figure 2: Farmland Protection

PR-122 Lajas-San German Connector
Coordinates: 18.061759,-67.044357




PR-122 Right of Way
1 Mile Buffer

Farmland Class

- All areas are prime farmland
- Farmland of statewide importance
- Prime farmland if drained
- Prime farmland if irrigated
- Not prime farmland

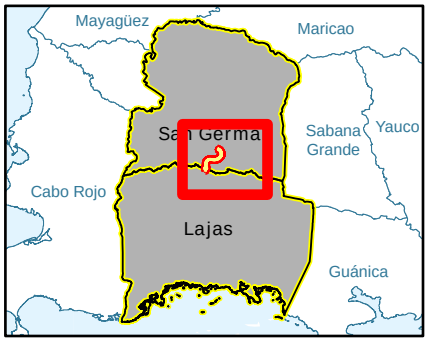
NORTH

1:40,000

0 0.45 0.9 mi
0 0.8 1.6 km

Service Layer Credits: World Imagery: Earthstar Geographics
World Imagery: Maxar




**Source**

Natural Resources Conservation Service (NRCS)
Gridded Soil Survey Geographic Database (gSSURGO) (Dec 4, 2023)
https://nrcs.app.box.com/v/soils/folder/233398887779

July 1, 2024

Manuel Matos Rodríguez
State Soil Scientist
U.S. Department of Agriculture (USDA)
NRCS Caribbean Area
654 Muñoz Rivera Ave., Suite 604
San Juan, PR 00918-4123
Email: Manuel.matos@usda.gov

**RE: Puerto Rico Department of Housing / Infrastructure Mitigation Program**
**PR-122 Lajas-San Germán Connector (INFRA-STR-004)**
**NRCS Farmland Conversion Impact Rating for Corridor Type Projects**

Dear Mr. Matos Rodríguez:

Puerto Rico was included in the Community Development Block Grant – Mitigation (CDBG-MIT) funds from the United States Department of Housing and Urban Development (HUD). The impacts of Hurricanes Irma and María were widely felt across the island and caused extensive damage to many homes and businesses. The Puerto Rico Department of Housing (PRDOH) is proposing to use the CDBG-MIT funds to implement large, transformative infrastructure projects that will provide long-term benefits and strengthen a community's resilience to future hazards.

The PRDOH is the responsible entity for completing the HUD environmental review in accordance with 24 CFR Part 58. As part of that review, a determination of the potential of new construction (or expansion of existing construction) on the various types of farmlands in Puerto Rico, is required. As such, one of the applicants in the Infrastructure Mitigation Program, INFRA-STR-004, is proposing the construction of an extension of the PR-122 Road, known as Ángel Castro Pérez Avenue, from its current intersection with the east end of the PR-166 Road (San Germán South Detour) to its intersection with the PR-321 Road in Lajas, Puerto Rico.

Based on an analysis of the information available on the Natural Resources Conservation Services (NRCS) platform, there are two sections that will cross land classified as **farmland of statewide importance** and one section classified as **prime farmland**. The Form NRCS-CPA-106 has been completed to initiate the evaluation of the farmland conversion impact rating of the proposed project.

Attached to this letter, we are including the information and maps showing the area and planned construction. We thank you for your consideration and look forward to your response. Should you have any questions, please do not hesitate to contact us at the information below.

Sincerely,

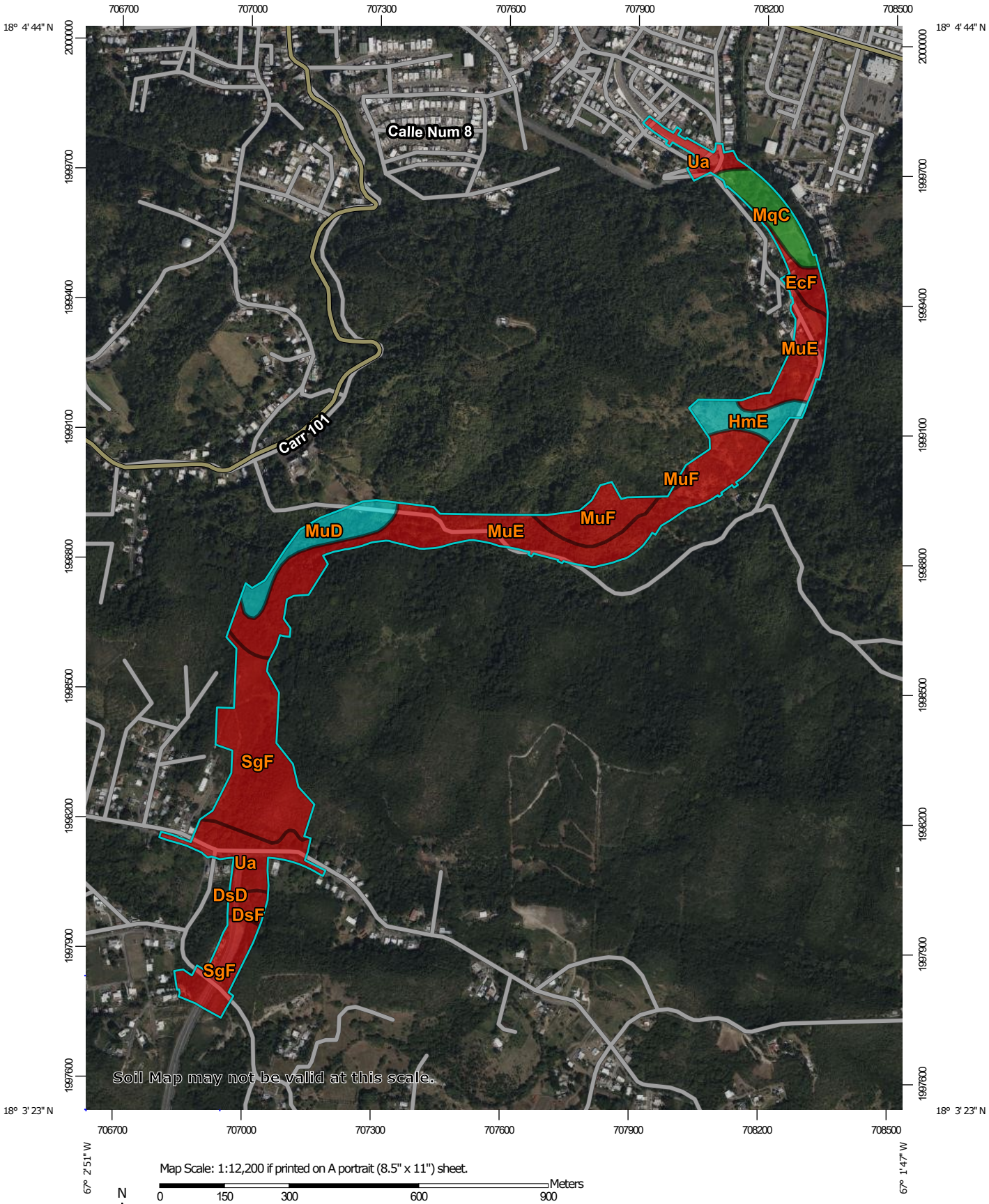
Juan Carlos Pérez Bofill, PE, MEng.
Director – Disaster Recovery, CDBG-DR/MIT Program
environmentcdbg@vivienda.pr.gov | 787.274.2527 ext. 4320

C: Aldo A. Rivera Vázquez
Director for Program Management
Permits and Environmental Compliance Division

Angel G. López Guzmán
Deputy Director
Permits and Environmental Compliance Division

**Attachment**

Farmland Classification—San German Area, Southwestern Puerto Rico
(PR122_ROW_dissolve)




Map Scale: 1:12,200 if printed on A portrait (8.5" x 11") sheet.

N

Meters
0 150 300 600 900

Feet
0 500 1000 2000 3000

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 19N WGS84

# MAP LEGEND

**Area of Interest (AOI)**

- Area of Interest (AOI)

**Soils**

**Soil Rating Polygons**

- Not prime farmland
- All areas are prime farmland
- Prime farmland if drained
- Prime farmland if protected from flooding or not frequently flooded during the growing season
- Prime farmland if irrigated
- Prime farmland if drained and either protected from flooding or not frequently flooded during the growing season
- Prime farmland if irrigated and drained
- Prime farmland if irrigated and either protected from flooding or not frequently flooded during the growing season
- Prime farmland if subsoiled, completely removing the root inhibiting soil layer
- Prime farmland if irrigated and the product of I (soil erodibility) x C (climate factor) does not exceed 60
- Prime farmland if irrigated and reclaimed of excess salts and sodium
- Farmland of statewide importance
- Farmland of statewide importance, if drained
- Farmland of statewide importance, if protected from flooding or not frequently flooded during the growing season
- Farmland of statewide importance, if irrigated
- Farmland of statewide importance, if drained and either protected from flooding or not frequently flooded during the growing season
- Farmland of statewide importance, if irrigated and drained
- Farmland of statewide importance, if irrigated and either protected from flooding or not frequently flooded during the growing season
- Farmland of statewide importance, if subsoiled, completely removing the root inhibiting soil layer
- Farmland of statewide importance, if irrigated and the product of I (soil erodibility) x C (climate factor) does not exceed 60
- Farmland of statewide importance, if irrigated and reclaimed of excess salts and sodium
- Farmland of statewide importance, if drained or either protected from flooding or not frequently flooded during the growing season
- Farmland of statewide importance, if warm enough, and either drained or either protected from flooding or not frequently flooded during the growing season
- Farmland of statewide importance, if warm enough
- Farmland of statewide importance, if thawed
- Farmland of local importance
- Farmland of local importance, if irrigated
- Farmland of unique importance
- Not rated or not available

**Soil Rating Lines**

- Not prime farmland
- All areas are prime farmland
- Prime farmland if drained
- Prime farmland if protected from flooding or not frequently flooded during the growing season
- Prime farmland if irrigated
- Prime farmland if drained and either protected from flooding or not frequently flooded during the growing season
- Prime farmland if irrigated and drained
- Prime farmland if irrigated and either protected from flooding or not frequently flooded during the growing season

- Prime farmland if subsoiled, completely removing the root inhibiting soil layer
- Prime farmland if irrigated and the product of I (soil erodibility) x C (climate factor) does not exceed 60
- Prime farmland if irrigated and reclaimed of excess salts and sodium
- Farmland of statewide importance
- Farmland of statewide importance, if drained
- Farmland of statewide importance, if protected from flooding or not frequently flooded during the growing season
- Farmland of statewide importance, if irrigated
- Farmland of statewide importance, if drained and either protected from flooding or not frequently flooded during the growing season
- Farmland of statewide importance, if irrigated and drained
- Farmland of statewide importance, if irrigated and either protected from flooding or not frequently flooded during the growing season
- Farmland of statewide importance, if subsoiled, completely removing the root inhibiting soil layer
- Farmland of statewide importance, if irrigated and the product of I (soil erodibility) x C (climate factor) does not exceed 60
- Farmland of statewide importance, if irrigated and reclaimed of excess salts and sodium
- Farmland of statewide importance, if drained or either protected from flooding or not frequently flooded during the growing season
- Farmland of statewide importance, if warm enough, and either drained or either protected from flooding or not frequently flooded during the growing season
- Farmland of statewide importance, if warm enough
- Farmland of statewide importance, if thawed
- Farmland of local importance
- Farmland of local importance, if irrigated
- Farmland of unique importance
- Not rated or not available

**Soil Rating Points**

- Not prime farmland
- All areas are prime farmland
- Prime farmland if drained
- Prime farmland if protected from flooding or not frequently flooded during the growing season
- Prime farmland if irrigated
- Prime farmland if drained and either protected from flooding or not frequently flooded during the growing season
- Prime farmland if irrigated and drained
- Prime farmland if irrigated and either protected from flooding or not frequently flooded during the growing season
- Prime farmland if subsoiled, completely removing the root inhibiting soil layer
- Prime farmland if irrigated and the product of I (soil erodibility) x C (climate factor) does not exceed 60
- Prime farmland if irrigated and reclaimed of excess salts and sodium
- Farmland of statewide importance
- Farmland of statewide importance, if drained
- Farmland of statewide importance, if protected from flooding or not frequently flooded during the growing season
- Farmland of statewide importance, if irrigated

- Farmland of statewide importance, if drained and either protected from flooding or not frequently flooded during the growing season
- Farmland of statewide importance, if irrigated and drained
- Farmland of statewide importance, if irrigated and either protected from flooding or not frequently flooded during the growing season
- Farmland of statewide importance, if subsoiled, completely removing the root inhibiting soil layer
- Farmland of statewide importance, if irrigated and the product of I (soil erodibility) x C (climate factor) does not exceed 60
- Farmland of statewide importance, if irrigated and reclaimed of excess salts and sodium
- Farmland of statewide importance, if drained or either protected from flooding or not frequently flooded during the growing season
- Farmland of statewide importance, if warm enough, and either drained or either protected from flooding or not frequently flooded during the growing season
- Farmland of statewide importance, if warm enough
- Farmland of statewide importance, if thawed
- Farmland of local importance
- Farmland of local importance, if irrigated
- Farmland of unique importance
- Not rated or not available

**Water Features**

- Streams and Canals

**Transportation**

- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

**Background**

- Aerial Photography

The soil surveys that comprise your AOI were mapped at 1:20,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: San German Area, Southwestern Puerto Rico
Survey Area Data: Version 15, Sep 13, 2023

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jan 23, 2022—Mar 1, 2022

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

# Farmland Classification

| Map unit symbol | Map unit name | Rating | Acres in AOI | Percent of AOI |
|---|---|---|---|---|
| DsD | Descalabrado clay, 12 to 20 percent slopes | Not prime farmland | 0.0 | 0.0% |
| DsF | Descalabrado clay, 20 to 60 percent slopes | Not prime farmland | 1.4 | 1.7% |
| EcF | El Cacique-La Taina complex, 20 to 60 percent slopes, very stony | Not prime farmland | 2.1 | 2.6% |
| HmE | Humatas clay, 20 to 40 percent slopes | Farmland of statewide importance | 3.9 | 4.8% |
| MqC | Montegrande clay, 2 to 12 percent slopes | All areas are prime farmland | 4.4 | 5.5% |
| MuD | Mucara loam, 12 to 20 percent slopes | Farmland of statewide importance | 5.3 | 6.6% |
| MuE | Mucara loam, 20 to 40 percent slopes | Not prime farmland | 29.1 | 36.4% |
| MuF | Mucara loam, 40 to 60 percent slopes | Not prime farmland | 5.1 | 6.3% |
| SgF | San German-Duey complex, 20 to 60 percent slopes | Not prime farmland | 20.2 | 25.3% |
| Ua | Urban land | Not prime farmland | 8.5 | 10.7% |
| **Totals for Area of Interest** | | | **79.9** | **100.0%** |

## Description

Farmland classification identifies map units as prime farmland, farmland of statewide importance, farmland of local importance, or unique farmland. It identifies the location and extent of the soils that are best suited to food, feed, fiber, forage, and oilseed crops. NRCS policy and procedures on prime and unique farmlands are published in the "Federal Register," Vol. 43, No. 21, January 31, 1978.

## Rating Options

*Aggregation Method:* No Aggregation Necessary

*Tie-break Rule:* Lower

# APPENDIX 9: Section 106 Consultation

GOVERNMENT OF PUERTO RICO
DEPARTMENT OF HOUSING

April 30, 2024

**Arch. Carlos A. Rubio Cancela**
Executive Director
Puerto Rico State Historic Preservation Office
Cuartel de Ballajá, Third Floor
San Juan, Puerto Rico 00901

**Re: Authorization to Submit Documents for Consultation**

Dear Arch. Rubio Cancela,

The U.S. Department of Housing (HUD) approved the allocations of Community Development Block Grant (CDBG-DR) funds on February 9, 2018. It also approved the allocation of Community Development Block Grant Mitigation (CDBG-MIT) funds on January 27, 2020. The purpose of these allocations is to address unsatisfied needs as a result of Hurricanes Irma and Maria in September 2017; and to carry out strategic and high-impact activities to mitigate disaster risks and reduce future losses.

To comply with the environmental requirements established by HUD, the Department of Housing of Puerto Rico (PRDOH) contracted Horne Federal LLC to provide environmental review services, among others, that will support the objectives of the agenda for both CDBG-DR and CDBG -MIT Programs.

To expedite the processes, Horne Federal LLC, is authorized to submit to the State Historic Preservation Officer, documentation of projects related to both the CDBG-DR and CDBG-MIT on behalf of PRDOH.

Cordially,

**Aldo A. Rivera Vázquez, PE**
Director
Division of Environmental Permitting and Compliance
Office of Disaster Recovery

December 11, 2024

Carlos A. Rubio Cancela
State Historic Preservation Officer
Puerto Rico State Historic Preservation Office
Cuartel de Ballajá (Tercer Piso)
San Juan, PR 00902-3935

## Puerto Rico Disaster Recovery, Community Development Block Grant Mitigation (CDBG-MIT): Infra-MIT Program

**SHPO-CF-02-13-03-02 and SHPO-CF-03-22-24-01, PR-INFRA-STR-004, PR-122 DESDE LA PR-321 HASTA LA PR-166, LAJAS - SAN GERMÁN, PUERTO RICO / AC-012201 – ARCHAEOLOGICAL MONITORING PLAN**

Dear Architect Rubio-Cancela,

On behalf of the Puerto Rico Department of Housing, we thank you for your letter dated April 11, 2024, in response to our March 12, 2024, letter submitting the revised archaeological resources mitigation plan. The letter states the PRSHPO had the following recommendations for the project:

1. When available please submit the relocation plan for the historic resource 5.
2. Shoring and protection of the historical resources 3, 5A, 6, 7, 8, 9, 10, 11, 12 and 13 prior the beginning of the project.
3. Archaeological monitoring during all ground disturbance activities within the historic resource 4 and 5 area.
4. Installation of a silt fence around all historic structures, to guarantee its protection during the project implementation.

Therefore, you requested an archaeological monitoring and protection work plan for your review and concurrence.

As such, we are submitting the requested Archaeological Monitoring Plan prepared by Virginia River Calderón, Archaeologist and José M. Izquierdo Encarnación, Engineer. We are requesting your review of the prepared plan and concurrence that the implementation of the plan is appropriate for the undertaking.

Should you need additional information please contact me at 225-405-7676 or lauren.poche@horne.com.

Kindest regards,



**Lauren Bair Poche, M.A.**
Architectural Historian, EHP Senior Manager
LPB/KPS

Attachments

GOVERNMENT OF PUERTO RICO
STATE HISTORIC PRESERVATION OFFICE
Executive Director | Carlos A. Rubio Cancela | carubio@prshpo.pr.gov

Thursday, January 9, 2025

Lauren B Poche

269 Avenida Ponce de León, San Juan, PR, 00917

SHPO-CF-12-11-24-08 INFRA-STR-004, PR-122 DESDE LA PR-321 HASTA LA PR-166, LAJAS - SAN GERMÁN

Dear Ms. Poche:
We acknowledge receipt of the archaeological monitoring work plan submitted on December 11, 2024, regarding the above referenced project. After evaluating the documentation provided, it is deemed acceptable, and we concur with its implementation.
The PRSHPO would like to highlight the importance of receiving the following information before performing certain interventions:
The Historic American Engineer Record (HAER) level II documentation must be submitted for our review and comments before the construction begins.
The results of the archaeological units to be excavated (interior and exterior) of the structure #4 must be submitted for our review prior to its demolition.
If the relocation of structure #5 requires making cuts to facilitate its movement, the proposed intervention must be submitted to the PRSHPO for review.
Please notify the PRSHPO the archaeological monitoring start date 48 hours prior to the initiation of work.
If you have any questions concerning our comments, do not hesitate to contact our Office.

Sincerely,

Carlos A. Rubio Cancela
State Historic Preservation Officer
CARC/GMO/ OJR

February 25, 2025

Aldo Rivera-Vazquez
Assistant Secretary
Environmental Permits and Compliance Division

Ref: *Lajas to San German Road Connector Extension Project*
*San German and Lajas, San German and Lajas Municipalities County, Puerto Rico*
*ACHP Project Number: 022177*

Dear Mr. Rivera-Vazquez:

On February 11, 2025, the Advisory Council on Historic Preservation (ACHP) received your notification and supporting documentation regarding the potential adverse effects of the referenced undertaking on a property or properties listed or eligible for listing in the National Register of Historic Places. Based upon the information you provided, we have concluded that Appendix A, *Criteria for Council Involvement in Reviewing Individual Section 106 Cases*, of our regulations, "Protection of Historic Properties" (36 CFR Part 800) implementing Section 106 of the National Historic Preservation Act, does not apply to this undertaking. Accordingly, we do not believe our participation in the consultation to resolve adverse effects is needed.

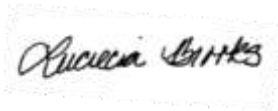
However, if we receive a request for participation from the State Historic Preservation Officer (SHPO), Tribal Historic Preservation Officer, affected Indian tribe, a consulting party, or other party, we may reconsider this decision. Should the undertaking's circumstances change, consulting parties cannot come to consensus, or you need further advisory assistance to conclude the consultation process, please contact us.

Pursuant to Section 800.6(b)(1)(iv), you will need to file the final Section 106 agreement document (Agreement), developed in consultation with the Puerto Rico SHPO and any other consulting parties, and related documentation with the ACHP at the conclusion of the consultation process. The filing of the Agreement and supporting documentation with the ACHP is required in order to complete the requirements of Section 106 of the National Historic Preservation Act.

Thank you for providing us with your notification of adverse effect. If you have any questions or require our further assistance, please contact Max Sickler at (202) 517-0220 or by e-mail at msickler@achp.gov

and reference the ACHP Project Number above.

Sincerely,



Lucrecia Brooks
Historic Preservation Technician
Office of Federal Agency Programs

**Carlos A. Rubio Cancela**
State Historic Preservation Officer
CARC/GMO/OJR

SHPO
OFICINA ESTATAL DE CONSERVACIÓN HISTÓRICA
OFICINA DEL GOBERNADOR
STATE HISTORIC PRESERVATION OFFICE
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OECH

STATE HISTORIC
PRESERVATION
OFFICE

GOVERMENT OF PUERTO RICO

Executive Director | Carlos A. Rubio Cancela | carubio@prshpo.pr.gov

September 2, 2025

**Lauren B Poche**
269 Avenida Ponce de León
San Juan, PR 00917

Referencia: SHPO-CF-08-06-25-05 - INFRA-STR-004, PR-122 DESDE LA PR-321 HASTA LA PR-166, LAJAS - SAN GERMÁN

Dear Ms. Poche,

We acknowledge receipt of the archaeological monitoring work plan dated July 16, 2025, prepared by archaeologist Virginia Rivera Calderón & the Historic – Architectural mitigation plan: documentation, interpretation and nomination to the National Register of Historic Places prepared by Karen Anderson, Arleen Pabón & Berenice Sueiro submitted in July 2025 for the case mentioned above. Both plans are deemed acceptable, and we concur with their implementation. When available, please submit the relocation plan for Historic Resource #5.

Please notify the PRSHPO the archaeological monitoring start date 48 hours prior to the initiation of work. If you have any questions concerning our comments, do not hesitate to contact our Office.

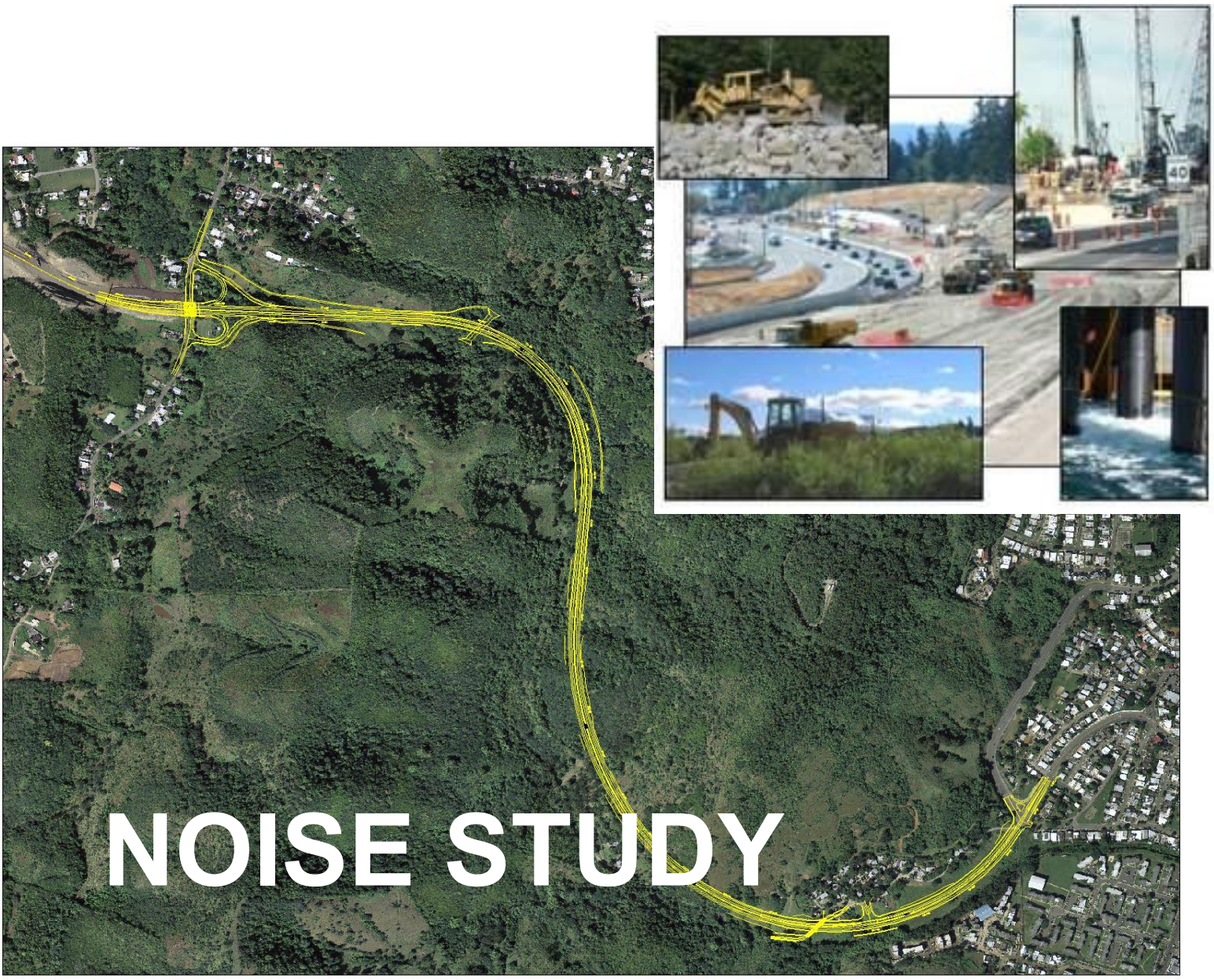
Sincerely,

SHPO
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STATE HISTORIC PRESERVATION OFFICE
OFFICE OF THE GOVERNOR
OECH

**Carlos A. Rubio Cancela**
State Historic Preservation Officer
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# APPENDIX 10: Noise Study



# NOISE STUDY

## PR-122 Extension from PR-321 to PR-166, Lajas - San Germán

**Revised December 2024**

**Prepared by**


BYA BEHAR-YBARRA AND ASSOCIATES LLC

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## List of Abbreviated Terms

| | |
|---|---|
| **AADT** | **Average Annual Daily Traffic** |
| **CFR** | **Code of Federal Regulations** |
| **dB** | **decibels** |
| **dBA** | **A-weighted decibels** |
| **EA** | **Environmental Assessment** |
| **FHWA** | **Federal Highway Administration** |
| **FTA** | **Federal Transit Administration** |
| **Hz** | **Hertz** |
| **HT** | **heavy-duty trucks** |
| **LDN** | **Day-Night Level** |
| **LEQ** | **Equivalent Sound Level** |
| **LEQ(h)** | **Equivalent Sound Level over one hour** |
| **Lmax** | **Maximum Sound Level** |
| **LOS** | **level of service** |
| **Mph** | **miles per hour** |
| **NAC** | **noise abatement criteria** |
| **NEPA** | **National Environmental Policy Act** |
| **ESO** | **Environmental Studies Office** |
| **PRHTA** | **Puerto Rico Highway and Transportation Authority** |
| **SqM** | **Square meters** |
| **TNM 2.5** | **FHWA Traffic Noise Model Version 2.5** |
| **USDA** | **United States Department of Agriculture** |
| **Vph** | **vehicles per hour** |

# I. INTRODUCTION

This Evaluation summarizes the results of the noise evaluation for Extension of road PR-122 from PR-321 to road PR-166 within the boundaries of the municipalities of Lajas and San Germán. This assessment is required to be performed as part of the environmental planning studies required by the National Environmental Policy Act (NEPA) for projects that are sponsored and/or require permitting from the federal government. This analysis was carried out following the guidelines and requirements of the Puerto Rico Environmental Control Board, federal regulation 23 CFR 772, the most recent Federal Highway Administration (FWHA) for the control and mitigation of noise, and the Puerto Rico Highway and Transportation Authority (PRHTA) Environmental Studies Office (ESO).

## I.1 PROJECT DESCRIPTION

The Puerto Rico Highway and Transportation Authority (PRHTA) proposes to extend the Angel Castro Pérez Avenue (PR-122), from road PR-321 to road PR-166 (San Germán South Bypass), within the boundaries of the municipalities of San Germán and Lajas in the Commonwealth of Puerto Rico. The project is approximately 2.7 kilometers miles long. The project vicinity area is shown on Figure 1 . The purpose of the proposed PR-122 Extension project is to improve mobility and connectivity in the project study area. The proposed project would provide a direct link between road PR-2 in the Municipality of San Germán and the Municipality of Lajas and its tourist area. It would provide an alternate route to PR-101, enhancing regional travel options and safety while protecting the environment and promoting the economic development of the region. The proposed project would provide additional capacity in the project area.

The extension of State Road PR-122 from Lajas to San Germán will be designed to meet the requirements of a Design Class Code R-5, in accordance with the PRHTA's Design Manual. The new road segment will run from south to north through the neighborhood of Ancones and Retiro with a typical section, similar to the one used on the already constructed PR-122 segments. This

section consists of four lanes of 3.65 meters wide each and will be divided by a concrete barrier, see Figure 2.

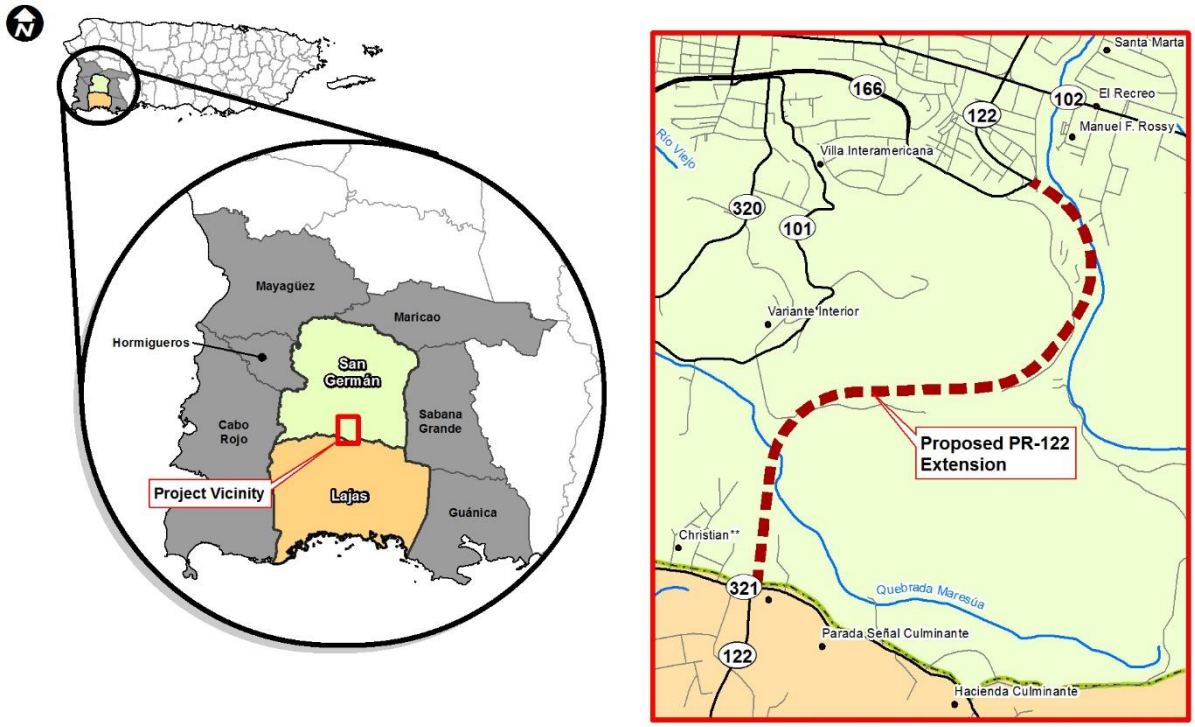



*Figure 1: Project Vicinity*

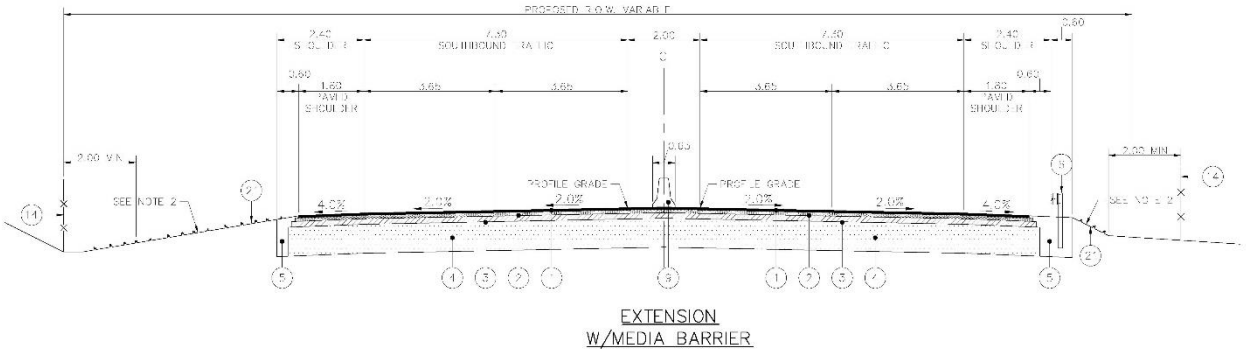



*Figure 2: Proposed Road Section*

The land where the project is proposed is undeveloped land. According to data from the United States Department of Agriculture (USDA), several reserves and agricultural valleys surround the project. However, since these areas are distant enough from the project, no direct impacts are anticipated. Agricultural Reserves are the Cabo Rojo - Guánica and the Cabo Rojo - Sabana Grande areas, while the Agricultural Valleys are the valleys of Guanajibo and Lajas, see Figure 3: Agricultural Reserves and Valleys). Conversely, part of the project runs through Class IV agricultural lands. These lands are not the most fertile but belong to the high agricultural capability soils class, see Figure 4.

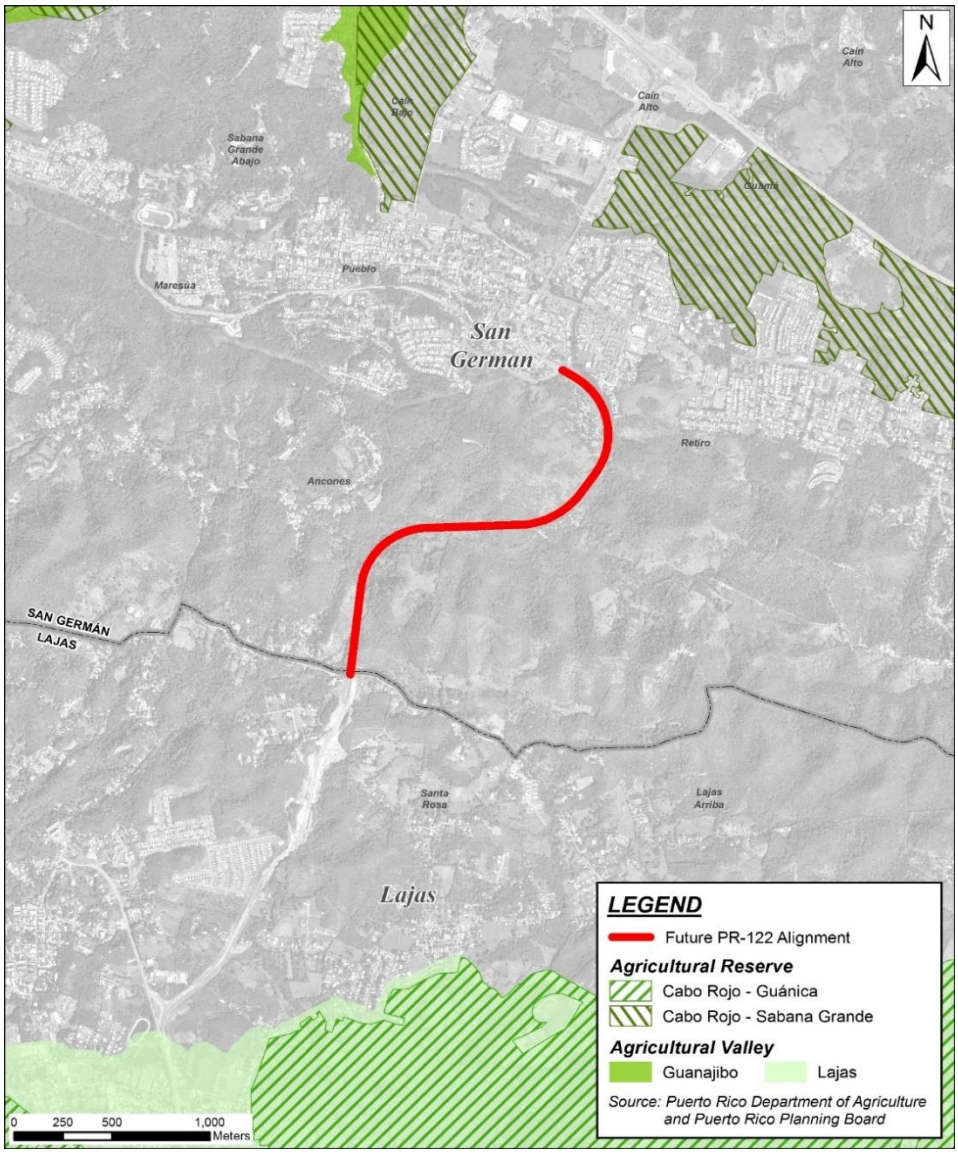



*Figure 3: Agricultural Reserves and Valleys*

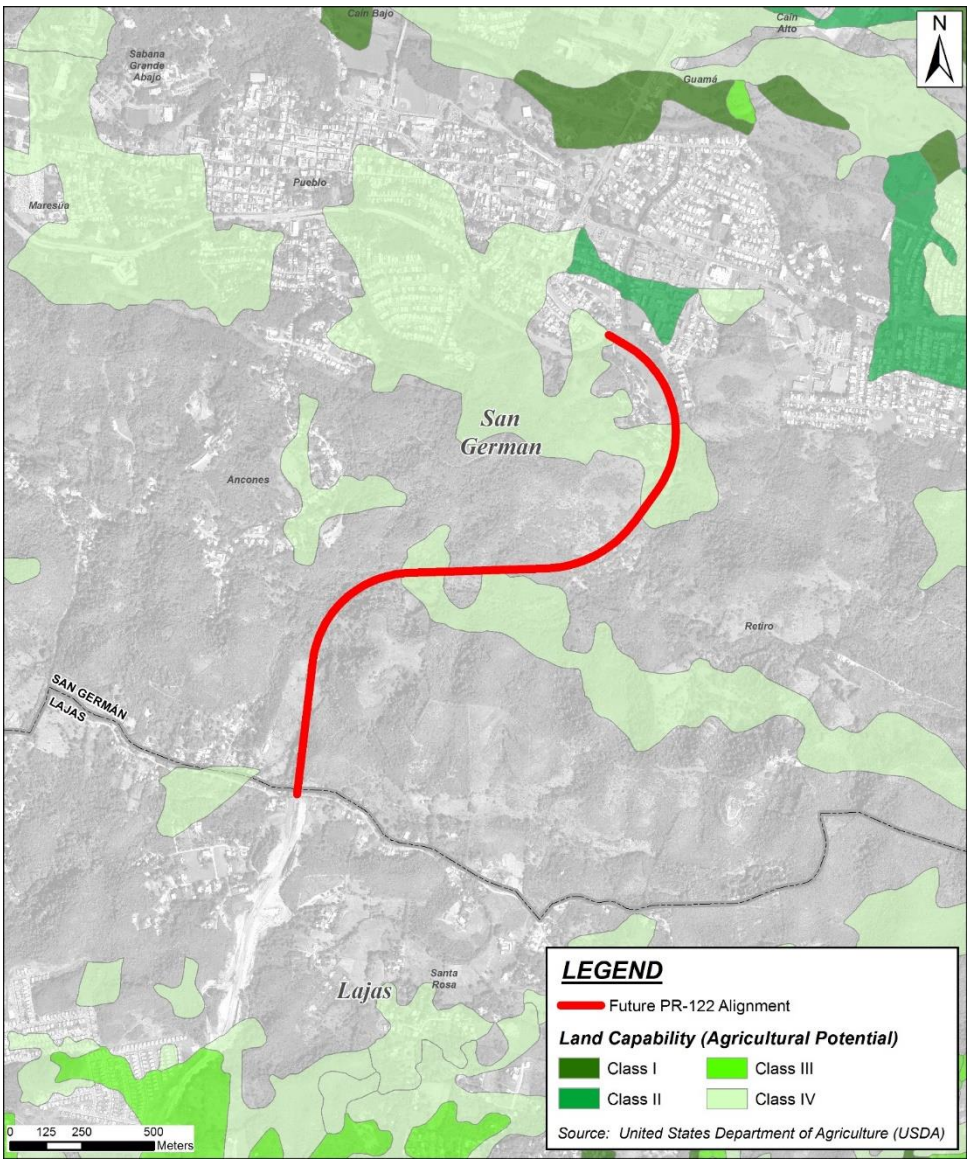



*Figure 4: Agricultural Soils*

In terms of residential uses, residential areas of medium density predominate along the corridor. Proximity to high and medium density residential areas is shown in Table 1.

*Table 1: Proximity to High and Medium Density Areas*

| Description | Density | Area (SqM) | Total Area |
|---|---|---|---|
| R-3 | Medium | 377,482.18 | **379,659.18** |
| R-4 | | 2,177.00 | |
| R-5 | High | 83,938.77 | 83,938.77 |

## I.2 STUDY OBJECTIVES

This Noise Assessment will serve to characterize the existing noise environment of the areas surrounding the proposed project corridor, and therefore, will be used to define impacts that could be reasonably expected from the operation of such system. In performing this task, special consideration has been provided to utilize available guidelines to perform this type of analysis from the (FHWA).

## I.3 ENVIRONMENTAL DOCUMENTATION

In order to document the environmental findings, an Environmental Assessment (EA) is in development. The EA will include studies such as: Air Quality Analysis, Noise Analysis, Traffic Analysis, Archaeological Analysis among others. These studies will document the level of potential impact associated with the project and identify any necessary mitigation measures to reduce or eliminate those impacts.

# II. BASIC NOISE CONCEPTS

## II.1 FUNDAMENTALS OF NOISE

Noise is usually considered as an unwanted type of sound. Sound, is what we hear when our ears are exposed to small pressure fluctuations in the air. Although there are many ways to generate or cause pressure fluctuations, they are typically the result of a vibrating movement of a solid object. It propagates in the form of waves. From a technical perspective, there is no physical difference between "noise" and "sound". For this reason, the discussions of the technical aspects that govern noise make use of the terms sound and noise interchangeably. Noise can be described in terms of three (3) variables:

- ***Amplitude (loud or soft)***

  The loudness of a sound depends on the amplitude of the fluctuations above and below atmospheric pressure associated with a sound wave. The mean value of the alternating positive and negative pressure fluctuations is the static atmospheric pressure, which is not a useful descriptor of sound. However, the effective magnitude of the sound pressure in a sound wave can be expressed by the "root mean square" (rms) of the oscillating pressure measured in Pascals, a unit named after Blaise Pascal, a 17th century French mathematician. In calculating the "rms", the values of the sound pressure are squared to make them all positive and time-averaged to smooth out variations. The "rms" is the square root of this time averaged value.

  The quietest sound that can be heard by most humans, which is known as the threshold of hearing, is a sound pressure of about 20 microPascals, and the loudest sounds typically found in our environment range up to 20 million microPascals. Due to the difficulty in dealing with such extreme range of numbers, acousticians use a compressed scale based on logarithms of the ratio of the sound energy contained in the wave related to the square of sound pressures, instead of the sound pressures themselves, resulting in the use of the term "sound pressure level" in decibels (dB). The "B" in dB is always capitalized because is a unit named after Alexander Graham Bell, a leading 19th century innovator in communications. Sound level pressure Lp is defined as:

$Lp = 10 \log_{10} (p^2 \text{ rms}/p^2 \text{ ref}) = 20 \log_{10} (p_{rms}/p_{ref})$ dB, where $p_{ref}$ = 20 microPascals

Substituting the range of sound pressure values in the equation, results in the threshold of hearing at 20 microPascals at 0 dB and a typical loudest sound of 20 million microPascals is 120 dB.

- ***Frequency (pitch)***

Since sound is a fluctuation of sound pressure, the number of times the fluctuation occurs in one second is called its frequency. In acoustics, frequency is quantified in cycles per seconds, or Hertz (abbreviated as Hz), named after Heinrich Hertz, a famous 19th century German physicist. Some type of sounds, such as whistle, are associated with a single frequency, and are referred to as a "pure tone". More often, however, noise is made of many frequencies, all blended together in a spectrum. Human hearing is adapted to a frequency range of 20 Hz to 20,000 Hz. When the sound spectrum is dominated by many low frequency components, the noise will have a characteristic like the rumble of a thunder.

- ***Time Pattern (variability)***

The third important characteristic of noise it its variation with time. Environmental noise in general derives from a conglomeration of distant noise sources. Such sources may include distant traffic, wind in trees, and distant industrial or farm activities that form part of our daily lives. These distant sources create a low level "background noise" in which no individual source is identifiable. This noise is often constant from moment to moment, but varies slowly from hour to hour as natural forces change or as a human activity follows its daily cycle.

It is possible to describe these fluctuating noises in the environment using a single number descriptor. This allows to manage measurements, computations, and impact assessments.

## II.2 SOURCES OF VEHICULAR TRAFFIC NOISE

For a project like the one being analyzed, the principal source of noise is constituted by the one created by transit sources. Transit noise is generated by vehicles in motion. Vehicles generate noise as result of the following:

- Engine exhaust noise

- Air turbulence generated by cooling fans
- Gear noise
- Interaction of wheel/tires with running surfaces

Tire noise from rubber tires of vehicles constitute a significant source of noise at normal operating speeds. In general, noise increases with the speed of the vehicles.

## II.3 DESCRIPTOR OF TRAFFIC NOISE

As earlier indicated, a single number descriptor can define traffic noise related measurements, and assessment. This terminology is on normal use not only in the United States but in other countries around the world. When dealing with traffic or transit related studies, there are two (2) commonly used noise descriptors. They are:

***Hourly Equivalent Sound Level (Leq):*** describes a receiver's cumulative noise exposure from all events over a one hour period.

***Day-Night Average Sound Level (Ldn):*** describes a receiver cumulative noise exposure from all events over a full 24 hours, with events between 10 P.M. and 7:00 A.M. increased by 10 decibels to account for greater nighttime sensitivity.

$L_{dn}$ sound level noise descriptor is usually used for systems that operate around the clock or both during daytime and nighttime. Noise analyses of transit systems using trains usually utilize this noise descriptor as recommended by the Federal Transit Administration (FTA), while vehicular traffic related projects utilize the Leq noise descriptor. This later one is the one used by the FHWA. It is important to establish that both descriptors are used with the A-weighted scale. This unit is used to describe a receiver's noise at any moment in time and is read directly from noise monitoring equipment. Typical "A" weighted sound levels for both transit and non- transit sources are illustrated in Figure 5 (obtained from FTA Transit Noise and Vibration Impact Assessment report).

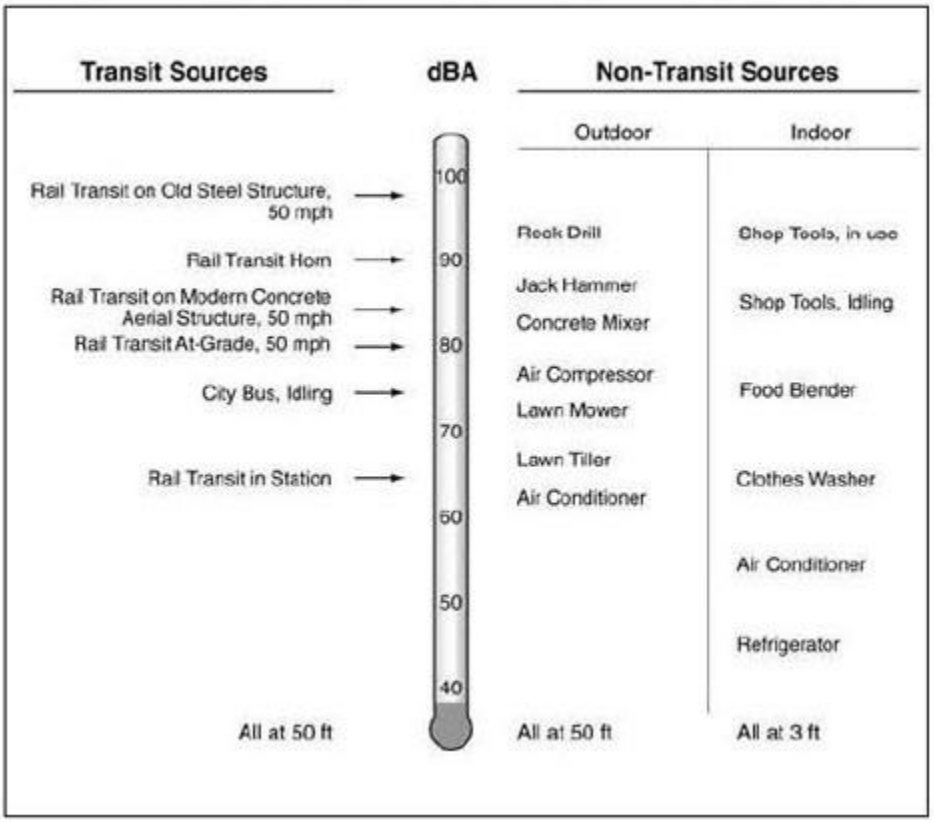



*Figure 5: Typical A-weighted Sound Levels*

Since the proposed project pertains to a new highway, it has been determined that the noise descriptor better suited to describe the existing noise data as well as to perform the impact analysis is the Leq and the noise impact criteria developed by the FHWA.

# III. REGULATIONS AND POLICIES

## III.1 PUERTO RICO QUALITY BOARD

### III.1.1 REGULATION FOR THE CONTROL OF NOISE POLLUTION

The Puerto Rico Quality Board in its Regulation for the Control of Noise Pollution (2011) (Reglamento para el Control de la Contaminación por Ruidos, Spanish) specifies the policies, procedures, and practices for the control, reduction or elimination of noises that may be harmful to health and disturb the public welfare. This regulation establishes the requirements for noise emission levels between zones and for administration and procedures related to the assessment of sound levels. Table 2: Criteria for Noise Measurements describes the criteria that are used to identify the conditions that require the mitigation of traffic-related noise in public roads, provided that these are the most prominent sources. These criteria are consistent with the recommendations of the FHWA.

*Table 2: Criteria for Noise Measurements*

| Category | 1 HL ( Leq 1 Hr) | Uses and activities description |
|---|---|---|
| **A** | 57 dBA (exterior) | Lands on which serenity and quiet are of extraordinary significance and serve an important public need and where the preservation of those qualities is essential if the area is to continue to serve its intended purpose. |
| **B** | 67 dBA (exterior) | Residential |
| **C** | 67 dBA (exterior) | Active sports areas, amphitheaters, auditoriums, cemeteries, day care centers, hospitals, libraries, medical facilities, parks, picnic areas, places of worship, playgrounds, public meeting rooms, public or nonprofit institutional structures, radio studios, recording studios, recreation areas, Section 4 (f) sites, schools, television studios, trails, and trail crossings. |
| **D** | 52 dBA (interior) | Auditoriums, day care centers, hospitals, libraries, medical facilities, places of worship, public meeting rooms, public or nonprofit institutional structures, radio studios, recording studios, schools, and television studios. |
| **E** | 72 dBA (exterior) | Hotels, motels, offices, restaurant/bars/and other developed lands, properties and activities not included in A & D. |
| *All values are A-weighted decibels (dBA).* | | |

*Source: Federal Highway Administration*

In identifying noise impacts, primary consideration is given to exterior areas of frequent human use. In situations where there are no exterior activities, or where the exterior activities are far from the roadway or physically shielded in a manner that prevents an impact on exterior activities, the interior criterion (Activity Category D) is used as the basis for determining a noise impact. External areas of the receptors included in this study fall in Category B, C, and E.

# IV. SCREENING FOR NOISE SENSITIVE LOCATIONS

The first step in performing a noise impact assessment is to define the noise sensitive land uses along the path of the project corridor. The identification of such locations is based on the land use areas defined by the FHWA on its Noise Policy. This report describes a screening procedure that is used to perform this task. After defining such corridor, different sources of site-specific information such as aerial photographs, highway maps and visual surveys were integrated in the screening effort. Based upon a review of the different sources of data, areas adjacent to the proposed project include:

- Commercial areas
- Residential areas
- Institutional areas (Government offices, schools, universities, elder homes, courtrooms, museums, etc.
- Industrial area
- Passive and active areas

# V. EXISTING LAND USES

## V.1 Existing Land Uses

Since the majority of the project corridor runs along undeveloped lands, most of the land uses are zoned as General Rustic land. However, other land uses exist in the project corridor, these land uses will be briefly discussed below.

### V.1.1 Section of the corridor within the Municipality of San Germán

Land uses surrounding the beginning area of the project, specifically at El Retiro Community in the Municipality of San Germán (at the point of intersection with PR-166) are Intermediate Residential (R-I) and High Density Residential (R-A).

In the continuation of the route towards the south, it passes through agricultural land (A-G, General agricultural) that is currently without productive use. Land uses along the Project corridor are presented in Figure 6.

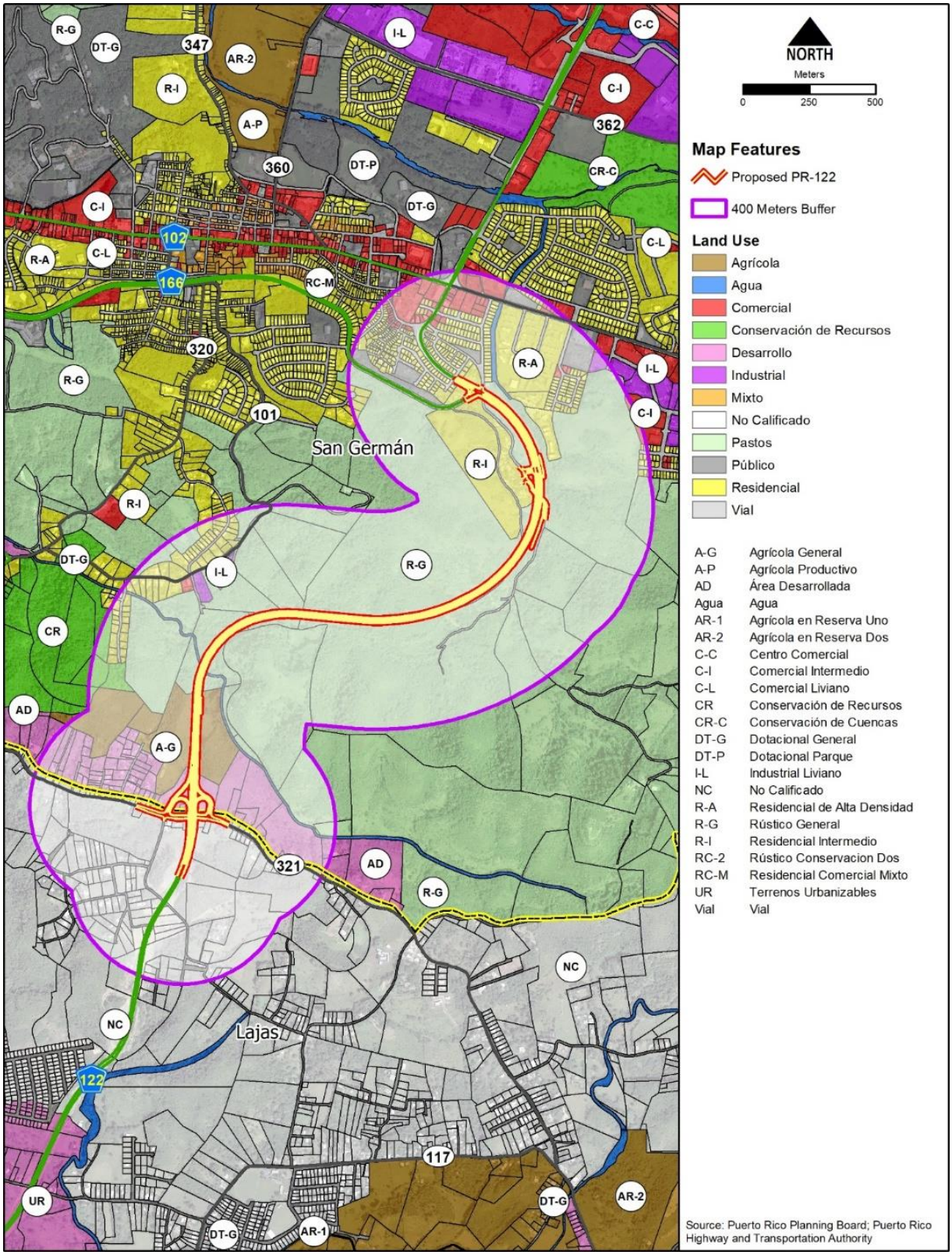



*Figure 6: Land Use Map*

According to the Puerto Rico Planning Board, the land uses that currently dominate the study area are residential, agricultural, and rural. The residential uses are limited to El Retiro Community at the point of intersection with PR-166. Developed areas are located at the point of intersection with road PR-321 in the Municipality of Lajas.

Most of the land occupied by the extension of road PR-122 has not been developed (general rural denomination). Due to this reason, there are no expected effects on the existing land uses.

Various light industrial lots can be found at the north of the vicinity. These lots are part of a Puerto Rico Industrial Development Company (PRIDCO) Industrial Park identified as L-049-0-55. Figure 7 shows the location of PRIDCO Industrial Parks along the corridor.

### V.1.2 Section of the corridor within the Municipality of Lajas

Land uses surrounding the end area of the project in the municipality of Lajas are entirely unqualified land. In summary, industrial uses are restricted to those observed in the portion of the alignment near the intersection between state roads PR-166 and PR-122.

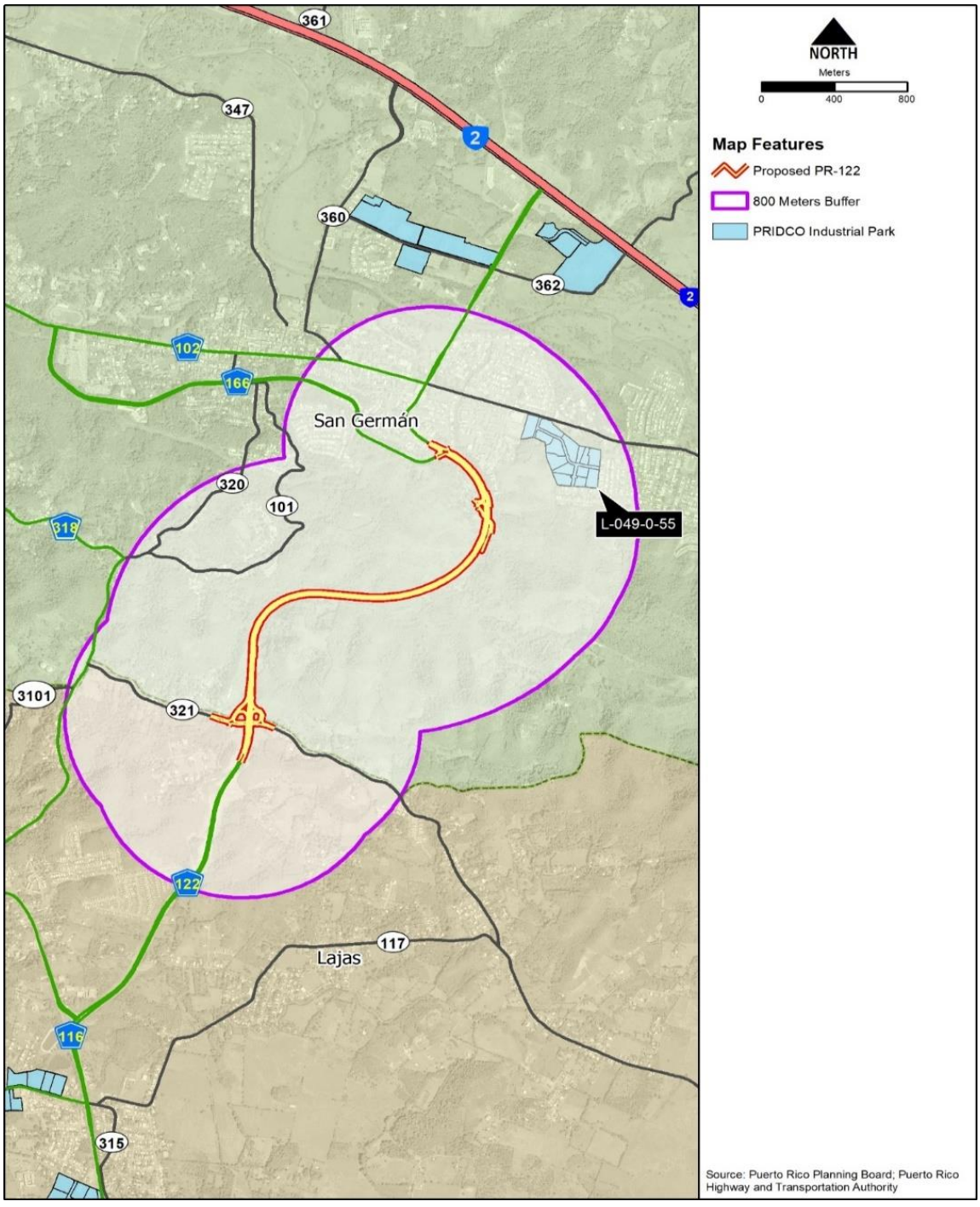



*Figure 7: PRIDCO Industrial Parks along the Project Corridor*

# VI. EXISTING MEASUREMENT DATA AND METHODOLOGY

## VI.1 EXISTING MEASUREMENT DATA AND METHODOLOGY

Existing ambient noise levels were characterized by direct measurement at three (3) sites along the proposed project alignment on April 4, 2017. The determination or estimation of the existing noise levels constitutes is important step of the analysis process since noise impact assessment thresholds are based on the existing noise level. Short Term (ST) noise measurements were made at each of the noise sensitive locations using an ANSI Standard S1.4 compliant sound level meter. Prior to each noise monitoring event, equipment calibration traceable to the U.S. National Institute of Standards and Technology (NIST) was performed using an acoustical calibrator. The calibrator and the sound level meter calibration certificates are included in Appendix 1. This calibration is performed on an annual basis.

Measurements of noise were made using a microphone protected with a windscreen and mounted on a tripod at a height of 4 to 6 feet above the ground. The microphone arrangement was made in a way that served to characterize the exposure of the site to the principal noise sources found near the area. In performing this job, the equipment was located at the approximate setback lines of receptors from nearby roads. Special care was taken to minimize acoustic shielding from structures such as walls and fences.

Results of the existing ambient noise measurements have been summarized in Table 3. They will constitute the basis for determining existing noise conditions at all noise- sensitive receptors located along the proposed highway alignment. Table 4 summarizes the major observations made at each one of the monitored stations. Photographs of each one of the noise monitoring stations are included in Appendix 2. Figures 6, 7, and 8 illustrate the location of the noise monitoring stations. It is important to note that stations 1 and 3 were established near residential areas that are located relatively close to the proposed new roadway alignment. Station 2 provides a background of current noise conditions of the center portion of the alignment which is in an underdeveloped condition.

Copy of the collected data for each station has been included in Appendix 3.

*Table 3: Summary of Existing Noise Measurements Results*

| SITE ID | Measurement Location Description | Start of Measurement | | Measuring time (mins.) | Noise Exposure (Leq, dBA) |
|---|---|---|---|---|---|
| | | | | | |
| **ST-1** | El Retiro community, comprised of approximately 52 residences as per an interview with a resident. | 4/4/17 | 10:00 PM | 30 | 51.1 |
| **ST-2** | Station located within undeveloped areas along the proposed roadway corridor. | 4/4/17 | 10:48 PM | 30 | 42.6 |
| **ST-3** | Residential area located close to the project end at its intersection with PR-321. | 4/4/17 | 11:52 AM | 30 | 49.7 |

*Table 4: Description of Observation made at Noise Monitoring Stations*

| SITE ID | Measurement Location Description | Noise Exposure (Leq, dBA) | General Observations |
|---|---|---|---|
| **ST-1** | Near a cluster of residences of El Retiro community. A total of approximately 52 housing units comprises this community | 51.1 | This station is located at the front portion of the community that will face the new roadway, once in operation. Light local traffic currently affects the noise environment of the area since there is a local road that provides access to PR-166. This traffic noise as well as noise from pets, dogs, and other types of noise generated by local residents dominate the current noise environment. |

| | | | |
|---|---|---|---|
| **ST-2** | Undeveloped area near the proposed project corridor. | 42.6 | This station was located within an undeveloped area located to the southwest side of El Retiro community. No human induced sources of noise were noticed during the surveying time. The sounds generated by local wildlife consisting mainly of birds as well as horses dominate the sonic environment of the area. |
| **ST-3** | Residential area located near the project intersection with PR-321. This area is located toward the south of the proposed roadway alignment. | 49.7 | This station was located close to a cluster of residences that are located at the top of a hill, near the project starting point close to PR-321. The vehicular traffic through PR-321 constitutes one of the predominant sources of noise for this location. However, this noise is perceived attenuated because of the light traffic volume conditions of the roadway as well as that distance of this station with respect to the roadways. |

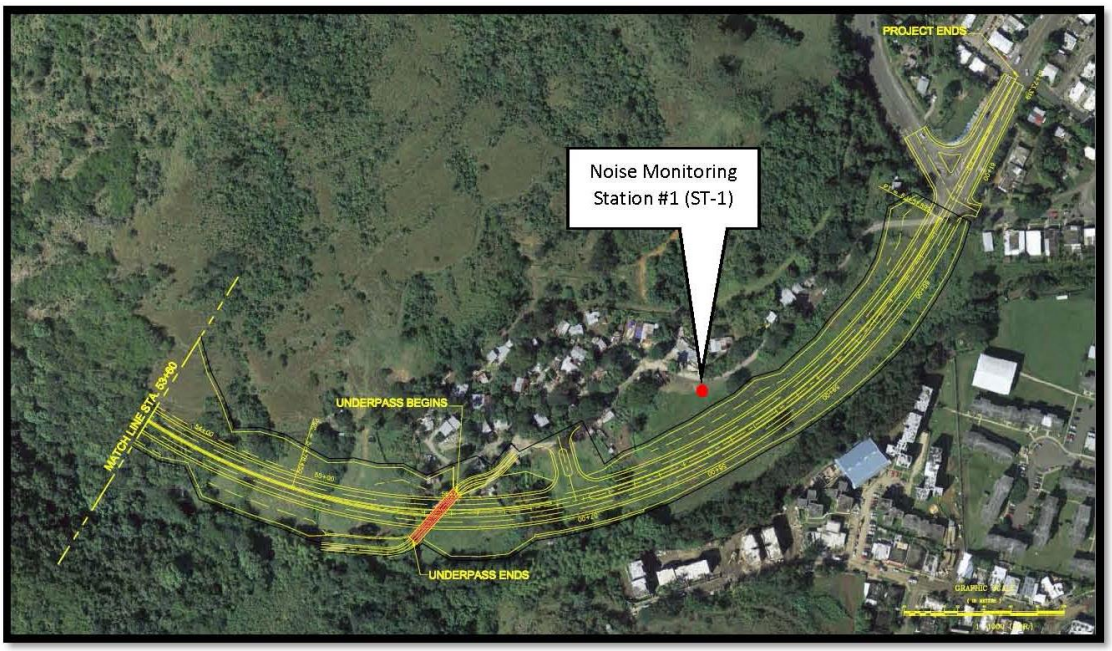



*Figure 8: Location of Noise Monitoring Station #1 (ST-1)*

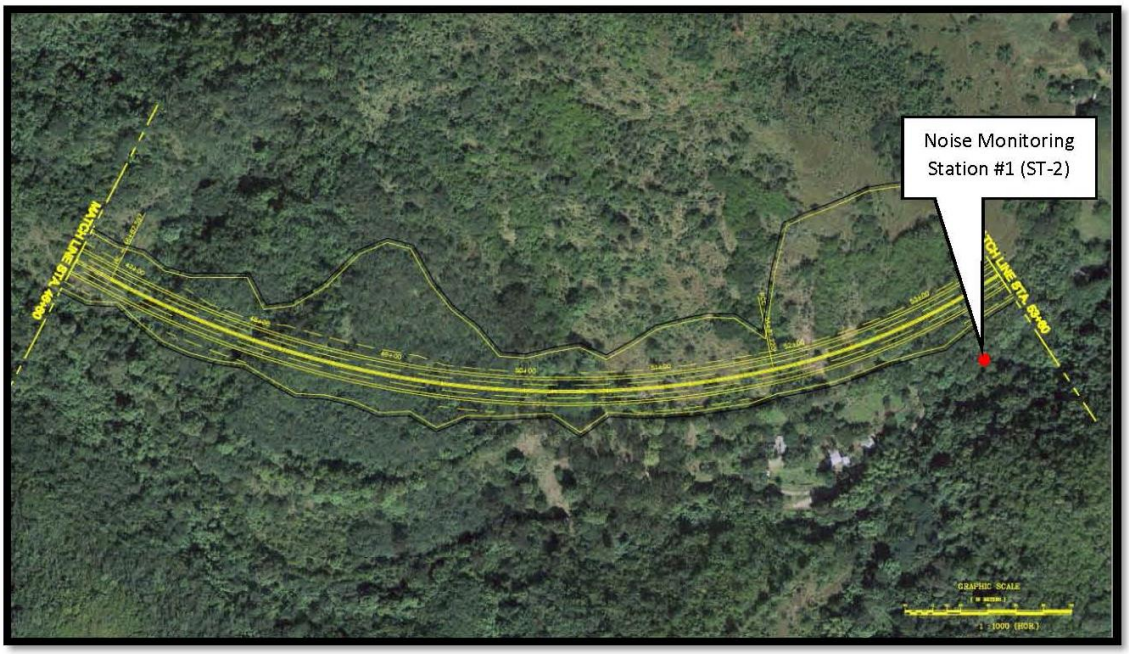



*Figure 9: Location of Noise Monitoring Station #1 (ST-2)*

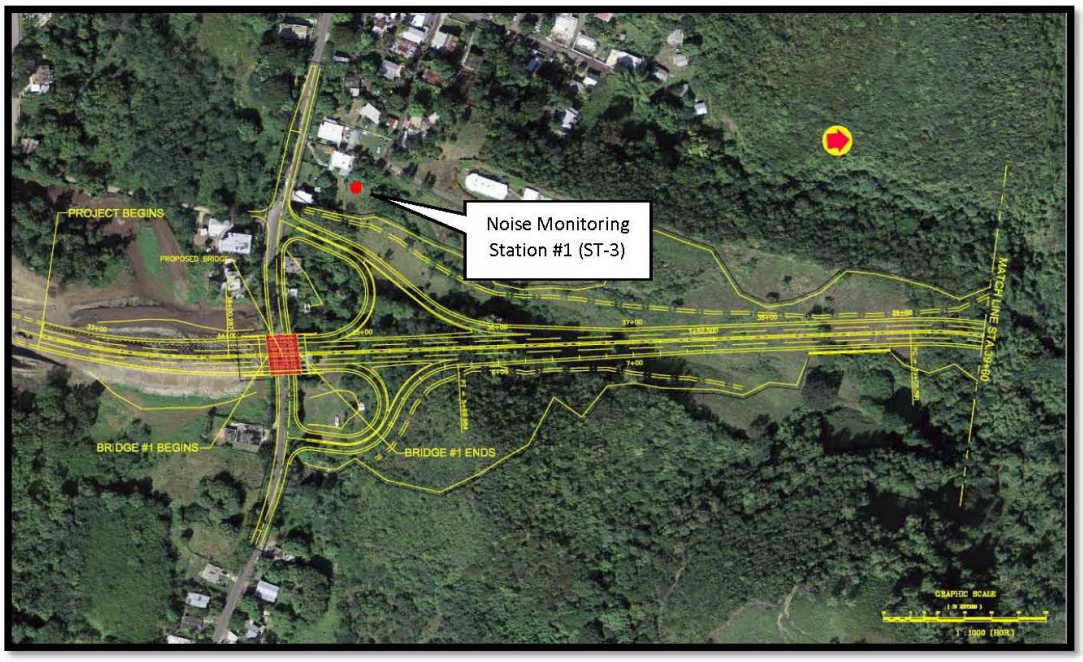



*Figure 10**: Location of Noise Monitoring Station #1 (ST-3)***

## VI.2 ANALYSIS OF EXISTING NOISE MEASUREMENT DATA

A review of the collected noise measurements along the project corridor allow to conclude that:

- In general, existing noise environments are consistent to those associated with rural areas
- Measured Leq noise levels ranged from 42.6 dBA to 51.1 dBA.
- The highest noise level was measured at station #1, which is located within El Retiro community.
- Noise generated from local noise activities such as local vehicular traffic, existing wildlife, as well as pets constitute the predominant source of noise within the area, except for station #3 which is influenced by the vehicular traffic of PR-321.
- The lowest noise levels were recorded at station #2, which is isolated from residential areas or other sources of human activities induced noise.
- There is a good correlation between spatial locations of stations and actual noise generation activities.

# VII. PROJECTED MEASURES

Traffic noise levels were predicted using the FHWA Traffic Noise Model Version 2.5 (TNM 2.5). Key inputs to the traffic noise model were the locations of roadways, shielding features (e.g., topography and buildings), existing noise barriers, ground type, and receivers. Three-dimensional representations of these inputs were developed using CAD drawings, aerial photographs, and topographic contours.

Worst-case (loudest hour) traffic noise typically occurs when traffic is free flowing at full speed; this condition typically occurs at Level of Service (LOS) C. Under LOS C conditions, traffic is heavy but remain free flowing. Traffic speed at LOS C is assumed to be 50 mph (80 kmh) which is the proposed posted speed limit for the PR-122 extension.

The PR-122 Extension Traffic Study (Behar Ybarra and Associates, June 2024) provides the traffic levels based on roadway capacities at different LOS for collector roadways. Present roadway volumes assuming an opening year of 2028 is projected to be 7,800 vehicles per day (vpd) and Future roadway volume in year 2048 is projected to be 10,000 vpd, see Table 5.

*Table 5: Present and Future Volumes (AADT)*

| **Present and Future Roadway Volumes (AADT)** | |
|---|---|
| **Present Year 2028** | 7,800 vpd |
| **Future Year 2048** | 10,000 vpd |
| ***Source: Traffic Study for PR-122 Extension performed by Behar Ybarra and Associates LLC June 2024*** | |

The existing receptors' locations presented in Section VI represent various locations along the proposed project alignment. Noise monitoring site Station #1 (ST-3) represents projected measures R-1, R-2, and R-3. Noise monitoring station #1 (ST-2) represents projected measure R-4 while noise monitoring station #1 (ST-1) represents projected measures R-5, R-6, R-7, R-8, R-9, and R-10. Figure 9 presents the projected measures locations along the proposed alignment.

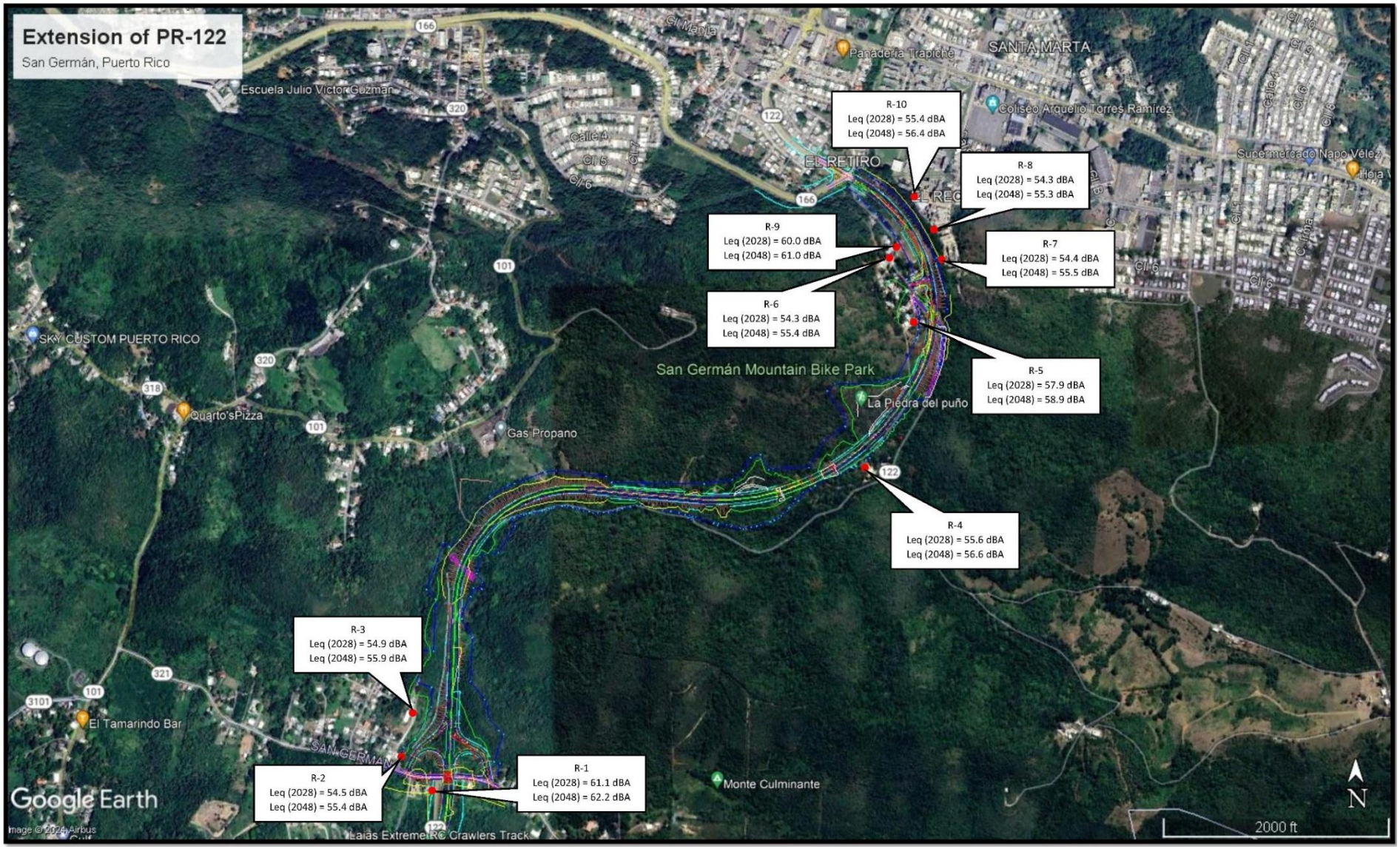



*Figure 1: Projected Measures along the proposed alignment*

## VII.1 Projected Measures Results

TNM 2.5 was used to compare measured traffic noise levels to modeled noise levels at field measurement locations. The higher model calculated noise levels for opening year 2028 were identified at Receptor 1 and Receptor 9. The model calculated a noise level of 61.1 dBA at Receptor 1 located at PR-321 and PR-122 intersection and a noise level of 6.0 at Receptor 9 located in the El Retiro Community. When comparing this result with the FHWA standard, a difference of -5.9 dBA and -7.0 is calculated, respectively. None of the results exceed the FWHA standards. Table 6 presents a summary of the TNM results for the opening year 2028. Appendix 4 includes the TNM Results for opening year 2028.

*Table 6: TNM Results for Year 2028*

| **Receptor (Estimated distance between nearby road edge and receiver)** | **Existing Noise Level 2020 Measured/Estimated (Leq in dBA)** | **Results (Leq) (in dBA no barrier) 2028 (Leq in dBA)** | **Federal Highway Administration (FHWA) Standard** | **Difference between results and FHWA Standards** |
|---|---|---|---|---|
| **Receptor-1** Residences (2) in PR-321 and PR-122 intersection | 49.7 | 61.1 | 67 | - 5.9 |
| **Receptor-2** Residence near Camino Las Piedras | 49.7 | 54.5 | 67 | -12.5 |
| **Receptor-3** Residence near Camino Las Piedras | 49.7 | 54.9 | 67 | - 12.1 |
| **Receptor-4** Isolated Residence | 42.6 | 55.6 | 67 | - 11.4 |
| **Receptor-5** Residences Comunidad El Retiro | 51.1 | 57.9 | 67 | - 9.1 |
| **Receptor 6** Residences Comunidad El Retiro | 51.1 | 54.3 | 67 | -12.7 |
| **Receptor 7** | 51.1 | 54.4 | 67 | -12.6 |

| | | | | |
|---|---|---|---|---|
| Manuel F. Rossy Public Housing Complex | | | | |
| **Receptor 8** Manuel F. Rossy Public Housing Complex | 51.1 | 54.3 | 67 | - 12.7 |
| **Receptor 9** Residence in Comunidad El Retiro | 51.1 | 60.0 | 67 | - 7.0 |
| **Receptor 10** Manuel F. Rossy Public Housing Complex | 51.1 | 55.4 | 67 | - 11.6 |

For future year 2048, the estimated noise levels fluctuate between 55.3 dBA and 62.2 dBA. Based on the results obtained for future year 2048, it is concluded that the estimated noise levels are lower than the impact level (67 dBA) established by current regulations and do not meet the definition of "close to threshold" (66 dBA or more) established by federal regulations. Table 7 includes a summary of the TNM results for future year 2048. Appendix 5 includes the TNM Results for opening year 2028.

***Table 7: TNM Results for Year 2048***

| **Receptor (Estimated distance between nearby road edge and receiver)** | **Existing Noise Level 2020 Measured/Estimated (Leq in dBA)** | **Results (Leq) (in dBA no barrier) 2048 (Leq in dBA)** | **Federal Highway Administration (FHWA) Standard** | **Difference between results and FHWA Standards** |
|---|---|---|---|---|
| **Receptor-1** Residences (2) in PR-321 and PR-122 intersection | 49.7 | 62.2 | 67 | -4.8 |
| **Receptor-2** Residence near Camino Las Piedras | 49.7 | 55.4 | 67 | -11.6 |
| **Receptor-3** Residence near Camino Las Piedras | 49.7 | 55.9 | 67 | - 11.1 |
| **Receptor-4** Isolated Residence | 42.6 | 56.6 | 67 | - 10.4 |

| | | | | |
|---|---|---|---|---|
| **Receptor-5** Residences Comunidad El Retiro | 51.1 | 58.9 | 67 | - 8.1 |
| **Receptor 6** Residences Comunidad El Retiro | 51.1 | 55.4 | 67 | -11.6 |
| **Receptor 7** Manuel F. Rossy Public Housing Complex | 51.1 | 55.5 | 67 | -11.5 |
| **Receptor 8** Manuel F. Rossy Public Housing Complex | 51.1 | 55.3 | 67 | - 11.7 |
| **Receptor 9** Residence in Comunidad El Retiro | 51.1 | 61.0 | 67 | -6.0 |
| **Receptor 10** Manuel F. Rossy Public Housing Complex | 51.1 | 56.4 | 67 | - 10.6 |

None of the receivers approach the FHWA threshold level (66 dBA) and none of the calculated noise levels for the years 2028 and 2048 exceeded the regulatory limit of 67 dBA according to the Noise Abatement Criteria described in Table 1 of the 23 CFR Part 772.

# VIII. CONSTRUCTION NOISE

Noise impacts can occur on any project involving the construction of a highway facility. While the magnitude of the impact construction noise may have on a community may not be known early in the project development stages, measures can be implemented during the design phase that can help to reduce the anticipated noise impacts at sensitive receptors. However, design changes and modification to project layout are not always practical or feasible. Also, the magnitude of the noise reduction attained from some of these techniques is usually difficult to determine prior to and possibly even during construction. During construction of the project, noise from construction activities may intermittently dominate the noise environment in the immediate area of construction. Table 8 summarizes noise levels produced by construction equipment that is commonly used on roadway construction projects. Construction equipment is expected to generate noise levels ranging from 70 to 90 dB at a distance of 50 feet, and noise produced by construction equipment would be reduced over distance at a rate of about 6 dB per doubling of distance.

*Table 8: Construction Equipment Noise*

| Equipment | Maximum Noise Level (dBA at 50 feet) |
|---|---|
| **Scrapers** | 89 |
| **Bulldozers** | 85 |
| **Heavy Trucks** | 88 |
| **Backhoe** | 80 |
| **Pneumatic Tools** | 85 |
| **Concrete Pump** | 82 |
| ***Source: Federal Transit Administration, 2018. See also: http://www.fhwa.dot.gov/environment/noise/construction_noise/handbook/handbook09.cfm*** | |

In addressing construction noise mitigation during the design phases of a project, abatement opportunities can be considered for a variety of areas and features include: storage areas, haul roads, detours, sequence of operations, and alternative construction methods.

# IX. ANALYSIS OF EXISTING AND PROJECTED NOISE MEASUREMENTS

Existing noise levels were measured and estimated in different strategic points that could be affected by the proposed project. A review of the collected noise measurements along the project corridor allow to conclude that:

- In general, existing noise environment are consistent to those associated with rural areas and noise generated from local noise activities such as local vehicular traffic, existing wildlife, as well as pets constitute the predominant source of noise within the area, except for station #3 which is influenced by the vehicular traffic of PR-321.
- Measured Leq noise levels ranged from 42.6 dBA to 51.1 dBA.

A review of the estimated noise levels concluded that the project noise levels will be below the FHWA Noise Abatement Criteria required for transportation projects. The highest recorded Leq was 61.2 dB for opening year 2028 and 62.2 dB for future year 2048.

# X. REFERENCIAS

Behar-Ybarra and Associates, LLC. Traffic Study PR-122 Extension, San Juan, Puerto Rico. June 2024.

Federal Highway Administration

2004 FHWA Traffic Noise Model, Version 2.5. February. FHWA-PD-96-010.

Washington D.C.

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Federal Highways Administration, Highway Traffic Noise Analysis and Abatement; Policy and Guidance, June 1995.

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Federal highways Administration, Highway Noise in the United States; Problem and Response, August 1997.

Puerto Rico Highways & Transportation Authority, Noise Policy in the Development and Operation of Transportation Project, 2011.

U.S. Department of Transportation Federal Highway Administration (July, 14 2011) High Traffic Noise.https://www.fhwa.dot.gov/environment/noise/noise_co mpatible_planning/federal_ap proach/audible_landscape/al04.cfm.

# XI. APPENDICES

# APPENDIX 1
## COPY OF SOUND LEVEL METER AND ACOUSTIC CALIBRATOR CERTIFICATE OF CALIBRATION

**3M Personal Safety Division**

3M Oconomowoc
1060 Corporate Center Drive
Oconomowoc, WI 53066-4828
www.3M.com/detection
800 245 0779

*An ISO 9001 Registered Company*

3M

# Certificate of Calibration

**Certificate Number:** 1703030926BGR030001

**Model:** SoundPro SP DL-2
**S/N:** BGR030001

**Date Issued:** 03-Mar-2017

**On this day of manufacture and calibration, 3M certifies that the above listed product meets or exceeds the performance requirements of the following acoustic standard(s):**

ANSI S1.4 1983 (R 2006) - Specification for Sound Level Meters / Type 2
ANSI S1.43 1997 (R 2007) - Specification for Integrating - Averaging Sound Level Meters / Type 2
IEC 61672-1 (2002) - Electro acoustics – Sound Level Meters – Part 1: Specifications / Class 2

**Test Conditions:** Temp: 18-25ºC Humidity: 20-80% R.H. Barometric Pressure: 950-1050 mBar
**Test Procedure:** S053-899

**Subassemblies:**

| | |
|---|---|
| QE7052 | 48833 |
| SPro Preamp | 02172194 |

**Reference Standard(s):**

| Device | Ref Standard Cal Due | Uncertainty - Estimated at 95% Confidence Level (k=2) |
|---|---|---|
| B&K Ensemble | 3/8/2017 | +/- 2.2% Acoustic (0.19dB) |
| Fluke 45 | 3/8/2017 | +/- 1.4% AC Voltage, +/-0.1% DC Voltage |

**Calibrated By:** Janet Pompe
Janet Pompe - Assembler

In order to maintain best instrument performance over time, and in the event of inspection, audit or litigation, we recommend the instrument be recalibrated annually. Any number of factors may cause the calibration to drift before the recommended interval has expired. See user manual for more information.

All equipment used in the test and calibration of this instrument is traceable to NIST, and applies only to the unit identified above. This report must not be reproduced, except in its entirety, without the written approval of 3M.

**3M Personal Safety Division**

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1060 Corporate Center Drive
Oconomowoc, WI 53066-4828
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# Certificate of Calibration

**Certificate Number:** 1703060756AC300008961

**Model:** AC-300 Acoustic Calibrator
**S/N:** AC300008961

**Date Issued:** 06-Mar-2017

**On this day of manufacture and calibration, 3M certifies that the above listed product meets or exceeds the performance requirements of the following acoustic standard(s):**

ANSI S1.40-2006 (R2011) - Specifications and Verification Procedures for Sound Calibrators
IEC 60942:2003 / EN60942-2003 Electroacoustics Sound Calibrators / Class 1

**Test Conditions:** Temp: 18-25°C Humidity: 20-80% R.H. Barometric Pressure: 950-1050 mBar

**Test Procedure:** S057-879

**Reference Standard(s):**

| Device | Ref Standard Cal Due | Uncertainty - Estimated at 95% Confidence Level (k=2) |
|---|---|---|
| B&K Ensemble | 3/8/2017 | +/- 2.2% Acoustic (0.19dB) |
| Fluke 45 | 3/8/2017 | +/- 1.4% AC Voltage, +/-0.1% DC Voltage |

**Calibrated By:** Janet Pompe
Janet Pompe - Assembler

In order to maintain best instrument performance over time and in the event of inspection, audit or litigation, we recommend the instrument be recalibrated annually. Any number of factors may cause the calibration to drift before the recommended interval has expired. See user manual for more information.

All equipment used in the test and calibration of this instrument is traceable to NIST, and applies only to the unit identified above. This report must not be reproduced, except in its entirety, without the written approval of 3M.

# APPENDIX 2
## PHOTOGRAPHS OF NOISE MONITORING STATIONS

# PHOTOGRAPHIC LOG OF NOISE MONITORING STATIONS

**DYNAMIC TOLL LANE**

| **Client:** | **Project Location:** | **Project No.** |
|---|---|---|
| Behar Ybarra and Assocaites | **San Germán, Puerto Rico** | **17-591** |

| **Photo Log** | **Date:** |
|---|---|
| **1** | **4/4/2017** |

**Description:**

View of noise monitoring station ST-1.

This station corresponds to El Retiro community.







| Photo Log | Date: |
|---|---|
| 2 | 4/4/2017 |

**Description:**

View of noise monitoring station ST-2. This station corresponds to an undeveloped part of the project corridor.





| Photo Log | Date: |
|---|---|
| 3 | 4/4/2017 |

**Description:**

View of noise monitoring station ST-3, located near a residential area at the intersection of the proposed new highway with PR-321.





| Photo No. | Date: | |
|---|---|---|
| 4 | 4/4/2017 | |
| **Description:**<br><br>Photograph of the project starting point. | |  <br><br>  |

| Photo No. | Date: | |
|---|---|---|
| 5 | 4/4/2017 | |
| **Description:** | | |
| Photograph of the project ending point at PR-166. | |  |

# APPENDIX 3
## COPY OF DATA LOGGED BY THE SOUND LEVEL METER

# Session Report

**4/5/2017**

## Information Panel

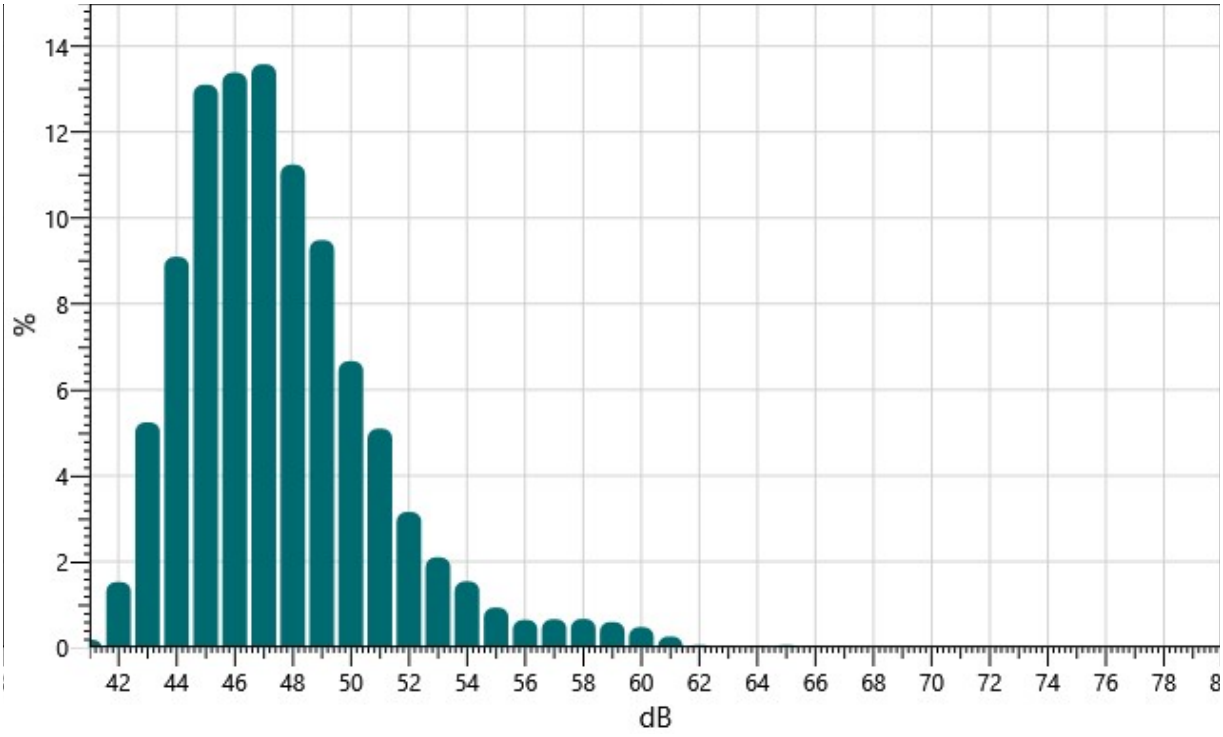
| | |
|---|---|
| Name | Monitoring Station #1 (PR-122) |
| Start Time | 4/4/2017 9:59:46 AM |
| Stop Time | 4/4/2017 10:30:49 AM |
| Device Name | BGR030001 |
| Model Type | SoundPro DL |
| Device Firmware Rev | R.13H |
| Comments | |

## Summary Data Panel

| Description | Meter | Value | Description | Meter | Value |
|---|---|---|---|---|---|
| Leq | 1 | 51.1 dB | | | |
| Exchange Rate | 1 | 3 dB | Weighting | 1 | A |
| Response | 1 | SLOW | Bandwidth | 1 | OFF |
| Exchange Rate | 2 | 3 dB | Weighting | 2 | C |
| Response | 2 | FAST | | | |

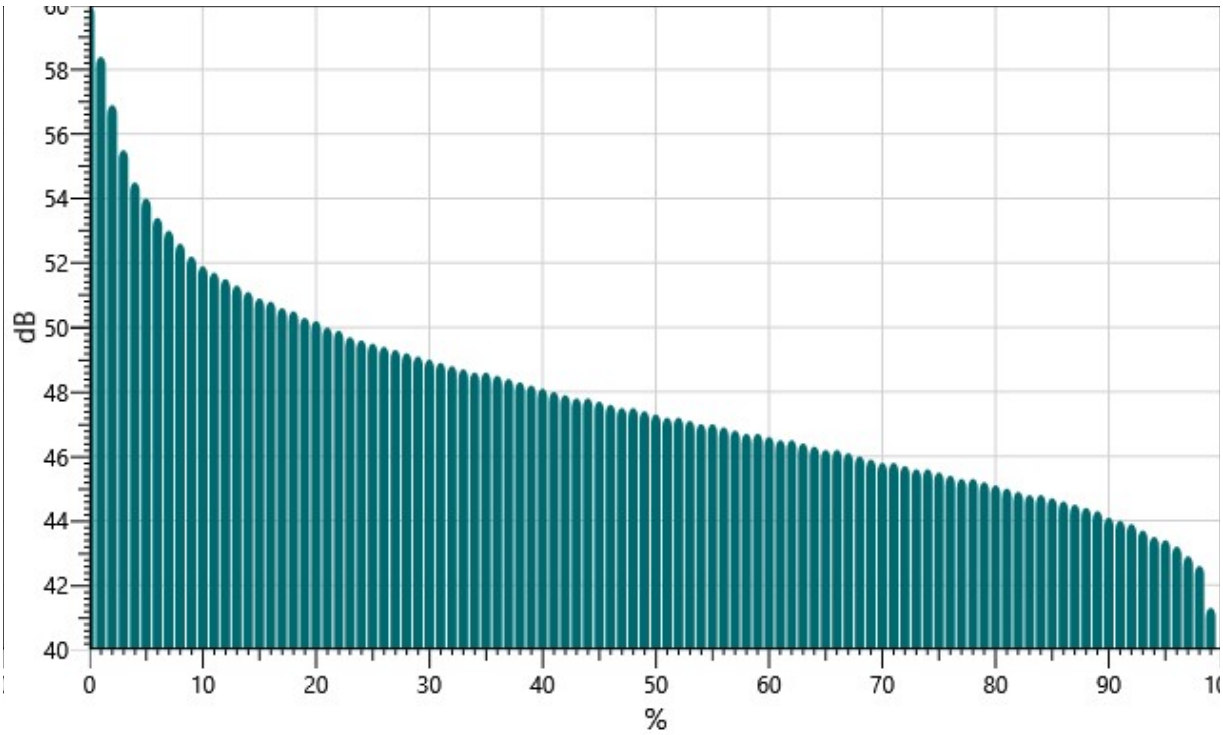
## Statistics Chart

Monitoring Station #1 (PR-122): Statistics Chart




## Exceedance Chart

Monitoring Station #1 (PR-122): Exceedance Chart



## Statistics Table

| dB: | 0.0 | 0.1 | 0.2 | 0.3 | 0.4 | 0.5 | 0.6 | 0.7 | 0.8 | 0.9 | % |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 41: | 0.00 | 0.00 | 0.00 | 0.00 | 0.02 | 0.02 | 0.02 | 0.04 | 0.03 | 0.06 | 0.19 |
| 42: | 0.04 | 0.08 | 0.08 | 0.08 | 0.09 | 0.11 | 0.20 | 0.23 | 0.26 | 0.36 | 1.53 |
| 43: | 0.42 | 0.18 | 0.45 | 0.46 | 0.50 | 0.62 | 0.68 | 0.61 | 0.62 | 0.70 | 5.24 |
| 44: | 0.73 | 0.73 | 0.69 | 0.81 | 0.81 | 0.98 | 1.06 | 1.05 | 1.14 | 1.10 | 9.09 |
| 45: | 1.17 | 1.20 | 1.25 | 1.25 | 1.31 | 1.31 | 1.32 | 1.37 | 1.47 | 1.45 | 13.10 |
| 46: | 1.54 | 0.95 | 1.32 | 1.33 | 1.35 | 1.33 | 1.41 | 1.44 | 1.43 | 1.29 | 13.38 |
| 47: | 1.37 | 1.41 | 1.44 | 1.48 | 1.40 | 1.34 | 1.28 | 1.31 | 1.30 | 1.24 | 13.58 |
| 48: | 1.21 | 1.11 | 1.09 | 1.07 | 1.14 | 1.14 | 1.12 | 1.09 | 1.13 | 1.15 | 11.24 |
| 49: | 1.25 | 0.83 | 1.07 | 0.97 | 0.93 | 1.00 | 0.87 | 0.88 | 0.86 | 0.82 | 9.49 |
| 50: | 0.74 | 0.65 | 0.71 | 0.68 | 0.68 | 0.68 | 0.72 | 0.69 | 0.57 | 0.55 | 6.67 |
| 51: | 0.55 | 0.54 | 0.57 | 0.52 | 0.54 | 0.44 | 0.42 | 0.47 | 0.54 | 0.51 | 5.10 |
| 52: | 0.52 | 0.36 | 0.31 | 0.28 | 0.31 | 0.31 | 0.28 | 0.23 | 0.25 | 0.31 | 3.16 |
| 53: | 0.23 | 0.23 | 0.23 | 0.23 | 0.25 | 0.24 | 0.17 | 0.16 | 0.16 | 0.19 | 2.10 |
| 54: | 0.15 | 0.16 | 0.18 | 0.14 | 0.17 | 0.20 | 0.18 | 0.14 | 0.11 | 0.12 | 1.54 |
| 55: | 0.11 | 0.10 | 0.07 | 0.08 | 0.10 | 0.07 | 0.08 | 0.10 | 0.10 | 0.12 | 0.93 |
| 56: | 0.09 | 0.06 | 0.06 | 0.05 | 0.08 | 0.06 | 0.06 | 0.07 | 0.07 | 0.05 | 0.64 |
| 57: | 0.07 | 0.07 | 0.06 | 0.06 | 0.05 | 0.06 | 0.09 | 0.07 | 0.06 | 0.07 | 0.66 |
| 58: | 0.07 | 0.07 | 0.04 | 0.06 | 0.06 | 0.08 | 0.06 | 0.06 | 0.09 | 0.07 | 0.67 |
| 59: | 0.06 | 0.06 | 0.05 | 0.04 | 0.06 | 0.05 | 0.07 | 0.08 | 0.07 | 0.06 | 0.59 |
| 60: | 0.06 | 0.07 | 0.07 | 0.05 | 0.03 | 0.05 | 0.04 | 0.04 | 0.04 | 0.04 | 0.48 |
| 61: | 0.03 | 0.03 | 0.03 | 0.04 | 0.02 | 0.02 | 0.02 | 0.02 | 0.03 | 0.01 | 0.26 |
| 62: | 0.02 | 0.02 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.06 |
| 63: | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.03 |
| 64: | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.01 | 0.00 | 0.04 |
| 65: | 0.01 | 0.01 | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.06 |
| 66: | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.04 |
| 67: | 0.01 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.03 |
| 68: | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 |
| 69: | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 |
| 70: | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 |
| 71: | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 |
| 72: | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 |
| 73: | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 |
| 74: | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 |
| 75: | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 |

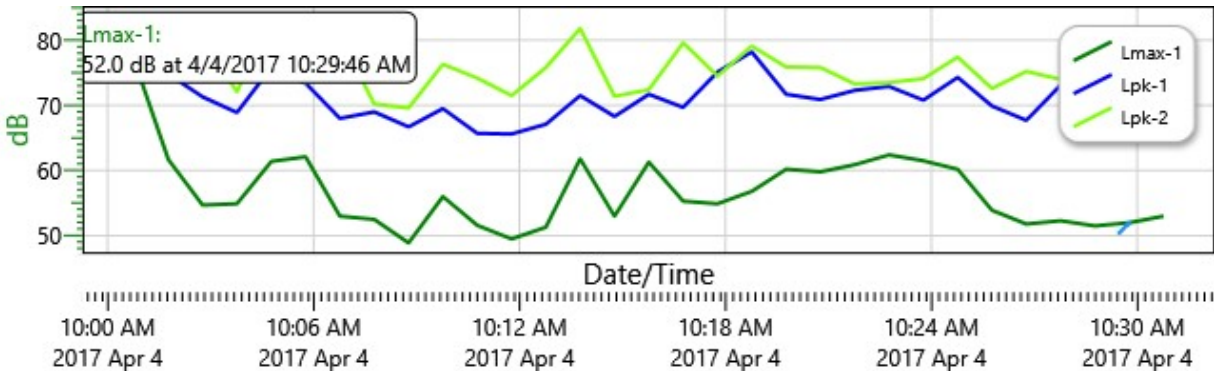
| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 76: | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 |
| 77: | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

## Exceedance Table

| . | 0% | 1% | 2% | 3% | 4% | 5% | 6% | %7 | %8 | %9 |
|---|---|---|---|---|---|---|---|---|---|---|
| 0%: | | 60.0 | 58.4 | 56.9 | 55.5 | 54.5 | 54.0 | 53.4 | 53.0 | 52.6 |
| 10%: | 52.2 | 51.9 | 51.7 | 51.5 | 51.3 | 51.1 | 50.9 | 50.8 | 50.6 | 50.5 |
| 20%: | 50.3 | 50.2 | 50.0 | 49.9 | 49.7 | 49.6 | 49.5 | 49.4 | 49.3 | 49.2 |
| 30%: | 49.1 | 49.0 | 48.9 | 48.8 | 48.7 | 48.6 | 48.6 | 48.5 | 48.4 | 48.3 |
| 40%: | 48.2 | 48.1 | 48.0 | 47.9 | 47.8 | 47.8 | 47.7 | 47.6 | 47.5 | 47.5 |
| 50%: | 47.4 | 47.3 | 47.2 | 47.2 | 47.1 | 47.0 | 47.0 | 46.9 | 46.8 | 46.7 |
| 60%: | 46.7 | 46.6 | 46.5 | 46.5 | 46.4 | 46.3 | 46.2 | 46.2 | 46.1 | 46.0 |
| 70%: | 45.9 | 45.8 | 45.8 | 45.7 | 45.6 | 45.6 | 45.5 | 45.4 | 45.3 | 45.3 |
| 80%: | 45.2 | 45.1 | 45.0 | 44.9 | 44.8 | 44.8 | 44.7 | 44.6 | 44.5 | 44.4 |
| 90%: | 44.3 | 44.1 | 44.0 | 43.9 | 43.7 | 43.5 | 43.4 | 43.2 | 42.9 | 42.6 |
| 100%: | 41.3 | | | | | | | | | |

## Logged Data Chart

Monitoring Station #1 (PR-122): Logged Data Chart



# Session Report

**4/5/2017**

## Information Panel

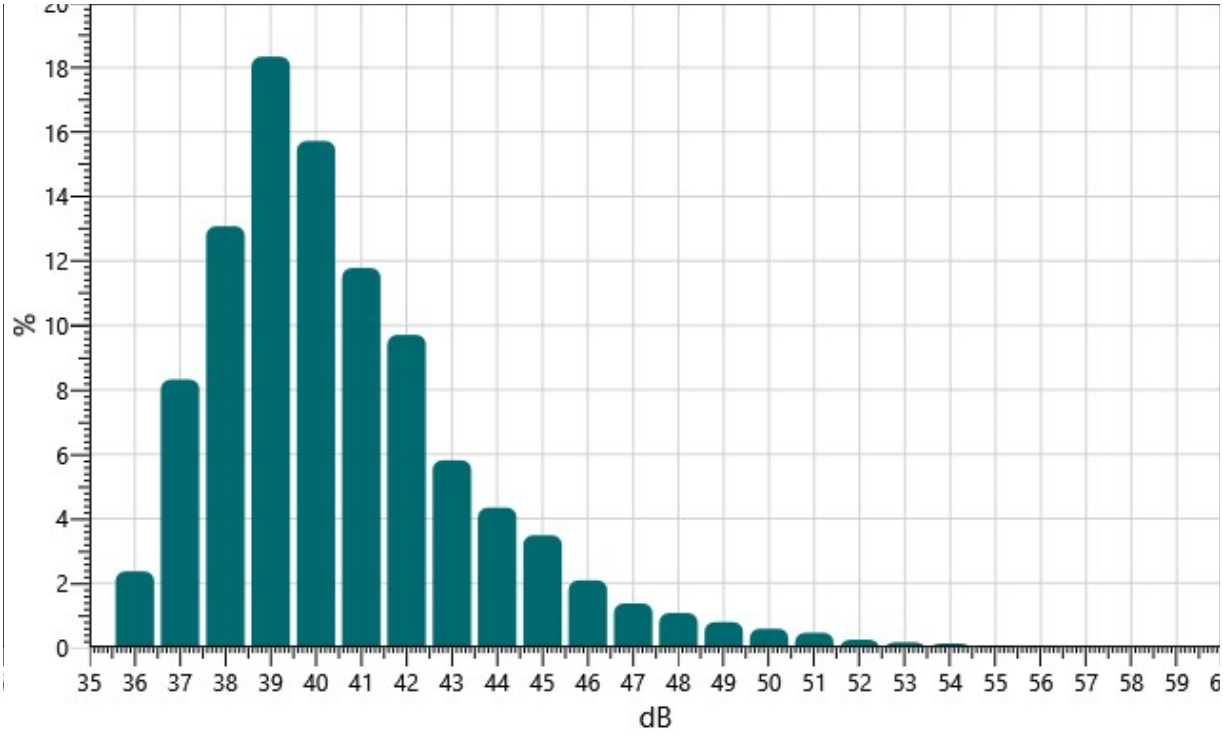
| | |
|---|---|
| Name | Noise Monitoring Station #2 PR-122 |
| Start Time | 4/4/2017 10:48:11 AM |
| Stop Time | 4/4/2017 11:18:16 AM |
| Device Name | BGR030001 |
| Model Type | SoundPro DL |
| Device Firmware Rev | R.13H |
| Comments | |

## Summary Data Panel

| Description | Meter | Value | Description | Meter | Value |
|---|---|---|---|---|---|
| Leq | 1 | 42.5 dB | | | |
| Exchange Rate | 1 | 3 dB | Weighting | 1 | A |
| Response | 1 | SLOW | Bandwidth | 1 | OFF |
| Exchange Rate | 2 | 3 dB | Weighting | 2 | C |
| Response | 2 | FAST | | | |

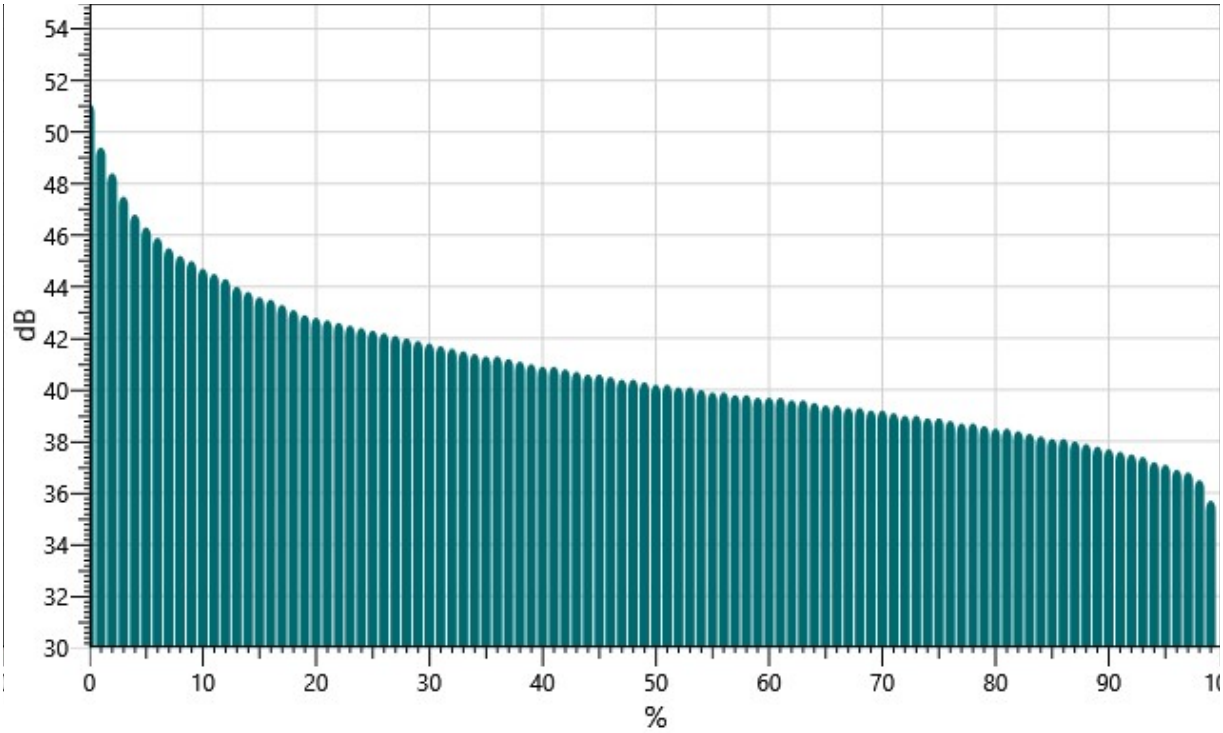
## Statistics Chart

Noise Monitoring Station #2 PR-122: Statistics Chart




## Exceedance Chart

Noise Monitoring Station #2 PR-122: Exceedance Chart



## Statistics Table

| dB: | 0.0 | 0.1 | 0.2 | 0.3 | 0.4 | 0.5 | 0.6 | 0.7 | 0.8 | 0.9 | % |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 35: | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.03 | 0.04 |
| 36: | 0.06 | 0.03 | 0.05 | 0.09 | 0.15 | 0.30 | 0.29 | 0.34 | 0.45 | 0.59 | 2.36 |
| 37: | 0.60 | 0.49 | 0.80 | 0.84 | 0.83 | 0.84 | 0.89 | 0.92 | 1.02 | 1.09 | 8.32 |
| 38: | 1.09 | 1.11 | 1.17 | 1.16 | 1.21 | 1.26 | 1.40 | 1.47 | 1.55 | 1.66 | 13.08 |
| 39: | 1.62 | 1.76 | 1.74 | 1.66 | 1.72 | 1.78 | 1.87 | 2.01 | 2.11 | 2.07 | 18.34 |
| 40: | 2.08 | 1.29 | 1.83 | 1.68 | 1.59 | 1.50 | 1.46 | 1.45 | 1.48 | 1.37 | 15.72 |
| 41: | 1.38 | 1.25 | 1.23 | 1.21 | 1.17 | 1.13 | 1.13 | 1.13 | 1.10 | 1.06 | 11.78 |
| 42: | 1.04 | 1.02 | 0.97 | 0.96 | 0.95 | 0.93 | 0.94 | 1.01 | 0.97 | 0.92 | 9.70 |
| 43: | 0.80 | 0.32 | 0.63 | 0.61 | 0.63 | 0.63 | 0.58 | 0.57 | 0.55 | 0.50 | 5.81 |
| 44: | 0.46 | 0.44 | 0.45 | 0.46 | 0.41 | 0.49 | 0.43 | 0.40 | 0.41 | 0.39 | 4.34 |
| 45: | 0.41 | 0.40 | 0.39 | 0.35 | 0.37 | 0.35 | 0.33 | 0.30 | 0.29 | 0.30 | 3.49 |
| 46: | 0.29 | 0.19 | 0.24 | 0.25 | 0.21 | 0.21 | 0.17 | 0.18 | 0.18 | 0.18 | 2.09 |
| 47: | 0.16 | 0.13 | 0.15 | 0.14 | 0.15 | 0.14 | 0.14 | 0.11 | 0.12 | 0.12 | 1.37 |
| 48: | 0.12 | 0.11 | 0.11 | 0.10 | 0.11 | 0.11 | 0.10 | 0.11 | 0.10 | 0.11 | 1.07 |
| 49: | 0.12 | 0.06 | 0.08 | 0.08 | 0.08 | 0.09 | 0.07 | 0.07 | 0.07 | 0.06 | 0.79 |
| 50: | 0.05 | 0.06 | 0.08 | 0.07 | 0.06 | 0.05 | 0.04 | 0.05 | 0.06 | 0.05 | 0.59 |
| 51: | 0.05 | 0.05 | 0.07 | 0.05 | 0.05 | 0.04 | 0.04 | 0.03 | 0.03 | 0.04 | 0.46 |
| 52: | 0.03 | 0.03 | 0.02 | 0.03 | 0.02 | 0.03 | 0.02 | 0.02 | 0.02 | 0.02 | 0.24 |
| 53: | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.01 | 0.02 | 0.01 | 0.01 | 0.01 | 0.16 |
| 54: | 0.02 | 0.02 | 0.01 | 0.02 | 0.01 | 0.01 | 0.01 | 0.01 | 0.00 | 0.01 | 0.12 |
| 55: | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.00 | 0.00 | 0.06 |
| 56: | 0.00 | 0.00 | 0.01 | 0.00 | 0.01 | 0.00 | 0.01 | 0.00 | 0.01 | 0.00 | 0.04 |
| 57: | 0.01 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.03 |
| 58: | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 |

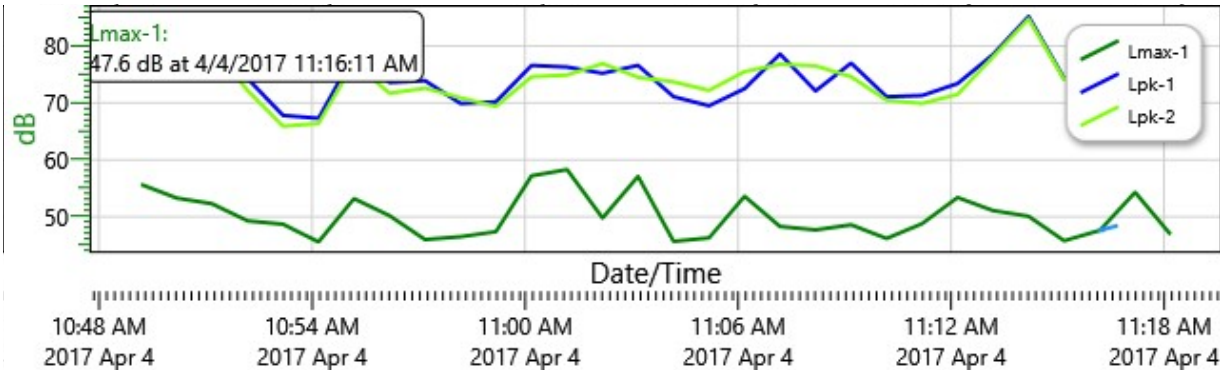
## Exceedance Table

| . | 0% | 1% | 2% | 3% | 4% | 5% | 6% | %7 | %8 | %9 |
|---|---|---|---|---|---|---|---|---|---|---|
| 0%: | | 51.1 | 49.4 | 48.4 | 47.5 | 46.8 | 46.3 | 45.9 | 45.5 | 45.2 |
| 10%: | 45.0 | 44.7 | 44.5 | 44.3 | 44.0 | 43.8 | 43.6 | 43.5 | 43.3 | 43.1 |
| 20%: | 42.9 | 42.8 | 42.7 | 42.6 | 42.5 | 42.4 | 42.3 | 42.2 | 42.1 | 42.0 |
| 30%: | 41.9 | 41.8 | 41.7 | 41.6 | 41.5 | 41.4 | 41.3 | 41.3 | 41.2 | 41.1 |
| 40%: | 41.0 | 40.9 | 40.9 | 40.8 | 40.7 | 40.6 | 40.6 | 40.5 | 40.4 | 40.4 |
| 50%: | 40.3 | 40.2 | 40.2 | 40.1 | 40.1 | 40.0 | 39.9 | 39.9 | 39.8 | 39.8 |
| 60%: | 39.7 | 39.7 | 39.7 | 39.6 | 39.6 | 39.5 | 39.4 | 39.4 | 39.3 | 39.3 |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 70%: | 39.2 | 39.2 | 39.1 | 39.0 | 39.0 | 38.9 | 38.9 | 38.8 | 38.7 | 38.7 |
| 80%: | 38.6 | 38.5 | 38.5 | 38.4 | 38.3 | 38.2 | 38.1 | 38.1 | 38.0 | 37.9 |
| 90%: | 37.8 | 37.7 | 37.6 | 37.5 | 37.4 | 37.2 | 37.1 | 36.9 | 36.8 | 36.5 |
| 100%: | 35.7 | | | | | | | | | |

## Logged Data Chart

Noise Monitoring Station #2 PR-122: Logged Data Chart



# Session Report

**4/5/2017**

## Information Panel

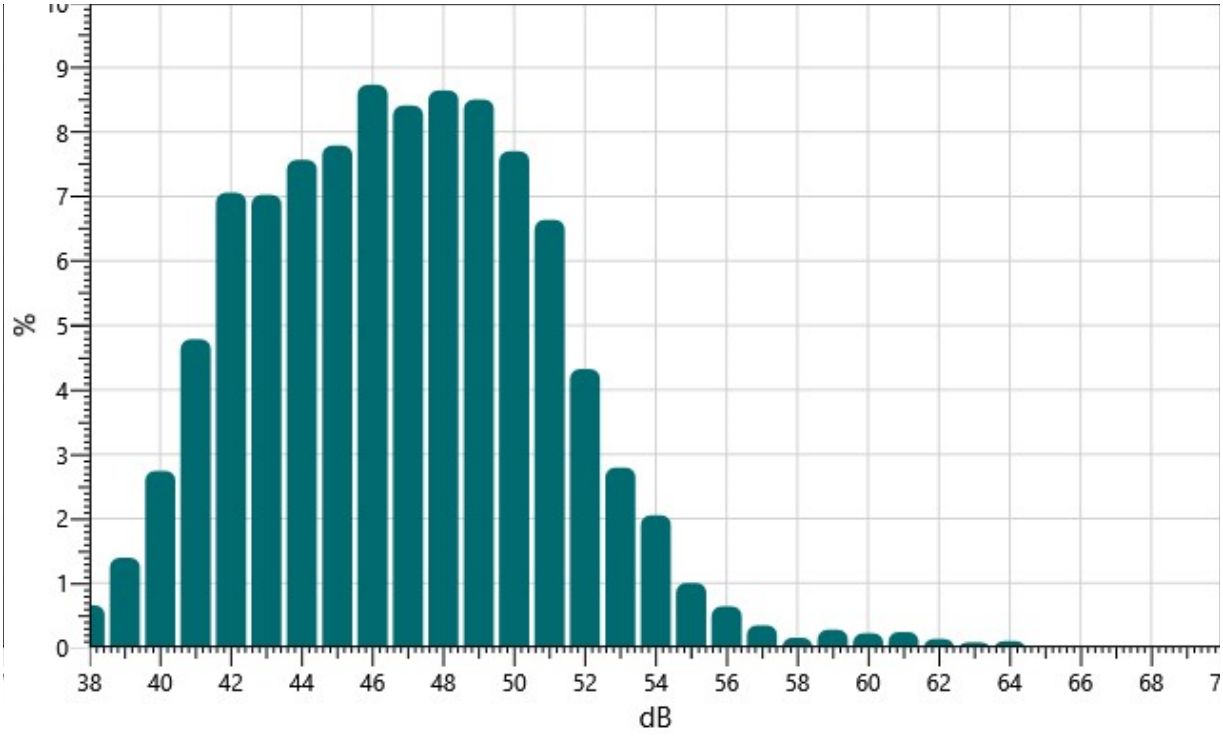
| | |
|---|---|
| Name | Noise Monitoring Station #3 PR-122 |
| Start Time | 4/4/2017 11:53:46 AM |
| Stop Time | 4/4/2017 12:24:50 PM |
| Device Name | BGR030001 |
| Model Type | SoundPro DL |
| Device Firmware Rev | R.13H |
| Comments | |

## Summary Data Panel

| Description | Meter | Value | Description | Meter | Value |
|---|---|---|---|---|---|
| Leq | 1 | 49.6 dB | | | |
| Exchange Rate | 1 | 3 dB | Weighting | 1 | A |
| Response | 1 | SLOW | Bandwidth | 1 | OFF |
| Exchange Rate | 2 | 3 dB | Weighting | 2 | C |
| Response | 2 | FAST | | | |

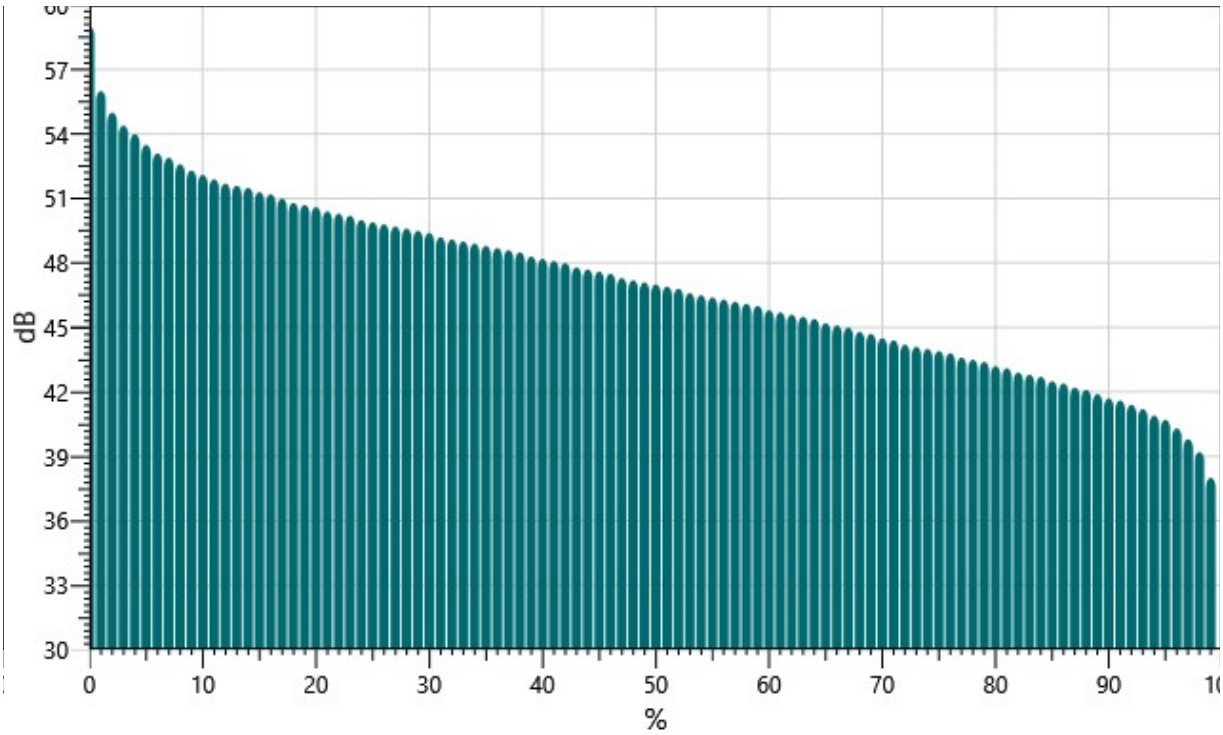
## Statistics Chart

Noise Monitoring Station #3 PR-122: Statistics Chart




## Exceedance Chart

Noise Monitoring Station #3 PR-122: Exceedance Chart



## Statistics Table

| dB: | 0.0 | 0.1 | 0.2 | 0.3 | 0.4 | 0.5 | 0.6 | 0.7 | 0.8 | 0.9 | % |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 38: | 0.00 | 0.07 | 0.03 | 0.03 | 0.07 | 0.10 | 0.12 | 0.07 | 0.07 | 0.09 | 0.66 |
| 39: | 0.09 | 0.13 | 0.06 | 0.10 | 0.14 | 0.09 | 0.14 | 0.18 | 0.24 | 0.24 | 1.39 |
| 40: | 0.28 | 0.19 | 0.21 | 0.21 | 0.22 | 0.27 | 0.29 | 0.27 | 0.37 | 0.43 | 2.74 |
| 41: | 0.36 | 0.35 | 0.44 | 0.41 | 0.45 | 0.54 | 0.56 | 0.59 | 0.57 | 0.52 | 4.78 |
| 42: | 0.60 | 0.58 | 0.55 | 0.71 | 0.72 | 0.83 | 0.70 | 0.71 | 0.84 | 0.80 | 7.06 |
| 43: | 0.89 | 0.33 | 0.65 | 0.71 | 0.67 | 0.69 | 0.78 | 0.75 | 0.67 | 0.89 | 7.02 |
| 44: | 0.93 | 0.81 | 0.87 | 0.80 | 0.81 | 0.71 | 0.64 | 0.66 | 0.65 | 0.68 | 7.57 |
| 45: | 0.73 | 0.74 | 0.77 | 0.72 | 0.63 | 0.82 | 0.82 | 0.97 | 0.80 | 0.81 | 7.79 |
| 46: | 0.99 | 0.77 | 1.08 | 0.89 | 0.92 | 0.79 | 0.83 | 0.81 | 0.80 | 0.86 | 8.73 |
| 47: | 0.76 | 0.83 | 0.90 | 0.88 | 0.96 | 0.90 | 0.87 | 0.82 | 0.75 | 0.74 | 8.41 |
| 48: | 0.68 | 0.83 | 0.84 | 0.82 | 0.77 | 0.84 | 0.86 | 0.94 | 1.06 | 0.99 | 8.64 |
| 49: | 0.90 | 0.64 | 0.83 | 0.84 | 0.82 | 1.01 | 0.80 | 0.91 | 0.90 | 0.86 | 8.50 |
| 50: | 0.91 | 0.81 | 0.80 | 0.76 | 0.86 | 0.79 | 0.73 | 0.67 | 0.67 | 0.70 | 7.70 |
| 51: | 0.61 | 0.66 | 0.65 | 0.63 | 0.72 | 0.67 | 0.64 | 0.76 | 0.70 | 0.60 | 6.64 |
| 52: | 0.64 | 0.45 | 0.53 | 0.46 | 0.44 | 0.43 | 0.35 | 0.29 | 0.40 | 0.34 | 4.32 |
| 53: | 0.38 | 0.37 | 0.37 | 0.29 | 0.26 | 0.23 | 0.21 | 0.21 | 0.23 | 0.23 | 2.79 |
| 54: | 0.23 | 0.23 | 0.24 | 0.27 | 0.18 | 0.19 | 0.20 | 0.16 | 0.16 | 0.20 | 2.05 |
| 55: | 0.17 | 0.15 | 0.09 | 0.09 | 0.08 | 0.07 | 0.07 | 0.09 | 0.11 | 0.09 | 1.00 |
| 56: | 0.11 | 0.10 | 0.09 | 0.05 | 0.05 | 0.04 | 0.05 | 0.07 | 0.04 | 0.04 | 0.64 |
| 57: | 0.03 | 0.04 | 0.05 | 0.03 | 0.05 | 0.04 | 0.03 | 0.03 | 0.03 | 0.02 | 0.34 |
| 58: | 0.02 | 0.02 | 0.02 | 0.02 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.15 |
| 59: | 0.04 | 0.06 | 0.03 | 0.03 | 0.03 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.28 |
| 60: | 0.03 | 0.04 | 0.03 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.22 |
| 61: | 0.02 | 0.03 | 0.02 | 0.05 | 0.05 | 0.02 | 0.01 | 0.01 | 0.02 | 0.02 | 0.24 |
| 62: | 0.02 | 0.01 | 0.01 | 0.02 | 0.01 | 0.01 | 0.01 | 0.02 | 0.02 | 0.01 | 0.13 |
| 63: | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.08 |
| 64: | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.02 | 0.02 | 0.00 | 0.00 | 0.01 | 0.10 |
| 65: | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

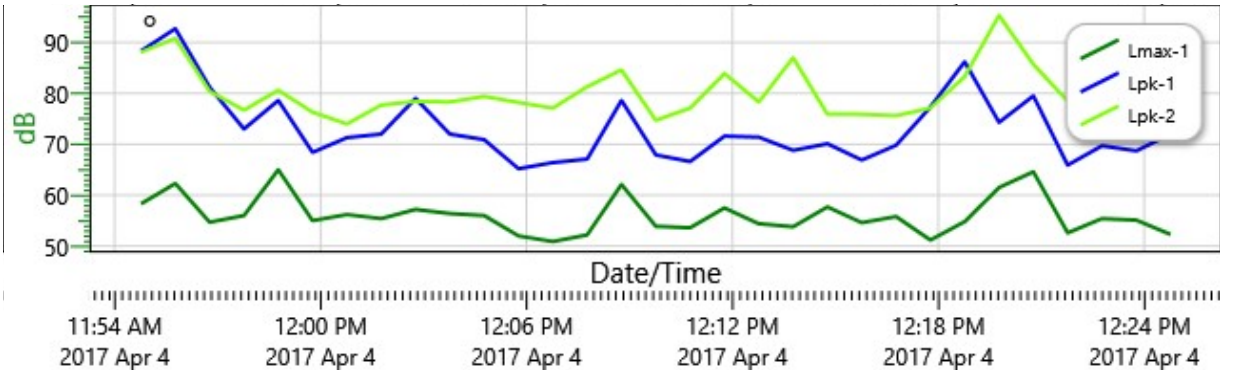
## Exceedance Table

| . | 0% | 1% | 2% | 3% | 4% | 5% | 6% | %7 | %8 | %9 |
|---|---|---|---|---|---|---|---|---|---|---|
| 0%: | | 59.0 | 56.0 | 55.0 | 54.4 | 54.0 | 53.5 | 53.1 | 52.9 | 52.6 |
| 10%: | 52.3 | 52.1 | 51.9 | 51.7 | 51.6 | 51.5 | 51.3 | 51.2 | 51.0 | 50.8 |
| 20%: | 50.7 | 50.6 | 50.4 | 50.3 | 50.2 | 50.0 | 49.9 | 49.8 | 49.7 | 49.6 |

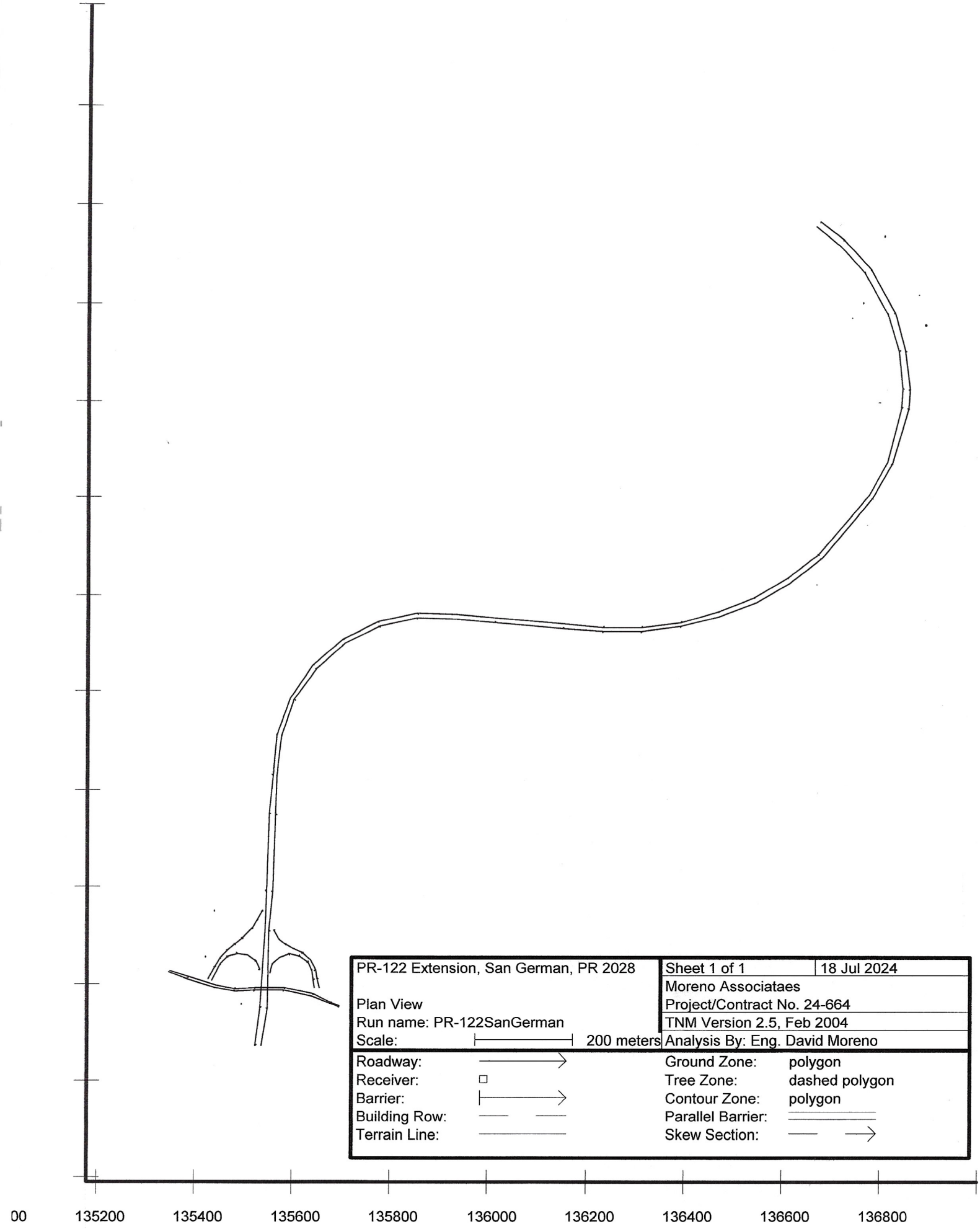
| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 30%: | 49.5 | 49.4 | 49.2 | 49.1 | 49.0 | 48.9 | 48.8 | 48.7 | 48.6 | 48.5 |
| 40%: | 48.3 | 48.2 | 48.1 | 48.0 | 47.8 | 47.7 | 47.6 | 47.5 | 47.3 | 47.2 |
| 50%: | 47.1 | 47.0 | 46.9 | 46.8 | 46.6 | 46.5 | 46.4 | 46.3 | 46.2 | 46.1 |
| 60%: | 46.0 | 45.8 | 45.7 | 45.6 | 45.5 | 45.4 | 45.2 | 45.1 | 45.0 | 44.8 |
| 70%: | 44.7 | 44.5 | 44.4 | 44.2 | 44.1 | 44.0 | 43.9 | 43.8 | 43.6 | 43.5 |
| 80%: | 43.4 | 43.2 | 43.1 | 42.9 | 42.8 | 42.7 | 42.5 | 42.4 | 42.2 | 42.1 |
| 90%: | 41.9 | 41.7 | 41.6 | 41.4 | 41.2 | 40.9 | 40.7 | 40.3 | 39.8 | 39.2 |
| 100%: | 38.0 | | | | | | | | | |

## Logged Data Chart

Noise Monitoring Station #3 PR-122: Logged Data Chart



# APPENDIX 4: TNM RESULTS FOR OPENING YEAR 2028


PR-122 Extension, San German, PR 2028
Plan View
Run name: PR-122SanGerman
Scale:
200 meters
Sheet 1 of 1
18 Jul 2024
Moreno Associataes
Project/Contract No. 24-664
TNM Version 2.5, Feb 2004
Analysis By: Eng. David Moreno
Roadway:
Receiver:
Barrier:
Building Row:
Terrain Line:
Ground Zone: polygon
Tree Zone: dashed polygon
Contour Zone: polygon
Parallel Barrier:
Skew Section:
00
135200
135400
135600
135800
136000
136200
136400
136600
136800

Moreno Associataes
Eng. David Moreno

18 July 2024
TNM 2.5
Calculated with TNM 2.5

RESULTS: SOUND LEVELS
PROJECT/CONTRACT: 24-664
RUN: PR-122 Extension, San German, PR 2028
BARRIER DESIGN: INPUT HEIGHTS
ATMOSPHERICS: 20 deg C, 50% RH

Average pavement type shall be used unless a State highway agency substantiates the use of a different type with approval of FHWA.

| Receiver Name | No. | #DUs | Existing LAeq1h | No Barrier | | | | | With Barrier | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | LAeq1h | | Increase over existing | | Type Impact | Calculated LAeq1h | Noise Reduction | | |
| | | | | Calculated | Crit'n | Calculated | Crit'n Sub'l Inc | | | Calculated | Goal | Calculated minus Goal |
| | | | dBA | dBA | dBA | dB | dB | | dBA | dB | dB | dB |
| PR122-01 | 1 | 1 | 49.7 | 61.1 | 66 | 11.4 | 10 | Sub'l Inc | 61.1 | 0.0 | 8 | -8.0 |
| PR122-02 | 2 | 1 | 49.7 | 54.5 | 66 | 4.8 | 10 | ---- | 54.5 | 0.0 | 8 | -8.0 |
| PR122-03 | 3 | 1 | 49.7 | 54.9 | 66 | 5.2 | 10 | ---- | 54.9 | 0.0 | 8 | -8.0 |
| PR122-04 | 4 | 1 | 42.6 | 55.6 | 66 | 13.0 | 10 | Sub'l Inc | 55.6 | 0.0 | 8 | -8.0 |
| PR122-05 | 5 | 1 | 51.1 | 57.9 | 66 | 6.8 | 10 | ---- | 57.9 | 0.0 | 8 | -8.0 |
| PR122-06 | 6 | 1 | 51.1 | 54.3 | 66 | 3.2 | 10 | ---- | 54.3 | 0.0 | 8 | -8.0 |
| PR122-07 | 7 | 1 | 51.1 | 54.4 | 66 | 3.3 | 10 | ---- | 54.4 | 0.0 | 8 | -8.0 |
| PR122-08 | 8 | 1 | 51.1 | 54.3 | 66 | 3.2 | 10 | ---- | 54.3 | 0.0 | 8 | -8.0 |
| PR122-09 | 9 | 1 | 51.1 | 60.0 | 66 | 8.9 | 10 | ---- | 60.0 | 0.0 | 8 | -8.0 |
| PR122-10 | 10 | 1 | 51.1 | 55.4 | 66 | 4.3 | 10 | ---- | 55.4 | 0.0 | 8 | -8.0 |

| Dwelling Units | # DUs | Noise Reduction | | |
|---|---|---|---|---|
| | | Min | Avg | Max |
| | | dB | dB | dB |
| All Selected | 10 | 0.0 | 0.0 | 0.0 |
| All Impacted | 2 | 0.0 | 0.0 | 0.0 |
| All that meet NR Goal | 0 | 0.0 | 0.0 | 0.0 |

Moreno Associataes
Eng. David Moreno

18 July 2024
TNM 2.5

INPUT: RECEIVERS
PROJECT/CONTRACT: 24-664
RUN: PR-122 Extension, San German, PR 2028

| Receiver Name | No. | #DUs | Coordinates (ground) | | | Height above Ground | Input Sound Levels and Criteria | | | | Active in Calc. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | X | Y | Z | | Existing LAeq1h | Impact Criteria LAeq1h | Impact Criteria Sub'l | NR Goal | |
| | | | m | m | m | m | dBA | dBA | dB | dB | |
| PR122-01 | 1 | 1 | 135,294.2 | 225,360.3 | 121.00 | 1.50 | 49.70 | 66 | 10.0 | 8.0 | Y |
| PR122-02 | 2 | 1 | 135,221.2 | 225,459.1 | 116.54 | 1.50 | 49.70 | 66 | 10.0 | 8.0 | Y |
| PR122-03 | 3 | 1 | 135,239.1 | 225,552.5 | 133.95 | 1.50 | 49.70 | 66 | 10.0 | 8.0 | Y |
| PR122-04 | 4 | 1 | 136,466.2 | 226,225.1 | 81.48 | 1.50 | 42.60 | 66 | 10.0 | 8.0 | Y |
| PR122-05 | 5 | 1 | 136,592.9 | 226,601.8 | 76.35 | 1.50 | 51.10 | 66 | 10.0 | 8.0 | Y |
| PR122-06 | 6 | 1 | 136,536.1 | 226,775.7 | 68.99 | 1.50 | 51.10 | 66 | 10.0 | 8.0 | Y |
| PR122-07 | 7 | 1 | 136,687.0 | 226,761.2 | 59.13 | 1.50 | 51.10 | 66 | 10.0 | 8.0 | Y |
| PR122-08 | 8 | 1 | 136,672.4 | 226,823.5 | 58.06 | 1.50 | 51.10 | 66 | 10.0 | 8.0 | Y |
| PR122-09 | 9 | 1 | 136,559.7 | 226,806.8 | 66.97 | 1.50 | 51.10 | 66 | 10.0 | 8.0 | Y |
| PR122-10 | 10 | 1 | 136,601.6 | 226,943.1 | 56.15 | 1.50 | 51.10 | 66 | 10.0 | 8.0 | Y |

Moreno Associataes
Eng. David Moreno

18 July 2024
TNM 2.5

INPUT: TRAFFIC FOR LAeq1h Volumes
PROJECT/CONTRACT: 24-664
RUN: PR-122 Extension, San German, PR 2028

| Roadway Name | Points Name | No. | Segment | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Autos | | MTrucks | | HTrucks | | Buses | | Motorcycles | |
| | | | V | S | V | S | V | S | V | S | V | S |
| | | | veh/hr | km/h | veh/hr | km/h | veh/hr | km/h | veh/hr | km/h | veh/hr | km/h |
| PR-122 south to north lane | A | 32 | 370 | 80 | 8 | 80 | 12 | 72 | 0 | 0 | 0 | 0 |
| | B | 31 | 370 | 80 | 8 | 80 | 12 | 72 | 0 | 0 | 0 | 0 |
| | C | 30 | 370 | 80 | 8 | 80 | 12 | 72 | 0 | 0 | 0 | 0 |
| | D | 29 | 370 | 80 | 8 | 80 | 12 | 72 | 0 | 0 | 0 | 0 |
| | E | 28 | 370 | 80 | 8 | 80 | 12 | 72 | 0 | 0 | 0 | 0 |
| | F | 27 | 370 | 80 | 8 | 80 | 12 | 72 | 0 | 0 | 0 | 0 |
| | G | 26 | 370 | 80 | 8 | 80 | 12 | 72 | 0 | 0 | 0 | 0 |
| | H | 25 | 370 | 80 | 8 | 80 | 12 | 72 | 0 | 0 | 0 | 0 |
| | I | 24 | 370 | 80 | 8 | 80 | 12 | 72 | 0 | 0 | 0 | 0 |
| | J | 23 | 370 | 80 | 8 | 80 | 12 | 72 | 0 | 0 | 0 | 0 |
| | K | 22 | 370 | 80 | 8 | 80 | 12 | 72 | 0 | 0 | 0 | 0 |
| | L | 21 | 370 | 80 | 8 | 80 | 12 | 72 | 0 | 0 | 0 | 0 |
| | M | 20 | 370 | 80 | 8 | 80 | 12 | 72 | 0 | 0 | 0 | 0 |
| | N | 19 | 370 | 80 | 8 | 80 | 12 | 72 | 0 | 0 | 0 | 0 |
| | O | 18 | 370 | 80 | 8 | 80 | 12 | 72 | 0 | 0 | 0 | 0 |
| | P | 17 | 370 | 80 | 8 | 80 | 12 | 72 | 0 | 0 | 0 | 0 |
| | Q | 16 | 370 | 80 | 8 | 80 | 12 | 72 | 0 | 0 | 0 | 0 |
| | R | 15 | 370 | 80 | 8 | 80 | 12 | 72 | 0 | 0 | 0 | 0 |
| | S | 14 | 370 | 80 | 8 | 80 | 12 | 72 | 0 | 0 | 0 | 0 |
| | T | 13 | 370 | 80 | 8 | 80 | 12 | 72 | 0 | 0 | 0 | 0 |
| | U | 12 | 370 | 80 | 8 | 80 | 12 | 72 | 0 | 0 | 0 | 0 |
| | V | 11 | 370 | 80 | 8 | 80 | 12 | 72 | 0 | 0 | 0 | 0 |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | W | 10 | 370 | 80 | 8 | 80 | 12 | 72 | 0 | 0 | 0 | 0 |
| | X | 9 | 370 | 80 | 8 | 80 | 12 | 72 | 0 | 0 | 0 | 0 |
| | Y | 8 | 370 | 80 | 8 | 80 | 12 | 72 | 0 | 0 | 0 | 0 |
| | Z | 7 | 370 | 80 | 8 | 80 | 12 | 72 | 0 | 0 | 0 | 0 |
| | AA | 6 | 370 | 80 | 8 | 80 | 12 | 72 | 0 | 0 | 0 | 0 |
| | BB | 5 | 370 | 80 | 8 | 80 | 12 | 72 | 0 | 0 | 0 | 0 |
| | CC | 4 | 370 | 80 | 8 | 80 | 12 | 72 | 0 | 0 | 0 | 0 |
| | DD | 3 | 370 | 80 | 8 | 80 | 12 | 72 | 0 | 0 | 0 | 0 |
| | EE | 2 | 370 | 80 | 8 | 80 | 12 | 72 | 0 | 0 | 0 | 0 |
| | FF | 1 | | | | | | | | | | |
| PR122 north to south lane | FF | 64 | 370 | 80 | 8 | 80 | 12 | 72 | 0 | 0 | 0 | 0 |
| | EE | 63 | 370 | 80 | 8 | 80 | 12 | 72 | 0 | 0 | 0 | 0 |
| | DD | 62 | 370 | 80 | 8 | 80 | 12 | 72 | 0 | 0 | 0 | 0 |
| | CC | 61 | 370 | 80 | 8 | 80 | 12 | 72 | 0 | 0 | 0 | 0 |
| | BB | 60 | 370 | 80 | 8 | 80 | 12 | 72 | 0 | 0 | 0 | 0 |
| | AA | 59 | 370 | 80 | 8 | 80 | 12 | 72 | 0 | 0 | 0 | 0 |
| | Z | 58 | 370 | 80 | 8 | 80 | 12 | 72 | 0 | 0 | 0 | 0 |
| | Y | 57 | 370 | 80 | 8 | 80 | 12 | 72 | 0 | 0 | 0 | 0 |
| | X | 56 | 370 | 80 | 8 | 80 | 12 | 72 | 0 | 0 | 0 | 0 |
| | W | 55 | 370 | 80 | 8 | 80 | 12 | 72 | 0 | 0 | 0 | 0 |
| | V | 54 | 370 | 80 | 8 | 80 | 12 | 72 | 0 | 0 | 0 | 0 |
| | U | 53 | 370 | 80 | 8 | 80 | 12 | 72 | 0 | 0 | 0 | 0 |
| | T | 52 | 370 | 80 | 8 | 80 | 12 | 72 | 0 | 0 | 0 | 0 |
| | S | 51 | 370 | 80 | 8 | 80 | 12 | 72 | 0 | 0 | 0 | 0 |
| | R | 50 | 370 | 80 | 8 | 80 | 12 | 72 | 0 | 0 | 0 | 0 |
| | Q | 49 | 370 | 80 | 8 | 80 | 12 | 72 | 0 | 0 | 0 | 0 |
| | P | 48 | 370 | 80 | 8 | 80 | 12 | 72 | 0 | 0 | 0 | 0 |
| | O | 47 | 370 | 80 | 8 | 80 | 12 | 72 | 0 | 0 | 0 | 0 |
| | N | 46 | 370 | 80 | 8 | 80 | 12 | 72 | 0 | 0 | 0 | 0 |
| | M | 45 | 370 | 80 | 8 | 80 | 12 | 72 | 0 | 0 | 0 | 0 |
| | L | 44 | 370 | 80 | 8 | 80 | 12 | 72 | 0 | 0 | 0 | 0 |
| | K | 43 | 370 | 80 | 8 | 80 | 12 | 72 | 0 | 0 | 0 | 0 |
| | J | 42 | 370 | 80 | 8 | 80 | 12 | 72 | 0 | 0 | 0 | 0 |
| | I | 41 | 370 | 80 | 8 | 80 | 12 | 72 | 0 | 0 | 0 | 0 |
| | H | 40 | 370 | 80 | 8 | 80 | 12 | 72 | 0 | 0 | 0 | 0 |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | G | 39 | 370 | 80 | 8 | 80 | 12 | 72 | 0 | 0 | 0 | 0 |
| | F | 38 | 370 | 80 | 8 | 80 | 12 | 72 | 0 | 0 | 0 | 0 |
| | E | 37 | 370 | 80 | 8 | 80 | 12 | 72 | 0 | 0 | 0 | 0 |
| | D | 36 | 370 | 80 | 8 | 80 | 12 | 72 | 0 | 0 | 0 | 0 |
| | C | 35 | 370 | 80 | 8 | 80 | 12 | 72 | 0 | 0 | 0 | 0 |
| | B | 34 | 370 | 80 | 8 | 80 | 12 | 72 | 0 | 0 | 0 | 0 |
| | A | 33 | | | | | | | | | | |
| PR-321 west to east lane | A | 73 | 104 | 56 | 2 | 56 | 3 | 56 | 0 | 0 | 0 | 0 |
| | B | 72 | 104 | 56 | 2 | 56 | 3 | 56 | 0 | 0 | 0 | 0 |
| | C | 71 | 104 | 56 | 2 | 56 | 3 | 56 | 0 | 0 | 0 | 0 |
| | D | 70 | 104 | 56 | 2 | 56 | 3 | 56 | 0 | 0 | 0 | 0 |
| | E | 69 | 104 | 56 | 2 | 56 | 3 | 56 | 0 | 0 | 0 | 0 |
| | F | 68 | 104 | 56 | 2 | 56 | 3 | 56 | 0 | 0 | 0 | 0 |
| | G | 67 | 104 | 56 | 2 | 56 | 3 | 56 | 0 | 0 | 0 | 0 |
| | H | 66 | 104 | 56 | 2 | 56 | 3 | 56 | 0 | 0 | 0 | 0 |
| | I | 65 | | | | | | | | | | |
| PR-321 east to west lane | I | 82 | 104 | 56 | 2 | 56 | 3 | 56 | 0 | 0 | 0 | 0 |
| | H | 81 | 104 | 56 | 2 | 56 | 3 | 56 | 0 | 0 | 0 | 0 |
| | G | 80 | 104 | 56 | 2 | 56 | 3 | 56 | 0 | 0 | 0 | 0 |
| | F | 79 | 104 | 56 | 2 | 56 | 3 | 56 | 0 | 0 | 0 | 0 |
| | E | 78 | 104 | 56 | 2 | 56 | 3 | 56 | 0 | 0 | 0 | 0 |
| | D | 77 | 104 | 56 | 2 | 56 | 3 | 56 | 0 | 0 | 0 | 0 |
| | C | 76 | 104 | 56 | 2 | 56 | 3 | 56 | 0 | 0 | 0 | 0 |
| | B | 75 | 104 | 56 | 2 | 56 | 3 | 56 | 0 | 0 | 0 | 0 |
| | A | 74 | | | | | | | | | | |
| West side exit ramp to PR-321 | A | 96 | 37 | 40 | 2 | 40 | 2 | 40 | 0 | 0 | 0 | 0 |
| | B | 95 | 37 | 40 | 2 | 40 | 2 | 40 | 0 | 0 | 0 | 0 |
| | C | 94 | 37 | 40 | 2 | 40 | 2 | 40 | 0 | 0 | 0 | 0 |
| | D | 93 | 37 | 40 | 2 | 40 | 2 | 40 | 0 | 0 | 0 | 0 |
| | E | 92 | 37 | 40 | 2 | 40 | 2 | 40 | 0 | 0 | 0 | 0 |
| | F | 91 | 37 | 40 | 2 | 40 | 2 | 40 | 0 | 0 | 0 | 0 |
| | G | 90 | 37 | 40 | 2 | 40 | 2 | 40 | 0 | 0 | 0 | 0 |
| | H | 89 | 37 | 40 | 2 | 40 | 2 | 40 | 0 | 0 | 0 | 0 |
| | I | 88 | 37 | 40 | 2 | 40 | 2 | 40 | 0 | 0 | 0 | 0 |
| | J | 87 | | | | | | | | | | |

**INPUT: TRAFFIC FOR LAeq1h Volumes** **24-664**

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| West side ramp fom PR-321 | A | 103 | 37 | 40 | 2 | 40 | 2 | 40 | 0 | 0 | 0 | 0 |
| | B | 102 | 37 | 40 | 2 | 40 | 2 | 40 | 0 | 0 | 0 | 0 |
| | C | 101 | 37 | 40 | 2 | 40 | 2 | 40 | 0 | 0 | 0 | 0 |
| | D | 100 | 37 | 40 | 2 | 40 | 2 | 40 | 0 | 0 | 0 | 0 |
| | E | 99 | 37 | 40 | 2 | 40 | 2 | 40 | 0 | 0 | 0 | 0 |
| | F | 98 | 37 | 40 | 2 | 40 | 2 | 40 | 0 | 0 | 0 | 0 |
| | G | 97 | | | | | | | | | | |
| East side entrance ramp from PR-321 | A | 112 | 37 | 40 | 2 | 40 | 2 | 40 | 0 | 0 | 0 | 0 |
| | B | 111 | 37 | 40 | 2 | 40 | 2 | 40 | 0 | 0 | 0 | 0 |
| | C | 110 | 37 | 40 | 2 | 40 | 2 | 40 | 0 | 0 | 0 | 0 |
| | D | 109 | 37 | 40 | 2 | 40 | 2 | 40 | 0 | 0 | 0 | 0 |
| | E | 108 | 37 | 40 | 2 | 40 | 2 | 40 | 0 | 0 | 0 | 0 |
| | F | 107 | 37 | 40 | 2 | 40 | 2 | 40 | 0 | 0 | 0 | 0 |
| | G | 106 | 37 | 40 | 2 | 40 | 2 | 40 | 0 | 0 | 0 | 0 |
| | H | 105 | 37 | 40 | 2 | 40 | 2 | 40 | 0 | 0 | 0 | 0 |
| | I | 104 | | | | | | | | | | |
| East side exit ramp to PR-321 | A | 121 | 37 | 40 | 2 | 40 | 2 | 40 | 0 | 0 | 0 | 0 |
| | B | 120 | 37 | 40 | 2 | 40 | 2 | 40 | 0 | 0 | 0 | 0 |
| | C | 119 | 37 | 40 | 2 | 40 | 2 | 40 | 0 | 0 | 0 | 0 |
| | D | 118 | 37 | 40 | 2 | 40 | 2 | 40 | 0 | 0 | 0 | 0 |
| | E | 117 | 37 | 40 | 2 | 40 | 2 | 40 | 0 | 0 | 0 | 0 |
| | F | 116 | 37 | 40 | 2 | 40 | 2 | 40 | 0 | 0 | 0 | 0 |
| | G | 115 | 37 | 40 | 2 | 40 | 2 | 40 | 0 | 0 | 0 | 0 |
| | H | 114 | 37 | 40 | 2 | 40 | 2 | 40 | 0 | 0 | 0 | 0 |
| | I | 113 | | | | | | | | | | |

Moreno Associataes
Eng. David Moreno

18 July 2024
TNM 2.5

INPUT: ROADWAYS
PROJECT/CONTRACT: 24-664
RUN: PR-122 Extension, San German, PR 2028

Average pavement type shall be used unless a State highway agency substantiates the use of a different type with the approval of FHWA

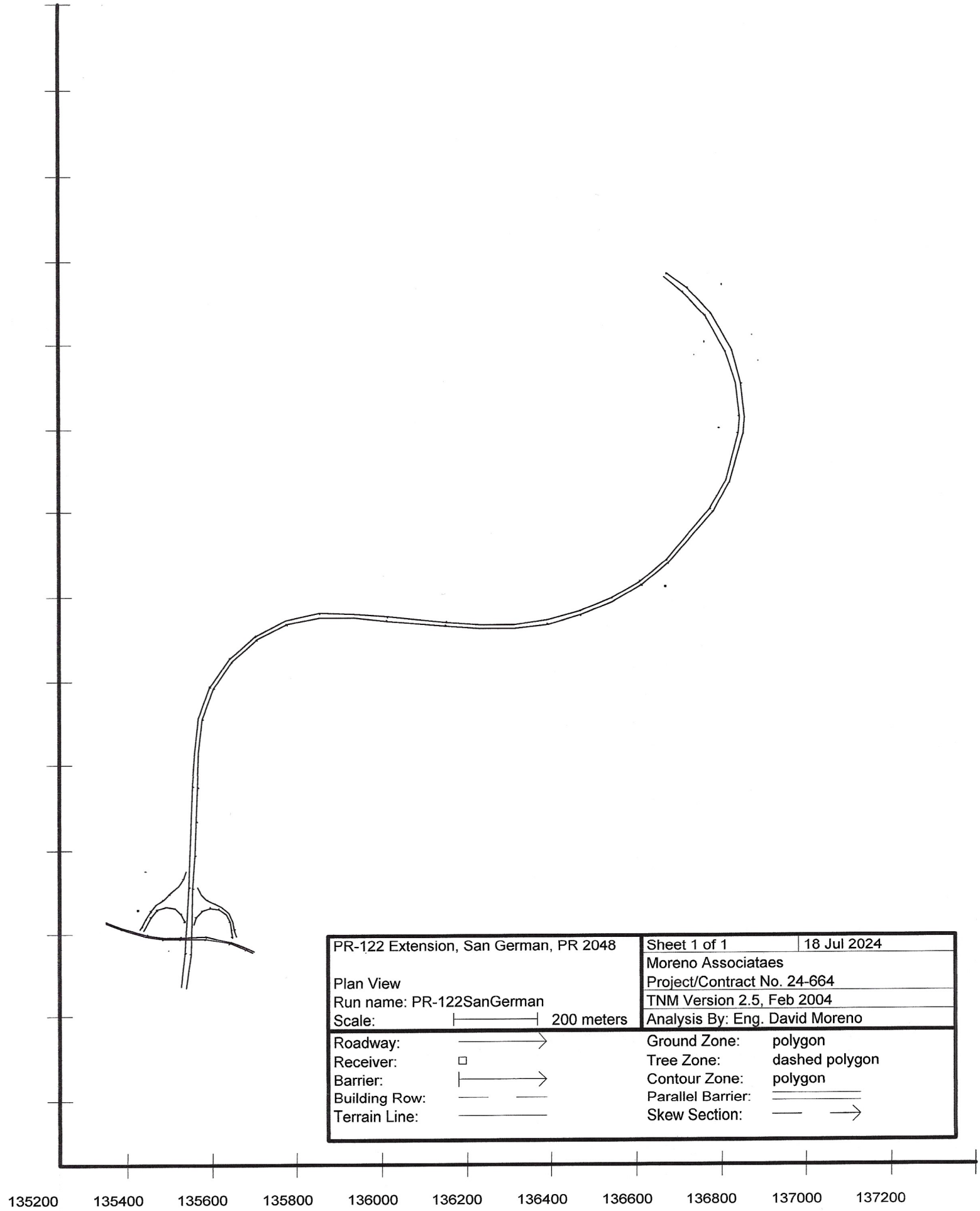
| Roadway | | Points | | | | | Flow Control | | | Segment | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Name | Width | Name | No. | Coordinates (pavement) X | Y | Z | Control Device | Speed Constraint | Percent Vehicles Affected | Pvmt Type | On Struct? |
| | m | | | m | m | m | | km/h | % | | |
| PR-122 south to north lane | 3.7 | A | 32 | 135,335.1 | 225,272.7 | 124.70 | | | | Average | |
| | | B | 31 | 135,346.4 | 225,352.3 | 123.80 | | | | Average | Y |
| | | C | 30 | 135,351.4 | 225,512.2 | 115.90 | | | | Average | |
| | | D | 29 | 135,357.1 | 225,592.3 | 110.00 | | | | Average | |
| | | E | 28 | 135,360.5 | 225,672.4 | 104.20 | | | | Average | |
| | | F | 27 | 135,363.3 | 225,752.3 | 98.40 | | | | Average | |
| | | G | 26 | 135,365.7 | 225,832.4 | 93.50 | | | | Average | |
| | | H | 25 | 135,375.1 | 225,911.3 | 90.30 | | | | Average | |
| | | I | 24 | 135,401.8 | 225,985.3 | 89.50 | | | | Average | |
| | | J | 23 | 135,445.3 | 226,048.8 | 90.60 | | | | Average | |
| | | K | 22 | 135,505.2 | 226,101.7 | 92.80 | | | | Average | |
| | | L | 21 | 135,574.5 | 226,136.6 | 94.70 | | | | Average | |
| | | M | 20 | 135,651.2 | 226,153.4 | 96.60 | | | | Average | |
| | | N | 19 | 135,730.6 | 226,152.4 | 98.80 | | | | Average | |
| | | O | 18 | 135,810.8 | 226,144.9 | 100.70 | | | | Average | |
| | | P | 17 | 135,949.9 | 226,132.9 | 104.00 | | | | Average | |
| | | Q | 16 | 136,029.5 | 226,125.7 | 105.10 | | | | Average | |
| | | R | 15 | 136,109.7 | 226,125.5 | 104.70 | | | | Average | |
| | | S | 14 | 136,189.3 | 226,135.9 | 103.00 | | | | Average | |
| | | T | 13 | 136,267.2 | 226,157.2 | 101.60 | | | | Average | |
| | | U | 12 | 136,341.5 | 226,187.7 | 96.80 | | | | Average | |
| | | V | 11 | 136,411.3 | 226,228.9 | 93.60 | | | | Average | |
| | | W | 10 | 136,474.9 | 226,278.5 | 90.10 | | | | Average | |
| | | X | 9 | 136,579.8 | 226,401.2 | 82.10 | | | | Average | |
| | | Y | 8 | 136,618.5 | 226,471.6 | 78.20 | | | | Average | |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Z | 7 | 136,651.6 | 226,588.7 | 72.60 | | | | Average | |
| | | AA | 6 | 136,654.2 | 226,628.9 | 71.20 | | | | Average | |
| | | BB | 5 | 136,645.7 | 226,708.8 | 68.30 | | | | Average | |
| | | CC | 4 | 136,623.7 | 226,786.7 | 65.60 | | | | Average | |
| | | DD | 3 | 136,573.6 | 226,875.7 | 63.20 | | | | Average | Y |
| | | EE | 2 | 136,518.9 | 226,936.2 | 62.50 | | | | Average | Y |
| | | FF | 1 | 136,470.1 | 226,971.3 | 62.10 | | | | | |
| PR122 north to south lane | 3.7 | FF | 64 | 136,463.6 | 226,961.9 | 62.10 | | | | Average | |
| | | EE | 63 | 136,510.5 | 226,925.5 | 62.50 | | | | Average | |
| | | DD | 62 | 136,562.3 | 226,868.8 | 62.40 | | | | Average | |
| | | CC | 61 | 136,610.8 | 226,783.0 | 64.80 | | | | Average | |
| | | BB | 60 | 136,633.4 | 226,707.1 | 67.60 | | | | Average | |
| | | AA | 59 | 136,640.8 | 226,628.9 | 70.30 | | | | Average | |
| | | Z | 58 | 136,638.1 | 226,589.4 | 71.80 | | | | Average | |
| | | Y | 57 | 136,609.3 | 226,474.8 | 77.40 | | | | Average | |
| | | X | 56 | 136,571.7 | 226,405.9 | 81.50 | | | | Average | |
| | | W | 55 | 136,468.9 | 226,286.3 | 89.50 | | | | Average | |
| | | V | 54 | 136,406.1 | 226,236.7 | 93.10 | | | | Average | |
| | | U | 53 | 136,338.0 | 226,196.9 | 96.30 | | | | Average | |
| | | T | 52 | 136,264.4 | 226,166.1 | 101.10 | | | | Average | |
| | | S | 51 | 136,188.4 | 226,145.6 | 102.50 | | | | Average | |
| | | R | 50 | 136,109.0 | 226,135.2 | 104.20 | | | | Average | |
| | | Q | 49 | 136,030.1 | 226,135.3 | 104.70 | | | | Average | |
| | | P | 48 | 135,950.4 | 226,142.1 | 104.00 | | | | Average | |
| | | O | 47 | 135,811.0 | 226,154.6 | 100.70 | | | | Average | |
| | | N | 46 | 135,731.4 | 226,161.9 | 99.00 | | | | Average | |
| | | M | 45 | 135,650.9 | 226,163.5 | 97.30 | | | | Average | |
| | | L | 44 | 135,571.1 | 226,146.0 | 95.40 | | | | Average | |
| | | K | 43 | 135,499.4 | 226,108.9 | 93.50 | | | | Average | |
| | | J | 42 | 135,438.4 | 226,055.2 | 91.60 | | | | Average | |
| | | I | 41 | 135,392.5 | 225,987.5 | 90.20 | | | | Average | |
| | | H | 40 | 135,365.1 | 225,912.2 | 91.00 | | | | Average | |
| | | G | 39 | 135,356.5 | 225,832.5 | 93.60 | | | | Average | |
| | | F | 38 | 135,351.3 | 225,752.1 | 98.50 | | | | Average | |
| | | E | 37 | 135,347.9 | 225,671.7 | 104.30 | | | | Average | |
| | | D | 36 | 135,344.2 | 225,592.3 | 110.00 | | | | Average | |
| | | C | 35 | 135,342.5 | 225,512.2 | 115.80 | | | | Average | Y |
| | | B | 34 | 135,333.5 | 225,352.4 | 123.30 | | | | Average | Y |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | A | 33 | 135,322.9 | 225,274.2 | 123.50 | | | | | |
| PR-321 west to east lane | 3.7 | A | 73 | 135,146.5 | 225,427.6 | 113.60 | | | | Average | |
| | | B | 72 | 135,184.1 | 225,413.6 | 114.30 | | | | Average | |
| | | C | 71 | 135,241.1 | 225,394.7 | 115.50 | | | | Average | |
| | | D | 70 | 135,281.6 | 225,388.5 | 115.90 | | | | Average | |
| | | E | 69 | 135,321.8 | 225,389.1 | 115.20 | | | | Average | |
| | | F | 68 | 135,381.1 | 225,389.1 | 113.10 | | | | Average | |
| | | G | 67 | 135,438.6 | 225,376.6 | 109.30 | | | | Average | |
| | | H | 66 | 135,475.7 | 225,361.9 | 106.50 | | | | Average | |
| | | I | 65 | 135,493.6 | 225,353.4 | 105.10 | | | | | |
| PR-321 east to west lane | 3.7 | I | 82 | 135,495.1 | 225,356.4 | 105.10 | | | | Average | |
| | | H | 81 | 135,477.2 | 225,365.2 | 106.50 | | | | Average | |
| | | G | 80 | 135,440.4 | 225,381.7 | 109.50 | | | | Average | |
| | | F | 79 | 135,381.7 | 225,394.4 | 113.20 | | | | Average | |
| | | E | 78 | 135,321.6 | 225,393.9 | 115.30 | | | | Average | |
| | | D | 77 | 135,281.8 | 225,393.3 | 115.60 | | | | Average | |
| | | C | 76 | 135,243.0 | 225,399.9 | 115.20 | | | | Average | |
| | | B | 75 | 135,185.2 | 225,417.2 | 114.30 | | | | Average | |
| | | A | 74 | 135,147.7 | 225,430.8 | 113.60 | | | | | |
| West side exit ramp to PR-321 | 3.7 | A | 96 | 135,226.3 | 225,413.1 | 114.70 | | | | Average | |
| | | B | 95 | 135,232.2 | 225,422.2 | 114.60 | | | | Average | |
| | | C | 94 | 135,241.1 | 225,439.5 | 114.80 | | | | Average | |
| | | D | 93 | 135,251.8 | 225,457.3 | 114.90 | | | | Average | |
| | | E | 92 | 135,265.7 | 225,472.8 | 115.30 | | | | Average | |
| | | F | 91 | 135,281.6 | 225,485.7 | 115.70 | | | | Average | |
| | | G | 90 | 135,296.9 | 225,497.9 | 115.60 | | | | Average | |
| | | H | 89 | 135,317.9 | 225,517.9 | 115.30 | | | | Average | |
| | | I | 88 | 135,328.5 | 225,534.9 | 114.30 | | | | Average | |
| | | J | 87 | 135,336.6 | 225,553.2 | 112.90 | | | | | |
| West side ramp fom PR-321 | 3.7 | A | 103 | 135,235.1 | 225,409.8 | 114.80 | | | | Average | |
| | | B | 102 | 135,252.2 | 225,444.3 | 114.80 | | | | Average | |
| | | C | 101 | 135,266.9 | 225,459.9 | 115.30 | | | | Average | |
| | | D | 100 | 135,286.9 | 225,466.7 | 116.60 | | | | Average | |
| | | E | 99 | 135,307.5 | 225,463.0 | 118.20 | | | | Average | |
| | | F | 98 | 135,323.9 | 225,450.4 | 119.70 | | | | Average | |
| | | G | 97 | 135,331.8 | 225,431.7 | 120.70 | | | | | |
| East side entrance ramp from PR-321 | 3.7 | A | 112 | 135,452.8 | 225,394.9 | 109.80 | | | | Average | |
| | | B | 111 | 135,448.9 | 225,414.3 | 111.30 | | | | Average | |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | C | 110 | 135,445.2 | 225,432.2 | 112.80 | | | | Average | |
| | | D | 109 | 135,435.6 | 225,453.4 | 114.30 | | | | Average | |
| | | E | 108 | 135,418.2 | 225,467.6 | 115.60 | | | | Average | |
| | | F | 107 | 135,401.1 | 225,475.7 | 116.50 | | | | Average | |
| | | G | 106 | 135,383.6 | 225,484.9 | 117.00 | | | | Average | |
| | | H | 105 | 135,370.6 | 225,496.8 | 116.80 | | | | Average | |
| | | I | 104 | 135,360.8 | 225,514.2 | 115.50 | | | | | |
| East side exit ramp to PR-321 | 3.7 | A | 121 | 135,353.3 | 225,424.4 | 120.90 | | | | Average | |
| | | B | 120 | 135,358.6 | 225,444.1 | 119.80 | | | | Average | |
| | | C | 119 | 135,373.4 | 225,458.8 | 118.30 | | | | Average | |
| | | D | 118 | 135,393.1 | 225,465.0 | 116.70 | | | | Average | |
| | | E | 117 | 135,413.8 | 225,461.5 | 115.10 | | | | Average | |
| | | F | 116 | 135,430.2 | 225,448.3 | 113.70 | | | | Average | |
| | | G | 115 | 135,438.5 | 225,430.2 | 112.30 | | | | Average | |
| | | H | 114 | 135,442.2 | 225,410.9 | 111.00 | | | | Average | |
| | | I | 113 | 135,444.1 | 225,393.7 | 109.90 | | | | | |

# APPENDIX 5: TNM RESULTS FOR FUTURE YEAR 2048


PR-122 Extension, San German, PR 2048
Plan View
Run name: PR-122SanGerman
Scale: 200 meters
Sheet 1 of 1
18 Jul 2024
Moreno Associataes
Project/Contract No. 24-664
TNM Version 2.5, Feb 2004
Analysis By: Eng. David Moreno
Roadway:
Receiver:
Barrier:
Building Row:
Terrain Line:
Ground Zone: polygon
Tree Zone: dashed polygon
Contour Zone: polygon
Parallel Barrier:
Skew Section:
135200
135400
135600
135800
136000
136200
136400
136600
136800
137000
137200

Moreno Associataes
Eng. David Moreno

18 July 2024
TNM 2.5
Calculated with TNM 2.5

RESULTS: SOUND LEVELS
PROJECT/CONTRACT: 24-664
RUN: PR-122 Extension, San German, PR 2048
BARRIER DESIGN: INPUT HEIGHTS
ATMOSPHERICS: 20 deg C, 50% RH

Average pavement type shall be used unless a State highway agency substantiates the use of a different type with approval of FHWA.

| Receiver Name | No. | #DUs | Existing LAeq1h | No Barrier | | | | | With Barrier | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | LAeq1h | | Increase over existing | | Type Impact | Calculated LAeq1h | Noise Reduction | | |
| | | | | Calculated | Crit'n | Calculated | Crit'n Sub'l Inc | | | Calculated | Goal | Calculated minus Goal |
| | | | dBA | dBA | dBA | dB | dB | | dBA | dB | dB | dB |
| PR122-01 | 1 | 1 | 49.7 | 62.2 | 66 | 12.5 | 10 | Sub'l Inc | 62.2 | 0.0 | 8 | -8.0 |
| PR122-02 | 2 | 1 | 49.7 | 55.4 | 66 | 5.7 | 10 | ---- | 55.4 | 0.0 | 8 | -8.0 |
| PR122-03 | 3 | 1 | 49.7 | 55.9 | 66 | 6.2 | 10 | ---- | 55.9 | 0.0 | 8 | -8.0 |
| PR122-04 | 4 | 1 | 42.6 | 56.6 | 66 | 14.0 | 10 | Sub'l Inc | 56.6 | 0.0 | 8 | -8.0 |
| PR122-05 | 5 | 1 | 51.1 | 58.9 | 66 | 7.8 | 10 | ---- | 58.9 | 0.0 | 8 | -8.0 |
| PR122-06 | 6 | 1 | 51.1 | 55.4 | 66 | 4.3 | 10 | ---- | 55.4 | 0.0 | 8 | -8.0 |
| PR122-07 | 7 | 1 | 51.1 | 55.5 | 66 | 4.4 | 10 | ---- | 55.5 | 0.0 | 8 | -8.0 |
| PR122-08 | 8 | 1 | 51.1 | 55.3 | 66 | 4.2 | 10 | ---- | 55.3 | 0.0 | 8 | -8.0 |
| PR122-09 | 9 | 1 | 51.1 | 61.0 | 66 | 9.9 | 10 | ---- | 61.0 | 0.0 | 8 | -8.0 |
| PR122-10 | 10 | 1 | 51.1 | 56.4 | 66 | 5.3 | 10 | ---- | 56.4 | 0.0 | 8 | -8.0 |

| Dwelling Units | # DUs | Noise Reduction | | |
|---|---|---|---|---|
| | | Min | Avg | Max |
| | | dB | dB | dB |
| All Selected | 10 | 0.0 | 0.0 | 0.0 |
| All Impacted | 2 | 0.0 | 0.0 | 0.0 |
| All that meet NR Goal | 0 | 0.0 | 0.0 | 0.0 |

Moreno Associataes
Eng. David Moreno

18 July 2024
TNM 2.5

INPUT: RECEIVERS
PROJECT/CONTRACT: 24-664
RUN: PR-122 Extension, San German, PR 2048

| Receiver Name | No. | #DUs | Coordinates (ground) X | Y | Z | Height above Ground | Input Sound Levels and Criteria: Existing LAeq1h | Impact Criteria LAeq1h | Impact Criteria Sub'l | NR Goal | Active in Calc. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | m | m | m | m | dBA | dBA | dB | dB | |
| PR122-01 | 1 | 1 | 135,294.2 | 225,360.3 | 121.00 | 1.50 | 49.70 | 66 | 10.0 | 8.0 | Y |
| PR122-02 | 2 | 1 | 135,221.2 | 225,459.1 | 116.54 | 1.50 | 49.70 | 66 | 10.0 | 8.0 | Y |
| PR122-03 | 3 | 1 | 135,239.1 | 225,552.5 | 133.95 | 1.50 | 49.70 | 66 | 10.0 | 8.0 | Y |
| PR122-04 | 4 | 1 | 136,466.2 | 226,225.1 | 81.48 | 1.50 | 42.60 | 66 | 10.0 | 8.0 | Y |
| PR122-05 | 5 | 1 | 136,592.9 | 226,601.8 | 76.35 | 1.50 | 51.10 | 66 | 10.0 | 8.0 | Y |
| PR122-06 | 6 | 1 | 136,536.1 | 226,775.7 | 68.99 | 1.50 | 51.10 | 66 | 10.0 | 8.0 | Y |
| PR122-07 | 7 | 1 | 136,687.0 | 226,761.2 | 59.13 | 1.50 | 51.10 | 66 | 10.0 | 8.0 | Y |
| PR122-08 | 8 | 1 | 136,672.4 | 226,823.5 | 58.06 | 1.50 | 51.10 | 66 | 10.0 | 8.0 | Y |
| PR122-09 | 9 | 1 | 136,559.7 | 226,806.8 | 66.97 | 1.50 | 51.10 | 66 | 10.0 | 8.0 | Y |
| PR122-10 | 10 | 1 | 136,601.6 | 226,943.1 | 56.15 | 1.50 | 51.10 | 66 | 10.0 | 8.0 | Y |

Moreno Associataes
Eng. David Moreno

18 July 2024
TNM 2.5

INPUT: TRAFFIC FOR LAeq1h Volumes
PROJECT/CONTRACT: 24-664
RUN: PR-122 Extension, San German, PR 2048

| Roadway | Points | | Segment | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Name | Name | No. | Autos | | MTrucks | | HTrucks | | Buses | | Motorcycles | |
| | | | V | S | V | S | V | S | V | S | V | S |
| | | | veh/hr | km/h | veh/hr | km/h | veh/hr | km/h | veh/hr | km/h | veh/hr | km/h |
| PR-122 south to north lane | A | 32 | 475 | 80 | 10 | 80 | 15 | 72 | 0 | 0 | 0 | 0 |
| | B | 31 | 475 | 80 | 10 | 80 | 15 | 72 | 0 | 0 | 0 | 0 |
| | C | 30 | 475 | 80 | 10 | 80 | 15 | 72 | 0 | 0 | 0 | 0 |
| | D | 29 | 475 | 80 | 10 | 80 | 15 | 72 | 0 | 0 | 0 | 0 |
| | E | 28 | 475 | 80 | 10 | 80 | 15 | 72 | 0 | 0 | 0 | 0 |
| | F | 27 | 475 | 80 | 10 | 80 | 15 | 72 | 0 | 0 | 0 | 0 |
| | G | 26 | 475 | 80 | 10 | 80 | 15 | 72 | 0 | 0 | 0 | 0 |
| | H | 25 | 475 | 80 | 10 | 80 | 15 | 72 | 0 | 0 | 0 | 0 |
| | I | 24 | 475 | 80 | 10 | 80 | 15 | 72 | 0 | 0 | 0 | 0 |
| | J | 23 | 475 | 80 | 10 | 80 | 15 | 72 | 0 | 0 | 0 | 0 |
| | K | 22 | 475 | 80 | 10 | 80 | 15 | 72 | 0 | 0 | 0 | 0 |
| | L | 21 | 475 | 80 | 10 | 80 | 15 | 72 | 0 | 0 | 0 | 0 |
| | M | 20 | 475 | 80 | 10 | 80 | 15 | 72 | 0 | 0 | 0 | 0 |
| | N | 19 | 475 | 80 | 10 | 80 | 15 | 72 | 0 | 0 | 0 | 0 |
| | O | 18 | 475 | 80 | 10 | 80 | 15 | 72 | 0 | 0 | 0 | 0 |
| | P | 17 | 475 | 80 | 10 | 80 | 15 | 72 | 0 | 0 | 0 | 0 |
| | Q | 16 | 475 | 80 | 10 | 80 | 15 | 72 | 0 | 0 | 0 | 0 |
| | R | 15 | 475 | 80 | 10 | 80 | 15 | 72 | 0 | 0 | 0 | 0 |
| | S | 14 | 475 | 80 | 10 | 80 | 15 | 72 | 0 | 0 | 0 | 0 |
| | T | 13 | 475 | 80 | 10 | 80 | 15 | 72 | 0 | 0 | 0 | 0 |
| | U | 12 | 475 | 80 | 10 | 80 | 15 | 72 | 0 | 0 | 0 | 0 |
| | V | 11 | 475 | 80 | 10 | 80 | 15 | 72 | 0 | 0 | 0 | 0 |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | W | 10 | 475 | 80 | 10 | 80 | 15 | 72 | 0 | 0 | 0 | 0 |
| | X | 9 | 475 | 80 | 10 | 80 | 15 | 72 | 0 | 0 | 0 | 0 |
| | Y | 8 | 475 | 80 | 10 | 80 | 15 | 72 | 0 | 0 | 0 | 0 |
| | Z | 7 | 475 | 80 | 10 | 80 | 15 | 72 | 0 | 0 | 0 | 0 |
| | AA | 6 | 475 | 80 | 10 | 80 | 15 | 72 | 0 | 0 | 0 | 0 |
| | BB | 5 | 475 | 80 | 10 | 80 | 15 | 72 | 0 | 0 | 0 | 0 |
| | CC | 4 | 475 | 80 | 10 | 80 | 15 | 72 | 0 | 0 | 0 | 0 |
| | DD | 3 | 475 | 80 | 10 | 80 | 15 | 72 | 0 | 0 | 0 | 0 |
| | EE | 2 | 475 | 80 | 10 | 80 | 15 | 72 | 0 | 0 | 0 | 0 |
| | FF | 1 | | | | | | | | | | |
| PR122 north to south lane | FF | 64 | 475 | 80 | 10 | 80 | 15 | 72 | 0 | 0 | 0 | 0 |
| | EE | 63 | 475 | 80 | 10 | 80 | 15 | 72 | 0 | 0 | 0 | 0 |
| | DD | 62 | 475 | 80 | 10 | 80 | 15 | 72 | 0 | 0 | 0 | 0 |
| | CC | 61 | 475 | 80 | 10 | 80 | 15 | 72 | 0 | 0 | 0 | 0 |
| | BB | 60 | 475 | 80 | 10 | 80 | 15 | 72 | 0 | 0 | 0 | 0 |
| | AA | 59 | 475 | 80 | 10 | 80 | 15 | 72 | 0 | 0 | 0 | 0 |
| | Z | 58 | 475 | 80 | 10 | 80 | 15 | 72 | 0 | 0 | 0 | 0 |
| | Y | 57 | 475 | 80 | 10 | 80 | 15 | 72 | 0 | 0 | 0 | 0 |
| | X | 56 | 475 | 80 | 10 | 80 | 15 | 72 | 0 | 0 | 0 | 0 |
| | W | 55 | 475 | 80 | 10 | 80 | 15 | 72 | 0 | 0 | 0 | 0 |
| | V | 54 | 475 | 80 | 10 | 80 | 15 | 72 | 0 | 0 | 0 | 0 |
| | U | 53 | 475 | 80 | 10 | 80 | 15 | 72 | 0 | 0 | 0 | 0 |
| | T | 52 | 475 | 80 | 10 | 80 | 15 | 72 | 0 | 0 | 0 | 0 |
| | S | 51 | 475 | 80 | 10 | 80 | 15 | 72 | 0 | 0 | 0 | 0 |
| | R | 50 | 475 | 80 | 10 | 80 | 15 | 72 | 0 | 0 | 0 | 0 |
| | Q | 49 | 475 | 80 | 10 | 80 | 15 | 72 | 0 | 0 | 0 | 0 |
| | P | 48 | 475 | 80 | 10 | 80 | 15 | 72 | 0 | 0 | 0 | 0 |
| | O | 47 | 475 | 80 | 10 | 80 | 15 | 72 | 0 | 0 | 0 | 0 |
| | N | 46 | 475 | 80 | 10 | 80 | 15 | 72 | 0 | 0 | 0 | 0 |
| | M | 45 | 475 | 80 | 10 | 80 | 15 | 72 | 0 | 0 | 0 | 0 |
| | L | 44 | 475 | 80 | 10 | 80 | 15 | 72 | 0 | 0 | 0 | 0 |
| | K | 43 | 475 | 80 | 10 | 80 | 15 | 72 | 0 | 0 | 0 | 0 |
| | J | 42 | 475 | 80 | 10 | 80 | 15 | 72 | 0 | 0 | 0 | 0 |
| | I | 41 | 475 | 80 | 10 | 80 | 15 | 72 | 0 | 0 | 0 | 0 |
| | H | 40 | 475 | 80 | 10 | 80 | 15 | 72 | 0 | 0 | 0 | 0 |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | G | 39 | 475 | 80 | 10 | 80 | 15 | 72 | 0 | 0 | 0 | 0 |
| | F | 38 | 475 | 80 | 10 | 80 | 15 | 72 | 0 | 0 | 0 | 0 |
| | E | 37 | 475 | 80 | 10 | 80 | 15 | 72 | 0 | 0 | 0 | 0 |
| | D | 36 | 475 | 80 | 10 | 80 | 15 | 72 | 0 | 0 | 0 | 0 |
| | C | 35 | 475 | 80 | 10 | 80 | 15 | 72 | 0 | 0 | 0 | 0 |
| | B | 34 | 475 | 80 | 10 | 80 | 15 | 72 | 0 | 0 | 0 | 0 |
| | A | 33 | | | | | | | | | | |
| PR-321 west to east lane | A | 73 | 133 | 56 | 3 | 56 | 4 | 56 | 0 | 0 | 0 | 0 |
| | B | 72 | 133 | 56 | 3 | 56 | 4 | 56 | 0 | 0 | 0 | 0 |
| | C | 71 | 133 | 56 | 3 | 56 | 4 | 56 | 0 | 0 | 0 | 0 |
| | D | 70 | 133 | 56 | 3 | 56 | 4 | 56 | 0 | 0 | 0 | 0 |
| | E | 69 | 133 | 56 | 3 | 56 | 4 | 56 | 0 | 0 | 0 | 0 |
| | F | 68 | 133 | 56 | 3 | 56 | 4 | 56 | 0 | 0 | 0 | 0 |
| | G | 67 | 133 | 56 | 3 | 56 | 4 | 56 | 0 | 0 | 0 | 0 |
| | H | 66 | 133 | 56 | 3 | 56 | 4 | 56 | 0 | 0 | 0 | 0 |
| | I | 65 | | | | | | | | | | |
| PR-321 east to west lane | I | 82 | 133 | 56 | 3 | 56 | 4 | 56 | 0 | 0 | 0 | 0 |
| | H | 81 | 133 | 56 | 3 | 56 | 4 | 56 | 0 | 0 | 0 | 0 |
| | G | 80 | 133 | 56 | 3 | 56 | 4 | 56 | 0 | 0 | 0 | 0 |
| | F | 79 | 133 | 56 | 3 | 56 | 4 | 56 | 0 | 0 | 0 | 0 |
| | E | 78 | 133 | 56 | 3 | 56 | 4 | 56 | 0 | 0 | 0 | 0 |
| | D | 77 | 133 | 56 | 3 | 56 | 4 | 56 | 0 | 0 | 0 | 0 |
| | C | 76 | 133 | 56 | 3 | 56 | 4 | 56 | 0 | 0 | 0 | 0 |
| | B | 75 | 133 | 56 | 3 | 56 | 4 | 56 | 0 | 0 | 0 | 0 |
| | A | 74 | | | | | | | | | | |
| West side exit ramp to PR-321 | A | 96 | 37 | 40 | 2 | 40 | 2 | 40 | 0 | 0 | 0 | 0 |
| | B | 95 | 37 | 40 | 2 | 40 | 2 | 40 | 0 | 0 | 0 | 0 |
| | C | 94 | 37 | 40 | 2 | 40 | 2 | 40 | 0 | 0 | 0 | 0 |
| | D | 93 | 37 | 40 | 2 | 40 | 2 | 40 | 0 | 0 | 0 | 0 |
| | E | 92 | 37 | 40 | 2 | 40 | 2 | 40 | 0 | 0 | 0 | 0 |
| | F | 91 | 37 | 40 | 2 | 40 | 2 | 40 | 0 | 0 | 0 | 0 |
| | G | 90 | 37 | 40 | 2 | 40 | 2 | 40 | 0 | 0 | 0 | 0 |
| | H | 89 | 37 | 40 | 2 | 40 | 2 | 40 | 0 | 0 | 0 | 0 |
| | I | 88 | 37 | 40 | 2 | 40 | 2 | 40 | 0 | 0 | 0 | 0 |
| | J | 87 | | | | | | | | | | |

**INPUT: TRAFFIC FOR LAeq1h Volumes** **24-664**

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| West side ramp fom PR-321 | A | 103 | 37 | 40 | 2 | 40 | 2 | 40 | 0 | 0 | 0 | 0 |
| | B | 102 | 37 | 40 | 2 | 40 | 2 | 40 | 0 | 0 | 0 | 0 |
| | C | 101 | 37 | 40 | 2 | 40 | 2 | 40 | 0 | 0 | 0 | 0 |
| | D | 100 | 37 | 40 | 2 | 40 | 2 | 40 | 0 | 0 | 0 | 0 |
| | E | 99 | 37 | 40 | 2 | 40 | 2 | 40 | 0 | 0 | 0 | 0 |
| | F | 98 | 37 | 40 | 2 | 40 | 2 | 40 | 0 | 0 | 0 | 0 |
| | G | 97 | | | | | | | | | | |
| East side entrance ramp from PR-321 | A | 112 | 37 | 40 | 2 | 40 | 2 | 40 | 0 | 0 | 0 | 0 |
| | B | 111 | 37 | 40 | 2 | 40 | 2 | 40 | 0 | 0 | 0 | 0 |
| | C | 110 | 37 | 40 | 2 | 40 | 2 | 40 | 0 | 0 | 0 | 0 |
| | D | 109 | 37 | 40 | 2 | 40 | 2 | 40 | 0 | 0 | 0 | 0 |
| | E | 108 | 37 | 40 | 2 | 40 | 2 | 40 | 0 | 0 | 0 | 0 |
| | F | 107 | 37 | 40 | 2 | 40 | 2 | 40 | 0 | 0 | 0 | 0 |
| | G | 106 | 37 | 40 | 2 | 40 | 2 | 40 | 0 | 0 | 0 | 0 |
| | H | 105 | 37 | 40 | 2 | 40 | 2 | 40 | 0 | 0 | 0 | 0 |
| | I | 104 | | | | | | | | | | |
| East side exit ramp to PR-321 | A | 121 | 37 | 40 | 2 | 40 | 2 | 40 | 0 | 0 | 0 | 0 |
| | B | 120 | 37 | 40 | 2 | 40 | 2 | 40 | 0 | 0 | 0 | 0 |
| | C | 119 | 37 | 40 | 2 | 40 | 2 | 40 | 0 | 0 | 0 | 0 |
| | D | 118 | 37 | 40 | 2 | 40 | 2 | 40 | 0 | 0 | 0 | 0 |
| | E | 117 | 37 | 40 | 2 | 40 | 2 | 40 | 0 | 0 | 0 | 0 |
| | F | 116 | 37 | 40 | 2 | 40 | 2 | 40 | 0 | 0 | 0 | 0 |
| | G | 115 | 37 | 40 | 2 | 40 | 2 | 40 | 0 | 0 | 0 | 0 |
| | H | 114 | 37 | 40 | 2 | 40 | 2 | 40 | 0 | 0 | 0 | 0 |
| | I | 113 | | | | | | | | | | |

Moreno Associataes
Eng. David Moreno

18 July 2024
TNM 2.5

INPUT: ROADWAYS
PROJECT/CONTRACT: 24-664
RUN: PR-122 Extension, San German, PR 2048

Average pavement type shall be used unless a State highway agency substantiates the use of a different type with the approval of FHWA

| Roadway | | Points | | | | | Flow Control | | | Segment | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Name | Width | Name | No. | Coordinates (pavement) X | Y | Z | Control Device | Speed Constraint | Percent Vehicles Affected | Pvmt Type | On Struct? |
| | m | | | m | m | m | | km/h | % | | |
| PR-122 south to north lane | 3.7 | A | 32 | 135,335.1 | 225,272.7 | 124.70 | | | | Average | |
| | | B | 31 | 135,346.4 | 225,352.3 | 123.80 | | | | Average | Y |
| | | C | 30 | 135,351.4 | 225,512.2 | 115.90 | | | | Average | |
| | | D | 29 | 135,357.1 | 225,592.3 | 110.00 | | | | Average | |
| | | E | 28 | 135,360.5 | 225,672.4 | 104.20 | | | | Average | |
| | | F | 27 | 135,363.3 | 225,752.3 | 98.40 | | | | Average | |
| | | G | 26 | 135,365.7 | 225,832.4 | 93.50 | | | | Average | |
| | | H | 25 | 135,375.1 | 225,911.3 | 90.30 | | | | Average | |
| | | I | 24 | 135,401.8 | 225,985.3 | 89.50 | | | | Average | |
| | | J | 23 | 135,445.3 | 226,048.8 | 90.60 | | | | Average | |
| | | K | 22 | 135,505.2 | 226,101.7 | 92.80 | | | | Average | |
| | | L | 21 | 135,574.5 | 226,136.6 | 94.70 | | | | Average | |
| | | M | 20 | 135,651.2 | 226,153.4 | 96.60 | | | | Average | |
| | | N | 19 | 135,730.6 | 226,152.4 | 98.80 | | | | Average | |
| | | O | 18 | 135,810.8 | 226,144.9 | 100.70 | | | | Average | |
| | | P | 17 | 135,949.9 | 226,132.9 | 104.00 | | | | Average | |
| | | Q | 16 | 136,029.5 | 226,125.7 | 105.10 | | | | Average | |
| | | R | 15 | 136,109.7 | 226,125.5 | 104.70 | | | | Average | |
| | | S | 14 | 136,189.3 | 226,135.9 | 103.00 | | | | Average | |
| | | T | 13 | 136,267.2 | 226,157.2 | 101.60 | | | | Average | |
| | | U | 12 | 136,341.5 | 226,187.7 | 96.80 | | | | Average | |
| | | V | 11 | 136,411.3 | 226,228.9 | 93.60 | | | | Average | |
| | | W | 10 | 136,474.9 | 226,278.5 | 90.10 | | | | Average | |
| | | X | 9 | 136,579.8 | 226,401.2 | 82.10 | | | | Average | |
| | | Y | 8 | 136,618.5 | 226,471.6 | 78.20 | | | | Average | |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Z | 7 | 136,651.6 | 226,588.7 | 72.60 | | | | Average | |
| | | AA | 6 | 136,654.2 | 226,628.9 | 71.20 | | | | Average | |
| | | BB | 5 | 136,645.7 | 226,708.8 | 68.30 | | | | Average | |
| | | CC | 4 | 136,623.7 | 226,786.7 | 65.60 | | | | Average | |
| | | DD | 3 | 136,573.6 | 226,875.7 | 63.20 | | | | Average | Y |
| | | EE | 2 | 136,518.9 | 226,936.2 | 62.50 | | | | Average | Y |
| | | FF | 1 | 136,470.1 | 226,971.3 | 62.10 | | | | | |
| PR122 north to south lane | 3.7 | FF | 64 | 136,463.6 | 226,961.9 | 62.10 | | | | Average | |
| | | EE | 63 | 136,510.5 | 226,925.5 | 62.50 | | | | Average | |
| | | DD | 62 | 136,562.3 | 226,868.8 | 62.40 | | | | Average | |
| | | CC | 61 | 136,610.8 | 226,783.0 | 64.80 | | | | Average | |
| | | BB | 60 | 136,633.4 | 226,707.1 | 67.60 | | | | Average | |
| | | AA | 59 | 136,640.8 | 226,628.9 | 70.30 | | | | Average | |
| | | Z | 58 | 136,638.1 | 226,589.4 | 71.80 | | | | Average | |
| | | Y | 57 | 136,609.3 | 226,474.8 | 77.40 | | | | Average | |
| | | X | 56 | 136,571.7 | 226,405.9 | 81.50 | | | | Average | |
| | | W | 55 | 136,468.9 | 226,286.3 | 89.50 | | | | Average | |
| | | V | 54 | 136,406.1 | 226,236.7 | 93.10 | | | | Average | |
| | | U | 53 | 136,338.0 | 226,196.9 | 96.30 | | | | Average | |
| | | T | 52 | 136,264.4 | 226,166.1 | 101.10 | | | | Average | |
| | | S | 51 | 136,188.4 | 226,145.6 | 102.50 | | | | Average | |
| | | R | 50 | 136,109.0 | 226,135.2 | 104.20 | | | | Average | |
| | | Q | 49 | 136,030.1 | 226,135.3 | 104.70 | | | | Average | |
| | | P | 48 | 135,950.4 | 226,142.1 | 104.00 | | | | Average | |
| | | O | 47 | 135,811.0 | 226,154.6 | 100.70 | | | | Average | |
| | | N | 46 | 135,731.4 | 226,161.9 | 99.00 | | | | Average | |
| | | M | 45 | 135,650.9 | 226,163.5 | 97.30 | | | | Average | |
| | | L | 44 | 135,571.1 | 226,146.0 | 95.40 | | | | Average | |
| | | K | 43 | 135,499.4 | 226,108.9 | 93.50 | | | | Average | |
| | | J | 42 | 135,438.4 | 226,055.2 | 91.60 | | | | Average | |
| | | I | 41 | 135,392.5 | 225,987.5 | 90.20 | | | | Average | |
| | | H | 40 | 135,365.1 | 225,912.2 | 91.00 | | | | Average | |
| | | G | 39 | 135,356.5 | 225,832.5 | 93.60 | | | | Average | |
| | | F | 38 | 135,351.3 | 225,752.1 | 98.50 | | | | Average | |
| | | E | 37 | 135,347.9 | 225,671.7 | 104.30 | | | | Average | |
| | | D | 36 | 135,344.2 | 225,592.3 | 110.00 | | | | Average | |
| | | C | 35 | 135,342.5 | 225,512.2 | 115.80 | | | | Average | Y |
| | | B | 34 | 135,333.5 | 225,352.4 | 123.30 | | | | Average | Y |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | A | 33 | 135,322.9 | 225,274.2 | 123.50 | | | | | |
| PR-321 west to east lane | 3.7 | A | 73 | 135,146.5 | 225,427.6 | 113.60 | | | | Average | |
| | | B | 72 | 135,184.1 | 225,413.6 | 114.30 | | | | Average | |
| | | C | 71 | 135,241.1 | 225,394.7 | 115.50 | | | | Average | |
| | | D | 70 | 135,281.6 | 225,388.5 | 115.90 | | | | Average | |
| | | E | 69 | 135,321.8 | 225,389.1 | 115.20 | | | | Average | |
| | | F | 68 | 135,381.1 | 225,389.1 | 113.10 | | | | Average | |
| | | G | 67 | 135,438.6 | 225,376.6 | 109.30 | | | | Average | |
| | | H | 66 | 135,475.7 | 225,361.9 | 106.50 | | | | Average | |
| | | I | 65 | 135,493.6 | 225,353.4 | 105.10 | | | | | |
| PR-321 east to west lane | 3.7 | I | 82 | 135,495.1 | 225,356.4 | 105.10 | | | | Average | |
| | | H | 81 | 135,477.2 | 225,365.2 | 106.50 | | | | Average | |
| | | G | 80 | 135,440.4 | 225,381.7 | 109.50 | | | | Average | |
| | | F | 79 | 135,381.7 | 225,394.4 | 113.20 | | | | Average | |
| | | E | 78 | 135,321.6 | 225,393.9 | 115.30 | | | | Average | |
| | | D | 77 | 135,281.8 | 225,393.3 | 115.60 | | | | Average | |
| | | C | 76 | 135,243.0 | 225,399.9 | 115.20 | | | | Average | |
| | | B | 75 | 135,185.2 | 225,417.2 | 114.30 | | | | Average | |
| | | A | 74 | 135,147.7 | 225,430.8 | 113.60 | | | | | |
| West side exit ramp to PR-321 | 3.7 | A | 96 | 135,226.3 | 225,413.1 | 114.70 | | | | Average | |
| | | B | 95 | 135,232.2 | 225,422.2 | 114.60 | | | | Average | |
| | | C | 94 | 135,241.1 | 225,439.5 | 114.80 | | | | Average | |
| | | D | 93 | 135,251.8 | 225,457.3 | 114.90 | | | | Average | |
| | | E | 92 | 135,265.7 | 225,472.8 | 115.30 | | | | Average | |
| | | F | 91 | 135,281.6 | 225,485.7 | 115.70 | | | | Average | |
| | | G | 90 | 135,296.9 | 225,497.9 | 115.60 | | | | Average | |
| | | H | 89 | 135,317.9 | 225,517.9 | 115.30 | | | | Average | |
| | | I | 88 | 135,328.5 | 225,534.9 | 114.30 | | | | Average | |
| | | J | 87 | 135,336.6 | 225,553.2 | 112.90 | | | | | |
| West side ramp fom PR-321 | 3.7 | A | 103 | 135,235.1 | 225,409.8 | 114.80 | | | | Average | |
| | | B | 102 | 135,252.2 | 225,444.3 | 114.80 | | | | Average | |
| | | C | 101 | 135,266.9 | 225,459.9 | 115.30 | | | | Average | |
| | | D | 100 | 135,286.9 | 225,466.7 | 116.60 | | | | Average | |
| | | E | 99 | 135,307.5 | 225,463.0 | 118.20 | | | | Average | |
| | | F | 98 | 135,323.9 | 225,450.4 | 119.70 | | | | Average | |
| | | G | 97 | 135,331.8 | 225,431.7 | 120.70 | | | | | |
| East side entrance ramp from PR-321 | 3.7 | A | 112 | 135,452.8 | 225,394.9 | 109.80 | | | | Average | |
| | | B | 111 | 135,448.9 | 225,414.3 | 111.30 | | | | Average | |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | C | 110 | 135,445.2 | 225,432.2 | 112.80 | | | | Average | |
| | | D | 109 | 135,435.6 | 225,453.4 | 114.30 | | | | Average | |
| | | E | 108 | 135,418.2 | 225,467.6 | 115.60 | | | | Average | |
| | | F | 107 | 135,401.1 | 225,475.7 | 116.50 | | | | Average | |
| | | G | 106 | 135,383.6 | 225,484.9 | 117.00 | | | | Average | |
| | | H | 105 | 135,370.6 | 225,496.8 | 116.80 | | | | Average | |
| | | I | 104 | 135,360.8 | 225,514.2 | 115.50 | | | | | |
| East side exit ramp to PR-321 | 3.7 | A | 121 | 135,353.3 | 225,424.4 | 120.90 | | | | Average | |
| | | B | 120 | 135,358.6 | 225,444.1 | 119.80 | | | | Average | |
| | | C | 119 | 135,373.4 | 225,458.8 | 118.30 | | | | Average | |
| | | D | 118 | 135,393.1 | 225,465.0 | 116.70 | | | | Average | |
| | | E | 117 | 135,413.8 | 225,461.5 | 115.10 | | | | Average | |
| | | F | 116 | 135,430.2 | 225,448.3 | 113.70 | | | | Average | |
| | | G | 115 | 135,438.5 | 225,430.2 | 112.30 | | | | Average | |
| | | H | 114 | 135,442.2 | 225,410.9 | 111.00 | | | | Average | |
| | | I | 113 | 135,444.1 | 225,393.7 | 109.90 | | | | | |

# APPENDIX 11: Wetlands Protection

## 8-Step Decision-Making Process Analysis,

## Wetland Jurisdictional Determination and Delineation Study,

## Wetlands Visual Assessment

## USACE Nationwide Permit 14 Verification Letter

# 8-Step Decision Making Process Analysis

# Step 2 Documents

# AVISO PÚBLICO

DEPARTAMENTO DE LA VIVIENDA
GOBIERNO DE PUERTO RICO

**Aviso Preliminar y Revisión Pública de una Actividad Propuesta en un humedal**

PR-122 Lajas-San Germán Connector
INFRA-STR-004

Para: Todas las partes interesadas, grupos e individuos

Este aviso notifica que el Departamento de la Vivienda de Puerto Rico (Vivienda, en adelante) ha determinado que la siguiente acción propuesta bajo el Programa para la Mitigación en la Infraestructura, Subvención en Bloque para el Desarrollo Comunitario – Mitigación (CDBG-MIT), número de subvención B-18-DP-72-0002, se encuentra dentro de un humedal. Vivienda identificará y evaluará alternativas prácticas para realizar la acción propuesta dentro del humedal y los posibles impactos en el humedal debido a la acción propuesta, según establecido por la Orden Ejecutiva 11990, de acuerdo con las regulaciones de HUD en 24 CFR 55.20 Subparte C - Procedimientos para tomar determinaciones sobre el manejo del valle inundable y la protección de humedales. El proyecto propuesto, **INFRA-STR-004**, se encuentra dentro de un municipio que sufrió daños debido a los huracanes Irma y María, y está localizado en dentro de los límites de los municipios de Lajas y San Germán en Puerto Rico. El proyecto comienza en la carretera PR-321 en Lajas, y termina en la carretera PR-166 en San Germán; coordenadas desde 18.058536, -67.045267 hasta 18.076742, -67.034764. La extensión del humedal se determinó utilizando el mapa del Inventario Nacional de Humedales (NWI, por sus siglas en inglés). La acción propuesta consiste en extender la actual carretera PR-122, desde su intersección actual con el extremo este de la carretera PR-166 hasta su intersección con la carretera PR-321. La longitud estimada del proyecto es de 2.7 kilómetros. El Área de Estudio corre en su mayor parte paralela a la carretera PR-101 y aproximadamente a un kilómetro al este de la misma. En su trayectoria, la carretera PR-122 pasa entre la Comunidad El Retiro y una quebrada sin nombre en San Germán, luego continúa hasta Lajas cruzando por el km 1.0 en la carretera PR-321. La topografía va de plana a empinada. El proyecto propuesto tiene como objetivo mejorar la movilidad y la conectividad en el área y proporcionará un enlace directo entre la carretera PR-2 en San Germán y Lajas y su zona turística. Proporcionaría una ruta alterna a la PR-101, mejorando las opciones de viaje y seguridad y promueve el desarrollo económico de la región, y capacidad adicional en el área del proyecto. El proyecto incluye un nuevo sistema de drenaje a lo largo de la carretera, que consta de elementos de drenaje transversales y atarjeas en el cruce de la quebrada Maresúa para manejar la escorrentía actual y disponer eficientemente de las aguas pluviales en la extensión de la carretera PR-122. El proyecto implica un total de 79.86 acres incluyendo el derecho de paso. Según el mapa del NWI, un área aproximada de 0.19 acres relacionados con la quebrada sin nombre y 1.44 acres relacionados con la quebrada Maresúa pueden verse afectados por el proyecto propuesto, para un total de 1.63 acres de humedal ribereño. Algunas de las posibles funciones ecológicas de estas áreas son almacenamiento de agua superficial, recarga de agua subterránea, transformación y reciclaje de elementos, retención y eliminación de sustancias disueltas y acumulación de sedimentos inorgánicos. Estas funciones sirven para reducir el impacto de las aguas de inundación, aumentar la deposición de sedimentos, mantener la calidad del agua y reponer el suministro de agua. Los humedales en el área del proyecto se encuentran en el mapa del NWI en https://fwsprimary.wim.usgs.gov/wetlands/apps/wetlands-mapper/.

Este aviso tiene tres propósitos principales. Primero, las personas que puedan verse afectadas por actividades en el humedal y aquellos que tengan interés en la protección del ambiente natural deben recibir la oportunidad de expresar sus preocupaciones y proveer información sobre áreas. Se exhorta a la comunidad a ofrecer o recomendar ubicaciones alternas fuera del humedal, métodos alternos para cumplir con el propósito del proyecto, y métodos para minimizar y mitigar los impactos en el humedal. Segundo, un programa adecuado de avisos públicos puede ser una herramienta importante para la educación pública. La divulgación de información y solicitud de comentarios públicos sobre humedales puede facilitar y mejorar los esfuerzos federales para reducir los riesgos e impactos asociados con la ocupación y alteración de estas áreas especiales. Tercero, como materia de justicia, cuando el gobierno federal determina participar en acciones ubicadas en el humedal, debe informárselo a quienes puedan ser expuestos a un riesgo mayor o similar al presente.

Comentarios por escrito deben ser recibidos por Vivienda en la siguiente dirección en o antes de 21 de marzo de 2025: Departamento de la Vivienda de Puerto Rico, edificio Juan C. Cordero Dávila, 606 avenida Barbosa, Río Piedras, PR 00918-8461, y (787)274-2527 ext. 4320, Atención: Aldo Rivera, Secretario Auxiliar. Una descripción completa del proyecto está disponible para revisión de 8:30 a.m. a 4:00 p.m. en el Departamento de la Vivienda de Puerto Rico, edificio Juan C. Cordero Dávila, 606 avenida Barbosa, Río Piedras, PR 00918. Los comentarios también pueden enviarse por correo electrónico a comentariosambiental@vivienda.pr.gov.

Fecha: 6 de marzo de 2025

Ciary Y. Pérez Peña
Secretaria del Departamento de la Vivienda

# PUBLIC NOTICE

DEPARTMENT OF HOUSING
GOVERMENT OF PUERTO RICO

**Early Notice and Public Review of a Proposed Activity in a Wetland**

PR-122 Lajas-San Germán Connector
INFRA-STR-004

To: All Interested Parties, Groups & Individuals

This is to give notice that the Puerto Rico Department of Housing (PRDOH) has determined that the following proposed action under the Infrastructure Mitigation Program, Community Development Block Grant – Mitigation (CDBG-MIT), Grant number B-18-DP-72-0002, is located within a wetland. PRDOH will be identifying and evaluating practicable alternatives to locating the action within the wetland and the potential impacts on the wetland from the proposed action, as required by Executive Order 11990, in accordance with HUD regulations at 24 CFR 55.20 Subpart C - Procedures for Making Determinations on Floodplain Management and Protection of Wetlands. The proposed project, **INFRA-STR-004**, is within a municipality with structures damaged by Hurricanes Irma and María, and it is located within the boundaries of the municipalities of Lajas and San Germán in Puerto Rico. The project begins at PR-321 Road, Lajas, and ends at PR-166 Road, San Germán; coordinates from 18.058536, -67.045267 to 18.076742, -67.034764. The extent of the wetland was determined using the National Wetland Inventory (NWI) Map. The proposed action consists of extending the existing PR-122 Highway from its current intersection with the eastern end of PR-166 Road to its intersection with PR-321 Road. The project estimated length is 2.7 kilometers. The Study Area runs mostly parallel to the PR-101 Road and approximately one kilometer to the east of it. On its trajectory, the PR-122 Road passes between the El Retiro Community and a creek without name in San Germán, then it continues to Lajas by crossing through Km 1.0 in PR-321 Road. The topography of the property goes from flat to steep. The purpose of the project is to improve mobility and connectivity in the project area and provide a direct link between PR-2 Road in San Germán and Lajas and its tourist area. It would provide an alternate route to PR-101, enhancing regional travel options and safety and promoting the economic development of the region, and additional capacity in the project area. The project includes a new drainage system along the road, that consists of cross drainage elements and box culverts at the Maresúa creek crossing to handle current runoff and allow for efficient stormwater removal across the PR-122 Road extension. The project entails a total of 79.86 acres including the right of way. According to the NWI Map, an approximate area of 0.19 acres related to the unnamed creek and 1.44 acres related to the Maresúa creek may be impacted by the proposed project, for a total of 1.63 acres of riverine wetland. Some of the potential ecological functions of these areas are surface water storage, groundwater recharge, element transformation and cycling, dissolved substances retention and removal, and inorganic sediments accumulation. These functions serve in reducing the impact from floodwaters, increasing sediment deposition, maintaining water quality, and replenishing the water supply. The wetlands in the project area can be found in the NWI Map at https://fwsprimary.wim.usgs.gov/wetlands/apps/wetlands-mapper/.

There are three primary purposes for this notice. First, people who may be affected by activities in the wetland and those who have an interest in the protection of the natural environment should be given an opportunity to express their concerns and provide information about these areas. Commenters are encouraged to offer alternative sites outside of the wetland, alternative methods to serve the same project purpose, and methods to minimize and mitigate project impacts on the wetland. Second, an adequate public notice program can be an important public educational tool. The dissemination of information and request for public comment about wetlands can facilitate and enhance Federal efforts to reduce the risks and impacts associated with the occupancy and modification of these special areas. Third, as a matter of fairness, when the Federal government determines it will participate in actions taking place in the wetland, it must inform those who may be put at greater or continued risk.

Written comments must be received by PRDOH at the following address on or before March 21, 2025: Puerto Rico Department of Housing, 606 Barbosa Avenue, Juan C. Cordero Dávila Building, Río Piedras, PR 00918-8461, and (787)274-2527 ext. 4320, Attention: Aldo Rivera, Director. A full description of the project may also be reviewed from 8:30 am to 4:00 pm at the Puerto Rico Department of Housing, 606 Barbosa Avenue, Juan C. Cordero Dávila Building, Río Piedras, PR 00918. Comments may also be submitted via email at comentariosambiental@vivienda.pr.gov .

Date: March 6, 2025

Ciary Y. Pérez Peña
Secretary of the Department of Housing

## SUBASTA FORMAL 230010819 REEMPLAZO DE VENTANAS

La Junta de Subastas del Recinto Universitario de Mayagüez estará recibiendo propuestas, en sobres sellados, en la Oficina de Compras, para reemplazo de ventanas en el edificio 836 en Isla Magueyes.

Se llevará a cabo una **reunión presubasta compulsoria** el viernes, 21 de marzo de 2025 a las 10:00 a.m., en Isla Magueyes. La fecha de apertura se determinará en la reunión presubasta.

Los pliegos de subasta estarán disponibles, libre de costo, a partir del lunes, 10 hasta el viernes, 14 de marzo de 2025, de 8:00 a 11:30 a.m. y de 1:30 a 4:00 p.m., en la Oficina de Compras del RUM, Edificio Esteban Terrats, Oficina 110 (primer piso). **No se entregarán pliegos fuera de las fechas indicadas, ni el día de la presubasta y no podrán asistir a la presubasta compulsoria licitadores que no hayan recogido pliegos en dichas fechas**.

La Junta de Subastas del RUM se reservará el derecho de cancelar esta subasta, o parte de ésta, antes o después de la adjudicación, cuando lo estime necesario.

Dr. Gustavo Gutiérrez
Presidente
Junta de Subastas
Tel. (787) 832-4040 ext. 6787

"Patrono con Igualdad de Oportunidades en el Empleo (M/M/V/I)"

## SUBASTA FORMAL 230010818 REHABILITACIÓN SISTEMA ELÉCTRICO

La Junta de Subastas del Recinto Universitario de Mayagüez estará recibiendo propuestas, en sobres sellados, en la Oficina de Compras, para reparación de vacuum breakers y adquisición de gabinetes eléctricos.

Se llevará a cabo una **reunión presubasta compulsoria** el martes, 18 de marzo de 2025 a las 10:00 a.m., en la Oficina de Compras. La fecha de apertura se determinará en la reunión presubasta.

Los pliegos de subasta estarán disponibles, libre de costo, a partir del lunes, 10 hasta el viernes, 14 de marzo de 2025, de 8:00 a 11:30 a.m. y de 1:30 a 4:00 p.m., en la Oficina de Compras del RUM, Edificio Esteban Terrats, Oficina 110 (primer piso). **No se entregarán pliegos fuera de las fechas indicadas, ni el día de la presubasta y no podrán asistir a la presubasta compulsoria licitadores que no hayan recogido pliegos en dichas fechas**.

La Junta de Subastas del RUM se reservará el derecho de cancelar esta subasta, o parte de ésta, antes o después de la adjudicación, cuando lo estime necesario.

Dr. Gustavo Gutiérrez
Presidente
Junta de Subastas
Tel. (787) 832-4040 ext. 6787

"Patrono con Igualdad de Oportunidades en el Empleo (M/M/V/I)"

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**From:** Caribbean ES, FW4
**To:** CDBG - Comentarios Ambiental
**Subject:** Re: [EXTERNAL] Public Notice – Early Notice and Public Review of a Proposed Activity in a Wetland_PRDOH_CDBG-MIT_INFRA-STR-004
**Date:** Monday, March 10, 2025 8:21:08 AM
**Attachments:** image003.png

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Good Morning

Acknowledge receipt. Can you please provide additional information (DIA, Map, methodology, etc) regarding this project.

Thanks in advanced

Caribbean Ecological Services Field Office
(786) 244-0081
caribbean_es@fws.gov

**For project evaluations, please visit our Consultation Guidelines website.**

---

**From:** CDBG - Comentarios Ambiental <comentariosambiental@vivienda.pr.gov>
**Sent:** Thursday, March 6, 2025 3:16 PM
**To:** Jose.A.CedenoMaldonado@hud.gov <Jose.A.CedenoMaldonado@hud.gov>; Donna.M.Mahon@hud.gov <Donna.M.Mahon@hud.gov>; Caribbean ES, FW4 <Caribbean_ES@fws.gov>; Mena, Lourdes <Lourdes_Mena@fws.gov>; vivian.gerena@usace.army.mil <vivian.gerena@usace.army.mil>; nelson.r.colon@usace.army.mil <nelson.r.colon@usace.army.mil>; cesaa-cco@usace.army.mil <cesaa-cco@usace.army.mil>; Rivera_r1@jp.pr.gov <Rivera_r1@jp.pr.gov>; comentariosjp@jp.pr.gov <comentariosjp@jp.pr.gov>; Noah.Silverman@noaa.gov <Noah.Silverman@noaa.gov>; nmfs.ser.esa.consultations@noaa.gov <nmfs.ser.esa.consultations@noaa.gov>; FEMA-R4EHP@fema.dhs.gov <FEMA-R4EHP@fema.dhs.gov>; carubio@prshpo.pr.gov <carubio@prshpo.pr.gov>; comunicaciones@ddec.pr.gov <comunicaciones@ddec.pr.gov>; Rodriguez.elias@epa.gov <Rodriguez.elias@epa.gov>; Guerrero.carmen@epa.gov <Guerrero.carmen@epa.gov>; secretario@ddec.pr.gov <secretario@ddec.pr.gov>; jannira.colon@ddec.pr.gov <jannira.colon@ddec.pr.gov>; pmzc@drna.pr.gov <pmzc@drna.pr.gov>; eortega@drna.pr.gov <eortega@drna.pr.gov>; ayudaciudadano@drna.pr.gov <ayudaciudadano@drna.pr.gov>; anais.rodriguez@drna.pr.gov <anais.rodriguez@drna.pr.gov>
**Subject:** [EXTERNAL] Public Notice – Early Notice and Public Review of a Proposed Activity in a Wetland_PRDOH_CDBG-MIT_INFRA-STR-004

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Concerned agencies,

Enclosed please find a **Public Notice – Early Notice and Public Review of a Proposed Activity in a Wetland**, the Puerto Rico Department of Housing (as the Responsible Entity) published as part of HUD's requirements for the release of CDBG-MIT funds to undertake the project PR-122 Lajas-San Germán Connector (INFRA-STR-004). The Early Notice was published in the Primera Hora newspaper of Puerto Rico on March 6, 2025.

Respectfully,


**PERMITS AND ENVIRONMENTAL COMPLIANCE DIVISION**

**Disaster Recovery Office**

comentariosambiental@vivienda.pr.gov | 787.274.2527

Visit us: recuperacion.pr.gov

Contact us: infocdbg@vivienda.pr.gov

DEPARTAMENTO DE LA VIVIENDA

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DEPARTMENT OF
HOUSING
GOVERNMENT OF PUERTO RICO

CDBG-DR FUNDS
CDBG-MIT FUNDS

# Validation Letter

April 2, 2025

To whom it may concern,

A comment was received through the Permits and Environmental Compliance Division e-mail: comentariosambiental@vivienda.pr.gov, for the project **PR-122 Lajas-San Germán Connector (INFRA-STR-004)**, as part of the CDBG-MIT Infrastructure Mitigation Program, on March 10, 2025 by the USFWS Caribbean Ecological Services Field Office. The email received requested additional information be provided regarding the project in question. As a response, the following documents were provided on March 13, 2025: OGPe Pre-Consult 2023, Environmental Assessment 2003, USFWS Concurrence Letter 2021 (NLAA), USFWS agreement with EA 2003, Step 2 Early Notice Project Package, Wetland Study, Preliminary Project Plans, IPaC 2021, Conservation Measures for the Puerto Rican Boa and the *Agelaius xanthomus* Determination of Presence Study. The Early Notice and Public Review of a Proposed Activity in a Wetland was published in the *Primera Hora* newspaper of Puerto Rico on March 6, 2025, with a comment period that concluded on March 21, 2025. An additional 15 days were granted; however, no comments were received.

Cordially,

Permits and Environmental Compliance Division
Disaster Recovery Office
comentariosambiental@vivienda.pr.gov | 787.274.2527 ext. 4320

**From:** Kenneth M. Garcia-De Leon
**To:** CDBG - Comentarios Ambiental
**Subject:** RE: Comentarios - Aviso Preliminar INFRA-STR-004
**Date:** Tuesday, March 25, 2025 10:11:32 AM
**Attachments:** image002.png
image003.png

Saludos:

Por correo postal no llegaron comentarios para mencionado proyecto.

Cordialmente,


**Kenneth M. García de León**
Especialista en Control de Documentos | Operaciones
**Oficina de Recuperación de Desastres**
kgarcia@vivienda.pr.gov | 787-274-2527 Ext. 4013
Visítanos: recuperacion.pr.gov
Contáctanos: infocdbg@vivienda.pr.gov


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**From:** CDBG - Comentarios Ambiental <comentariosambiental@vivienda.pr.gov>
**Sent:** Tuesday, March 25, 2025 10:10 AM

**To:** Kenneth M. Garcia-De Leon <kgarcia@vivienda.pr.gov>
**Subject:** Comentarios - Aviso Preliminar INFRA-STR-004

Saludos Kenneth,

Con respecto a la publicación del Aviso Preliminar y Revisión Pública de una Actividad Propuesta en un humedal (Paso 2) para el proyecto ***PR-122 Lajas-San Germán Connector*** **(INFRA-STR-004)**, ¿habrá llegado algún comentario a través del correo postal? De ser así, por favor nos lo hace llegar.

Cordialmente,


PERMITS AND ENVIRONMENTAL COMPLIANCE DIVISION
**Disaster Recovery Office**
comentariosambiental@vivienda.pr.gov | 787.274.2527
Visit us: recuperacion.pr.gov
Contact us: infocdbg@vivienda.pr.gov

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| | |
|---|---|
| **From:** | CDBG - Comentarios Ambiental |
| **To:** | Caribbean ES, FW4 |
| **Subject:** | RE: [EXTERNAL] Public Notice – Early Notice and Public Review of a Proposed Activity in a Wetland_PRDOH_CDBG-MIT_INFRA-STR-004 |
| **Date:** | Thursday, March 13, 2025 11:40:32 AM |
| **Attachments:** | image003.png<br>image004.png |

To whom it may concern:

We acknowledge receipt of your comment.

As requested, attached please find all pertinent additional information and documentation for the project in question.

INFRA-STR-004_Requested Additional Information

Should you have any other questions or concerns, please don't hesitate to reach back to us.

Sincerely,


PERMITS AND ENVIRONMENTAL COMPLIANCE DIVISION

**Disaster Recovery Office**

comentariosambiental@vivienda.pr.gov | 787.274.2527

Visit us: recuperacion.pr.gov

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**From:** Caribbean ES, FW4 <Caribbean_ES@fws.gov>
**Sent:** Monday, March 10, 2025 8:21 AM
**To:** CDBG - Comentarios Ambiental <comentariosambiental@vivienda.pr.gov>
**Subject:** Re: [EXTERNAL] Public Notice – Early Notice and Public Review of a Proposed Activity in a Wetland_PRDOH_CDBG-MIT_INFRA-STR-004

Good Morning

Acknowledge receipt. Can you please provide additional information (DIA, Map, methodology, etc) regarding this project.

Thanks in advanced

Caribbean Ecological Services Field Office
(786) 244-0081
caribbean_es@fws.gov

**For project evaluations, please visit our Consultation Guidelines website.**

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**From:** CDBG - Comentarios Ambiental <comentariosambiental@vivienda.pr.gov>
**Sent:** Thursday, March 6, 2025 3:16 PM
**To:** Jose.A.CedenoMaldonado@hud.gov <Jose.A.CedenoMaldonado@hud.gov>; Donna.M.Mahon@hud.gov <Donna.M.Mahon@hud.gov>; Caribbean ES, FW4 <Caribbean_ES@fws.gov>; Mena, Lourdes <Lourdes_Mena@fws.gov>; vivian.gerena@usace.army.mil <vivian.gerena@usace.army.mil>; nelson.r.colon@usace.army.mil <nelson.r.colon@usace.army.mil>; cesaa-cco@usace.army.mil <cesaa-cco@usace.army.mil>; Rivera_r1@jp.pr.gov <Rivera_r1@jp.pr.gov>; comentariosjp@jp.pr.gov <comentariosjp@jp.pr.gov>; Noah.Silverman@noaa.gov <Noah.Silverman@noaa.gov>; nmfs.ser.esa.consultations@noaa.gov <nmfs.ser.esa.consultations@noaa.gov>; FEMA-R4EHP@fema.dhs.gov <FEMA-R4EHP@fema.dhs.gov>; carubio@prshpo.pr.gov <carubio@prshpo.pr.gov>; comunicaciones@ddec.pr.gov <comunicaciones@ddec.pr.gov>; Rodriguez.elias@epa.gov <Rodriguez.elias@epa.gov>; Guerrero.carmen@epa.gov <Guerrero.carmen@epa.gov>; secretario@ddec.pr.gov <secretario@ddec.pr.gov>; jannira.colon@ddec.pr.gov <jannira.colon@ddec.pr.gov>; pmzc@drna.pr.gov <pmzc@drna.pr.gov>; eortega@drna.pr.gov <eortega@drna.pr.gov>; ayudaciudadano@drna.pr.gov <ayudaciudadano@drna.pr.gov>; anais.rodriguez@drna.pr.gov <anais.rodriguez@drna.pr.gov>
**Subject:** [EXTERNAL] Public Notice – Early Notice and Public Review of a Proposed Activity in a Wetland_PRDOH_CDBG-MIT_INFRA-STR-004

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Concerned agencies,

Enclosed please find a **Public Notice – Early Notice and Public Review of a Proposed Activity in a Wetland**, the Puerto Rico Department of Housing (as the Responsible Entity) published as part of HUD's requirements for the release of CDBG-MIT funds to undertake the project PR-122 Lajas-San Germán Connector (INFRA-STR-004). The Early Notice was published in the Primera Hora newspaper of Puerto Rico on March 6, 2025.

Respectfully,

PERMITS AND ENVIRONMENTAL COMPLIANCE DIVISION
**Disaster Recovery Office**
comentariosambiental@vivienda.pr.gov | 787.274.2527
Visit us: recuperacion.pr.gov
Contact us: infocdbg@vivienda.pr.gov

DEPARTAMENTO DE LA
VIVIENDA
GOBIERNO DE PUERTO RICO

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# Step 7 Notice Publication

DEPARTMENT OF TRANSPORTATION AND PUBLIC WORKS
DTPW
GOVERNMENT OF PUERTO RICO

PUERTO RICO HIGHWAY AND TRANSPORTATION AUTHORITY
PRHTA
GOVERNMENT OF PUERTO RICO

# Public Notice

## Final Notice and Public Explanation of a Proposed Activity in a Wetland PR-122 Lajas - San Germán Connector INFRA-STR-004

To: All Interested Agencies, Individuals and groups

This is to give notice that the Puerto Rico Highway and Transportation Authority (PRHTA) has conducted an evaluation as required by Executive Order 11990, in accordance with HUD regulations at 24 CFR 55.20 in Subpart C - Procedures for Making Determinations on Wetlands Protection. The activity is funded under the Infrastructure Mitigation Program, Community Development Block Grant –Mitigation (CDBG-MIT), Grant number B-18-DP-72-0002. The proposed project, INFRA-STR-004, is located within the boundaries of the municipalities of Lajas and San Germán in Puerto Rico. The proposed project consists of extending the existing PR-122 from its intersection with PR-166 in San Germán (18.076742, -67.034764) to its intersection with PR-321 in Lajas (18.058536, -67.045267). The estimated length of the project is 2.7 kilometers. The project aims to improve emergencies response time, enhance road access to and from the highways to facilitate rapid repair and asset recovery efforts, and improve public safety while promoting the region's economic development. The project encompasses a total of 79.86 acres, including the right-of-way. It includes cross-drainage features and a 73.94-meter-long concrete culvert at the Maresúa creek to control existing runoff. This creek is identified as a riparian wetland in the National Wetlands Inventory (NWI).

PRHTA has considered the following alternatives and mitigation measures to minimize adverse impacts and restore and preserve the natural and beneficial functions, as well as the intrinsic values of the existing wetland:

(1) Locations outside the wetland - A location outside the wetland is not possible without affecting it because the Maresúa stream crosses the project area from east to west. The only way to avoid impacting the stream is to shorten the project and relocate it to the existing PR-101 highway. However, this would not reduce emergency response times or create a safer route, as it would not fulfill the project's objective of connecting the existing sections of PR-122 between San Germán and Lajas.

(2) Alternative methods to achieve the project objective, including, but not limited to, design alternatives to mitigate impacts on the wetland – Various alignment and grading alternatives were evaluated, including the incorporation of structures such as bridges, retaining walls, and culverts to minimize the impact on existing wetlands in the area. Design options were developed through discussions with project stakeholders, and concepts were modified based on location, design concept, limitations, and constraints. The resulting project design further reduced the extent of construction and associated impacts.

(3) Decision not to approve any action proposing the occupation or modification of a wetland (No action) – The no action alternative is impractical because it does not meet the need for an improved strategic road network, mobility, and accessibility for people and goods before, during, and after an emergency in the area.
After considering environmental, engineering, and economic factors, Alternative 2 remains the viable option. It minimizes wetland encroachment while meeting the project's objectives for transportation efficiency and public safety. The proposed design includes:

- A new drainage system along the highway, including cross-drainage elements and a three-cell box culvert to preserve the stream's natural flow.
- The installation of a water dissipator to maintain the natural flow and connectivity of the Maresúa stream, as well as to control current runoff and allow for efficient stormwater drainage along the length of PR-122.
- The implementation of construction phases to allow for partial flow in the Maresúa stream during construction activities.
- The implementation of Best Management Practices for erosion and sedimentation control throughout the construction area.
- Restoration and revegetation of temporarily disturbed areas with plant species typical of wetlands.

A temporary crossing will need to be constructed to allow the movement of heavy machinery, impacting 0.02694 acres within the High Ordinary Water Mark (OHWM). The temporary crossing will be 26.6028 meters long and will include four strategically placed, 42-inch diameter pipes to redirect the stream's flow, allowing construction to be divided into phases. Construction of this temporary crossing is expected to affect approximately 0.0152 acres and deposit approximately 45.804 cubic yards of permanent material in U.S. waters. Another direct temporary impact is related to the construction of the three-cell box culvert and the berms necessary to redirect the flow of Maresúa Creek and allow work to be performed under dry conditions. In addition to the proposed berm at the entrance of the temporary crossing, a second berm will be constructed at the outlet of the box culvert to allow for partial construction
of the proposed energy dissipator. These temporary berms are expected to affect approximately 0.01174 acres and deposit approximately 14.96 cubic yards of temporary fill in U.S. waters. The areas subject to temporary direct impacts will be restored to their original condition once the three-cell box culvert is completed. Direct and indirect construction impacts are expected to be temporary and will be mitigated through phased construction plans to minimize disruption during the construction period.

Impact after construction: The project is expected to cause permanent direct impacts on the waters of Maresúa Creek in the United States due to the construction of the three-cell box culvert. Construction of this structure is projected to permanently impact an area of approximately 0.2245 acres with an estimated fill volume of 1,082.5569 cubic yards of permanent material that will be deposited in U.S. waters. The project preserves the natural hydrologic function of the watershed. No diversion, channeling, or increase in impervious areas outside the road alignment are proposed.

The project was submitted to the U.S. Army Corps of Engineers (USACE) for the construction of the three-cell concrete culvert that would impact the waters of Maresúa Creek. On June 10, 2025, the USACE authorized National Permit 14. Any potential adverse impacts from construction would be temporary and mitigated through phased construction plans to minimize disruptions during the construction period. An Erosion and Sedimentation Control Plan will be developed as part of the Final Design to minimize the impact on water quality during construction.

PRHTA has reevaluated the alternatives to building in the wetland and has determined that it has no practicable alternative out of the wetland area. Environmental files that document compliance with Executive Order 11990 are available for public inspection, review and copy upon request at the times and location delineated in the last paragraph of this notice for receipt of comments.

There are three primary purposes for this notice. First, people who may be affected by activities in the wetland and those who have an interest in the protection of the natural environment should be given an opportunity to express their concerns and provide information about these areas. Second, an adequate public notice program can be an important public education tool. The dissemination of information and request for public comments about wetlands can facilitate and enhance Federal efforts to reduce the risks and impacts associated with the occupancy and modification of these special areas. Third, as a matter of fairness, when the Federal government determines it will participate in actions taking place in the wetland, it must inform those who may be put at greater or continued risk.

Written comments must be received by the PRHTA at the following address on or before February 28, 2026: Puerto Rico Highway andTransportationAuthority, PO Box 42007, San Juan, Puerto Rico 00940-2007, Attention: Edwin Velázquez, Permits and Environmental Compliance Specialist. Full description of the project may also be reviewed from 8:30 am to 4:00 pm at the Puerto Rico Highway and Transportation Authority, Roberto Sánchez Vilella Government Center, South Tower, 10th Floor, De Diego Avenue, Santurce. Comments may also be submitted via email at oea@act.pr.gov.
Date: February 20, 2026

Dr. Edwin E. González Montalvo, PE
Executive Director PRTHA

Y OBRAS PÚBLICAS
DTOP
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Y TRANSPORTACIÓN
ACT
GOBIERNO DE PUERTO RICO

# Aviso Público

## Aviso Final y Explicación Pública de una Actividad Propuesta en un humedal PR-122 Conector LajasSan Germán INFRA-STR-004

Para: Todas las agencias interesadas, individuos y grupos
Este aviso notifica que la Autoridad de Carreteras y Transportación (ACT, en adelante) completó una evaluación según estipulado en la Orden Ejecutiva 11990, en conformidad con las regulaciones de HUD en 24 CFR 55.20 en la Subparte C - Procedimientos para hacer determinaciones sobre la protección de humedales. La actividad está subvencionada con fondos del Programa de Mitigación de Infraestructura, Subvención en Bloque para el Desarrollo Comunitario – Mitigación (CDBG-MIT), número de subvención B-18-DP-72-0002. El proyecto propuesto, INFRA-STR-004, está localizado dentro de los límites de los municipios de Lajas y San Germán en Puerto Rico. El proyecto propuesto consiste en extender la actual PR-122, desde su intersección con la PR-166 en San Germán (18.076742, -67.034764) hasta su intersección con la PR-321 en Lajas (18.058536, -67.045267). La longitud estimada del proyecto es de 2.7 kilómetros. El proyecto pretende mejorar el tiempo de respuesta ante emergencias, mejorar el ingreso y egreso de las carreteras para permitir esfuerzos rápidos de reparación y recuperación de activos. De igual forma, mejorar la seguridad pública al tiempo que promueve el desarrollo económico de la región. El proyecto abarca un total de 79.86 acres, incluyendo el derecho de vía. Incluye elementos de drenaje transversal y una atarjea de hormigón de 73.94 metros de longitud en el cruce de la quebrada Maresúa para controlar la escorrentía actual. Esta quebrada esta identificada como un humedal ribereño en el Inventario Nacional de Humedales (NWI, en inglés).

La ACT consideró las siguientes alternativas y medidas de mitigación para minimizar los impactos adversos, restaurar y preservar las funciones naturales y beneficiosas, así como los valores intrínsecos del humedal existente:

(1) Ubicaciones fuera del humedal - No es posible una ubicación fuera del humedal sin afectarlo debido a que el lugar donde está la quebrada Maresúa cruza el área del proyecto de este a oeste. La única manera de evitar afectar la quebrada es acortar el proyecto y trasladarlo a la PR-101 existente. Sin embargo, esto no reduciría los tiempos de respuesta ante emergencias ni crearía una vía más segura, ya que no cumpliría el objetivo del proyecto de conectar los tramos existentes de la PR-122 entre San Germán y Lajas.

(2) Métodos alternativos para alcanzar el objetivo del proyecto, incluyendo, entre otros, alternativas de diseño para mitigar impactos en el humedal - Se evaluaron diversas alternativas de alineación y nivelación, incluyendo la incorporación de estructuras como puentes, muros de contención y alcantarillas para minimizar el impacto en los humedales existentes en la zona. Las opciones de diseño se desarrollaron mediante conversaciones con las partes interesadas del proyecto y los conceptos se modificaron en función de la ubicación, el concepto de diseño, las limitaciones y las restricciones. El diseño resultante del proyecto redujo aún más la extensión de la construcción y los impactos asociados.

(3) La decisión de no aprobar ninguna acción que proponga la ocupación o modificación de un humedal (No acción) - La alternativa de no tomar medidas es impracticable porque no satisface la necesidad de una mejor red vial estratégica, movilidad y accesibilidad para personas y carga antes, durante y después de una emergencia en la zona.

Tras considerar factores ambientales, de ingeniería y económicos, la Alternativa 2 sigue siendo la alternativa viable. Minimiza la invasión de humedales y, al mismo tiempo, cumple con los objetivos del proyecto en materia de eficiencia del transporte y seguridad pública. El diseño propuesto incluye:

- Un nuevo sistema de drenaje a lo largo de la carretera, que incluye elementos de drenaje transversal y el uso de una alcantaril la de cajón de tres celdas para preservar el caudal natural de la quebrada.
- La instalación de un disipador de agua para mantener el caudal natural y la conectividad en la quebrada Maresúa, así como para controlar la escorrentía actual y permitir la evacuación eficiente de las aguas pluviales a lo largo de la extensión de la carretera PR-122.
- La implementación de fases de construcción para permitir el flujo parcial de la quebrada Maresúa durante las actividades.
- La implementación de las Mejores Prácticas de Gestión para el control de la erosión y la sedimentación en toda el área de construcción.
- Restauración y revegetación de áreas temporalmente perturbadas con especies vegetales propias de los humedales.

Será necesaria la construcción de un cruce temporal para permitir el movimiento de maquinaria pesada, que impacta 0.02694 acres dentro de la Marca de Agua Ordinaria Alta (OHWM). El cruce temporal tendrá una longitud de 26.6028 metros e incluirá cuatro tuberías de 42" de diámetro, estratégicamente ubicadas, para redirigir el caudal de la quebrada, lo que permitirá dividir la construcción en fases. Se prevé que la construcción de este cruce temporero afecte aproximadamente 0.0152 acres y deposite aproximadamente 45.804 yardas cúbicas de material permanente en aguas de Estados Unidos. Otro impacto temporal directo está relacionado con la construcción de la alcantarilla de cajón de tres celdas y las bermas necesarias para redirigir el caudal de la quebrada Maresúa y permitir que las obras se realicen en condiciones secas. Además de la berma propuesta a la entrada del cruce temporero, se construirá una segunda berma a la salida de la alcantarilla de cajón para permitir la construcción parcial del disipador de energía propuesto. Se prevé que estas bermas temporeras afecten aproximadamente 0.01174 acres y depositen aproximadamente 14.96 yardas cúbicas de relleno de tierra temporero en aguas de Estados Unidos.

Las áreas sujetas a impactos directos temporeros se restaurarán a sus condiciones originales una vez finalizada la alcantarilla de cajón de tres celdas. Se prevé que los impactos directos e indirectos de la construcción sean temporeros y se mitiguen mediante planes de construcción por etapas, para minimizar las perturbaciones durante el período de construcción.

Impacto después de la construcción: se espera que el proyecto cause impactos directos permanentes en las aguas de la quebrada Maresúa de los Estados Unidos debido a la construcción de la alcantarilla de cajón de tres celdas. Se prevé que la construcción de esta estructura impacte de forma permanente un área aproximada de 0.2245 acres con un volumen de relleno aproximado de 1,082.5569 yardas cúbicas de material permanente que se depositará en aguas de Estados Unidos. El proyecto preserva la función hidrológica natural de la cuenca. No se propone ninguna desviación, canalización ni aumento del área impermeable fuera del trazado de la carretera.

El proyecto se presentó al Cuerpo de Ingenieros del Ejército de los Estados Unidos (USACE) para la construcción de la alcantarilla de hormigón de tres celdas que impactaría las aguas de la quebrada Maresúa. El 10 de junio de 2025, el USACE autorizó un Permiso Nacional 14.

Los posibles impactos adversos de la construcción serían temporales y se mitigarían mediante planes de construcción por etapas para minimizar las perturbaciones durante el período de construcción. Se desarrollará un Plan de Control de Erosión y Sedimentación como parte del Diseño Final para minimizar el impacto en la calidad del agua durante la construcción.

La ACT reevaluó las alternativas para construir en el humedal y determinó que no cuenta con alternativas prácticas fuera del área de humedal. La documentación ambiental que documento el cumplimiento con la Orden Ejecutiva 11990 está disponible para inspección, revisión y reproducción del público, de ser solicitado, en el horario y lugar indicado en el último párrafo de este aviso, el cual trata sobre recibo de comentarios.

Este aviso tiene tres propósitos principales. Primero, las personas que pueden verse afectadas por actividades en el humedal y aquellos que tengan interés en la protección del ambiente natural deben recibir la oportunidad de expresar sus preocupaciones y proveer información sobre estas áreas. Segundo, un programa adecuado de avisos públicos puede ser una importante herramienta de educación pública. La divulgación de información y solicitud de comentarios públicos sobre humedales puede facilitar y mejorar los esfuerzos federales para reducir los riesgos e impactos asociados con la ocupación y alteración de estas áreas especiales. Tercero, como materia de justicia, cuando el gobierno federal determina participar en acciones ubicadas en el humedal, debe informárselo a quienes puedan ser expuestos a un riesgo mayor o similar al presente.

Comentarios por escrito deben ser recibidos por la ACT en la siguiente dirección en o antes del 28 de febrero de 2026: Autoridad de Carreteras y Transportación, PO Box 42007, San Juan, Puerto Rico 00940-2007, Atención: Edwin Velázquez, Especialista en Permisos y Cumplimiento Ambiental. Una descripción completa del proyecto está disponible al público para revisión de 8:30 a.m. a 4:00 p.m. en la Autoridad de Carreteras y Transportación, Centro Gubernamental Roberto Sánchez Vilella, Torre Sur, Piso 10, Avenida de Diego, Santurce. Los comentarios también pueden enviarse por correo electrónico a oea@act.pr.gov.

Fecha: 20 de febrero de 2026

Dr. Edwin E. González Montalvo, PE
Director Ejecutivo ACT

## Yazmin Acevedo-Ortiz

**From:** Martin, Kevin <Kevin.Martin2@atkinsrealis.com>
**Sent:** Wednesday, March 11, 2026 1:07 PM
**To:** Yazmin Acevedo-Ortiz; Miguel Perez
**Cc:** Torres, Eryck; Santiago Tirado, Angel; Di Cristina, Raul J
**Subject:** FW: AC-012201 Conector Lajas - San Germán PR-122_Comentarios Anuncio Final Humedal

Saludos Yazmin y Miguel,

Favor ver abajo comunicación de parte de Clarissa Rucci, confirmando que **NO** se recibieron comentarios durante el periodo establecido para recibir los mismos luego de la publicación del Step 7 (Aviso Final y Explicación Pública) del proceso de 8 Pasos de Humedales del proyecto de la PR-122.

Favor de proceder a finalizar el Step 8 y someter para evaluación de la ACT en o antes del próximo **miércoles, 18 de marzo de 2026**.

De tener alguna duda o preocupación al respecto, por favor no duden en comunicarse con nosotros.

Cordialmente,

**Kevin M. Martin Hidalgo** PE, PMP
Sr Engineer II
**AtkinsRéalis**
**Tel:** +19392051325
Guaynabo, PR, 00968, US

AtkinsRéalis

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**From:** Clarissa Rucci Torres <crucci@act.pr.gov>
**Sent:** Wednesday, March 11, 2026 12:25 PM
**To:** Martin, Kevin <Kevin.Martin2@atkinsrealis.com>; Luis E. Rodriguez Rosa <lurodriguez@act.pr.gov>; Olga M. Pagani Candelario <OPagani@act.pr.gov>
**Cc:** Torres, Eryck <Eryck.Torres@atkinsrealis.com>; Di Cristina, Raul J <Raul.DiCristina@atkinsrealis.com>
**Subject:** RE: AC-012201 Conector Lajas - San Germán PR-122_Comentarios Anuncio Final Humedal

Buenas tardes Kevin:
Por este medio se certifica que no se recibieron comentarios en el correo electrónico oea@act.pr.gov entre el 20 al 28 de febrero de 2026 respecto al AC-012201 Conector Lajas- San German PR-122 Anuncio Final.
Cordialmente,

Clarissa Rucci

---

**From:** Martin, Kevin <Kevin.Martin2@atkinsrealis.com>
**Sent:** Wednesday, March 11, 2026 10:29 AM
**To:** Luis E. Rodriguez Rosa <lurodriguez@act.pr.gov>; Olga M. Pagani Candelario <OPagani@act.pr.gov>; Clarissa Rucci Torres <crucci@act.pr.gov>
**Cc:** Torres, Eryck <Eryck.Torres@atkinsrealis.com>; Di Cristina, Raul J <Raul.DiCristina@atkinsrealis.com>
**Subject:** RE: AC-012201 Conector Lajas - San Germán PR-122_Comentarios Anuncio Final Humedal

Buenos días equipo,

Sólo escribo a modo de seguimiento para que por favor nos confirmen si se recibió algún comentario luego del anuncio final del Proceso de 8 Pasos de Humedales del proyecto AC-012201 requerido por HUD. De no haber recibido, debemos entonces recibir la certificación de que no hubo comentario para poder cerrar el proceso e incorporarlo en la Evaluación Ambiental del proyecto.

Quedamos pendiente a su respuesta y de tener alguna pregunta o preocupación al respecto, por favor no duden en comunicarse conmigo.

Cordialmente,

**Kevin M. Martin Hidalgo** PE, PMP
Sr Engineer II
**AtkinsRéalis**
**Tel:** +19392051325
Guaynabo, PR, 00968, US

AtkinsRéalis

Planning for Fire: A Huge Risk to Roadway Structures

READ MARTY STONE'S ARTICLE



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**From:** Luis E. Rodriguez Rosa <lurodriguez@act.pr.gov>
**Sent:** Wednesday, March 4, 2026 3:11 PM
**To:** Olga M. Pagani Candelario <OPagani@act.pr.gov>; Clarissa Rucci Torres <crucci@act.pr.gov>
**Cc:** Martin, Kevin <Kevin.Martin2@atkinsrealis.com>
**Subject:** FW: AC-012201 Conector Lajas - San Germán PR-122_Comentarios Anuncio Final Humedal

Saludos:

Por favor revisen el portal y si alguien sometió comentarios envíenlo a Kevin. Si es lo contrario certifiquen que culminado el periodo no se recibieron comentarios al proytecto.

Cordialmente,

Luis E. Rodríguez

---

**From:** Martin, Kevin <Kevin.Martin2@atkinsrealis.com>
**Sent:** Wednesday, March 4, 2026 2:58 PM
**To:** Olga M. Pagani Candelario <OPagani@act.pr.gov>; Clarissa Rucci Torres <crucci@act.pr.gov>
**Cc:** Luis E. Rodriguez Rosa <lurodriguez@act.pr.gov>; Edwin Velazquez Del Valle <edvelazquez@act.pr.gov>; Yazmin Acevedo-Ortiz <yacevedo@byaea.com>; Miguel Perez <Mperez@byaea.com>; Torres, Eryck <Eryck.Torres@atkinsrealis.com>; Santiago Tirado, Angel <angel.santiagotirado@atkinsglobal.com>
**Subject:** AC-012201 Conector Lajas - San Germán PR-122_Comentarios Anuncio Final Humedal

Saludos Olga y Clarissa,

Espero que se encuentren bien. Les escribo, ya que el pasado 28 de febrero de 2026 cerró el periodo de comentarios de la ciudadanía referente al anuncio final que se publicó el pasado 20 de febrero de 2026 sobre el impacto a humedales del proyecto AC-012201 y necesitamos conocer si se ha recibido algún correo electrónico al respecto.

Favor de dejarnos saber para atender el asunto según corresponda. Cualquier duda, quedo a la orden.

Cordialmente,

**Kevin M. Martin Hidalgo** PE, PMP
Sr Engineer II
**AtkinsRéalis**
**Tel:** +19392051325
Guaynabo, PR, 00968, US

AtkinsRéalis

Planning for Fire: A Huge Risk to Roadway Structures

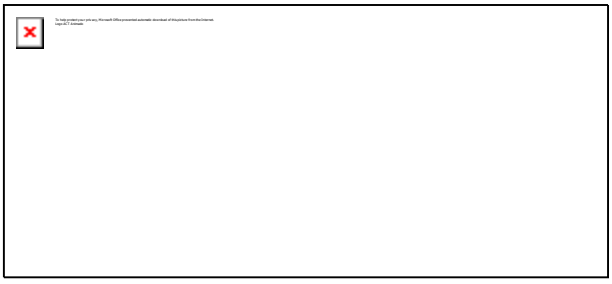
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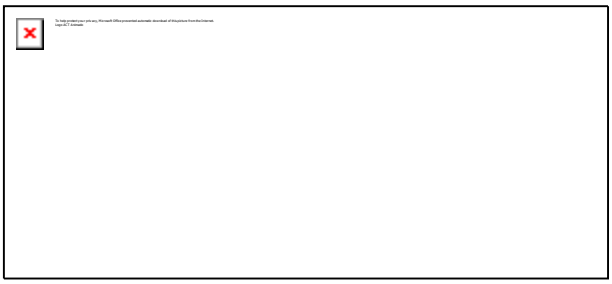


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# Wetland Jurisdictional Determination and Delineation Report

# WETLAND JURISDICTIONAL DETERMINATION AND DELINEATION STUDY

AC-012201Extension os State Road PR-122 from PR-321 to PR-166 San Germán and Lajas, Puerto Rico

GOVERNMENT OF PUERTO RICO
Puerto Rico Highway and Transportation Authority

**PREPARED FOR:**

BYA BEHAR–YBARRA & ASSOCIATES, L.L.P.

**PREPARED BY:**

AMBIENTA INC.
*Environmental Consultants*

**MARCH 2024**

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## EXECUTIVE SUMMARY

The Puerto Rico Highway and Transportation Authority (PRHTA) and the U.S. Department of Transportation (USDOT) through the Federal Highway Administration (FHWA) propose the expansion of the Ángel Castro Pérez Avenue (AKA PR-122) by the construction of a new segment of approximately 2.7 kilometers, from road PR-321 to road PR-166 (San Germán South Bypass) to improve the mobility and connectivity between the Municipalities of San Germán and Lajas.

**AMBIENTA INC.** was contracted to conduct a wetland jurisdictional determination study within the provided Project impact area (the Study Area) consisting of approximately 40 acres. This document represents the *Wetland Jurisdictional Determination and Delineation Study* (the Study) for the Ángel Castro Pérez Avenue (PR-122) Expansion Project, between the municipalities of San Germán and Lajas, Puerto Rico. It is important to mention that this Study doesn't include the Project's entire right-of-way, consisting of approximately 60 acres.

The methodology used for this Study followed the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Caribbean Islands Region* (Caribbean Supplement, 2011). A preliminary screening process of existing literature and geographic information layers was followed by performing a detailed screening analysis using Geographic Information System (GIS) tools, global positioning system (GPS) equipment and field data collected by wetland specialists, environmental scientists, biologists and environmental technicians during the month of March 2023 to specifically identify the potential wetland areas inside the Project limits included under the jurisdiction of Section 404 of the Clean Water Act (CWA), or under the jurisdiction of Section 10 of the Rivers and Harbors Act regulated by the U.S. Army Corps of Engineers (USACE).

Based on literature review and historic aerial photograph interpretation, the Study Area used to be an agricultural land during the past century, probably for the production of various crops; more recently some areas were used for cattle grazing.

The larger dominant vegetative community within the Study Area consists mostly of forested uplands; but, herbaceous and scrub-shrub upland areas are also present. Dominant species documented within the evaluated locations are: *Megathyrsus maximus* (FACU), *Trichostigma octandrum* (FACU), *Commelina diffusa* (FACU), *Cupania americana* (NI), *Dieffenbachia seguine* (FAC), *Zanthoxylum martinicense* (NI) and *Casearia guianensis* (FAC). All of these species classification are based on the 2020 National List of Wetlands Plants-Caribbean Region (CB).



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The National Wetlands Inventory (NWI) Maps from the USFWS show the Quebrada Maresúa (a creek or stream) crossing from east to west through the southern section of the Study Area. Based on field observations, Quebrada Maresúa is ephemeral and can be denominated as a non-relative permanent water (NRPW). In addition, an unnamed creek runs from south to north outside and along the eastern-northeastern side of the Study Area; this unnamed creek seems to be a relative permanent water (RPW).

Based on field observations, other streams included on the PR Commonwealth Hydrography GIS Layer seem to be ephemeral streams and erosional features between the hills' toes (gullies and small washes characterized by infrequent or short duration flow) that collect runoff water from adjacent uplands through the Study Area and appear to be natural; some are tributaries of Quebrada Maresúa and some are tributaries of the unnamed creek.

The actual condition of the Study Area has been influenced by past uses of the land, agricultural activities and other anthropogenic factors. Within the Study Area, most of the ephemeral streams tributaries of Quebrada Maresúa are fragmented and crossed by existing dirt roads with no visible culvert or water management structures. However, the tributaries of the unnamed creek, which are crossed by the former railroad berm, have historic culverts that were built with stones, bricks and concrete. On the other hand, the tributaries of the unnamed creek crossed by the existing road PR-122 at the Retiro community (northern section of the Study Area) have corrugated pipe culverts.

Out of the twenty-nine (29) evaluated locations established for the Study, six (6) were classified as sampling points (SP), and twenty three (23) as observation points (OP). Three (3) of the evaluated locations met the wetland criteria, two (2) of which are within the stream banks of two (2) tributaries of Quebrada Maresúa, and another one (1) which is located within the channel of Quebrada Maresúa.

During the past four (4) years, several changes have occurred regarding the federal definition of "waters of the United States" (WOTUS) under the CWA. Most recently, on May 25, 2023, the Supreme Court of the United States issued a decision in *Sackett v. EPA* (case No. 21-454), ruling and narrowing the EPA's jurisdiction over wetlands under the CWA. In the *Sackett* case, the court probes into the CWA's jurisdictional standard for identifying adjacent wetlands as WOTUS in the situation of a challenge to the EPA's compliance order for the unauthorized discharge of fill material into WOTUS.



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Under the *Sackett* standard, "to assert jurisdiction over an adjacent wetland, a party must establish first, that the adjacent water body constitutes WOTUS (*i.e.*, a relatively permanent water connected to traditional interstate navigable waters); and second, that the wetland has a continuous surface connection with that water, making it difficult to determine where the 'water' ends and the 'wetland' begins". Under the *Sackett* test, "wetlands that are separate from traditional navigable waters cannot be considered part of those waters, even if they are located nearby". *Sackett v. EPA* case represents the latest in a series of legal disputes regarding the interpretation of WOTUS. Although the Court did not address the validity of the Rule in *Sackett*, the Court's holding rejects the use of the "significant nexus" standard on which the Agencies' interpretation of WOTUS is based.

Given the abovementioned Supreme Court's decision, it is unclear how the Agencies will implement the Rule in the come around of the *Sackett* decision; however it could have various implications. The *Sackett* Supreme Court's decision is focused on wetlands, however, the standards of a continuous surface connection and the presence of relatively permanent waters are very relevant to other areas, including ephemeral and intermittent waters, as well as manmade structures like ditches and canals.

Even though the ephemeral streams found within the Study Area could meet the Rule criteria to have a "significant nexus" to a relative permanent water, a nexus should be established by the Agencies since some of these areas abut to NRPW or do not have a "continuous surface connection" to "traditional interstate navigable waters". The Court found that the meaning of "waters" in the CWA encompasses "only those relatively permanent, standing, or continuously flowing bodies of water."

Based on the 2008 EPA-USACE Memorandum, which is not definitive or final (`e.g., ***agencies generally will not assert jurisdiction*****)**, the final jurisdictional determination of the evaluated non-navigable tributaries that are not relatively permanent waters and which consist of ditches, swales or erosional features (e.g., gullies, small washes characterized by low volume, infrequent, or short duration flow) would be decided by the agencies based on a significant nexus. Based on field observations, the Project's ephemeral features are natural and it is uncertain if they should be considered under the jurisdiction of the CWA if a significant nexus is not established by the agencies or if this nexus condition is now considered null for other non-wetland areas.



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Based on the new Rule in contrast with the *Sackett* Supreme Court's decision, it is also uncertain if the ephemeral streams and the areas that meet the wetland criteria located within the ephemeral streams could be considered non-jurisdictional and excluded from CWA Section 404 regulation, since they represent non-relatively permanent waters (NRPW) and *ephemeral features* far away from "traditional interstate navigable waters".

Some of the potential ecological functions of these areas are: surface water storage, groundwater recharge, element transformation and cycling, dissolved substances retention and removal, and inorganic sediments accumulation. These functions serve in reducing the impact from floodwaters, increasing sediment deposition, maintaining water quality, and replenishing the water supply.

The Wetland Jurisdictional Determination and Delineation Study conducted by **AMBIENTA INC.** shows that within the Project's limits there are NRPW streams and areas that meet the wetlands criteria abutting to RPW and to NRPW that could be under the jurisdiction of the CWA Section 404 regulation if a significant nexus is established by the Agencies. These ephemeral features are characterized by infrequent or short duration flow. Given the recent Supreme Court decision in *Sackett v. EPA*, the Agencies should determine the jurisdiction of these areas under the CWA.

Impacts to jurisdictional wetlands can be avoided through comprehensive planning. Wetlands and U.S. Waters provide functions and posses attributes that may well enhance the Project's landscape, among other services. If there is the possibility of impacting aquatic resources during the construction phase of any planned Project, a formal permitting process may need to be initiated with the Regulatory Division of the Antilles Regulatory Section of the USACE. It is the policy of the USACE, and the EPA, through a Memorandum of Understanding, that a sequence of steps has to be considered during the design of any project impacting jurisdictional wetlands. First, an attempt to develop a design that avoids the impact on the wetland area should be made. If impacts to wetland areas are unavoidable, an attempt to minimize them to a practicable extent should be made, followed by the mitigation actions for the wetlands that are going to be inevitably impacted.

In addition, since the project possesses federal funding and since the presence of three (3) listed endangered fauna species has been confirmed, an Endangered Species Act (ESA) Section 7 consultation process should be initiated. The endangered listed species observed during this Study are: Puerto Rican Boa (*Chilabothrus inornatus*), Puerto Rican Nightjar (*Antrostomus noctitherus*) and Puerto Rican Yellow-shouldered blackbird (*Agelaius xanthomus*).



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## INTRODUCTION

The Puerto Rico Highway and Transportation Authority (PRHTA) and the U.S. Department of Transportation (USDOT), through the Federal Highway Administration (FHWA) propose the expansion of the Ángel Castro Pérez Avenue (AKA PR-122) from road PR-321 to road PR-166 (San Germán South Bypass), within the boundaries of the municipalities of San Germán and Lajas in the Commonwealth of Puerto Rico. The Project consists in the expansion of PR-122 by the construction of a new segment of approximately 2.7 kilometers, from Lajas to San Germán. The purpose of the proposed Project is to improve the mobility and connectivity between road PR-2 in the Municipality of San Germán and the Municipality of Lajas and its tourist area. It would provide an alternate route to PR-101, enhancing regional travel options and promoting the economic development of the region.

**AMBIENTA INC.** was contracted to conduct a wetland jurisdictional determination study within the provided Project impact area (the Study Area) consisting of approximately 40 acres. This document represents the *Wetland Jurisdictional Determination and Delineation Study* (the Study) for the Ángel Castro Pérez Avenue (PR-122) Expansion Project, between the municipalities of San Germán and Lajas, Puerto Rico. It is important to mention that this Study doesn't include the Project's entire right-of-way, consisting of approximately 60 acres.

The methodology used for this Study followed the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Caribbean Islands Region* (Caribbean Supplement, 2011). First, a preliminary screening process of existing literature and geographic information layers was performed to determine the potential jurisdictional wetlands at the Project site. Second, to specifically identify the potential wetland areas inside the Project limits included under the jurisdiction of Section 404 of the Clean Water Act (CWA), or under the jurisdiction of Section 10 of the Rivers and Harbors Act regulated by the U.S. Army Corps of Engineers (USACE), a detailed screening analysis was performed using Geographic Information System (GIS) tools, global positioning system (GPS) equipment and field data collected by wetland specialists, environmental scientists, biologists and environmental technicians. The field reconnaissance and assessment were conducted during the month of March 2023.

This report is organized into four (4) sections: 1) site description, 2) methodology and technical approach, 3) results and discussion, and 4) conclusions and recommendations. The results and conclusions of this Study are supported by the Wetland Determination Data Forms and the Photographic Documentation presented in the appendices of this report.



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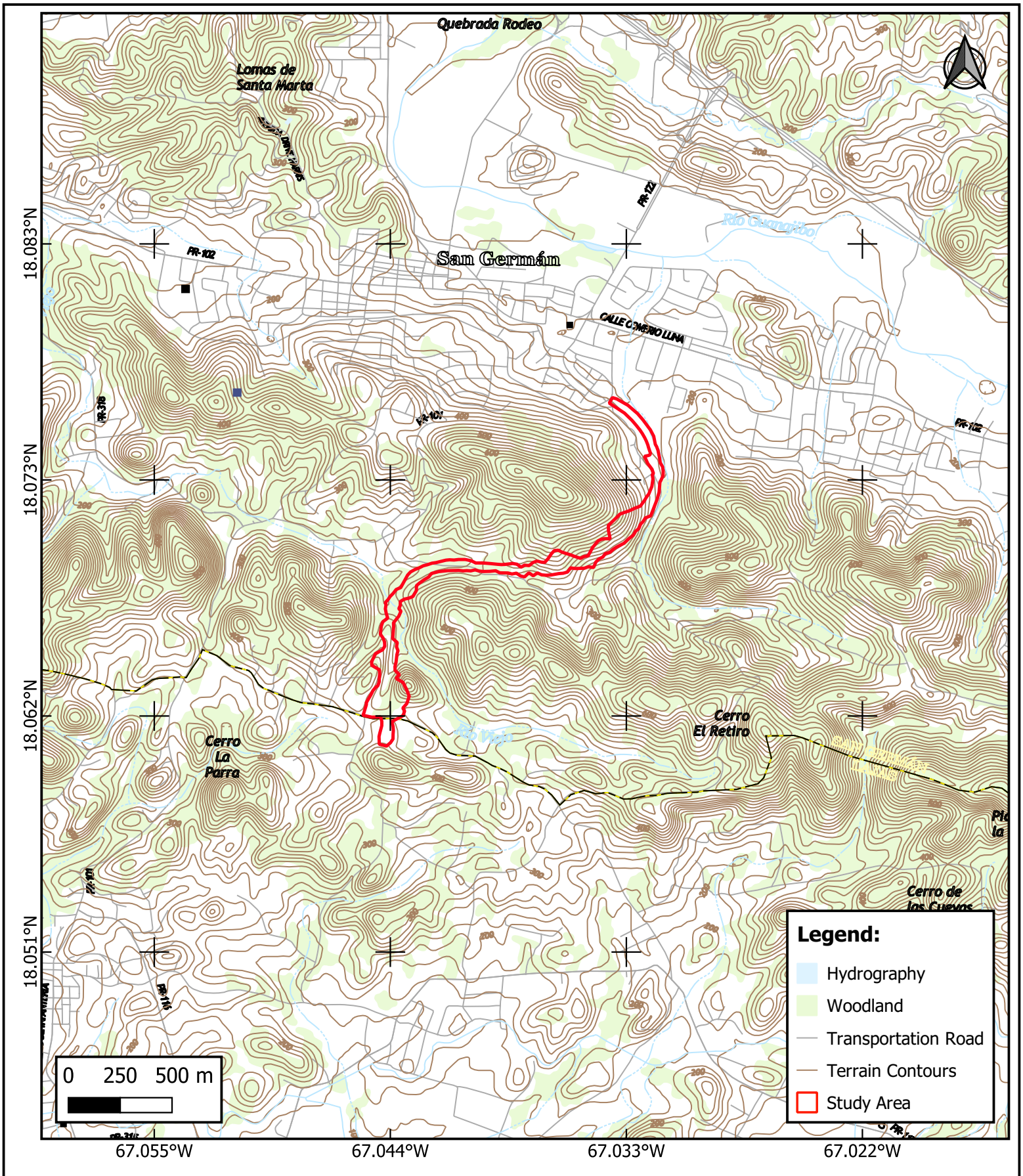



**Figure 1: USGS Topographic Map**
**PRHTA PR-122**
**Lajas-San Germán, Puerto Rico**

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## SITE DESCRIPTION

Site description is essential to properly assess the attributes of the Study Area and, most importantly, to confirm the presence of jurisdictional wetlands within its limits. This information, combined with a detailed field investigation and analysis that takes into account the three (3) jurisdictional wetland criteria (presence of hydrophytic vegetation, wetland hydrology and hydric soils), is fundamental in the determination of jurisdictional wetlands. This section of the report contains various figures in order to supplement the site description.

**Location and Topography**: The Study Area runs mostly parallel to road PR-101 and approximately one kilometer (1 Km) to the east of it. On its trajectory, PR-101 passes between the El Retiro Community and a creek without name in San Germán, then it continues to Lajas by crossing through Km 1.0 in road PR-321. The topography of the property goes from flat to steep. The elevation varies between sixty and one hundred meters above sea level (60-100 m). **Figure 1** (see previous page) shows the USGS Topographic Quadrangle with the location of the Study Area.

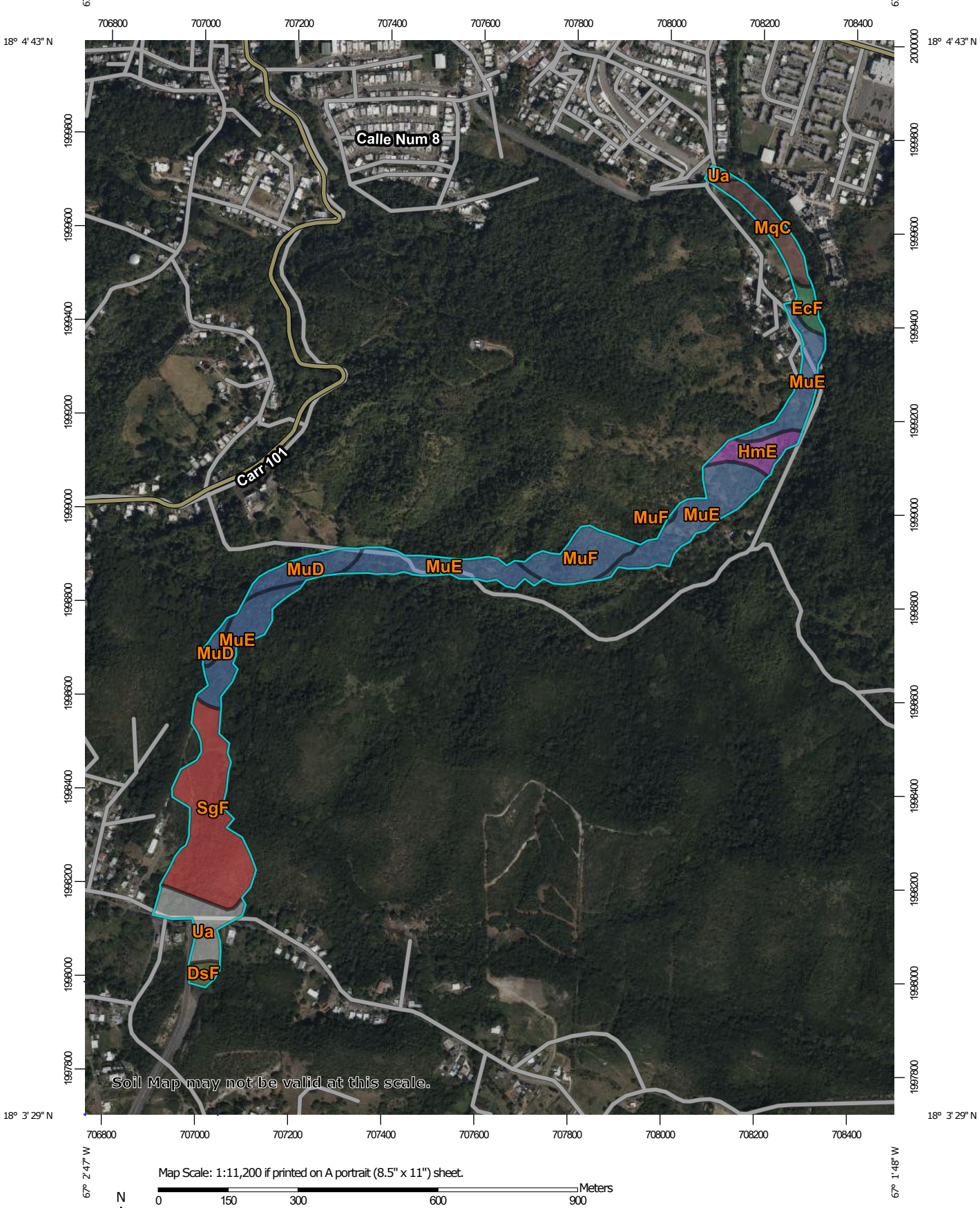
**Vegetative communities**: Based on literature review and historic aerial photograph interpretation, the Study Area used to be an agricultural land during the past century, probably for the production of various crops; more recently some areas were used for cattle grazing. The larger dominant vegetative community within the Study Area consists mostly of forested uplands; but, herbaceous and scrub-shrub upland areas are also present. Dominant species documented within the evaluated locations are: *Megathyrsus maximus* (FACU), *Trichostigma octandrum* (FACU), *Commelina diffusa* (FACU), *Cupania americana* (NI), *Dieffenbachia seguine* (FAC), *Zanthoxylum martinicense* (NI) and *Casearia guianensis* (FAC). All of these species classification are based on the 2020 National List of Wetlands Plants-Caribbean Region (CB).

**Soils**: Based on the Soil Survey of the San Germán Area of Puerto Rico, from the U.S. Department of Agriculture Soil Conservation Service, the Study Area contains ten (10) soil series: Descalabrado clay series (DsF), El Cacique-La Taina complex series (EcF), Humatas clay series (HmE), Montegrande clay series (MqC), Mucara loam series (MuC), Mucara loam series (MuD), Mucara loam series (MuE), Mucara loam series (MuF), San Germán-Duey coomplex series (SgF) and Urban land series (Ua) **Figure 2** include the NRCS Soil Map.



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**Figure 2: NRCS Soil Map**
**PRHTA PR-122**
**Lajas-San Germán, Puerto Rico**



- **Descalabrado clay series (DsF):** These soils are found on the slopes of volcanic hills. They are of good drainage, moderate permeability, low water capacity and their runoff is fast. These lands are mostly natural habitats and forests.
- **El Cacique-La Taina complex Series (EcF):** These soils are found on the slopes of hills and mountains. They have good drainage, moderate to slow permeability, low water capacity and rapid runoffs. These lands are mostly natural habitats and forested.
- **Humatas clay Series (HmE)**: These soils are found in hills and mountains. They have good drainage, moderate permeability, high water capacity and their runoffs are high. These lands are mostly used for crops and forested areas.
- **Montegrande clay series (MqC):** These soils are found on alluvial slopes and in low hills. They are poorly drained, with moderately slow permeability, high water capacity and their runoff is medium. These lands are mostly used for crops and natural pastures.
- **Mucara loam series (MuC):** These soils are found in the mountains and hills. They are of good drainage, moderate permeability, moderate water capacity and their runoff is medium. These lands are mostly natural pastures but if they are worked they can be used for crops.
- **Mucara loam series (MuD):** These soils are found in mountains and mountain slopes. They are of good drainage, moderate permeability, moderate water capacity and their runoff is moderate. These lands are mostly natural pastures.
- **Mucara loam series (MuE):** These moderately steep soils are found in mountains and mountain slopes. They are of good drainage, moderate permeability, moderate water capacity and their runoff is high. These lands are mostly natural pastures.
- **Mucara clay Series (MuF)**: These soils are found in mountains and mountains slopes. They have good drainage, moderate permeability, moderate water capacity and their runoffs are high. These lands are mostly natural grasslands.
- **San Germán-Duey complex Series (SgF):** These soils are found in hills and hill slopes. They have good drainage, very slow permeability, very low water capacity and their runoffs are very high. These lands are mostly natural grasslands.
- **Urban land series (Ua):** These soils are found in coastal plains and hills. This series of soil consists of covered areas with streets, buildings, parking lots, parks and residences. The original soils in this series have been seriously mechanically disturbed.



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**Aquatic resources**: The National Wetlands Inventory (NWI) Maps from the USFWS show the Quebrada Maresúa (a creek or stream) crossing from east to west through the southern section of the Study Area. Quebrada Maresúa is a tributary of Río Viejo, which in turn is a tributary of Río Guanajibo. Based on field observations within the Study Area, Quebrada Maresúa is ephemeral and can be denominated as a non-relative permanent water (NRPW). In addition, an unnamed creek tributary of Río Guanajibo runs from south to north outside and along the eastern-northeastern side of the Study Area; this unnamed creek seems to be a relative permanent water (RPW). **Figure 3** shows the NWI Map of the area. In this map the Quebrada Maresúa is incorrectly labeled as Río Viejo.

There are several other streams included on the PR Commonwealth Hydrography GIS Layer. Based on field observations, these streams seem to be ephemeral and in some cases could be classified as erosional features between the hills toes. The erosional features can be described as gullies, or small washes, characterized by infrequent or short duration flow. These ephemeral features collect runoff water from adjacent uplands through the Study Area and appear to be natural; some are tributaries of Quebrada Maresúa and some are tributaries of the unnamed creek.

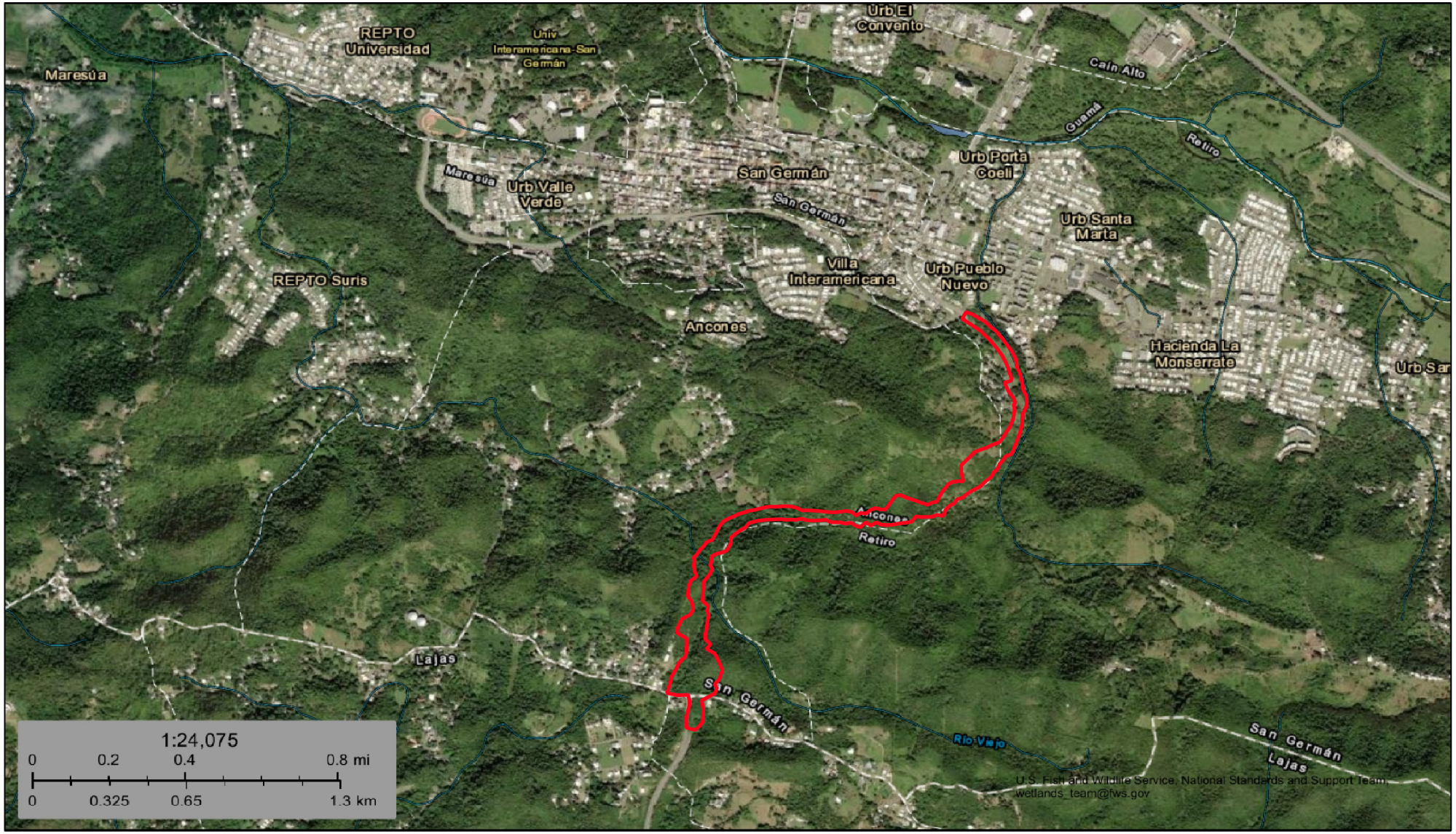


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U.S. Fish and Wildlife Service

National Wetlands Inventory

**Figure 3: USFWS National Wetland Inventory**
**PRHTA PR-122**
**Lajas-San Germán, Puerto Rico**




May 10, 2023

**Wetlands**

- Estuarine and Marine Deepwater
- Estuarine and Marine Wetland
- Freshwater Emergent Wetland
- Freshwater Forested/Shrub Wetland
- Freshwater Pond
- Lake
- Other
- Riverine

This map is for general reference only. The US Fish and Wildlife Service is not responsible for the accuracy or currentness of the base data shown on this map. All wetlands related data should be used in accordance with the layer metadata found on the Wetlands Mapper web site.

Study Area

National Wetlands Inventory (NWI)
This page was produced by the NWI mapper

## TECHNICAL APPROACH AND METHODOLOGY

A four-phase approach was used for the Wetland Jurisdictional Determination and Delineation Study (the Study) performed for the Project. The technical approach followed the determination method described in the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Caribbean Islands Region* (Caribbean supplement, 2011).

During Phase 1 of the Study, a screening level analysis was performed to identify those areas within the Project regarded as potential jurisdictional wetlands under Section 404 of the CWA and Section 10 of the Rivers and Harbors Act (RHA). The screening level analysis was performed using a Geographic Information System (GIS) loaded with the following data:

- Topography;
- Soil Survey;
- National Wetland Inventory (NWI) Map;
- Flood Zones and Hydrography; and,
- Historic and recent aerial photographs.

Also, land survey topography was used during this Phase 1. The results from this phase of the investigation provided specific and important information for the design of the field reconnaissance and data collection effort.

Phase 2 of the Study consisted of a series of preliminary site visits, including the inspection of the previously identified, potential wetland areas. These visits helped validate data that was gathered during the previous phase, while also contributing to a better understanding of the environmental conditions at the Study Area in order to develop a fieldwork plan. **Appendix A** includes photographic documentation of the Study Area.

Phase 3 of the Study included field visits to delineate any and all jurisdictional wetlands within the Study Area. This included a description of hydrology, soil and dominant vegetation at representative sampling locations.

Final wetland delineation was performed using a combination of the three (3) wetland criteria within the selected evaluation locations (both, sampling points and observation points); and GPS data and measurements, as well as land survey topography identified over aerial images of the site.



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Each evaluated location description (sampling points and observation points) is included in an individual Wetland Determination Data Form. **Appendix B** includes the transcripts of the Wetland Determination Data Forms from the Caribbean Supplement of the Wetland Delineation Manual.

The following tasks were carried out during this phase:

- Visual inspection of the site and identification of landscape features;
- Identification of plant communities;
- Selection of a representative area within each plant community (based on aerial images) to establish evaluation locations;
- Identification of dominant plant species from the various strata at each location;
- Classification of plant species using the 2020 National List of Wetlands Plants-Caribbean Region (CB);
- Description of hydrology within and around each evaluation location;
- Soil characterization using the Munsell Soil Color Chart;
- Fill in gathered data for each evaluated location (sampling points and observation points) on the Wetland Determination Data Form from the Caribbean Supplement of the Wetland Delineation Manual;
- Photographic documentation of the Site, soil pits and surrounding vegetation; and,
- Field delineation of wetland areas using the aerial photographs, handheld Global Positioning System (GPS), land survey topography and land survey equipment.

For the purposes of this Study, a total of twenty-nine (29) evaluation locations were established, from which six (6) were classified as sampling points (SP) and twenty three (23) were classified as observation points (OP). If wetlands were present, its limits were recorded with GPS. All areas were accessed and inspected in detail by walking.

Phase 4 of the Study comprised the final analysis of data gathered during the inspection and delineation visits, and the drafting of this Wetland Jurisdictional Determination and Delineation Report. Final wetland boundary determination was based on the combination of all the available evidence. The field reconnaissance and assessment efforts for this Study were conducted during the month of March 2023.



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## RESULTS AND CONCLUSION

During the site reconnaissance, assessment and jurisdictional wetland determination and delineation field visits for the Study, a total of twenty-nine (29) evaluated locations were established: six (6) were classified as sampling points (SP), and twenty three (23) were classified as observation points (OP). Three (3) of the evaluated locations met the wetland criteria, two (2) of which are within the stream banks of two (2) tributaries of Quebrada Maresúa, and another one (1) which is located within the channel of Quebrada Maresúa. **Table 1** summarizes the Jurisdictional Wetland Criteria Status for all sampling and observation points, stating whether each should be considered or not as a wetland.

**TABLE 1: WETLAND CRITERIA STATUS FOR THE SAMPLING POINTS AND OBSERVATION POINTS.**

| SP # | Latitude | Longitude | Hydrophytic Vegetation | Hydric Soil* | Wetland Hydrology | Wetland Determination |
|---|---|---|---|---|---|---|
| SP-01 | 18.062365 | -67.044609 | No | No | No | No |
| SP-02 | 18.06382 | -67.04412 | No | No | No | No |
| SP-03 | 18.065195 | -67.043592 | No | No | No | No |
| SP-04 | 18.067013 | -67.043918 | YES | YES | YES | YES |
| SP-05 | 18.066594 | -67.043453 | No | No | YES | No |
| SP-06 | 18.068643 | -67.042095 | YES | YES | YES | YES |
| OP-01 | 18.067117 | -67.04403 | YES | YES | YES | YES |
| OP-02 | 18.068458 | -67.042958 | No | YES | YES | No |
| OP-03 | 18.068927 | -67.041327 | No | NP | YES | No |
| OP-04 | 18.068844 | -67.04058 | No | NP | YES | No |
| OP-05 | 18.06859 | -67.040609 | No | NP | No | No |
| OP-06 | 18.068686 | -67.037826 | No | NP | YES | No |
| OP-07 | 18.068204 | -67.037882 | No | NP | YES | No |
| OP-08 | 18.068334 | -67.03707 | No | NP | YES | No |
| OP-09 | 18.068853 | -67.036966 | No | NP | YES | No |
| OP-10 | 18.068725 | -67.035716 | No | NP | YES | No |
| OP-11 | 18.068591 | -67.035366 | No | NP | YES | No |
| OP-12 | 18.069201 | -67.035211 | No | NP | YES | No |
| OP-13 | 18.068647 | -67.034658 | No | NP | No | No |
| OP-14 | 18.069346 | -67.033759 | No | NP | YES | No |
| OP-15 | 18.069582 | -67.03357 | No | NP | YES | No |
| OP-16 | 18.069832 | -67.033812 | No | NP | YES | No |
| OP-17 | 18.071526 | -67.032411 | No | NP | YES | No |
| OP-18 | 18.071925 | -67.031683 | No | NP | YES | No |
| OP-19 | 18.072696 | -67.031861 | No | NP | No | No |
| OP-20 | 18.073366 | -67.032179 | YES | NP | No | No |
| OP-21 | 18.07355 | -67.031664 | No | NP | YES | No |
| OP-22 | 18.074054 | -67.032091 | No | NP | YES | No |
| OP-22b | 18.073952 | -67.031778 | No | NP | YES | No |

**NP = soil pit Not Performed (Exposed rock, underground bedrock and many roots, unable to dig soil pit).*



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**Appendix A** contains photographic documentation of the evaluated areas. **Appendix B** contains the Transcripts of the Sampling Point Data Forms. **Figure 4** illustrates the positions of the evaluated locations within the Study Area over the aerial photograph.

The larger dominant vegetative community within the Study Area consists mostly of forested uplands; but also, herbaceous and scrub-shrub upland areas are also present. Dominant species documented within the evaluated locations are: *Megathyrsus maximus* (FACU), *Trichostigma octandrum* (FACU), *Commelina diffusa* (FACU), *Cupania americana* (NI), *Dieffenbachia seguine* (FAC), *Zanthoxylum martinicense* (NI) and *Casearia guianensis* (FAC). All of these species classification are based on the 2020 National List of Wetlands Plants-Caribbean Region (CB).

The National Wetlands Inventory (NWI) Maps from the USFWS show the Quebrada Maresúa (a creek or stream) crossing from east to west through the southern section of the Study Area. Based on field observations within the Study Area, Quebrada Maresúa is ephemeral and can be denominated as a non-relative permanent water (NRPW). In addition, an unnamed creek tributary of Río Guanajibo, runs from south to north outside and along the eastern-northeastern side of the Study Area, this stream seems to be a relative permanent water (RPW).

There are several other streams included on the PR Commonwealth Hydrography GIS Layer. Based on field observations, these streams seem to be ephemeral and in some cases could be classified as erosional features between the hills toes. The erosional features can be described as gullies, or small washes, characterized by infrequent or short duration flow. These ephemeral features collect runoff water from adjacent uplands through the Study Area and appear to be natural; some are tributaries of Quebrada Maresúa and some are tributaries of the unnamed creek. **Appendix C** shows the project drawings and the identified streams.

The actual condition of the Study Area has been influenced by past uses of the land, agricultural activities and other anthropogenic factors. Within the Study Area, most of the ephemeral streams tributaries of Quebrada Maresúa are fragmented and crossed by existing dirt roads with no visible culvert or water management structures. However, the tributaries of the unnamed creek, which are crossed by the former railroad berm, have historic culverts that were built with stones, bricks and concrete. On the other hand, the tributaries of the unnamed creek crossed by the existing road PR-122 at the Retiro community (northern section of the Study Area) have corrugated pipe culverts.



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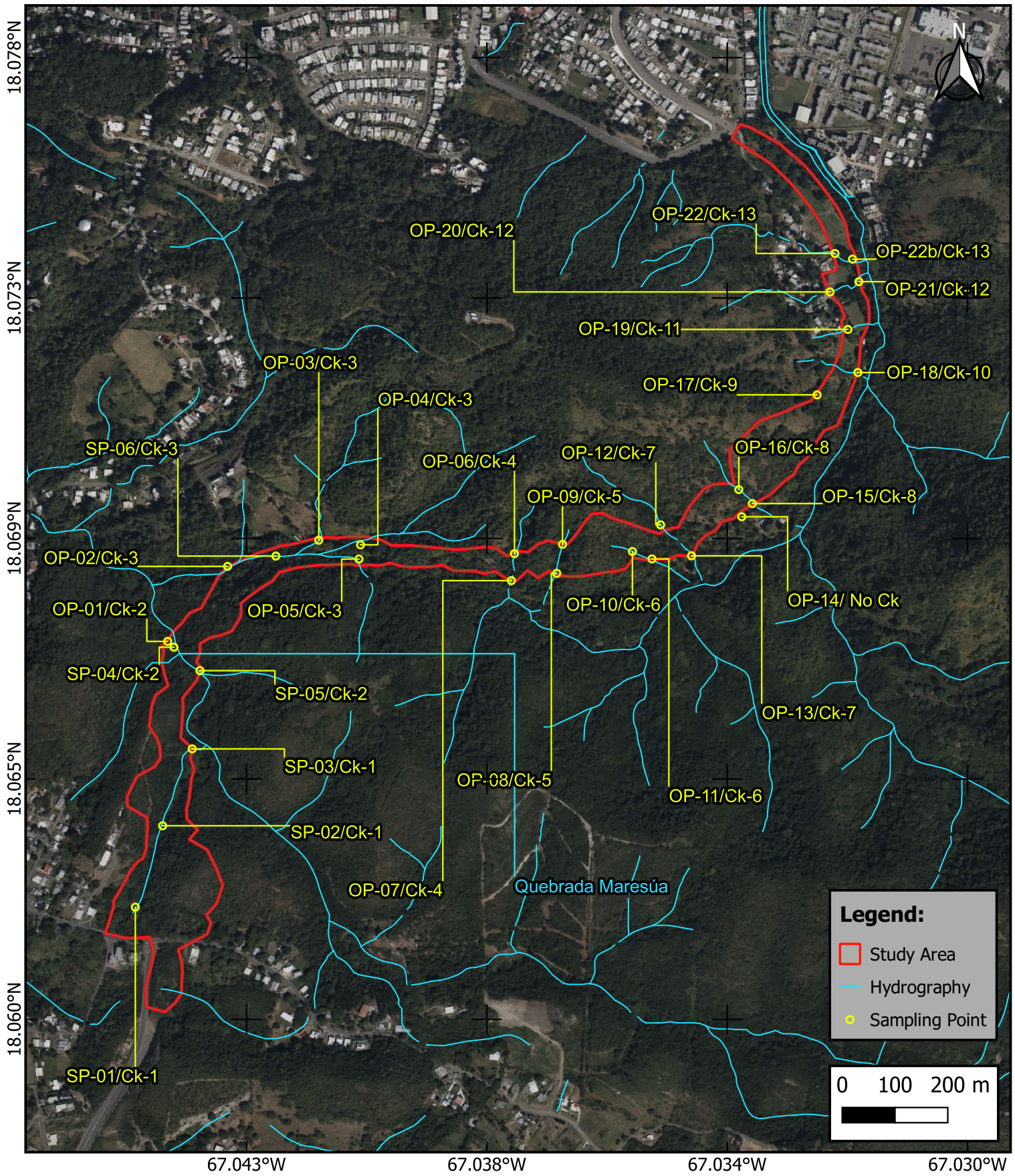



**Figure 4: Wetland Delineation and Sampling Points Locations**
**PRHTA PR-122**
**Lajas-San Germán, Puerto Rico**

AMBIENTA INC.
*Environmental Consultants*

During the past four (4) years, several changes have occurred regarding the federal definition of "waters of the United States" (WOTUS) under the CWA. On January 23, 2020, the Trump Administration issued the final Navigable Waters Protection Rule (NWPR), which redefined WOTUS under the CWA. The Environmental Protection Agency (EPA) and the USACE (the Agencies) in receipt of the U.S. District Court for the District of Arizona's August 30, 2021 order vacating and remanding the NWPR in the case of Pascua Yaqui Tribe v. U.S., halted implementation of the NWPR and resumed interpreting WOTUS consistent with the pre-2015 regulatory regime until further notice.

Later, on December 30, 2022, the Agencies announced a final rule (the Rule) founded upon the pre-2015 definition of WOTUS, but updated to reflect consideration of Supreme Court decisions, the science and the agencies' technical expertise. The Rule's effective date was March 20, 2023. This regulatory regime is based on *Rapanos* and *SWANCC* guidance.

The Agencies chose the familiar, pre-2015 definition as a foundation for the Rule because it has supported decades of clean water progress, and has been implemented by every administration in the last 45 years. Changing regulatory definitions due to court decisions and issuing final rules by the Agencies in 2015, 2019, and 2020 have caused an uncertainty that has harmed communities and our nation's waters. The Rule restored fundamental protections so that the nation will be closer to achieving Congress' direction in the CWA that our waters be fishable and swimmable. It will also ensure that our waters support recreation and wildlife.

Most recently, on May 25, 2023, the Supreme Court of the United States issued a decision in *Sackett v. EPA* (case No. 21-454), ruling and narrowing the EPA's jurisdiction over wetlands under the CWA. In the *Sackett* case, the court probes into the CWA's jurisdictional standard for identifying adjacent wetlands as WOTUS in the situation of a challenge to the EPA's compliance order for the unauthorized discharge of fill material into WOTUS.

The Supreme Court held the wetlands on the *Sackett* case as non-jurisdictional, by a rationale that the CWA applies only to those wetlands with a "continuous surface connection" to "traditional interstate navigable waters". The Court discarded the "significant nexus" standard used by the EPA, previously established during the *Rapanos v. United States*, 547 U.S. 715 (2006) case used in the current Rule, and set up a more stringent test to determine when the CWA applies to an adjacent wetland.



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Under the *Sackett* standard, "to assert jurisdiction over an adjacent wetland, a party must establish first, that the adjacent water body constitutes WOTUS (*i.e.*, a relatively permanent water connected to traditional interstate navigable waters); and second, that the wetland has a continuous surface connection with that water, making it difficult to determine where the 'water' ends and the 'wetland' begins". Under the *Sackett* test, "wetlands that are separate from traditional navigable waters cannot be considered part of those waters, even if they are located nearby". *Sackett v. EPA* case represents the latest in a series of legal disputes regarding the interpretation of WOTUS. Although the Court did not address the validity of the Rule in *Sackett*, the Court's holding rejects the use of the "significant nexus" standard on which the Agencies' interpretation of WOTUS is based.

Given the abovementioned Supreme Court's decision, it is unclear how the Agencies will implement the Rule in the come around of the *Sackett* decision; however it could have various implications. The *Sackett* Supreme Court's decision is focused on wetlands, however, the standards of a continuous surface connection and the presence of relatively permanent waters are very relevant to other areas, including ephemeral and intermittent waters, as well as manmade structures like ditches and canals.

Even though the ephemeral streams found within the Study Area could meet the Rule criteria to have a "significant nexus" to a relative permanent water, a nexus should be established by the Agencies since some of these areas abut to NRPW or do not have a "continuous surface connection" to "traditional interstate navigable waters". As discussed before, based on the *Sackett* Supreme Court's decision, "to assert jurisdiction over an adjacent wetland, a party must establish first, that the adjacent water body constitutes 'waters of the United States' (*i.e.*, a relatively permanent water connected to traditional interstate navigable waters); and second, that the wetland has a continuous surface connection with that water, making it difficult to determine where the 'water' ends and the 'wetland' begins." The Court found that the meaning of "waters" in the CWA encompasses "only those relatively permanent, standing, or continuously flowing bodies of water."

Based on the pre-2015 regime, which includes the EPA and USACE Memorandum: Clean Water Act Jurisdiction Following the U.S. Supreme Court's Decision in Rapanos v. United States(2006) & Carabell v. United States (2008), this is addressed as follows:



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***"The Agencies will decide jurisdiction over the following waters based on a fact-specific analysis to determine whether they have a significant nexus with a traditional navigable water:***

- *Non-navigable tributaries that are not relatively permanent.*
- *Wetlands adjacent to non-navigable tributaries that are not relatively permanent.*
- *Wetlands adjacent to, but that do not directly abut a relatively permanent non-navigable tributary.*

***The Agencies generally will not assert jurisdiction over the following features:***

- *Swales or erosional features (e.g., gullies, small washes characterized by low volume, infrequent, or short duration flow).*
- *Ditches (including roadside ditches) excavated wholly in and draining only uplands and that do not carry a relatively permanent flow of water.*

***The Agencies will apply the significant nexus standard as follows:***

- *A significant nexus analysis will assess the flow characteristics and functions of the tributary itself and the functions performed by all wetlands adjacent to the tributary to determine if they significantly affect the chemical, physical and biological integrity of downstream traditional navigable waters.*
- *Significant nexus includes consideration of hydrologic and ecologic factors."*

Based on the 2008 EPA-USACE Memorandum, which is not definitive or final (`e.g., ***agencies generally will not assert jurisdiction*****)**, the final jurisdictional determination of the evaluated non-navigable tributaries that are not relatively permanent waters and which consist of ditches, swales or erosional features (e.g., gullies, small washes characterized by low volume, infrequent, or short duration flow) would be decided by the agencies based on a significant nexus. Based on field observations, the Project's ephemeral features are natural and it is uncertain if they should be considered under the jurisdiction of the CWA if a significant nexus is not established by the agencies or if this nexus condition is now considered null for other non-wetland areas.

Based on the new Rule in contrast with the *Sackett* Supreme Court's decision, it is also uncertain if the ephemeral streams and the areas that meet the wetland criteria located within the ephemeral streams could be considered non-jurisdictional and excluded from CWA Section 404 regulation, since they represent non-relatively permanent waters (NRPW) and *ephemeral features* far away from "traditional interstate navigable waters".



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Some of the potential ecological functions of these areas are: surface water storage, groundwater recharge, element transformation and cycling, dissolved substances retention and removal, and inorganic sediments accumulation. These functions serve in reducing the impact from floodwaters, increasing sediment deposition, maintaining water quality, and replenishing the water supply.

The Wetland Jurisdictional Determination and Delineation Study conducted by **AMBIENTA INC.** shows that within the Project's limits there are NRPW streams and areas that meet the wetlands criteria abutting to RPW and to NRPW that could be under the jurisdiction of the CWA Section 404 regulation if a significant nexus is established by the Agencies (refer to **Appendix C**). These ephemeral features are characterized by infrequent or short duration flow. Given the recent Supreme Court decision in *Sackett v. EPA*, the Agencies should determine the jurisdiction of these areas under the CWA.

Impacts to jurisdictional wetlands can be avoided through comprehensive planning. Wetlands and U.S. Waters provide functions and posses attributes that may well enhance the Project's landscape, among other services. If there is the possibility of impacting aquatic resources during the construction phase of any planned Project, a formal permitting process may need to be initiated with the Regulatory Division of the Antilles Regulatory Section of the USACE. It is the policy of the USACE, and the EPA, through a Memorandum of Understanding, that a sequence of steps has to be considered during the design of any project impacting jurisdictional wetlands. First, an attempt to develop a design that avoids the impact on the wetland area should be made. If impacts to wetland areas are unavoidable, an attempt to minimize them to a practicable extent should be made, followed by the mitigation actions for the wetlands that are going to be inevitably impacted.

In addition, since the project possesses federal funding and since the presence of three (3) listed endangered fauna species has been confirmed, an Endangered Species Act (ESA) Section 7 consultation process should be initiated. The endangered listed species observed during this Study are: Puerto Rican Boa (*Chilabothrus inornatus*), Puerto Rican Nightjar (*Antrostomus noctitherus*) and Puerto Rican Yellow-shouldered blackbird (*Agelaius xanthomus*).



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## APPENDIXES



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# APPENDIX A:

# PHOTOGRAPHIC DOCUMENTATION



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**Soil pit at creek area.**




**Soil sampling pit.**



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**Soil evaluation.**




**Typical View of Sampling Point 1.**



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**Typical View of Sampling Point 2.**




**Typical View of Sampling Point 3.**



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**Typical View of Sampling Point 4.**




**Typical View of Sampling Point 5.**



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**Typical View of Sampling Point 6.**




**Typical View of Observation Point 1.**



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**Typical View of Observation Point 2.**




**Typical View of Observation Point 3**



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**Typical View of Observation Point 4.**




**Typical View of Observation Point 5**



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**Typical View of Observation Point 6.**




**Typical View of Observation Point 7.**



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**Typical View of Observation Point 8.**




**Typical View of Observation Point 9.**



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**Typical View of Observation Point 10.**




**Typical View of Observation Point 11**



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**Typical View of Observation Point 12.**




**Typical View of Observation Point 13**



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**Typical View of Observation Point 14.**




**Typical View of Observation Point 15.**



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**Typical View of Observation Point 16.**




**Typical View of Observation Point 17.**



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**Typical View of Observation Point 18.**




**Typical View of Observation Point 19.**



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**Typical View of Observation Point 20.**




**Typical View of Observation Point 21.**



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**Typical View of Observation Point 22.**




**Typical View of Observation Point 22b.**



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# APPENDIX B:

# TRANSCRIPTS OF DATA FORMS FOR ROUTINE WETLAND DETERMINATION



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# WETLAND DETERMINATION DATA FORM – Caribbean Islands Region

Project/Site: ÁNGEL CASTRO PÉREZ AVENUE EXPANSION (PR-122) Municipality/Town: San German & Lajas Sampling Date: March 29, 2023

Applicant/Owner: The Puerto Rico Highway and Transportation Authority (PRHTA) and the U.S. Department of Transportation (USDOT) PR or USVI: PR Sampling Point: SP-01 (Ck-1)

Investigator(s): Walter E. Soler Ward/Estate: Ancones

Landform (hillslope, terrace, etc.): Vegetated naturally swaled area Local relief (concave, convex, none): None Slope (%): 0

Lat: 18.062365° Long: -67.044609° Datum: PR Datum

Soil Map Unit Name: San German-Duey complex (SgF) NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes X No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

## SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

| | | | |
|---|---|---|---|
| Hydrophytic Vegetation Present? | Yes _____ | No X | **Is the Sampled Area within a Wetland?** **Yes** _____ **No** X |
| Hydric Soil Present? | Yes _____ | No X | |
| Wetland Hydrology Present? | Yes _____ | No X | |

Remarks:

Sampling Point located within the beginning of a vegetated naturally swaled ephemeral area (Ck1) with no defined bank, that collects runoff and abuts (tributary) to Quebrada Maresua.

## VEGETATION – Use scientific names of plants.

| Tree Stratum (Plot size: 30 feet radius) | Absolute % Cover | Dominant Species? | Indicator Status |
|---|---|---|---|
| 1. Bixa orellana | 10 | No | UPL |
| 2. Carica papaya | 35 | Yes | UPL |
| 3. Sterculia apetala | 25 | Yes | UPL |
| 4. | | | |
| 5. | | | |
| | 70 | = Total Cover | |
| **Sapling/Shrub Stratum** (Plot size: 15 feet radius) | | | |
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| | _____ | = Total Cover | |
| **Herb Stratum** (Plot size: 5 feet radius) | | | |
| 1. Megathyrsus maximus | 30 | Yes | FACU |
| 2. Commelina diffusa | 50 | Yes | FAC |
| 3. Trichostigma octandrum | 20 | Yes | FACU |
| 4. | | | |
| 5. | | | |
| 6. | | | |
| 7. | | | |
| 8. | | | |
| | 100 | = Total Cover | |
| **Woody Vine Stratum** (Plot size: 30 feet radius) | | | |
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| | _____ | = Total Cover | |

**Dominance Test worksheet:**

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 5 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 20 (A/B)

**Prevalence Index worksheet:**

| Total % Cover of: | | Multiply by: | |
|---|---|---|---|
| OBL species | _____ | x 1 = | _____ |
| FACW species | _____ | x 2 = | _____ |
| FAC species | 50 | x 3 = | 150 |
| FACU species | 50 | x 4 = | 200 |
| UPL species | 70 | x 5 = | 350 |
| Column Totals: | 170 (A) | | 700 (B) |

Prevalence Index = B/A = 4.12

**Hydrophytic Vegetation Indicators:**

- ☐ Rapid Test for Hydrophytic Vegetation
- ☐ Dominance Test is >50%
- ☐ Prevalence Index is ≤3.0[1]
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

**Hydrophytic Vegetation Present?** **Yes** _____ **No** X

Remarks:

## SOIL

Sampling Point: SP-01 (Ck-1)

**Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)**

| Depth (inches) | Matrix Color (moist) | Matrix % | Redox Features Color (moist) | Redox Features % | Type[1] | Loc[2] | Texture | Remarks |
|---|---|---|---|---|---|---|---|---|
| 0 - 18 | 10 YR 2/2 | 100 | | | | | Silty loam | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

**Hydric Soil Indicators:**

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Organic Bodies (A6)
- ☐ 5 cm Mucky Mineral (A7)
- ☐ Muck Presence (A8)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Dark Surface (S7)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)

**Indicators for Problematic Hydric Soils[3]:**

- ☐ Stratified Layers (A5)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

**Restrictive Layer (if observed):**

Type: _____

Depth (inches): _____

**Hydric Soil Present? Yes** _____ **No** X

Remarks:

## HYDROLOGY

**Wetland Hydrology Indicators:**

Primary Indicators (minimum of one required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift Deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Aquatic Fauna (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres on Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Fiddler Crab Burrows (C10)
- ☐ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ☐ Surface Soil Cracks (B6)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)

**Field Observations:**

Surface Water Present? Yes _____ No X Depth (inches): _____

Water Table Present? Yes _____ No X Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes _____ No X Depth (inches): _____

**Wetland Hydrology Present? Yes** _____ **No** X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

No hydrology indicators. Shallow watershed basin, no defined bank. Watershed defined by adjacent hillslope and old railroad berm.

# WETLAND DETERMINATION DATA FORM – Caribbean Islands Region

Project/Site: ÁNGEL CASTRO PÉREZ AVENUE EXPANSION (PR-122) Municipality/Town: San German & Lajas Sampling Date: March 29, 2023

Applicant/Owner: The Puerto Rico Highway and Transportation Authority (PRHTA) and the U.S. Department of Transportation (USDOT) PR or USVI: PR Sampling Point: SP-02 (Ck-1)

Investigator(s): Walter E. Soler Ward/Estate: Ancones

Landform (hillslope, terrace, etc.): Vegetated naturally swaled area Local relief (concave, convex, none): None Slope (%): 5

Lat: 18.063820° Long: -67.044120° Datum: PR Datum

Soil Map Unit Name: San German-Duey complex (SgF) NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes X No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

## SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

| | | | |
|---|---|---|---|
| Hydrophytic Vegetation Present? | Yes _____ | No X | **Is the Sampled Area within a Wetland?** **Yes** _____ **No** X |
| Hydric Soil Present? | Yes _____ | No X | |
| Wetland Hydrology Present? | Yes _____ | No X | |

Remarks:

Sampling Point located within a vegetated naturally swaled ephemeral area (Ck1) with no defined bank, that collects runoff and abuts (tributary) to Quebrada Maresua.

## VEGETATION – Use scientific names of plants.

| Tree Stratum (Plot size: 30 feet radius) | Absolute % Cover | Dominant Species? | Indicator Status |
|---|---|---|---|
| 1. Zanthoxylum martinicense | 20 | Yes | UPL |
| 2. Cupania americana | 70 | Yes | UPL |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| | 90 | = Total Cover | |
| **Sapling/Shrub Stratum** (Plot size: 15 feet radius) | | | |
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| | _____ | = Total Cover | |
| **Herb Stratum** (Plot size: 5 feet radius) | | | |
| 1. Megathyrsus maximus | 45 | Yes | FACU |
| 2. Oplismenus hirtellus | 25 | Yes | FACU |
| 3. Trichostigma octandrum | 20 | Yes | FACU |
| 4. Mikania congesta | 10 | No | FACW |
| 5. | | | |
| 6. | | | |
| 7. | | | |
| 8. | | | |
| | 100 | = Total Cover | |
| **Woody Vine Stratum** (Plot size: 30 feet radius) | | | |
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| | _____ | = Total Cover | |

**Dominance Test worksheet:**

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across All Strata: 5 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0 (A/B)

**Prevalence Index worksheet:**

| Total % Cover of: | | Multiply by: | |
|---|---|---|---|
| OBL species | _____ | x 1 = | _____ |
| FACW species | 10 | x 2 = | 20 |
| FAC species | _____ | x 3 = | _____ |
| FACU species | 90 | x 4 = | 360 |
| UPL species | 90 | x 5 = | 450 |
| Column Totals: | 190 (A) | | 830 (B) |

Prevalence Index = B/A = 4.4

**Hydrophytic Vegetation Indicators:**

- ☐ Rapid Test for Hydrophytic Vegetation
- ☐ Dominance Test is >50%
- ☐ Prevalence Index is ≤3.0[1]
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

**Hydrophytic Vegetation Present?** **Yes** _____ **No** X

Remarks:

## SOIL

Sampling Point: SP-02 (Ck-1)

**Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)**

| Depth (inches) | Matrix Color (moist) | Matrix % | Redox Features Color (moist) | Redox Features % | Type[1] | Loc[2] | Texture | Remarks |
|---|---|---|---|---|---|---|---|---|
| 0 - 18 | 10 YR 2/2 | 100 | | | | | Silty loam | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

**Hydric Soil Indicators:**

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Organic Bodies (A6)
- ☐ 5 cm Mucky Mineral (A7)
- ☐ Muck Presence (A8)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Dark Surface (S7)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)

**Indicators for Problematic Hydric Soils[3]:**

- ☐ Stratified Layers (A5)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

**Restrictive Layer (if observed):**

Type: _____

Depth (inches): _____

**Hydric Soil Present? Yes** _____ **No** X

Remarks:

## HYDROLOGY

**Wetland Hydrology Indicators:**

Primary Indicators (minimum of one required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift Deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Aquatic Fauna (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres on Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Fiddler Crab Burrows (C10)
- ☐ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ☐ Surface Soil Cracks (B6)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)

**Field Observations:**

Surface Water Present? Yes _____ No X Depth (inches): _____

Water Table Present? Yes _____ No X Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes _____ No X Depth (inches): _____

**Wetland Hydrology Present? Yes** _____ **No** X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

No hydrology indicators. Shallow watershed basin, no defined bank. Watershed defined by adjacent hillslopes and existing trail.

# WETLAND DETERMINATION DATA FORM – Caribbean Islands Region

Project/Site: ÁNGEL CASTRO PÉREZ AVENUE EXPANSION (PR-122) Municipality/Town: San German & Lajas Sampling Date: March 29, 2023

Applicant/Owner: The Puerto Rico Highway and Transportation Authority (PRHTA) and the U.S. Department of Transportation (USDOT) PR or USVI: PR Sampling Point: SP-03 (Ck-1)

Investigator(s): Walter E. Soler Ward/Estate: Ancones

Landform (hillslope, terrace, etc.): Vegetated naturally swaled area Local relief (concave, convex, none): None Slope (%): 5

Lat: 18.065195° Long: -67.043592° Datum: PR Datum

Soil Map Unit Name: Mucara loam (MuE) NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes X No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

## SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

| | | | |
|---|---|---|---|
| Hydrophytic Vegetation Present? | Yes _____ | No X | **Is the Sampled Area within a Wetland?** **Yes** _____ **No** X |
| Hydric Soil Present? | Yes _____ | No X | |
| Wetland Hydrology Present? | Yes _____ | No X | |

Remarks:

Sampling Point located within a vegetated naturally swaled ephemeral area (Ck1) with no defined bank, that collects runoff and abuts (tributary) to Quebrada Maresua.

## VEGETATION – Use scientific names of plants.

| Tree Stratum (Plot size: 30 feet radius) | Absolute % Cover | Dominant Species? | Indicator Status |
|---|---|---|---|
| 1. Cupania americana | 25 | Yes | UPL |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| | 25 | = Total Cover | |
| **Sapling/Shrub Stratum** (Plot size: 15 feet radius) | | | |
| 1. Cestrum diurnum | 10 | Yes | UPL |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| | 10 | = Total Cover | |
| **Herb Stratum** (Plot size: 5 feet radius) | | | |
| 1. Cynodon nlemfuensis | 100 | Yes | UPL |
| 2. Ipomoea tiliacea | 15 | No | UPL |
| 3. Mikania congesta | 25 | No | FACW |
| 4. | | | |
| 5. | | | |
| 6. | | | |
| 7. | | | |
| 8. | | | |
| | 140 | = Total Cover | |
| **Woody Vine Stratum** (Plot size: 30 feet radius) | | | |
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| | _____ | = Total Cover | |

**Dominance Test worksheet:**

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0 (A/B)

**Prevalence Index worksheet:**

| Total % Cover of: | | Multiply by: | |
|---|---|---|---|
| OBL species | _____ | x 1 = | _____ |
| FACW species | 25 | x 2 = | 50 |
| FAC species | _____ | x 3 = | _____ |
| FACU species | _____ | x 4 = | _____ |
| UPL species | 150 | x 5 = | 750 |
| Column Totals: | 175 (A) | | 800 (B) |

Prevalence Index = B/A = 4.6

**Hydrophytic Vegetation Indicators:**

- ☐ Rapid Test for Hydrophytic Vegetation
- ☐ Dominance Test is >50%
- ☐ Prevalence Index is ≤3.0[1]
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

**Hydrophytic Vegetation Present?** **Yes** _____ **No** X

Remarks:

## SOIL

Sampling Point: SP-03 (Ck-1)

**Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)**

| Depth (inches) | Matrix Color (moist) | Matrix % | Redox Features Color (moist) | Redox Features % | Type[1] | Loc[2] | Texture | Remarks |
|---|---|---|---|---|---|---|---|---|
| 0 - 10 | 10 YR 3/2 | 100 | | | | | Silty loam | |
| 10-18 | Rockcrumble | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

**Hydric Soil Indicators:**

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Organic Bodies (A6)
- ☐ 5 cm Mucky Mineral (A7)
- ☐ Muck Presence (A8)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Dark Surface (S7)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)

**Indicators for Problematic Hydric Soils[3]:**

- ☐ Stratified Layers (A5)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

**Restrictive Layer (if observed):**

Type: _____

Depth (inches): _____

**Hydric Soil Present? Yes** _____ **No** X

Remarks:

No redoxymorphic features.

## HYDROLOGY

**Wetland Hydrology Indicators:**

Primary Indicators (minimum of one required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift Deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Aquatic Fauna (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres on Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Fiddler Crab Burrows (C10)
- ☐ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ☐ Surface Soil Cracks (B6)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)

**Field Observations:**

Surface Water Present? Yes _____ No X Depth (inches): _____

Water Table Present? Yes _____ No X Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes _____ No X Depth (inches): _____

**Wetland Hydrology Present? Yes** _____ **No** X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

No hydrology indicators. Shallow watershed basin, no defined bank.

# WETLAND DETERMINATION DATA FORM – Caribbean Islands Region

Project/Site: ÁNGEL CASTRO PÉREZ AVENUE EXPANSION (PR-122) Municipality/Town: San German & Lajas Sampling Date: March 29, 2023

Applicant/Owner: The Puerto Rico Highway and Transportation Authority (PRHTA) and the U.S. Department of Transportation (USDOT) PR or USVI: PR Sampling Point: SP-04 (Ck-2)

Investigator(s): Walter E. Soler Ward/Estate: Ancones

Landform (hillslope, terrace, etc.): Stream bed Local relief (concave, convex, none): None Slope (%): 0

Lat: 18.067013° Long: -67.043918° Datum: PR Datum

Soil Map Unit Name: Mucara loam (MuE) NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes X No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

## SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

| | | |
|---|---|---|
| Hydrophytic Vegetation Present? | Yes X No _____ | **Is the Sampled Area within a Wetland?** Yes X No _____ |
| Hydric Soil Present? | Yes X No _____ | |
| Wetland Hydrology Present? | Yes X No _____ | |

Remarks:

Sampling Point located within an ephemeral stream (Ck2) bed of Quebrada Maresua, which upstrem channel is interrupted and obstructed by a dirt road.

## VEGETATION – Use scientific names of plants.

| Tree Stratum (Plot size: 30 feet radius) | Absolute % Cover | Dominant Species? | Indicator Status |
|---|---|---|---|
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| | _____ = Total Cover | | |
| **Sapling/Shrub Stratum** (Plot size: 15 feet radius) | | | |
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| | _____ = Total Cover | | |
| **Herb Stratum** (Plot size: 5 feet radius) | | | |
| 1. Dieffenbachia seguine | 25 | Yes | FAC |
| 2. Commelina diffusa | 40 | Yes | FAC |
| 3. Mikania congesta | 20 | Yes | FACW |
| 4. Pueraria phaseoloides | 10 | No | UPL |
| 5. Ipomoea tiliacea | 5 | No | UPL |
| 6. | | | |
| 7. | | | |
| 8. | | | |
| | 100 = Total Cover | | |
| **Woody Vine Stratum** (Plot size: 30 feet radius) | | | |
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| | _____ = Total Cover | | |

**Dominance Test worksheet:**

Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across All Strata: 5 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 60 (A/B)

**Prevalence Index worksheet:**

| Total % Cover of: | Multiply by: |
|---|---|
| OBL species _____ | x 1 = _____ |
| FACW species _____ | x 2 = _____ |
| FAC species _____ | x 3 = _____ |
| FACU species _____ | x 4 = _____ |
| UPL species _____ | x 5 = _____ |
| Column Totals: _____ (A) | _____ (B) |

Prevalence Index = B/A = _____

**Hydrophytic Vegetation Indicators:**

- ☐ Rapid Test for Hydrophytic Vegetation
- ☑ Dominance Test is >50%
- ☐ Prevalence Index is ≤3.0[1]
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

**Hydrophytic Vegetation Present?** Yes X No _____

Remarks:

Vegetation assessment performed within the stream bank, other stratum outside the stream bank where not used for the determination.

## SOIL

Sampling Point: SP-04 (Ck-2)

**Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)**

| Depth (inches) | Matrix Color (moist) | Matrix % | Redox Features Color (moist) | Redox Features % | Type[1] | Loc[2] | Texture | Remarks |
|---|---|---|---|---|---|---|---|---|
| 0 - 18 | 10 YR 3/2 | 100 | | | | | Silty loam | Rockcrumble at pit bottom |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

**Hydric Soil Indicators:**

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Organic Bodies (A6)
- ☐ 5 cm Mucky Mineral (A7)
- ☐ Muck Presence (A8)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Dark Surface (S7)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)

**Indicators for Problematic Hydric Soils[3]:**

- ☐ Stratified Layers (A5)
- ☐ Very Shallow Dark Surface (TF12)
- ☑ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

**Restrictive Layer (if observed):**

Type: _____

Depth (inches): _____

**Hydric Soil Present?** Yes X No _____

Remarks:

Low chroma with no redoximorphic features observed, however soils could be classified as problematic since are located within an ephemeral stream bed.

## HYDROLOGY

**Wetland Hydrology Indicators:**

Primary Indicators (minimum of one required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift Deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☑ Aquatic Fauna (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres on Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Fiddler Crab Burrows (C10)
- ☐ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ☐ Surface Soil Cracks (B6)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)

**Field Observations:**

Surface Water Present? Yes _____ No X Depth (inches): _____

Water Table Present? Yes _____ No X Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes _____ No X Depth (inches): _____

**Wetland Hydrology Present?** Yes X No _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Aquatic fauna indicator (B13) marked based on the presence of the Caribbean Whithe-lipped frog (Leptodactylus albilabris). Sampling point collected at an ephemeral stream with a channel of 1.5m of depth and 4.5m of width from bank to bank.

# WETLAND DETERMINATION DATA FORM – Caribbean Islands Region

Project/Site: ÁNGEL CASTRO PÉREZ AVENUE EXPANSION (PR-122) Municipality/Town: San German & Lajas Sampling Date: March 29, 2023

Applicant/Owner: The Puerto Rico Highway and Transportation Authority (PRHTA) and the U.S. Department of Transportation (USDOT) PR or USVI: PR Sampling Point: SP-05 (Ck-2)

Investigator(s): Walter E. Soler Ward/Estate: Ancones

Landform (hillslope, terrace, etc.): Unvegetated ephemeral stream bed Local relief (concave, convex, none): None Slope (%): 5

Lat: 18.066594° Long: -67.043453° Datum: PR Datum

Soil Map Unit Name: Mucara loam (MuE) NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes X No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

## SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

| | | | |
|---|---|---|---|
| Hydrophytic Vegetation Present? | Yes _____ | No X | **Is the Sampled Area within a Wetland?** Yes _____ No X |
| Hydric Soil Present? | Yes _____ | No X | |
| Wetland Hydrology Present? | Yes X | No _____ | |

Remarks:

Sampling Point located within an unvegetated ephemeral stream (Ck2: Quebrada Maresua) with a defined bank and exposed bed rock.

## VEGETATION – Use scientific names of plants.

| Tree Stratum (Plot size: 30 feet radius) | Absolute % Cover | Dominant Species? | Indicator Status |
|---|---|---|---|
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| | _____ = Total Cover | | |
| **Sapling/Shrub Stratum** (Plot size: 15 feet radius) | | | |
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| | _____ = Total Cover | | |
| **Herb Stratum** (Plot size: 5 feet radius) | | | |
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| 6. | | | |
| 7. | | | |
| 8. | | | |
| | _____ = Total Cover | | |
| **Woody Vine Stratum** (Plot size: 30 feet radius) | | | |
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| | _____ = Total Cover | | |

**Dominance Test worksheet:**

Number of Dominant Species That Are OBL, FACW, or FAC: _____ (A)

Total Number of Dominant Species Across All Strata: _____ (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: _____ (A/B)

**Prevalence Index worksheet:**

| Total % Cover of: | Multiply by: |
|---|---|
| OBL species _____ | x 1 = _____ |
| FACW species _____ | x 2 = _____ |
| FAC species _____ | x 3 = _____ |
| FACU species _____ | x 4 = _____ |
| UPL species _____ | x 5 = _____ |
| Column Totals: _____ (A) | _____ (B) |

Prevalence Index = B/A = 3.8

**Hydrophytic Vegetation Indicators:**

- ☐ Rapid Test for Hydrophytic Vegetation
- ☐ Dominance Test is >50%
- ☐ Prevalence Index is ≤3.0[1]
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

**Hydrophytic Vegetation Present?** Yes _____ No X

Remarks:

Vegetation not present at ephemeral stream bed.

## SOIL

Sampling Point: SP-05 (Ck-2)

**Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)**

| Depth (inches) | Matrix Color (moist) | Matrix % | Redox Features Color (moist) | Redox Features % | Type[1] | Loc[2] | Texture | Remarks |
|---|---|---|---|---|---|---|---|---|
| 0 - 6 | 10 YR 3/2 | 100 | | | | | Silty sand | Rockcrumble at pit bottom |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

**Hydric Soil Indicators:**

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Organic Bodies (A6)
- ☐ 5 cm Mucky Mineral (A7)
- ☐ Muck Presence (A8)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Dark Surface (S7)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)

**Indicators for Problematic Hydric Soils[3]:**

- ☐ Stratified Layers (A5)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

**Restrictive Layer (if observed):**

Type: _____

Depth (inches): _____

**Hydric Soil Present?** Yes _____ No X

Remarks:

Low chroma, problematic soil within an ephemeral stream with deposition of sediments, bedrock and rock crumble below the first 8" of soil.

## HYDROLOGY

**Wetland Hydrology Indicators:**

Primary Indicators (minimum of one required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1)
- ☑ Sediment Deposits (B2)
- ☐ Drift Deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☑ Aquatic Fauna (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres on Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Fiddler Crab Burrows (C10)
- ☐ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ☐ Surface Soil Cracks (B6)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)

**Field Observations:**

Surface Water Present? Yes X No _____ Depth (inches): _____

Water Table Present? Yes X No _____ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes X No _____ Depth (inches): _____

**Wetland Hydrology Present?** Yes X No _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Sampling point collected at Quebrada Maresua (Ck2) on a shallow watershed basin or stream bed with exposed bedrock and defined banks of 1m of depth and 6.5m of width from bank to bank. No visible OHWM.

# WETLAND DETERMINATION DATA FORM – Caribbean Islands Region

Project/Site: ÁNGEL CASTRO PÉREZ AVENUE EXPANSION (PR-122) Municipality/Town: San German & Lajas Sampling Date: March 29, 2023

Applicant/Owner: The Puerto Rico Highway and Transportation Authority (PRHTA) and the U.S. Department of Transportation (USDOT) PR or USVI: PR Sampling Point: OP-01 (Ck-2)

Investigator(s): Walter E. Soler Ward/Estate: Ancones

Landform (hillslope, terrace, etc.): Stream bed Local relief (concave, convex, none): None Slope (%): 0

Lat: 18.067117° Long: -67.044030° Datum: PR Datum

Soil Map Unit Name: Mucara loam (MuE) NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes X No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

## SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

| | | | |
|---|---|---|---|
| Hydrophytic Vegetation Present? | Yes X | No _____ | **Is the Sampled Area within a Wetland?** **Yes** X **No** _____ |
| Hydric Soil Present? | Yes X | No _____ | |
| Wetland Hydrology Present? | Yes X | No _____ | |

Remarks:

Observation Point located on stream bed at Ck2 (Quebrada Maresua), within an area with exposed bed rock and stagnant water, downstream of SP-4; seems to be ephemeral.

## VEGETATION – Use scientific names of plants.

| | Absolute % Cover | Dominant Species? | Indicator Status |
|---|---|---|---|
| **Tree Stratum** (Plot size: 30 feet radius) | | | |
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| | _____ = Total Cover | | |
| **Sapling/Shrub Stratum** (Plot size: 15 feet radius) | | | |
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| | _____ = Total Cover | | |
| **Herb Stratum** (Plot size: 5 feet radius) | | | |
| 1. Dieffenbachia seguine | 40 | Yes | FAC |
| 2. Syngonium podophyllum | 10 | No | UPL |
| 3. Ruellia simplex | 30 | Yes | FACW |
| 4. Pueraria phaseoloides | 20 | Yes | FAC* |
| 5. | | | |
| 6. | | | |
| 7. | | | |
| 8. | | | |
| | 10 = Total Cover | | |
| **Woody Vine Stratum** (Plot size: 30 feet radius) | | | |
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| | _____ = Total Cover | | |

**Dominance Test worksheet:**

Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across All Strata: 4 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 75 (A/B)

**Prevalence Index worksheet:**

| Total % Cover of: | Multiply by: |
|---|---|
| OBL species _____ | x 1 = _____ |
| FACW species _____ | x 2 = _____ |
| FAC species _____ | x 3 = _____ |
| FACU species _____ | x 4 = _____ |
| UPL species _____ | x 5 = _____ |
| Column Totals: _____ (A) | _____ (B) |

Prevalence Index = B/A = _____

**Hydrophytic Vegetation Indicators:**

- ☐ Rapid Test for Hydrophytic Vegetation
- ☑ Dominance Test is >50%
- ☐ Prevalence Index is ≤3.0[1]
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

**Hydrophytic Vegetation Present?** **Yes** X **No** _____

Remarks:

*Species not included in 2020 National Wetland Plants List; indicator status based on professional judgement.

## SOIL

Sampling Point: OP-01 (Ck-2)

**Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)**

| Depth (inches) | Matrix Color (moist) | % | Redox Features Color (moist) | % | Type[1] | Loc[2] | Texture | Remarks |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

**Hydric Soil Indicators:**

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Organic Bodies (A6)
- ☐ 5 cm Mucky Mineral (A7)
- ☐ Muck Presence (A8)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Dark Surface (S7)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)

**Indicators for Problematic Hydric Soils[3]:**

- ☐ Stratified Layers (A5)
- ☐ Very Shallow Dark Surface (TF12)
- ☑ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

**Restrictive Layer (if observed):**

Type: _____

Depth (inches): _____

**Hydric Soil Present? Yes _____ No _____**

Remarks:

Stream with stagnant water, unable to perform soil sample. Vegetative association met hydrophytic criteria.

## HYDROLOGY

**Wetland Hydrology Indicators:**

Primary Indicators (minimum of one required; check all that apply)

- ☑ Surface Water (A1)
- ☐ High Water Table (A2)
- ☑ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☑ Drift Deposits (B3)
- ☑ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☑ Aquatic Fauna (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres on Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Fiddler Crab Burrows (C10)
- ☐ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ☐ Surface Soil Cracks (B6)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)

**Field Observations:**

Surface Water Present? Yes X No _____ Depth (inches): 3"- 12"

Water Table Present? Yes _____ No _____ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes _____ No _____ Depth (inches): _____

**Wetland Hydrology Present? Yes X No _____**

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Observation point collected at Ck2 on a steam channel of approximately 1.5m of depth from top of the bank, and 6.5m of width from bank to bank.

# WETLAND DETERMINATION DATA FORM – Caribbean Islands Region

Project/Site: ÁNGEL CASTRO PÉREZ AVENUE EXPANSION (PR-122) Municipality/Town: San German & Lajas Sampling Date: March 29, 2023

Applicant/Owner: The Puerto Rico Highway and Transportation Authority (PRHTA) and the U.S. Department of Transportation (USDOT) PR or USVI: PR Sampling Point: OP-02 (Ck-3)

Investigator(s): Walter E. Soler Ward/Estate: Ancones

Landform (hillslope, terrace, etc.): Unvegetated ephemeral stream bed Local relief (concave, convex, none): None Slope (%): 0

Lat: 18.068458° Long: -67.042958° Datum: PR Datum

Soil Map Unit Name: Mucara loam (MuE) NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes X No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

## SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

| | | | |
|---|---|---|---|
| Hydrophytic Vegetation Present? | Yes _____ | No X | **Is the Sampled Area within a Wetland?** Yes _____ No X |
| Hydric Soil Present? | Yes _____ | No _____ | |
| Wetland Hydrology Present? | Yes X | No _____ | |

Remarks:

Observation Point located within an ephemeral stream bed with defined bank, which is a tributary of Quebrada Maresua (Ck3), theis area partially unvegetated with few exposed bed rock.

## VEGETATION – Use scientific names of plants.

| | Absolute % Cover | Dominant Species? | Indicator Status |
|---|---|---|---|
| Tree Stratum (Plot size: 30 feet radius) | | | |
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| | _____ = Total Cover | | |
| Sapling/Shrub Stratum (Plot size: 15 feet radius) | | | |
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| | _____ = Total Cover | | |
| Herb Stratum (Plot size: 5 feet radius) | | | |
| 1. Mucuna pruriens | 20 | Yes | UPL |
| 2. Syngonium podophyllum | 50 | Yes | UPL |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| 6. | | | |
| 7. | | | |
| 8. | | | |
| | 70 = Total Cover | | |
| Woody Vine Stratum (Plot size: 30 feet radius) | | | |
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| | _____ = Total Cover | | |

**Dominance Test worksheet:**

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0 (A/B)

**Prevalence Index worksheet:**

| Total % Cover of: | | Multiply by: | |
|---|---|---|---|
| OBL species | _____ | x 1 = | _____ |
| FACW species | _____ | x 2 = | _____ |
| FAC species | _____ | x 3 = | _____ |
| FACU species | _____ | x 4 = | _____ |
| UPL species | 145 | x 5 = | 725 |
| Column Totals: | 145 (A) | | 725 (B) |

Prevalence Index = B/A = 5

**Hydrophytic Vegetation Indicators:**

- ☐ Rapid Test for Hydrophytic Vegetation
- ☐ Dominance Test is >50%
- ☐ Prevalence Index is ≤3.0[1]
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

**Hydrophytic Vegetation Present?** Yes _____ No X

Remarks:

No hydrophytic vegetation found on the Observation Point, scarce vegetation documented correspond to naturally occurring UPL species within an ephemeral stream.

## SOIL

Sampling Point: OP-02 (Ck-3)

**Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)**

| Depth (inches) | Matrix Color (moist) | % | Redox Features Color (moist) | % | Type[1] | Loc[2] | Texture | Remarks |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

**Hydric Soil Indicators:**

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Organic Bodies (A6)
- ☐ 5 cm Mucky Mineral (A7)
- ☐ Muck Presence (A8)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Dark Surface (S7)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)

**Indicators for Problematic Hydric Soils[3]:**

- ☐ Stratified Layers (A5)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

**Restrictive Layer (if observed):**

Type: _____

Depth (inches): _____

**Hydric Soil Present?** Yes X No _____

Remarks:

Exposed rock, underground bedrock and many roots, unable to dig soil pit.

## HYDROLOGY

**Wetland Hydrology Indicators:**

Primary Indicators (minimum of one required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☑ Drift Deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Aquatic Fauna (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres on Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Fiddler Crab Burrows (C10)
- ☐ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ☐ Surface Soil Cracks (B6)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)

**Field Observations:**

Surface Water Present? Yes _____ No X Depth (inches): _____

Water Table Present? Yes _____ No X Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes _____ No X Depth (inches): _____

**Wetland Hydrology Present?** Yes X No _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Observation point collected at Ck3 on a shallow watershed basin of 1m of depth and 5m of width from bank to bank. Watershed defined by adjacent hillslope. No HWM observed.

# WETLAND DETERMINATION DATA FORM – Caribbean Islands Region

Project/Site: ÁNGEL CASTRO PÉREZ AVENUE EXPANSION (PR-122) Municipality/Town: San German & Lajas Sampling Date: March 29, 2023

Applicant/Owner: The Puerto Rico Highway and Transportation Authority (PRHTA) and the U.S. Department of Transportation (USDOT) PR or USVI: PR Sampling Point: SP-06 (Ck-3)

Investigator(s): Walter E. Soler Ward/Estate: Ancones

Landform (hillslope, terrace, etc.): Unvegetated ephemeral stream bed Local relief (concave, convex, none): None Slope (%): 0

Lat: 18.068643° Long: -67.042095° Datum: PR Datum

Soil Map Unit Name: Mucara loam (MuE) NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes X No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

## SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

| | | | |
|---|---|---|---|
| Hydrophytic Vegetation Present? | Yes X | No _____ | **Is the Sampled Area within a Wetland?** **Yes** X **No** _____ |
| Hydric Soil Present? | Yes X | No _____ | |
| Wetland Hydrology Present? | Yes X | No _____ | |

Remarks:

Sampling Point located within an unvegetated ephemeral stream bed (Ck3), tributary of Quebrada Maresua (Ck2).

## VEGETATION – Use scientific names of plants.

| Tree Stratum (Plot size: 30 feet radius) | Absolute % Cover | Dominant Species? | Indicator Status |
|---|---|---|---|
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| | _____ = Total Cover | | |
| **Sapling/Shrub Stratum** (Plot size: 15 feet radius) | | | |
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| | _____ = Total Cover | | |
| **Herb Stratum** (Plot size: 5 feet radius) | | | |
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| 6. | | | |
| 7. | | | |
| 8. | | | |
| | _____ = Total Cover | | |
| **Woody Vine Stratum** (Plot size: 30 feet radius) | | | |
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| | _____ = Total Cover | | |

**Dominance Test worksheet:**

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0 (A/B)

**Prevalence Index worksheet:**

| Total % Cover of: | | Multiply by: | |
|---|---|---|---|
| OBL species | _____ | x 1 = | _____ |
| FACW species | _____ | x 2 = | _____ |
| FAC species | _____ | x 3 = | _____ |
| FACU species | 75 | x 4 = | 300 |
| UPL species | 85 | x 5 = | 425 |
| Column Totals: | 160 (A) | | 725 (B) |

Prevalence Index = B/A = 4.5

**Hydrophytic Vegetation Indicators:**

- ☐ Rapid Test for Hydrophytic Vegetation
- ☐ Dominance Test is >50%
- ☐ Prevalence Index is ≤3.0[1]
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

**Hydrophytic Vegetation Present?** **Yes** _____ **No** X

Remarks:

The Sampling Point is an unvegetated area, within an ephemeral stream bed. Vegetation/wetland criteria based on soils and hydrology indicators, geomorphology and landform.

## SOIL

Sampling Point: SP-06 (Ck-3)

**Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)**

| Depth (inches) | Matrix Color (moist) | Matrix % | Redox Features Color (moist) | Redox Features % | Type[1] | Loc[2] | Texture | Remarks |
|---|---|---|---|---|---|---|---|---|
| 0 - 4 | 10 YR 3/2 | 100 | | | | | Silty loam | |
| 4 - 6 | 10 YR 3/2 | 70 | Gley 2 3/5pb | 25 | C | M | Silty loam | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

**Hydric Soil Indicators:**

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Organic Bodies (A6)
- ☐ 5 cm Mucky Mineral (A7)
- ☐ Muck Presence (A8)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☑ Stripped Matrix (S6)
- ☐ Dark Surface (S7)
- ☑ Loamy Gleyed Matrix (F2)
- ☑ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)

**Indicators for Problematic Hydric Soils[3]:**

- ☐ Stratified Layers (A5)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

**Restrictive Layer (if observed):**

Type: _____

Depth (inches): _____

**Hydric Soil Present?** Yes X No _____

Remarks:

## HYDROLOGY

**Wetland Hydrology Indicators:**

Primary Indicators (minimum of one required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1)
- ☑ Sediment Deposits (B2)
- ☑ Drift Deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Aquatic Fauna (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres on Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Fiddler Crab Burrows (C10)
- ☐ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ☐ Surface Soil Cracks (B6)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)

**Field Observations:**

Surface Water Present? Yes _____ No X Depth (inches): _____

Water Table Present? Yes _____ No X Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes _____ No X Depth (inches): _____

**Wetland Hydrology Present?** Yes X No _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Shallow ephemeral stream bed (watershed basin). Watershed defined by adjacent hillslope and old railroad berm. Sampling point collected at an area that seems to be disturbed by existing dirt road crossing.

# WETLAND DETERMINATION DATA FORM – Caribbean Islands Region

Project/Site: ÁNGEL CASTRO PÉREZ AVENUE EXPANSION (PR-122) Municipality/Town: San German & Lajas Sampling Date: March 29, 2023

Applicant/Owner: The Puerto Rico Highway and Transportation Authority (PRHTA) and the U.S. Department of Transportation (USDOT) PR or USVI: PR Sampling Point: OP-03 (Ck-3)

Investigator(s): Walter E. Soler Ward/Estate: Ancones

Landform (hillslope, terrace, etc.): Vegetated ephemeral stream Local relief (concave, convex, none): None Slope (%): 0

Lat: 18.068927° Long: -67.041327° Datum: PR Datum

Soil Map Unit Name: Mucara loam (MuE) NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes X No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

## SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

| | | | |
|---|---|---|---|
| Hydrophytic Vegetation Present? | Yes _____ | No X | **Is the Sampled Area within a Wetland?** Yes _____ No X |
| Hydric Soil Present? | Yes _____ | No _____ | |
| Wetland Hydrology Present? | Yes X | No _____ | |

Remarks:

Observation Point located within a vegetated ephemeral stream bed area, with partially defined banks.

## VEGETATION – Use scientific names of plants.

| Tree Stratum (Plot size: 30 feet radius) | Absolute % Cover | Dominant Species? | Indicator Status |
|---|---|---|---|
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| | _____ = Total Cover | | |
| **Sapling/Shrub Stratum** (Plot size: 15 feet radius) | | | |
| 1. Eugenia biflora | | Yes | UPL |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| | _____ = Total Cover | | |
| **Herb Stratum** (Plot size: 5 feet radius) | | | |
| 1. Bambusa vulgaris | 75 | Yes | FACU |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| 6. | | | |
| 7. | | | |
| 8. | | | |
| | 75 = Total Cover | | |
| **Woody Vine Stratum** (Plot size: 30 feet radius) | | | |
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| | _____ = Total Cover | | |

**Dominance Test worksheet:**

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0 (A/B)

**Prevalence Index worksheet:**

| Total % Cover of: | Multiply by: |
|---|---|
| OBL species _____ | x 1 = _____ |
| FACW species _____ | x 2 = _____ |
| FAC species _____ | x 3 = _____ |
| FACU species 75 | x 4 = 300 |
| UPL species 15 | x 5 = 75 |
| Column Totals: 90 (A) | 375 (B) |

Prevalence Index = B/A = 4.16

**Hydrophytic Vegetation Indicators:**

- ☐ Rapid Test for Hydrophytic Vegetation
- ☐ Dominance Test is >50%
- ☐ Prevalence Index is ≤3.0[1]
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

**Hydrophytic Vegetation Present?** Yes _____ No X

Remarks:

## SOIL

Sampling Point: OP-03 (Ck-3)

**Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)**

| Depth (inches) | Matrix Color (moist) | % | Redox Features Color (moist) | % | Type[1] | Loc[2] | Texture | Remarks |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

**Hydric Soil Indicators:**

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Organic Bodies (A6)
- ☐ 5 cm Mucky Mineral (A7)
- ☐ Muck Presence (A8)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Dark Surface (S7)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)

**Indicators for Problematic Hydric Soils[3]:**

- ☐ Stratified Layers (A5)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

**Restrictive Layer (if observed):**

Type: _____

Depth (inches): _____

**Hydric Soil Present? Yes _____ No _____**

Remarks:

Underground bedrock, unable to dig soil pit.

## HYDROLOGY

**Wetland Hydrology Indicators:**

Primary Indicators (minimum of one required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☑ Drift Deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Aquatic Fauna (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres on Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Fiddler Crab Burrows (C10)
- ☐ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ☐ Surface Soil Cracks (B6)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)

**Field Observations:**

Surface Water Present? Yes _____ No _____ Depth (inches): _____

Water Table Present? Yes _____ No _____ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes _____ No _____ Depth (inches): _____

**Wetland Hydrology Present? Yes X No _____**

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Observation point collected within an ephemeral stream-like area, on a shallow watershed basin of 0.6m of depth and 3.5m of width from bank to bank. Watershed defined by adjacent hillslope. No OHWM observed.

# WETLAND DETERMINATION DATA FORM – Caribbean Islands Region

Project/Site: ÁNGEL CASTRO PÉREZ AVENUE EXPANSION (PR-122) Municipality/Town: San German & Lajas Sampling Date: March 29, 2023

Applicant/Owner: The Puerto Rico Highway and Transportation Authority (PRHTA) and the U.S. Department of Transportation (USDOT) PR or USVI: PR Sampling Point: OP-04 (Ck-3)

Investigator(s): Walter E. Soler Ward/Estate: Ancones

Landform (hillslope, terrace, etc.): Vegetated ephemeral stream Local relief (concave, convex, none): None Slope (%): 5

Lat: 18.068844° Long: -67.040580° Datum: PR Datum

Soil Map Unit Name: Mucara loam (MuE) NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes X No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

## SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

| | | | |
|---|---|---|---|
| Hydrophytic Vegetation Present? | Yes _____ | No X | **Is the Sampled Area within a Wetland?** Yes _____ No X |
| Hydric Soil Present? | Yes _____ | No _____ | |
| Wetland Hydrology Present? | Yes X | No _____ | |

Remarks:

Observation Point located within a vegetated ephemeral stream bed area, with partially defined banks.

## VEGETATION – Use scientific names of plants.

| Tree Stratum (Plot size: 30 feet radius) | Absolute % Cover | Dominant Species? | Indicator Status |
|---|---|---|---|
| 1. Spondias mombin | 15 | Yes | UPL |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| | 15 | = Total Cover | |
| **Sapling/Shrub Stratum** (Plot size: 15 feet radius) | | | |
| 1. Miconia prasina | 10 | Yes | FAC |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| | 10 | = Total Cover | |
| **Herb Stratum** (Plot size: 5 feet radius) | | | |
| 1. Mikania congesta | 15 | No | FACW |
| 2. Trichostigma octandrum | 85 | Yes | FACU |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| 6. | | | |
| 7. | | | |
| 8. | | | |
| | 100 | = Total Cover | |
| **Woody Vine Stratum** (Plot size: 30 feet radius) | | | |
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| | _____ | = Total Cover | |

**Dominance Test worksheet:**

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 33 (A/B)

**Prevalence Index worksheet:**

| Total % Cover of: | | Multiply by: | |
|---|---|---|---|
| OBL species | _____ | x 1 = | _____ |
| FACW species | 15 | x 2 = | 30 |
| FAC species | 10 | x 3 = | 30 |
| FACU species | 85 | x 4 = | 340 |
| UPL species | 15 | x 5 = | 75 |
| Column Totals: | 125 (A) | | 475 (B) |

Prevalence Index = B/A = 3.8

**Hydrophytic Vegetation Indicators:**

- ☐ Rapid Test for Hydrophytic Vegetation
- ☐ Dominance Test is >50%
- ☐ Prevalence Index is ≤3.0[1]
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

**Hydrophytic Vegetation Present?** Yes _____ No X

Remarks:

## SOIL

Sampling Point: OP-04 (Ck-3)

**Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)**

| Depth (inches) | Matrix Color (moist) | % | Redox Features Color (moist) | % | Type[1] | Loc[2] | Texture | Remarks |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

**Hydric Soil Indicators:**

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Organic Bodies (A6)
- ☐ 5 cm Mucky Mineral (A7)
- ☐ Muck Presence (A8)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Dark Surface (S7)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)

**Indicators for Problematic Hydric Soils[3]:**

- ☐ Stratified Layers (A5)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

**Restrictive Layer (if observed):**

Type: _____

Depth (inches): _____

**Hydric Soil Present? Yes _____ No _____**

Remarks:

Underground bedrock, unable to dig soil pit.

## HYDROLOGY

**Wetland Hydrology Indicators:**

Primary Indicators (minimum of one required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☑ Drift Deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Aquatic Fauna (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres on Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Fiddler Crab Burrows (C10)
- ☐ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ☐ Surface Soil Cracks (B6)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)

**Field Observations:**

Surface Water Present? Yes _____ No _____ Depth (inches): _____

Water Table Present? Yes _____ No _____ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes _____ No _____ Depth (inches): _____

**Wetland Hydrology Present? Yes X No _____**

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Observation point collected at on a shallow ephemeral naturally swaled area (watershed basin) of 2.6m of depth and 1m of width from bank to bank. Watershed defined by adjacent hillslopes. No HWM observed.

# WETLAND DETERMINATION DATA FORM – Caribbean Islands Region

Project/Site: ÁNGEL CASTRO PÉREZ AVENUE EXPANSION (PR-122) Municipality/Town: San German & Lajas Sampling Date: March 30, 2023

Applicant/Owner: The Puerto Rico Highway and Transportation Authority (PRHTA) and the U.S. Department of Transportation (USDOT) PR or USVI: PR Sampling Point: OP-05 (Ck-3)

Investigator(s): Walter E. Soler Ward/Estate: Ancones

Landform (hillslope, terrace, etc.): Vegetated ephemeral stream Local relief (concave, convex, none): None Slope (%): 5

Lat: 18.068590° Long: -67.040609° Datum: PR Datum

Soil Map Unit Name: Mucara loam (MuE) NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes X No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

## SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

| | | | |
|---|---|---|---|
| Hydrophytic Vegetation Present? | Yes _____ | No X | **Is the Sampled Area within a Wetland?** Yes _____ No X |
| Hydric Soil Present? | Yes _____ | No _____ | |
| Wetland Hydrology Present? | Yes X | No _____ | |

Remarks:

Observation Point located within a vegetated ephemeral stream bed area, with partially defined banks.

## VEGETATION – Use scientific names of plants.

| Tree Stratum (Plot size: 30 feet radius) | Absolute % Cover | Dominant Species? | Indicator Status |
|---|---|---|---|
| 1. Zanthoxylum martinicense | 30 | Yes | UPL |
| 2. Genipa americana | 40 | Yes | UPL |
| 3. Casearia guianensis | 30 | Yes | FAC |
| 4. | | | |
| 5. | | | |
| | 100 | = Total Cover | |
| **Sapling/Shrub Stratum** (Plot size: 15 feet radius) | | | |
| 1. Cupania americana | 10 | Yes | UPL |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| | 10 | = Total Cover | |
| **Herb Stratum** (Plot size: 5 feet radius) | | | |
| 1. Sansevieria trifasciata | 20 | Yes | UPL |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| 6. | | | |
| 7. | | | |
| 8. | | | |
| | 20 | = Total Cover | |
| **Woody Vine Stratum** (Plot size: 30 feet radius) | | | |
| 1. Paulinnia pinnata | | | FAC |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| | _____ | = Total Cover | |

**Dominance Test worksheet:**

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 5 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 20 (A/B)

**Prevalence Index worksheet:**

| Total % Cover of: | Multiply by: |
|---|---|
| OBL species _____ | x 1 = _____ |
| FACW species _____ | x 2 = _____ |
| FAC species _____ | x 3 = _____ |
| FACU species _____ | x 4 = _____ |
| UPL species _____ | x 5 = _____ |
| Column Totals: _____ (A) | _____ (B) |

Prevalence Index = B/A = _____

**Hydrophytic Vegetation Indicators:**

- ☐ Rapid Test for Hydrophytic Vegetation
- ☐ Dominance Test is >50%
- ☐ Prevalence Index is ≤3.0[1]
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

**Hydrophytic Vegetation Present?** Yes _____ No X

Remarks:

## SOIL

Sampling Point: OP-05 (Ck-3)

**Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)**

| Depth (inches) | Matrix Color (moist) | % | Redox Features Color (moist) | % | Type[1] | Loc[2] | Texture | Remarks |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

**Hydric Soil Indicators:**

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Organic Bodies (A6)
- ☐ 5 cm Mucky Mineral (A7)
- ☐ Muck Presence (A8)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Dark Surface (S7)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)

**Indicators for Problematic Hydric Soils[3]:**

- ☐ Stratified Layers (A5)
- ☐ Very Shallow Dark Surface (TF12)
- ☑ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

**Restrictive Layer (if observed):**

Type: _____

Depth (inches): _____

**Hydric Soil Present? Yes _____ No _____**

Remarks:

Underground bedrock and roots, unable to dig soil pit.

## HYDROLOGY

**Wetland Hydrology Indicators:**

Primary Indicators (minimum of one required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☑ Drift Deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Aquatic Fauna (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres on Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Fiddler Crab Burrows (C10)
- ☐ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ☐ Surface Soil Cracks (B6)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)

**Field Observations:**

Surface Water Present? Yes _____ No X Depth (inches): _____

Water Table Present? Yes _____ No X Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes _____ No X Depth (inches): _____

**Wetland Hydrology Present? Yes X No _____**

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Observation point collected at Ck3 on a shallow watershed basin of 2.5m of depth and 4m of width from bank to bank. Watershed defined by adjacent hillslopeS. No OHWM observed.

# WETLAND DETERMINATION DATA FORM – Caribbean Islands Region

Project/Site: ÁNGEL CASTRO PÉREZ AVENUE EXPANSION (PR-122) Municipality/Town: San German & Lajas Sampling Date: March 30, 2023

Applicant/Owner: The Puerto Rico Highway and Transportation Authority (PRHTA) and the U.S. Department of Transportation (USDOT) PR or USVI: PR Sampling Point: OP-06 (Ck-4)

Investigator(s): Walter E. Soler Ward/Estate: Ancones

Landform (hillslope, terrace, etc.): Vegetated ephemeral stream Local relief (concave, convex, none): None Slope (%): 10

Lat: 18.068686° Long: -67.037826° Datum: PR Datum

Soil Map Unit Name: Mucara loam (MuE) NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes X No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

## SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

| | | | |
|---|---|---|---|
| Hydrophytic Vegetation Present? | Yes _____ | No X | **Is the Sampled Area within a Wetland?** Yes _____ No X |
| Hydric Soil Present? | Yes _____ | No _____ | |
| Wetland Hydrology Present? | Yes X | No _____ | |

Remarks:

Observation Point located within a vegetated ephemeral stream bed area (defined banks, exposed rocks), upstream of a culvert of former railroad track.

## VEGETATION – Use scientific names of plants.

| Tree Stratum (Plot size: 30 feet radius) | Absolute % Cover | Dominant Species? | Indicator Status |
|---|---|---|---|
| 1. Zanthoxylum martinicense | | | UPL |
| 2. Cordia alliodora | | | UPL |
| 3. Casearia sylvestris | | | FAC |
| 4. Inga laurina | | | UPL |
| 5. | | | |
| | _____ = Total Cover | | |
| **Sapling/Shrub Stratum** (Plot size: 15 feet radius) | | | |
| 1. Randia aculeata | | | UPL |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| | _____ = Total Cover | | |
| **Herb Stratum** (Plot size: 5 feet radius) | | | |
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| 6. | | | |
| 7. | | | |
| 8. | | | |
| | _____ = Total Cover | | |
| **Woody Vine Stratum** (Plot size: 30 feet radius) | | | |
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| | _____ = Total Cover | | |

**Dominance Test worksheet:**

Number of Dominant Species That Are OBL, FACW, or FAC: _____ (A)

Total Number of Dominant Species Across All Strata: _____ (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: _____ (A/B)

**Prevalence Index worksheet:**

| Total % Cover of: | Multiply by: |
|---|---|
| OBL species _____ | x 1 = _____ |
| FACW species _____ | x 2 = _____ |
| FAC species _____ | x 3 = _____ |
| FACU species _____ | x 4 = _____ |
| UPL species _____ | x 5 = _____ |
| Column Totals: _____ (A) | _____ (B) |

Prevalence Index = B/A = _____

**Hydrophytic Vegetation Indicators:**

- ☐ Rapid Test for Hydrophytic Vegetation
- ☐ Dominance Test is >50%
- ☐ Prevalence Index is ≤3.0[1]
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

**Hydrophytic Vegetation Present?** Yes _____ No X

Remarks:

## SOIL

Sampling Point: OP-06 (Ck-4)

**Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)**

| Depth (inches) | Matrix Color (moist) | % | Redox Features Color (moist) | % | Type[1] | Loc[2] | Texture | Remarks |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

**Hydric Soil Indicators:**

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Organic Bodies (A6)
- ☐ 5 cm Mucky Mineral (A7)
- ☐ Muck Presence (A8)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Dark Surface (S7)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)

**Indicators for Problematic Hydric Soils[3]:**

- ☐ Stratified Layers (A5)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

**Restrictive Layer (if observed):**

Type: _____

Depth (inches): _____

**Hydric Soil Present? Yes _____ No _____**

Remarks:

Exposed rock, underground bedrock and many roots, unable to dig soil pit.

## HYDROLOGY

**Wetland Hydrology Indicators:**

Primary Indicators (minimum of one required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1)
- ☑ Sediment Deposits (B2)
- ☑ Drift Deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Aquatic Fauna (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres on Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Fiddler Crab Burrows (C10)
- ☐ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ☐ Surface Soil Cracks (B6)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)

**Field Observations:**

Surface Water Present? Yes _____ No _____ Depth (inches): _____

Water Table Present? Yes _____ No _____ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes _____ No _____ Depth (inches): _____

**Wetland Hydrology Present? Yes X No _____**

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Observation point collected at a shallow ephemeral stream basin of 0.6m of depth bank and 1m of width from bank to bank. Basin defined by adjacent hillslope. No HWM observed.

# WETLAND DETERMINATION DATA FORM – Caribbean Islands Region

Project/Site: ÁNGEL CASTRO PÉREZ AVENUE EXPANSION (PR-122) Municipality/Town: San German & Lajas Sampling Date: March 30, 2023

Applicant/Owner: The Puerto Rico Highway and Transportation Authority (PRHTA) and the U.S. Department of Transportation (USDOT) PR or USVI: PR Sampling Point: OP-07 (Ck-4)

Investigator(s): Walter E. Soler Ward/Estate: Ancones

Landform (hillslope, terrace, etc.): Vegetated ephemeral stream Local relief (concave, convex, none): None Slope (%): 5

Lat: 18.068204° Long: -67.037882° Datum: PR Datum

Soil Map Unit Name: Mucara loam (MuE) NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes X No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

## SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

| | | | |
|---|---|---|---|
| Hydrophytic Vegetation Present? | Yes _____ | No X | **Is the Sampled Area within a Wetland?** Yes _____ No X |
| Hydric Soil Present? | Yes _____ | No _____ | |
| Wetland Hydrology Present? | Yes X | No _____ | |

Remarks:

Observation Point located within a vegetated ephemeral stream bed area (defined banks, exposed rocks), upstream of a culvert of former railroad track.

## VEGETATION – Use scientific names of plants.

| Tree Stratum (Plot size: 30 feet radius) | Absolute % Cover | Dominant Species? | Indicator Status |
|---|---|---|---|
| 1. Zanthoxylum martinicense | | | UPL |
| 2. Cordia alliodora | | | UPL |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| | = Total Cover | | |
| **Sapling/Shrub Stratum** (Plot size: 15 feet radius) | | | |
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| | = Total Cover | | |
| **Herb Stratum** (Plot size: 5 feet radius) | | | |
| 1. Sansevieria hyacinthoides | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| 6. | | | |
| 7. | | | |
| 8. | | | |
| | = Total Cover | | |
| **Woody Vine Stratum** (Plot size: 30 feet radius) | | | |
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| | = Total Cover | | |

**Dominance Test worksheet:**

Number of Dominant Species That Are OBL, FACW, or FAC: _____ (A)

Total Number of Dominant Species Across All Strata: _____ (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: _____ (A/B)

**Prevalence Index worksheet:**

| Total % Cover of: | Multiply by: |
|---|---|
| OBL species _____ | x 1 = _____ |
| FACW species _____ | x 2 = _____ |
| FAC species _____ | x 3 = _____ |
| FACU species _____ | x 4 = _____ |
| UPL species _____ | x 5 = _____ |
| Column Totals: _____ (A) | _____ (B) |

Prevalence Index = B/A = _____

**Hydrophytic Vegetation Indicators:**

- ☐ Rapid Test for Hydrophytic Vegetation
- ☐ Dominance Test is >50%
- ☐ Prevalence Index is ≤3.0[1]
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

**Hydrophytic Vegetation Present?** Yes _____ No X

Remarks:

## SOIL

Sampling Point: OP-07 (Ck-4)

**Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)**

| Depth (inches) | Matrix Color (moist) | % | Redox Features Color (moist) | % | Type[1] | Loc[2] | Texture | Remarks |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | |
| | | | | | | | | |
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| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

**Hydric Soil Indicators:**

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Organic Bodies (A6)
- ☐ 5 cm Mucky Mineral (A7)
- ☐ Muck Presence (A8)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Dark Surface (S7)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)

**Indicators for Problematic Hydric Soils[3]:**

- ☐ Stratified Layers (A5)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

**Restrictive Layer (if observed):**

Type: _____

Depth (inches): _____

**Hydric Soil Present? Yes _____ No _____**

Remarks:

Exposed rock, underground bedrock and many roots, unable to dig soil pit.

## HYDROLOGY

**Wetland Hydrology Indicators:**

Primary Indicators (minimum of one required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1)
- ☑ Sediment Deposits (B2)
- ☑ Drift Deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Aquatic Fauna (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres on Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Fiddler Crab Burrows (C10)
- ☐ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ☐ Surface Soil Cracks (B6)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)

**Field Observations:**

Surface Water Present? Yes _____ No _____ Depth (inches): _____

Water Table Present? Yes _____ No _____ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes _____ No _____ Depth (inches): _____

**Wetland Hydrology Present? Yes X No _____**

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Observation point collected at ephemeral stream that pass beneath the old railroad culvert crossing (Galeta). With a basin of 1.5m of depth bank and 4m of width from bank to bank, defined by adjacent hillslope, no OHWM observed.

# WETLAND DETERMINATION DATA FORM – Caribbean Islands Region

Project/Site: ÁNGEL CASTRO PÉREZ AVENUE EXPANSION (PR-122) Municipality/Town: San German & Lajas Sampling Date: March 30, 2023

Applicant/Owner: The Puerto Rico Highway and Transportation Authority (PRHTA) and the U.S. Department of Transportation (USDOT) PR or USVI: PR Sampling Point: OP-08 (Ck-5)

Investigator(s): Walter E. Soler Ward/Estate: Ancones

Landform (hillslope, terrace, etc.): Vegetated ephemeral stream Local relief (concave, convex, none): None Slope (%): 0

Lat: 18.068334° Long: -67.037070° Datum: PR Datum

Soil Map Unit Name: Mucara loam (MuE) NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes X No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

## SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

| | | | |
|---|---|---|---|
| Hydrophytic Vegetation Present? | Yes _____ | No X | **Is the Sampled Area within a Wetland?** Yes _____ No X |
| Hydric Soil Present? | Yes _____ | No _____ | |
| Wetland Hydrology Present? | Yes X | No _____ | |

Remarks:

Observation Point located within a vegetated ephemeral stream bed area with defined banks and exposed and underground rocks.

## VEGETATION – Use scientific names of plants.

| Tree Stratum (Plot size: 30 feet radius) | Absolute % Cover | Dominant Species? | Indicator Status |
|---|---|---|---|
| 1. Zanthoxylum martinicense | | | UPL |
| 2. Cupania americana | | | UPL |
| 3. Casearia guianensis | | | FACU |
| 4. | | | |
| 5. | | | |
| | _____ = Total Cover | | |
| **Sapling/Shrub Stratum** (Plot size: 15 feet radius) | | | |
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| | _____ = Total Cover | | |
| **Herb Stratum** (Plot size: 5 feet radius) | | | |
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| 6. | | | |
| 7. | | | |
| 8. | | | |
| | _____ = Total Cover | | |
| **Woody Vine Stratum** (Plot size: 30 feet radius) | | | |
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| | _____ = Total Cover | | |

**Dominance Test worksheet:**

Number of Dominant Species That Are OBL, FACW, or FAC: _____ (A)

Total Number of Dominant Species Across All Strata: _____ (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: _____ (A/B)

**Prevalence Index worksheet:**

| Total % Cover of: | Multiply by: |
|---|---|
| OBL species _____ | x 1 = _____ |
| FACW species _____ | x 2 = _____ |
| FAC species _____ | x 3 = _____ |
| FACU species _____ | x 4 = _____ |
| UPL species _____ | x 5 = _____ |
| Column Totals: _____ (A) | _____ (B) |

Prevalence Index = B/A = _____

**Hydrophytic Vegetation Indicators:**

- ☐ Rapid Test for Hydrophytic Vegetation
- ☐ Dominance Test is >50%
- ☐ Prevalence Index is ≤3.0[1]
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

**Hydrophytic Vegetation Present?** Yes _____ No X

Remarks:

## SOIL

Sampling Point: OP-08 (Ck-5)

**Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)**

| Depth (inches) | Matrix Color (moist) | % | Redox Features Color (moist) | % | Type[1] | Loc[2] | Texture | Remarks |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

**Hydric Soil Indicators:**

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Organic Bodies (A6)
- ☐ 5 cm Mucky Mineral (A7)
- ☐ Muck Presence (A8)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Dark Surface (S7)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)

**Indicators for Problematic Hydric Soils[3]:**

- ☐ Stratified Layers (A5)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

**Restrictive Layer (if observed):**

Type: _____

Depth (inches): _____

**Hydric Soil Present? Yes _____ No _____**

Remarks:

Exposed rock, underground bedrock and many roots, unable to dig soil pit.

## HYDROLOGY

**Wetland Hydrology Indicators:**

Primary Indicators (minimum of one required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1)
- ☑ Sediment Deposits (B2)
- ☑ Drift Deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Aquatic Fauna (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres on Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Fiddler Crab Burrows (C10)
- ☐ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ☐ Surface Soil Cracks (B6)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)

**Field Observations:**

Surface Water Present? Yes _____ No X Depth (inches): _____

Water Table Present? Yes _____ No X Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes _____ No X Depth (inches): _____

**Wetland Hydrology Present? Yes X No _____**

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Observation point collected at ephemeral stream that pass beneath the old railroad culvert crossing (Galeta). With a basin of 1.5m of depth bank and 4m of width from bank to bank, defined by adjacent hillslope, no OHWM observed.

# WETLAND DETERMINATION DATA FORM – Caribbean Islands Region

Project/Site: ÁNGEL CASTRO PÉREZ AVENUE EXPANSION (PR-122) Municipality/Town: San German & Lajas Sampling Date: March 30, 2023

Applicant/Owner: The Puerto Rico Highway and Transportation Authority (PRHTA) and the U.S. Department of Transportation (USDOT) PR or USVI: PR Sampling Point: OP-09 (Ck-5)

Investigator(s): Walter E. Soler Ward/Estate: Ancones

Landform (hillslope, terrace, etc.): Vegetated ephemeral stream Local relief (concave, convex, none): None Slope (%): 5

Lat: 18.068853° Long: -67.036966° Datum: PR Datum

Soil Map Unit Name: Mucara loam (MuE) NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes X No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

## SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

| | | | |
|---|---|---|---|
| Hydrophytic Vegetation Present? | Yes _____ | No X | **Is the Sampled Area within a Wetland?** Yes _____ No X |
| Hydric Soil Present? | Yes _____ | No _____ | |
| Wetland Hydrology Present? | Yes X | No _____ | |

Remarks:

Observation Point located within a vegetated ephemeral stream bed area with defined banks and exposed and underground rocks.

## VEGETATION – Use scientific names of plants.

| Tree Stratum (Plot size: 30 feet radius) | Absolute % Cover | Dominant Species? | Indicator Status |
|---|---|---|---|
| 1. Zanthoxylum martinicense | | | UPL |
| 2. Cupania americana | | | UPL |
| 3. Casearia guianensis | | | FACU |
| 4. | | | |
| 5. | | | |
| | _____ = Total Cover | | |
| **Sapling/Shrub Stratum** (Plot size: 15 feet radius) | | | |
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| | _____ = Total Cover | | |
| **Herb Stratum** (Plot size: 5 feet radius) | | | |
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| 6. | | | |
| 7. | | | |
| 8. | | | |
| | _____ = Total Cover | | |
| **Woody Vine Stratum** (Plot size: 30 feet radius) | | | |
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| | _____ = Total Cover | | |

**Dominance Test worksheet:**

Number of Dominant Species That Are OBL, FACW, or FAC: _____ (A)

Total Number of Dominant Species Across All Strata: _____ (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: _____ (A/B)

**Prevalence Index worksheet:**

| Total % Cover of: | | Multiply by: | |
|---|---|---|---|
| OBL species | _____ | x 1 = | _____ |
| FACW species | _____ | x 2 = | _____ |
| FAC species | _____ | x 3 = | _____ |
| FACU species | _____ | x 4 = | _____ |
| UPL species | _____ | x 5 = | _____ |
| Column Totals: | _____ (A) | | _____ (B) |

Prevalence Index = B/A = _____

**Hydrophytic Vegetation Indicators:**

- ☐ Rapid Test for Hydrophytic Vegetation
- ☐ Dominance Test is >50%
- ☐ Prevalence Index is ≤3.0[1]
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

**Hydrophytic Vegetation Present?** Yes _____ No X

Remarks:

## SOIL

Sampling Point: OP-09 (Ck-5)

**Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)**

| Depth (inches) | Matrix Color (moist) | % | Redox Features Color (moist) | % | Type[1] | Loc[2] | Texture | Remarks |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

**Hydric Soil Indicators:**

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Organic Bodies (A6)
- ☐ 5 cm Mucky Mineral (A7)
- ☐ Muck Presence (A8)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Dark Surface (S7)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)

**Indicators for Problematic Hydric Soils[3]:**

- ☐ Stratified Layers (A5)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

**Restrictive Layer (if observed):**

Type: _____

Depth (inches): _____

**Hydric Soil Present? Yes _____ No _____**

Remarks:

Exposed rock, underground bedrock and many roots, unable to dig soil pit.

## HYDROLOGY

**Wetland Hydrology Indicators:**

Primary Indicators (minimum of one required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☑ Drift Deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Aquatic Fauna (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres on Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Fiddler Crab Burrows (C10)
- ☐ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ☐ Surface Soil Cracks (B6)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)

**Field Observations:**

Surface Water Present? Yes _____ No _____ Depth (inches): _____

Water Table Present? Yes _____ No _____ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes _____ No _____ Depth (inches): _____

**Wetland Hydrology Present? Yes X No _____**

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Observation point collected at ephemeral stream that pass beneath the old railroad culvert crossing (Galeta). With a basin of 1m of depth bank and 3m of width that runs south down hill, defined by adjacent hillslopes, no OHWM observed.

# WETLAND DETERMINATION DATA FORM – Caribbean Islands Region

Project/Site: ÁNGEL CASTRO PÉREZ AVENUE EXPANSION (PR-122) Municipality/Town: San German & Lajas Sampling Date: March 30, 2023

Applicant/Owner: The Puerto Rico Highway and Transportation Authority (PRHTA) and the U.S. Department of Transportation (USDOT) PR or USVI: PR Sampling Point: OP-10 (Ck-6)

Investigator(s): Walter E. Soler Ward/Estate: Ancones

Landform (hillslope, terrace, etc.): Vegetated ephemeral stream Local relief (concave, convex, none): None Slope (%): 0

Lat: 18.068725° Long: -67.035716° Datum: PR Datum

Soil Map Unit Name: Mucara loam (MuE) NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes X No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

## SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

| | | | |
|---|---|---|---|
| Hydrophytic Vegetation Present? | Yes _____ | No X | **Is the Sampled Area within a Wetland?** Yes _____ No X |
| Hydric Soil Present? | Yes _____ | No _____ | |
| Wetland Hydrology Present? | Yes X | No _____ | |

Remarks:

Observation Point located within an ephemeral stream that runs south down hill and across and existing dirt road.

## VEGETATION – Use scientific names of plants.

| Tree Stratum (Plot size: 30 feet radius) | Absolute % Cover | Dominant Species? | Indicator Status |
|---|---|---|---|
| 1. Zanthoxylum martinicense | | | UPL |
| 2. Albizia procera | | | UPL |
| 3. Casearia guianensis | | | FACU |
| 4. | | | |
| 5. | | | |
| | _____ = Total Cover | | |
| **Sapling/Shrub Stratum** (Plot size: 15 feet radius) | | | |
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| | _____ = Total Cover | | |
| **Herb Stratum** (Plot size: 5 feet radius) | | | |
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| 6. | | | |
| 7. | | | |
| 8. | | | |
| | _____ = Total Cover | | |
| **Woody Vine Stratum** (Plot size: 30 feet radius) | | | |
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| | _____ = Total Cover | | |

**Dominance Test worksheet:**

Number of Dominant Species That Are OBL, FACW, or FAC: _____ (A)

Total Number of Dominant Species Across All Strata: _____ (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: _____ (A/B)

**Prevalence Index worksheet:**

| Total % Cover of: | Multiply by: |
|---|---|
| OBL species _____ | x 1 = _____ |
| FACW species _____ | x 2 = _____ |
| FAC species _____ | x 3 = _____ |
| FACU species _____ | x 4 = _____ |
| UPL species _____ | x 5 = _____ |
| Column Totals: _____ (A) | _____ (B) |

Prevalence Index = B/A = _____

**Hydrophytic Vegetation Indicators:**

- ☐ Rapid Test for Hydrophytic Vegetation
- ☐ Dominance Test is >50%
- ☐ Prevalence Index is ≤3.0[1]
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

**Hydrophytic Vegetation Present?** Yes _____ No X

Remarks:

## SOIL

Sampling Point: OP-10 (Ck-6)

**Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)**

| Depth (inches) | Matrix Color (moist) | % | Redox Features Color (moist) | % | Type[1] | Loc[2] | Texture | Remarks |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

**Hydric Soil Indicators:**

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Organic Bodies (A6)
- ☐ 5 cm Mucky Mineral (A7)
- ☐ Muck Presence (A8)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Dark Surface (S7)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)

**Indicators for Problematic Hydric Soils[3]:**

- ☐ Stratified Layers (A5)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

**Restrictive Layer (if observed):**

Type: _____

Depth (inches): _____

**Hydric Soil Present? Yes _____ No _____**

Remarks:

Exposed rock, underground bedrock and many roots, unable to dig soil pit.

## HYDROLOGY

**Wetland Hydrology Indicators:**

Primary Indicators (minimum of one required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1)
- ☑ Sediment Deposits (B2)
- ☑ Drift Deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Aquatic Fauna (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres on Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Fiddler Crab Burrows (C10)
- ☐ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ☐ Surface Soil Cracks (B6)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)

**Field Observations:**

Surface Water Present? Yes _____ No _____ Depth (inches): _____

Water Table Present? Yes _____ No _____ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes _____ No _____ Depth (inches): _____

**Wetland Hydrology Present? Yes X No _____**

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Observation Point located within an ephemeral stream that runs south down hill and across and existing dirt road. With a basin of 1m of depth bank and 4m of width from bank to bank, defined by adjacent hillslope;o OHWM observed.

# WETLAND DETERMINATION DATA FORM – Caribbean Islands Region

Project/Site: ÁNGEL CASTRO PÉREZ AVENUE EXPANSION (PR-122) Municipality/Town: San German & Lajas Sampling Date: March 30, 2023

Applicant/Owner: The Puerto Rico Highway and Transportation Authority (PRHTA) and the U.S. Department of Transportation (USDOT) PR or USVI: PR Sampling Point: OP-11 (Ck-6)

Investigator(s): Walter E. Soler Ward/Estate: Ancones

Landform (hillslope, terrace, etc.): Vegetated ephemeral stream Local relief (concave, convex, none): None Slope (%): 0

Lat: 18.068591° Long: -67.035366° Datum: PR Datum

Soil Map Unit Name: Mucara loam (MuE) NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes X No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

## SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

| | | | |
|---|---|---|---|
| Hydrophytic Vegetation Present? | Yes _____ | No X | **Is the Sampled Area within a Wetland?** Yes _____ No X |
| Hydric Soil Present? | Yes _____ | No _____ | |
| Wetland Hydrology Present? | Yes X | No _____ | |

Remarks:

Observation Point located within a vegetated ephemeral stream bed area with banks defined by hillslopes and exposed and underground rocks.

## VEGETATION – Use scientific names of plants.

| Tree Stratum (Plot size: 30 feet radius) | Absolute % Cover | Dominant Species? | Indicator Status |
|---|---|---|---|
| 1. Senna siamea | | | UPL |
| 2. Inga laurina | | | UPL |
| 3. Casearia guianensis | | | FACU |
| 4. | | | |
| 5. | | | |
| | _____ = Total Cover | | |
| **Sapling/Shrub Stratum** (Plot size: 15 feet radius) | | | |
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| | _____ = Total Cover | | |
| **Herb Stratum** (Plot size: 5 feet radius) | | | |
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| 6. | | | |
| 7. | | | |
| 8. | | | |
| | _____ = Total Cover | | |
| **Woody Vine Stratum** (Plot size: 30 feet radius) | | | |
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| | _____ = Total Cover | | |

**Dominance Test worksheet:**

Number of Dominant Species That Are OBL, FACW, or FAC: _____ (A)

Total Number of Dominant Species Across All Strata: _____ (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: _____ (A/B)

**Prevalence Index worksheet:**

| Total % Cover of: | Multiply by: |
|---|---|
| OBL species _____ | x 1 = _____ |
| FACW species _____ | x 2 = _____ |
| FAC species _____ | x 3 = _____ |
| FACU species _____ | x 4 = _____ |
| UPL species _____ | x 5 = _____ |
| Column Totals: _____ (A) | _____ (B) |

Prevalence Index = B/A = _____

**Hydrophytic Vegetation Indicators:**

- ☐ Rapid Test for Hydrophytic Vegetation
- ☐ Dominance Test is >50%
- ☐ Prevalence Index is ≤3.0[1]
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

**Hydrophytic Vegetation Present?** Yes _____ No X

Remarks:

## SOIL

Sampling Point: OP-11 (Ck-6)

**Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)**

| Depth (inches) | Matrix Color (moist) | % | Redox Features Color (moist) | % | Type[1] | Loc[2] | Texture | Remarks |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

**Hydric Soil Indicators:**

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Organic Bodies (A6)
- ☐ 5 cm Mucky Mineral (A7)
- ☐ Muck Presence (A8)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Dark Surface (S7)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)

**Indicators for Problematic Hydric Soils[3]:**

- ☐ Stratified Layers (A5)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

**Restrictive Layer (if observed):**

Type: _____

Depth (inches): _____

**Hydric Soil Present? Yes _____ No _____**

Remarks:

Exposed rock, underground bedrock and many roots, unable to dig soil pit.

## HYDROLOGY

**Wetland Hydrology Indicators:**

Primary Indicators (minimum of one required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1)
- ☑ Sediment Deposits (B2)
- ☑ Drift Deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Aquatic Fauna (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres on Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Fiddler Crab Burrows (C10)
- ☐ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ☐ Surface Soil Cracks (B6)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)

**Field Observations:**

Surface Water Present? Yes _____ No _____ Depth (inches): _____

Water Table Present? Yes _____ No _____ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes _____ No _____ Depth (inches): _____

**Wetland Hydrology Present? Yes X No _____**

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Observation Point located within an ephemeral stream that runs south, down hill and across existent trails and through old railroad crossing (Galeta) which is obstructed with drift and sediment deposits. Watershed basin of 1.5m of depth bank and 6m of width from bank to bank, defined by adjacent hillslope. No OHWM observed.

# WETLAND DETERMINATION DATA FORM – Caribbean Islands Region

Project/Site: ÁNGEL CASTRO PÉREZ AVENUE EXPANSION (PR-122) Municipality/Town: San German & Lajas Sampling Date: March 30, 2023

Applicant/Owner: The Puerto Rico Highway and Transportation Authority (PRHTA) and the U.S. Department of Transportation (USDOT) PR or USVI: PR Sampling Point: OP-12 (Ck-7)

Investigator(s): Walter E. Soler Ward/Estate: Ancones

Landform (hillslope, terrace, etc.): Vegetated ephemeral stream Local relief (concave, convex, none): None Slope (%): 0

Lat: 18.069201° Long: -67.035211° Datum: PR Datum

Soil Map Unit Name: Mucara loam (MuE) NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes X No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

## SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

| | | | |
|---|---|---|---|
| Hydrophytic Vegetation Present? | Yes _____ | No X | **Is the Sampled Area within a Wetland?** Yes _____ No X |
| Hydric Soil Present? | Yes _____ | No _____ | |
| Wetland Hydrology Present? | Yes X | No _____ | |

Remarks:

Observation Point located within a vegetated ephemeral stream bed area (defined banks, exposed rocks), upstream of a culvert of former railroad track.

## VEGETATION – Use scientific names of plants.

| Tree Stratum (Plot size: 30 feet radius) | Absolute % Cover | Dominant Species? | Indicator Status |
|---|---|---|---|
| 1. Mangifera indica | | | UPL |
| 2. Casearia guianensis | | | FACU |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| | = Total Cover | | |
| **Sapling/Shrub Stratum** (Plot size: 15 feet radius) | | | |
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| | = Total Cover | | |
| **Herb Stratum** (Plot size: 5 feet radius) | | | |
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| 6. | | | |
| 7. | | | |
| 8. | | | |
| | = Total Cover | | |
| **Woody Vine Stratum** (Plot size: 30 feet radius) | | | |
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| | = Total Cover | | |

**Dominance Test worksheet:**

Number of Dominant Species That Are OBL, FACW, or FAC: _____ (A)

Total Number of Dominant Species Across All Strata: _____ (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: _____ (A/B)

**Prevalence Index worksheet:**

| Total % Cover of: | Multiply by: |
|---|---|
| OBL species _____ | x 1 = _____ |
| FACW species _____ | x 2 = _____ |
| FAC species _____ | x 3 = _____ |
| FACU species _____ | x 4 = _____ |
| UPL species _____ | x 5 = _____ |
| Column Totals: _____ (A) | _____ (B) |

Prevalence Index = B/A = _____

**Hydrophytic Vegetation Indicators:**

- ☐ Rapid Test for Hydrophytic Vegetation
- ☐ Dominance Test is >50%
- ☐ Prevalence Index is ≤3.0[1]
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

**Hydrophytic Vegetation Present?** Yes _____ No X

Remarks:

## SOIL

Sampling Point: OP-12 (Ck-7)

**Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)**

| Depth (inches) | Matrix Color (moist) | % | Redox Features Color (moist) | % | Type[1] | Loc[2] | Texture | Remarks |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

**Hydric Soil Indicators:**

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Organic Bodies (A6)
- ☐ 5 cm Mucky Mineral (A7)
- ☐ Muck Presence (A8)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Dark Surface (S7)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)

**Indicators for Problematic Hydric Soils[3]:**

- ☐ Stratified Layers (A5)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

**Restrictive Layer (if observed):**

Type: _____

Depth (inches): _____

**Hydric Soil Present? Yes _____ No _____**

Remarks:

Exposed rock, underground bedrock and many roots, unable to dig soil pit.

## HYDROLOGY

**Wetland Hydrology Indicators:**

Primary Indicators (minimum of one required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☑ Drift Deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Aquatic Fauna (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres on Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Fiddler Crab Burrows (C10)
- ☐ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ☐ Surface Soil Cracks (B6)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)

**Field Observations:**

Surface Water Present? Yes _____ No _____ Depth (inches): _____

Water Table Present? Yes _____ No _____ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes _____ No _____ Depth (inches): _____

**Wetland Hydrology Present? Yes X No _____**

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Observation Point located within an ephemeral stream that runs south, down hill and across the former railroad berm and culvert (Galeta) which is obstructed with drift and sediment deposits. Watershed basin of 1m of depth bank and 5m of width from bank to bank, defined by adjacent hillslope.
No OHWM observed.

# WETLAND DETERMINATION DATA FORM – Caribbean Islands Region

Project/Site: ÁNGEL CASTRO PÉREZ AVENUE EXPANSION (PR-122) Municipality/Town: San German & Lajas Sampling Date: March 30, 2023

Applicant/Owner: The Puerto Rico Highway and Transportation Authority (PRHTA) and the U.S. Department of Transportation (USDOT) PR or USVI: PR Sampling Point: OP-13 (Ck-7)

Investigator(s): Walter E. Soler Ward/Estate: Ancones

Landform (hillslope, terrace, etc.): Vegetated ephemeral stream Local relief (concave, convex, none): None Slope (%): 0

Lat: 18.068647° Long: -67.034658° Datum: PR Datum

Soil Map Unit Name: Mucara loam (MuE) NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes X No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

## SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

| | | | |
|---|---|---|---|
| Hydrophytic Vegetation Present? | Yes _____ | No X | **Is the Sampled Area within a Wetland?** Yes _____ No X |
| Hydric Soil Present? | Yes _____ | No _____ | |
| Wetland Hydrology Present? | Yes _____ | No X | |

Remarks:

Observation Point located within a vegetated ephemeral stream bed area with defined banks and exposed rocks.

## VEGETATION – Use scientific names of plants.

| Tree Stratum (Plot size: 30 feet radius) | Absolute % Cover | Dominant Species? | Indicator Status |
|---|---|---|---|
| 1. Senna siamea | | | UPL |
| 2. Casearia guianensis | | | FACU |
| 3. Melicoccus bijugatus | | | UPL |
| 4. | | | |
| 5. | | | |
| | _____ = Total Cover | | |
| **Sapling/Shrub Stratum** (Plot size: 15 feet radius) | | | |
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| | _____ = Total Cover | | |
| **Herb Stratum** (Plot size: 5 feet radius) | | | |
| 1. Bromelia pinguin | | | UPL |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| 6. | | | |
| 7. | | | |
| 8. | | | |
| | _____ = Total Cover | | |
| **Woody Vine Stratum** (Plot size: 30 feet radius) | | | |
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| | _____ = Total Cover | | |

**Dominance Test worksheet:**

Number of Dominant Species That Are OBL, FACW, or FAC: _____ (A)

Total Number of Dominant Species Across All Strata: _____ (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: _____ (A/B)

**Prevalence Index worksheet:**

| Total % Cover of: | Multiply by: |
|---|---|
| OBL species _____ | x 1 = _____ |
| FACW species _____ | x 2 = _____ |
| FAC species _____ | x 3 = _____ |
| FACU species _____ | x 4 = _____ |
| UPL species _____ | x 5 = _____ |
| Column Totals: _____ (A) | _____ (B) |

Prevalence Index = B/A = _____

**Hydrophytic Vegetation Indicators:**

- ☐ Rapid Test for Hydrophytic Vegetation
- ☐ Dominance Test is >50%
- ☐ Prevalence Index is ≤3.0[1]
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

**Hydrophytic Vegetation Present?** Yes _____ No X

Remarks:

## SOIL

Sampling Point: OP-13 (Ck-7)

**Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)**

| Depth (inches) | Matrix Color (moist) | % | Redox Features Color (moist) | % | Type[1] | Loc[2] | Texture | Remarks |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

**Hydric Soil Indicators:**

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Organic Bodies (A6)
- ☐ 5 cm Mucky Mineral (A7)
- ☐ Muck Presence (A8)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Dark Surface (S7)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)

**Indicators for Problematic Hydric Soils[3]:**

- ☐ Stratified Layers (A5)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

**Restrictive Layer (if observed):**

Type: _____

Depth (inches): _____

**Hydric Soil Present? Yes _____ No _____**

Remarks:

Exposed rock, underground bedrock and many roots, unable to dig soil pit.

## HYDROLOGY

**Wetland Hydrology Indicators:**

Primary Indicators (minimum of one required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift Deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Aquatic Fauna (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres on Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Fiddler Crab Burrows (C10)
- ☐ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ☐ Surface Soil Cracks (B6)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)

**Field Observations:**

Surface Water Present? Yes _____ No _____ Depth (inches): _____

Water Table Present? Yes _____ No _____ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes _____ No _____ Depth (inches): _____

**Wetland Hydrology Present? Yes _____ No X**

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

No hydrology indicators observed. Stream basin of 0.6m of depth bank and 1m of width from bank to bank, defined by adjacent hillslope.

# WETLAND DETERMINATION DATA FORM – Caribbean Islands Region

Project/Site: ÁNGEL CASTRO PÉREZ AVENUE EXPANSION (PR-122) Municipality/Town: San German & Lajas Sampling Date: March 30, 2023

Applicant/Owner: The Puerto Rico Highway and Transportation Authority (PRHTA) and the U.S. Department of Transportation (USDOT) PR or USVI: PR Sampling Point: OP-14

Investigator(s): Walter E. Soler Ward/Estate: Ancones

Landform (hillslope, terrace, etc.): Hillslopes basin Local relief (concave, convex, none): None Slope (%): 0

Lat: 18.069346° Long: -67.033759° Datum: PR Datum

Soil Map Unit Name: Mucara loam (MuE) NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes X No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

## SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

| | | | |
|---|---|---|---|
| Hydrophytic Vegetation Present? | Yes _____ | No X | **Is the Sampled Area within a Wetland?** Yes _____ No X |
| Hydric Soil Present? | Yes _____ | No _____ | |
| Wetland Hydrology Present? | Yes X | No _____ | |

Remarks:

Observation Point located within a drainage area that collects adjacent hills runoff out of the proposed project area, and abuts through a former railroad culvert.

## VEGETATION – Use scientific names of plants.

| Tree Stratum (Plot size: 30 feet radius) | Absolute % Cover | Dominant Species? | Indicator Status |
|---|---|---|---|
| 1. Senna siamea | | | UPL |
| 2. Casearia guianensis | | | FACU |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| | = Total Cover | | |
| **Sapling/Shrub Stratum** (Plot size: 15 feet radius) | | | |
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| | = Total Cover | | |
| **Herb Stratum** (Plot size: 5 feet radius) | | | |
| 1. Bromelia pinguin | | | UPL |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| 6. | | | |
| 7. | | | |
| 8. | | | |
| | = Total Cover | | |
| **Woody Vine Stratum** (Plot size: 30 feet radius) | | | |
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| | = Total Cover | | |

**Dominance Test worksheet:**

Number of Dominant Species That Are OBL, FACW, or FAC: _____ (A)

Total Number of Dominant Species Across All Strata: _____ (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: _____ (A/B)

**Prevalence Index worksheet:**

| Total % Cover of: | Multiply by: |
|---|---|
| OBL species _____ | x 1 = _____ |
| FACW species _____ | x 2 = _____ |
| FAC species _____ | x 3 = _____ |
| FACU species _____ | x 4 = _____ |
| UPL species _____ | x 5 = _____ |
| Column Totals: _____ (A) | _____ (B) |

Prevalence Index = B/A = _____

**Hydrophytic Vegetation Indicators:**

- ☐ Rapid Test for Hydrophytic Vegetation
- ☐ Dominance Test is >50%
- ☐ Prevalence Index is ≤3.0[1]
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

**Hydrophytic Vegetation Present?** Yes _____ No X

Remarks:

## SOIL

Sampling Point: OP-14

**Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)**

| Depth (inches) | Matrix Color (moist) | % | Redox Features Color (moist) | % | Type[1] | Loc[2] | Texture | Remarks |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

**Hydric Soil Indicators:**

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Organic Bodies (A6)
- ☐ 5 cm Mucky Mineral (A7)
- ☐ Muck Presence (A8)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Dark Surface (S7)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)

**Indicators for Problematic Hydric Soils[3]:**

- ☐ Stratified Layers (A5)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

**Restrictive Layer (if observed):**

Type: _____

Depth (inches): _____

**Hydric Soil Present? Yes _____ No _____**

Remarks:

Exposed rock, underground bedrock and many roots, unable to dig soil pit.

## HYDROLOGY

**Wetland Hydrology Indicators:**

Primary Indicators (minimum of one required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1)
- ☑ Sediment Deposits (B2)
- ☐ Drift Deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Aquatic Fauna (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres on Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Fiddler Crab Burrows (C10)
- ☐ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ☐ Surface Soil Cracks (B6)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)

**Field Observations:**

Surface Water Present? Yes _____ No _____ Depth (inches): _____

Water Table Present? Yes _____ No _____ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes _____ No _____ Depth (inches): _____

**Wetland Hydrology Present? Yes X No _____**

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Observation point located out of proposed project area. This drainage area is not on the hydrography map of the study area. To the northeast as observed, it doesn't shows traceable watershed basin or stream, to the south runs under the former railroad crossing (Galeta) and through an area with no defined bank along a private property.

# WETLAND DETERMINATION DATA FORM – Caribbean Islands Region

Project/Site: ÁNGEL CASTRO PÉREZ AVENUE EXPANSION (PR-122) Municipality/Town: San German & Lajas Sampling Date: March 30, 2023

Applicant/Owner: The Puerto Rico Highway and Transportation Authority (PRHTA) and the U.S. Department of Transportation (USDOT) PR or USVI: PR Sampling Point: OP-15 (Ck-8)

Investigator(s): Walter E. Soler Ward/Estate: Ancones

Landform (hillslope, terrace, etc.): Ephemeral Stream Basin Local relief (concave, convex, none): None Slope (%): 10

Lat: 18.069582° Long: -67.033570° Datum: PR Datum

Soil Map Unit Name: Mucara loam (MuE) NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes X No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

## SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

| | | | |
|---|---|---|---|
| Hydrophytic Vegetation Present? | Yes _____ | No X | **Is the Sampled Area within a Wetland?** Yes _____ No X |
| Hydric Soil Present? | Yes _____ | No _____ | |
| Wetland Hydrology Present? | Yes X | No _____ | |

Remarks:

Observation Point located within an ephemeral stream and drainage area that collects adjacent hills runoff, and abuts through a former railroad culvert; a tributary on an unnamed creek (RPW Stream).

## VEGETATION – Use scientific names of plants.

| Tree Stratum (Plot size: 30 feet radius) | Absolute % Cover | Dominant Species? | Indicator Status |
|---|---|---|---|
| 1. Spondias mombin | | | UPL |
| 2. Persea americana | | | UPL |
| 3. Melicoccus bijugatus | | | UPL |
| 4. | | | |
| 5. | | | |
| | = Total Cover | | |
| **Sapling/Shrub Stratum** (Plot size: 15 feet radius) | | | |
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| | = Total Cover | | |
| **Herb Stratum** (Plot size: 5 feet radius) | | | |
| 1. Bromelia pinguin | | | UPL |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| 6. | | | |
| 7. | | | |
| 8. | | | |
| | = Total Cover | | |
| **Woody Vine Stratum** (Plot size: 30 feet radius) | | | |
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| | = Total Cover | | |

**Dominance Test worksheet:**

Number of Dominant Species That Are OBL, FACW, or FAC: _____ (A)

Total Number of Dominant Species Across All Strata: _____ (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: _____ (A/B)

**Prevalence Index worksheet:**

| Total % Cover of: | Multiply by: |
|---|---|
| OBL species _____ | x 1 = _____ |
| FACW species _____ | x 2 = _____ |
| FAC species _____ | x 3 = _____ |
| FACU species _____ | x 4 = _____ |
| UPL species _____ | x 5 = _____ |
| Column Totals: _____ (A) | _____ (B) |

Prevalence Index = B/A = _____

**Hydrophytic Vegetation Indicators:**

- ☐ Rapid Test for Hydrophytic Vegetation
- ☐ Dominance Test is >50%
- ☐ Prevalence Index is ≤3.0[1]
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

**Hydrophytic Vegetation Present?** Yes _____ No X

Remarks:

## SOIL

Sampling Point: OP-15 (Ck-8)

**Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)**

| Depth (inches) | Matrix Color (moist) | % | Redox Features Color (moist) | % | Type[1] | Loc[2] | Texture | Remarks |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | |
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| | | | | | | | | |
| | | | | | | | | |

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

**Hydric Soil Indicators:**

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Organic Bodies (A6)
- ☐ 5 cm Mucky Mineral (A7)
- ☐ Muck Presence (A8)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Dark Surface (S7)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)

**Indicators for Problematic Hydric Soils[3]:**

- ☐ Stratified Layers (A5)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

**Restrictive Layer (if observed):**

Type: _____

Depth (inches): _____

**Hydric Soil Present? Yes _____ No _____**

Remarks:

Exposed rock, underground bedrock and many roots, unable to dig soil pit.

## HYDROLOGY

**Wetland Hydrology Indicators:**

Primary Indicators (minimum of one required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☑ Drift Deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Aquatic Fauna (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres on Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Fiddler Crab Burrows (C10)
- ☐ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ☐ Surface Soil Cracks (B6)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)

**Field Observations:**

Surface Water Present? Yes _____ No _____ Depth (inches): _____

Water Table Present? Yes _____ No _____ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes _____ No _____ Depth (inches): _____

**Wetland Hydrology Present? Yes X No _____**

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Observation Point located within an ephemeral stream that runs southeast, down hill and across existent trails and through an old railroad crossing (Galeta) which has drift and sediment deposits. Watershed basin of 1m of depth bank and 2m of width from bank to bank, defined by adjacent hillslope. Ephemeral stream is a tributary on an unnamed creek (RPW Stream).
No OHWM observed.

# WETLAND DETERMINATION DATA FORM – Caribbean Islands Region

Project/Site: ÁNGEL CASTRO PÉREZ AVENUE EXPANSION (PR-122) Municipality/Town: San German & Lajas Sampling Date: March 30, 2023

Applicant/Owner: The Puerto Rico Highway and Transportation Authority (PRHTA) and the U.S. Department of Transportation (USDOT) PR or USVI: PR Sampling Point: OP-16 (Ck-8)

Investigator(s): Walter E. Soler Ward/Estate: Ancones

Landform (hillslope, terrace, etc.): Ephemeral Stream Basin Local relief (concave, convex, none): None Slope (%): 15

Lat: 18.069832° Long: -67.033812° Datum: PR Datum

Soil Map Unit Name: Mucara loam (MuE) NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes X No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

## SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

| | | | |
|---|---|---|---|
| Hydrophytic Vegetation Present? | Yes _____ | No X | **Is the Sampled Area within a Wetland?** Yes _____ No X |
| Hydric Soil Present? | Yes _____ | No _____ | |
| Wetland Hydrology Present? | Yes X | No _____ | |

Remarks:

Observation Point located within at the beginning of an ephemeral stream upstream of OP15, that collects adjacent hills runoff, a tributary on an unnamed creek (RPW Stream).

## VEGETATION – Use scientific names of plants.

| Tree Stratum (Plot size: 30 feet radius) | Absolute % Cover | Dominant Species? | Indicator Status |
|---|---|---|---|
| 1. Spondias mombin | | | UPL |
| 2. Inga laurina | | | UPL |
| 3. Heamatoxylum campechianum | | | UPL |
| 4. | | | |
| 5. | | | |
| | = Total Cover | | |

| Sapling/Shrub Stratum (Plot size: 15 feet radius) | | | |
|---|---|---|---|
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| | = Total Cover | | |

| Herb Stratum (Plot size: 5 feet radius) | | | |
|---|---|---|---|
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| 6. | | | |
| 7. | | | |
| 8. | | | |
| | = Total Cover | | |

| Woody Vine Stratum (Plot size: 30 feet radius) | | | |
|---|---|---|---|
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| | = Total Cover | | |

**Dominance Test worksheet:**

Number of Dominant Species That Are OBL, FACW, or FAC: _____ (A)

Total Number of Dominant Species Across All Strata: _____ (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: _____ (A/B)

**Prevalence Index worksheet:**

| Total % Cover of: | Multiply by: |
|---|---|
| OBL species _____ | x 1 = _____ |
| FACW species _____ | x 2 = _____ |
| FAC species _____ | x 3 = _____ |
| FACU species _____ | x 4 = _____ |
| UPL species _____ | x 5 = _____ |
| Column Totals: _____ (A) | _____ (B) |

Prevalence Index = B/A = _____

**Hydrophytic Vegetation Indicators:**

- ☐ Rapid Test for Hydrophytic Vegetation
- ☐ Dominance Test is >50%
- ☐ Prevalence Index is ≤3.0[1]
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

**Hydrophytic Vegetation Present?** Yes _____ No X

Remarks:

## SOIL

Sampling Point: OP-16 (Ck-8)

**Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)**

| Depth (inches) | Matrix Color (moist) | % | Redox Features Color (moist) | % | Type[1] | Loc[2] | Texture | Remarks |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | |
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| | | | | | | | | |

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

**Hydric Soil Indicators:**

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Organic Bodies (A6)
- ☐ 5 cm Mucky Mineral (A7)
- ☐ Muck Presence (A8)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Dark Surface (S7)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)

**Indicators for Problematic Hydric Soils[3]:**

- ☐ Stratified Layers (A5)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

**Restrictive Layer (if observed):**

Type: _____

Depth (inches): _____

**Hydric Soil Present? Yes _____ No _____**

Remarks:

Exposed rock, underground bedrock and many roots, unable to dig soil pit.

## HYDROLOGY

**Wetland Hydrology Indicators:**

Primary Indicators (minimum of one required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1)
- ☑ Sediment Deposits (B2)
- ☑ Drift Deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Aquatic Fauna (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres on Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Fiddler Crab Burrows (C10)
- ☐ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ☐ Surface Soil Cracks (B6)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)

**Field Observations:**

Surface Water Present? Yes _____ No _____ Depth (inches): _____

Water Table Present? Yes _____ No _____ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes _____ No _____ Depth (inches): _____

**Wetland Hydrology Present? Yes X No _____**

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Observation Point located upstream of OP15, within the beginning of an ephemeral stream that runs southeast, down hill and across existent trails and through an old railroad crossing (Galeta) which has drift and sediment deposits. Watershed basin of 1m of depth bank and 2m of width from bank to bank, defined by adjacent hillslope. Ephemeral stream is a tributary on an unnamed creek (RPW Stream). No OHWM observed.

# WETLAND DETERMINATION DATA FORM – Caribbean Islands Region

Project/Site: ÁNGEL CASTRO PÉREZ AVENUE EXPANSION (PR-122) Municipality/Town: San German & Lajas Sampling Date: March 30, 2023

Applicant/Owner: The Puerto Rico Highway and Transportation Authority (PRHTA) and the U.S. Department of Transportation (USDOT) PR or USVI: PR Sampling Point: OP-17 (Ck-9)

Investigator(s): Walter E. Soler Ward/Estate: Ancones

Landform (hillslope, terrace, etc.): Hillslope Local relief (concave, convex, none): None Slope (%): 0

Lat: 18.071526° Long: -67.032411° Datum: PR Datum

Soil Map Unit Name: Humatas clay (HmE) NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes X No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

## SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

| | | | |
|---|---|---|---|
| Hydrophytic Vegetation Present? | Yes _____ | No X | **Is the Sampled Area within a Wetland?** Yes _____ No X |
| Hydric Soil Present? | Yes _____ | No _____ | |
| Wetland Hydrology Present? | Yes X | No _____ | |

Remarks:

Observation Point located on an ephemeral watershed basin, which is not shown as a stream on the hydrography maps, and collects runoff waters from adjacent hills and abuts through former old railroad crossing.

## VEGETATION – Use scientific names of plants.

| Tree Stratum (Plot size: 30 feet radius) | Absolute % Cover | Dominant Species? | Indicator Status |
|---|---|---|---|
| 1. Spondias mombin | | | UPL |
| 2. Inga laurina | | | UPL |
| 3. Heamatoxylum campechianum | | | UPL |
| 4. | | | |
| 5. | | | |
| | _____ = Total Cover | | |
| **Sapling/Shrub Stratum** (Plot size: 15 feet radius) | | | |
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| | _____ = Total Cover | | |
| **Herb Stratum** (Plot size: 5 feet radius) | | | |
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| 6. | | | |
| 7. | | | |
| 8. | | | |
| | _____ = Total Cover | | |
| **Woody Vine Stratum** (Plot size: 30 feet radius) | | | |
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| | _____ = Total Cover | | |

**Dominance Test worksheet:**

Number of Dominant Species That Are OBL, FACW, or FAC: _____ (A)

Total Number of Dominant Species Across All Strata: _____ (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: _____ (A/B)

**Prevalence Index worksheet:**

| Total % Cover of: | Multiply by: |
|---|---|
| OBL species _____ | x 1 = _____ |
| FACW species _____ | x 2 = _____ |
| FAC species _____ | x 3 = _____ |
| FACU species _____ | x 4 = _____ |
| UPL species _____ | x 5 = _____ |
| Column Totals: _____ (A) | _____ (B) |

Prevalence Index = B/A = _____

**Hydrophytic Vegetation Indicators:**

- ☐ Rapid Test for Hydrophytic Vegetation
- ☐ Dominance Test is >50%
- ☐ Prevalence Index is ≤3.0[1]
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

**Hydrophytic Vegetation Present?** Yes _____ No X

Remarks:

## SOIL

Sampling Point: OP-17 (Ck-9)

**Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)**

| Depth (inches) | Matrix Color (moist) | % | Redox Features Color (moist) | % | Type[1] | Loc[2] | Texture | Remarks |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | |
| | | | | | | | | |
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| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

**Hydric Soil Indicators:**

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Organic Bodies (A6)
- ☐ 5 cm Mucky Mineral (A7)
- ☐ Muck Presence (A8)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Dark Surface (S7)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)

**Indicators for Problematic Hydric Soils[3]:**

- ☐ Stratified Layers (A5)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

**Restrictive Layer (if observed):**

Type: _____

Depth (inches): _____

**Hydric Soil Present? Yes _____ No _____**

Remarks:

Exposed rock, underground bedrock and many roots, unable to dig soil pit.

## HYDROLOGY

**Wetland Hydrology Indicators:**

Primary Indicators (minimum of one required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1)
- ☑ Sediment Deposits (B2)
- ☑ Drift Deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Aquatic Fauna (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres on Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Fiddler Crab Burrows (C10)
- ☐ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ☐ Surface Soil Cracks (B6)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)

**Field Observations:**

Surface Water Present? Yes _____ No _____ Depth (inches): _____

Water Table Present? Yes _____ No _____ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes _____ No _____ Depth (inches): _____

**Wetland Hydrology Present? Yes X No _____**

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Observation Point located upstream within an ephemeral and undefined watershed basin, which is not shown as a stream on the hydrography maps, and collects runoff waters from adjacent hills. The area abuts through a former old railroad crossing (Galeta) which has drift and sediment deposits. The area eventually abuts to an unnamed creek (RPW Stream). No OHWM observed. Watershed basin banks not defined.

# WETLAND DETERMINATION DATA FORM – Caribbean Islands Region

Project/Site: ÁNGEL CASTRO PÉREZ AVENUE EXPANSION (PR-122) Municipality/Town: San German & Lajas Sampling Date: March 30, 2023

Applicant/Owner: The Puerto Rico Highway and Transportation Authority (PRHTA) and the U.S. Department of Transportation (USDOT) PR or USVI: PR Sampling Point: OP-18 (Ck-10)

Investigator(s): Walter E. Soler Ward/Estate: Ancones

Landform (hillslope, terrace, etc.): Ephemeral Stream Basin Local relief (concave, convex, none): None Slope (%): 5

Lat: 18.071925° Long: -67.031683° Datum: PR Datum

Soil Map Unit Name: Mucara loam (MuE) NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes X No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

## SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

| | | | |
|---|---|---|---|
| Hydrophytic Vegetation Present? | Yes _____ | No X | **Is the Sampled Area within a Wetland?** Yes _____ No X |
| Hydric Soil Present? | Yes _____ | No _____ | |
| Wetland Hydrology Present? | Yes X | No _____ | |

Remarks:

Observation Point located within an ephemeral stream that collects adjacent hills runoff, and abuts through corrugated pipe culvert under existing PR-122; it is a tributary on an unnamed creek (RPW Stream).

## VEGETATION – Use scientific names of plants.

| | Absolute % Cover | Dominant Species? | Indicator Status |
|---|---|---|---|
| **Tree Stratum** (Plot size: 30 feet radius) | | | |
| 1. Zanthoxylum martinicense | | | UPL |
| 2. Casearia guianensis | | | FAC |
| 3. Delonix regia | | | UPL |
| 4. | | | |
| 5. | | | |
| _____ = Total Cover | | | |
| **Sapling/Shrub Stratum** (Plot size: 15 feet radius) | | | |
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| _____ = Total Cover | | | |
| **Herb Stratum** (Plot size: 5 feet radius) | | | |
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| 6. | | | |
| 7. | | | |
| 8. | | | |
| _____ = Total Cover | | | |
| **Woody Vine Stratum** (Plot size: 30 feet radius) | | | |
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| _____ = Total Cover | | | |

**Dominance Test worksheet:**

Number of Dominant Species That Are OBL, FACW, or FAC: _____ (A)

Total Number of Dominant Species Across All Strata: _____ (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: _____ (A/B)

**Prevalence Index worksheet:**

| Total % Cover of: | Multiply by: |
|---|---|
| OBL species _____ | x 1 = _____ |
| FACW species _____ | x 2 = _____ |
| FAC species _____ | x 3 = _____ |
| FACU species _____ | x 4 = _____ |
| UPL species _____ | x 5 = _____ |
| Column Totals: _____ (A) | _____ (B) |

Prevalence Index = B/A = _____

**Hydrophytic Vegetation Indicators:**

- ☐ Rapid Test for Hydrophytic Vegetation
- ☐ Dominance Test is >50%
- ☐ Prevalence Index is ≤3.0[1]
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

**Hydrophytic Vegetation Present?** Yes _____ No X

Remarks:

## SOIL

Sampling Point: OP-18 (Ck-10)

**Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)**

| Depth (inches) | Matrix Color (moist) | % | Redox Features Color (moist) | % | Type[1] | Loc[2] | Texture | Remarks |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
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| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

**Hydric Soil Indicators:**

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Organic Bodies (A6)
- ☐ 5 cm Mucky Mineral (A7)
- ☐ Muck Presence (A8)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Dark Surface (S7)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)

**Indicators for Problematic Hydric Soils[3]:**

- ☐ Stratified Layers (A5)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

**Restrictive Layer (if observed):**

Type: _____

Depth (inches): _____

**Hydric Soil Present? Yes _____ No _____**

Remarks:

Exposed rock, underground bedrock and many roots, unable to dig soil pit.

## HYDROLOGY

**Wetland Hydrology Indicators:**

Primary Indicators (minimum of one required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1)
- ☑ Sediment Deposits (B2)
- ☑ Drift Deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Aquatic Fauna (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres on Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Fiddler Crab Burrows (C10)
- ☐ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ☐ Surface Soil Cracks (B6)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)

**Field Observations:**

Surface Water Present? Yes _____ No _____ Depth (inches): _____

Water Table Present? Yes _____ No _____ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes _____ No _____ Depth (inches): _____

**Wetland Hydrology Present? Yes X No _____**

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Observation Point located within an ephemeral stream that collects adjacent hills runoff, and abuts through corrugated pipe culvert under existing PR-122; it is a tributary on an unnamed creek (RPW Stream). Ephemeral stream basin of 0.6m of depth and 2m of width from bank to bank, defined by adjacent hillslopes.

# WETLAND DETERMINATION DATA FORM – Caribbean Islands Region

Project/Site: ÁNGEL CASTRO PÉREZ AVENUE EXPANSION (PR-122) Municipality/Town: San German & Lajas Sampling Date: March 31, 2023

Applicant/Owner: The Puerto Rico Highway and Transportation Authority (PRHTA) and the U.S. Department of Transportation (USDOT) PR or USVI: PR Sampling Point: OP-19 (Ck-11)

Investigator(s): Walter E. Soler Ward/Estate: Retiro

Landform (hillslope, terrace, etc.): Hillslope Local relief (concave, convex, none): None Slope (%): 0

Lat: 18.072696° Long: -67.031861° Datum: PR Datum

Soil Map Unit Name: Mucara loam (MuE) NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes X No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

## SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

| | | | |
|---|---|---|---|
| Hydrophytic Vegetation Present? | Yes _____ | No X | **Is the Sampled Area within a Wetland?** Yes _____ No X |
| Hydric Soil Present? | Yes _____ | No _____ | |
| Wetland Hydrology Present? | Yes _____ | No X | |

Remarks:

Observation Point located within an area shown in the hydrography maps, however no stream, watershed basin or channel was observed.

## VEGETATION – Use scientific names of plants.

| Tree Stratum (Plot size: 30 feet radius) | Absolute % Cover | Dominant Species? | Indicator Status |
|---|---|---|---|
| 1. Mangifera indica | | | UPL |
| 2. Casearia guianensis | | | FAC |
| 3. Citharexylum spinosum | | | UPL |
| 4. | | | |
| 5. | | | |
| | _____ = Total Cover | | |
| **Sapling/Shrub Stratum** (Plot size: 15 feet radius) | | | |
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| | _____ = Total Cover | | |
| **Herb Stratum** (Plot size: 5 feet radius) | | | |
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| 6. | | | |
| 7. | | | |
| 8. | | | |
| | _____ = Total Cover | | |
| **Woody Vine Stratum** (Plot size: 30 feet radius) | | | |
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| | _____ = Total Cover | | |

**Dominance Test worksheet:**

Number of Dominant Species That Are OBL, FACW, or FAC: _____ (A)

Total Number of Dominant Species Across All Strata: _____ (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: _____ (A/B)

**Prevalence Index worksheet:**

| Total % Cover of: | Multiply by: |
|---|---|
| OBL species _____ | x 1 = _____ |
| FACW species _____ | x 2 = _____ |
| FAC species _____ | x 3 = _____ |
| FACU species _____ | x 4 = _____ |
| UPL species _____ | x 5 = _____ |
| Column Totals: _____ (A) | _____ (B) |

Prevalence Index = B/A = _____

**Hydrophytic Vegetation Indicators:**

- ☐ Rapid Test for Hydrophytic Vegetation
- ☐ Dominance Test is >50%
- ☐ Prevalence Index is ≤3.0[1]
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

**Hydrophytic Vegetation Present?** Yes _____ No X

Remarks:

## SOIL

Sampling Point: OP-19 (Ck-11)

**Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)**

| Depth (inches) | Matrix Color (moist) | % | Redox Features Color (moist) | % | Type[1] | Loc[2] | Texture | Remarks |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

**Hydric Soil Indicators:**

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Organic Bodies (A6)
- ☐ 5 cm Mucky Mineral (A7)
- ☐ Muck Presence (A8)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Dark Surface (S7)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)

**Indicators for Problematic Hydric Soils[3]:**

- ☐ Stratified Layers (A5)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

**Restrictive Layer (if observed):**

Type: _____

Depth (inches): _____

**Hydric Soil Present? Yes _____ No _____**

Remarks:

Exposed rock, underground bedrock and many roots, unable to dig soil pit.

## HYDROLOGY

**Wetland Hydrology Indicators:**

Primary Indicators (minimum of one required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift Deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Aquatic Fauna (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres on Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Fiddler Crab Burrows (C10)
- ☐ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ☐ Surface Soil Cracks (B6)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)

**Field Observations:**

Surface Water Present? Yes _____ No _____ Depth (inches): _____

Water Table Present? Yes _____ No _____ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes _____ No _____ Depth (inches): _____

**Wetland Hydrology Present? Yes _____ No X**

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Observation Point located within an area shown in the hydrography maps, however no stream, watershed basin or channel was observed. The stream may have been deviated a long time ago during the construction of existing road PR-122 and Retiro Cummunity.

# WETLAND DETERMINATION DATA FORM – Caribbean Islands Region

Project/Site: ÁNGEL CASTRO PÉREZ AVENUE EXPANSION (PR-122) Municipality/Town: San German & Lajas Sampling Date: March 31, 2023

Applicant/Owner: The Puerto Rico Highway and Transportation Authority (PRHTA) and the U.S. Department of Transportation (USDOT) PR or USVI: PR Sampling Point: OP-20 (Ck-12)

Investigator(s): Walter E. Soler Ward/Estate: Retiro

Landform (hillslope, terrace, etc.): Ephemeral Stream Basin Local relief (concave, convex, none): None Slope (%): 0

Lat: 18.073366° Long: -67.032179° Datum: PR Datum

Soil Map Unit Name: El Cacique - La Taina complex (EcF) NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes X No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

## SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

| | | | |
|---|---|---|---|
| Hydrophytic Vegetation Present? | Yes X | No _____ | **Is the Sampled Area within a Wetland?** Yes _____ No X |
| Hydric Soil Present? | Yes _____ | No _____ | |
| Wetland Hydrology Present? | Yes _____ | No X | |

Remarks:

Observation Point located within a vegetated ephemeral stream that collects adjacent hills runoff, and abuts through corrugated pipe culvert under existing PR-122; it is a tributary on an unnamed creek (RPW Stream).

## VEGETATION – Use scientific names of plants.

| Tree Stratum (Plot size: 30 feet radius) | Absolute % Cover | Dominant Species? | Indicator Status |
|---|---|---|---|
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| | = Total Cover | | |
| **Sapling/Shrub Stratum** (Plot size: 15 feet radius) | | | |
| 1. Ricinus communis | 5 | Yes | FACU |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| | 5 = Total Cover | | |
| **Herb Stratum** (Plot size: 5 feet radius) | | | |
| 1. Trichostigma octandrum | 10 | No | FACU |
| 2. Mikania congesta | 45 | Yes | FACW |
| 3. Momordica charantia | 10 | No | FAC |
| 4. Commelina diffusa | 25 | Yes | FAC |
| 5. Alocasia macrorrhizos | 5 | No | FACW |
| 6. Antigonon leptopus | 5 | No | UPL |
| 7. | | | |
| 8. | | | |
| | 100 = Total Cover | | |
| **Woody Vine Stratum** (Plot size: 30 feet radius) | | | |
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| | = Total Cover | | |

**Dominance Test worksheet:**

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 66.67 (A/B)

**Prevalence Index worksheet:**

| Total % Cover of: | | Multiply by: | |
|---|---|---|---|
| OBL species | | x 1 = | |
| FACW species | 50 | x 2 = | 30 |
| FAC species | 35 | x 3 = | 105 |
| FACU species | 15 | x 4 = | 60 |
| UPL species | 5 | x 5 = | 25 |
| Column Totals: | 70 (A) | | 220 (B) |

Prevalence Index = B/A = 3.14

**Hydrophytic Vegetation Indicators:**

- ☐ Rapid Test for Hydrophytic Vegetation
- ☐ Dominance Test is >50%
- ☐ Prevalence Index is ≤3.0[1]
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

**Hydrophytic Vegetation Present?** Yes X No _____

Remarks:

## SOIL

Sampling Point: OP-20 (Ck-12)

**Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)**

| Depth (inches) | Matrix Color (moist) | % | Redox Features Color (moist) | % | Type[1] | Loc[2] | Texture | Remarks |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

**Hydric Soil Indicators:**

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Organic Bodies (A6)
- ☐ 5 cm Mucky Mineral (A7)
- ☐ Muck Presence (A8)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Dark Surface (S7)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)

**Indicators for Problematic Hydric Soils[3]:**

- ☐ Stratified Layers (A5)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

**Restrictive Layer (if observed):**

Type: _____

Depth (inches): _____

**Hydric Soil Present? Yes _____ No _____**

Remarks:

Exposed rock, underground bedrock and many roots, unable to dig soil pit.

## HYDROLOGY

**Wetland Hydrology Indicators:**

Primary Indicators (minimum of one required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift Deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Aquatic Fauna (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres on Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Fiddler Crab Burrows (C10)
- ☐ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ☐ Surface Soil Cracks (B6)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☑ FAC-Neutral Test (D5)

**Field Observations:**

Surface Water Present? Yes _____ No _____ Depth (inches): _____

Water Table Present? Yes _____ No _____ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes _____ No _____ Depth (inches): _____

**Wetland Hydrology Present? Yes _____ No X**

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Observation Point located within an ephemeral stream that collects adjacent hills runoff, and abuts through corrugated pipe culvert under existing PR-122; it is a tributary on an unnamed creek (RPW Stream). Ephemeral stream basin of 1m of depth and 5m of width from bank to bank, defined by adjacent hillslopes. No hydrology indicators observed. Some debris observed on creek.

# WETLAND DETERMINATION DATA FORM – Caribbean Islands Region

Project/Site: ÁNGEL CASTRO PÉREZ AVENUE EXPANSION (PR-122) Municipality/Town: San German & Lajas Sampling Date: March 31, 2023

Applicant/Owner: The Puerto Rico Highway and Transportation Authority (PRHTA) and the U.S. Department of Transportation (USDOT) PR or USVI: PR Sampling Point: OP-21 (Ck-12)

Investigator(s): Walter E. Soler Ward/Estate: Retiro

Landform (hillslope, terrace, etc.): Slope Local relief (concave, convex, none): None Slope (%): 5

Lat: 18.073550° Long: -67.031664° Datum: PR Datum

Soil Map Unit Name: El Cacique - La Taina complex (EcF) NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes X No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

## SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

| | | | |
|---|---|---|---|
| Hydrophytic Vegetation Present? | Yes _____ | No X | **Is the Sampled Area within a Wetland?** Yes _____ No X |
| Hydric Soil Present? | Yes _____ | No _____ | |
| Wetland Hydrology Present? | Yes X | No _____ | |

Remarks:

Observation Point located within a vegetated ephemeral stream that collects adjacent hills runoff, and abuts through corrugated pipe culvert under existing PR-122; it is a tributary on an unnamed creek (RPW Stream).

## VEGETATION – Use scientific names of plants.

| Tree Stratum (Plot size: 30 feet radius) | Absolute % Cover | Dominant Species? | Indicator Status |
|---|---|---|---|
| 1. Carica papaya | 10 | No | UPL |
| 2. Senna siamea | 75 | Yes | UPL |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| | 85 | = Total Cover | |
| **Sapling/Shrub Stratum** (Plot size: 15 feet radius) | | | |
| 1. Solanum torvum | 20 | Yes | FACU |
| 2. Piper amalago | 5 | Yes | UPL |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| | 25 | = Total Cover | |
| **Herb Stratum** (Plot size: 5 feet radius) | | | |
| 1. Dieffenbachia seguine | 10 | No | FACU |
| 2. Alocasia macrorrhizos | 30 | Yes | FACW |
| 3. Momordica charantia | 25 | Yes | FAC |
| 4. Ipomoea tiliacea | 35 | Yes | UPL |
| 5. Antigonon leptopus | 5 | No | UPL |
| 6. | | | |
| 7. | | | |
| 8. | | | |
| | 105 | = Total Cover | |
| **Woody Vine Stratum** (Plot size: 30 feet radius) | | | |
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| | _____ | = Total Cover | |

**Dominance Test worksheet:**

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 6 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 33 (A/B)

**Prevalence Index worksheet:**

| Total % Cover of: | | Multiply by: | |
|---|---|---|---|
| OBL species | _____ | x 1 = | _____ |
| FACW species | 30 | x 2 = | 60 |
| FAC species | 25 | x 3 = | 75 |
| FACU species | 30 | x 4 = | 140 |
| UPL species | 130 | x 5 = | 650 |
| Column Totals: | 215 (A) | | 925 (B) |

Prevalence Index = B/A = 4.3

**Hydrophytic Vegetation Indicators:**

- ☐ Rapid Test for Hydrophytic Vegetation
- ☐ Dominance Test is >50%
- ☐ Prevalence Index is ≤3.0[1]
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

**Hydrophytic Vegetation Present?** Yes _____ No X

Remarks:

## SOIL

Sampling Point: OP-21 (Ck-12)

**Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)**

| Depth (inches) | Matrix Color (moist) | % | Redox Features Color (moist) | % | Type[1] | Loc[2] | Texture | Remarks |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

**Hydric Soil Indicators:**

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Organic Bodies (A6)
- ☐ 5 cm Mucky Mineral (A7)
- ☐ Muck Presence (A8)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Dark Surface (S7)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)

**Indicators for Problematic Hydric Soils[3]:**

- ☐ Stratified Layers (A5)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

**Restrictive Layer (if observed):**

Type: _____

Depth (inches): _____

**Hydric Soil Present? Yes _____ No _____**

Remarks:

Exposed rock, underground bedrock and many roots, unable to dig soil pit.

## HYDROLOGY

**Wetland Hydrology Indicators:**

Primary Indicators (minimum of one required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1)
- ☑ Sediment Deposits (B2)
- ☑ Drift Deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Aquatic Fauna (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres on Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Fiddler Crab Burrows (C10)
- ☐ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ☐ Surface Soil Cracks (B6)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)

**Field Observations:**

Surface Water Present? Yes _____ No _____ Depth (inches): _____

Water Table Present? Yes _____ No _____ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes _____ No _____ Depth (inches): _____

**Wetland Hydrology Present? Yes X No _____**

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Observation Point located within a vegetated ephemeral stream that collects adjacent hills runoff, and abuts through corrugated pipe culvert under existing PR-122; it is a tributary on an unnamed creek (RPW Stream). Ephemeral stream basin of 0.6m of depth and 2m of width from bank to bank, defined by adjacent hillslopes. Seems that the heavy sedimentation and woody drifts deposits interrupt and somehow deviate the natural water flow.

# WETLAND DETERMINATION DATA FORM – Caribbean Islands Region

Project/Site: ÁNGEL CASTRO PÉREZ AVENUE EXPANSION (PR-122) Municipality/Town: San German & Lajas Sampling Date: March 31, 2023

Applicant/Owner: The Puerto Rico Highway and Transportation Authority (PRHTA) and the U.S. Department of Transportation (USDOT) PR or USVI: PR Sampling Point: OP-22 (Ck-13)

Investigator(s): Walter E. Soler Ward/Estate: Retiro

Landform (hillslope, terrace, etc.): Vegetated ephemeral stream Local relief (concave, convex, none): None Slope (%): 0

Lat: 18.074054° Long: -67.032091° Datum: PR Datum

Soil Map Unit Name: El Cacique - La Taina complex (EcF) NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes X No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

## SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

| | | | |
|---|---|---|---|
| Hydrophytic Vegetation Present? | Yes _____ | No X | **Is the Sampled Area within a Wetland?** Yes _____ No X |
| Hydric Soil Present? | Yes _____ | No _____ | |
| Wetland Hydrology Present? | Yes X | No _____ | |

Remarks:

Observation Point located within a vegetated ephemeral stream that collects adjacent hills runoff, and abuts through corrugated pipe culvert under existing PR-122; it is a tributary on an unnamed creek (RPW Stream).

## VEGETATION – Use scientific names of plants.

| Tree Stratum (Plot size: 30 feet radius) | Absolute % Cover | Dominant Species? | Indicator Status |
|---|---|---|---|
| 1. Terminalia catappa | 20 | Yes | UPL |
| 2. Senna siamea | 70 | Yes | UPL |
| 3. Casearia guianensis | 10 | No | FAC |
| 4. | | | |
| 5. | | | |
| | 100 | = Total Cover | |
| **Sapling/Shrub Stratum** (Plot size: 15 feet radius) | | | |
| 1. Ricinus communis | 25 | Yes | FACU |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| | 25 | = Total Cover | |
| **Herb Stratum** (Plot size: 5 feet radius) | | | |
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| 6. | | | |
| 7. | | | |
| 8. | | | |
| | _____ | = Total Cover | |
| **Woody Vine Stratum** (Plot size: 30 feet radius) | | | |
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| | _____ | = Total Cover | |

**Dominance Test worksheet:**

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0 (A/B)

**Prevalence Index worksheet:**

| Total % Cover of: | | Multiply by: | |
|---|---|---|---|
| OBL species | _____ | x 1 = | _____ |
| FACW species | _____ | x 2 = | _____ |
| FAC species | 10 | x 3 = | 30 |
| FACU species | 25 | x 4 = | 100 |
| UPL species | 90 | x 5 = | 450 |
| Column Totals: | 125 (A) | | 580 (B) |

Prevalence Index = B/A = 4.64

**Hydrophytic Vegetation Indicators:**

- ☐ Rapid Test for Hydrophytic Vegetation
- ☐ Dominance Test is >50%
- ☐ Prevalence Index is ≤3.0[1]
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

**Hydrophytic Vegetation Present?** Yes _____ No X

Remarks:

## SOIL

Sampling Point: OP-22 (Ck-13)

**Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)**

| Depth (inches) | Matrix Color (moist) | % | Redox Features Color (moist) | % | Type[1] | Loc[2] | Texture | Remarks |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

**Hydric Soil Indicators:**

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Organic Bodies (A6)
- ☐ 5 cm Mucky Mineral (A7)
- ☐ Muck Presence (A8)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Dark Surface (S7)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)

**Indicators for Problematic Hydric Soils[3]:**

- ☐ Stratified Layers (A5)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

**Restrictive Layer (if observed):**

Type: _____

Depth (inches): _____

**Hydric Soil Present? Yes _____ No _____**

Remarks:

Exposed rock, underground bedrock and many roots, unable to dig soil pit.

## HYDROLOGY

**Wetland Hydrology Indicators:**

Primary Indicators (minimum of one required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1)
- ☑ Sediment Deposits (B2)
- ☐ Drift Deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Aquatic Fauna (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres on Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Fiddler Crab Burrows (C10)
- ☐ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ☐ Surface Soil Cracks (B6)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)

**Field Observations:**

Surface Water Present? Yes _____ No _____ Depth (inches): _____

Water Table Present? Yes _____ No _____ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes _____ No _____ Depth (inches): _____

**Wetland Hydrology Present? Yes X No _____**

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Observation Point located within a vegetated ephemeral stream that collects adjacent hills runoff, and abuts through corrugated pipe culvert under existing PR-122; it is a tributary on an unnamed creek (RPW Stream). Ephemeral stream basin of 0.6m of depth and 1m of width from bank to bank, defined by adjacent hillslopes. No OHWM observed.

# WETLAND DETERMINATION DATA FORM – Caribbean Islands Region

Project/Site: ÁNGEL CASTRO PÉREZ AVENUE EXPANSION (PR-122) Municipality/Town: San German & Lajas Sampling Date: March 31, 2023

Applicant/Owner: The Puerto Rico Highway and Transportation Authority (PRHTA) and the U.S. Department of Transportation (USDOT) PR or USVI: PR Sampling Point: OP-22b (Ck-13)

Investigator(s): Walter E. Soler Ward/Estate: Retiro

Landform (hillslope, terrace, etc.): Vegetated ephemeral stream Local relief (concave, convex, none): None Slope (%): 0

Lat: 18.073952° Long: -67.031778° Datum: PR Datum

Soil Map Unit Name: El Cacique - La Taina complex (EcF) NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes X No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

## SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

| | | | |
|---|---|---|---|
| Hydrophytic Vegetation Present? | Yes _____ | No X | **Is the Sampled Area within a Wetland?** Yes b No X |
| Hydric Soil Present? | Yes _____ | No _____ | |
| Wetland Hydrology Present? | Yes X | No _____ | |

Remarks:

Observation Point located within a vegetated ephemeral stream that collects adjacent hills runoff, and abuts through corrugated pipe culvert under existing PR-122; it is a tributary on an unnamed creek (RPW Stream).

## VEGETATION – Use scientific names of plants.

| Tree Stratum (Plot size: 30 feet radius) | Absolute % Cover | Dominant Species? | Indicator Status |
|---|---|---|---|
| 1. Terminalia catappa | 40 | Yes | UPL |
| 2. Senna siamea | 50 | Yes | UPL |
| 3. Roystonea borinquena | 10 | No | FAC |
| 4. | | | |
| 5. | | | |
| | 100 | = Total Cover | |
| **Sapling/Shrub Stratum** (Plot size: 15 feet radius) | | | |
| 1. Ricinus communis | 10 | Yes | FACU |
| 2. Piper amalago | 35 | Yes | UPL |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| | 45 | = Total Cover | |
| **Herb Stratum** (Plot size: 5 feet radius) | | | |
| 1. Dieffenbachia seguine | 15 | Yes | FAC |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| 6. | | | |
| 7. | | | |
| 8. | | | |
| | 15 | = Total Cover | |
| **Woody Vine Stratum** (Plot size: 30 feet radius) | | | |
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| | _____ | = Total Cover | |

**Dominance Test worksheet:**

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 5 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 20 (A/B)

**Prevalence Index worksheet:**

| Total % Cover of: | | Multiply by: | |
|---|---|---|---|
| OBL species | _____ | x 1 = | _____ |
| FACW species | _____ | x 2 = | _____ |
| FAC species | 25 | x 3 = | 75 |
| FACU species | 10 | x 4 = | 40 |
| UPL species | 125 | x 5 = | 625 |
| Column Totals: | 160 (A) | | 740 (B) |

Prevalence Index = B/A = 4.6

**Hydrophytic Vegetation Indicators:**

- ☐ Rapid Test for Hydrophytic Vegetation
- ☐ Dominance Test is >50%
- ☐ Prevalence Index is ≤3.0[1]
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

**Hydrophytic Vegetation Present?** Yes _____ No X

Remarks:

## SOIL

Sampling Point: OP-22b (Ck-13)

**Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)**

| Depth (inches) | Matrix Color (moist) | % | Redox Features Color (moist) | % | Type[1] | Loc[2] | Texture | Remarks |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

**Hydric Soil Indicators:**

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Organic Bodies (A6)
- ☐ 5 cm Mucky Mineral (A7)
- ☐ Muck Presence (A8)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Dark Surface (S7)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)

**Indicators for Problematic Hydric Soils[3]:**

- ☐ Stratified Layers (A5)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

**Restrictive Layer (if observed):**

Type: _____

Depth (inches): _____

**Hydric Soil Present? Yes _____ No _____**

Remarks:

Exposed rock, underground bedrock and many roots, unable to dig soil pit.

## HYDROLOGY

**Wetland Hydrology Indicators:**

Primary Indicators (minimum of one required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1)
- ☑ Sediment Deposits (B2)
- ☐ Drift Deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Aquatic Fauna (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres on Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Fiddler Crab Burrows (C10)
- ☐ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ☐ Surface Soil Cracks (B6)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)

**Field Observations:**

Surface Water Present? Yes _____ No _____ Depth (inches): _____

Water Table Present? Yes _____ No _____ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes _____ No _____ Depth (inches): _____

**Wetland Hydrology Present? Yes X No _____**

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Observation Point located within a vegetated ephemeral stream that collects adjacent hills runoff, and abuts through corrugated pipe culvert under existing PR-122; it is a tributary on an unnamed creek (RPW Stream). Ephemeral stream basin of 0.6m of depth and 6m of width from bank to bank, defined by adjacent hillslopes. No OHWM observed.

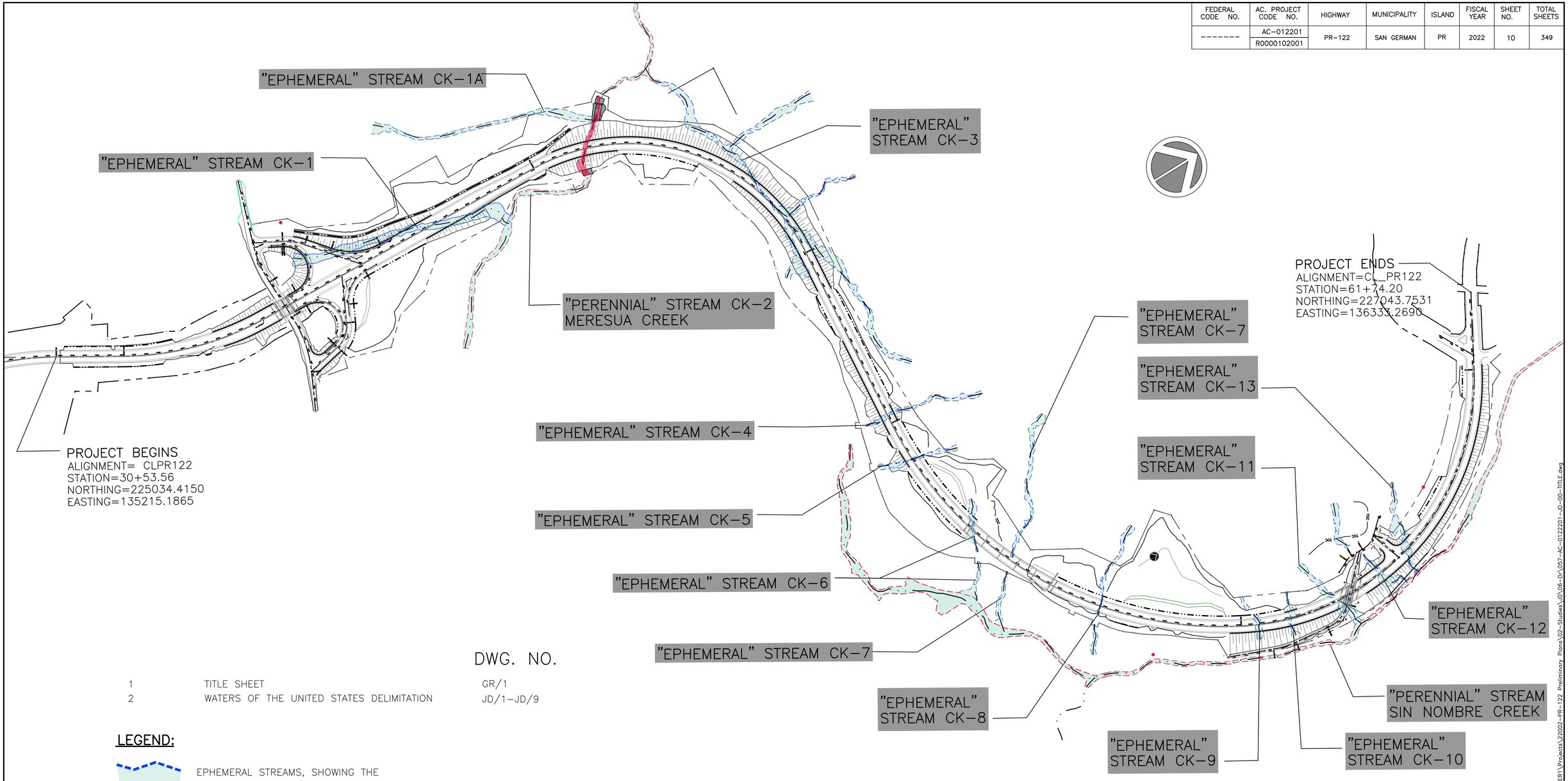
# APPENDIX C:

# PROJECT DRAWINGS AND STREAMS



AMBIENTA INC.
HC2 BOX 14029 AGUAS BUENAS, PR 00703
TELS. (787) 510-7031 / (787) 732-0907
FAX (787) 732-0907 / ambientainc@gmail.com

| FEDERAL CODE NO. | AC. PROJECT CODE NO. | HIGHWAY | MUNICIPALITY | ISLAND | FISCAL YEAR | SHEET NO. | TOTAL SHEETS |
|---|---|---|---|---|---|---|---|
| ------- | AC-012201 / R0000102001 | PR-122 | SAN GERMAN | PR | 2022 | 10 | 349 |




DWG. NO.

| | | |
|---|---|---|
| 1 | TITLE SHEET | GR/1 |
| 2 | WATERS OF THE UNITED STATES DELIMITATION | JD/1-JD/9 |

**LEGEND:**

EPHEMERAL STREAMS, SHOWING THE 10 YEAR HIGH WATER MARK

EPHEMERAL STREAMS, SHOWING THE ORDINARY HIGH WATER MARK (OHWM)

OHWM TO BE AFFECTED BY THE PROJECT

| WORK | BY | DATE |
|---|---|---|
| DESIGN | | |
| DRAWING | | |
| TRACED | | |
| CHECKED | | |
| FINAL CHECK | | |

PUERTO RICO HIGHWAY & TRANSPORTATION AUTHORITY
*BEHAR YBARRA & ASSOCIATES LLC*
*CONSULTING ENGINEERS AND ARCHITECTS*

EXTENSION HIGHWAY PR-122
FROM EXISTING PR-321 TO EXISTING PR-166

| DATE | REVISION |
|---|---|
| | |

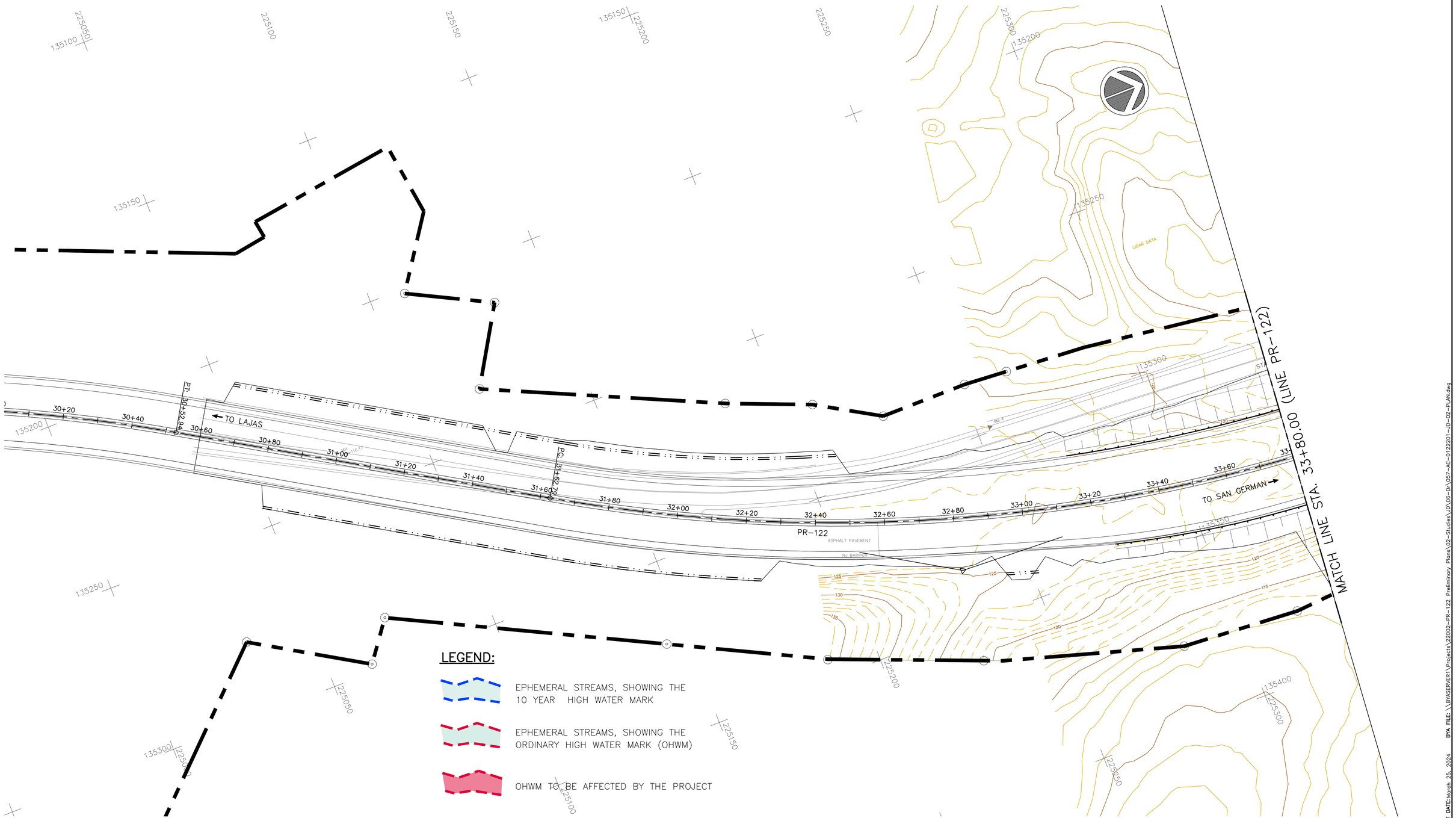
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WATERS OF THE UNITED STATES DELIMITATION
KEY PLAN

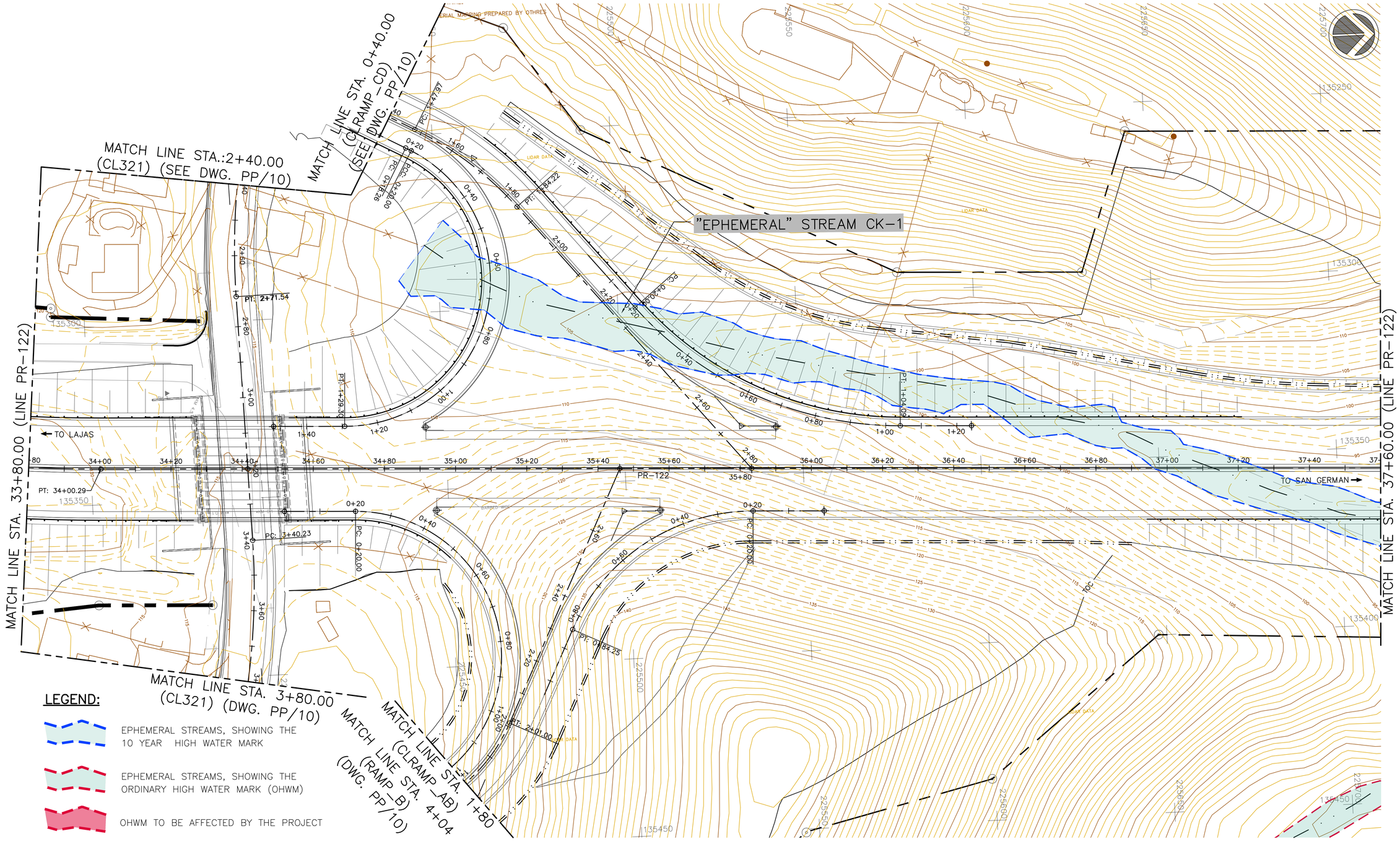
JD 1

PLOT DATE:March 25, 2024 BYA FILE: \\BYASERVER1\Projects\22002-PR-122 Preliminary Plans\02-Studies\JD\06-DA\057-AC-012201-JD-05-TITLE.dwg

| FEDERAL CODE NO. | AC. PROJECT CODE NO. | HIGHWAY | MUNICIPALITY | ISLAND | FISCAL YEAR | SHEET NO. | TOTAL SHEETS |
|---|---|---|---|---|---|---|---|
| ------- | AC-012201 | PR-122 | SAN GERMAN | PR | 2022 | 57 | 349 |
| | R0000102001 | | | | | | |



| FEDERAL CODE NO. | AC. PROJECT CODE NO. | HIGHWAY | MUNICIPALITY | ISLAND | FISCAL YEAR | SHEET NO. | TOTAL SHEETS |
|---|---|---|---|---|---|---|---|
| ------- | AC-012201 / R0000102001 | PR-122 | SAN GERMAN | PR | 2022 | 58 | 349 |




**LEGEND:**

- EPHEMERAL STREAMS, SHOWING THE 10 YEAR HIGH WATER MARK
- EPHEMERAL STREAMS, SHOWING THE ORDINARY HIGH WATER MARK (OHWM)
- OHWM TO BE AFFECTED BY THE PROJECT

| WORK | BY | DATE |
|---|---|---|
| DESIGN | | |
| DRAWING | | |
| TRACED | | |
| CHECKED | | |
| FINAL CHECK | | |

PUERTO RICO HIGHWAY & TRANSPORTATION AUTHORITY
*BEHAR YBARRA & ASSOCIATES LLC*
*CONSULTING ENGINEERS AND ARCHITECTS*

EXTENSION HIGHWAY PR-122
FROM EXISTING PR-321 TO EXISTING PR-166

| DATE | REVISION |
|---|---|
| | |

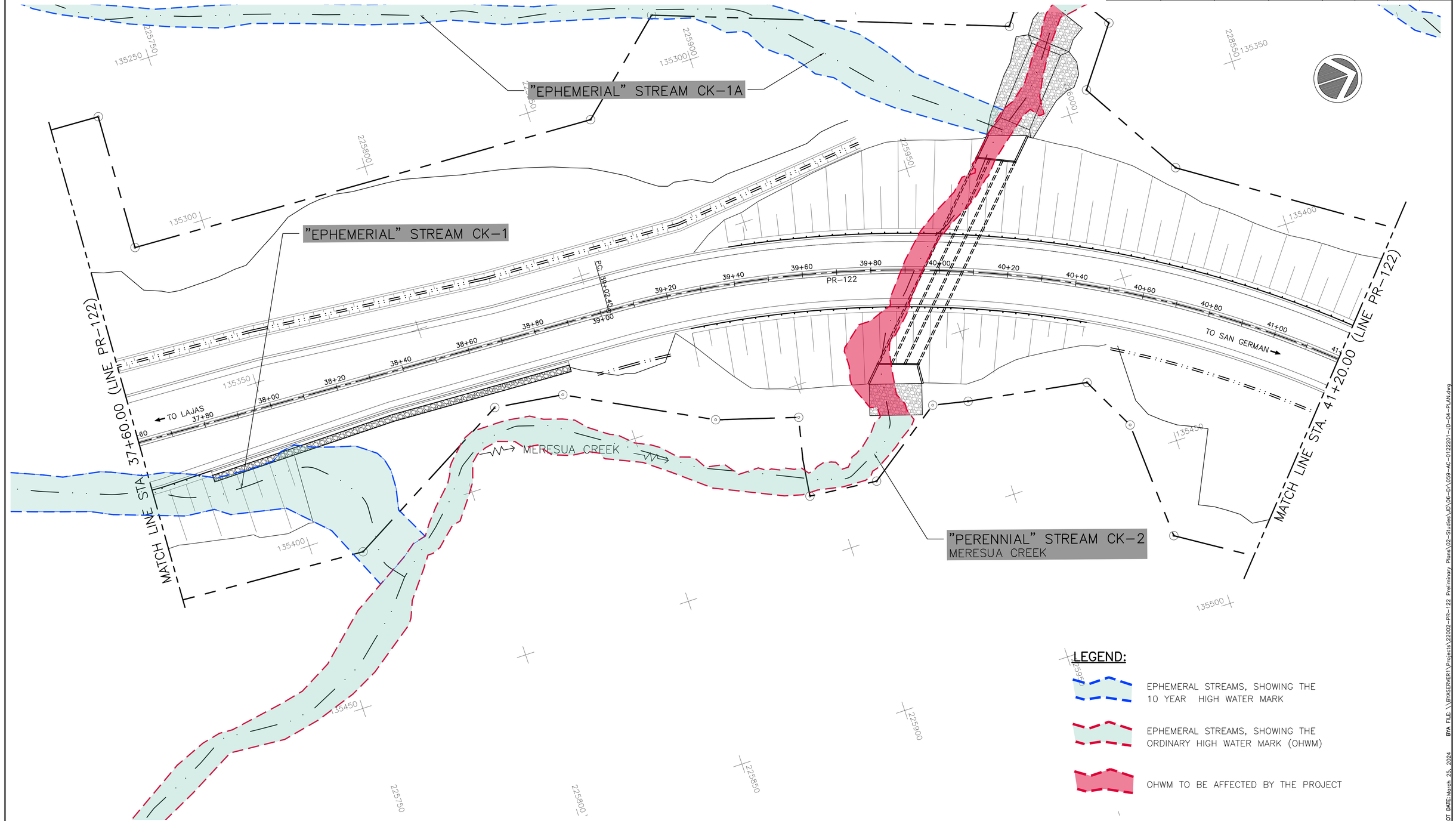
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0 5 10 20 30 40

WATERS OF THE UNITED STATES DELIMITATION
FROM STA. 33+80.00 TO STA. 37+60.00

JD 3

BYA FILE: \\BYASERVER1\Projects\22002-PR-122 Preliminary Plans\02-Studies\JD\06-Dr\058-AC-0122201-JD-03-PLAN.dwg
PLOT DATE: March 25, 2024
FILE NAME=

| FEDERAL CODE NO. | AC. PROJECT CODE NO. | HIGHWAY | MUNICIPALITY | ISLAND | FISCAL YEAR | SHEET NO. | TOTAL SHEETS |
|---|---|---|---|---|---|---|---|
| -------- | AC-012201<br>R0000102001 | PR-122 | SAN GERMAN | PR | 2022 | 59 | 349 |




LEGEND:

- EPHEMERAL STREAMS, SHOWING THE 10 YEAR HIGH WATER MARK
- EPHEMERAL STREAMS, SHOWING THE ORDINARY HIGH WATER MARK (OHWM)
- OHWM TO BE AFFECTED BY THE PROJECT

| WORK | BY | DATE |
|---|---|---|
| DESIGN | | |
| DRAWING | | |
| TRACED | | |
| CHECKED | | |
| FINAL CHECK | | |

PUERTO RICO HIGHWAY & TRANSPORTATION AUTHORITY
*BEHAR YBARRA & ASSOCIATES LLC*
*CONSULTING ENGINEERS AND ARCHITECTS*

EXTENSION HIGHWAY PR-122
FROM EXISTING PR-321 TO EXISTING PR-166

| DATE | REVISION |
|---|---|
| | |

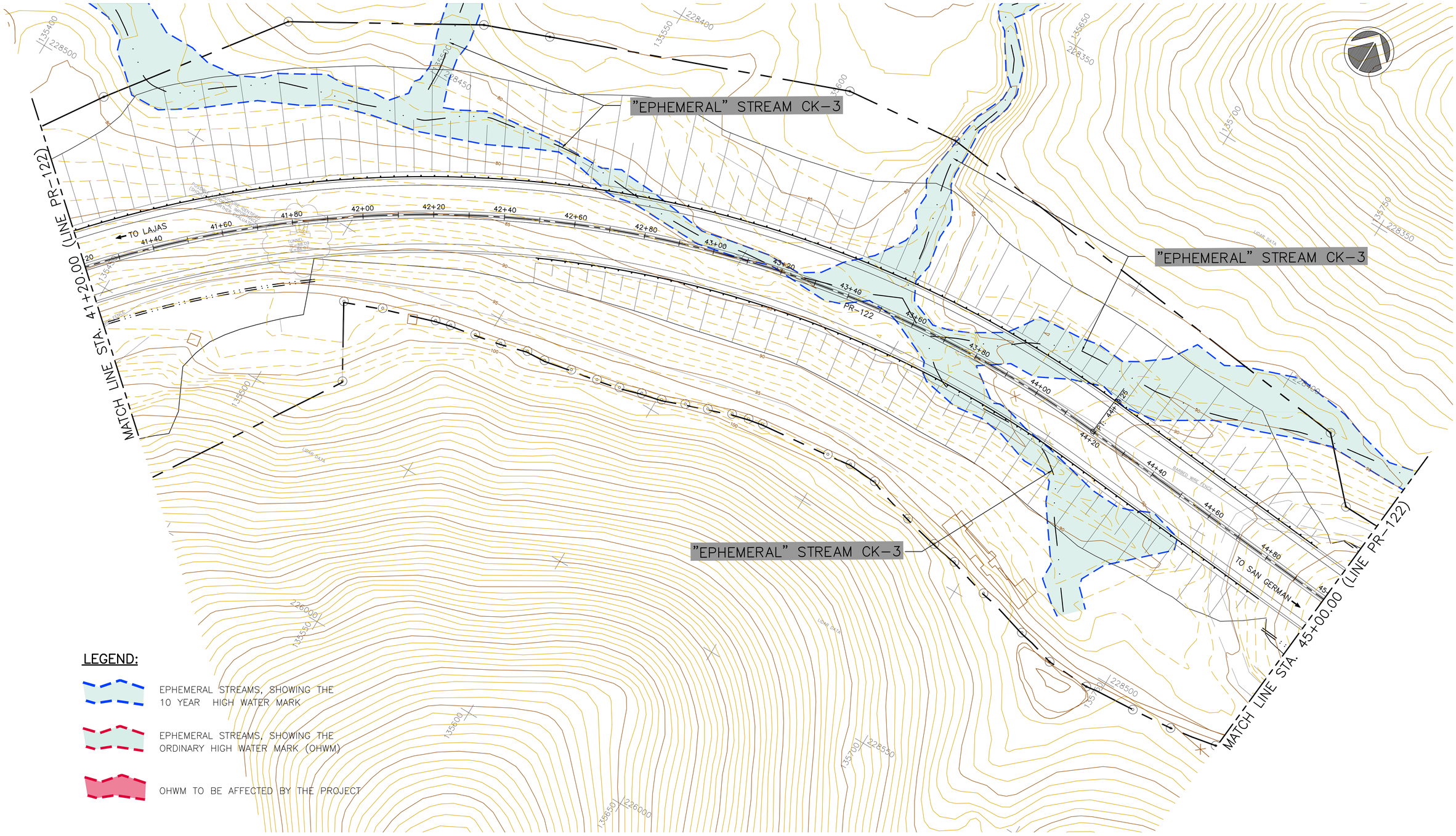
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0 5 10 20 30 40

WATERS OF THE UNITED STATES DELIMITATION
FROM STA. 37+60.00 TO STA. 41+20.00

JD
4

PLOT DATE: March 25, 2024
BYA FILE: \\BYASERVER1\Projects\22002-PR-122 Preliminary Plans\02-Studies\JD\06-D\059-AC-0122201-JD-04-PLAN.dwg
FILE NAME=

| FEDERAL CODE NO. | AC. PROJECT CODE NO. | HIGHWAY | MUNICIPALITY | ISLAND | FISCAL YEAR | SHEET NO. | TOTAL SHEETS |
|---|---|---|---|---|---|---|---|
| ------- | AC-012201 / R0000102001 | PR-122 | SAN GERMAN | PR | 2022 | 60 | 349 |




**LEGEND:**

- EPHEMERAL STREAMS, SHOWING THE 10 YEAR HIGH WATER MARK
- EPHEMERAL STREAMS, SHOWING THE ORDINARY HIGH WATER MARK (OHWM)
- OHWM TO BE AFFECTED BY THE PROJECT

| WORK | BY | DATE |
|---|---|---|
| DESIGN | | |
| DRAWING | | |
| TRACED | | |
| CHECKED | | |
| FINAL CHECK | | |

PUERTO RICO HIGHWAY & TRANSPORTATION AUTHORITY
*BEHAR YBARRA & ASSOCIATES LLC*
*CONSULTING ENGINEERS AND ARCHITECTS*

EXTENSION HIGHWAY PR-122
FROM EXISTING PR-321 TO EXISTING PR-166

| DATE | REVISION |
|---|---|
| | |

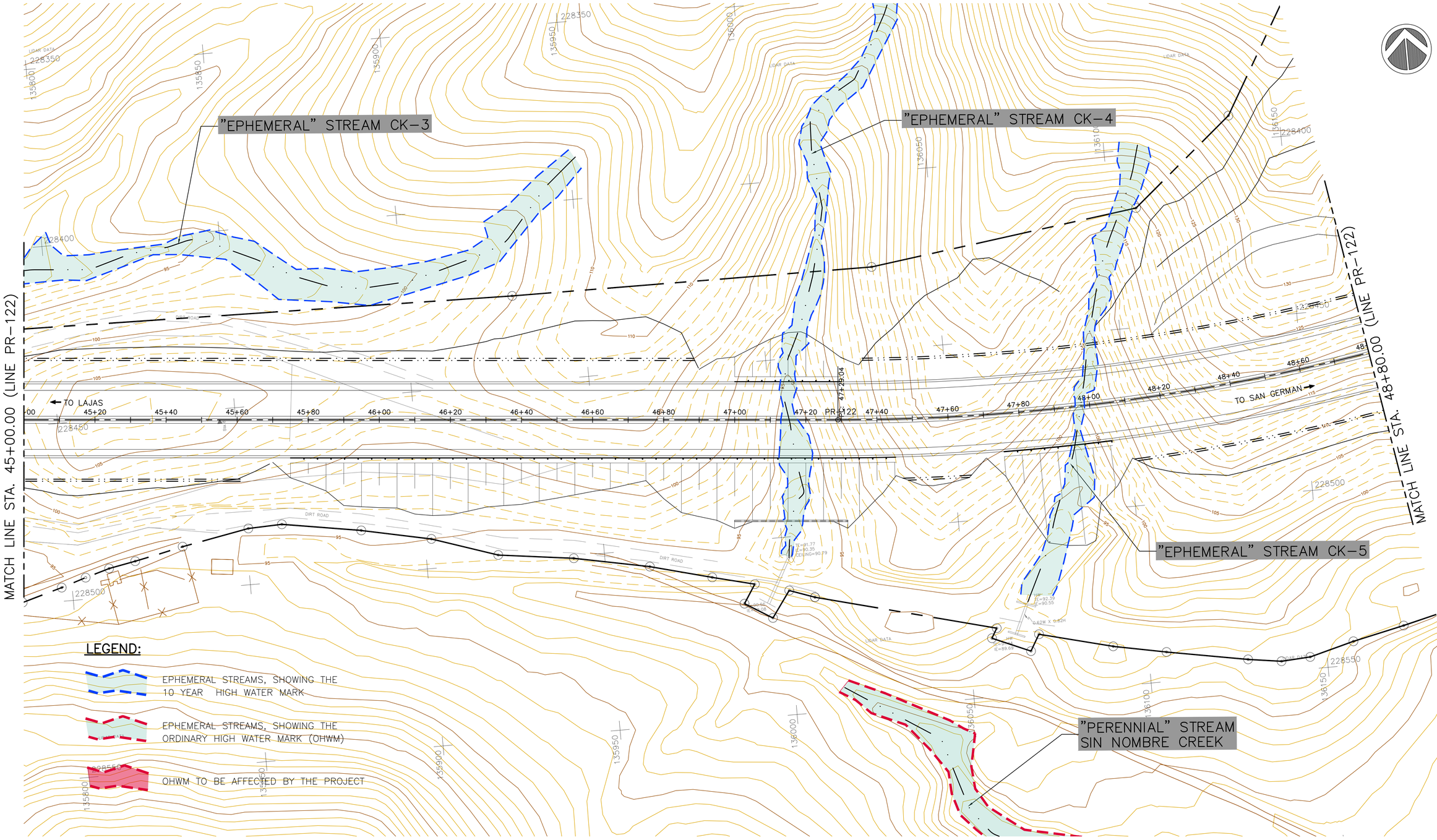
SCALE = 1 : 500
0 5 10 20 30 40

WATERS OF THE UNITED STATES DELIMITATION
FROM STA. 41+20.00 TO STA. 45+00.00

JD 5

BYA FILE: \\BYASERVER1\Projects\22002-PR-122 Preliminary Plans\02-Studies\JD\06-Dr\060-AC-0122201-JD-PLAN.dwg
PLOT DATE: March 25, 2024
FILE NAME=

| FEDERAL CODE NO. | AC. PROJECT CODE NO. | HIGHWAY | MUNICIPALITY | ISLAND | FISCAL YEAR | SHEET NO. | TOTAL SHEETS |
|---|---|---|---|---|---|---|---|
| ------- | AC-012201 / R0000102001 | PR-122 | SAN GERMAN | PR | 2022 | 61 | 349 |




| WORK | BY | DATE |
|---|---|---|
| DESIGN | | |
| DRAWING | | |
| TRACED | | |
| CHECKED | | |
| FINAL CHECK | | |

PUERTO RICO HIGHWAY & TRANSPORTATION AUTHORITY
*BEHAR YBARRA & ASSOCIATES LLC*
*CONSULTING ENGINEERS AND ARCHITECTS*

EXTENSION HIGHWAY PR-122
FROM EXISTING PR-321 TO EXISTING PR-166

| DATE | REVISION |
|---|---|
| | |

SCALE = 1 : 500
0 5 10 20 30 40

WATERS OF THE UNITED STATES DELIMITATION
FROM STA. 45+00.00 TO STA. 48+80.00

JD 6

PLOT DATE: March 25, 2024
BYA FILE: \\BYASERVER1\Projects\22002-PR-122 Preliminary Plans\02-Studies\JD\06-Dr\061-AC-012201-JD-06-PLAN.dwg
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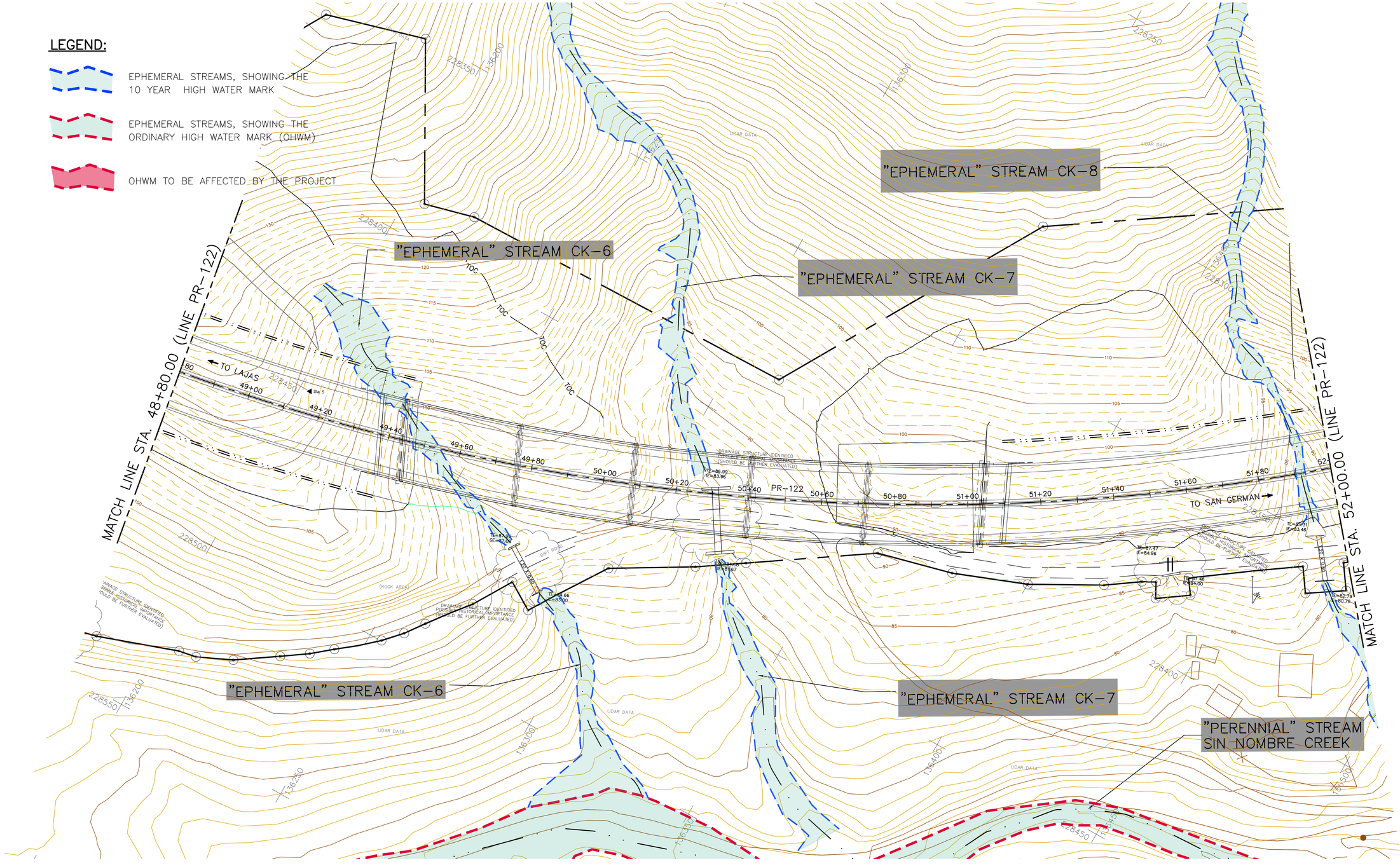
| FEDERAL CODE NO. | AC. PROJECT CODE NO. | HIGHWAY | MUNICIPALITY | ISLAND | FISCAL YEAR | SHEET NO. | TOTAL SHEETS |
|---|---|---|---|---|---|---|---|
| ------- | AC-012201 / R0000102001 | PR-122 | SAN GERMAN | PR | 2022 | 62 | 349 |

## LEGEND:

EPHEMERAL STREAMS, SHOWING THE 10 YEAR HIGH WATER MARK

EPHEMERAL STREAMS, SHOWING THE ORDINARY HIGH WATER MARK (OHWM)

OHWM TO BE AFFECTED BY THE PROJECT




| PUERTO RICO HIGHWAY & TRANSPORTATION AUTHORITY | EXTENSION HIGHWAY PR-122 | | SCALE = 1 : 500 | WATERS OF THE UNITED STATES DELIMITATION | JD |
|---|---|---|---|---|---|
| *BEHAR YBARRA & ASSOCIATES LLC* | FROM EXISTING PR-321 TO EXISTING PR-166 | DATE / REVISION | 0 5 10 20 30 40 | FROM STA. 48+80.00 TO STA. 52+00.00 | 7 |
| *CONSULTING ENGINEERS AND ARCHITECTS* | | | | | |

| WORK | BY | DATE |
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PLOT DATE: March 25, 2024
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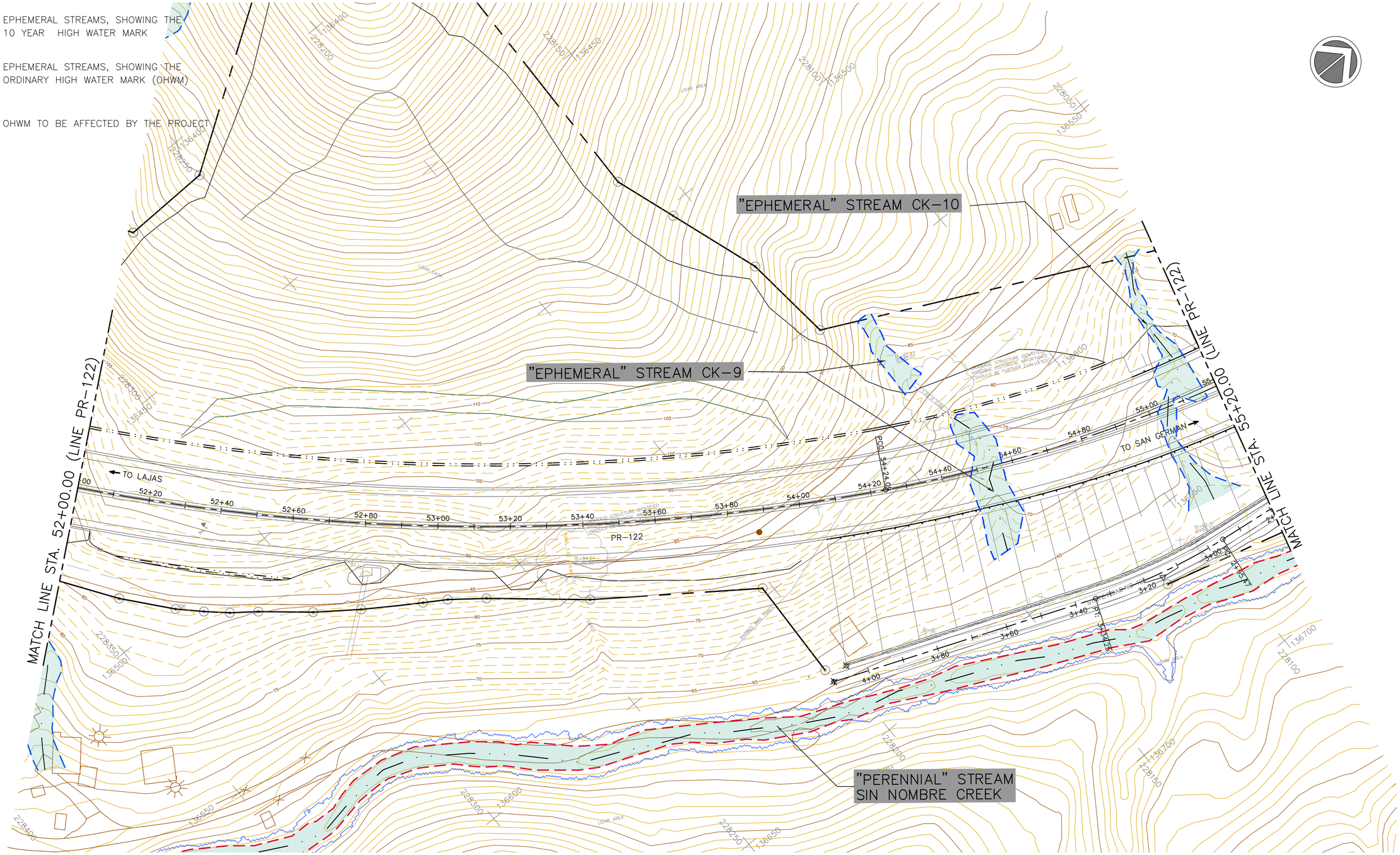
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|---|---|---|---|---|---|---|---|
| -------- | AC-012201<br>R0000102001 | PR-122 | SAN GERMAN | PR | 2022 | 63 | 349 |

## LEGEND:

EPHEMERAL STREAMS, SHOWING THE 10 YEAR HIGH WATER MARK

EPHEMERAL STREAMS, SHOWING THE ORDINARY HIGH WATER MARK (OHWM)

OHWM TO BE AFFECTED BY THE PROJECT




| WORK | BY | DATE |
|---|---|---|
| DESIGN | | |
| DRAWING | | |
| TRACED | | |
| CHECKED | | |
| FINAL CHECK | | |

PUERTO RICO HIGHWAY & TRANSPORTATION AUTHORITY
*BEHAR YBARRA & ASSOCIATES LLC*
*CONSULTING ENGINEERS AND ARCHITECTS*

EXTENSION HIGHWAY PR-122
FROM EXISTING PR-321 TO EXISTING PR-166

DATE | REVISION

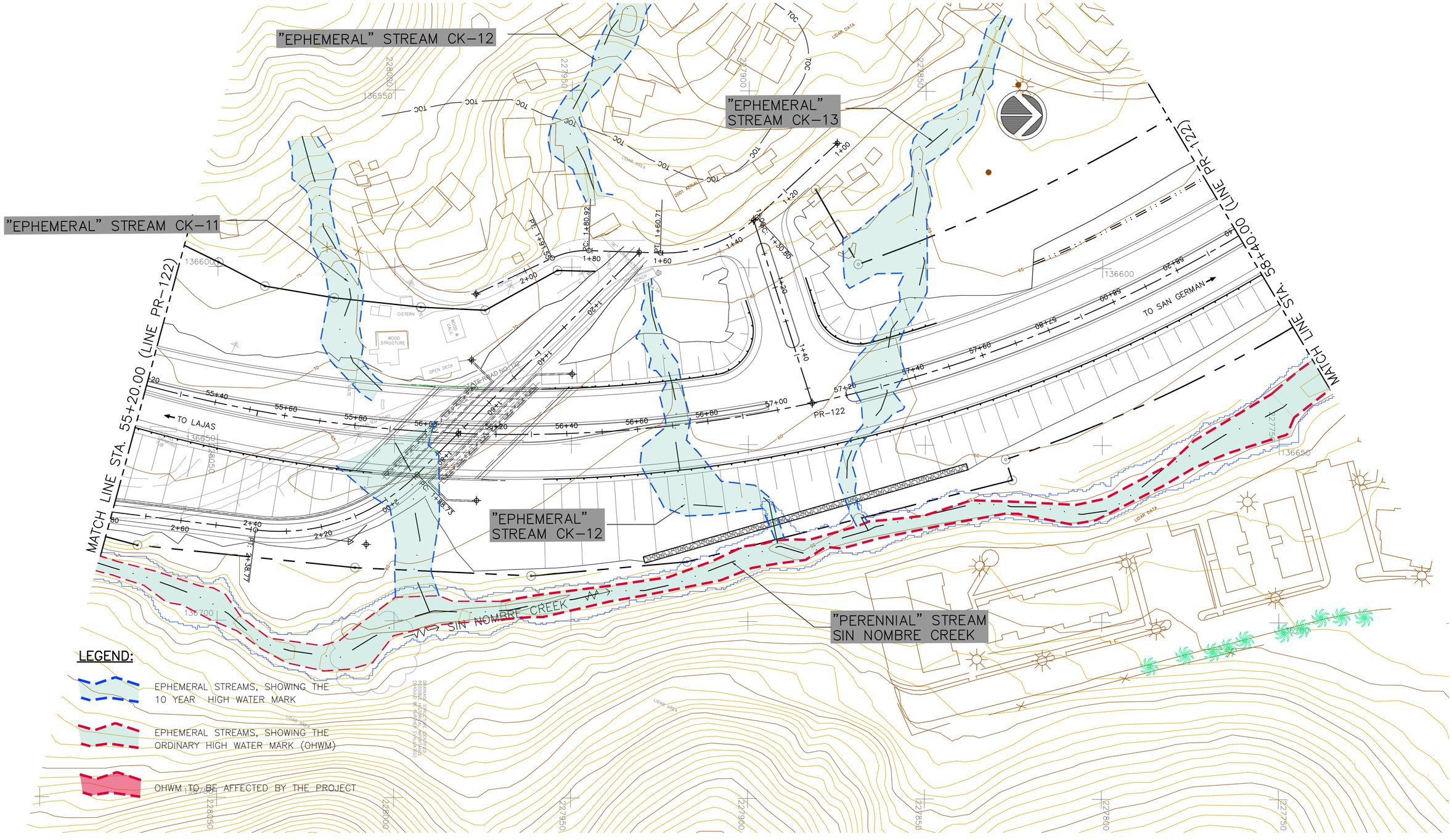
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WATERS OF THE UNITED STATES DELIMITATION
FROM STA. 52+00.00 TO STA. 55+20.00

JD 8

BYA FILE: \\BYASERVER1\Projects\22002-PR-122 Preliminary Plans\02-Studies\JD\06-Dr\063-AC-0122201-JD-08-PLAN.dwg
PLOT DATE: March 25, 2024
FILE NAME=

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| ------- | AC-012201<br>R0000102001 | PR-122 | SAN GERMAN | PR | 2022 | 64 | 349 |




| WORK | BY | DATE |
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| DESIGN | | |
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| TRACED | | |
| CHECKED | | |
| FINAL CHECK | | |

PUERTO RICO HIGHWAY & TRANSPORTATION AUTHORITY
*BEHAR YBARRA & ASSOCIATES LLC*
*CONSULTING ENGINEERS AND ARCHITECTS*

EXTENSION HIGHWAY PR-122
FROM EXISTING PR-321 TO EXISTING PR-166

| DATE | REVISION |
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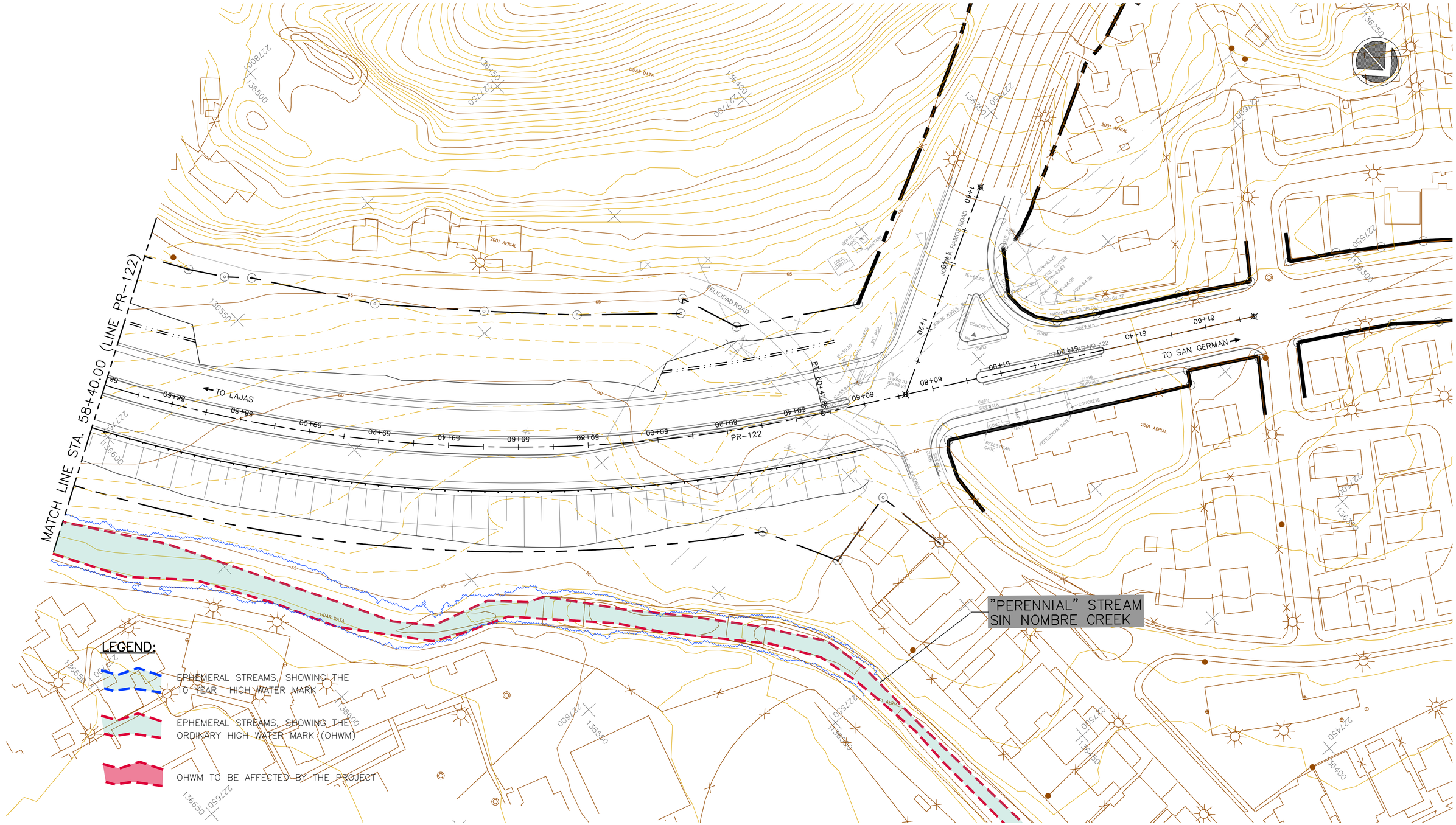
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WATERS OF THE UNITED STATES DELIMITATION
FROM STA. 55+20.00 TO STA. 58+40.00

JD 9

BYA FILE: \\BYASERVER1\Projects\22002-PR-122 Preliminary Plans\02-Studies\JD\06-Dr\064-AC-012201-JD-09-PLAN.dwg
PLOT DATE: March 25, 2024
FILE NAME=

| FEDERAL CODE NO. | AC. PROJECT CODE NO. | HIGHWAY | MUNICIPALITY | ISLAND | FISCAL YEAR | SHEET NO. | TOTAL SHEETS |
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| -------- | AC-012201<br>R0000102001 | PR-122 | SAN GERMAN | PR | 2022 | 65 | 349 |




| WORK | BY | DATE |
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| DESIGN | | |
| DRAWING | | |
| TRACED | | |
| DESIGN CHECKED | | |
| FINAL CHECK | | |

PUERTO RICO HIGHWAY & TRANSPORTATION AUTHORITY
*BEHAR YBARRA & ASSOCIATES LLC*
*CONSULTING ENGINEERS AND ARCHITECTS*

EXTENSION HIGHWAY PR-122
FROM EXISTING PR-321 TO EXISTING PR-166

| DATE | REVISION |
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SCALE = 1 : 500
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WATERS OF THE UNITED STATES DELIMITATION
FROM STA. 58+40.00 TO STA. 61+74.20

JD 10

PLOT DATE: March 25, 2024 BYA FILE: \\BYASERVER1\Projects\22002-PR-122 Preliminary Plans\02-Studies\JD\06-Dr\065-AC-01222201-JD-10-PLAN.dwg FILE NAME=

# Wetlands Visual Assessment

**CDBG-MIT PROGRAM**

Extensión PR-122 de Lajas a San Germán

# PRIMARY SCREENING FOR WETLANDS AS PER HUD's REGULATIONS AT 24 CFR 55.9(b)

| **General Information:** | | |
|---|---|---|
| Project Name (Case ID): | INFRA-STR-004 | |
| Coordinates: | Begins 18.058536, -67.045267, Ends 18.076742, -67.034764 | |
| Parcel ID: | 334-093-206-11, 334-000-007-02, 334-000-007-91, 334-000-007-86, and 334-074-201-54 | |
| Municipio: | San Germán/Lajas | |
| Report Date: | 2/6/25 | |
| Preparer: | Miguel A. Pérez | |
| **Project Scope:** | | |
| Does this project involve new construction as defined in Executive Order 11990?<br>(The term "new construction" shall include draining, dredging, channelizing, filling, diking, impounding, and related activities and any structures or facilities begun or authorized after the effective date of the Order.) | ☒ Yes | ☐ No<br>(Based on the response, the review is in compliance) |
| Project Site Conditions:<br>(Indicate whether the area is impacted or not. If impacted, specify what elements or factors are present.) | Click or tap here to enter text.The actual condition of the Study Area has been influenced by past uses of the land, agricultural activities and other anthropogenic factors. Within the Study Area, most of the ephemeral streams tributaries of Quebrada Maresúa are fragmented and crossed by | |

| | |
|---|---|
| | existing dirt roads with no visible culvert or water management structures. However, the tributaries of the unnamed creek, which are crossed by the former railroad berm, have historic culverts that were built with stones, bricks and concrete. On the other hand, the tributaries of the unnamed creek crossed by the existing access road at the Retiro community (northern section of the Study Area) have corrugated pipe culverts. The topography of the property goes from flat to steep. The elevation varies between sixty and one hundred meters above sea level (60-100 m). |

## A. Visual Assessment (Desktop Study)

| **National Wetlands Inventory (NWI) Reference** | | |
|---|---|---|
| Coordinates: 18.058536, -67.045267 | | |
| Is the project area located in proximity to wetlands identified on the National Wetlands Inventory (NWI)? | ☒ Yes | The project site is in proximity of wetlands identified as Riverine Wetland on NWI |
| | ☐ No | The project site is not in proximity of wetlands identified on NWI. |

## B. Visual Assessment (Field Study)

| **Visual Assessment performed on:** 3/29/2023 | | |
|---|---|---|
| **List Individual(s) conducting the assessment. List weather conditions the day the assessment was performed, description of Site Conditions and Transects performed at site.** | | |
| Individual(s) present: | Walter E. Soler | |
| Weather Conditions:<br>(Prior and during the site visit) | Sunny | |
| Where transects performed? | ☒<br>Yes | ☒<br>No |
| If performed, how many transects were performed per transects? | During the site reconnaissance, assessment and jurisdictional wetland determination and delineation field visits for the Study, a total of twenty-nine (29) evaluated locations were established: six (6) were classified as sampling points (SP), and twenty-three (23) were classified as observation points (OP). | |

| **Wetland Vegetation:** | | |
|---|---|---|
| Was vegetation identified throughout the visit? | ☒<br>Yes | Wetland vegetation was identified. (Provide supporting documentation) |
| | ☐<br>No | No wetland vegetation was identified. (Provide supporting documentation). |

| **Wetland Hydrology:** | | |
|---|---|---|
| Was visual inundation, ponding or saturation present at the site? | ☐ Yes | ☒ No |
| Were watermarks present within site (If applicable)? | ☐ Yes | ☒ No |
| If performed, how many borings were performed per transects? | 6 soil pits were performed during study. No borings were performed. | |
| If performed, how many samples were taken? | 6 | |
| If performed, was underground water found throughout borings? | ☐ Yes | ☒ No |
| If boring were performed, summarize determination of borings: | Wetland hydrology was found on five (5) of the soil pits performed. The wetland hydrology indicators found were: Aquatic Fauna (B13), Sediment Deposits (B2), Drift Deposits (B3), Saturation (A3), Surface Water (A1) and Algal Mat or Crust (B4). Out of the five (5) boring with indicators present, three (3) have a Wetland Determination. | |
| Reasoning as for why borings were not performed: | Click or tap here to enter text. | |
| **Provide supporting documentation (Photo Log) with brief descriptions and georeferenced document of all boring sample locations taken at end of form.** | | |

| **Hydric Soils:** | |
|---|---|
| What is the NRCS' soil classification for this site? | Based on the Soil Survey of the San Germán Area of Puerto Rico, from the U.S. Department of Agriculture Soil Conservation Service, the Study Area contains ten (10) soil series: Descalabrado clay series (DsF), El Cacique-La Taina complex series (EcF), Humatas clay series (HmE), Montegrande clay series (MqC), Mucara loam series (MuC), Mucara loam series (MuD), Mucara loam series (MuE), Mucara loam series (MuF), San Germán-Duey coomplex series (SgF) and Urban land series (Ua) |
| If performed, how many borings were performed per transects? | N/A |
| If performed, when were the borings performed? | N/A |
| If performed, how many samples were taken? | 6 soil pits were taken at six sample points. |
| If performed, what were the identified soils for each sample? | SP-04 Low chroma with no redoximorphic features observed, however soils could be classified as problematic since a relocated within an ephemeral stream bed.<br><br>SP-05 Low chroma, problematic soil within an ephemeral stream with deposition of sediments, |

| **Hydric Soils:** | | |
|---|---|---|
| | bedrock and rock crumble below the first 8" of soil.<br>OP-01 Stream with stagnant water, unable to perform soil sample. Vegetative association methydrophytic criteria.<br><br>SP-06 Stripped Matrix, Loamy Gleyed Matriz, Depleted Matrix | |
| If performed, does the identified soil sample concur with NRCS Soil Study Identification? | ☒ Yes | ☐ No |
| If performed, was underground water found throughout borings? | ☐ Yes | ☒ No |
| If boring were performed, summarize determination of borings: | N/A | |
| Reasoning as for why borings were not performed: | In some Observation points, inability to dig soil pits due to underground bedrocks and roots. | |
| **Provide supporting documentation (Photo Log) with brief descriptions and georeferenced document of all boring sample locations taken at end of form.** | | |

| **Summary of Finding for Wetland Indicators** | |
|---|---|
| Is there a presence of mentioned indicators or characteristics of wetlands within the assessed area? | ☒ Wetlands Vegetation |
| | ☒ Hydric Soils |
| | ☒ Hydrology |

| | |
|---|---|
| | ☐ No Indicators were observed |

## C. Determination

| Visual Assessment Field Study and Desktop Study | | |
|---|---|---|
| Based on Visual Assessment Field Study and Desktop Study: | ☒ | The primary screening conclusively determined that the project site contains wetlands. |
| | ☐ | The primary screening conclusively determined that the project site does not contain wetlands. |
| | ☐ | The primary screening is inconclusive; potential wetlands should be further studied. |

## D. Supporting Documentation

The best available information such as NRCS Soil identification, Maps, USDA Plant Lists, previous USACE wetland determinations, if any, and/or documentation of project site (if available) must be provided to support the determination made. All supporting documentation must provide source reference.

Field Study photos, photo log, and georeferenced document demonstrating location of all boring sample must be included in this form.

**Supporting Documentation**

# USACE Nationwide Permit 14 Verification Letter

**DEPARTMENT OF THE ARMY**
**U.S. ARMY CORPS OF ENGINEERS, CARIBBEAN DISTRICT**
**FUNDACIÓN ÁNGEL RAMOS ANNEX BLDG.**
**383 FRANKLIN D. ROOSEVELT AVE.**
**SAN JUAN, PUERTO RICO 00918**

June 10, 2025

Regulatory Branch
SAJ-2002-06830 (NWP-YCP)

Luis E. Rodríguez Rosa
Deputy Executive Director
PR Highway and Transportation Authority
Centro Gubernamental Roberto Sánchez Virella
P.O. Box 42007
San Juan, Puerto Rico 00940-2007
Sent via email: lurodriguez@act.p.gov

Dear Mr. Rodríguez Rosa:

The U.S. Army Corps of Engineers (Corps) has completed the review of your Department of the Army (DA) permit application regarding the proposed work to construct a three-cell concrete box culvert which would impact water of the Maresúa Creek. The project site is located at State Road PR-122, Municipality of San Germán, Puerto Rico (18.066827°, -67.043723°). Please reference file number SAJ-2002-06830 (NWP-YCP) in all future correspondence concerning this project.

A review of the submitted information and drawings indicates that the proposed work would result in permanent and temporary discharge of fill material into approximately 0.2245 and 0.02694 acres of waters of the United States, respectively. The project activities would include: (1) the construction of a three-cell box culvert, 73.96 long, with flared wingwalls; (2) the installation of a pool-type energy dissipator for erosion and sediment control; (3) embankment improvements that would consist in the placement of 183.8419 cubic yards of earth fill; (4) the placement of 82.0315 cubic yards of riprap protection; (5) the placement of 816.6934 cubic yards of earth cut for box culvert, pool-type energy dissipator and apron construction/installation purposes; (6) the implementation of soil erosion and sedimentation control measures (such as silt fences); (7) the installation of temporary berms for creek flow redirection purposes that would cover a surface area of jurisdictional waters of 0.01174 acres and the associated volume of fill material below the OHWM would be 14.96 cubic yards; and (8) the installation of a temporary crossing that would be 26.6028 meters long, and consist of four strategically placed 42" diameter pipes to allow better redirection of the creek flow allowing to divide the construction in phases, and would cover a surface area of jurisdictional waters of 0.0152 acres and the associated volume of fill material below the OHWM would be 45.804 cubic yards.

The project, as depicted on the enclosed drawings, is authorized by Nationwide Permit (NWP) 14 (Linear Transportation Projects), pursuant to Section 404 of the Clean Water Act (33 U.S.C. § 1344). **This verification is valid until March 14, 2026.** In order for this NWP authorization to be valid, you must ensure that the work is performed in accordance with the Nationwide Permit General Conditions, the Jacksonville District Regional Conditions, and the General and Project-Specific Special Conditions listed below. Furthermore, if you commence or are under contract to commence this activity before the date that the relevant NWP is modified or revoked, you will have 12 months from the date of the modification or revocation of the NWP to complete the activity under the present terms and conditions of this NWP. You can access the U.S. Army Corps of Engineers (Corps) Jacksonville District's Regulatory Source Book webpage for links to view NWP information at: https://www.saj.usace.army.mil/Missions/Regulatory/Source-Book/. Please be aware this Internet address is case sensitive and should be entered as it appears above. Once there, you will need to select "Nationwide Permits." Among other things, this part of the Source Book contains links to the federal register containing the text of the pertinent NWP authorization and the associated NWP general conditions, as well as separate links to the regional conditions applicable to the pertinent NWP verification.

You must comply with all of the special and general conditions for NWP-14, including any project-specific conditions included in this letter and all conditions incorporated by reference as described above.

**General Conditions:**

1. The time limit for completing the work authorized ends on **March 14, 2026**.

2. You must maintain the activity authorized by this permit in good condition and in conformance with the terms and conditions of this permit. You are not relieved of this requirement if you abandon the permitted activity, although you may make a good faith transfer to a third party in compliance with General Condition 4 below. Should you wish to cease to maintain the authorized activity, or should you desire to abandon it without a good faith transfer, you must obtain a modification of this permit from this office, which may require restoration of the area.

3. If you discover any previously unknown historic or archeological remains while accomplishing the activity authorized by this permit, you must immediately notify this office of what you have found. We will initiate the Federal and state coordination required to determine if the remains warrant a recovery effort or if the site is eligible for listing in the National Register of Historic Places.

4. If you sell the property associated with this permit you must obtain the signature of the new owner on the attached transfer form and forward a copy to this office to validate the transfer of this authorization.

5. If a conditioned water quality certification has been issued for your project, you must comply with the conditions specified in the certification as special conditions to this permit. For your convenience, a copy of the certification is attached (Attachment A) if it contains such conditions.

6. You must allow a representative from this office to inspect the authorized activity at any time deemed necessary to ensure that it is being or has been accomplished in accordance with the terms and conditions of your permit.

**Project Specific Special Conditions:**

The following project specific special conditions are included with this verification:

1. **Reporting Address:** The Permittee shall submit all reports, notifications, documentation, and correspondence required by the general and special conditions of this permit to either (not both) of the following addresses:

   a. For electronic mail (preferred): RD-Antilles@usace.army.mil (not to exceed 15 MB).

   b. For standard mail: U.S. Army Corps of Engineers, Caribbean District, Regulatory Branch, Fund. Ángel Ramos Annex. Bldg., 383 Franklin Delano Roosevelt Ave., San Juan, PR 00918.

The Permittee shall reference this permit number, SAJ-2002-06830 (NWP-YCP), on all submittals.

2. **Commencement Notification:** Within 10 days from the date of initiating the work authorized by this permit, the Permittee shall submit a completed "Commencement Notification" form (attached).

3. **Posting of Permit:** The Permittee shall have available and maintain for review a copy of this permit and approved plans at the construction site.

4. **Certification of Compliance**: Within 60 days of completion of the work authorized by this permit, the Permittee shall complete the ENG Form 6285 – "Certification of Compliance with Department of the Army Permit" (located at https://www.publications.usace.army.mil/Portals/76/Eng_Form_6285_2024%20Dec%20FINAL.pdf) and submit it to the Corps.

5. **Cultural Resources/Historic Properties:**

   a. No structure or work shall adversely affect, impact, or disturb properties listed in the *National Register of Historic Places* (NRHP), or those eligible for inclusion in the NRHP.

   b. If, during the ground disturbing activities and construction work within the permit area, there are archaeological/cultural materials encountered which were not the subject of a previous cultural resources assessment survey (and which shall include, but not be limited to: pottery, modified shell, human remains, ceramics, stone tools or metal implements, dugout canoes, evidence of structures or any other physical remains that could be associated with native cultures or early colonial settlement), the Permittee shall immediately stop all work and ground-disturbing activities within a 100-meter diameter of the discovery and notify the Corps at the addresses listed in the **Reporting Address Special Condition** within the same business day (8 hours). The Corps shall coordinate with the Puerto Rico State Historic Preservation Officer (SHPO) to assess the significance of the discovery and devise appropriate actions.

   c. Additional cultural resources assessments may be required of the permit area in the case of unanticipated discoveries as referenced in accordance with the above Special Condition and, if deemed necessary by the PRSHPO or Corps, in accordance with 36 CFR 800 or 33 CFR 325, Appendix C (5). Based on the circumstances of the discovery, equity to all parties, and considerations of the public interest, the Corps may modify, suspend, or revoke the permit in accordance with 33 CFR Part 325.7. Such activity shall not resume on non-federal lands without written authorization from the PRSHPO for finds under his or her jurisdiction, and from the Corps.

   d. In the unlikely event that unmarked human remains are identified on non-federal lands, all work and ground disturbing activities within a 100-meter diameter of the human remains shall immediately cease and the Permittee shall immediately notify the Corps and PRHSPO within the same business day (8-hours). The Corps shall coordinate with the appropriate SHPO. Based on the circumstances of the discovery, equity to all parties, and considerations of the public interest, the Corps may modify, suspend, or revoke the permit in accordance with 33 CFR Part 325.7. Such activity shall not resume without written authorization from the PRSHPO and from the Corps.

6. **Best Management Practices:**

   a. **Erosion Control:** Prior to the initiation of any work authorized by this permit, the Permittee shall install erosion control measures along the perimeter of all work areas to prevent the displacement of fill material outside the work area into waters of the United States. The erosion control measures shall remain in place and be maintained until all authorized work is completed and the work areas are stabilized.

   b. **Fill Material:** The Permittee shall use only clean fill material for this project. The fill material shall be free from items such as trash, debris, automotive parts, asphalt, construction materials, concrete block with exposed reinforcement bars, and soils contaminated with any toxic substance in toxic amounts, in accordance with Section 307 of the Clean Water Act.

   c. **Turbidity Barriers:** Prior to the initiation of any of the work authorized by this permit, the Permittee shall install turbidity barriers around all work areas that are in, or adjacent to, surface waters. The turbidity barriers shall remain in place and be maintained daily until the authorized work has been completed. Turbidity barriers shall be removed upon stabilization of the work area.

7. The Permittee shall comply with the Conservation Measures for the Puerto Rican boa (*Chilabothrus inornatus*) revised January 2024, and additional conditions in the U.S. Fish and Wildlife (USFWS) letter dated March 24, 2021, as read below:

   a. If forested areas will be cleared during Puerto Rican nightjar nesting season (April to July), we recommend experienced and qualified biologists should search for nightjar nests prior to vegetation removal.

   b. If nests are found, contact the Service immediately and postpone the activity until the nightjar fledges.

8. The Permittee shall comply with the provisions enclosed in the Archeological Monitoring Work Plan PR-122 from PR-321 to PR-166 Lajas – San Germán AC-012201 SHPO-CF-03-22-24-01 dated December 10, 2024 and approved by the PR-SHPO via letter dated January 9, 2025.

9. **Temporary Impacts**: Immediately after completion of the authorized work, all temporary fill material must be removed in their entirety and the affected areas of waters of the United States, including wetlands, completely restored to pre-existing conditions. The areas affected by temporary fills must be revegetated, as appropriate.

10. You must file a "Notice of Intent to be covered by the General Water Quality Certificate" (DNER Form GWQC-02), copy enclosed, with the Puerto Rico Department of Natural and Environmental Resources, Water Quality Area. A copy of the stamped form GWQC-02 must be provided to this office.

This letter of authorization does not give absolute Federal authority to perform the work as specified on your application. In addition, this letter of authorization does not preclude the necessity to obtain any other Federal, State, or local permits, which may be required.

Thank you for your cooperation with our permit program. The Corps' Caribbean District Regultaory Branch is committed to improving service to our customers. We strive to perform our duties in an efficient and timely manner while working to preserve our nation's aquatic resources. Should you have any questions related to this NWP verification or have issues accessing the documents referenced in this letter, please contact Ms. Yariellys E. Cruz Pérez, by telephone at 787-599-1854 (Cellular) or at 787-474-2381 (Landline), or by email at yariellys.e.cruzperez@usace.army.mil.

Sincerely,

Digitally signed by GERENA.VIVIAN.1241984024
Date: 2025.06.10 14:58:50 -04'00'

Vivian Gerena
Lead Regulatory Program Manager

Enclosures

Cc:
Agent
PRDNER – Point Sources Permits Division, Water Quality Area

**DEPARTMENT OF THE ARMY PERMIT TRANSFER REQUEST**

**DA PERMIT NUMBER: SAJ-2002-06830 (NWP-YCP)**

When the structures or work authorized by this permit are still in existence at the time the property is transferred, the terms and conditions of this permit will continue to be binding on the new owner(s) of the property. Although the construction period for works authorized by Department of the Army permits is finite, the permit itself, with its limitations, does not expire.

To validate the transfer of this permit and the associated responsibilities associated with compliance with its terms and conditions, have the transferee sign and date below and mail to the U.S. Army Corps of Engineers, Caribbean District, Regulatory Branch, Fund. Ángel Ramos Annex Bldg., 383 Franklin Delano Roosevelt Ave., San Juan, P.R. 00918 or submit via electronic mail to: RD-Antilles@usace.army.mil (not to exceed 15 MB).

_____
**(TRANSFEREE-SIGNATURE)**

_____
**(DATE)**

_____
**(NAME-PRINTED)**

_____

_____
**(MAILING ADDRESS)**

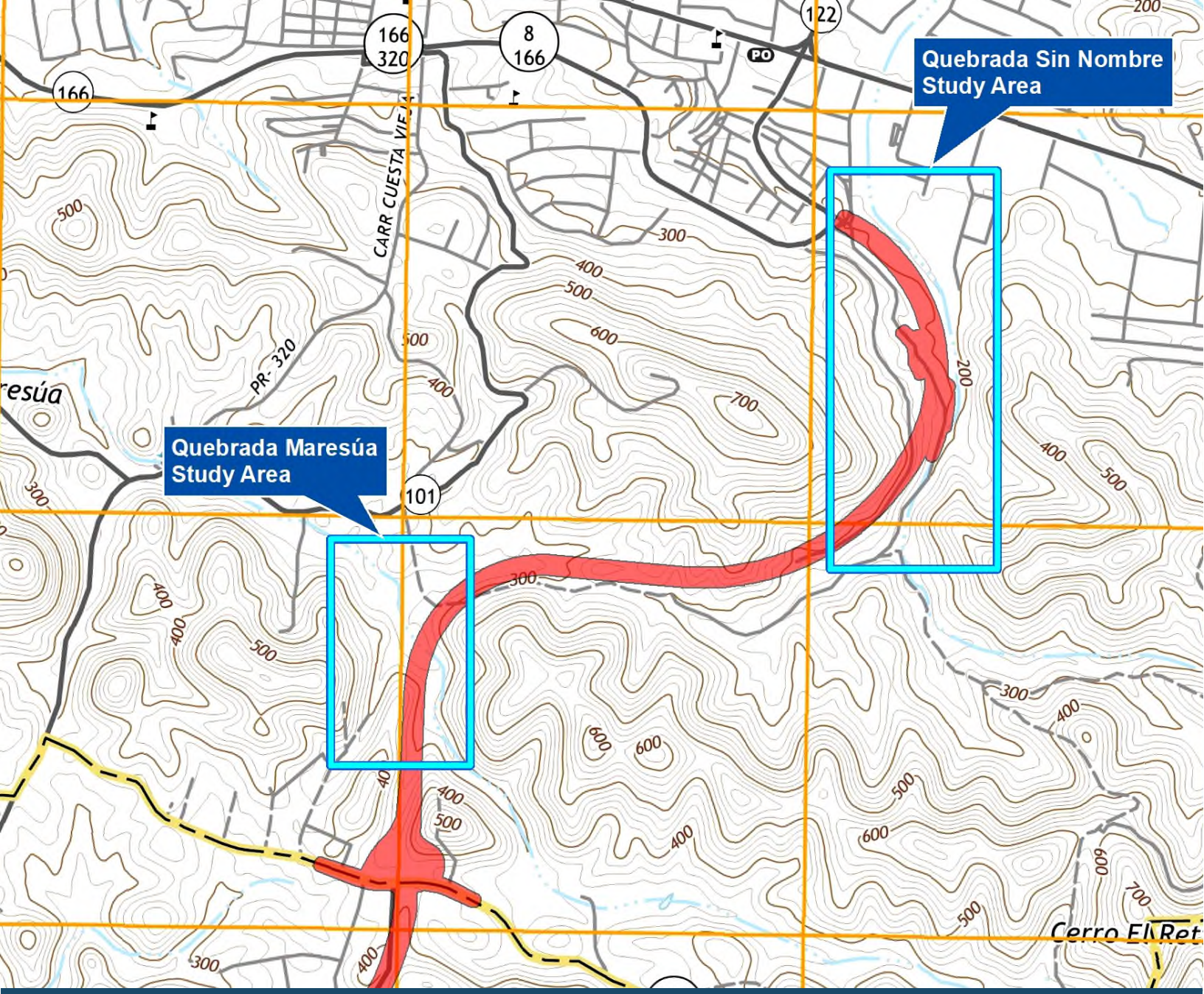
_____
**(CITY, STATE, ZIP CODE)**

_____
**(SUBDIVISION)**

_____ _____
**(LOT)** **(BLOCK)**

_____
**(STREET ADDRESS)**

# APPENDIX 12: Hydrologic and Hydraulic Study




# HYDROLOGIC & HYDRAULIC STUDY
# QUEBRADA MARESUA AND QUEBRADA SIN NOMBRE
# PR-122 FROM PR-321 TO PR-166
# LAJAS – SAN GERMAN
# (AC-012201)

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**May 23, 2025**

# HYDROLOGIC & HYDRAULIC STUDY

## QUEBRADA MARESUA AND
## QUEBRADA SIN NOMBRE
## SAN GERMAN, PUERTO RICO

### PR-122 FROM PR-321 TO PR-166
### LAJAS – SAN GERMAN
### (AC-012201)

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# 1 INTRODUCTION

The Puerto Rico Highway and Transportation Authority (PRHTA) propose to extend the Angel Castro Pérez Avenue (PR-122), from road PR-321 to road PR-166 (San Germán South Bypass), within the boundaries of the municipalities of San Germán and Lajas in the Commonwealth of Puerto Rico. The project is approximately 2.7 kilometers miles long. The project vicinity area is shown on **Figure 1**.

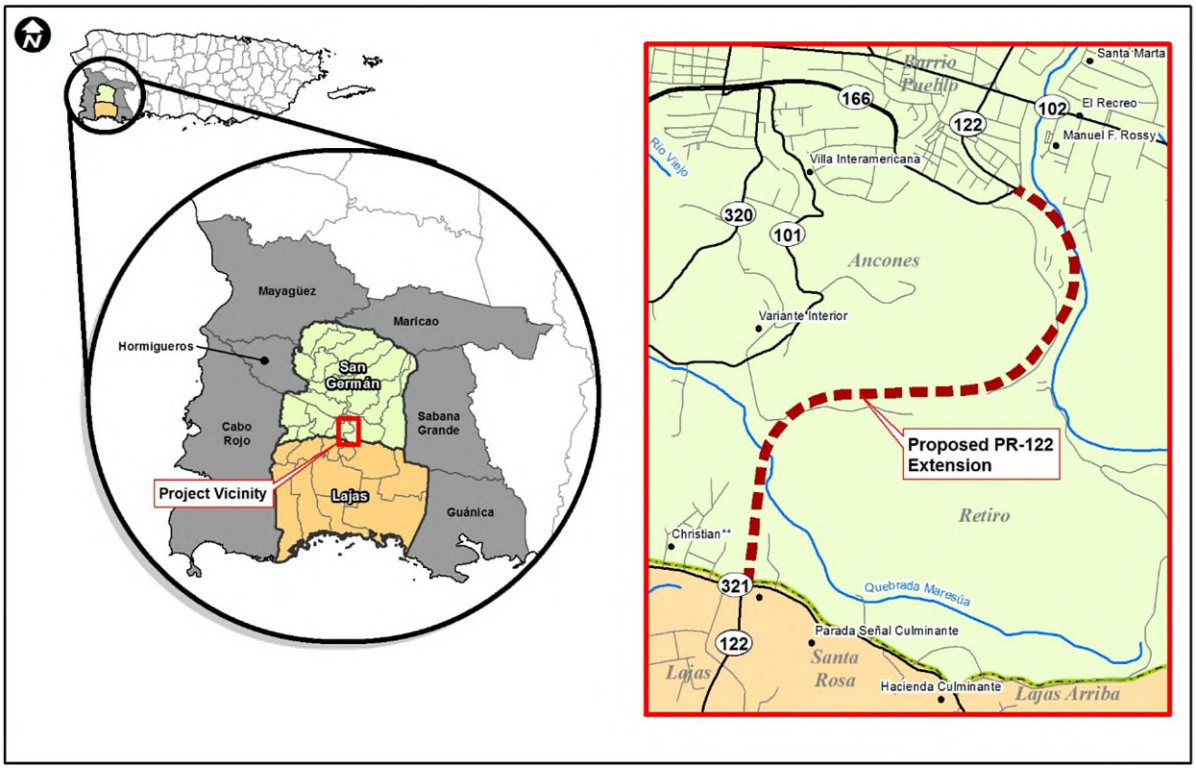



**Figure 1: Project Vicinity**

The purpose of the proposed PR-122 Extension project is to improve the mobility and connectivity in the project study area. The proposed project would provide a direct link between road PR-2 in the Municipality of San Germán and the Municipality of Lajas and its tourist area. It would provide an alternate route to PR-101, enhancing regional travel options and safety while protects the environment and promotes the economic development of the region.

## 1.1 Project Location and Description

The proposed project consists in the construction of a road 2.7 kilometers long with four lanes (two by direction) to connect the existing PR-122 at its intersection with road PR-321 to road PR-166 at San German. As a result, two water bodies within the municipality of San German will be impacted by the proposed project, Quebrada Maresúa and Quebrada sin Nombre. The area of effect at Quebrada Maresúa is located at Latitude: 18.066827°, Longitude: -67.043723°, while the area of effect at Quebrada sin Nombre is located at Latitude: 18.073851°, Longitude: -67.03149°.

The works to be performed along the Quebrada Maresúa consists in the construction of a tree-cell concrete box culvert, 73.94 long, with flared wingwalls. Each concrete cell will be 3.05 m wide by 3.05 m rise. The proposed works at Quebrada Sin Nombre will consist in the construction of a gabion wall along the creek's bank resulting from the fill slopes of the road. **Figure 2** shows the studied sites location in a partial reproduction of the United States Geological Survey (USGS) Topographic Quadrangle of San German[1]. **Figure 3** shows the project area on an aerial photo.

[1] (United States Geological Survey, 2018)

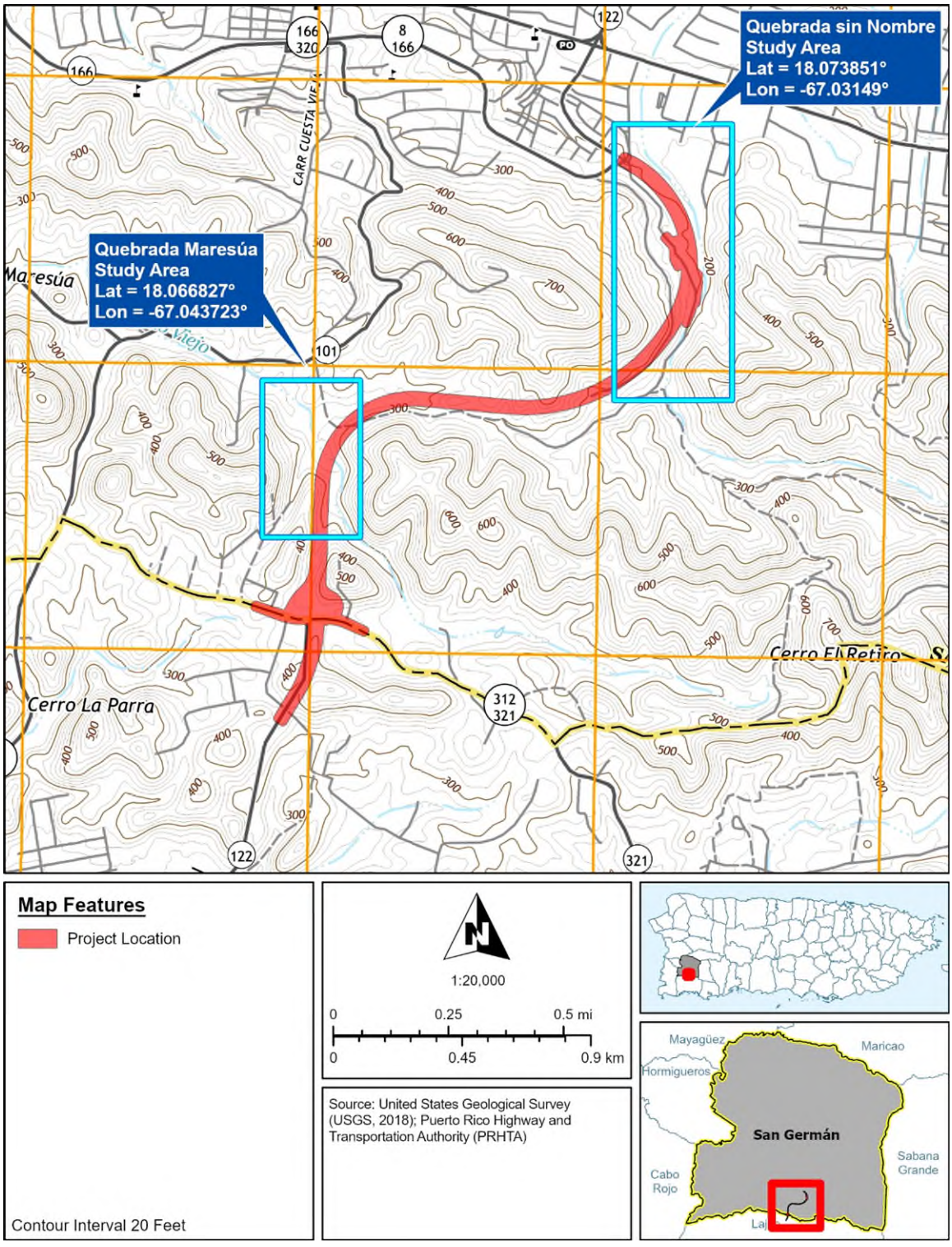



**Figure 2: Location Plan in the USGS Topographic Quadrangle of San German**

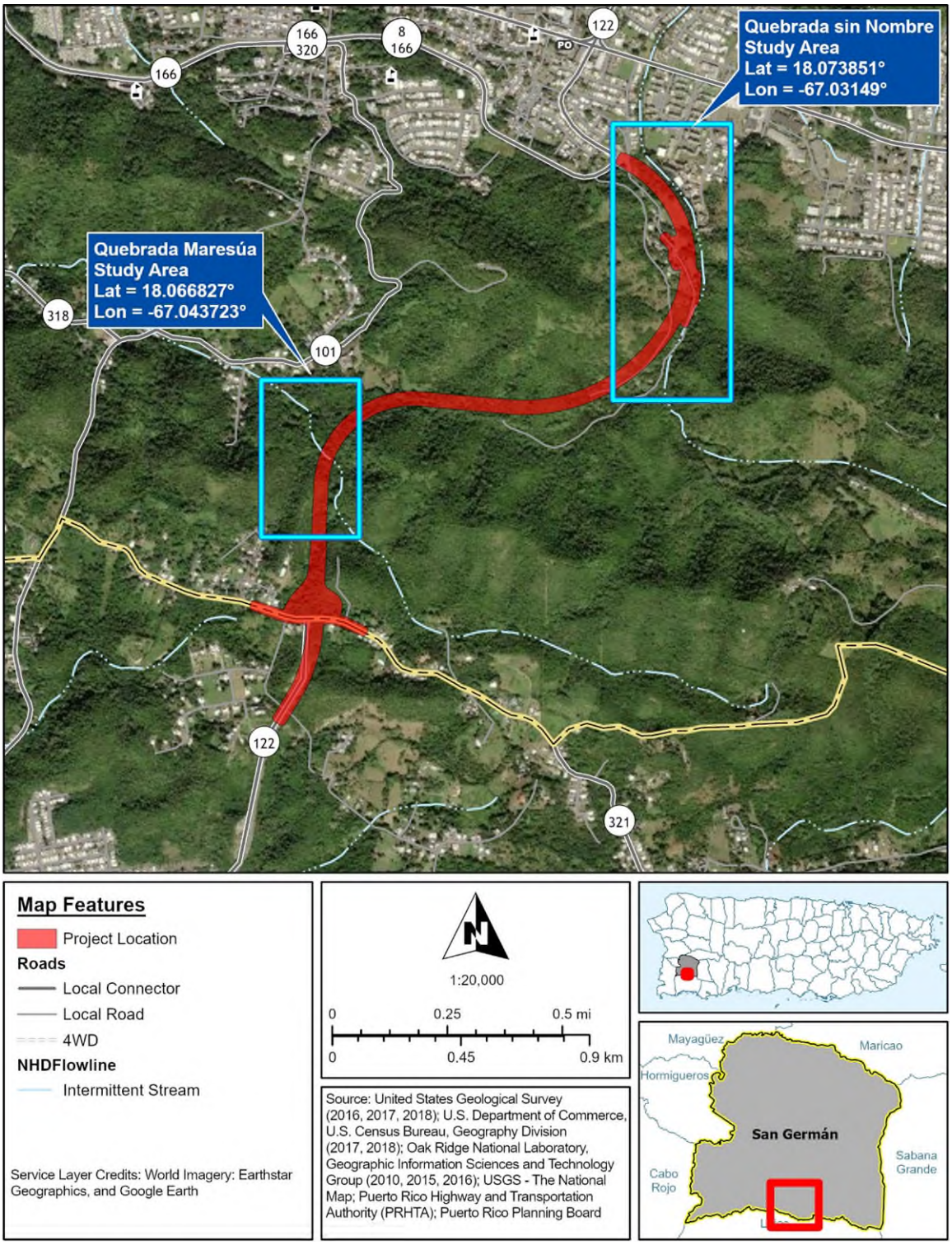



**Figure 3: Location Plan in Aerial Photo**

## 1.2 Purpose of the Study

The purpose of this study is to evaluate the hydraulic effect of the proposed works on Quebrada Maresúa and Quebrada Sin Nombre during extreme flood events. The evaluation will consist in the comparison of the existing and proposed flood levels after the construction of the project. The proposed hydraulic structures shall not increase the 100-year flood levels more than the allowed by the Puerto Rico Planning Board (PRPB) Regulation No. 13 (Puerto Rico Planning Board, 2010).

## 1.3 Scope of Work

This study will be conducted in two (2) parts: 1) a hydrologic analysis, and 2) a hydraulic analysis, following the guidelines adopted by the PRPB in the document *Guias Para La Elaboración de Estudios Hidrológicos-Hidráulicos* (Silva & Rivera, 2016).

The hydrologic analysis will determine the peak flow discharge magnitude at the proposed hydraulic structures, for the 100-year event.

The hydraulic analysis will determine the water surface elevations on the Quebrada Maresúa and Quebrada Sin Nombre for the 100-year event and compares the existing base flood elevations (BFE) levels with the levels after the construction of the proposed works. FEMA defines the BFE as the elevation of surface water resulting from a flood that has a 1% chance of equaling or exceeding that level in any given year. The proposed project shall not increase the 100-year flood levels more than the allowed by the PRPB Regulation No.13.

## 1.4 Parties Involved and Authorization

Owner : Puerto Rico Highway and Transportation Authority (PRHTA)

Consultant : Behar-Ybarra & Associates, L.L.C. (BYA)

Prepared By : Euclides Torres Rivera, PE

The consultant company Behar Ybarra & Associates, L.L.C. (BYA) developed this report under written authorization of the owner, the PRHTA.

## 1.5 Report Limitations and Warnings

All elevations are presented in meters and referred to PRVD02 vertical datum unless otherwise specified.

This study has been prepared in accordance with the best engineering practices as described in this report and based on the studies and field measurement provided by other parties.

The hydraulic analysis performed and documented in this report is based on the topographic field survey data as prepared and submitted by Antonio Meléndez & Associates, PSC, Surveying and Mapping Consultants. Any inaccuracies and/or changes to these data or field condition in the stream reach after the date that the field survey was performed, may invalidate the results and recommendations contained in this study.

BYA is not responsible for the conclusions or opinions made by others on this data and requests the opportunity to review the documentation, to confirm that our evaluations are properly interpreted and implemented.

This report should be read in full and no excerpts are to be taken as representative of the findings. No responsibility is accepted by BYA for the use of any part of this report in any other context.

This report has been prepared on behalf of, and the exclusive use of the PRHTA, and it is subject to, and issued in accordance with, the provisions of the agreement between BYA and PRHTA. BYA accepts no liability or responsibility whatsoever for, in respect of any use of, or reliance upon, this report by any third party.

# 2 STUDY AREA DESCRIPTION

## 2.1 Topography and Water Bodies

The project was divided in two major subbasins, the Quebrada Maresúa Subbasin and the Quebrada sin Nombre Subbasin. The Quebrada Maresúa Subbasin was subdivided into three subbasins to properly evaluate the proposed culvert capacity/effect. **Figure 4** shows the evaluated area.

The Quebrada Maresúa watershed is 1.58 Km² (0.61 mi²) and is located within the municipality of San Germán in the southwest region of Puerto Rico. The creek flows westward toward Río Viejo located approximately 3.5 km downstream of the study area. The topography elevation varies between 225 and 69 meters. The average overland slope of the basin upstream the study area is 39.2%.

The Quebrada Sin Nombre watershed is 1.84 Km² (0.71 mi²) and is located within the municipality of San Germán. The creek flows northward toward Río Guanajibo located approximately 700 m downstream of the study area. The topography elevation varies between 226 and 49 meters. The average overland slope of the basin upstream the study area is 43.7%.

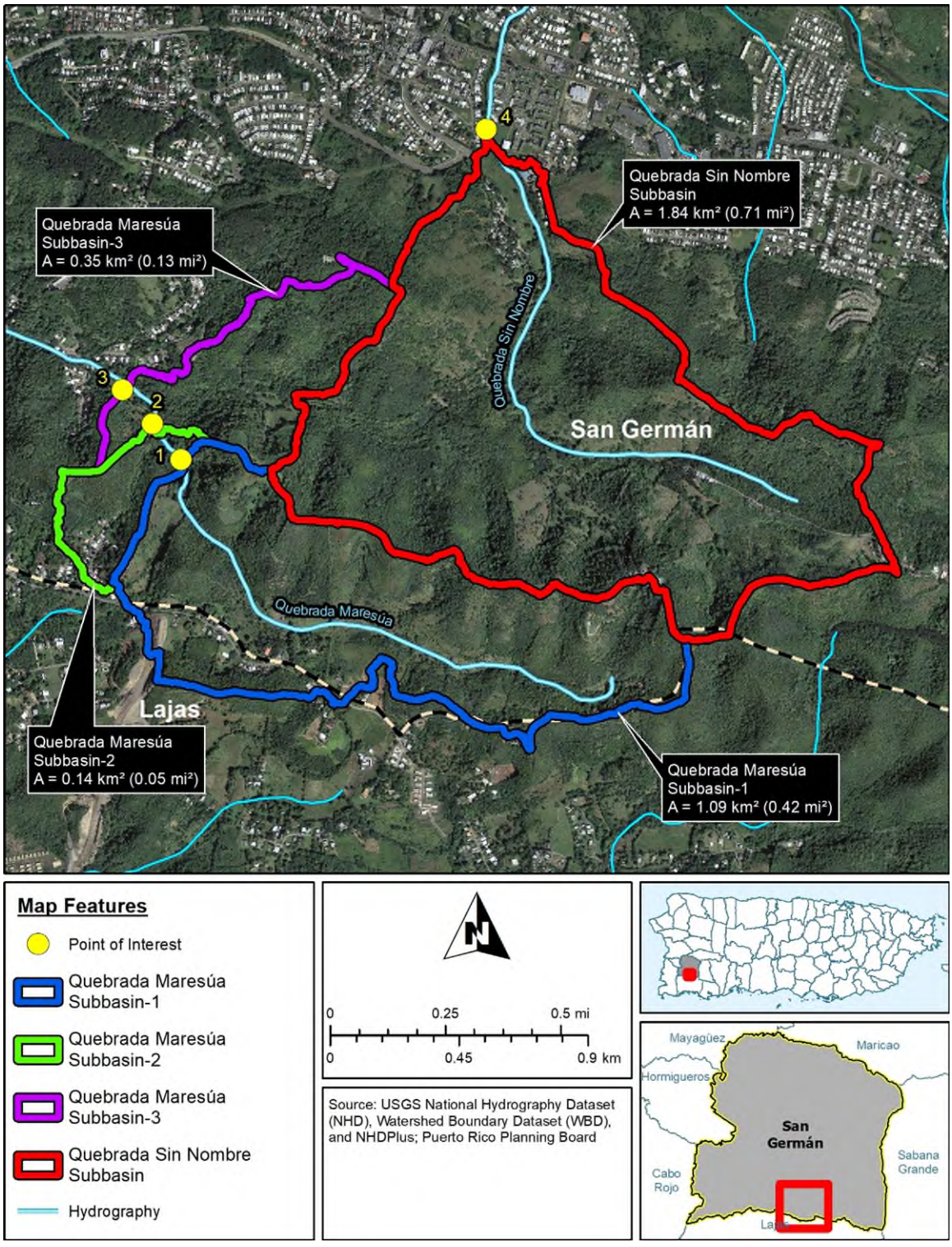



**Figure 4: Project Subbasins**

## 2.2 Previous Studies

According to FEMA Advisory Base Flood Elevations (ABFE) and FEMA Flood Insurance Rate Map (FIRM); Quebrada Maresúa and Quebrada Sin Nombre have not been studied and water surface elevations and floodway limits have not been determined. The Advisory map prepared from the Puerto Rico Advisory Data (Strategic Alliance for Risk Reduction, 2018) published by FEMA and the FIRM (Federal Emergency Management Agency, 2009) are shown in is shown in **Figure 5** and **Figure 6**, respectively.

## 2.3 Flood Issues

No flood issues were identified at the proposed project area.

## 2.4 Field Data

The Quebrada Maresúa and Quebrada Sin Nombre cross sections data were surveyed by Antonio Meléndez & Associates, PSC, Surveying and Mapping Consultants during November 2022. All distances are in meters and topographic data is referred to PRVD02 vertical datum unless otherwise specified. **Appendix A** includes a reproduction of the certified copy of the topographic survey.

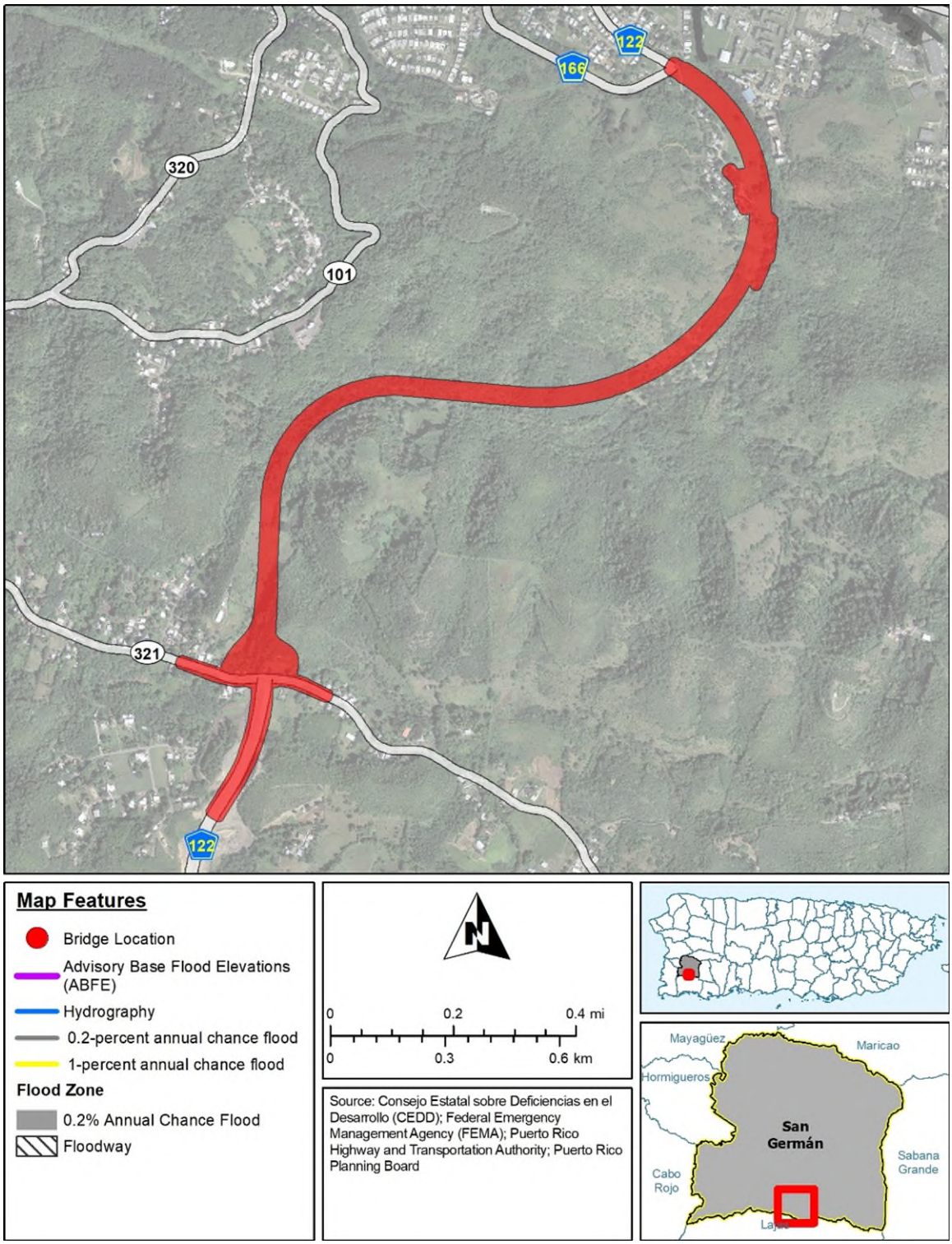



**Figure 5: FEMA Advisory Base Flood Elevations (ABFE) at PR-122 Location**

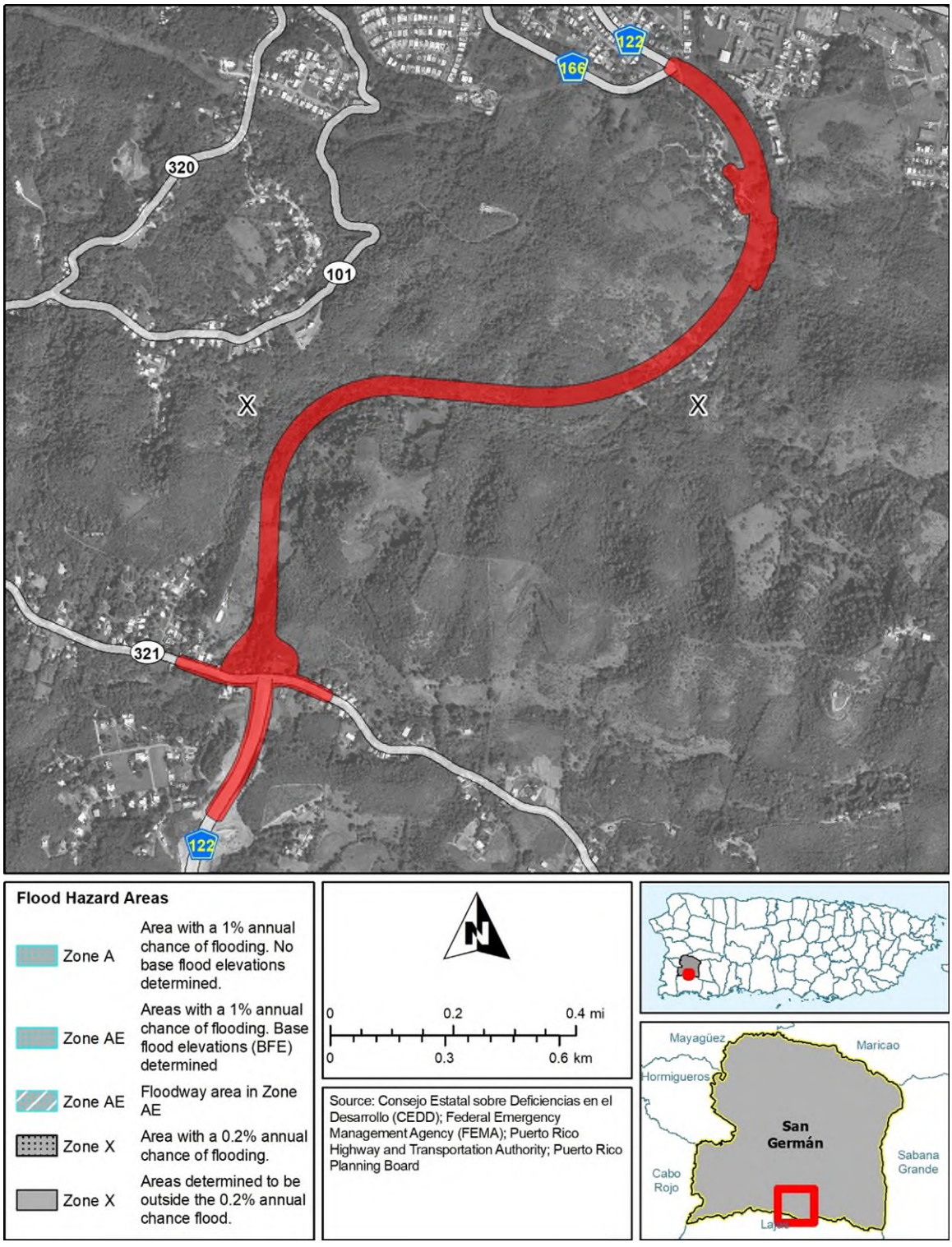



**Figure 6: FEMA Flood Insurance Rate Map (FIRM) at PR-122 Location**

# 3 HYDROLOGIC ANALYSIS

According to the "Guias Para La Elavoración de Estudios Hidrológicos-Hidráulicos"[2] from the Departamento de Recursos Naturales y Ambientales (DRNA), there are three acceptable methods to determine the design discharge to be used in the hydrologic and hydraulic (HH) studies. For gaged streams where the difference between the point of interest contributing area and the gage station contributing area does not exceed the 10% and the available peak flow records are adequate, the section 4.4 of the DRNA guidelines established that a frequency analysis following guidelines of the Bulletin #17B[3] should be performed to determine the design discharges. For ungagged streams the section 4.7 of the DRNA guidelines established that the preferred hydrologic method to determine the peak discharges is the Technical Release 55 (TR-55)[4] methodology. For sites within a regulated flood hazard zone the section 6.2 of the DRNA guidelines established that the HH study shall be based on the current regulatory study, thus the peak flows should be obtained from the current regulatory study.

## 3.1 Methodology

Since the bridge is located crossing an ungagged stream, the hydrologic analysis would be based on the TR-55 methodology.

### 3.1.1 Watershed Delimitation

The watersheds were delineated using the GIS capabilities of the Hydrologic Modeling System (HEC-HMS) version 4.9 developed by the USACE Hydrologic Engineering Center. The terrain data was extracted from the 2018 USGS Lidar DEM: Post Hurricane Maria - Puerto Rico[5] with 0.5 m.

#### 3.1.1.1 Quebrada Maresúa

**Figure 7** shows the Quebrada Maresúa subbasins delineated with HEC-HMS. **Table 1** the geomorphic parameters determined for the subbasins.

[2] (Silva & Rivera, 2016)
[3] (United States Department of the Interior Geological Survey, 1982)
[4] (Natural Resources Conservation Service, 1986)
[5] (Office for Coastal Management, 2021)

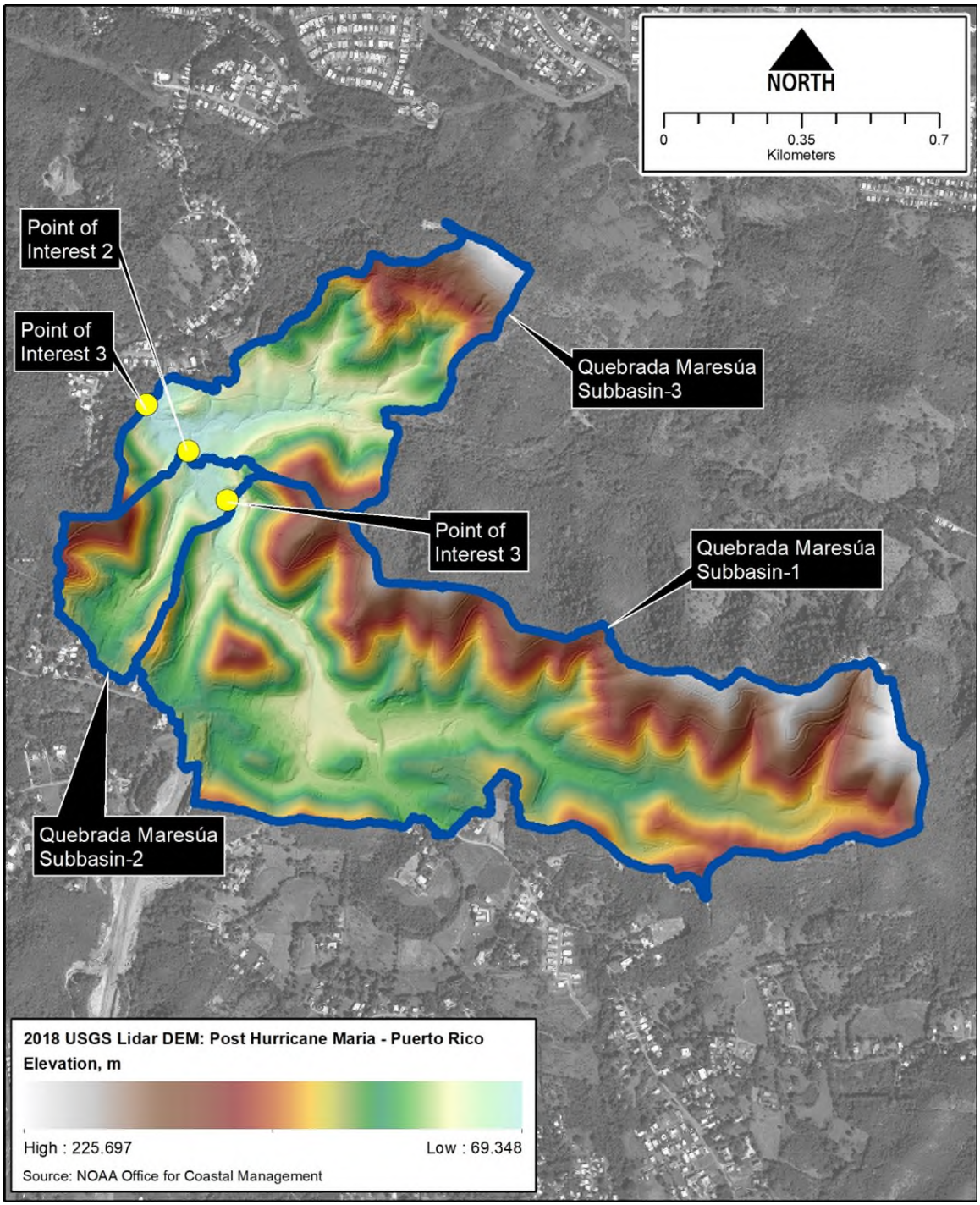



**Figure 7: Quebrada Maresúa Subbasins Delineated with HEC-HMS**

**Table 1. Geomorphic Parameters for Quebrada Maresúa Subbasins**

| Parameter | Subbasin 1 | Subbasin 2 | Subbasin 3 |
|---|---|---|---|
| **Basin Area (km²)** | 1.0881 | 0.13744 | 0.34909 |
| **Basin Slope (m/m)** | 0.385 | 0.424 | 0.392 |
| **Basin Relief (m)** | 144.70 | 104.81 | 156.24 |
| **Longest Flowpath Length (km)** | 2.96 | 0.90 | 1.44 |
| **Longest Flowpath Slope (m/m)** | 0.045 | 0.086 | 0.107 |
| **Centroid Latitude (degrees)** | 18.06176 | 18.06525 | 18.06938 |
| **Centroid Longitude (degrees)** | -67.03697 | -67.04550 | -67.04087 |

#### 3.1.1.2 Quebrada Sin Nombre

**Figure 8** shows the Quebrada Sin Nombre subbasin delineated with HEC-HMS. **Table 2** the geomorphic parameters determined for the subbasin.

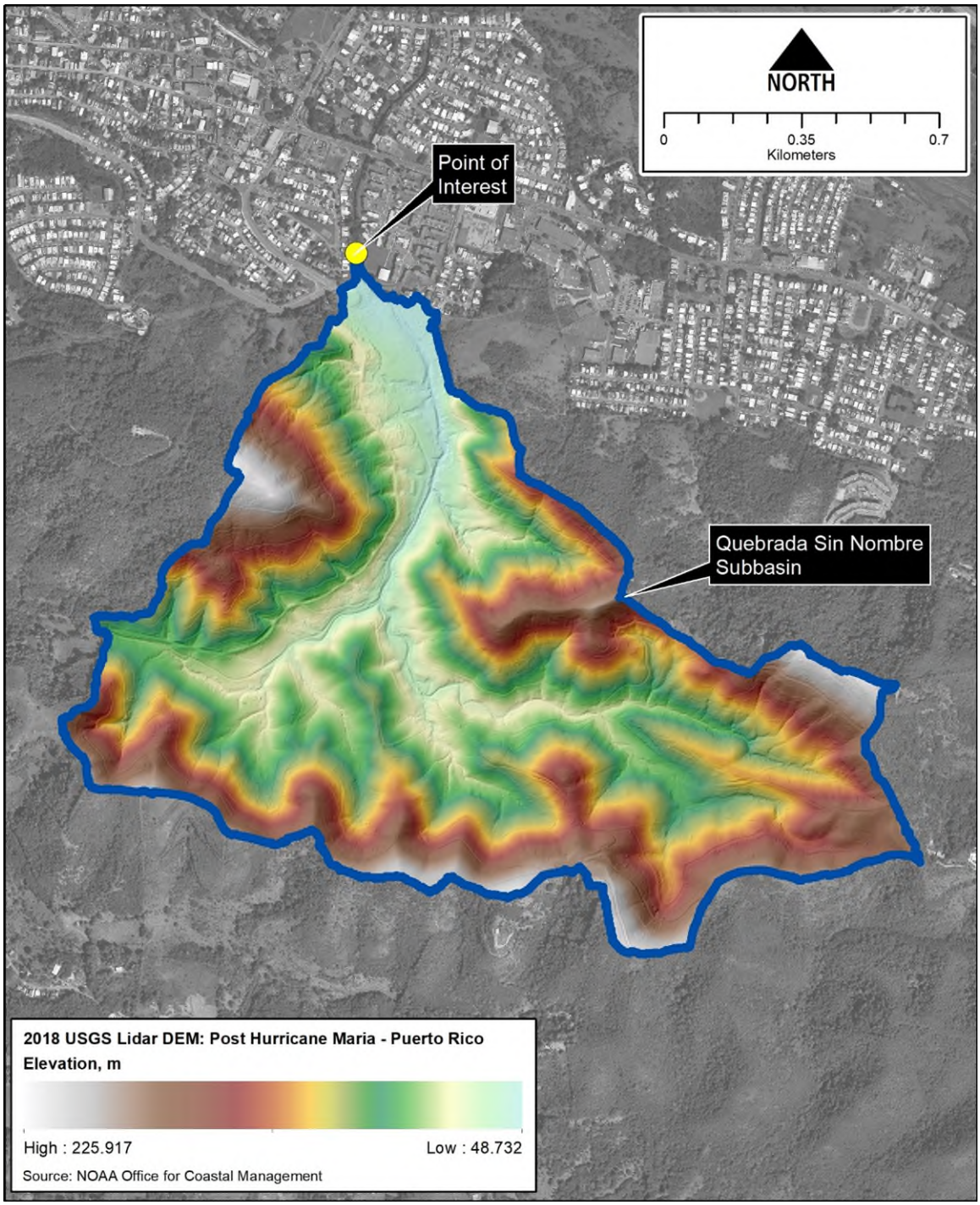



**Figure 8: Quebrada Sin Nombre Subbasin Delineated with HEC-HMS**

**Table 2. Geomorphic Parameters for Quebrada Sin Nombre Subbasin**

| Parameter | Value |
|---|---|
| **Basin Area (km²)** | 1.8407 |
| **Basin Slope (m/m)** | 0.437 |
| **Basin Relief (m)** | 176.92 |
| **Longest Flowpath Length (km)** | 3.33 |
| **Longest Flowpath Slope (m/m)** | 0.053 |
| **Centroid Latitude (degrees)** | 18.06749 |
| **Centroid Longitude (degrees)** | -67.03073 |

### 3.1.2 Rainfall Data

The National Oceanic and Atmospheric Administration (NOAA) has developed and updated the Precipitation Frequency Estimates for Puerto Rico in the NOAA Atlas 14, Volume 3 Version 4.0[6]. Rainfall depths were obtained from the web-based version of NOAA Atlas 14 for the 100-year frequency and rainfall events duration up to 24 hours. **Appendix B** shows a printout of NOAA Atlas 14 rainfall data for the Quebrada Maresúa and Quebrada Sin Nombre subbasins with centroid coordinates: latitude = 18.0658°, longitude = -67.0344°.

### 3.1.3 Rainfall Temporal Distribution

Rainfall temporal distribution is the form at which the total rainfall is distributed within the event duration. To comply with the requirements of the DRNA guidelines the accumulated depths obtained from the Atlas 14 for the 1, 6, 12 and 24 hours were distributed using temporal distributions which produce the highest peaks and corresponds to the first and fourth quartile and percentile of 10% and 90%, respectively. That is a total of eight (8) temporal distributions per recurrence interval.

#### 3.1.3.1 Time Interval

The magnitude of the peak flow obtained from computer hydrologic models is sensitive to the time interval used in the rainfall temporal distribution (Silva & Rivera, 2016). Depending on the storm event duration and the basin characteristics the peak flow can occurs at a

[6] (Bonnin, et al., 2008)

time larger than the event duration. For that reason, the HEC-HMS modeling time was extended beyond the requirements of the DRNA guidelines. In order to extends the modeling time in HEC-HMS for each rainfall event: the temporal distribution remains intact for the rainfall duration and the accumulated rainfall was repeated after the temporal distribution ends; since the modeling time was duplicated the number of intervals was duplicated; and the interval time remains unaltered. **Table 3** show the interval times used in the hydrologic model. **Appendix B** shows the temporal distributions used in the hydrologic model.

**Table 3. Time Intervals Used for the Rainfall Temporal Distribution**

| DRNA Guideline | | | Hydrologic Model | | |
|---|---|---|---|---|---|
| Rainfall duration (hr) | Number of time intervals | Time interval (min) | Model duration (hr) | Number of time intervals | Time interval (min) |
| 24 | 48 | 30 | 48 | 96 | 30 |
| 12 | 48 | 15 | 24 | 96 | 15 |
| 6 | 36 | 10 | 18 | 72 | 10 |
| 1 | 30 | 2 | 2 | 60 | 2 |

### 3.1.4 Curve Number

The CN of a watershed can be estimated as a function of land use, soil type, and antecedent watershed moisture, using tables published by the NRCS. CN values range from 100 (for water bodies) to approximately 60 for permeable soils with high infiltration rates.

Land cover were evaluated using the 2010 C-CAP 30 Meter Land Cover of Puerto Rico[7] data set developed by NOAA Office of Coastal Management (NOAA/OCM). The data set consists of land cover derived from high resolution imagery and was analyzed according to the Coastal Change Analysis Program (C-CAP) protocol.

Soil types were evaluated using the Gridded Soil Survey Geographic (gSSURGO) Database[8] version 202007 developed by United States Department of Agriculture (USDA).

[7] (Office for Coastal Management, 2017)
[8] (Soil Survey Staf, 2020)

#### 3.1.4.1 Quebrada Maresúa

**Figure 9** shows the 2010 C-CAP 30 Meter Land Cover through the Quebrada Maresúa subbasins.

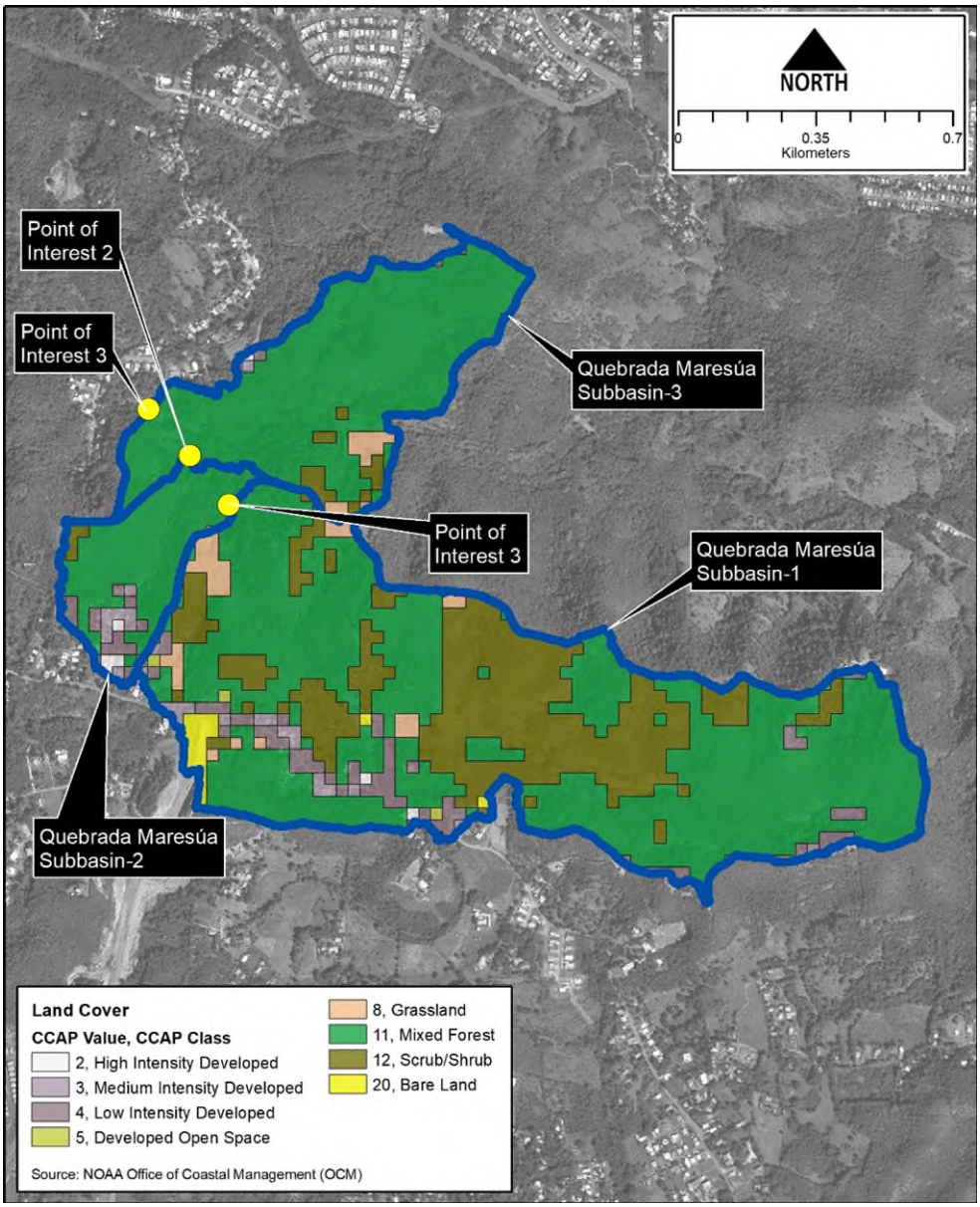



**Figure 9: 2010 C-CAP 30 Meter Land Cover through the Quebrada Maresúa Subbasins**

**Table 4** shows a summary of the land cover through the watershed. The main land uses in the Subbasin is mixed forest (69.68% of the area) and scrub/shrub (20.20% of the area).

**Table 4. Summary of the Land Cover Through the Quebrada Maresúa Subbasins**

| Land Cover | Percent of the Area | | |
|---|---|---|---|
| | Subbasin 1 | Subbasin 2 | Subbasin 3 |
| **Bare Land** | 1.36% | - | - |
| **Developed Open Space** | 0.25% | - | - |
| **Grassland** | 2.57% | 0.28% | 3.06% |
| **High Intensity Developed** | 0.17% | 2.44% | 0.21% |
| **Low Intensity Developed** | 5.20% | 9.48% | 0.92% |
| **Medium Intensity Developed** | 1.42% | 5.57% | 0.31% |
| **Mixed Forest** | 61.46% | 79.51% | 91.42% |
| **Scrub/Shrub** | 27.58% | 2.73% | 4.08% |

**Table 5** shows a summary of the hydrologic groups present in the watershed. **Figure 10** shows the hydrologic soil groups through the Quebrada Maresúa subbasins.

**Table 5. Summary of the Hydrologic Groups Present in the Quebrada Maresúa Subbasins**

| Hydrologic Group | Percent of the Area | | |
|---|---|---|---|
| | Subbasin 1 | Subbasin 2 | Subbasin 3 |
| **C** | 2.90 | 20.16 | 94.94 |
| **D** | 91.5 | 55.66 | 4.75 |
| **Null Value** | 5.6 | 24.18 | 0.37 |

Null value corresponds to the soil map unit Urban Land (Ua). To be conservative, hydrologic group with null values were treated as a group D soil. Thus, the predominant hydrologic soil group through the subbasins is D with 75.19% of the area.

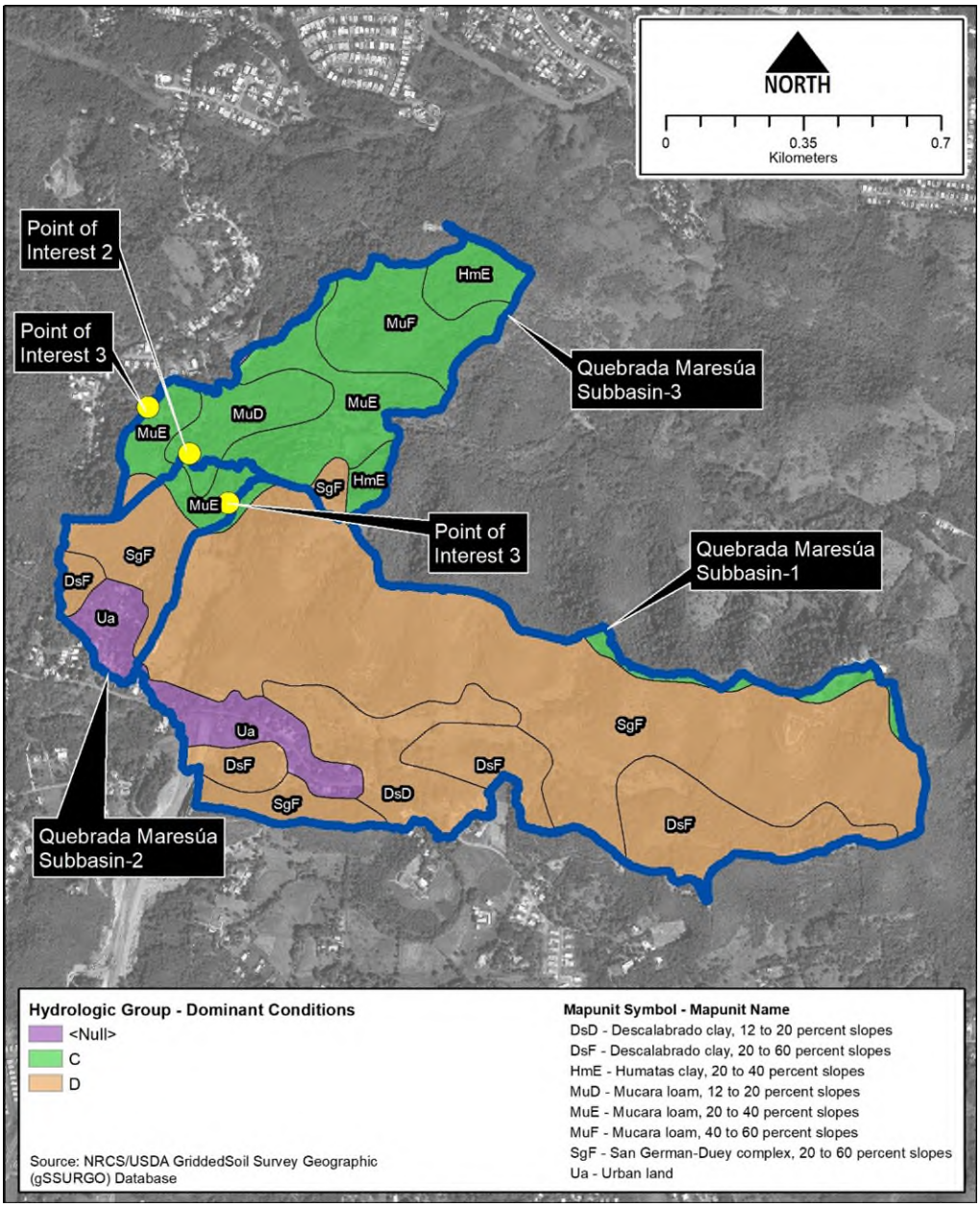



**Figure 10: Hydrologic Soil Groups through the Quebrada Maresúa Watershed**

For the Quebrada Maresúa subbasins weighted curve number values of 77, 78 and 71 were obtained for Subbasin-1, Subbasin-2, and Subbasin-3, respectively. Calculation of the curve numbers are included in **Appendix B**.

### 3.1.4.2 Quebrada Sin Nombre

**Figure 11**shows the 2010 C-CAP 30 Meter Land Cover through the Quebrada Sin Nombre.

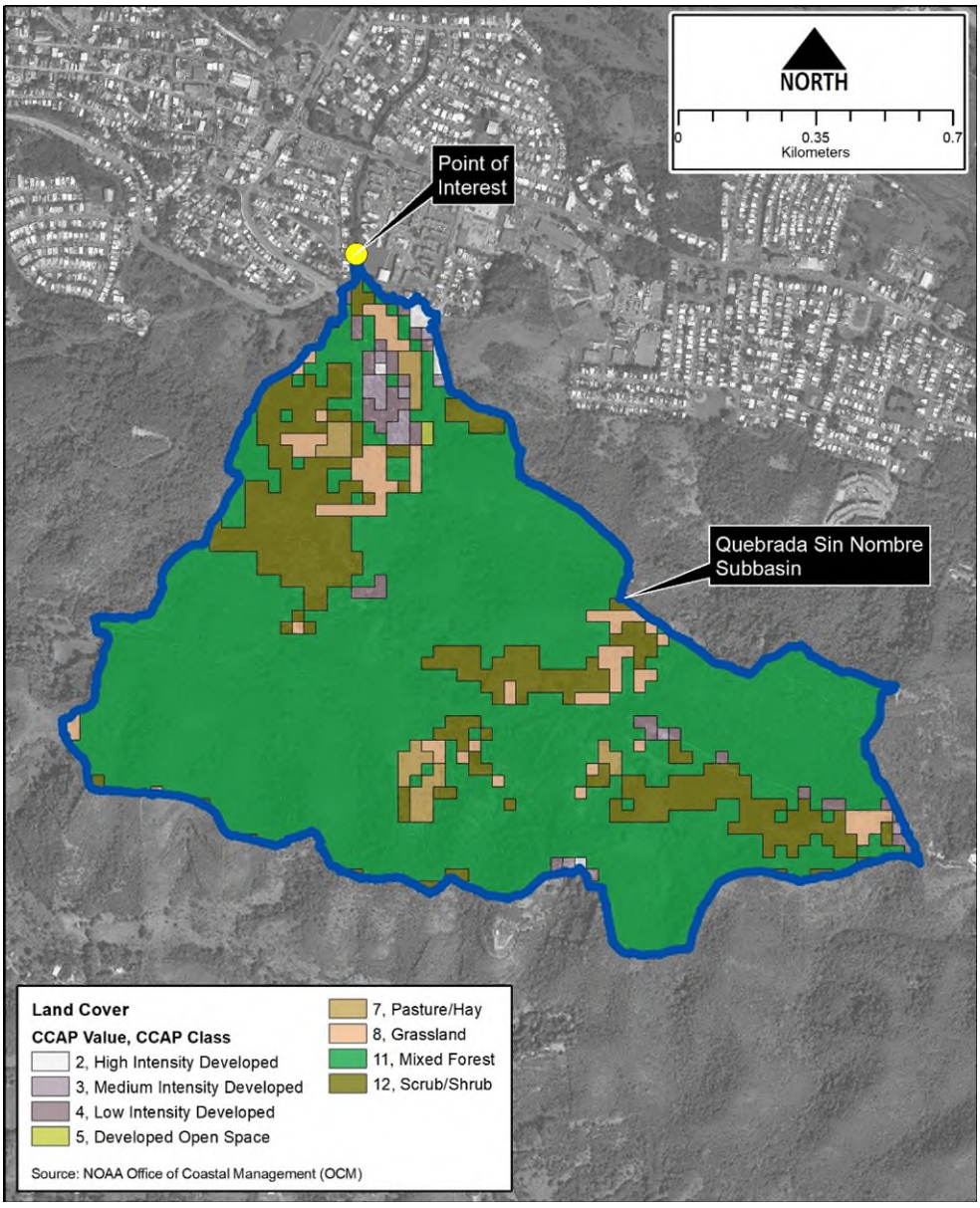



**Figure 11: 2010 C-CAP 30 Meter Land Cover through the Quebrada Sin Nombre Subbasin**

**Table 6** shows a summary of the land cover through the watershed. The main land uses in the Subbasin are mixed forest (75.43% of the area) and scrub/shrub (15.44% of the area).

**Table 6. Summary of the Land Cover Through the Quebrada Sin Nombre Watershed**

| Land Cover | Percent of the Area |
|---|---|
| **Developed Open Space** | 0.10% |
| **Grassland** | 4.08% |
| **High Intensity Developed** | 0.38% |
| **Low Intensity Developed** | 2.04% |
| **Medium Intensity Developed** | 0.88% |
| **Mixed Forest** | 75.43% |
| **Pasture/Hay** | 1.66% |
| **Scrub/Shrub** | 15.44% |

**Table 7** shows a summary of the hydrologic groups present in the watershed. **Figure 12** shows the hydrologic soil groups through the Quebrada Sin Nombre subbasin.

**Table 7. Summary of the Hydrologic Groups Present in the Quebrada Sin Nombre Subbasin**

| Hydrologic Group | Percent of the Area |
|---|---|
| **C** | 92.86% |
| **D** | 6.40% |
| **Null Value** | 0.74% |

As occurs with the Quebrada Maresúa subbasin, Null value corresponds to the soil map unit Urban Land (Ua). To be conservative, hydrologic group with null values were treated as a group D soil. The predominant hydrologic soil group through the subbasin is C with 92.86% of the area.

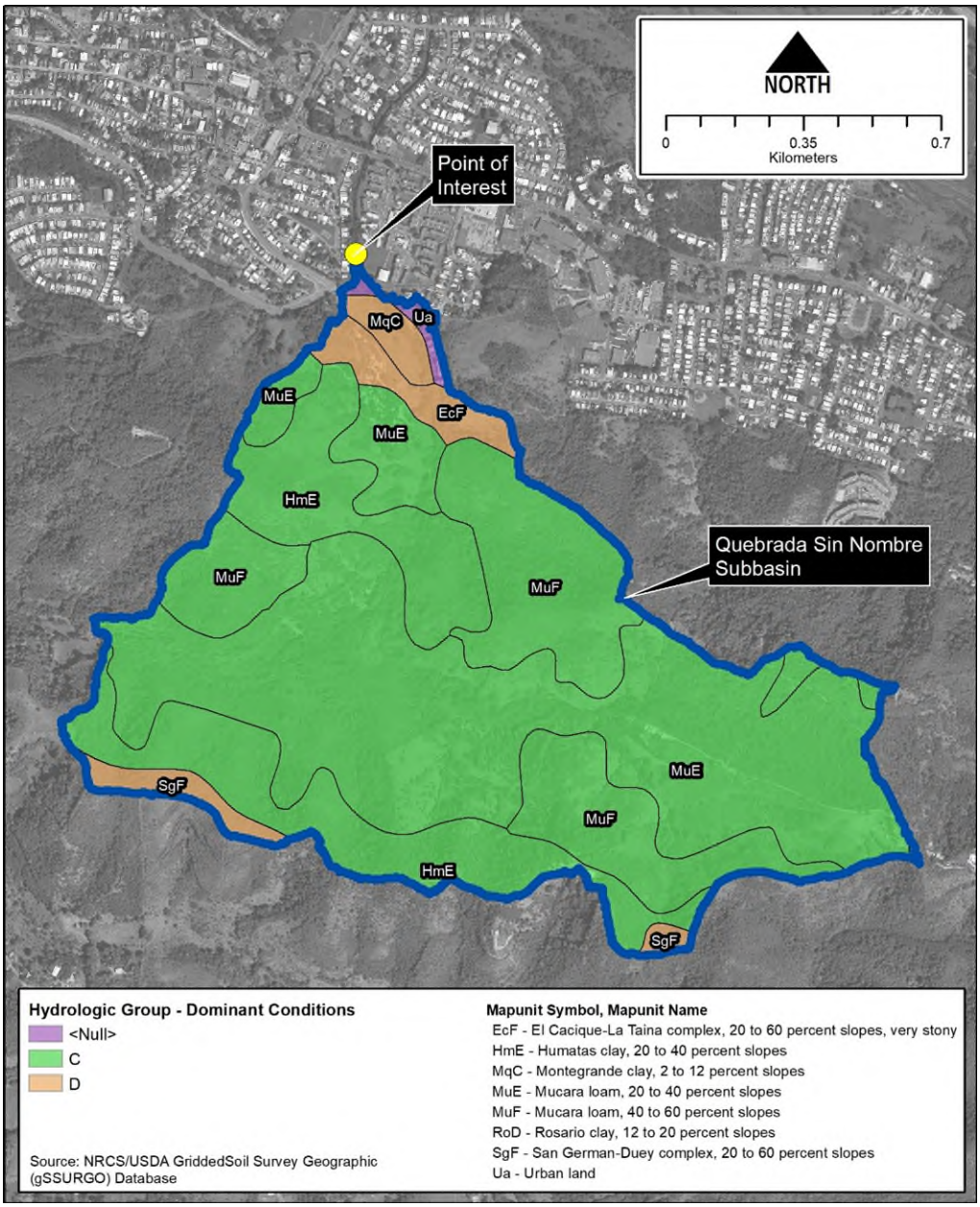



**Figure 12: Hydrologic Soil Groups through the Quebrada Sin Nombre Watershed**

A weighted curve number value of 71 was obtained for subbasin of Quebrada Sin Nombre. Calculation of the curve number are included in **Appendix B**.

### 3.1.5 Lag Time

Lag time is defined as the time between the center of mass of the effective rainfall hyetograph and the center of mass of the direct runoff hydrograph. For ungaged watersheds, the NRCS suggests that the unit hydrograph UH lag time may be related to time of concentration as:

$$t_{lag} = 0.6t_c \quad (3.1)$$

Where:

$t_{lag}$ = Lag time.

$t_c$ = Time of concentration.

Time of concentration is the time for runoff to travel from the hydraulically most distant point of the watershed to a point of interest within the watershed. Time of concentration is a quasi-physically based parameter that can be estimated as:

$$t_c = t_{sheet} + t_{shallow} + t_{channel} \quad (3.2)$$

Where:

$t_{sheet}$ = sum of travel time in sheet flow segments over the watershed land surface.

$t_{shallow}$ = sum of travel time in shallow flow segments, down streets, in gutters, or in shallow rills and rivulets.

$t_{channel}$ = sum of travel time in channel flow segments.

For sheet flow of less than 300 feet, the Manning's kinematic solution to compute travel time is:

$$T_t = \frac{0.007(NL)^{0.8}}{(P_2)^{0.5}S^{0.4}} \quad (3.3)$$

Where:

$T_t$ = Travel time (hr).

$N$ = Overland-flow roughness coefficient.

$L$ = Flow length (ft).

$P_2$ = 2-year, 24-hour rainfall (in).

$S$ = Slope of hydraulic grade line (land slope, ft/ft).

The average velocity for shallow concentrated flow can be estimated as:

$$V = \begin{cases} 16.1345\sqrt{S} & \text{for unpaved surface} \\ 20.3282\sqrt{S} & \text{for paved surface} \end{cases} \quad (3.4)$$

Where:

$V$ = Average velocity (ft/s).

$S$ = slope of hydraulic grade line (watercourse slope, ft/ft).

The travel time for shallow concentrated flow can be estimated as:

$$T_t = \frac{L}{3600\ V} \quad (3.5)$$

Where:

$T_t$ = Travel time (hr).

$L$ = Flow length (ft).

$V$ = Average velocity (ft/s).

$3600$ = conversion factor from seconds to hours.

Open channels are assumed to begin where surveyed cross section information has been obtained, where channels are visible on aerial photographs, or where blue lines (indicating streams) appear on the USGS quadrangle sheets. For open channels, the velocity is obtained by the Manning's equation:

$$V = \frac{1.49}{n} R^{2/3} \sqrt{S} \quad (3.6)$$

Where:

$V$ = Average velocity (ft/s).

$n$ = Manning's roughness coefficient.

$S$ = slope of hydraulic grade line (watercourse slope, ft/ft).

$R$ = the hydraulic radius (defined as the ratio of channel cross-section area to wetted perimeter, ft).

The travel time for open channel flow can be estimated using equation (3.5).

**Table 8** shows a summary of the time of concentration and lag time calculations.

**Table 8. Summary of the Time of Concentration and Lag Time Calculations**

| Parameter | Quebrada Maresúa Subbasin | | | Quebrada Sin Nombre Subbasin |
|---|---|---|---|---|
| | Subbasin 1 | Subbasin 2 | Subbasin 3 | |
| **Sheet Flow Travel Time (hr)** | 0.127 | 0.061 | 0.158 | 0.014 |
| **Shallow Concentrated Flow Travel Time (hr)** | 0.078 | 0.145 | 0.203 | 0.075 |
| **Channel Flow Travel Time (hr)** | 0.272 | 0.009 | 0.014 | 0.191 |
| **Time of Concentration (hr)** | 0.477 | 0.215 | 0.375 | 0.28 |
| **Lag Time (hr)** | 0.286 | 0.129 | 0.225 | 0.168 |

## 3.2 HEC-HMS Hydrologic Model

A view from the HEC-HMS desktop showing the basin map used to develop the basin model is included in **Figure 13**. Subbasins 1, 2 and correspond to the Quebrada Maresúa subbasins while subbasin 4 corresponds to the Quebrada Sin Nombre subbasin.

To represent the discharge points of the subbasin two sinks elements were used. A sink is an element with one or more inflows but no outflow. Multiple inflows are added together to determine the total amount of water entering the element. Sinks can be used to represent the lowest point of an interior drainage area or the outlet of the basin model (Bartles, et al., 2021).

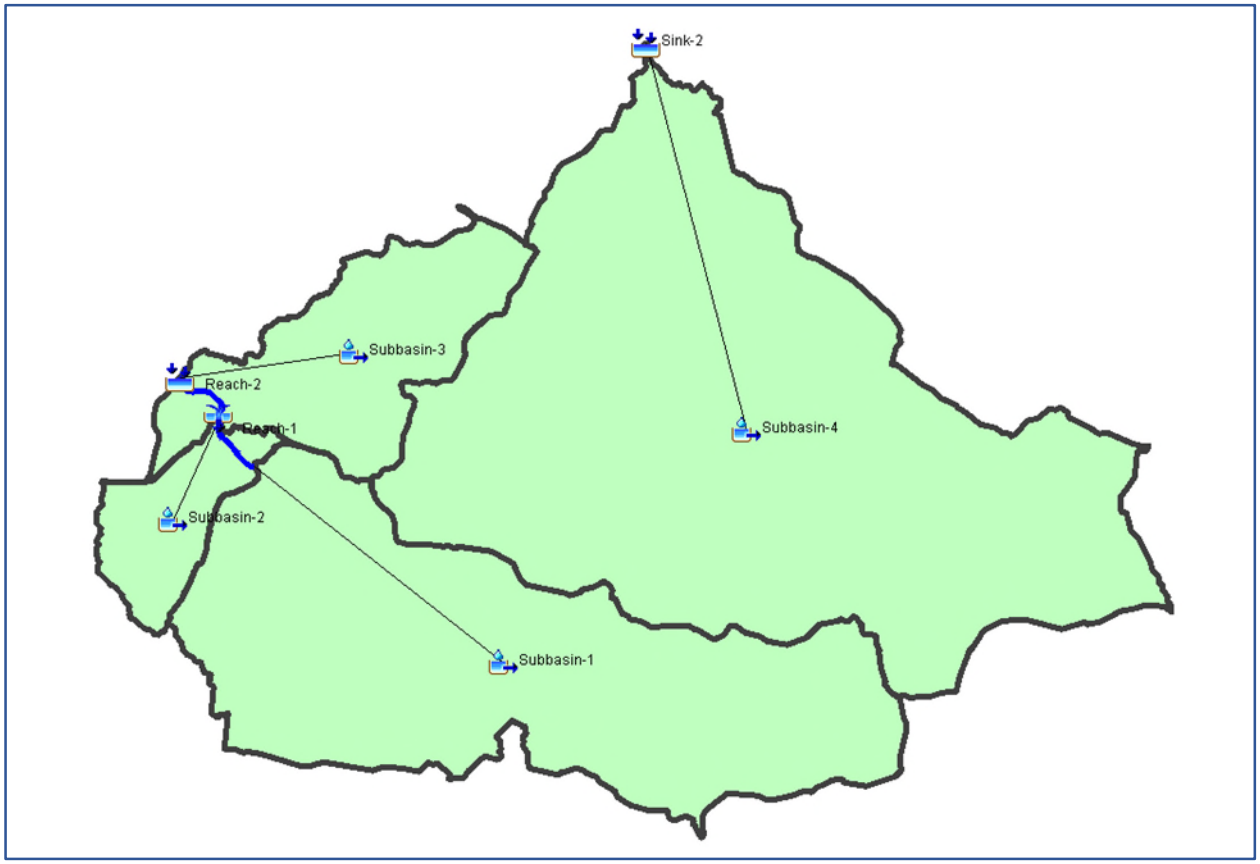



**Figure 13: Quebrada Maresúa and Quebrada Sin Nombre HEC-HMS Model Map**

## 3.3 Sensitivity Analysis

Sensitivity analysis is the study of how the variation in the output of a model can be apportioned, qualitatively or quantitatively, to different sources of variation, and how the given model depends upon the information fed into it (Haan, 2002). In the Local Sensitivity Analysis, the effect of the variation in each uncertain input parameter is determined by keeping other uncertain parameters constant (usually at their expected value). Two types of sensitivity coefficients are used, the absolute sensitivity coefficient (or simply the sensitivity coefficient), and the relative sensitivity coefficient, which are defined as follows:

$$S = \frac{\partial O}{\partial P} \tag{3.7}$$

$$S_r = \frac{\partial O}{\partial P}\frac{P}{O} \tag{3.8}$$

Where:

$S$ = absolute sensitivity (output units/input units).

$S_r$ = relative sensitivity (dimensionless).

$O$ = output parameter.

$P$ = input parameter.

The partial derivative in equation (3.7) can be numerically approximated as:

$$\frac{\partial O}{\partial P} \cong \frac{O_2 - O_1}{P_2 - P_1} \cong \frac{O_{P+\Delta P} - O_{P-\Delta P}}{2\Delta P} \quad (3.9)$$

Where:

$\Delta P$ = is the amount a parameter is perturbed from its base value. According with the DRNA guidelines this value shall be taken as ± 10% of $P$.

The parameters identified to be disturbed in the sensitivity analysis of the hydrologic model were the Curve Number, Lag Time, and the subbasin area being these three parameters of the TR-55 method with more uncertainty in its estimation. Using the 100-year flood event temporal distribution and the values of CN, $t_{lag}$ and area determined in the previous sections as the expected values, the results of the local sensitivity analysis for the Quebarda Maresúa model are presented in **Table 9** while the results for the Quebrada Sin Nombre model are included in **Table 10**.

**Table 9. Local Sensitivity Analysis Results for Quebrada Maresúa Hydrologic Model**

| Component and Parameter | | Input Values | | | | Output Values | | | Sensitivity Coefficients | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | P | ΔP | P-ΔP | P+ΔP | O | $O_{P-\Delta P}$ | $O_{P+\Delta P}$ | S | Sr |
| SB1 | CN | 77 | 7.7 | 69.3 | 84.7 | 47.1 | 43.4 | 53 | 0.62 | 1.02 |
| SB1 | $t_{lag}$ | 17.13 | 1.71 | 15.42 | 18.84 | 47.1 | 47.7 | 46.3 | 0.41 | 0.15 |
| SB1 | Area | 1.09 | 0.11 | 0.98 | 1.20 | 47.1 | 43.7 | 50.4 | -30.79 | -0.71 |
| SB2 | CN | 78 | 7.8 | 70.2 | 85.8 | 47.1 | 46.6 | 47.4 | 0.05 | 0.08 |
| SB2 | $t_{lag}$ | 7.77 | 0.78 | 6.99 | 8.55 | 47.1 | 47 | 47.1 | -0.06 | -0.01 |
| SB2 | Area | 0.14 | 0.01 | 0.12 | 0.15 | 47.1 | 46.7 | 47.5 | -29.10 | -0.08 |
| SB3 | CN | 71 | 7.1 | 63.9 | 78.1 | 47.1 | 45.6 | 48.4 | 0.20 | 0.30 |
| SB3 | $t_{lag}$ | 13.52 | 1.35 | 12.17 | 14.87 | 47.1 | 47.1 | 47 | 0.04 | 0.01 |
| SB3 | Area | 0.35 | 0.03 | 0.31 | 0.38 | 47.1 | 46.1 | 48 | -27.21 | -0.20 |

Notes: Lag time units are minutes; CN is unitless; Area units are km²; Subbasin (SB); Output Values corresponds to the peak discharge at the bridge location and the units are cms.

**Table 10. Local Sensitivity Analysis Results for Quebrada Sin Nombre Hydrologic Model**

| Component and Parameter | | Input Values | | | | Output Values | | | Sensitivity Coefficients | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | P | ΔP | P-ΔP | P+ΔP | O | $O_{P-\Delta P}$ | $O_{P+\Delta P}$ | S | Sr |
| SB4 | CN | 71 | 7.1 | 63.9 | 78.1 | 61.4 | 47.8 | 78.3 | 2.15 | 2.48 |
| SB4 | $t_{lag}$ | 10.11 | 1.011 | 9.099 | 11.121 | 61.4 | 65.1 | 58.2 | 3.41 | 0.56 |
| SB4 | Area | 1.84 | 0.18 | 1.66 | 2.02 | 61.4 | 55.3 | 67.6 | -33.41 | -1.00 |

Notes: Lag time units are minutes; CN is unitless; Area units are km²; Subbasin (SB); Output Values corresponds to the peak discharge at the bridge location and the units are cms.

The local sensitivity analysis for the Quebarda Maresúa model indicates that the CN of subbasin 1 is the most sensitive parameter with a relative sensitive of 1.02, while the analysis for Quebrada Sin Nombre indicates that the CN is the most sensitive parameter with a relative sensitive of 2.48.

### 3.4 Model Calibration

Calibration uses observed hydrometeorological data in a systematic search for parameters that yield the best fit of the computed results to the observed runoff for a specific event. The HEC-HMS Technical Reference Manual suggests the following tips to obtain a satisfactory calibration for a rainfall-runoff hydrologic model:

- Rainfall and runoff observations must be from the same storm. The runoff time series should represent all runoff due to the selected rainfall time series.
- The rainfall data must provide adequate spatial coverage of the watershed.
- The volume of the runoff hydrograph should approximately equal the volume of the rainfall hyetograph.
- The duration of the rainfall should exceed the time of concentration of the watershed to ensure that the entire watershed upstream of the concentration point is contributing to the observed runoff.
- The size of the storm selected for calibration should approximately equal the size of the storm the calibrated model is intended to analyze.

Since there is not available which includes any peak or stream flow data, thus it was not possible to perform a calibration of the model. However, a comparison with other methodologies to determine peak flows will be presented later in this report in order to determine the soundness of the hydrologic model results.

## 3.5 Hydrologic Model Results

The hydrologic model was executed to determine the peak flows produced by Quebrada Maresúa and Quebrada Sin Nombre at the different points of interest, as showed in **Figure 4**. The calculations were performed for the rainfall temporal distributions with 1, 6, 12 and 24 hours, as required by the DRNA guidelines, for annual exceedance probability (AEP) of 0.01/yr. The complete results are included in **Appendix B**. **Table 11** shows the results summary obtained from the hydrologic model of Quebrada Maresúa and Quebrada Sin Nombre.

**Table 11. Summary of Results of the Hydrologic Model**

| Run | Duration (hr) | Quartile | Percentile | 0.01/yr Annual Exceedance Probability Peak Discharge (cms) | | | |
|---|---|---|---|---|---|---|---|
| | | | | Point of Interest 1 | Point of Interest 2 | Point of Interest 3 | Point of Interest 4 |
| **1** | 1 | 1st | 10% | 17.7 | 19.9 | 24.4 | 26.5 |
| **2** | 1 | 4th | 90% | 32.1 | 34.6 | 43.8 | 61.4 |
| **3** | 6 | 1st | 10% | 32.5 | 36.5 | 46.1 | 52 |
| **4** | 6 | 4th | 90% | 25 | 28.2 | 35.8 | 41.1 |
| **5** | 12 | 1st | 10% | 33.3 | 37.3 | 47.1 | 53.4 |
| **6** | 12 | 4th | 90% | 26.3 | 29.6 | 37.8 | 43.4 |
| **7** | 24 | 1st | 10% | 32 | 36 | 45.8 | 51.9 |
| **8** | 24 | 4th | 90% | 26.4 | 29.8 | 38.1 | 43.9 |
| **Peak flow (cms)** | | | | **33.3** | **37.3** | **47.1** | **61.4** |

According to the results the peak flow at Quebrada Maresúa is produced by a storm with a duration of 12 hours, while the peak flow at Quebrada sin Nombre is produced by a storm with a duration of 1 hour.

## 3.6 Verification of the Hydrologic Model Results

As previously discussed in section 3.4, insufficient or no observed data is available to perform the hydrologic model calibration. In order to determine the adequacy of the hydrologic model results the regression equations provided by the USGS in the Water Resources Investigation Report (WRI) 99-4142[9] and 78-141[10] were used.

[9] (Ramos-Ginés, 1999)
[10] (López, Colón-Dieppa, & Cobb, 1979)

### 3.6.1 Water Resources Investigation Report 99-4142 Regression Equations

The USGS Report 99-4142 establishes a series of equations to estimate the peak flow discharge magnitude and frequency for ungaged sites in Puerto Rico in unregulated streams as follows:

$$Q_{100} = 1.8 \times 10^{5} \mathrm{CDA}^{0.760} \mathrm{DR}^{-1.68} \mathrm{MAR}^{0.518} \quad (3.10)$$

Where:

$Q_i$ = estimated discharge, in cubic feet per second, for the indicated recurrence interval in years.

$\mathrm{CDA}$ = contributing drainage area, in square miles.

$\mathrm{MAR}$ = mean annual rainfall, in inches.

$\mathrm{DR}$ = depth-to-rock, in inches.

#### 3.6.1.1 Contributing Drainage Area

The USGS Report 99-4142 uses the parameter Contributing Drainage Area (CDA) to compute the peak flows at the point of interest. The CDA differs from total drainage area in that all non-contributing areas such as sinkholes and drainage to caves are not taken into consideration. The areas to the different points of interest fall between the ranges established by the USGS of a minimum value of 0.83 and a maximum value of 208 square miles, for the application of the USGS Regression Equations.

#### 3.6.1.2 Mean Annual Rainfall

The hydrologic methodology proposed by the USGS Report 99-4142 uses the Mean Annual Rainfall (MAR) as developed by Calversbert in 1970. The mean annual rainfall map for Puerto Rico was developed with rain data ranging from year 1931 to 1960. For the subbasin upstream the different points of interest the MAR value are included in **Table 12**. **Figure 14** shows the location of the watershed in the Calversbert Mean Annual Rainfall map.

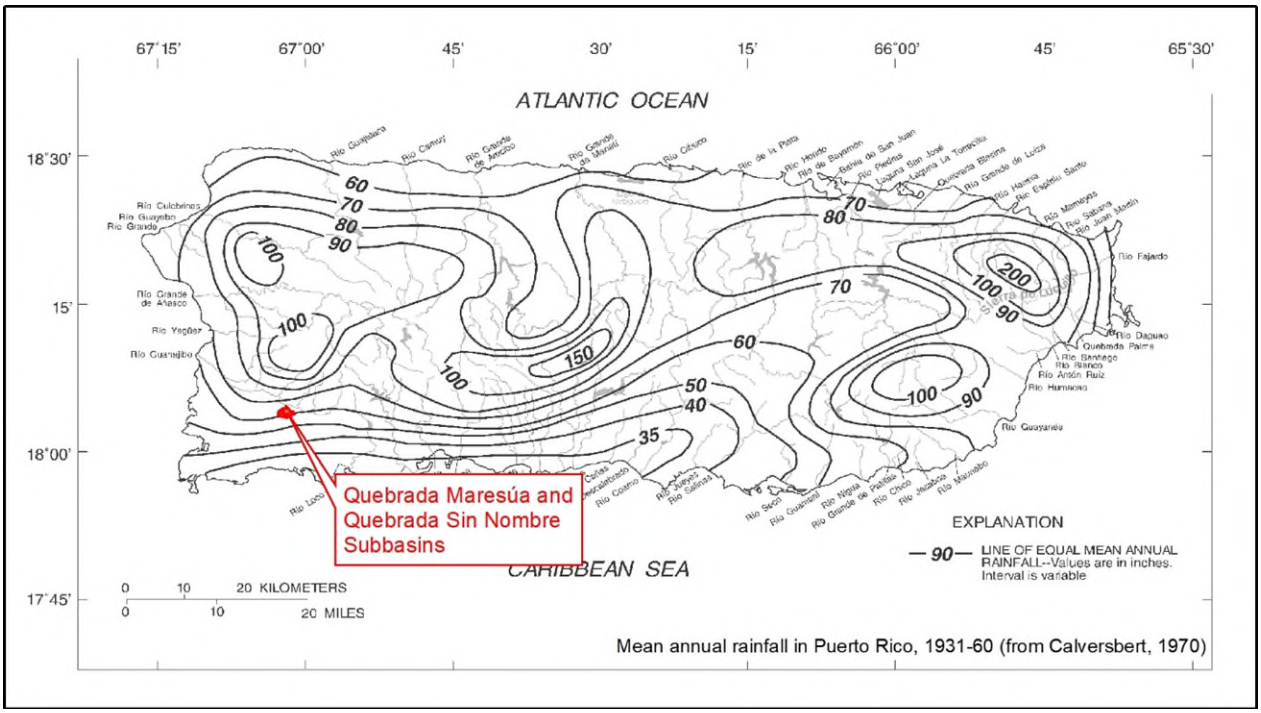



**Figure 14: Mean Annual Rainfall in Puerto Rico**

### 3.6.1.3 Depth to Rock

The methodology proposed by the USGS Report 99-4142 uses a soil parameter described as depth-to-rock (DR). DR values were obtained from the Gridded Soil Survey Geographic (gSSURGO) Database[11] version 202007. A weighted average of DR was computed using the minimum bed rock depth field in the database. If no value is described in a map unit, 39 inches (150.24 centimeters) which is the maximum used to generate the regression equations. This value was considered an acceptable value after a revision of this parameter with known DR values of studied basins in USGS Report 99-4142. For the subbasin upstream the different points of interest the DR values, obtained from a weighted average, are included in **Table 12**. **Figure 15** shows the minimum bed rock depth extracted from the gSSURGO database.

[11] (Soil Survey Staf, 2020)

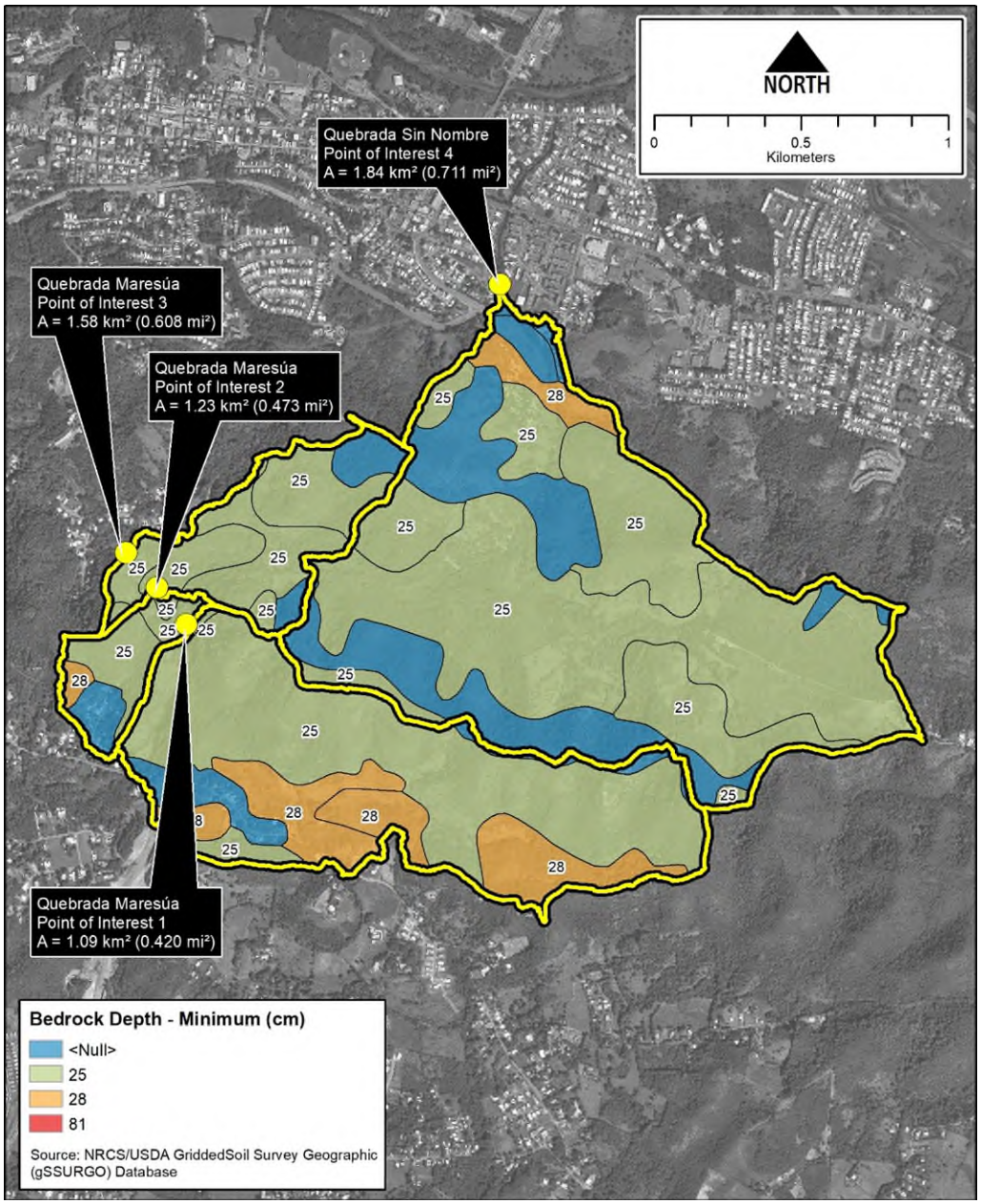



**Figure 15: Minimum Bed Rock Depth Within the Subbasins**

#### 3.6.1.4 WRI 99-4142 USGS Regression Equations Peak Flows

Peak discharges were obtained using the regional regression equations without weighted adjustment for recurrence interval of 100-year. **Table 12** shows the results obtained from the regional regression equations.

**Table 12. 100-Year Peak Discharges using the USGS WRI 99-4142 Regression Equations**

| Point of Interest | CDA (mi²) | DTR (in) | MAR (in) | 100 Year Peak Flow | |
|---|---|---|---|---|---|
| | | | | ft³/s | m³/s |
| 1 | 0.420 | 14.60 | 60.13 | 8,598 | 243.47 |
| 2 | 0.473 | 14.94 | 60.37 | 9,073 | 256.91 |
| 3 | 0.608 | 15.45 | 60.97 | 10,431 | 295.38 |
| 4 | 0.711 | 22.04 | 62.06 | 6,528 | 184.85 |

### 3.6.2 Water Resources Investigation Report 78-141 Regression Equations

The USGS Report 78-141 establishes a series of equations to estimate the peak flow discharge magnitude and frequency for ungaged sites in Puerto Rico in unregulated streams as follows:

$$Q_{100} = 286A^{0.832}(\text{Ann P})^{0.531} \quad (3.11)$$

Where:

$Q_i$ = is the T-Year recurrence interval peak discharge, ft³/s.

$A$ = drainage area, square miles.

$\text{Ann P}$ = weighted mean annual precipitation, inches.

#### 3.6.2.1 WRI 78-141 USGS Regression Equations Peak Flows

Peak discharges were obtained using the regional regression equations for recurrence interval of 100-year. The A and Ann P parameters were obtained as discussed in sections 3.6.1.1 and 3.6.1.2, respectively **Table 12** shows the results obtained from the regional regression equations.

**Table 13. 100-Year Peak Discharges using the USGS WRI 78-141 Regression Equations**

| Point of Interest | A (mi²) | Ann P (in) | 100 Year Peak Flow | |
|---|---|---|---|---|
| | | | $ft^3/s$ | $m^3/s$ |
| 1 | 0.420 | 60.13 | 1,147 | 32.465 |
| 2 | 0.473 | 60.37 | 1,268 | 35.917 |
| 3 | 0.608 | 60.97 | 1,571 | 44.493 |
| 4 | 0.711 | 62.06 | 1,807 | 51.159 |

### 3.6.3 Comparison of Results

The WRI 99-4142 equations were developed using gages stations with specific physical characteristics, for the depth to rock parameter the values shall fall between 24.24 in and 59.15 in. Since the determined DTR parameters are outside the stablished range of values, the USGS Report 99-4142 equation were discarded and the TR-55 results were compared only with the regression equations published in the USGS Report 78-141. The **Table 14** shows a comparison of the peak flows obtained from both methodologies.

**Table 14. Comparison of Results Between the TR-55 and the WRI 78-141 Methodologies**

| Point of Interest | TR-55 Peak Flow (cms) | USGS Regression Equations Peak Flow (cms) | Percent Error |
|---|---|---|---|
| 1 | 33.3 | 32.465 | -2.54 |
| 2 | 37.3 | 35.917 | -3.78 |
| 3 | 47.1 | 44.493 | -5.69 |
| 4 | 61.4 | 51.159 | -18.20 |

The results obtained using the USGS regression equations are lower than the TR-55 peak flow results, which could be expected due to the high average standard error of prediction of the regression equations, reported as +61% and -38% for the 100-year equation. Since it was not possible to calibrate the HEC-HMS model the difference between the results falls between the error of prediction of the regression equations. Thus, the peak flows obtained from the TR-55 could be considered appropriate to perform the hydraulic analysis for the proposed project.

# 4 HYDRAULIC ANALYSIS

## 4.1 Methodology

The hydraulic modeling for this study was performed using the River Analysis System (HEC-RAS) software version 6.1.0 developed by the US Army Corps of Engineers (USACE, 2021). HEC-RAS was designed to perform one-dimensional hydraulic calculations for natural and constructed channels. The hydraulic model developed for this study, estimates water surface profiles for steady gradually varied flow for the 100-year event. The basic computational procedure is based on the solution of the one-dimensional energy equation. Energy losses are evaluated by friction (Manning's equation) and contraction/expansion coefficients. The effects of various obstructions such as bridges, culverts, and structures in the flood plain are considered in the computations.

## 4.2 Evaluated Conditions

Two conditions were evaluated as part of the study, the existing condition, and the proposed condition. Each condition was evaluated in terms of the (1) Base Flood Elevations (BFE) and (2) Floodway Water Surface Elevations. Thus, four (4) hydraulic models were prepared for each creek to evaluate the effects of the proposed project on the base flood and floodway elevations.

- Existing Models – These models were developed from survey data, parameters were obtained using the methodology proposed in the Hydraulic Engineering Circular No.20 and the HEC-RAS, River Analysis System Hydraulic Reference Manual[12]. The purpose of these models is to determine the (BFE) and the floodway stations of both creeks. FEMA defines BFE as the elevation of surface water resulting from a flood that has a 1% chance of equaling or exceeding that level in any given year. The floodway stations were determined by performing a steady flow encroachment analysis. See **Section 4.3** for further details about the existing condition models. Input and Output data for the Existing Models are included in **Appendix C**.
- Proposed Models – The proposed condition models were developed by modifying the Existing Model to incorporate the proposed culvert at Quebrada Maresúa and the channel modification resulting from the fill slopes of the proposed road.

[12] (Brunner, 2021)

The proposed project shall not increase the 100-year flood levels more than the allowed by the PRPB Regulation No.13. **Section 4.3.1** includes further details about the proposed condition model. Input and Output data for the Proposed Model is included in **Appendix C**.

The names of each HEC-RAS plan used to perform the analysis are included in **Table 15**.

**Table 15. HEC-RAS Plan Study Matrix**

| Condition | Plan without Floodway | Plan with Floodway |
|---|---|---|
| **Quebrada Maresúa** | | |
| Existing Condition | Existing Condition Qda Maresua R2025 | Existing Cond Qda Maresua Floodway 2025 |
| Proposed Condition | Prop Condition Qda Maresua 3cell R2025 | Prop Condition Qda Maresua Floodway R2025 |
| **Quebrada Sin Nombre** | | |
| Existing Condition | Existing Condition Qda Sin Nombre | Existing Cond Qda Sin Nombre Floodway |
| Proposed Condition | Proposed Condition Qda Sin Nombre | Proposed Cond Qda Sin Nombre Floodway |

## 4.3 Existing Condition Model Development

The HEC-RAS hydraulic model of Quebrada Maresúa extends for a total length of approximately 550 m while the hydraulic model of Quebrada Sin Nombre extends for a total length of approximately 1000 m.

### 4.3.1 Stream Modeling Cross Sections

The existing conditions hydraulic model were developed by modeling a single reach with eight (8) cross sections along the Quebrada Maresúa, and eleven (11) cross sections along the Quebrada Sin Nombre. The cross sections were obtained from a field survey performed by Antonio Meléndez & Associates. **Figure 16** and **Figure 17** show the location plan of the cross section used in the hydraulic models for Quebrada Maresúa and Quebrada Sin Nombre, respectively, over an aerial photo. The figures also include the proposed project. **Table 16** shows the description of the cross section used in the hydraulic

models. A mirror image was applied to all the cross sections to meet the required HEC-RAS sections direction, from left to right in the direction of the flow.

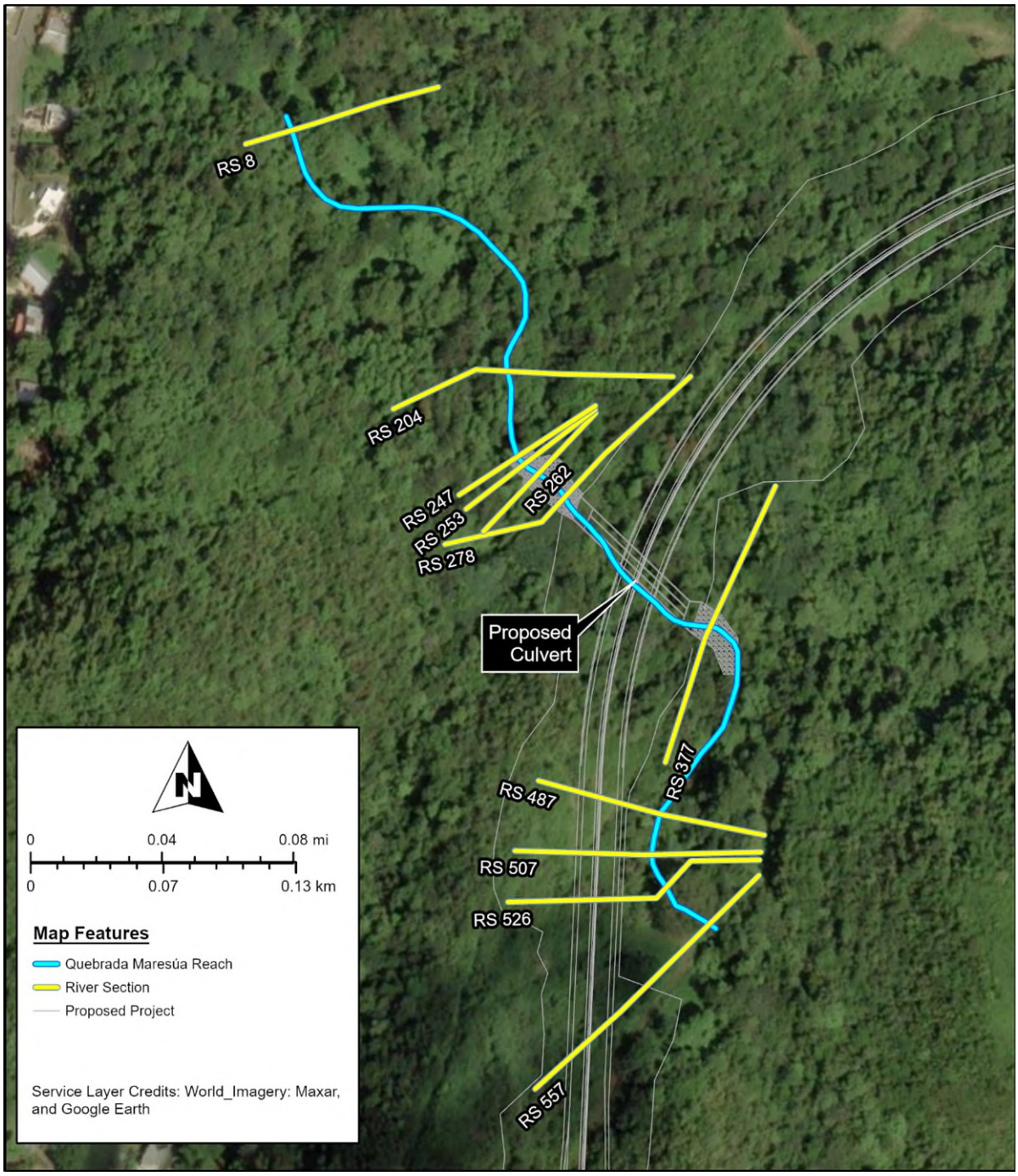



**Figure 16: Location Plan of the Cross Section Used in Hydraulic Model for Quebrada Maresúa**

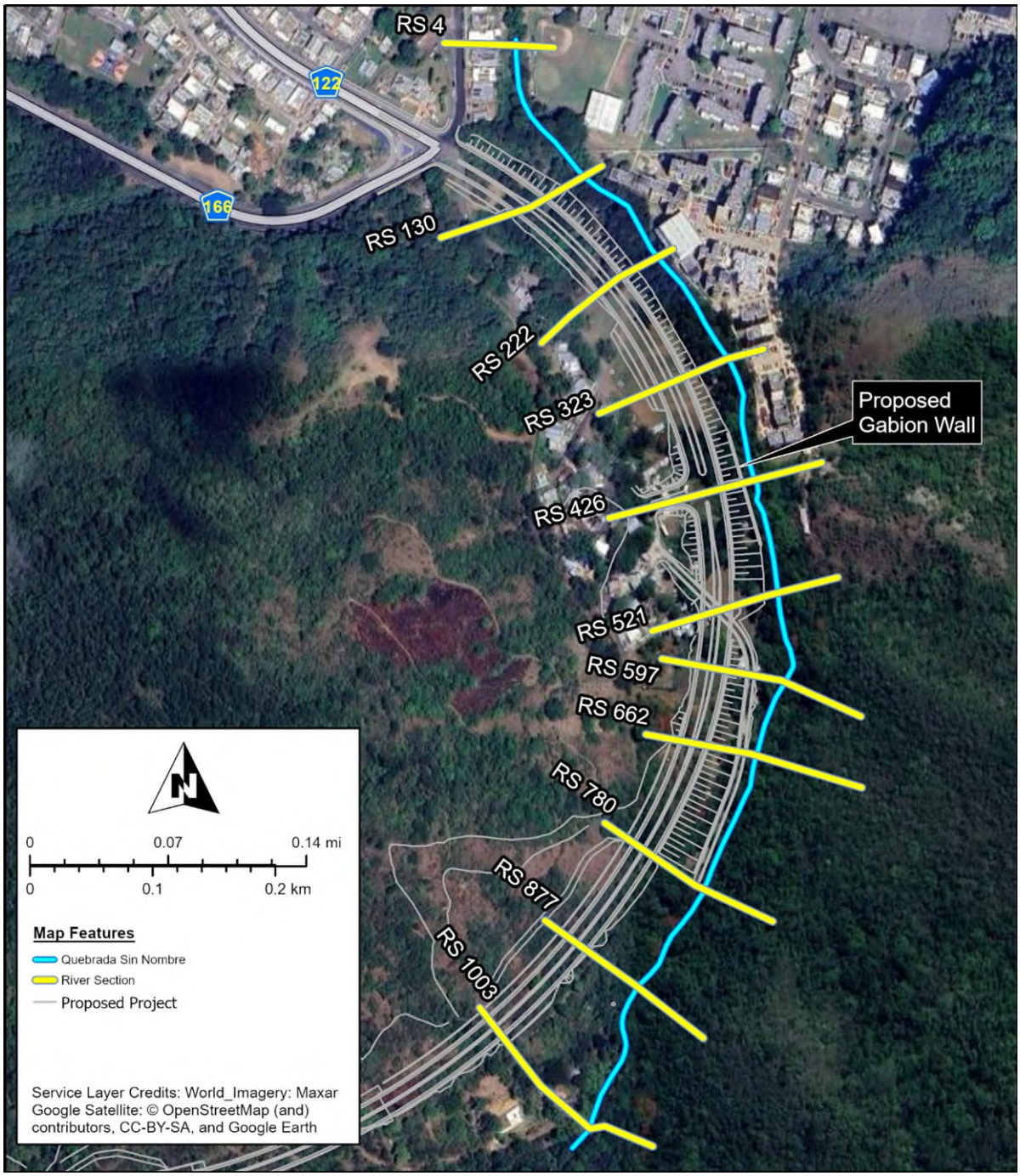



**Figure 17: Location Plan of the Cross Section Used in Hydraulic Model for Quebrada Sin Nombre**

**Table 16. Cross Sections Used in the Existing Hydraulic Model**

| Reach | Model Section (River Station) | Description |
|---|---|---|
| Quebrada Maresúa | 557 | XS-12 from field work. Mirrored to meet HEC-RAS requirements. |
| | 526 | XS-13 from field work. Mirrored to meet HEC-RAS requirements. |
| | 507 | XS-14 from field work. Mirrored to meet HEC-RAS requirements. |
| | 487 | XS-15 from field work. Mirrored to meet HEC-RAS requirements. |
| | 377 | XS-16 from field work. Mirrored to meet HEC-RAS requirements. |
| | 278 | XS-17 from field work. Mirrored to meet HEC-RAS requirements. |
| | 262 | |
| | 253 | |
| | 247 | |
| | 204 | XS-18 from field work. Mirrored to meet HEC-RAS requirements. |
| | 8 | XS-19 from field work. Mirrored to meet HEC-RAS requirements. |
| Quebrada Sin Nombre | 1003 | XS-1 from field work. Mirrored to meet HEC-RAS requirements. |
| | 877 | XS-2 from field work. Mirrored to meet HEC-RAS requirements. |
| | 780 | XS-3 from field work. Mirrored to meet HEC-RAS requirements. |
| | 662 | XS-4 from field work. Mirrored to meet HEC-RAS requirements. |
| | 597 | XS-5 from field work. Mirrored to meet HEC-RAS requirements. |
| | 521 | XS-6 from field work. Mirrored to meet HEC-RAS requirements. |
| | 426 | XS-7 from field work. Mirrored to meet HEC-RAS requirements. |
| | 323 | XS-8 from field work. Mirrored to meet HEC-RAS requirements. |
| | 222 | XS-9 from field work. Mirrored to meet HEC-RAS requirements. |
| | 130 | XS-10 from field work. Mirrored to meet HEC-RAS requirements. |
| | 4 | XS-11 from field work. Mirrored to meet HEC-RAS requirements. |

### 4.3.2 Hydraulic Coefficients

Energy loss coefficients are used by the computer model to evaluate energy losses. The value of Manning's roughness coefficients were obtained using the methodology proposed in the Hydraulic Engineering Circular No.20. For the main channel Manning's roughness coefficient of 0.04 and 0.017 were used, while 0.10 and 0.08 were used for the overbanks. For natural contraction and expansion of the stream the typical values of 0.1 and 0.3 were used respectively. When the change in effective cross section area is abrupt such as bridges, contraction and expansion coefficients of 0.3 and 0.5 were used.

### 4.3.3 Boundary Conditions

Boundary conditions are necessary to establish the starting water surface at the ends of the river system (upstream and downstream). In a subcritical flow regime, boundary conditions are only necessary at the downstream ends of the river system. If a supercritical flow regime is going to be calculated, boundary conditions are only necessary at the upstream ends of the river system. If a mixed flow regime calculation is going to be made, then boundary conditions must be entered at all ends of the river system.

Due to the slopes of the creeks a supercritical flow analysis was performed, thus the upstream boundary conditions were necessary. Normal depth was chosen as the upstream boundary condition. For this type of boundary condition, it is required to estimate an energy slope that will be used in calculating normal depth at that location. Based on the water surface profile an energy slope of 0.013 m/m was estimated for Quebrada Maresúa at the upstream boundary. For Quebrada Sin Nombre an energy slope of 0.02 m/m was estimated for at the upstream boundary.

## 4.4 Existing Model Hydraulic Analysis and Results

Existing condition hydraulic analysis was performed for eleven (11) cross sections along the Quebrada Maresúa reach, and eleven (11) cross sections along the Quebrada Sin Nombre reach. The hydraulic analysis was performed primarily for 100-year peak flows. **Appendix C** shows the results, cross sections, and water surface profiles. **Table 17** shows the 100-year water surface elevations and velocities.

**Table 17. Existing Condition Water Surface Elevations and Velocities for the 100-Year Event**

| Reach | River Station | Water Surface Elevation (m) | Channel Velocity (m/s) |
|---|---|---|---|
| Quebrada Maresúa | 557 | 83.57 | 3.56 |
| | 526 | 83.31 | 3.39 |
| | 507 | 82.58 | 4.12 |
| | 487 | 82.01 | 3.90 |
| | 377 | 79.40 | 3.41 |
| | 278 | 77.30 | 2.75 |
| | 262 | 76.72 | 3.59 |
| | 253 | 76.42 | 3.83 |
| | 247 | 76.27 | 3.85 |
| | 204 | 75.17 | 3.91 |
| | 8 | 72.00 | 3.61 |
| Quebrada Sin Nombre | 1003 | 64.60 | 3.81 |
| | 877 | 62.96 | 3.72 |
| | 780 | 61.35 | 4.06 |
| | 662 | 59.00 | 4.33 |
| | 597 | 58.24 | 3.90 |
| | 521 | 57.12 | 3.74 |
| | 426 | 56.30 | 3.64 |
| | 323 | 55.31 | 3.69 |
| | 222 | 55.58 | 3.52 |
| | 130 | 53.42 | 5.52 |
| | 4 | 49.49 | 7.88 |

**Figure 18** and **Figure 19** shows the 100-year flood event water surface profile for Quebrada Maresúa and Quebrada Sin Nombre respectively.

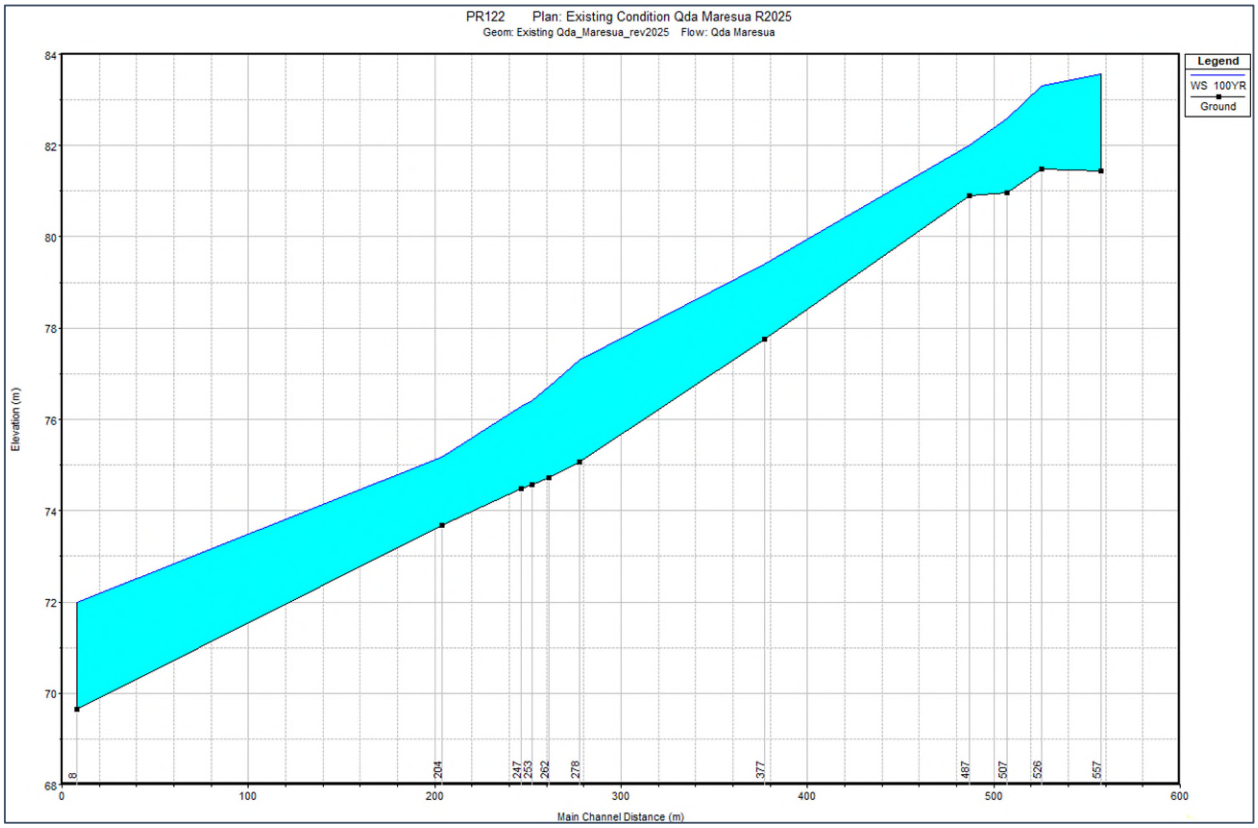



**Figure 18: Quebrada Maresúa Water Surface Elevation Profile for the 100-Year Flood Event**

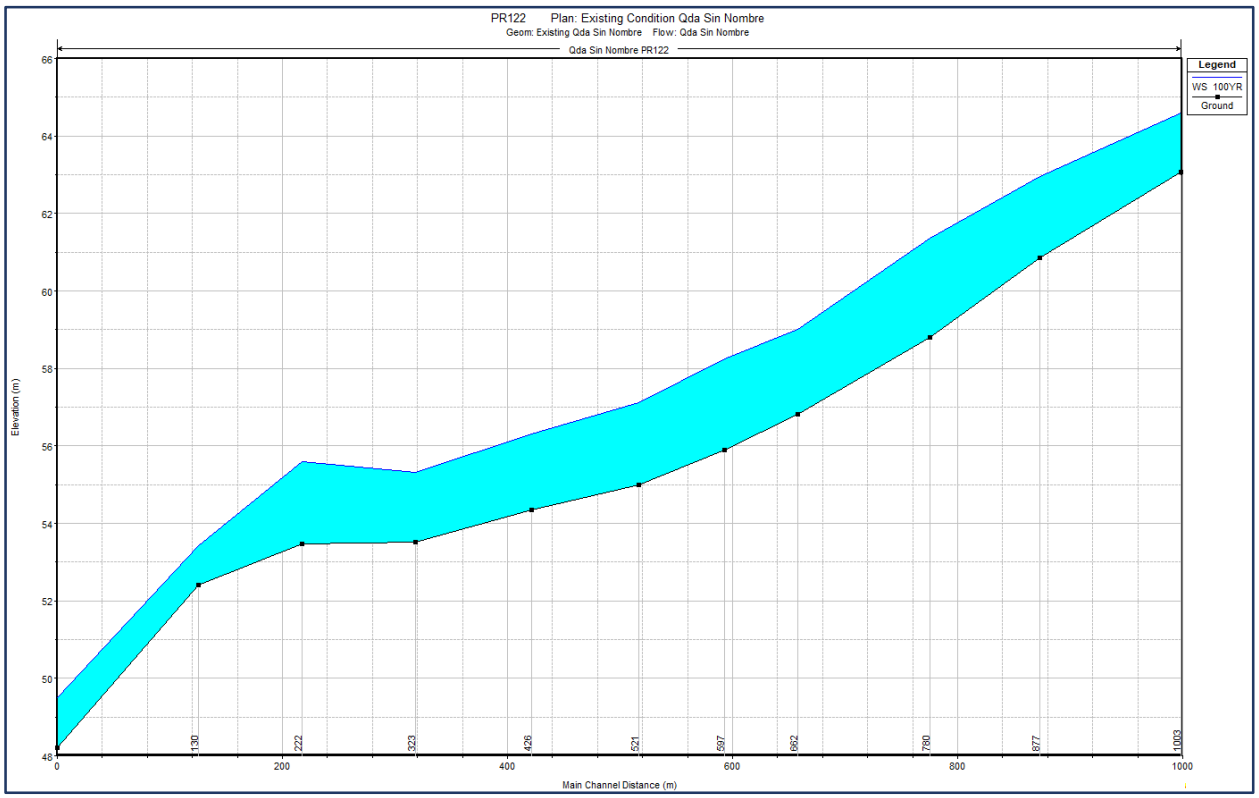



**Figure 19: Quebrada Sin Nombre Water Surface Elevation Profile for the 100-Year Flood Event**

### 4.4.1 Floodway Delineation (Encroachment)

According to the "Guias Para La Elavoración de Estudios Hidrológicos-Hidráulicos" Section 6.4, in addition to the determination of the BFE, the floodway of the stream shall be delimited. The delimitation of the floodway was performed using the floodplain encroachment analysis capabilities included in HEC-RAS. Method 4 and equal conveyance reduction were selected to preliminary determine the encroachment stations, then method 1 was selected to establish the final encroachment stations. When method 4 is selected the user specifies a target water surface increase, 0.15 m for floodway delimitation. In method 1 the user enters right and left encroachment stations. **Table 18** shows the encroachment stations, the floodway width, and water surface increase obtained from the encroachment analysis.

**Table 18. Existing Condition Model Floodway Delimitation Results**

| Reach | River Station | Floodway Station | | Floodway Width (m) | Water Surface Increse (m) |
|---|---|---|---|---|---|
| | | Left (m) | Right (m) | | |
| Quebrada Maresúa | 557 | 114.3 | 121.07 | 6.77 | -0.04 |
| | 526 | 74.75 | 85.28 | 10.53 | -0.07 |
| | 507 | 61.99 | 69.74 | 7.75 | -0.01 |
| | 487 | 56.79 | 72 | 15.21 | 0.04 |
| | 377 | 58.87 | 75.43 | 16.56 | 0.25 |
| | 278 | 58.216 | 73.536 | 15.32 | -0.35 |
| | 262 | 55.648 | 77.161 | 21.513 | -0.12 |
| | 253 | 58.762 | 72.736 | 13.974 | 0.02 |
| | 247 | 59.422 | 72.407 | 12.985 | 0.1 |
| | 204 | 53.51 | 65.23 | 11.72 | -0.05 |
| | 8 | 18.19 | 25.49 | 7.3 | -0.13 |
| Quebrada Sin Nombre | 1003 | 127.36 | 147.06 | 19.70 | 0 |
| | 877 | 90 | 102.28 | 12.28 | -0.02 |
| | 780 | 96.17 | 105.65 | 9.48 | 0 |
| | 662 | 87.36 | 99.18 | 11.82 | 0 |
| | 597 | 99.05 | 112.53 | 13.48 | 0 |
| | 521 | 102.6 | 120.59 | 17.99 | 0 |
| | 426 | 117.65 | 144.46 | 26.81 | 0 |
| | 323 | 112.86 | 123.41 | 10.55 | 0 |
| | 222 | 111.67 | 123.55 | 11.88 | -0.03 |
| | 130 | 128.89 | 142.78 | 13.89 | 0.02 |
| | 4 | 59.13 | 68.19 | 9.06 | 0 |

## 4.5 Proposed Condition Model

Section 6.01 of the on Special Flood Hazard Areas Regulation (Puerto Rico Planning Board, 2010) prohibits the location of structures, fillings, developments, or any obstacle within the floodway of the river. However, when all the alternatives have been evaluated and the only one available is to build within this area, the regulation allows the construction of structures, if it is shown, through a hydrologic and hydraulic study, that no increase in the floodway levels will occur

during the base flood discharge event. Thus, the effect of the proposed works shall not increase the floodway elevations to comply with the PRPB Regulation No. 13 (2010).

### 4.5.1 Proposed Works

For Quebrada Maresúa the proposed culvert was added at river station 327, between river sections 377 and 278. The proposed culvert and road geometries were obtained from the proposed culvert schematic drawings included in **Appendix E**. The proposed culvert is a three-cell concrete box culvert, 73.94 long, longitudinal slope of 0.02 m/m, and flared wingwalls. Each concrete cell will be 3.05 m wide by 3.05 m rise. The middle cell was lowered 10% of its height to carry the base flow. Also, a riprap basin is proposed at the culvert outlet as a scour countermeasure. The effect of the scour countermeasure was evaluated modifying the river sections 262, 253, and 247.

For the Quebrada Sin Nombre the proposed gabions wall was added at cross section 426. The proposed gabions wall will be installed at the creek's left bank.

### 4.5.2 Model Development

The proposed condition hydraulic analysis was based on the existing condition model previously discussed. Developed by modeling a single reach with eleven (11) cross sections along the Quebrada Maresúa, and eleven (11) cross sections along the Quebrada Sin Nombre. With the proposed model it can be evaluated the effect of proposed project in the BFE by comparing the water level surface elevations with the values obtained from the existing model. The effect of the proposed works should not increase the floodway elevations obtained from the existing condition model.

### 4.5.3 Proposed Model Hydraulic Analysis and Results

#### 4.5.3.1 Quebrada Maresúa

**Table 19** and **Figure 20** show the BFE and Floodway water surface elevations comparison between the existing and the proposed condition models for Quebrada Maresúa.

The results in **Table 19** shows that the proposed culvert at Quebrada Maresúa do not increase the upstream floodway water levels of by more than 0.15 m in compliance with the PR Planning Board Regulation No.13 (2010). An increase at river section 204 of 0.21

m between the BFE and the proposed condition floodway is observed at the downstream side of the culvert. However, this increase does not change the flood limits since the peak flow remains within the creek channel as illustrated in **Figure 21**.

**Table 19. Quebrada Maresúa Base Flood Elevations Floodway Water Surface Elevations Comparison between the Existing and Proposed Hydraulic Models**

| River Station | Base Flood Elevation (m) | | | Floodway Water Surface Elevation (m) | | |
|---|---|---|---|---|---|---|
| | Existing Model | Proposed Model | Difference | Existing Model | Proposed Model | Difference |
| 557 | 83.57 | 83.57 | 0.00 | 83.53 | 83.53 | 0.00 |
| 526 | 83.31 | 83.31 | 0.00 | 83.28 | 83.24 | -0.04 |
| 507 | 82.58 | 82.58 | 0.00 | 82.56 | 82.57 | 0.01 |
| 487 | 82.01 | 81.97 | -0.04 | 82.07 | 82.01 | -0.06 |
| 377 | 79.4 | 78.59 | -0.81 | 79.53 | 78.80 | -0.73 |
| 327 (Proposed Culvert) | | | | | | |
| 278 | 77.3 | 74.83 | -2.47 | 76.95 | 74.83 | -2.12 |
| 262 | 76.72 | 74.77 | -1.95 | 76.6 | 74.77 | -1.83 |
| 253 | 76.42 | 75.75 | -0.67 | 76.44 | 75.75 | -0.69 |
| 247 | 76.27 | 75.66 | -0.61 | 76.37 | 75.66 | -0.71 |
| 204 | 75.17 | 75.32 | 0.15 | 75.12 | 75.33 | 0.21 |
| 8 | 72.00 | 71.91 | -0.09 | 71.87 | 71.87 | 0.00 |

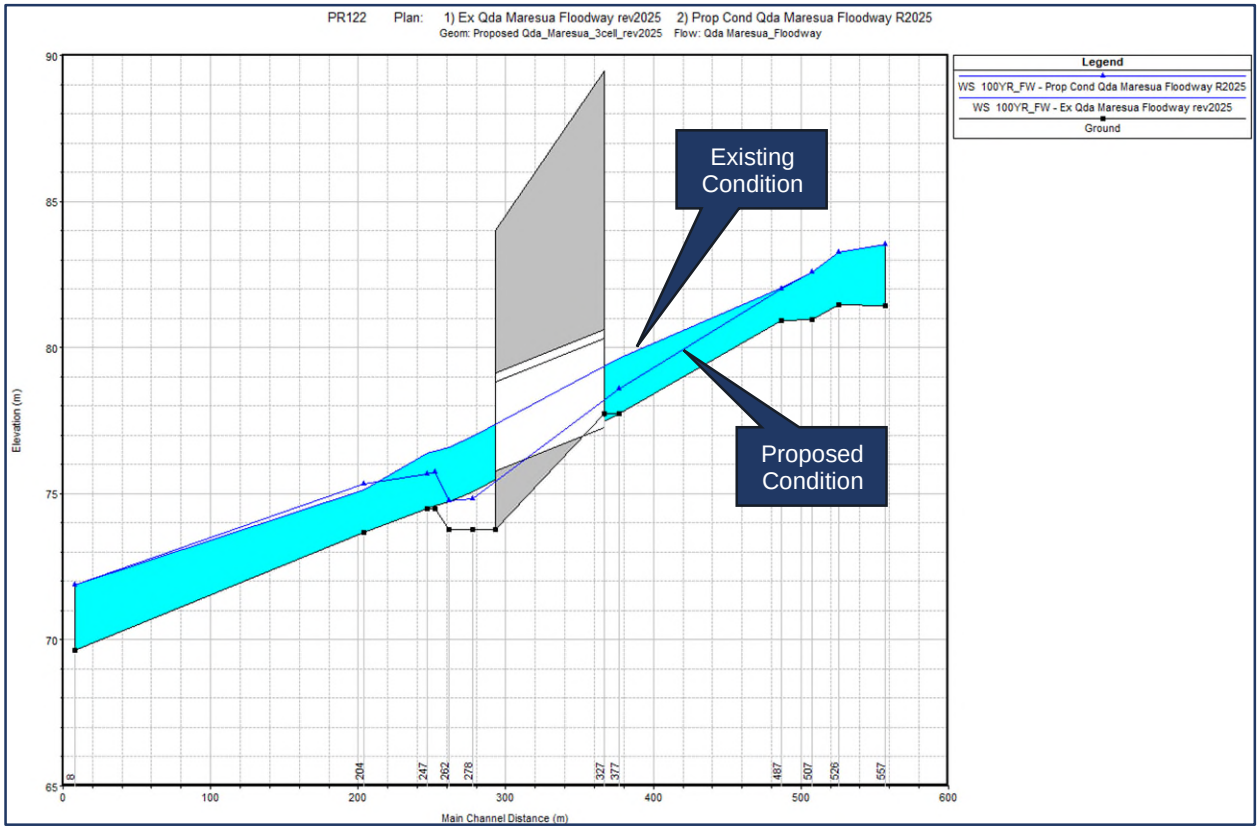



**Figure 20: Quebrada Maresúa Floodway Water Surface Profile, Comparison Between Existing and Proposed Conditions**

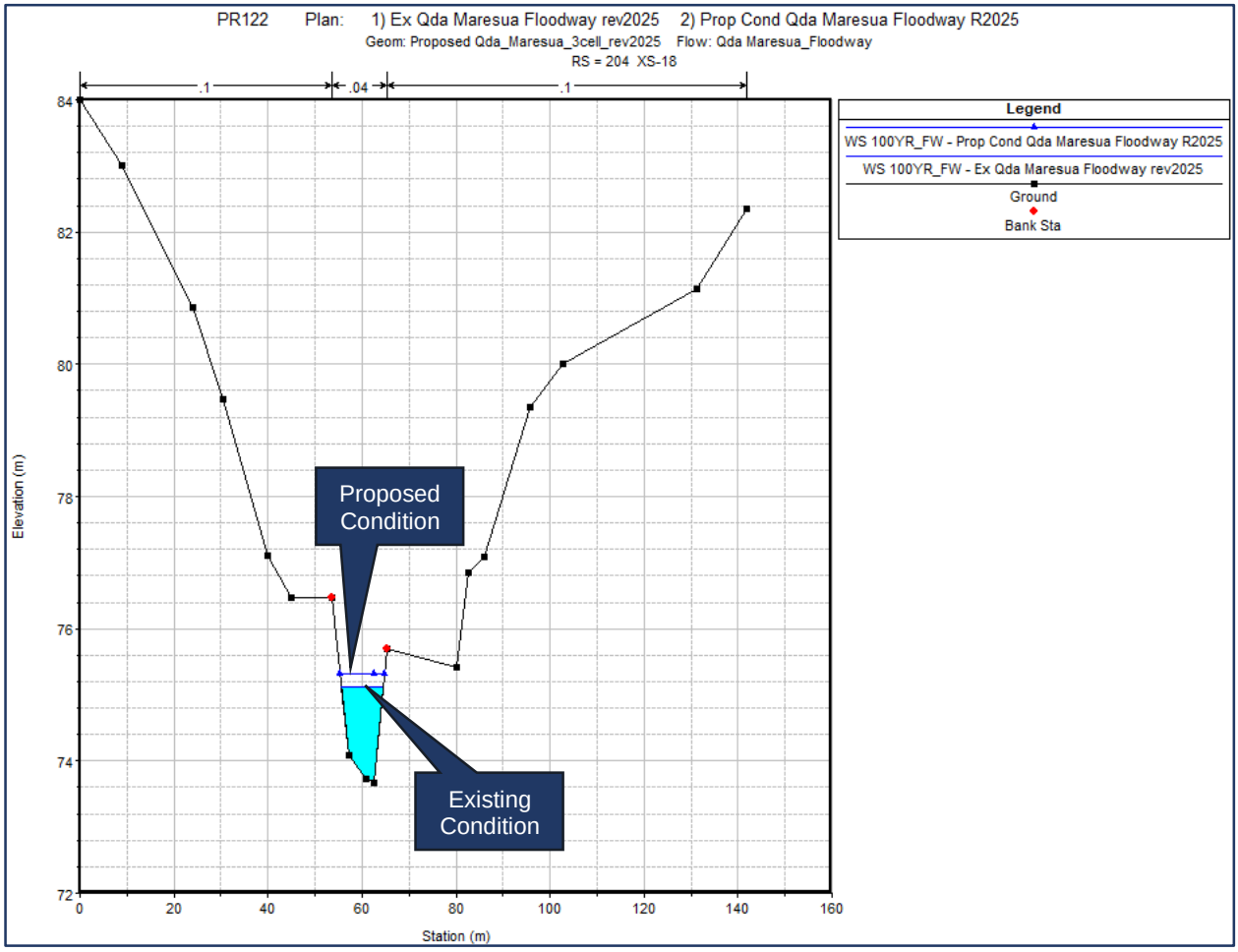



**Figure 21: Comparison Between Floodway Water Surface Elevations at Quebrada Maresúa River Section 204**

#### 4.5.3.1 Quebrada Sin Nombre

For Quebrada Sin Nombre there is no increase in the floodway water surface elevation as shown in the results in **Table 20**, also in compliance with the PR Planning Board Regulation No.13. **Figure 20** shows the BFE and Floodway water surface elevations comparison between the existing and the proposed condition models for Quebrada Sin Nombre. The results of the hydraulic analysis and results for the proposed condition model are included in **Appendix D**

**Table 20. Quebrada Sin Nombre Base Flood Elevations Floodway Water Surface Elevations Comparison between the Existing and Proposed Hydraulic Models**

| River Station | Base Flood Elevation (m) | | | Floodway Water Surface Elevation (m) | | |
|---|---|---|---|---|---|---|
| | Existing Model | Proposed Model | Difference | Existing Model | Proposed Model | Difference |
| 1003 | 64.60 | 64.60 | 0 | 64.60 | 64.60 | 0 |
| 877 | 62.96 | 62.96 | 0 | 62.94 | 62.94 | 0 |
| 780 | 61.35 | 61.35 | 0 | 61.35 | 61.35 | 0 |
| 662 | 59.00 | 59.00 | 0 | 59.00 | 59.00 | 0 |
| 597 | 58.24 | 58.24 | 0 | 58.24 | 58.24 | 0 |
| 521 | 57.12 | 57.12 | 0 | 57.12 | 57.12 | 0 |
| 426 | 56.30 | 56.30 | 0 | 56.30 | 56.30 | 0 |
| 323 | 55.31 | 55.31 | 0 | 55.31 | 55.31 | 0 |
| 222 | 55.58 | 55.58 | 0 | 55.55 | 55.55 | 0 |
| 130 | 53.42 | 53.42 | 0 | 53.44 | 53.44 | 0 |
| 4 | 49.49 | 49.49 | 0 | 49.49 | 49.49 | 0 |

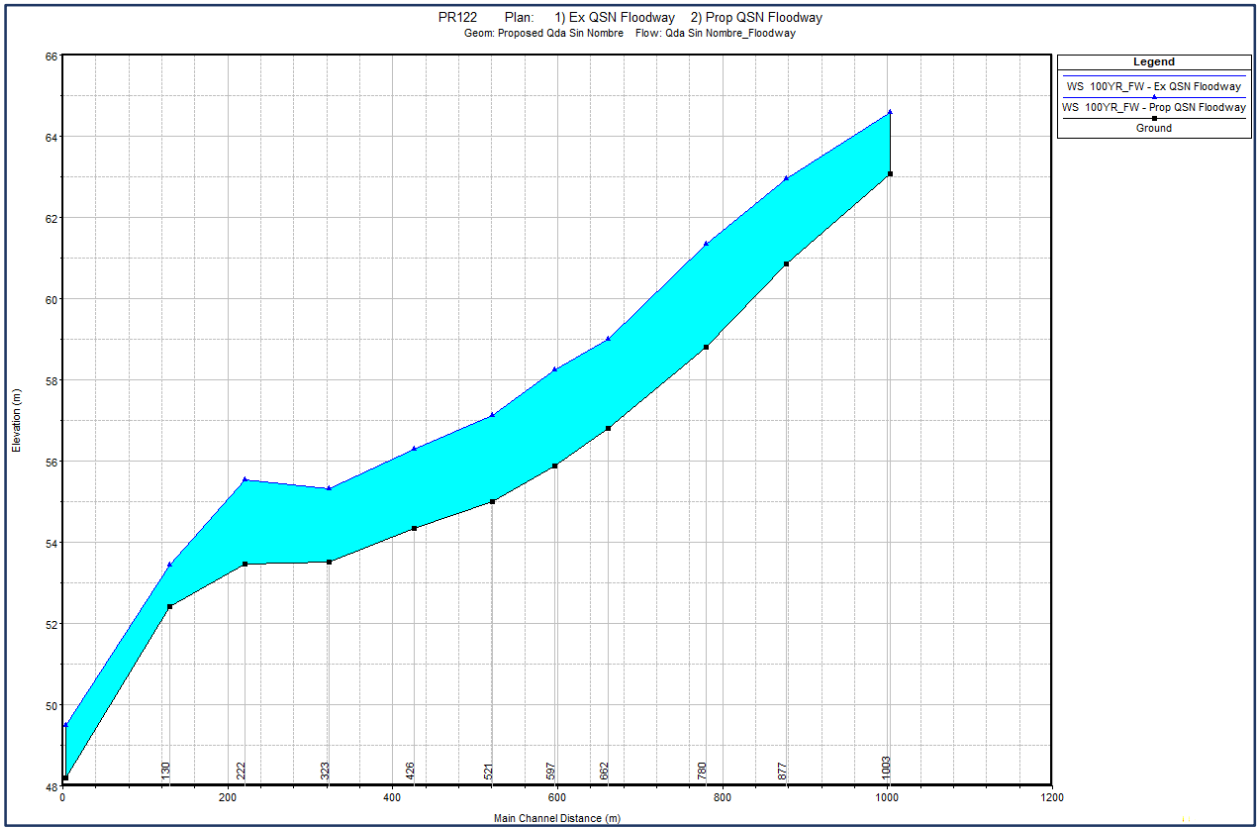



**Figure 22: Quebrada Sin Nombre Floodway Water Surface Profile, Existing and Proposed Conditions**

# 5 CONCLUSIONS AND RECOMMENDATIONS

## 5.1 Conclusions

Based on the collected information and the mathematical models previously discussed in this report, the following conclusions are provided:

1. The proposed project consists in the construction of a road 2.7 kilometers long with four lanes (two by direction) to connect the existing PR-122 at its intersection with road PR-321 to road PR-166 at San German.

2. Two water bodies within the municipality of San German will be impacted by the proposed project, Quebrada Maresúa and Quebrada sin Nombre. The works to be performed along the Quebrada Maresúa consists in the construction of a tree-cell concrete box culvert, 73.94 long with flared wingwalls, and a riprap basin at the culvert outlet. Each concrete cell will be 3.05 m wide by 3.05 m rise. For the Quebrada Sin Nombre the proposed gabions wall was added at cross section 426. The proposed gabions wall will be installed at the creek's left bank.

3. The area of effect at Quebrada Maresúa is located at Latitude: 18.066827°, Longitude: -67.043723°, while the area of effect at Quebrada sin Nombre is located at Latitude: 18.073851°, Longitude: -67.03149°.

4. According to FEMA Advisory Base Flood Elevations (ABFE) and FEMA Flood Insurance Rate Map (FIRM); Quebrada Maresúa and Quebrada Sin Nombre have not been studied, and water surface elevations and floodway limits have not been determined.

5. The Quebrada Maresúa watershed is 1.58 $Km^2$ (0.61 $mi^2$) and is located within the municipality of San Germán in the southwest region of Puerto Rico. The creek flows westward toward Río Viejo located approximately 3.5 km downstream of the study area. The topography elevation varies between 225 and 69 meters. The average overland slope of the basin upstream the study area is 39.2%.

6. The Quebrada Sin Nombre watershed is 1.84 $Km^2$ (0.71 $mi^2$) and is located within the municipality of San Germán. The creek flows northward toward Río Guanajibo located

approximately 700 m downstream of the study area. The topography elevation varies between 226 and 49 meters. The average overland slope of the basin upstream the study area is 43.7%.

7. Since the projects are located crossing two ungagged streams, the hydrologic analysis was based on the TR-55 methodology for both creeks. Rainfall depths were obtained from the web-based version of NOAA Atlas 14 for the 100-year frequency and rainfall events duration up to 24 hours. To comply with the requirements of the DRNA guidelines the accumulated depths obtained from the Atlas 14 for the 1, 6, 12 and 24 hours were distributed using temporal distributions which produce the highest peaks and correspond to the first and fourth quartile and percentile of 10% and 90%, respectively.

8. For the Quebrada Maresúa subbasins weighted curve number values of 77, 78 and 71 were obtained for Subbasin-1, Subbasin-2, and Subbasin-3, respectively. A weighted curve number value of 71 was obtained for subbasin of Quebrada Sin Nombre. The time of concentration for Subbasin-1, Subbasin-2, and Subbasin-3 of Quebrada Maresúa were estimated in 0.477 hr, 0215 hr and 0375 hr, respectively. For Quebrada sin Nombre the time of concentration was estimated in 0.28 hr.

9. For the 100-year flood event, the calculated peak flows of Quebrada Maresúa upstream of the proposed culvert is 33.3 cms, and 61.4 cms for Quebrada sin Nombre.

10. Two conditions were evaluated as part of the study, the existing condition, and the proposed condition. Each condition was evaluated in terms of the (1) Base Flood Elevations (BFE) and (2) Floodway Water Surface Elevations. Thus, four (4) hydraulic models were prepared for each creek to evaluate the effects of the proposed project on the base flood and floodway elevations.

11. The existing conditions hydraulic model were developed by modeling a single reach with eight (8) cross sections along the Quebrada Maresúa, and eleven (11) cross sections along the Quebrada Sin Nombre. The cross sections were obtained from a field survey performed by Antonio Meléndez & Associates. The bridges details were provided by surveyor Antonio Meléndez's field work.

12. The delimitation of the floodway was performed using the floodplain encroachment analysis capabilities included in HEC-RAS. Method 4 and equal conveyance reduction were selected to preliminary determine the encroachment stations, then method 1 was selected to establish the final encroachment stations. When method 4 is selected the user specifies a target water surface increase, 0.15 m for floodway delimitation. In method 1 the user enters right and left encroachment stations.

13. The proposed condition hydraulic analysis was based on the existing condition model previously discussed. Developed by modeling a single reach with eight (8) cross sections along the Quebrada Maresúa, and eleven (11) cross sections along the Quebrada Sin Nombre. For Quebrada Maresúa the proposed culvert was added at river station 327, between river sections 377 and 278. The works to be performed along the Quebrada Maresúa consists in the construction of a tree-cell concrete box culvert. The proposed culvert is a three-cell concrete box culvert, 73.94 long, longitudinal slope of 0.02 m/m, and flared wingwalls. Each concrete cell will be 3.05 m wide by 3.05 m rise. The middle cell was lowered 10% of its height to carry the base flow. For the Quebrada Sin Nombre the proposed gabions wall was added at cross section 426. The proposed gabions wall will be installed at the creek's left bank.

14. The results of the proposed condition hydraulic models show that the proposed culvert at Quebrada Maresúa does not increase the 100-year event water levels by more than 0.15 m in compliance with the PR Planning Board Regulation No.13 (2010). A maximum increase at river section 204 of 0.15 m between the BFE and the proposed condition floodway (75.33 m – 75.18 m = 0.12 m) is observed at the downstream side of the culvert. For Quebrada Sin Nombre there is no increase, also in compliance with the PR Planning Board Regulation No.13.

## 5.2 Recommendations

Based on the collected information discussed in this report and the analysis results, the following recommendations are provided:

1. Scour calculation should be performed based on the proposed culvert, especially at the downstream (outlet) side.

# 6 CERTIFICATION

I hereby certify that the report titled "*Hydrologic and Hydraulic Study (Quebrada Maresúa and Quebrada Sin Nombre), for PR-122 from PR-321 to PR-166, Lajas -San German (AC-012201)*" has been prepared in accordance with the best hydrologic and hydraulic practices as described in this document and that, based on the studies and field measurements provided by others parties, results are true and correct.

Certified today July 9, 2025




Euclides Torres Rivera, PE

Lic. No. 20120

# 7 REFERENCES

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# APPENDICES

# Appendix A:

## *REPRODUCTION OF THE CERTIFIED FIELD SURVEY*

| FED. AID HWAY PROJECT No. | A.C. PROJECT CODE No. | HIGHWAY | MUNICIPALITY | ISLAND | FISCAL YEAR | SHEET NO. | TOTAL SHEETS |
|---|---|---|---|---|---|---|---|
| | | PR-122 | | P.R. | | 1 | 18 |

PLANIMETRY FROM AERIAL MAPPING PREPARED BY OTHERS

LIDAR DATA

STATE ROAD NO. 122

STATE ROAD NO. 121

BARBED WIRE

N 225,300 · N 225,400 · N 225,500 · N 225,600 · E 135,250 · E 135,300 · E 135,350 · E 135,400 · E 135,450

HORIZONTAL & VERTICAL CONTROL

| Station | Northing | Easting | Elevation | Description |
|---|---|---|---|---|
| 1 | 226994.057 | 136396.573 | 61.31 | MAGNETIC NAIL |
| 2 | 225372.215 | 135319.503 | 115.90 | MAGNETIC NAIL |
| 3 | 227139.843 | 136215.524 | 56.35 | MAGNETIC NAIL |
| 4 | 226283.914 | 135298.729 | 122.06 | MAGNETIC NAIL |
| 5 | 226150.034 | 136202.915 | 115.36 | IRON ROD |
| 6 | 226289.367 | 136486.464 | 95.64 | IRON ROD |
| 7 | 226581.861 | 136641.856 | 68.15 | IRON ROD |
| 8 | 226718.311 | 135845.482 | 105.23 | IRON ROD |
| 9 | 225857.695 | 135361.870 | 98.60 | IRON ROD |

NOTES:
1. ALL DISTANCES IN METERS.
2. COORDINATE SYSTEM IS REFERRED TO THE STATE PLANE COORDINATE SYSTEM FOR PUERTO RICO AND THE US VIRGIN ISLANDS, NAD83, EPOCH 2010, ADJUSTMENT 2011, LAMBERT PROJECTION.
3. ALL ELEVATIONS IN METERS.
4. ELEVATIONS ARE ORTHOMETRIC, REFERRED TO PRVD02 DATUM.
5. CONTOUR INTERVAL = 1.00 METERS, HIGHLIGHT CONTOUR INTERVAL = 5.00 METERS.
6. ONLY VISIBLE UTILITIES ARE SHOWN. NO SERVICE NOR SUE (SUB SURFACE ENGINEERING) HAS BEEN EVALUATED.
7. CONTRACTOR SHALL VERIFY ALL DIMENSIONS AND FIELD CONDITIONS AND SHALL ADVICE THE OWNER OF ANY DIFFERENCES FOUND.
8. CONTOUR LINES OUTSIDE THE SURVEY CORRIDOR WERE GENERATED FROM 2017 LIDAR DATA. PLANIMETRIC DATA OUTSIDE THE SURVEY CORRIDOR WAS OBTAINED FROM 2001 AERIAL IMAGERY.
9. STORM SEWER UTILITIES ALONG THE PROPOSED ALIGNMENT SHOULD BE REVIEWED AS THEY MAY BE OF HISTORICAL IMPORTANCE.

ANTONIO R. MELENDEZ EMBARS
AGRIMENSOR LICENCIADO
LIC. 14662
PUERTO RICO

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Tel: (787) 505-3190 info@antoniomelendezpr.com
www.antoniomelendezpr.com

AUTORIDAD DE CARRETERAS Y TRANSPORTACION

DATE REVISION

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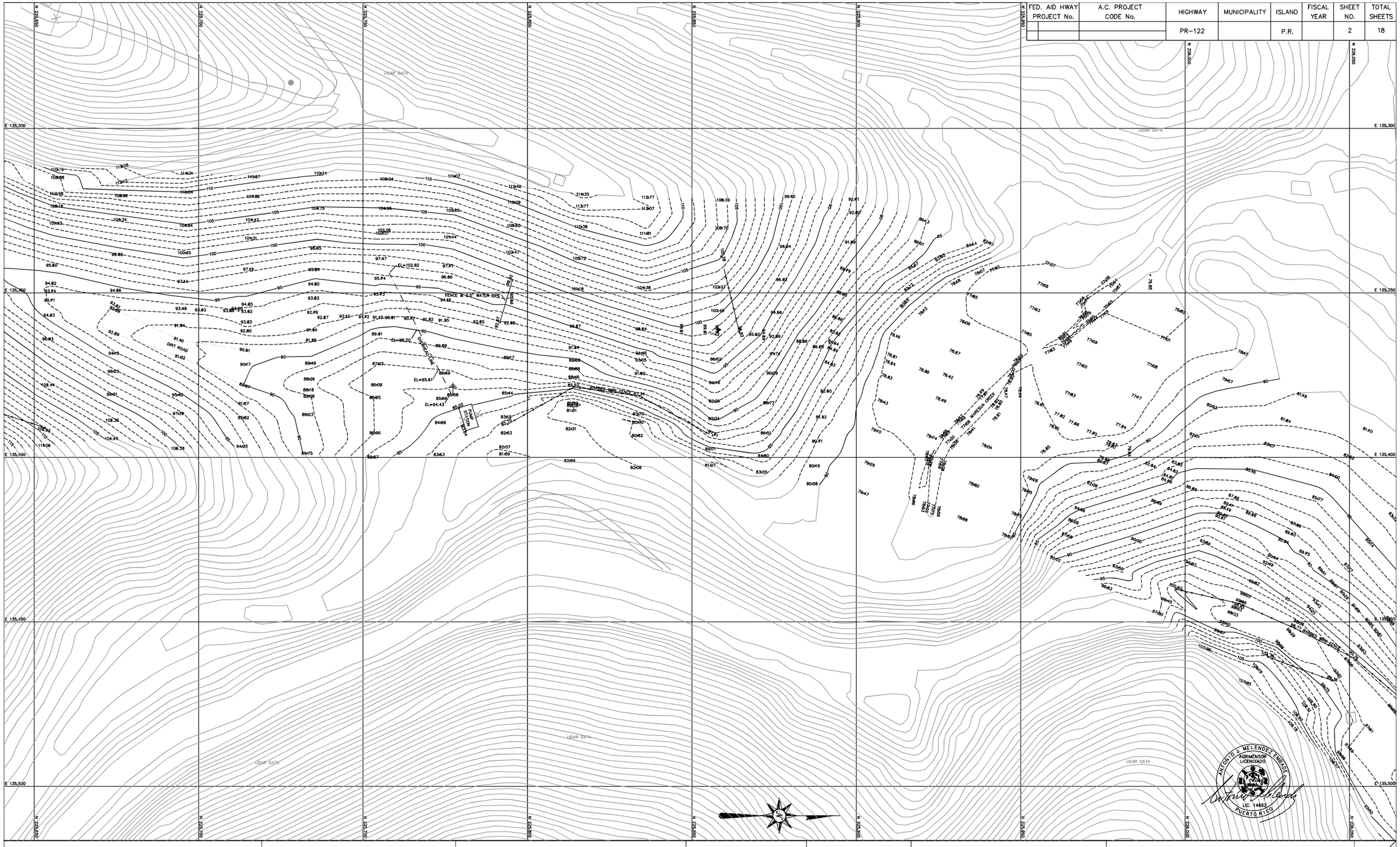
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PR-122
SAN GERMAN, PR

AS BUILT & TOPOGRAPIC PLAN

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|---|---|---|---|---|---|---|---|
| | | PR-122 | | P.R. | | 2 | 18 |





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| DATE | REVISION |
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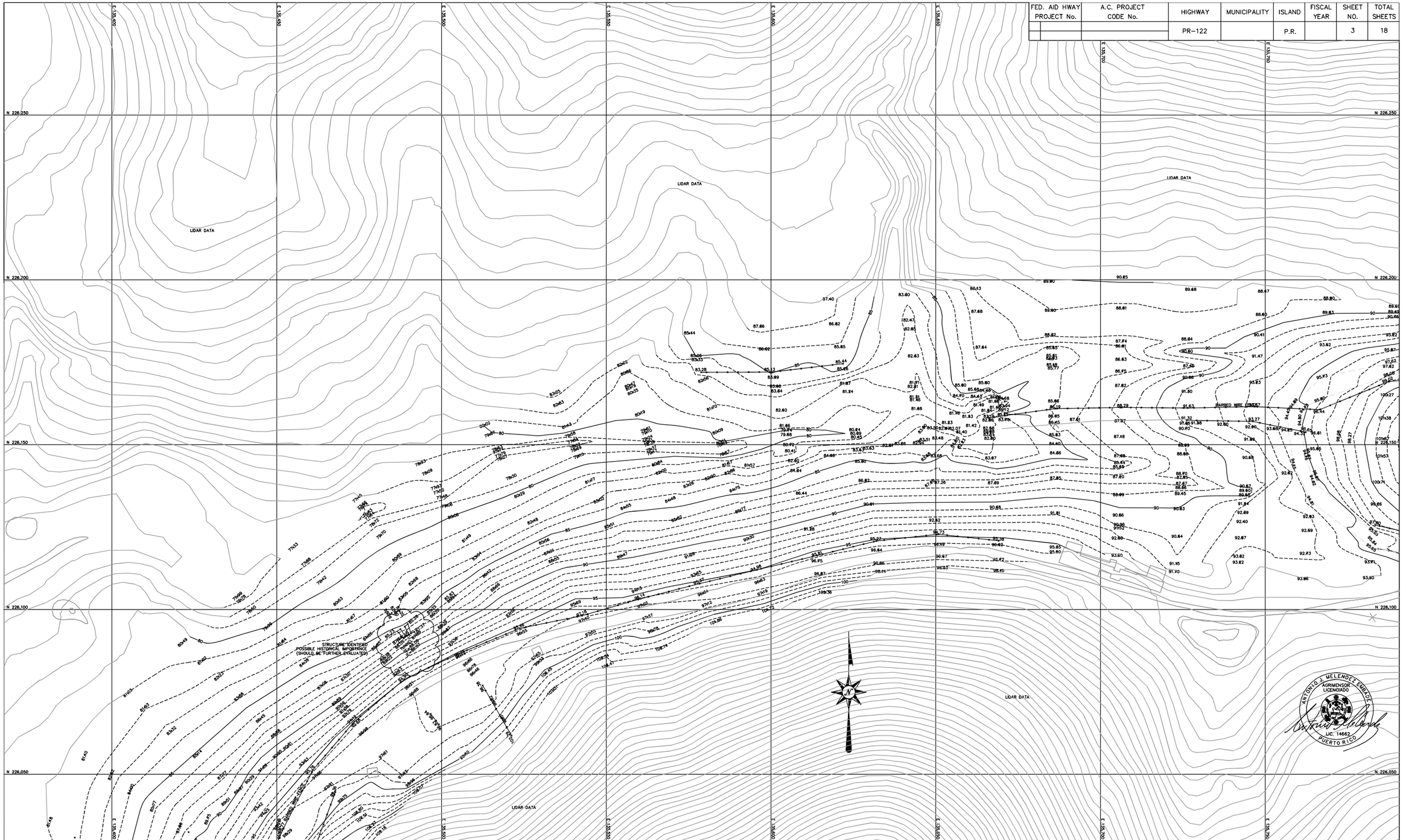
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PR-122
SAN GERMAN, PR

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| FED. AID HWAY PROJECT No. | A.C. PROJECT CODE No. | HIGHWAY | MUNICIPALITY | ISLAND | FISCAL YEAR | SHEET NO. | TOTAL SHEETS |
|---|---|---|---|---|---|---|---|
| | | PR-122 | | P.R. | | 3 | 18 |




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AUTORIDAD DE CARRETERAS Y TRANSPORTACION

DATE REVISION

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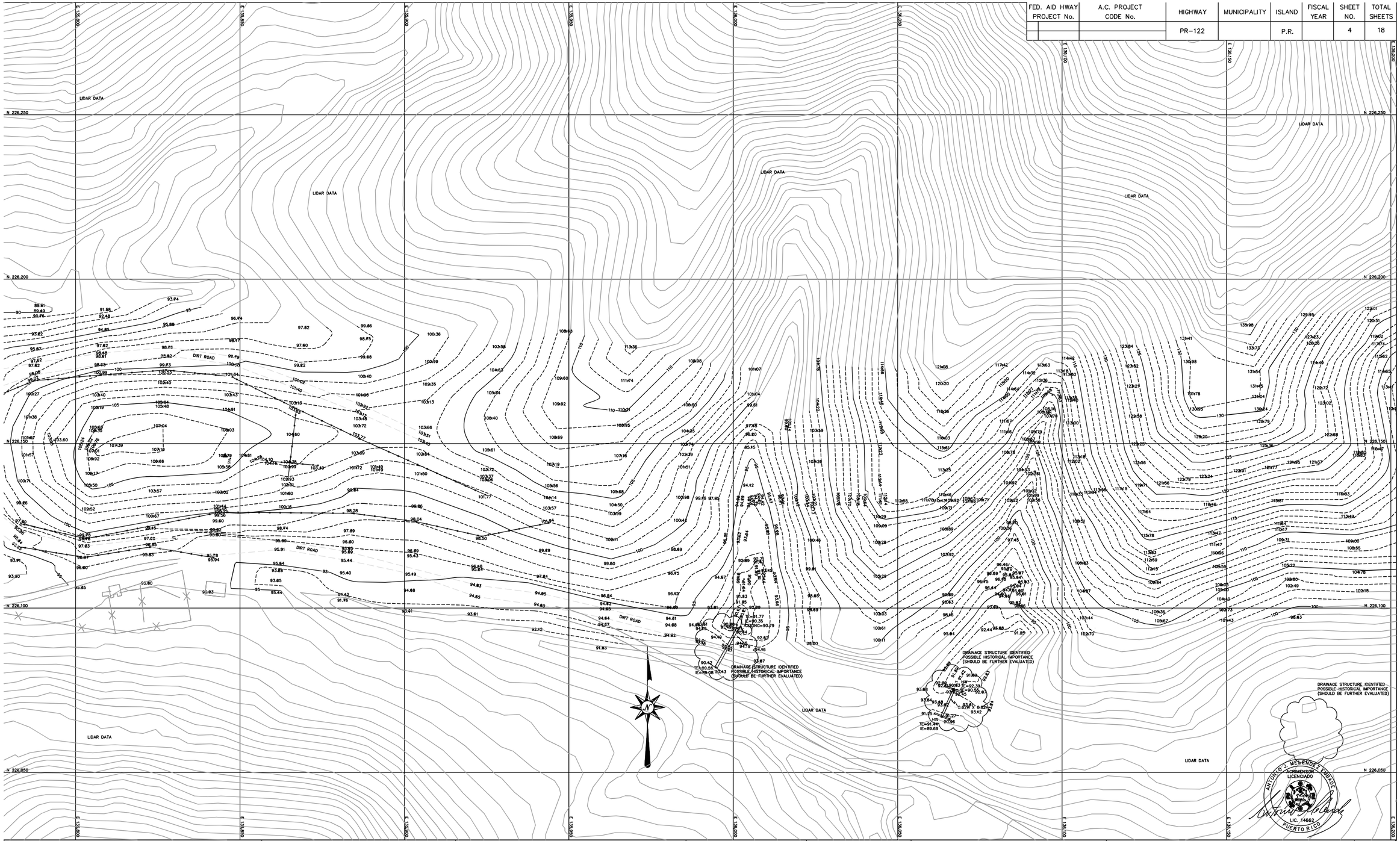
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COGO FILE: PR122-6B
DATE: NOV. 2022
CONSULTANT: BYA

PR-122
SAN GERMAN, PR

AS BUILT & TOPOGRAPIC PLAN

3
18

| FED. AID HWAY PROJECT No. | A.C. PROJECT CODE No. | HIGHWAY | MUNICIPALITY | ISLAND | FISCAL YEAR | SHEET NO. | TOTAL SHEETS |
|---|---|---|---|---|---|---|---|
| | | PR-122 | | P.R. | | 4 | 18 |




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LICENCIADO
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AUTORIDAD DE CARRETERAS Y TRANSPORTACION

DATE REVISION

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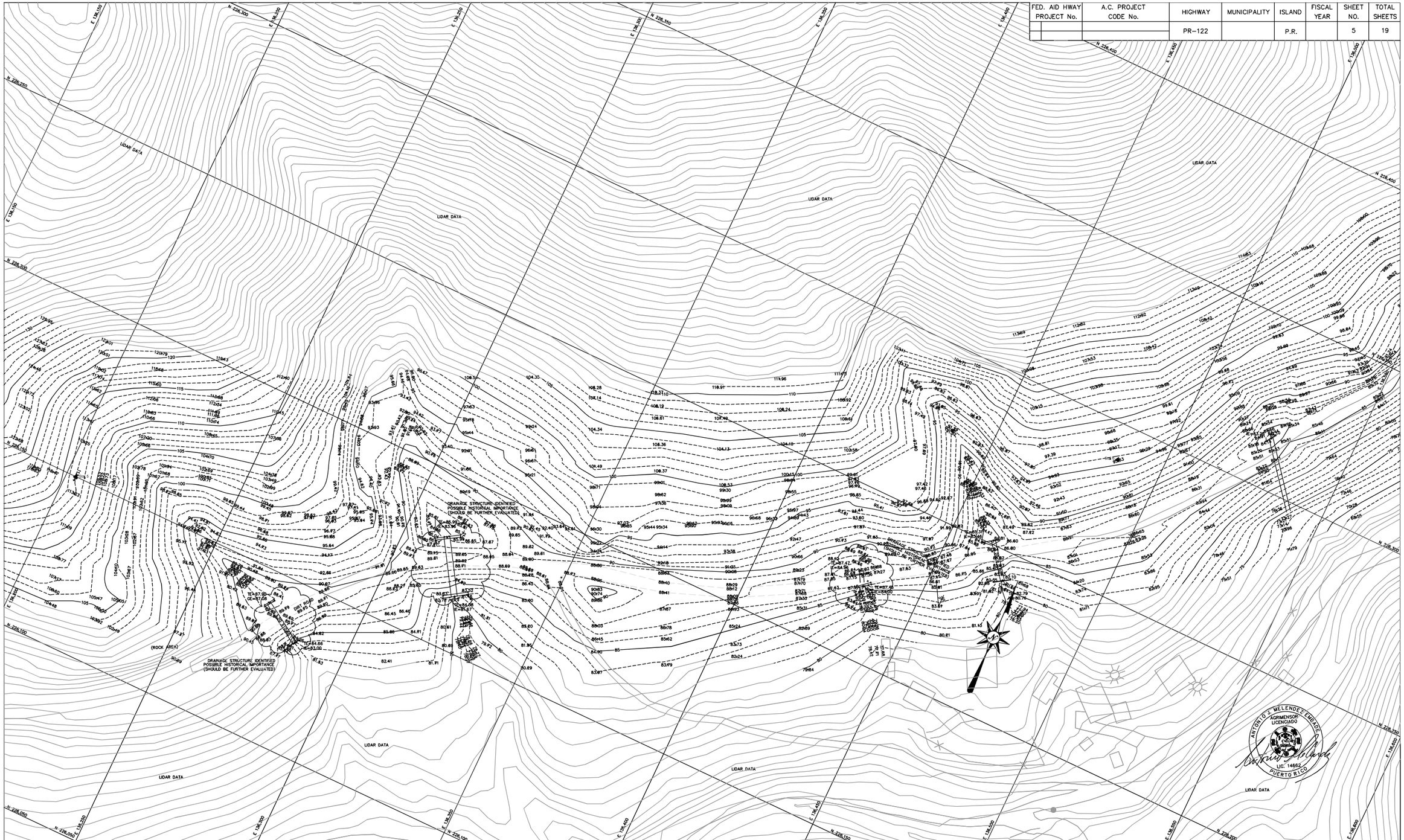
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18

| FED. AID HWAY PROJECT No. | A.C. PROJECT CODE No. | HIGHWAY | MUNICIPALITY | ISLAND | FISCAL YEAR | SHEET NO. | TOTAL SHEETS |
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DATE: NOV. 2022
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| FED. AID HWAY PROJECT No. | A.C. PROJECT CODE No. | HIGHWAY | MUNICIPALITY | ISLAND | FISCAL YEAR | SHEET NO. | TOTAL SHEETS |
|---|---|---|---|---|---|---|---|
| | | PR-122 | | P.R. | | 6 | 19 |

LIDAR AREA

LIDAR DATA

DRAINAGE STRUCTURE IDENTIFIED POSSIBLE HISTORICAL IMPORTANCE (SHOULD BE FURTHER EVALUATED)

STATE ROAD NO. 122

ASPHALTED ROAD

BARBED WIRE FENCE

CHAIN LINK FENCE

CONCRETE WALL

WOOD STRUCTURE

OPEN DECK

CATTLE CROSSING

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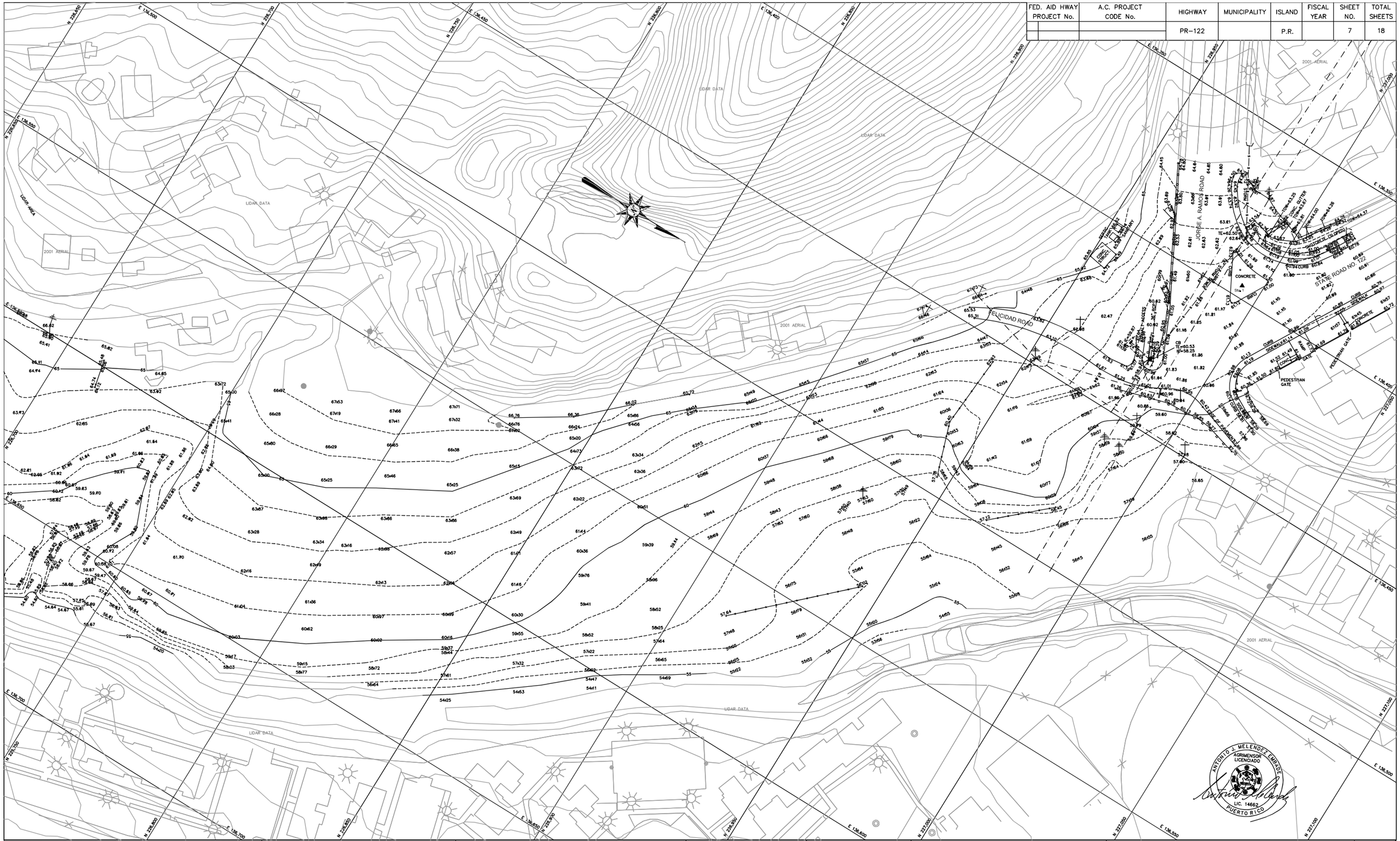
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| FED. AID HWAY PROJECT No. | A.C. PROJECT CODE No. | HIGHWAY | MUNICIPALITY | ISLAND | FISCAL YEAR | SHEET NO. | TOTAL SHEETS |
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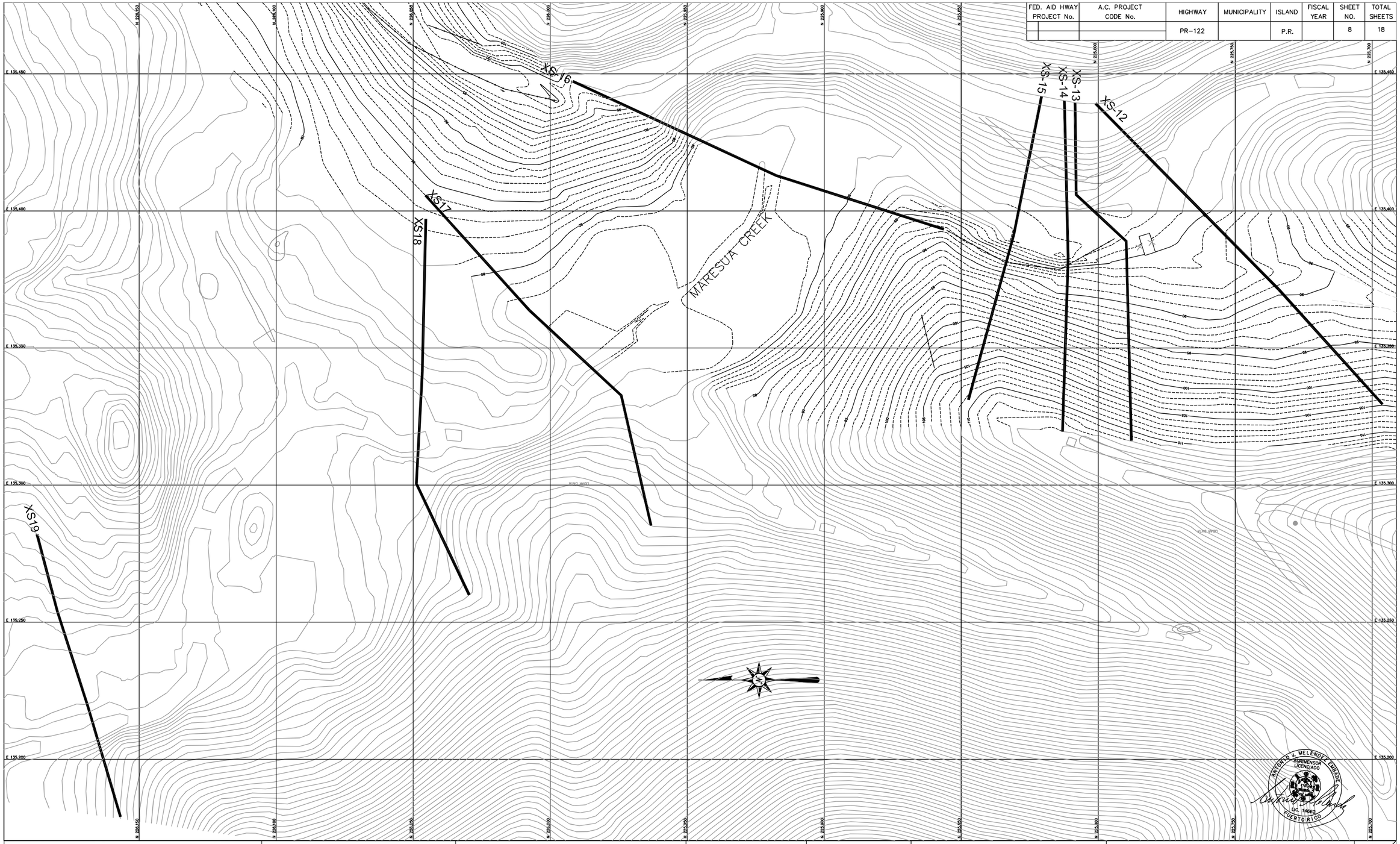
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CONSULTANT: BYA

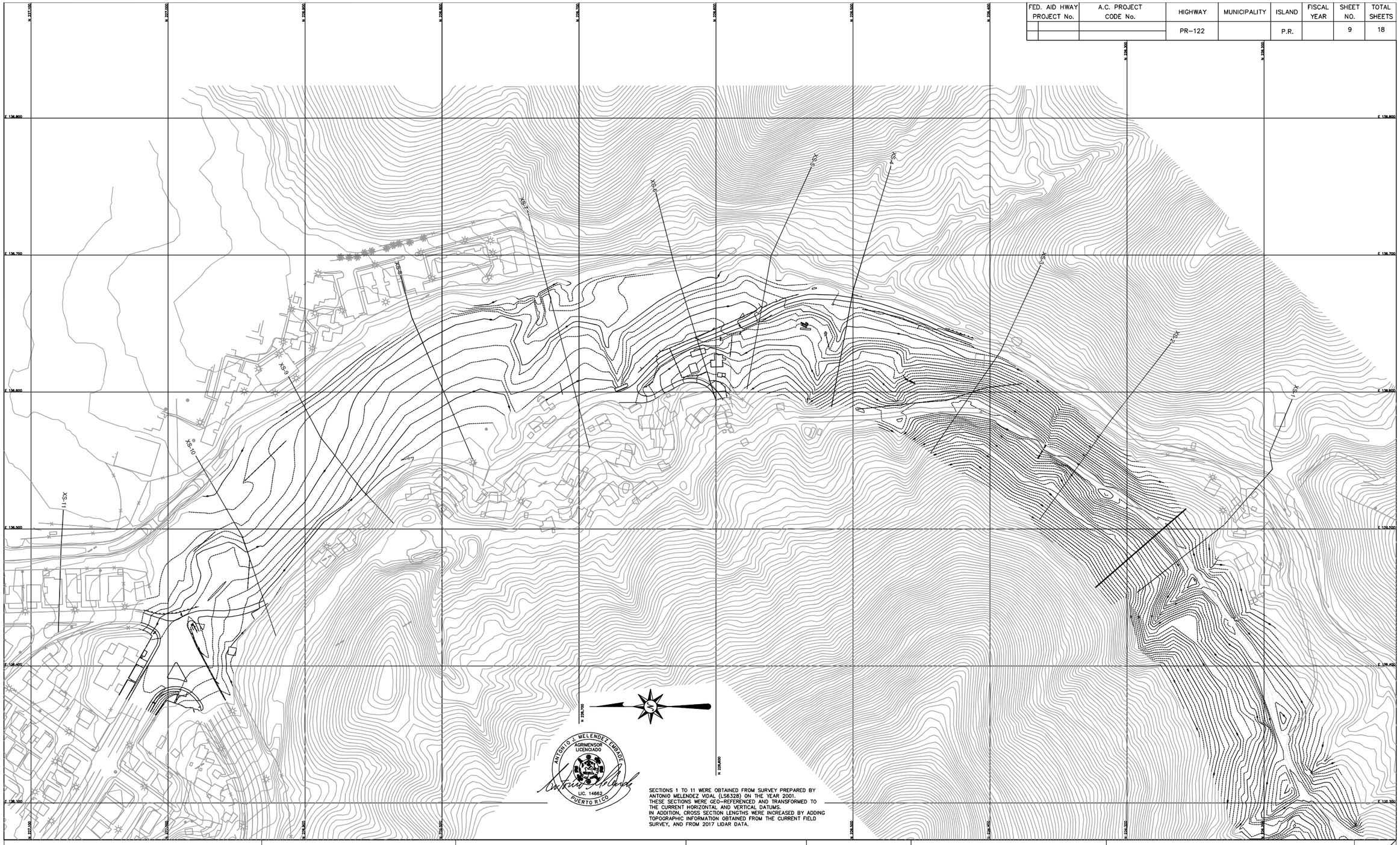
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18

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|---|---|---|---|---|---|---|---|
| | | PR-122 | | P.R. | | 9 | 18 |




SECTIONS 1 TO 11 WERE OBTAINED FROM SURVEY PREPARED BY ANTONIO MELENDEZ VIDAL (LS6328) ON THE YEAR 2001. THESE SECTIONS WERE GEO-REFERENCED AND TRANSFORMED TO THE CURRENT HORIZONTAL AND VERTICAL DATUMS. IN ADDITION, CROSS SECTION LENGTHS WERE INCREASED BY ADDING TOPOGRAPHIC INFORMATION OBTAINED FROM THE CURRENT FIELD SURVEY, AND FROM 2017 LIDAR DATA.


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AUTORIDAD DE CARRETERAS Y TRANSPORTACION

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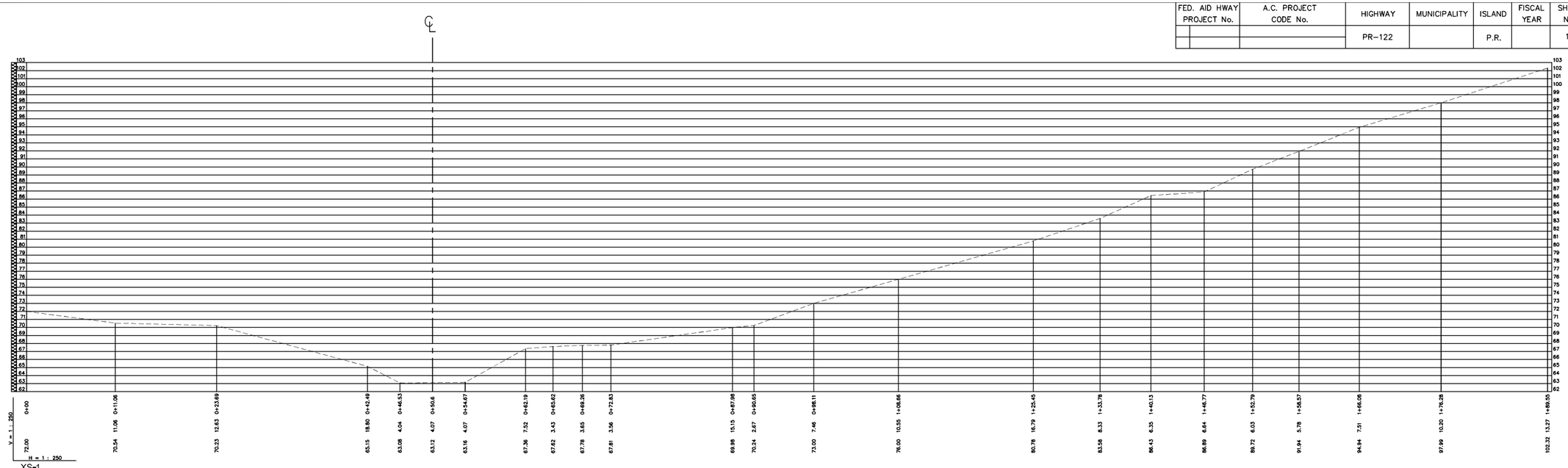
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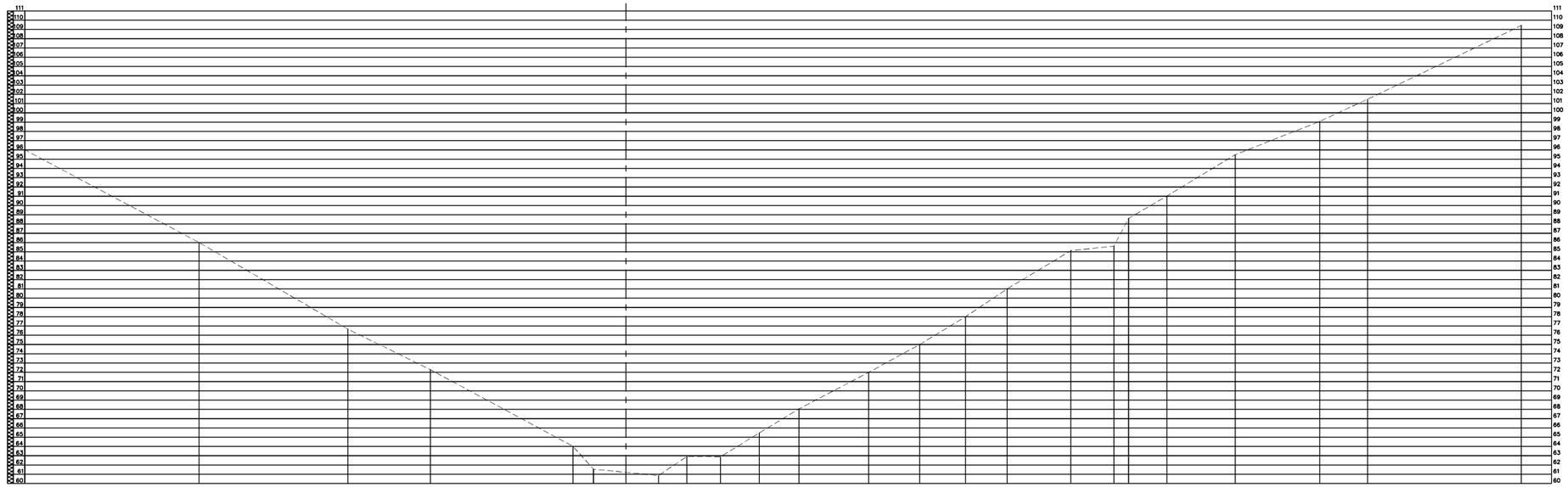
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CONSULTANT: BYA

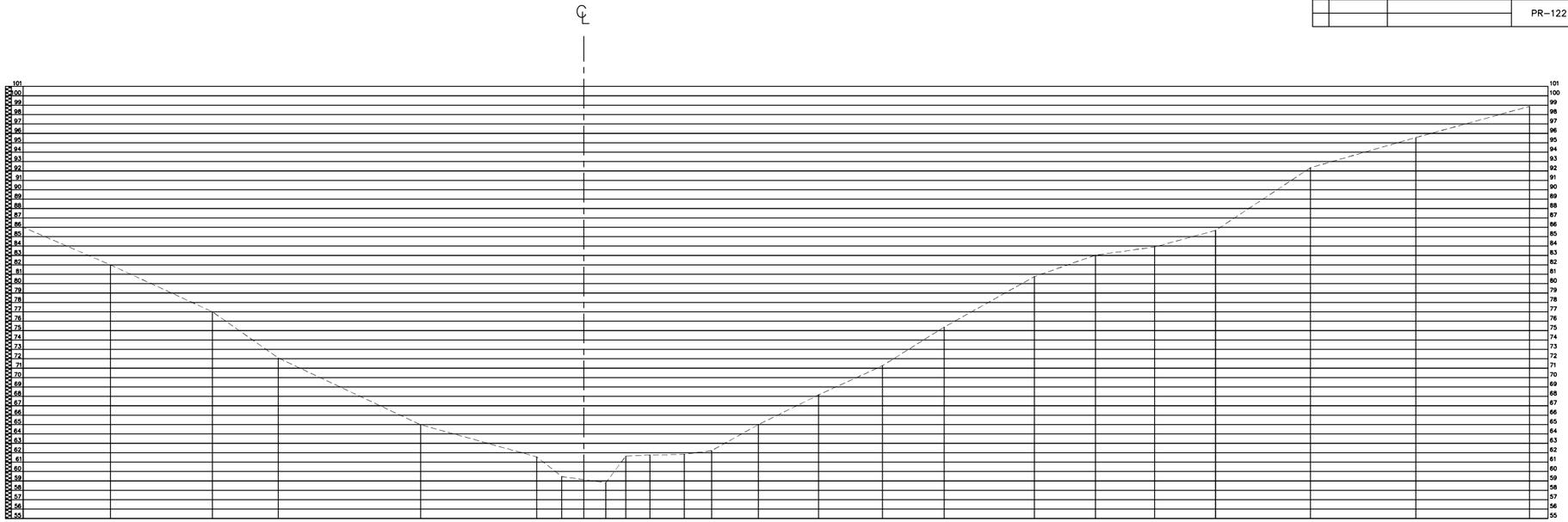
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10/18

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AGRIMENSOR LICENCIADO
LIC. 14662
PUERTO RICO

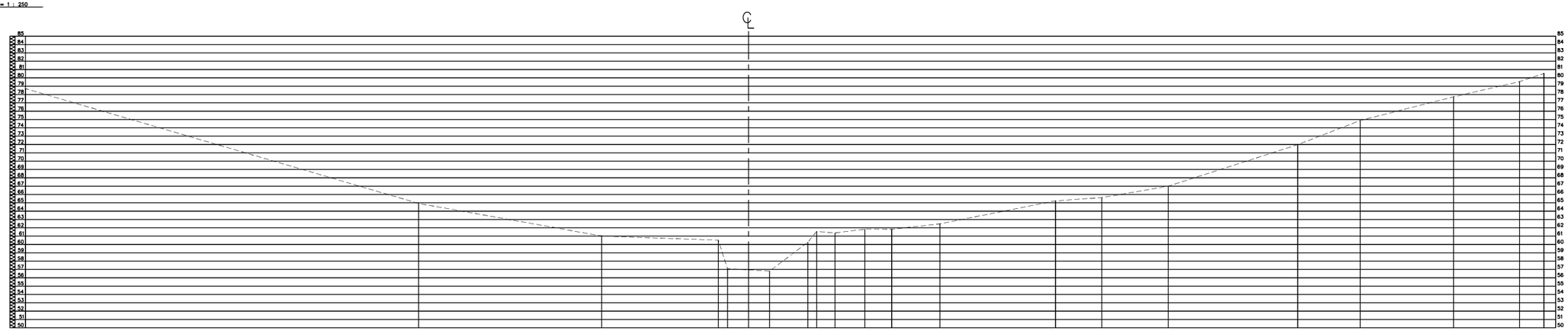
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|---|---|---|---|---|---|---|---|
| | | PR-122 | | P.R. | | 11 | 18 |



| Station | 0+00 | 0+09.29 | 0+20.14 | 0+27.15 | 0+42.3 | 0+54.64 | 0+57.31 | 0+59.66 | 0+62.01 | 0+64.12 | 0+66.69 | 0+70.34 | 0+73.26 | 0+78.23 | 0+84.65 | 0+91.43 | 0+98 | 1+07.59 | 1+14.09 | 1+20.4 | 1+26.87 | 1+36.97 | 1+48.18 | 1+60.29 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Partial | | 9.29 | 10.85 | 7.01 | 15.14 | 12.34 | 2.68 | 2.35 | 2.35 | 2.11 | 2.58 | 3.65 | 2.92 | 4.97 | 6.42 | 6.79 | 6.57 | 9.60 | 6.49 | 6.31 | 6.48 | 10.10 | 11.20 | 12.11 |
| Elevation | 86.00 | 82.00 | 77.00 | 72.09 | 64.98 | 61.56 | 59.46 | 59.13 | 58.80 | 61.64 | 61.76 | 61.83 | 62.22 | 64.98 | 68.16 | 71.26 | 75.37 | 80.75 | 83.03 | 83.91 | 85.67 | 92.34 | 95.55 | 98.88 |

V = 1 : 250
H = 1 : 250

XS-3



| Station | 0+00 | 0+47.21 | 0+69.2 | 0+83.21 | 0+84.32 | 0+86.85 | 0+89.38 | 0+93.97 | 0+95.03 | 0+97.24 | 1+00.81 | 1+04.05 | 1+09.83 | 1+23.73 | 1+29.29 | 1+37.27 | 1+52.81 | 1+60.32 | 1+71.53 | 1+79.46 | 1+82.39 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Partial | | 47.21 | 21.99 | 14.01 | 1.11 | 2.53 | 2.53 | 4.59 | 1.06 | 2.21 | 3.58 | 3.23 | 5.79 | 13.89 | 5.56 | 7.98 | 15.54 | 7.51 | 11.21 | 7.93 | 2.93 |
| Elevation | 78.71 | 64.93 | 61.02 | 60.52 | 57.09 | 56.95 | 56.81 | 60.27 | 61.45 | 61.39 | 61.85 | 61.83 | 62.48 | 65.25 | 65.63 | 67.00 | 71.98 | 74.89 | 77.72 | 79.55 | 80.53 |

V = 1 : 250
H = 1 : 250

XS-4


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AUTORIDAD DE CARRETERAS Y TRANSPORTACION

| DATE | REVISION |
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COGO FILE: PR122-6B
DATE: NOV. 2022
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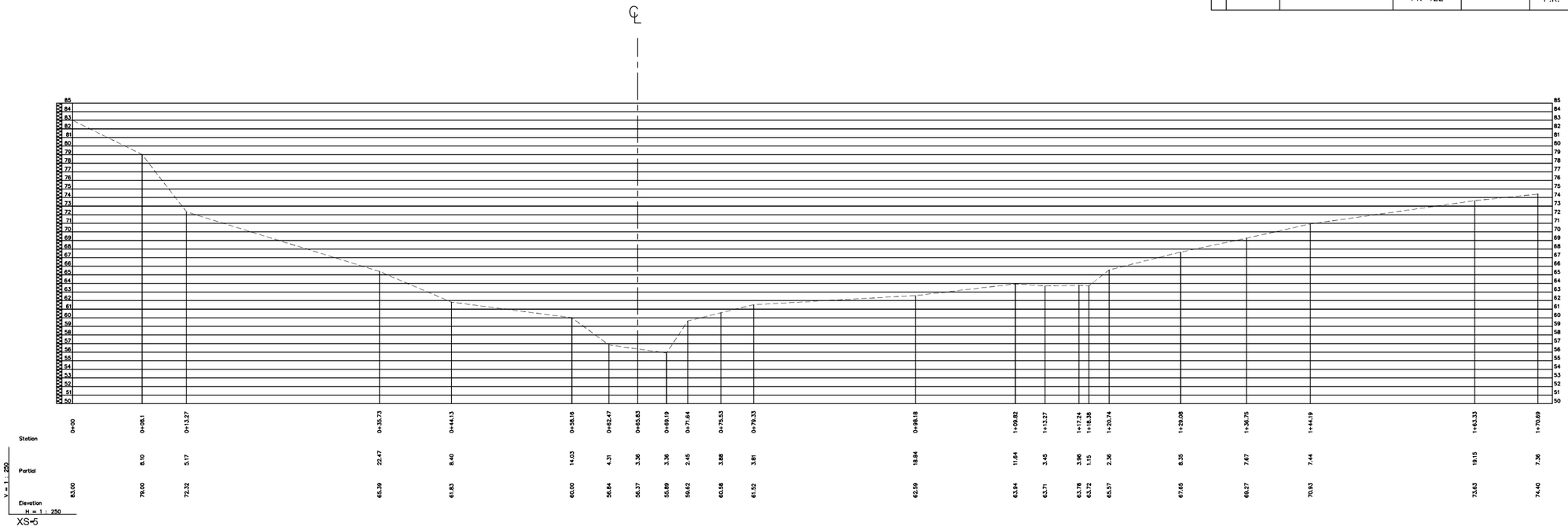
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SAN GERMAN, PR

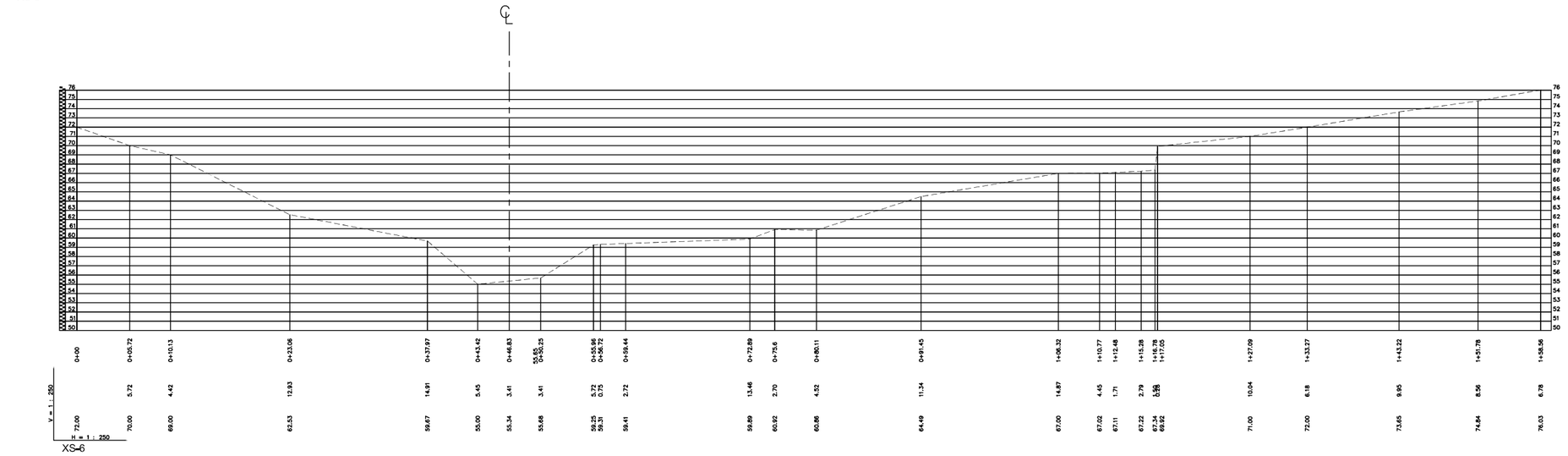
AS BUILT & TOPOGRAPIC PLAN

11/18

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| FED. AID HWAY PROJECT No. | A.C. PROJECT CODE No. | HIGHWAY | MUNICIPALITY | ISLAND | FISCAL YEAR | SHEET NO. | TOTAL SHEETS |
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AUTORIDAD DE CARRETERAS Y TRANSPORTACION

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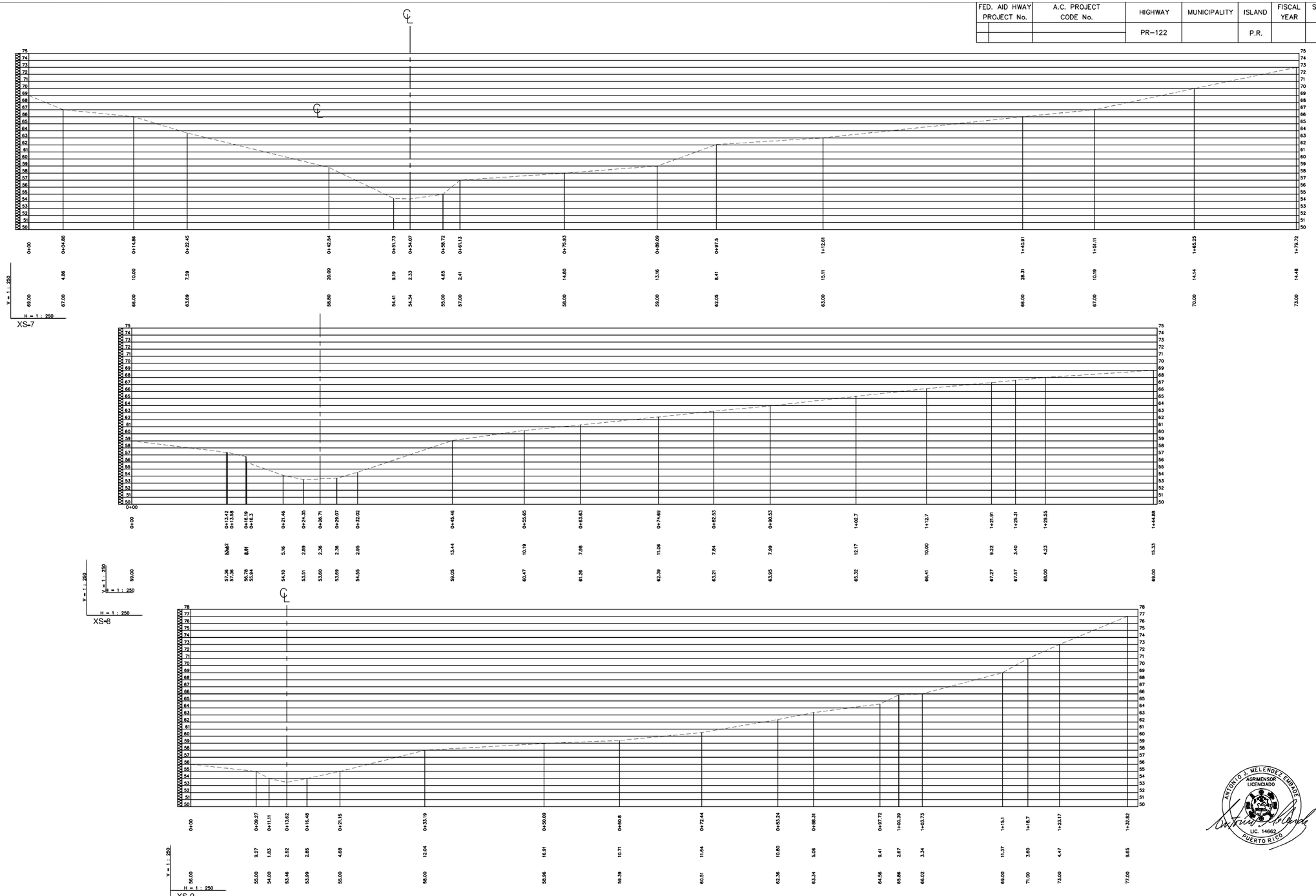
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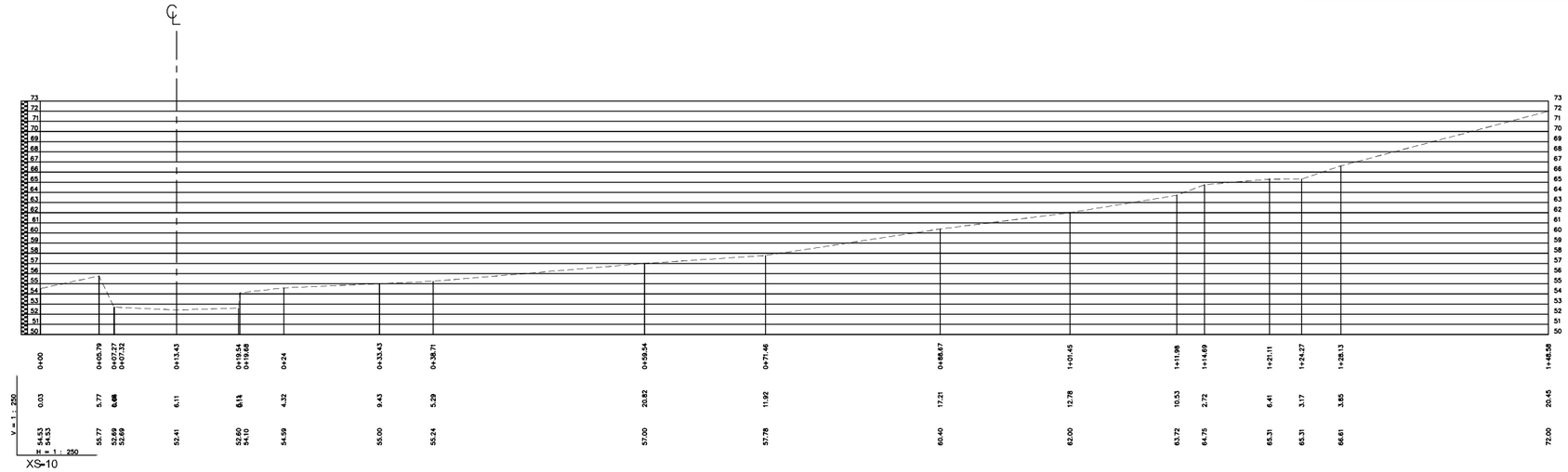
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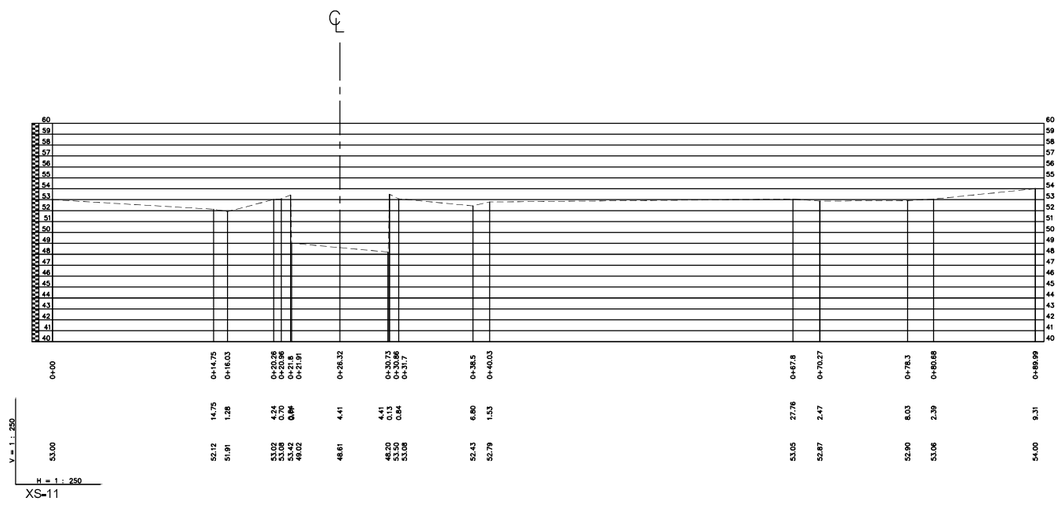
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13/18

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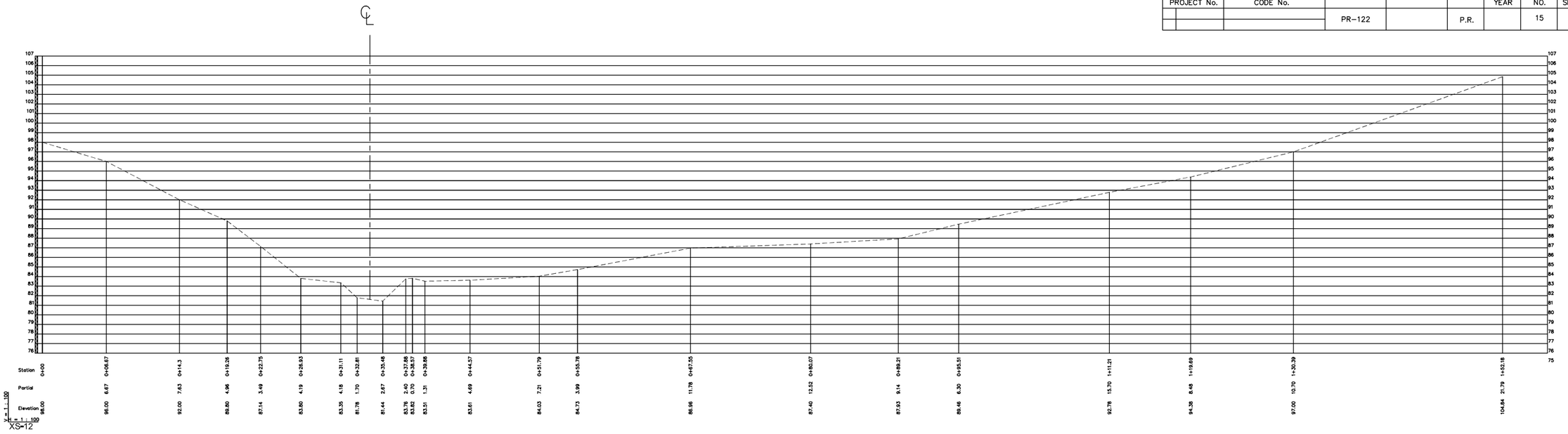
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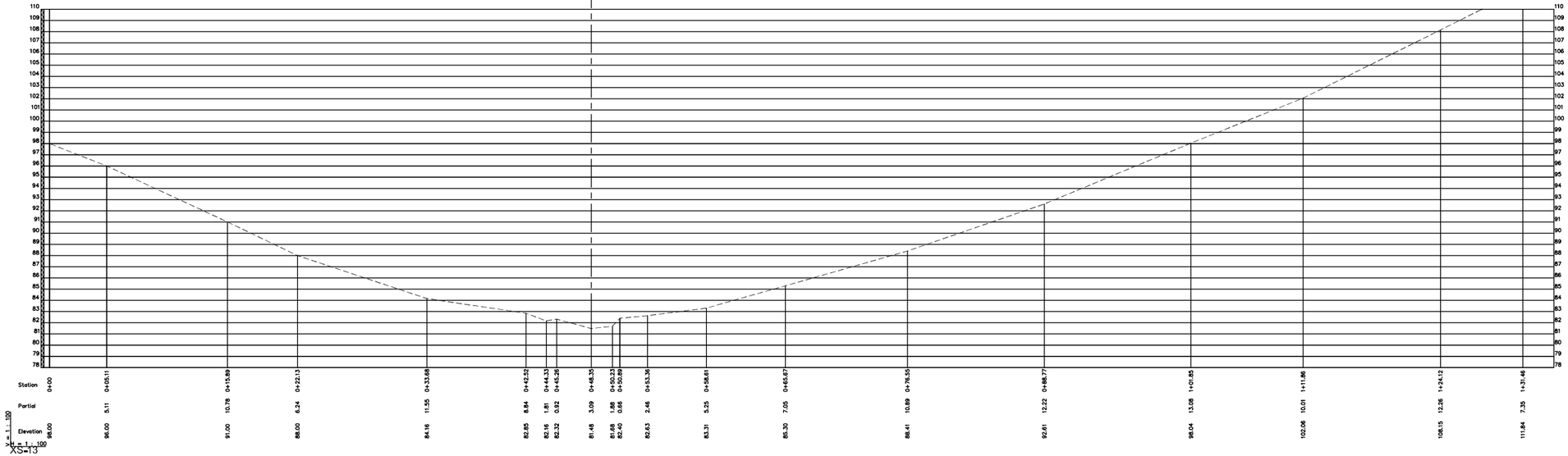
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14/18

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AUTORIDAD DE CARRETERAS Y TRANSPORTACION

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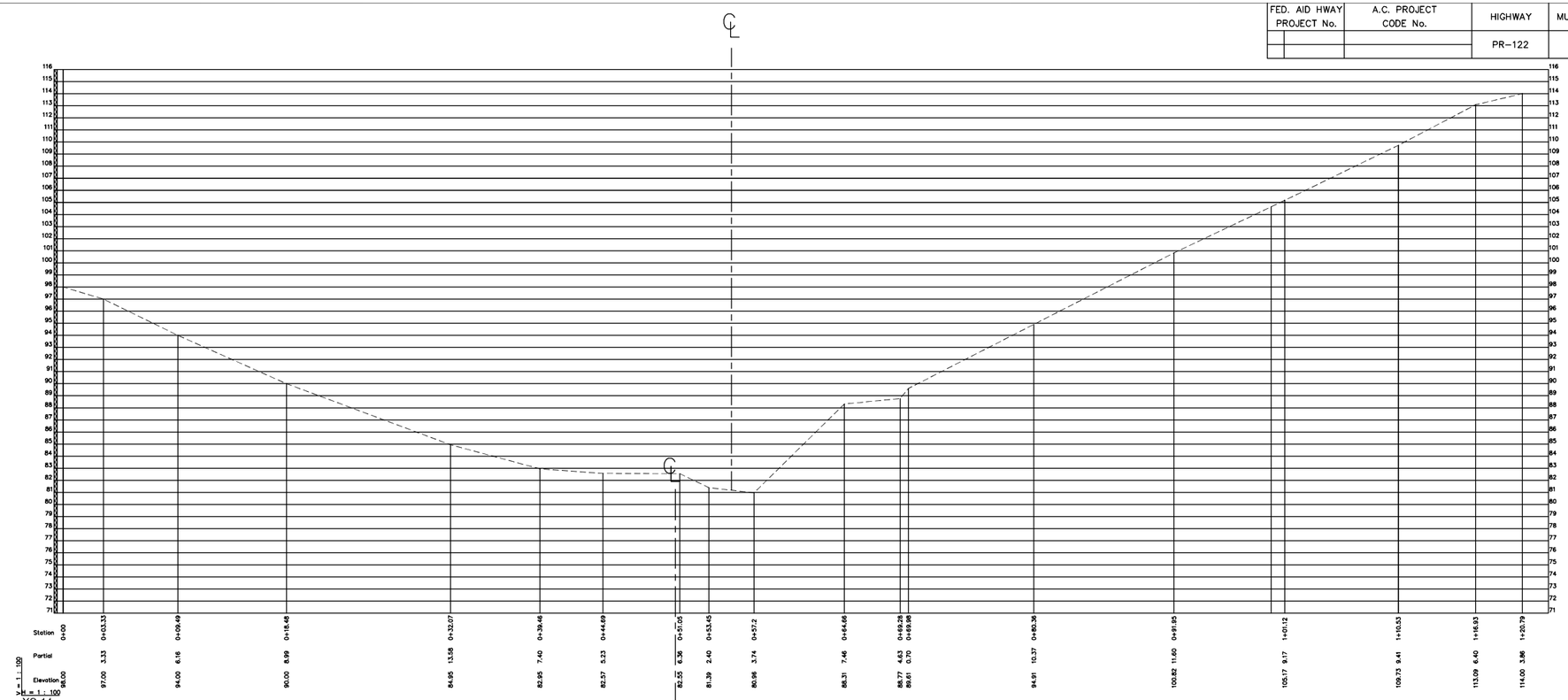
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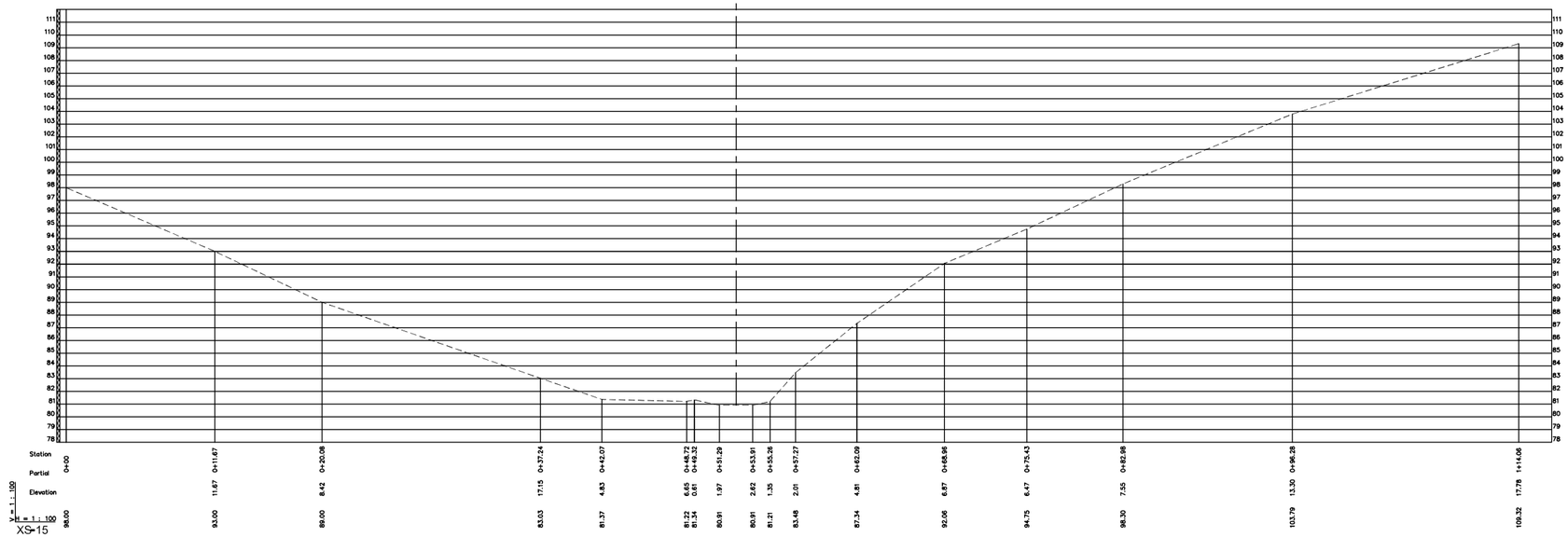
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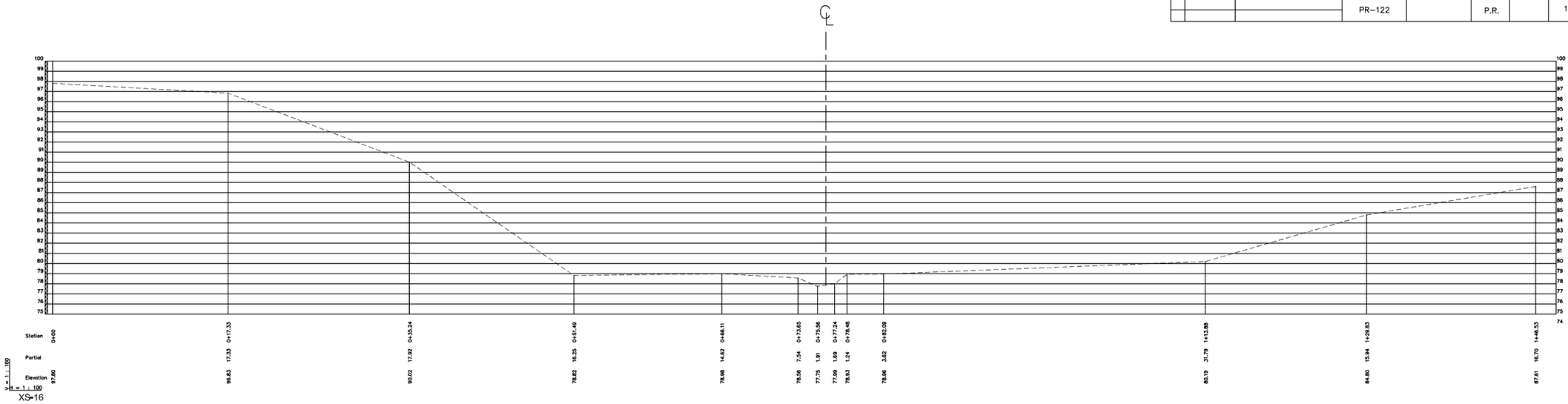
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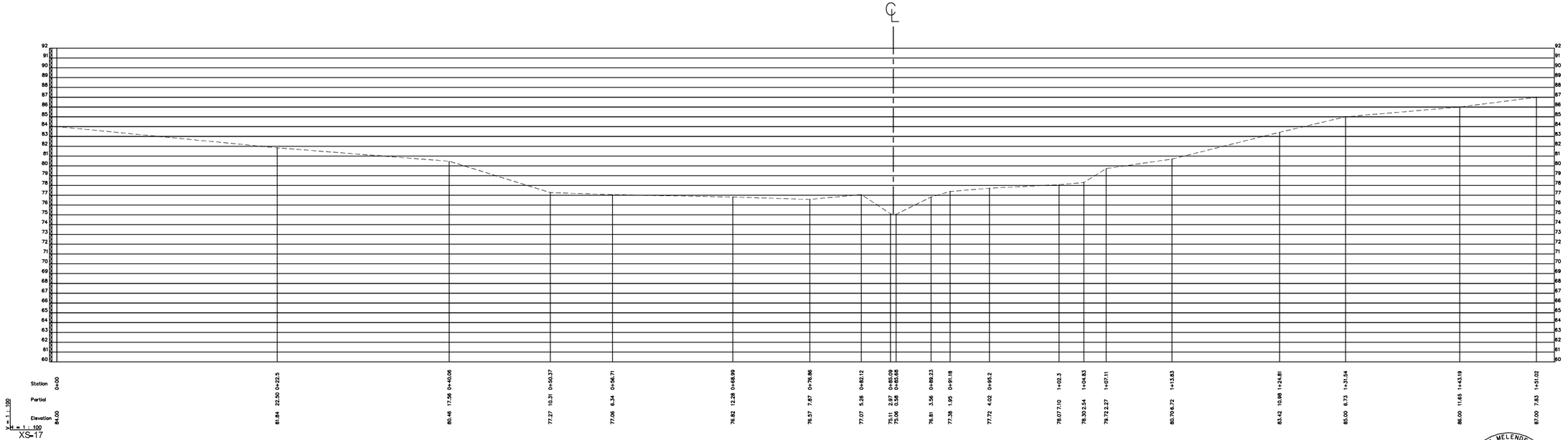
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DATE: NOV. 2022
CONSULTANT: BYA

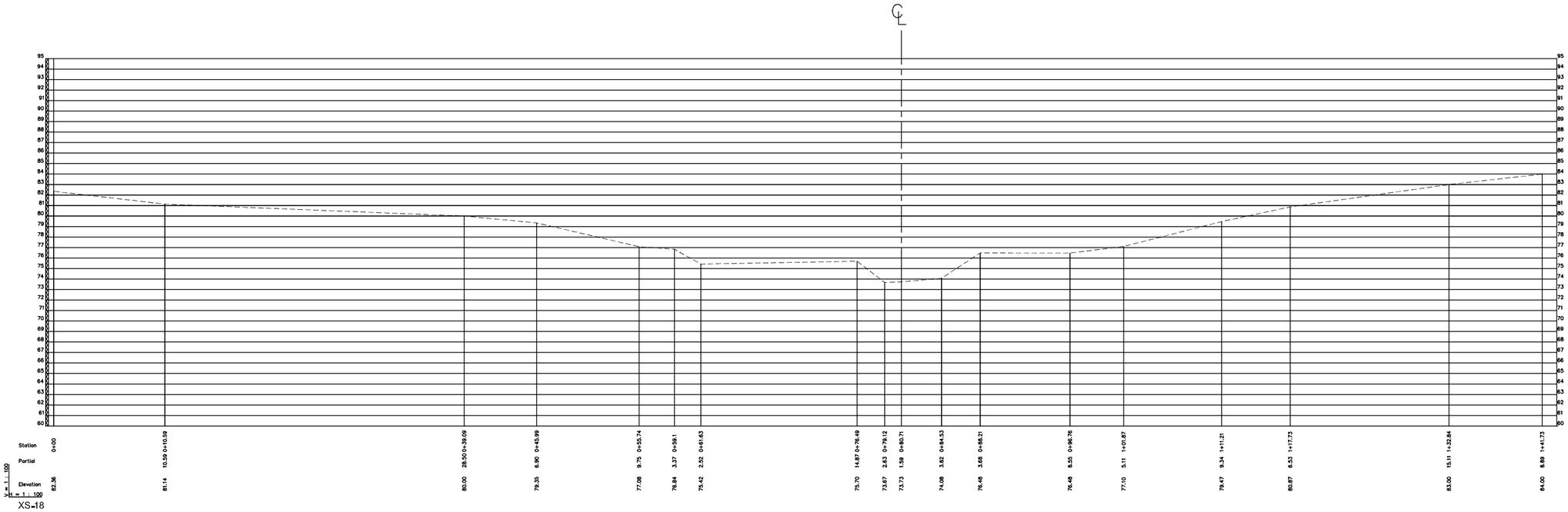
PR-122
SAN GERMAN, PR

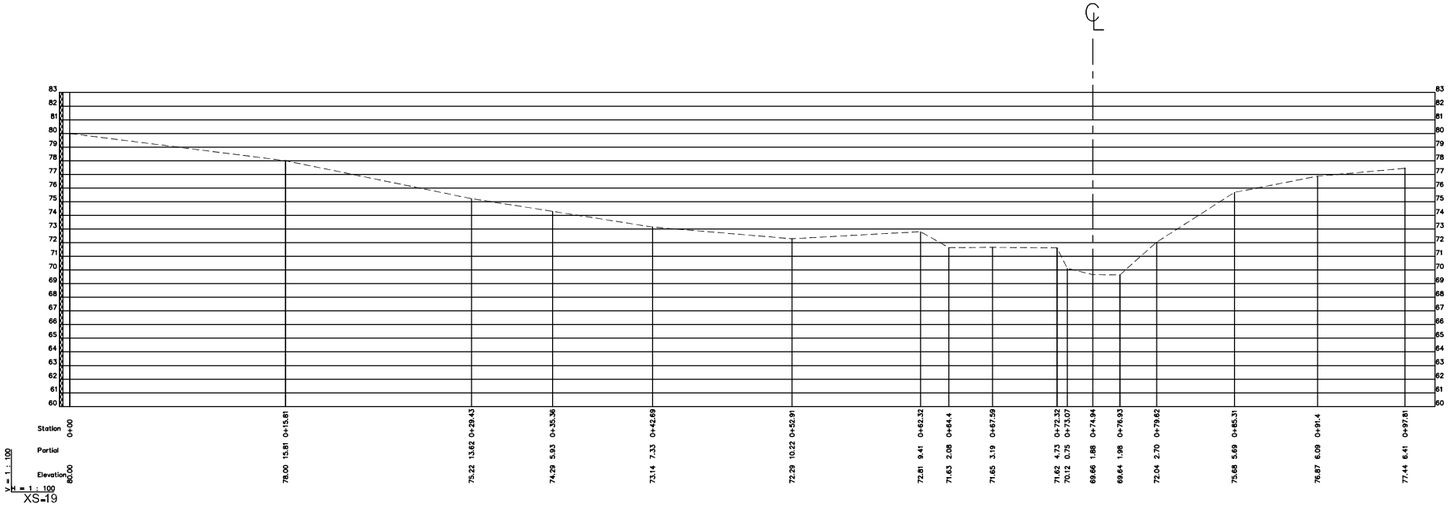
AS BUILT & TOPOGRAPIC PLAN

17/18

ANTONIO J. MELENDEZ ENDARA
AGRIMENSOR
LICENCIADO
LIC. 14662
PUERTO RICO

| FED. AID HWAY PROJECT No. | A.C. PROJECT CODE No. | HIGHWAY | MUNICIPALITY | ISLAND | FISCAL YEAR | SHEET NO. | TOTAL SHEETS |
|---|---|---|---|---|---|---|---|
| | | PR-122 | | P.R. | | 18 | 18 |




ANTONIO J. MELENDEZ ENRIQUE
AGRIMENSOR
LICENCIADO
LIC. 14662
PUERTO RICO

antonio melendez & asociados inc.
Consultores en Ingeniería y Agrimensura
B-17 Marginal Este, Forest Hills, Bayamon, P.R., 00959
Tel# (787) 505-2190 info@antoniomelendezpr.com
www.antoniomelendezpr.com

AUTORIDAD DE CARRETERAS Y TRANSPORTACION

| DATE | REVISION |
|---|---|
| | |

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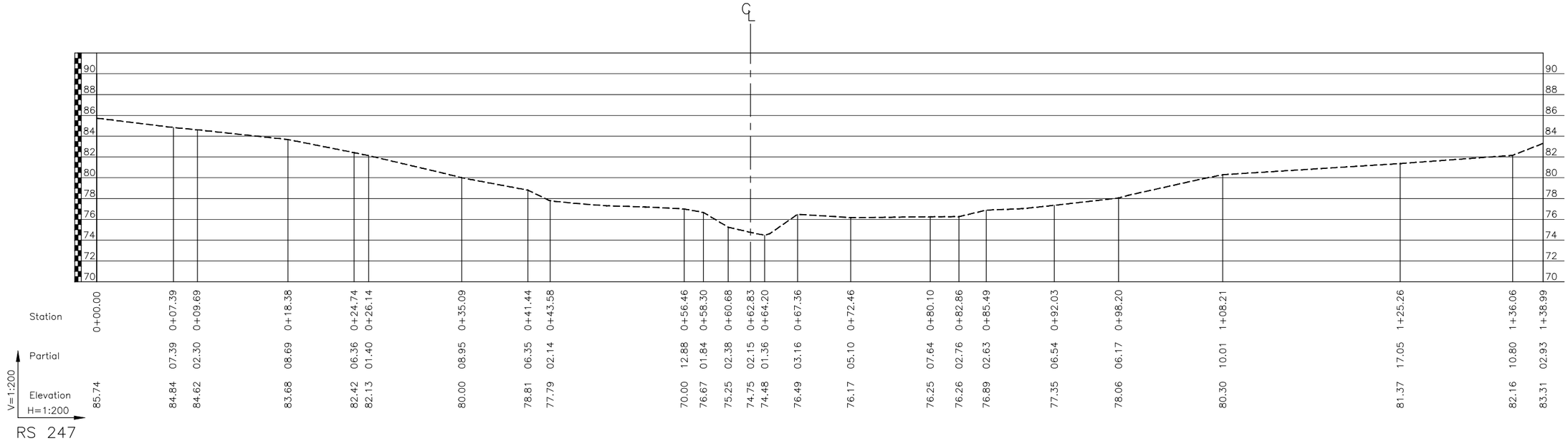
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CONSULTANT: BYA

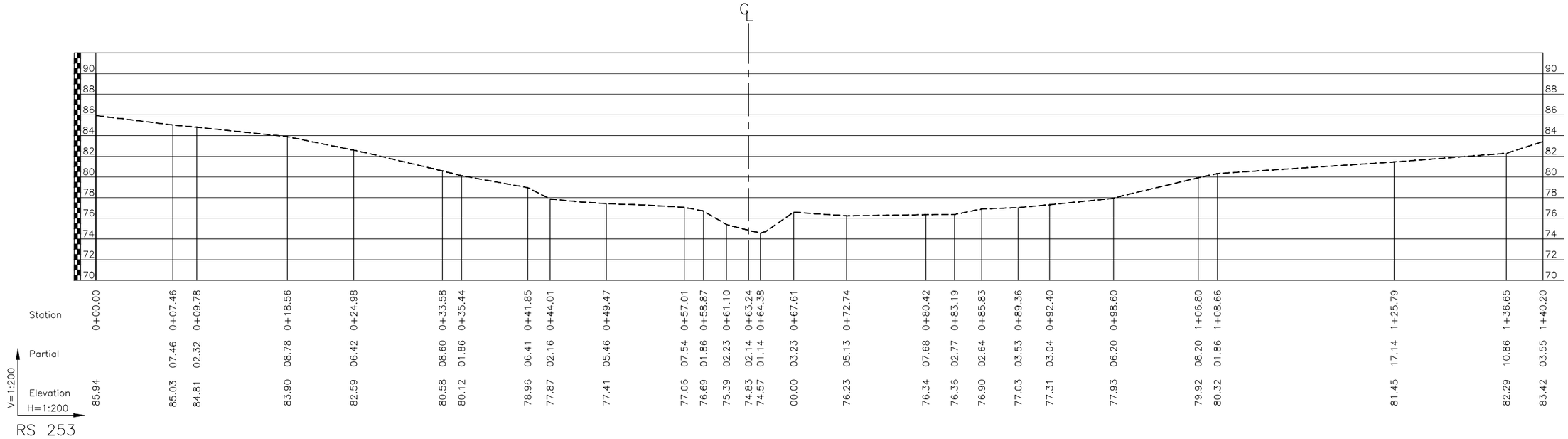
PR-122
SAN GERMAN, PR

AS BUILT & TOPOGRAPIC PLAN

18
18

| FEDERAL CODE NO. | AC. PROJECT CODE NO. | HIGHWAY | MUNICIPALITY | ISLAND | FISCAL YEAR | SHEET NO. | TOTAL SHEETS |
|---|---|---|---|---|---|---|---|
| ------- | AC-012201<br>R0000102001 | PR-122 | SAN GERMAN | PR | 2025 | | 252 |




| WORK | BY | DATE |
|---|---|---|
| DESIGN | | |
| DRAWING | | |
| TRACED | | |
| CHECKED | | |
| FINAL CHECK | | |

PUERTO RICO HIGHWAY & TRANSPORTATION AUTHORITY

BYA BEHAR-YBARRA AND ASSOCIATES LLC

ENGINEERING•ENVIRONMENTAL•ARCHITECTURE•PLANNING

554 Calle Perseo, Suite J-3, San Juan, P.R. 00920 Tel.(787)783-0290

EXTENSION HIGHWAY PR-122

FROM EXISTING PR-321 TO EXISTING PR-166

FROM STA. 30+52.94 TO STA.61+74.20

| DATE | REVISION |
|---|---|
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AS BUILT & TOPOGRAPHIC PLAN

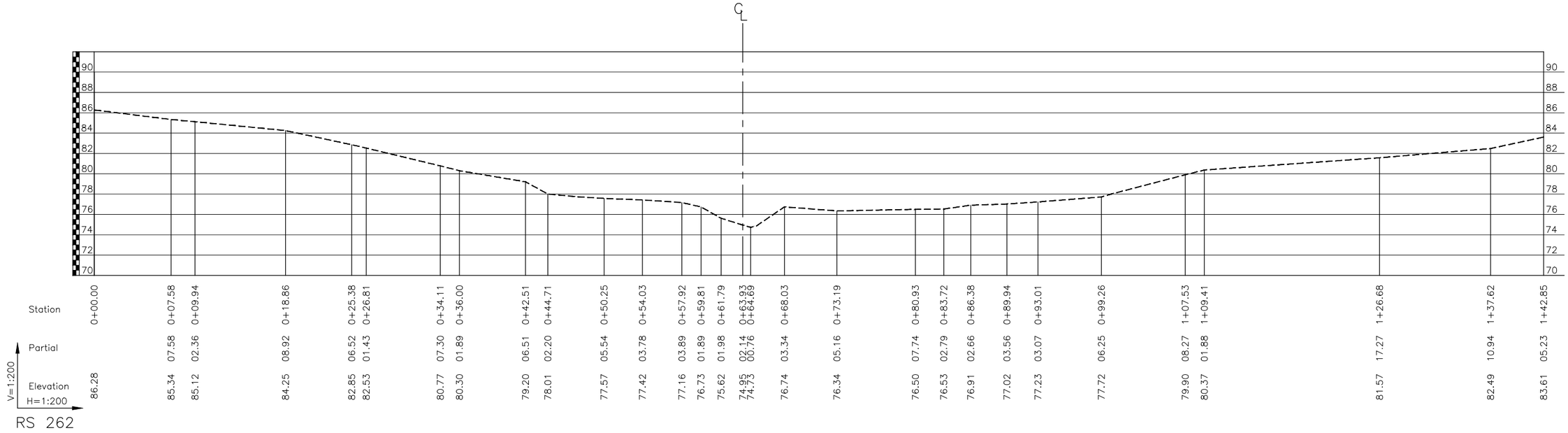
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PLOT DATE: August 1, 2025

BYA FILE: \\BYASERVER1\Projects\22002-PR-122 Preliminary Plans\02-Studies\Hrl\Interpolated HECRAS Sections.dwg

FILE NAME=

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|---|---|---|---|---|---|---|---|
| ------- | AC-012201<br>R0000102001 | PR-122 | SAN GERMAN | PR | 2025 | | 252 |




| WORK | BY | DATE |
|---|---|---|
| DESIGN | | |
| DRAWING | | |
| TRACED | | |
| CHECKED | | |
| FINAL CHECK | | |

PUERTO RICO HIGHWAY & TRANSPORTATION AUTHORITY

BYA BEHAR-YBARRA AND ASSOCIATES LLC

ENGINEERING•ENVIRONMENTAL•ARCHITECTURE•PLANNING

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EXTENSION HIGHWAY PR-122

FROM EXISTING PR-321 TO EXISTING PR-166

FROM STA. 30+52.94 TO STA.61+74.20

| DATE | REVISION |
|---|---|
| | |
| | |
| | |

SCALE = 1 : 200

0 2.5 5 10 15

AS BUILT & TOPOGRAPHIC PLAN

20/20

PLOT DATE: August 1, 2025 BYA FILE: \\BYASERVER1\Projects\22002--PR-122 Preliminary Plans\02-Studies\HH\Interpolated HECRAS Sections.dwg

FILE NAME=

# Appendix B:

## *HYDROLOGICAL DATA AND CALCULATIONS*

**NOAA Atlas 14, Volume 3, Version 4**
**Location name: Retiro, Puerto Rico, PRI***
**Latitude: 18.0658°, Longitude: -67.0344°**
**Elevation: 109.77 m****
* source: ESRI Maps
** source: USGS

**POINT PRECIPITATION FREQUENCY ESTIMATES**

G.M. Bonnin, D. Martin, B. Lin, T. Parzybok, M.Yekta, and D. Riley

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

## PF tabular

**AMS-based point precipitation frequency estimates with 90% confidence intervals (in millimeters)[1]**

| Duration | Annual exceedance probability (1/years) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | 1/2 | 1/5 | 1/10 | 1/25 | 1/50 | 1/100 | 1/200 | 1/500 | 1/1000 |
| 5-min | 14 (13-15) | 17 (16-19) | 19 (18-21) | 22 (20-23) | 23 (22-25) | 25 (23-27) | 27 (25-29) | 29 (26-32) | 31 (28-34) |
| 10-min | 20 (18-21) | 24 (22-25) | 26 (25-28) | 29 (27-32) | 32 (30-34) | 34 (32-37) | 36 (34-40) | 40 (36-44) | 42 (38-47) |
| 15-min | 25 (24-27) | 30 (28-32) | 34 (31-36) | 38 (35-41) | 41 (38-44) | 44 (41-48) | 47 (43-51) | 51 (46-56) | 54 (49-60) |
| 30-min | 40 (38-43) | 49 (45-52) | 54 (50-58) | 60 (56-65) | 65 (61-71) | 70 (65-77) | 75 (69-82) | 81 (74-90) | 86 (78-97) |
| 60-min | 60 (56-64) | 72 (67-77) | 80 (75-86) | 90 (84-97) | 97 (90-105) | 104 (96-114) | 111 (102-122) | 121 (110-134) | 128 (116-143) |
| 2-hr | 75 (69-80) | 93 (87-100) | 106 (98-114) | 122 (112-132) | 134 (123-147) | 146 (133-162) | 159 (144-178) | 175 (157-198) | 188 (167-215) |
| 3-hr | 78 (73-85) | 100 (92-108) | 115 (106-126) | 136 (124-150) | 152 (137-169) | 169 (150-190) | 186 (164-212) | 210 (182-243) | 229 (196-269) |
| 6-hr | 88 (80-97) | 119 (107-131) | 142 (127-157) | 173 (152-194) | 198 (172-225) | 225 (192-259) | 253 (213-296) | 293 (242-350) | 325 (264-395) |
| 12-hr | 97 (86-110) | 140 (123-158) | 174 (151-198) | 225 (191-260) | 268 (223-314) | 316 (257-377) | 369 (293-448) | 447 (345-556) | 513 (385-649) |
| 24-hr | 111 (99-128) | 168 (148-192) | 215 (188-246) | 287 (246-330) | 349 (294-404) | 418 (347-488) | 496 (404-584) | 612 (487-729) | 711 (555-855) |
| 2-day | 140 (122-163) | 210 (181-245) | 269 (229-314) | 358 (300-420) | 435 (358-515) | 523 (422-625) | 621 (491-749) | 769 (592-941) | 895 (675-1109) |
| 3-day | 147 (129-171) | 220 (191-255) | 279 (240-324) | 367 (310-428) | 443 (369-521) | 530 (433-628) | 626 (502-750) | 771 (604-946) | 900 (688-1114) |
| 4-day | 155 (136-178) | 229 (200-264) | 289 (250-334) | 377 (320-436) | 452 (379-527) | 536 (443-631) | 631 (513-750) | 774 (616-951) | 904 (700-1120) |
| 7-day | 176 (157-199) | 253 (225-287) | 312 (275-354) | 396 (345-452) | 467 (402-536) | 545 (463-638) | 631 (528-758) | 782 (630-960) | 913 (713-1131) |
| 10-day | 199 (179-224) | 281 (251-316) | 342 (304-385) | 427 (375-482) | 494 (430-561) | 572 (492-654) | 655 (557-765) | 792 (662-970) | 922 (746-1142) |
| 20-day | 270 (247-298) | 365 (332-402) | 432 (391-478) | 522 (468-581) | 592 (527-663) | 666 (587-749) | 743 (649-842) | 863 (744-986) | 959 (818-1154) |
| 30-day | 334 (306-365) | 443 (404-485) | 518 (471-569) | 616 (555-680) | 691 (618-767) | 768 (682-858) | 847 (746-952) | 962 (837-1090) | 1058 (912-1207) |
| 45-day | 422 (390-457) | 547 (505-594) | 631 (579-686) | 736 (671-804) | 815 (738-893) | 894 (805-985) | 974 (871-1079) | 1082 (958-1208) | 1171 (1028-1314) |
| 60-day | 502 (466-543) | 645 (597-699) | 738 (680-800) | 852 (781-927) | 936 (854-1023) | 1020 (926-1120) | 1104 (996-1219) | 1215 (1087-1353) | 1300 (1156-1456) |

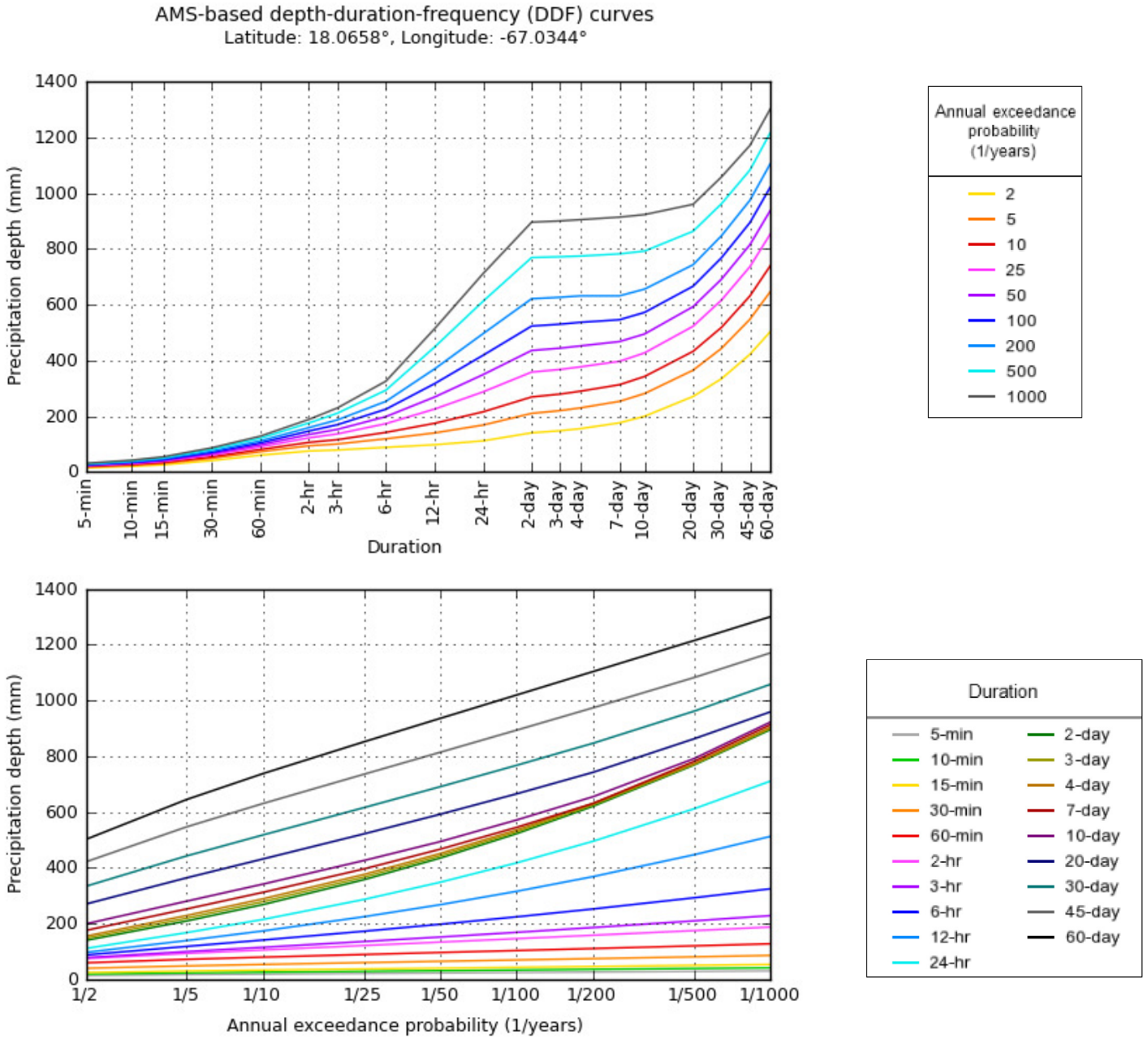
[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of annual maxima series (AMS).

Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and annual exceedance probability) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

Please refer to NOAA Atlas 14 document for more information.

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## PF graphical



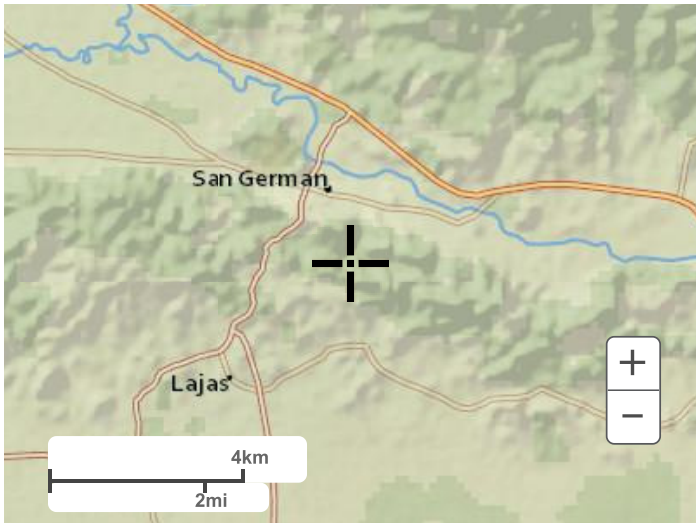

NOAA Atlas 14, Volume 3, Version 4

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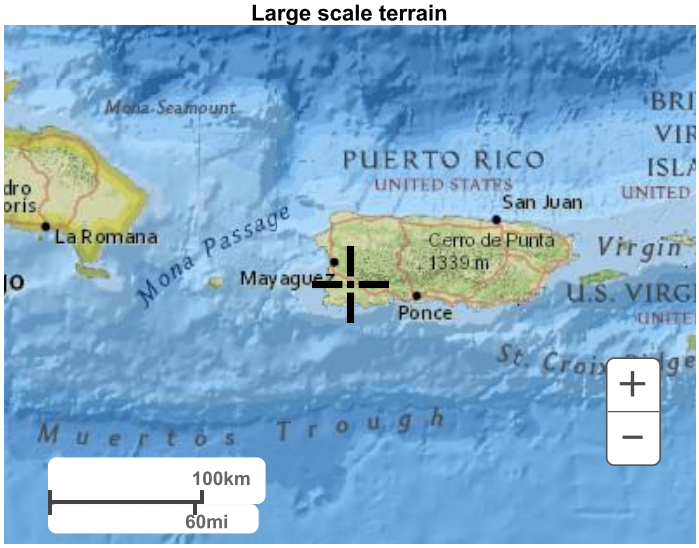
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## Maps & aerials

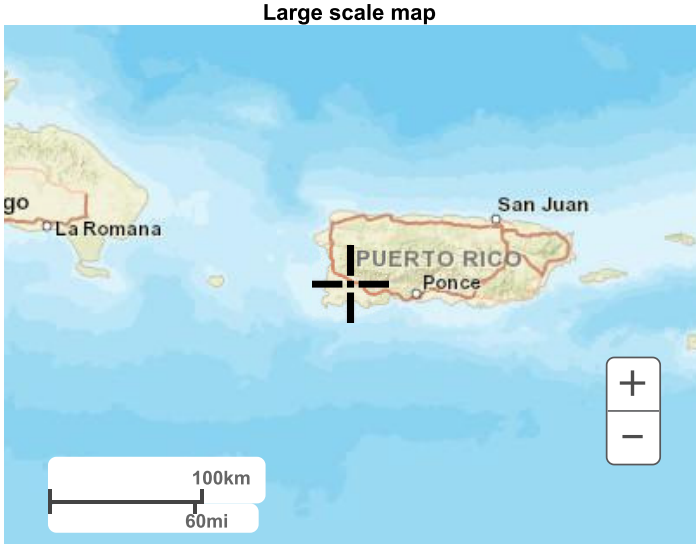
**Small scale terrain**




**Large scale terrain**




**Large scale map**




**Large scale aerial**




Back to Top

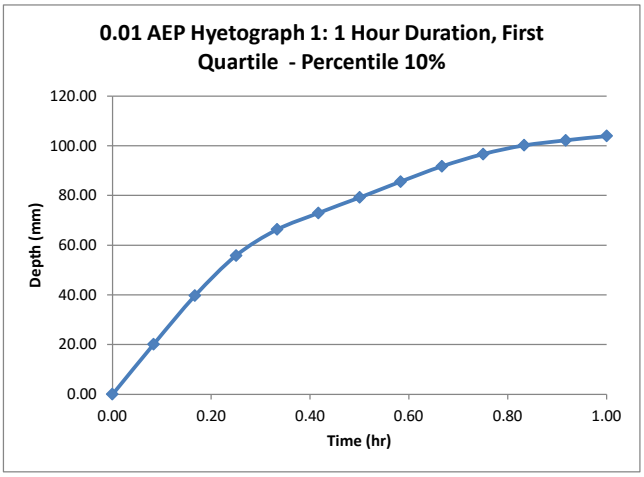
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US Department of Commerce
National Oceanic and Atmospheric Administration
National Weather Service
National Water Center
1325 East West Highway
Silver Spring, MD 20910
Questions?: HDSC.Questions@noaa.gov

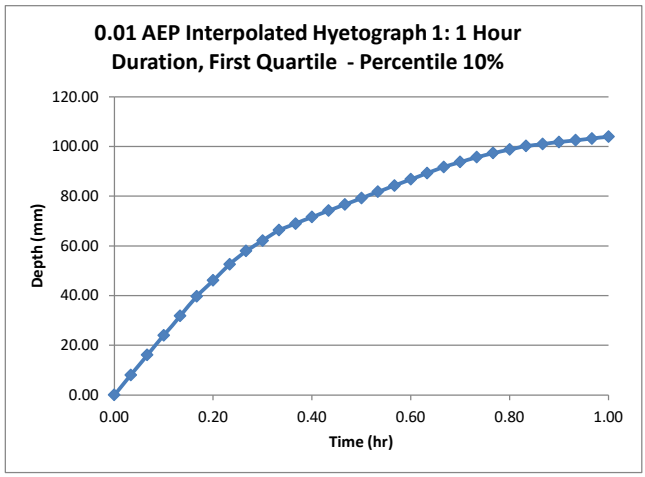
Disclaimer

| | | | | |
|---|---|---|---|---|
| Project: | PR-122 | | | |
| | | | | |
| Data type: | Precipitation depth | | | |
| Time series type: | Annual maximum | | | |
| Source: | NOAA Atlas 14 Volume 3 Version 4 | | | |
| Latitude: | 18.0658° | | | |
| Longitude: | -67.0344° | | | |
| Annual exceedance probability: | 0.01 | | | |
| Duration (hr) | 1 | 6 | 12 | 24 |
| Point precipitation estimate (mm) | 104 | 225 | 316 | 418 |
| Number of intervals | 30 | 36 | 48 | 48 |
| Time interval (min) | 2 | 10 | 15 | 30 |
| HMS Model Duration (hr) | 4 | 12 | 24 | 48 |
| HMS Model Intervals | 120 | 72 | 96 | 96 |

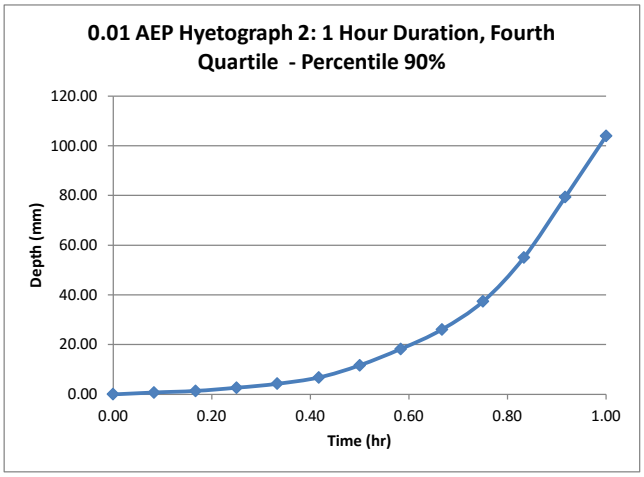
| 0.01 AEP Hyetograph 1: 1 Hour Duration, First Quartile - Percentile 10% | | | |
|---|---|---|---|
| Percent of duration | Percent of Total Precipitation | Time (hr) | Depth (mm) |
| 0 | 0 | 0.0000 | 0.0000 |
| 8.3 | 19.3 | 0.0830 | 20.0720 |
| 16.7 | 38.2 | 0.1670 | 39.7280 |
| 25 | 53.7 | 0.2500 | 55.8480 |
| 33.3 | 63.8 | 0.3330 | 66.3520 |
| 41.7 | 70.2 | 0.4170 | 73.0080 |
| 50 | 76.2 | 0.5000 | 79.2480 |
| 58.3 | 82.3 | 0.5830 | 85.5920 |
| 66.7 | 88.3 | 0.6670 | 91.8320 |
| 75 | 93 | 0.7500 | 96.7200 |
| 83.3 | 96.4 | 0.8330 | 100.2560 |
| 91.7 | 98.3 | 0.9170 | 102.2320 |
| 100 | 100 | 1.0000 | 104.0000 |



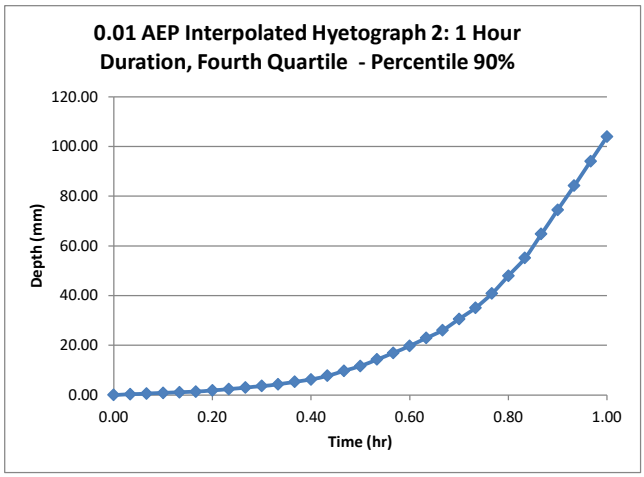

| 0.01 AEP Interpolated Hyetograph 1: 1 Hour Duration, First Quartile - Percentile 10% | | | |
|---|---|---|---|
| Interval | Time (min) | Time (hr) | Depth (mm) |
| 0 | 0 | 0.0000 | 0.0000 |
| 1 | 2 | 0.0333 | 8.0610 |
| 2 | 4 | 0.0667 | 16.1221 |
| 3 | 6 | 0.1000 | 24.0500 |
| 4 | 8 | 0.1333 | 31.8500 |
| 5 | 10 | 0.1667 | 39.6500 |
| 6 | 12 | 0.2000 | 46.1372 |
| 7 | 14 | 0.2333 | 52.6111 |
| 8 | 16 | 0.2667 | 57.9572 |
| 9 | 18 | 0.3000 | 62.1757 |
| 10 | 20 | 0.3333 | 66.3784 |
| 11 | 22 | 0.3667 | 69.0197 |
| 12 | 24 | 0.4000 | 71.6610 |
| 13 | 26 | 0.4333 | 74.2360 |
| 14 | 28 | 0.4667 | 76.7420 |
| 15 | 30 | 0.5000 | 79.2480 |
| 16 | 32 | 0.5333 | 81.7958 |
| 17 | 34 | 0.5667 | 84.3436 |
| 18 | 36 | 0.6000 | 86.8549 |
| 19 | 38 | 0.6333 | 89.3310 |
| 20 | 40 | 0.6667 | 91.8072 |
| 21 | 42 | 0.7000 | 93.7754 |
| 22 | 44 | 0.7333 | 95.7385 |
| 23 | 46 | 0.7667 | 97.4300 |
| 24 | 48 | 0.8000 | 98.8501 |
| 25 | 50 | 0.8333 | 100.2638 |
| 26 | 52 | 0.8667 | 101.0480 |
| 27 | 54 | 0.9000 | 101.8321 |
| 28 | 56 | 0.9333 | 102.5799 |
| 29 | 58 | 0.9667 | 103.2900 |
| 30 | 60 | 1.0000 | 104.0000 |



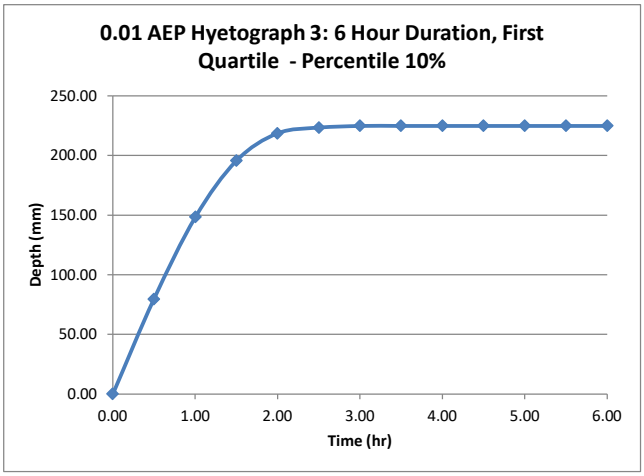
| 0.01 AEP Hyetograph 2: 1 Hour Duration, Fourth Quartile - Percentile 90% | | | |
|---|---|---|---|
| Percent of duration | Percent of Total Precipitation | Time (hr) | Depth (mm) |
| 0 | 0 | 0.0000 | 0.0000 |
| 8.3 | 0.7 | 0.0830 | 0.7280 |
| 16.7 | 1.3 | 0.1670 | 1.3520 |
| 25 | 2.5 | 0.2500 | 2.6000 |
| 33.3 | 4.1 | 0.3330 | 4.2640 |
| 41.7 | 6.5 | 0.4170 | 6.7600 |
| 50 | 11.2 | 0.5000 | 11.6480 |
| 58.3 | 17.5 | 0.5830 | 18.2000 |
| 66.7 | 25.1 | 0.6670 | 26.1040 |
| 75 | 35.9 | 0.7500 | 37.3360 |
| 83.3 | 52.9 | 0.8330 | 55.0160 |
| 91.7 | 76.4 | 0.9170 | 79.4560 |
| 100 | 100 | 1.0000 | 104.0000 |



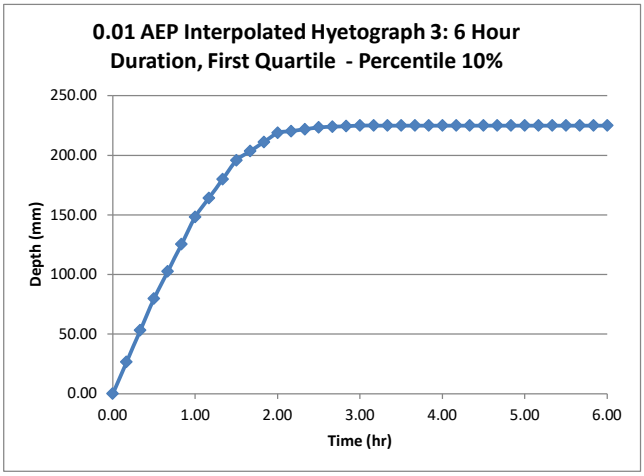

| 0.01 AEP Interpolated Hyetograph 2: 1 Hour Duration, Fourth Quartile - Percentile 90% | | | |
|---|---|---|---|
| Interval | Time (min) | Time (hr) | Depth (mm) |
| 0 | 0 | 0.0000 | 0.0000 |
| 1 | 2 | 0.0333 | 0.2924 |
| 2 | 4 | 0.0667 | 0.5847 |
| 3 | 6 | 0.1000 | 0.8543 |
| 4 | 8 | 0.1333 | 1.1019 |
| 5 | 10 | 0.1667 | 1.3495 |
| 6 | 12 | 0.2000 | 1.8482 |
| 7 | 14 | 0.2333 | 2.3494 |
| 8 | 16 | 0.2667 | 2.9341 |
| 9 | 18 | 0.3000 | 3.6024 |
| 10 | 20 | 0.3333 | 4.2739 |
| 11 | 22 | 0.3667 | 5.2644 |
| 12 | 24 | 0.4000 | 6.2549 |
| 13 | 26 | 0.4333 | 7.7219 |
| 14 | 28 | 0.4667 | 9.6849 |
| 15 | 30 | 0.5000 | 11.6480 |
| 16 | 32 | 0.5333 | 14.2793 |
| 17 | 34 | 0.5667 | 16.9107 |
| 18 | 36 | 0.6000 | 19.7996 |
| 19 | 38 | 0.6333 | 22.9361 |
| 20 | 40 | 0.6667 | 26.0726 |
| 21 | 42 | 0.7000 | 30.5697 |
| 22 | 44 | 0.7333 | 35.0806 |
| 23 | 46 | 0.7667 | 40.8862 |
| 24 | 48 | 0.8000 | 47.9866 |
| 25 | 50 | 0.8333 | 55.1130 |
| 26 | 52 | 0.8667 | 64.8114 |
| 27 | 54 | 0.9000 | 74.5098 |
| 28 | 56 | 0.9333 | 84.2859 |
| 29 | 58 | 0.9667 | 94.1430 |
| 30 | 60 | 1.0000 | 104.0000 |



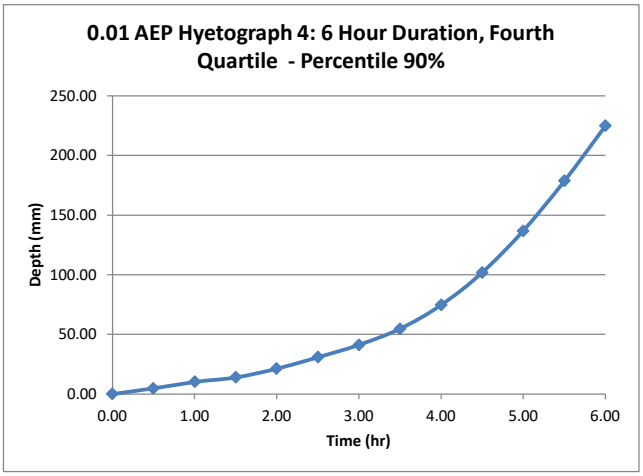
| 0.01 AEP Hyetograph 3: 6 Hour Duration, First Quartile - Percentile 10% | | | |
|---|---|---|---|
| Percent of duration | Percent of Total Precipitation | Time (hr) | Depth (mm) |
| 0 | 0 | 0.0000 | 0.0000 |
| 8.3 | 35.3 | 0.4980 | 79.4250 |
| 16.7 | 66 | 1.0020 | 148.5000 |
| 25 | 87 | 1.5000 | 195.7500 |
| 33.3 | 97.2 | 1.9980 | 218.7000 |
| 41.7 | 99.3 | 2.5020 | 223.4250 |
| 50 | 100 | 3.0000 | 225.0000 |
| 58.3 | 100 | 3.4980 | 225.0000 |
| 66.7 | 100 | 4.0020 | 225.0000 |
| 75 | 100 | 4.5000 | 225.0000 |
| 83.3 | 100 | 4.9980 | 225.0000 |
| 91.7 | 100 | 5.5020 | 225.0000 |
| 100 | 100 | 6.0000 | 225.0000 |



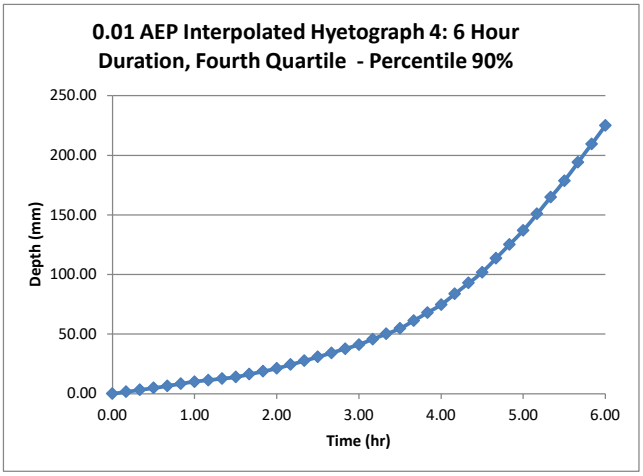

| 0.01 AEP Interpolated Hyetograph 3: 6 Hour Duration, First Quartile - Percentile 10% | | | |
|---|---|---|---|
| Interval | Time (min) | Time (hr) | Depth (mm) |
| 0 | 0 | 0.0000 | 0.0000 |
| 1 | 10 | 0.1667 | 26.5813 |
| 2 | 20 | 0.3333 | 53.1627 |
| 3 | 30 | 0.5000 | 79.6991 |
| 4 | 40 | 0.6667 | 102.5414 |
| 5 | 50 | 0.8333 | 125.3836 |
| 6 | 60 | 1.0000 | 148.2259 |
| 7 | 70 | 1.1667 | 164.1235 |
| 8 | 80 | 1.3333 | 179.9367 |
| 9 | 90 | 1.5000 | 195.7500 |
| 10 | 100 | 1.6667 | 203.4307 |
| 11 | 110 | 1.8333 | 211.1114 |
| 12 | 120 | 2.0000 | 218.7188 |
| 13 | 130 | 2.1667 | 220.2813 |
| 14 | 140 | 2.3333 | 221.8438 |
| 15 | 150 | 2.5000 | 223.4063 |
| 16 | 160 | 2.6667 | 223.9458 |
| 17 | 170 | 2.8333 | 224.4729 |
| 18 | 180 | 3.0000 | 225.0000 |
| 19 | 190 | 3.1667 | 225.0000 |
| 20 | 200 | 3.3333 | 225.0000 |
| 21 | 210 | 3.5000 | 225.0000 |
| 22 | 220 | 3.6667 | 225.0000 |
| 23 | 230 | 3.8333 | 225.0000 |
| 24 | 240 | 4.0000 | 225.0000 |
| 25 | 250 | 4.1667 | 225.0000 |
| 26 | 260 | 4.3333 | 225.0000 |
| 27 | 270 | 4.5000 | 225.0000 |
| 28 | 280 | 4.6667 | 225.0000 |
| 29 | 290 | 4.8333 | 225.0000 |
| 30 | 300 | 5.0000 | 225.0000 |
| 31 | 310 | 5.1667 | 225.0000 |
| 32 | 320 | 5.3333 | 225.0000 |
| 33 | 330 | 5.5000 | 225.0000 |
| 34 | 340 | 5.6667 | 225.0000 |
| 35 | 350 | 5.8333 | 225.0000 |
| 36 | 360 | 6.0000 | 225.0000 |



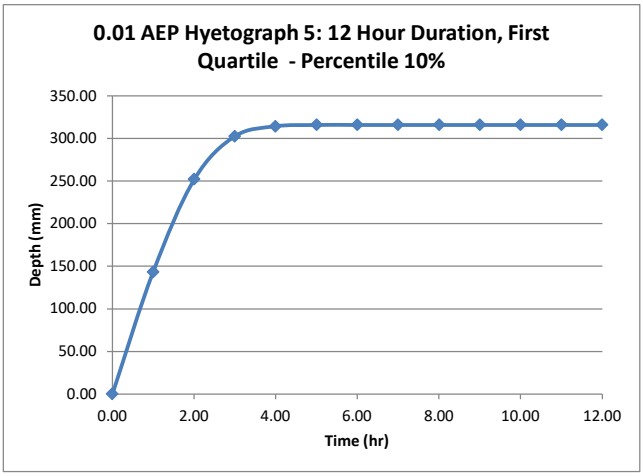
| 0.01 AEP Hyetograph 4: 6 Hour Duration, Fourth Quartile - Percentile 90% | | | |
|---|---|---|---|
| Percent of duration | Percent of Total Precipitation | Time (hr) | Depth (mm) |
| 0 | 0 | 0.0000 | 0.0000 |
| 8.3 | 2.1 | 0.4980 | 4.7250 |
| 16.7 | 4.5 | 1.0020 | 10.1250 |
| 25 | 6.2 | 1.5000 | 13.9500 |
| 33.3 | 9.4 | 1.9980 | 21.1500 |
| 41.7 | 13.7 | 2.5020 | 30.8250 |
| 50 | 18.3 | 3.0000 | 41.1750 |
| 58.3 | 24.3 | 3.4980 | 54.6750 |
| 66.7 | 33.2 | 4.0020 | 74.7000 |
| 75 | 45.3 | 4.5000 | 101.9250 |
| 83.3 | 60.8 | 4.9980 | 136.8000 |
| 91.7 | 79.5 | 5.5020 | 178.8750 |
| 100 | 100 | 6.0000 | 225.0000 |



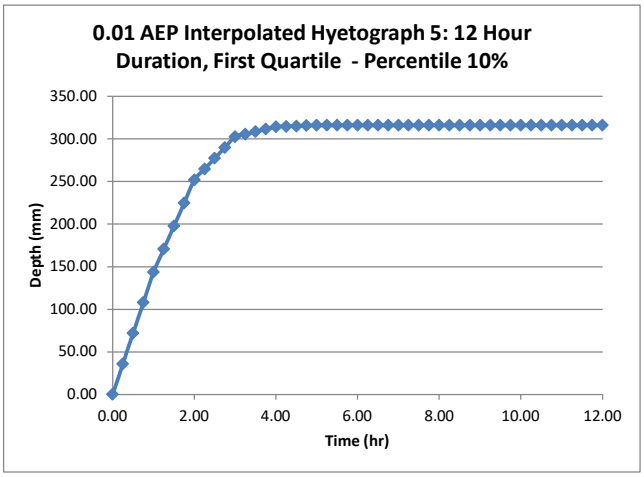

| 0.01 AEP Interpolated Hyetograph 4: 6 Hour Duration, Fourth Quartile - Percentile 90% | | | |
|---|---|---|---|
| Interval | Time (min) | Time (hr) | Depth (mm) |
| 0 | 0 | 0.0000 | 0.0000 |
| 1 | 10 | 0.1667 | 1.5813 |
| 2 | 20 | 0.3333 | 3.1627 |
| 3 | 30 | 0.5000 | 4.7464 |
| 4 | 40 | 0.6667 | 6.5321 |
| 5 | 50 | 0.8333 | 8.3179 |
| 6 | 60 | 1.0000 | 10.1036 |
| 7 | 70 | 1.1667 | 11.3898 |
| 8 | 80 | 1.3333 | 12.6699 |
| 9 | 90 | 1.5000 | 13.9500 |
| 10 | 100 | 1.6667 | 16.3596 |
| 11 | 110 | 1.8333 | 18.7693 |
| 12 | 120 | 2.0000 | 21.1884 |
| 13 | 130 | 2.1667 | 24.3878 |
| 14 | 140 | 2.3333 | 27.5872 |
| 15 | 150 | 2.5000 | 30.7866 |
| 16 | 160 | 2.6667 | 34.2473 |
| 17 | 170 | 2.8333 | 37.7111 |
| 18 | 180 | 3.0000 | 41.1750 |
| 19 | 190 | 3.1667 | 45.6931 |
| 20 | 200 | 3.3333 | 50.2111 |
| 21 | 210 | 3.5000 | 54.7545 |
| 22 | 220 | 3.6667 | 61.3765 |
| 23 | 230 | 3.8333 | 67.9985 |
| 24 | 240 | 4.0000 | 74.6205 |
| 25 | 250 | 4.1667 | 83.7021 |
| 26 | 260 | 4.3333 | 92.8136 |
| 27 | 270 | 4.5000 | 101.9250 |
| 28 | 280 | 4.6667 | 113.5967 |
| 29 | 290 | 4.8333 | 125.2684 |
| 30 | 300 | 5.0000 | 136.9670 |
| 31 | 310 | 5.1667 | 150.8807 |
| 32 | 320 | 5.3333 | 164.7943 |
| 33 | 330 | 5.5000 | 178.7080 |
| 34 | 340 | 5.6667 | 194.1265 |
| 35 | 350 | 5.8333 | 209.5633 |
| 36 | 360 | 6.0000 | 225.0000 |



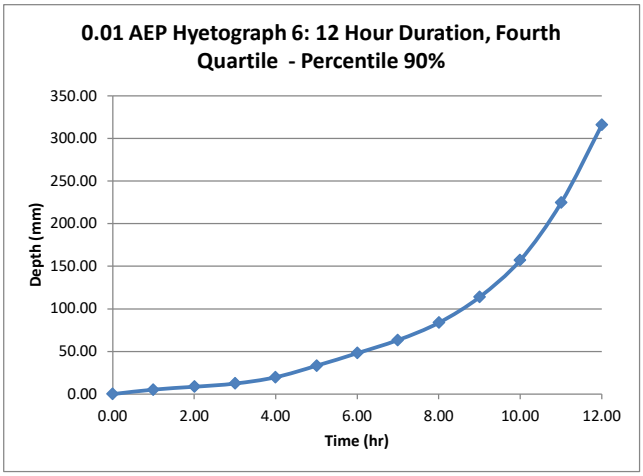
| 0.01 AEP Hyetograph 5: 12 Hour Duration, First Quartile - Percentile 10% | | | |
|---|---|---|---|
| Percent of duration | Percent of Total Precipitation | Time (hr) | Depth (mm) |
| 0 | 0 | 0.0000 | 0.0000 |
| 8.3 | 45.3 | 0.9960 | 143.1480 |
| 16.7 | 79.8 | 2.0040 | 252.1680 |
| 25 | 95.8 | 3.0000 | 302.7280 |
| 33.3 | 99.5 | 3.9960 | 314.4200 |
| 41.7 | 100 | 5.0040 | 316.0000 |
| 50 | 100 | 6.0000 | 316.0000 |
| 58.3 | 100 | 6.9960 | 316.0000 |
| 66.7 | 100 | 8.0040 | 316.0000 |
| 75 | 100 | 9.0000 | 316.0000 |
| 83.3 | 100 | 9.9960 | 316.0000 |
| 91.7 | 100 | 11.0040 | 316.0000 |
| 100 | 100 | 12.0000 | 316.0000 |



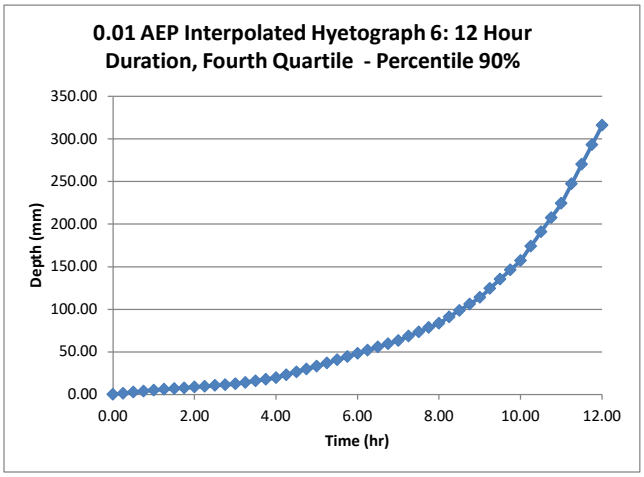

| 0.01 AEP Interpolated Hyetograph 5: 12 Hour Duration, First Quartile - Percentile 10% | | | |
|---|---|---|---|
| Interval | Time (min) | Time (hr) | Depth (mm) |
| 0 | 0 | 0.00 | 0.0000 |
| 1 | 15 | 0.25 | 35.9307 |
| 2 | 30 | 0.50 | 71.8614 |
| 3 | 45 | 0.75 | 107.7922 |
| 4 | 60 | 1.00 | 143.5806 |
| 5 | 75 | 1.25 | 170.6193 |
| 6 | 90 | 1.50 | 197.6580 |
| 7 | 105 | 1.75 | 224.6967 |
| 8 | 120 | 2.00 | 251.7354 |
| 9 | 135 | 2.25 | 264.6557 |
| 10 | 150 | 2.50 | 277.3465 |
| 11 | 165 | 2.75 | 290.0372 |
| 12 | 180 | 3.00 | 302.7280 |
| 13 | 195 | 3.25 | 305.6627 |
| 14 | 210 | 3.50 | 308.5975 |
| 15 | 225 | 3.75 | 311.5322 |
| 16 | 240 | 4.00 | 314.4263 |
| 17 | 255 | 4.25 | 314.8181 |
| 18 | 270 | 4.50 | 315.2100 |
| 19 | 285 | 4.75 | 315.6019 |
| 20 | 300 | 5.00 | 315.9937 |
| 21 | 315 | 5.25 | 316.0000 |
| 22 | 330 | 5.50 | 316.0000 |
| 23 | 345 | 5.75 | 316.0000 |
| 24 | 360 | 6.00 | 316.0000 |
| 25 | 375 | 6.25 | 316.0000 |
| 26 | 390 | 6.50 | 316.0000 |
| 27 | 405 | 6.75 | 316.0000 |
| 28 | 420 | 7.00 | 316.0000 |
| 29 | 435 | 7.25 | 316.0000 |
| 30 | 450 | 7.50 | 316.0000 |
| 31 | 465 | 7.75 | 316.0000 |
| 32 | 480 | 8.00 | 316.0000 |
| 33 | 495 | 8.25 | 316.0000 |
| 34 | 510 | 8.50 | 316.0000 |
| 35 | 525 | 8.75 | 316.0000 |
| 36 | 540 | 9.00 | 316.0000 |
| 37 | 555 | 9.25 | 316.0000 |
| 38 | 570 | 9.50 | 316.0000 |
| 39 | 585 | 9.75 | 316.0000 |
| 40 | 600 | 10.00 | 316.0000 |
| 41 | 615 | 10.25 | 316.0000 |
| 42 | 630 | 10.50 | 316.0000 |
| 43 | 645 | 10.75 | 316.0000 |
| 44 | 660 | 11.00 | 316.0000 |
| 45 | 675 | 11.25 | 316.0000 |
| 46 | 690 | 11.50 | 316.0000 |
| 47 | 705 | 11.75 | 316.0000 |
| 48 | 720 | 12.00 | 316.0000 |



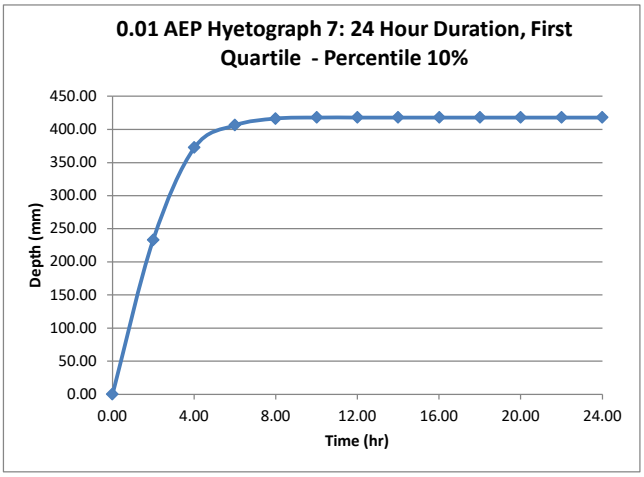
| 0.01 AEP Hyetograph 6: 12 Hour Duration, Fourth Quartile - Percentile 90% | | | |
|---|---|---|---|
| Percent of duration | Percent of Total Precipitation | Time (hr) | Depth (mm) |
| 0 | 0 | 0.0000 | 0.0000 |
| 8.3 | 1.6 | 0.9960 | 5.0560 |
| 16.7 | 2.7 | 2.0040 | 8.5320 |
| 25 | 3.9 | 3.0000 | 12.3240 |
| 33.3 | 6.2 | 3.9960 | 19.5920 |
| 41.7 | 10.5 | 5.0040 | 33.1800 |
| 50 | 15.2 | 6.0000 | 48.0320 |
| 58.3 | 20 | 6.9960 | 63.2000 |
| 66.7 | 26.5 | 8.0040 | 83.7400 |
| 75 | 36 | 9.0000 | 113.7600 |
| 83.3 | 49.7 | 9.9960 | 157.0520 |
| 91.7 | 71.1 | 11.0040 | 224.6760 |
| 100 | 100 | 12.0000 | 316.0000 |



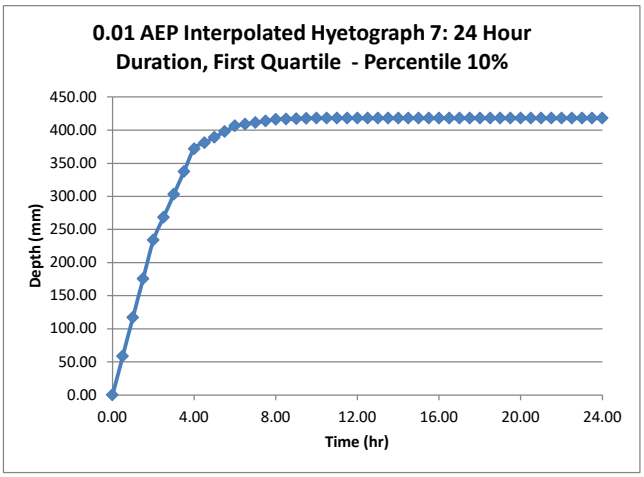

| 0.01 AEP Interpolated Hyetograph 6: 12 Hour Duration, Fourth Quartile - Percentile 90% | | | |
|---|---|---|---|
| Interval | Time (min) | Time (hr) | Depth (mm) |
| 0 | 0 | 0.00 | 0.0000 |
| 1 | 15 | 0.25 | 1.2691 |
| 2 | 30 | 0.50 | 2.5382 |
| 3 | 45 | 0.75 | 3.8072 |
| 4 | 60 | 1.00 | 5.0698 |
| 5 | 75 | 1.25 | 5.9319 |
| 6 | 90 | 1.50 | 6.7940 |
| 7 | 105 | 1.75 | 7.6561 |
| 8 | 120 | 2.00 | 8.5182 |
| 9 | 135 | 2.25 | 9.4686 |
| 10 | 150 | 2.50 | 10.4204 |
| 11 | 165 | 2.75 | 11.3722 |
| 12 | 180 | 3.00 | 12.3240 |
| 13 | 195 | 3.25 | 14.1483 |
| 14 | 210 | 3.50 | 15.9726 |
| 15 | 225 | 3.75 | 17.7969 |
| 16 | 240 | 4.00 | 19.6459 |
| 17 | 255 | 4.25 | 23.0160 |
| 18 | 270 | 4.50 | 26.3860 |
| 19 | 285 | 4.75 | 29.7560 |
| 20 | 300 | 5.00 | 33.1261 |
| 21 | 315 | 5.25 | 36.8483 |
| 22 | 330 | 5.50 | 40.5762 |
| 23 | 345 | 5.75 | 44.3041 |
| 24 | 360 | 6.00 | 48.0320 |
| 25 | 375 | 6.25 | 51.8392 |
| 26 | 390 | 6.50 | 55.6465 |
| 27 | 405 | 6.75 | 59.4537 |
| 28 | 420 | 7.00 | 63.2815 |
| 29 | 435 | 7.25 | 68.3758 |
| 30 | 450 | 7.50 | 73.4700 |
| 31 | 465 | 7.75 | 78.5642 |
| 32 | 480 | 8.00 | 83.6585 |
| 33 | 495 | 8.25 | 91.1546 |
| 34 | 510 | 8.50 | 98.6897 |
| 35 | 525 | 8.75 | 106.2249 |
| 36 | 540 | 9.00 | 113.7600 |
| 37 | 555 | 9.25 | 124.6265 |
| 38 | 570 | 9.50 | 135.4929 |
| 39 | 585 | 9.75 | 146.3594 |
| 40 | 600 | 10.00 | 157.3203 |
| 41 | 615 | 10.25 | 174.0922 |
| 42 | 630 | 10.50 | 190.8640 |
| 43 | 645 | 10.75 | 207.6358 |
| 44 | 660 | 11.00 | 224.4077 |
| 45 | 675 | 11.25 | 247.2319 |
| 46 | 690 | 11.50 | 270.1546 |
| 47 | 705 | 11.75 | 293.0773 |
| 48 | 720 | 12.00 | 316.0000 |



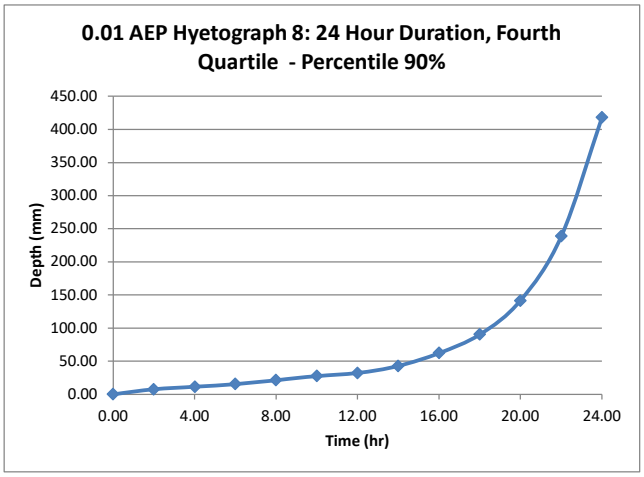
| 0.01 AEP Hyetograph 7: 24 Hour Duration, First Quartile - Percentile 10% | | | |
|---|---|---|---|
| Percent of duration | Percent of Total Precipitation | Time (hr) | Depth (mm) |
| 0 | 0 | 0.0000 | 0.0000 |
| 8.3 | 55.8 | 1.9920 | 233.2440 |
| 16.7 | 89.1 | 4.0080 | 372.4380 |
| 25 | 97.2 | 6.0000 | 406.2960 |
| 33.3 | 99.6 | 7.9920 | 416.3280 |
| 41.7 | 100 | 10.0080 | 418.0000 |
| 50 | 100 | 12.0000 | 418.0000 |
| 58.3 | 100 | 13.9920 | 418.0000 |
| 66.7 | 100 | 16.0080 | 418.0000 |
| 75 | 100 | 18.0000 | 418.0000 |
| 83.3 | 100 | 19.9920 | 418.0000 |
| 91.7 | 100 | 22.0080 | 418.0000 |
| 100 | 100 | 24.0000 | 418.0000 |



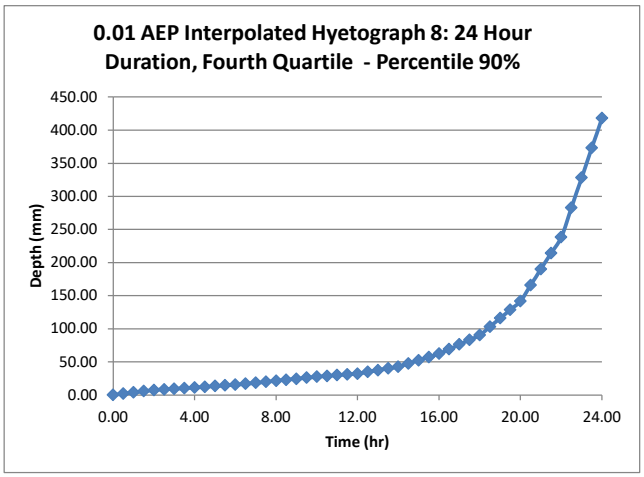

| 0.01 AEP Interpolated Hyetograph 7: 24 Hour Duration, First Quartile - Percentile 10% | | | |
|---|---|---|---|
| Interval | Time (min) | Time (hr) | Depth (mm) |
| 0 | 0 | 0 | 0.0000 |
| 1 | 30 | 0.5 | 58.5452 |
| 2 | 60 | 1 | 117.0904 |
| 3 | 90 | 1.5 | 175.6355 |
| 4 | 120 | 2 | 233.7964 |
| 5 | 150 | 2.5 | 268.3187 |
| 6 | 180 | 3 | 302.8410 |
| 7 | 210 | 3.5 | 337.3633 |
| 8 | 240 | 4 | 371.8856 |
| 9 | 270 | 4.5 | 380.8005 |
| 10 | 300 | 5 | 389.2990 |
| 11 | 330 | 5.5 | 397.7975 |
| 12 | 360 | 6 | 406.2960 |
| 13 | 390 | 6.5 | 408.8141 |
| 14 | 420 | 7 | 411.3321 |
| 15 | 450 | 7.5 | 413.8502 |
| 16 | 480 | 8 | 416.3346 |
| 17 | 510 | 8.5 | 416.7493 |
| 18 | 540 | 9 | 417.1640 |
| 19 | 570 | 9.5 | 417.5787 |
| 20 | 600 | 10 | 417.9934 |
| 21 | 630 | 10.5 | 418.0000 |
| 22 | 660 | 11 | 418.0000 |
| 23 | 690 | 11.5 | 418.0000 |
| 24 | 720 | 12 | 418.0000 |
| 25 | 750 | 12.5 | 418.0000 |
| 26 | 780 | 13 | 418.0000 |
| 27 | 810 | 13.5 | 418.0000 |
| 28 | 840 | 14 | 418.0000 |
| 29 | 870 | 14.5 | 418.0000 |
| 30 | 900 | 15 | 418.0000 |
| 31 | 930 | 15.5 | 418.0000 |
| 32 | 960 | 16 | 418.0000 |
| 33 | 990 | 16.5 | 418.0000 |
| 34 | 1020 | 17 | 418.0000 |
| 35 | 1050 | 17.5 | 418.0000 |
| 36 | 1080 | 18 | 418.0000 |
| 37 | 1110 | 18.5 | 418.0000 |
| 38 | 1140 | 19 | 418.0000 |
| 39 | 1170 | 19.5 | 418.0000 |
| 40 | 1200 | 20 | 418.0000 |
| 41 | 1230 | 20.5 | 418.0000 |
| 42 | 1260 | 21 | 418.0000 |
| 43 | 1290 | 21.5 | 418.0000 |
| 44 | 1320 | 22 | 418.0000 |
| 45 | 1350 | 22.5 | 418.0000 |
| 46 | 1380 | 23 | 418.0000 |
| 47 | 1410 | 23.5 | 418.0000 |
| 48 | 1440 | 24 | 418.0000 |



| 0.01 AEP Hyetograph 8: 24 Hour Duration, Fourth Quartile - Percentile 90% | | | |
|---|---|---|---|
| Percent of duration | Percent of Total Precipitation | Time (hr) | Depth (mm) |
| 0 | 0 | 0.0000 | 0.0000 |
| 8.3 | 1.8 | 1.9920 | 7.5240 |
| 16.7 | 2.7 | 4.0080 | 11.2860 |
| 25 | 3.7 | 6.0000 | 15.4660 |
| 33.3 | 5.1 | 7.9920 | 21.3180 |
| 41.7 | 6.6 | 10.0080 | 27.5880 |
| 50 | 7.7 | 12.0000 | 32.1860 |
| 58.3 | 10.2 | 13.9920 | 42.6360 |
| 66.7 | 14.9 | 16.0080 | 62.2820 |
| 75 | 21.6 | 18.0000 | 90.2880 |
| 83.3 | 33.8 | 19.9920 | 141.2840 |
| 91.7 | 57.1 | 22.0080 | 238.6780 |
| 100 | 100 | 24.0000 | 418.0000 |




| 0.01 AEP Interpolated Hyetograph 8: 24 Hour Duration, Fourth Quartile - Percentile 90% | | | |
|---|---|---|---|
| Interval | Time (min) | Time (hr) | Depth (mm) |
| 0 | 0 | 0 | 0.0000 |
| 1 | 30 | 0.5 | 1.8886 |
| 2 | 60 | 1 | 3.7771 |
| 3 | 90 | 1.5 | 5.6657 |
| 4 | 120 | 2 | 7.5389 |
| 5 | 150 | 2.5 | 8.4720 |
| 6 | 180 | 3 | 9.4050 |
| 7 | 210 | 3.5 | 10.3380 |
| 8 | 240 | 4 | 11.2711 |
| 9 | 270 | 4.5 | 12.3184 |
| 10 | 300 | 5 | 13.3676 |
| 11 | 330 | 5.5 | 14.4168 |
| 12 | 360 | 6 | 15.4660 |
| 13 | 390 | 6.5 | 16.9349 |
| 14 | 420 | 7 | 18.4038 |
| 15 | 450 | 7.5 | 19.8726 |
| 16 | 480 | 8 | 21.3429 |
| 17 | 510 | 8.5 | 22.8979 |
| 18 | 540 | 9 | 24.4530 |
| 19 | 570 | 9.5 | 26.0081 |
| 20 | 600 | 10 | 27.5631 |
| 21 | 630 | 10.5 | 28.7237 |
| 22 | 660 | 11 | 29.8778 |
| 23 | 690 | 11.5 | 31.0319 |
| 24 | 720 | 12 | 32.1860 |
| 25 | 750 | 12.5 | 34.8090 |
| 26 | 780 | 13 | 37.4320 |
| 27 | 810 | 13.5 | 40.0550 |
| 28 | 840 | 14 | 42.7140 |
| 29 | 870 | 14.5 | 47.5865 |
| 30 | 900 | 15 | 52.4590 |
| 31 | 930 | 15.5 | 57.3315 |
| 32 | 960 | 16 | 62.2040 |
| 33 | 990 | 16.5 | 69.1991 |
| 34 | 1020 | 17 | 76.2288 |
| 35 | 1050 | 17.5 | 83.2584 |
| 36 | 1080 | 18 | 90.2880 |
| 37 | 1110 | 18.5 | 103.0882 |
| 38 | 1140 | 19 | 115.8884 |
| 39 | 1170 | 19.5 | 128.6886 |
| 40 | 1200 | 20 | 141.6705 |
| 41 | 1230 | 20.5 | 165.8257 |
| 42 | 1260 | 21 | 189.9810 |
| 43 | 1290 | 21.5 | 214.1363 |
| 44 | 1320 | 22 | 238.2915 |
| 45 | 1350 | 22.5 | 282.9684 |
| 46 | 1380 | 23 | 327.9789 |
| 47 | 1410 | 23.5 | 372.9895 |
| 48 | 1440 | 24 | 418.0000 |



| ITEM | AREA | LAND COVER | Curve Number | | | | MUSYM | muname | hydgrpdcd | | AREA, A | Curve | A × CN |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | ($m^2$) | (Coastal Change Analisys Program C-CAP) | A | B | C | D | (Soil Class) | (Soil Description) | (H. Group) | | ($mi^2$) | Number, CN | |
| 1 | 2904.63 | Mixed Forest | 30 | 55 | 70 | 77 | ay, 20 to 60 | 28 | D | | 0.00112 | 77 | 0.08635 |
| 2 | 7200.00 | Mixed Forest | 30 | 55 | 70 | 77 | ay, 20 to 60 | 28 | D | | 0.00278 | 77 | 0.21406 |
| 3 | 511.50 | Low Intensity Developed | 61 | 75 | 83 | 87 | ay, 20 to 60 | 28 | D | | 0.00020 | 87 | 0.01718 |
| 4 | 900.00 | Scrub/Shrub | 30 | 48 | 65 | 73 | ay, 20 to 60 | 28 | D | | 0.00035 | 73 | 0.02537 |
| 5 | 45733.45 | Scrub/Shrub | 30 | 48 | 65 | 73 | ay, 20 to 60 | 28 | D | | 0.01766 | 73 | 1.28902 |
| 6 | 900.00 | Scrub/Shrub | 30 | 48 | 65 | 73 | ay, 20 to 60 | 28 | D | | 0.00035 | 73 | 0.02537 |
| 7 | 821.12 | Low Intensity Developed | 61 | 75 | 83 | 87 | ay, 20 to 60 | 28 | D | | 0.00032 | 87 | 0.02758 |
| 8 | 1800.00 | Scrub/Shrub | 30 | 48 | 65 | 73 | ay, 20 to 60 | 28 | D | | 0.00069 | 73 | 0.05073 |
| 9 | 3227.25 | Low Intensity Developed | 61 | 75 | 83 | 87 | ay, 20 to 60 | 28 | D | | 0.00125 | 87 | 0.10841 |
| 10 | 839.00 | Medium Intensity Developed | 77 | 85 | 90 | 92 | ay, 20 to 60 | 28 | D | | 0.00032 | 92 | 0.02980 |
| 11 | 321.74 | Low Intensity Developed | 61 | 75 | 83 | 87 | ay, 20 to 60 | 28 | D | | 0.00012 | 87 | 0.01081 |
| 12 | 2846.50 | Low Intensity Developed | 61 | 75 | 83 | 87 | ay, 20 to 60 | 28 | D | | 0.00110 | 87 | 0.09562 |
| 13 | 2535.75 | Low Intensity Developed | 61 | 75 | 83 | 87 | ay, 20 to 60 | 28 | D | | 0.00098 | 87 | 0.08518 |
| 14 | 90145.50 | Mixed Forest | 30 | 55 | 70 | 77 | ay, 20 to 60 | 28 | D | | 0.03481 | 77 | 2.68001 |
| 15 | 0.42 | Medium Intensity Developed | 77 | 85 | 90 | 92 | omplex, 20 | 25 | D | | 0.00000 | 92 | 0.00001 |
| 16 | 1929.32 | Bare Land | 77 | 86 | 91 | 94 | omplex, 20 | 25 | D | | 0.00074 | 94 | 0.07002 |
| 17 | 33055.99 | Mixed Forest | 30 | 55 | 70 | 77 | omplex, 20 | 25 | D | | 0.01276 | 77 | 0.98275 |
| 18 | 3016.32 | Grassland | 30 | 58 | 71 | 78 | omplex, 20 | 25 | D | | 0.00116 | 78 | 0.09084 |
| 19 | 10289.29 | Scrub/Shrub | 30 | 48 | 65 | 73 | omplex, 20 | 25 | D | | 0.00397 | 73 | 0.29001 |
| 20 | 1800.00 | Scrub/Shrub | 30 | 48 | 65 | 73 | omplex, 20 | 25 | D | | 0.00069 | 73 | 0.05073 |
| 21 | 10964.13 | Grassland | 30 | 58 | 71 | 78 | omplex, 20 | 25 | D | | 0.00423 | 78 | 0.33020 |
| 22 | 3979.50 | Scrub/Shrub | 30 | 48 | 65 | 73 | omplex, 20 | 25 | D | | 0.00154 | 73 | 0.11216 |
| 23 | 2175.50 | Grassland | 30 | 58 | 71 | 78 | omplex, 20 | 25 | D | | 0.00084 | 78 | 0.06552 |
| 24 | 14399.75 | Scrub/Shrub | 30 | 48 | 65 | 73 | omplex, 20 | 25 | D | | 0.00556 | 73 | 0.40586 |
| 25 | 2593.25 | Low Intensity Developed | 61 | 75 | 83 | 87 | omplex, 20 | 25 | D | | 0.00100 | 87 | 0.08711 |
| 26 | 471.59 | Low Intensity Developed | 61 | 75 | 83 | 87 | omplex, 20 | 25 | D | | 0.00018 | 87 | 0.01584 |
| 27 | 900.00 | Developed Open Space | 49 | 69 | 79 | 84 | omplex, 20 | 25 | D | | 0.00035 | 84 | 0.02919 |
| 28 | 4333.50 | Grassland | 30 | 58 | 71 | 78 | omplex, 20 | 25 | D | | 0.00167 | 78 | 0.13051 |
| 29 | 9765.78 | Scrub/Shrub | 30 | 48 | 65 | 73 | omplex, 20 | 25 | D | | 0.00377 | 73 | 0.27525 |
| 30 | 49.13 | Medium Intensity Developed | 77 | 85 | 90 | 92 | omplex, 20 | 25 | D | | 0.00002 | 92 | 0.00175 |
| 31 | 883.68 | Low Intensity Developed | 61 | 75 | 83 | 87 | omplex, 20 | 25 | D | | 0.00034 | 87 | 0.02968 |
| 32 | 13483.68 | Scrub/Shrub | 30 | 48 | 65 | 73 | omplex, 20 | 25 | D | | 0.00521 | 73 | 0.38004 |
| 33 | 900.00 | Mixed Forest | 30 | 55 | 70 | 77 | omplex, 20 | 25 | D | | 0.00035 | 77 | 0.02676 |
| 34 | 1585.91 | Mixed Forest | 30 | 55 | 70 | 77 | omplex, 20 | 25 | D | | 0.00061 | 77 | 0.04715 |
| 35 | 9629.83 | Scrub/Shrub | 30 | 48 | 65 | 73 | omplex, 20 | 25 | D | | 0.00372 | 73 | 0.27142 |
| 36 | 763.08 | Developed Open Space | 49 | 69 | 79 | 84 | omplex, 20 | 25 | D | | 0.00029 | 84 | 0.02475 |
| 37 | 66.75 | Low Intensity Developed | 61 | 75 | 83 | 87 | omplex, 20 | 25 | D | | 0.00003 | 87 | 0.00224 |
| 38 | 153.25 | Bare Land | 77 | 86 | 91 | 94 | omplex, 20 | 25 | D | | 0.00006 | 94 | 0.00556 |
| 39 | 411.88 | Low Intensity Developed | 61 | 75 | 83 | 87 | omplex, 20 | 25 | D | | 0.00016 | 87 | 0.01384 |
| 40 | 55.65 | Grassland | 30 | 58 | 71 | 78 | omplex, 20 | 25 | D | | 0.00002 | 78 | 0.00168 |
| 41 | 900.00 | Mixed Forest | 30 | 55 | 70 | 77 | omplex, 20 | 25 | D | | 0.00035 | 77 | 0.02676 |
| 42 | 4560.28 | Scrub/Shrub | 30 | 48 | 65 | 73 | omplex, 20 | 25 | D | | 0.00176 | 73 | 0.12853 |
| 43 | 2700.00 | Low Intensity Developed | 61 | 75 | 83 | 87 | omplex, 20 | 25 | D | | 0.00104 | 87 | 0.09070 |
| 44 | 1370.60 | Scrub/Shrub | 30 | 48 | 65 | 73 | omplex, 20 | 25 | D | | 0.00053 | 73 | 0.03863 |
| 45 | 130034.69 | Scrub/Shrub | 30 | 48 | 65 | 73 | omplex, 20 | 25 | D | | 0.05021 | 73 | 3.66509 |
| 46 | 1878.88 | Low Intensity Developed | 61 | 75 | 83 | 87 | omplex, 20 | 25 | D | | 0.00073 | 87 | 0.06311 |
| 47 | 351.76 | Low Intensity Developed | 61 | 75 | 83 | 87 | omplex, 20 | 25 | D | | 0.00014 | 87 | 0.01182 |
| 48 | 431854.07 | Mixed Forest | 30 | 55 | 70 | 77 | omplex, 20 | 25 | D | | 0.16674 | 77 | 12.83896 |
| 49 | 623.93 | Grassland | 30 | 58 | 71 | 78 | , 20 to 40 p | 0 | C | | 0.00024 | 71 | 0.01710 |
| 50 | 1266.25 | Low Intensity Developed | 61 | 75 | 83 | 87 | , 20 to 40 p | 0 | C | | 0.00049 | 83 | 0.04058 |
| 51 | 16.75 | High Intensity Developed | 89 | 92 | 94 | 95 | , 20 to 40 p | 0 | C | | 0.00001 | 94 | 0.00061 |
| 52 | 6.75 | Low Intensity Developed | 61 | 75 | 83 | 87 | , 20 to 40 p | 0 | C | | 0.00000 | 83 | 0.00022 |
| 53 | 2426.67 | Scrub/Shrub | 30 | 48 | 65 | 73 | , 20 to 40 p | 0 | C | | 0.00094 | 65 | 0.06090 |
| 54 | 2639.72 | Scrub/Shrub | 30 | 48 | 65 | 73 | , 20 to 40 p | 0 | C | | 0.00102 | 65 | 0.06625 |
| 55 | 1286.34 | Scrub/Shrub | 30 | 48 | 65 | 73 | , 20 to 40 p | 0 | C | | 0.00050 | 65 | 0.03228 |
| 56 | 16861.49 | Mixed Forest | 30 | 55 | 70 | 77 | , 20 to 40 p | 0 | C | | 0.00651 | 70 | 0.45572 |
| 57 | 21.96 | Scrub/Shrub | 30 | 48 | 65 | 73 | , 20 to 40 p | 25 | C | | 0.00001 | 65 | 0.00055 |
| 58 | 357.62 | Grassland | 30 | 58 | 71 | 78 | , 20 to 40 p | 25 | C | | 0.00014 | 71 | 0.00980 |
| 59 | 5993.09 | Mixed Forest | 30 | 55 | 70 | 77 | , 20 to 40 p | 25 | C | | 0.00231 | 70 | 0.16198 |
| 60 | 103.66 | Low Intensity Developed | 61 | 75 | 83 | 87 | Urban land | 0 | 0 | | 0.00004 | 87 | 0.00348 |
| 61 | 168.00 | Grassland | 30 | 58 | 71 | 78 | Urban land | 0 | 0 | | 0.00006 | 78 | 0.00506 |
| 62 | 959.11 | Medium Intensity Developed | 77 | 85 | 90 | 92 | Urban land | 0 | 0 | | 0.00037 | 92 | 0.03407 |
| 63 | 17.82 | Low Intensity Developed | 61 | 75 | 83 | 87 | Urban land | 0 | 0 | | 0.00001 | 87 | 0.00060 |
| 64 | 2714.34 | Mixed Forest | 30 | 55 | 70 | 77 | Urban land | 0 | 0 | | 0.00105 | 77 | 0.08070 |
| 65 | 6.50 | Low Intensity Developed | 61 | 75 | 83 | 87 | Urban land | 0 | 0 | | 0.00000 | 87 | 0.00022 |
| 66 | 898.50 | Scrub/Shrub | 30 | 48 | 65 | 73 | Urban land | 0 | 0 | | 0.00035 | 73 | 0.02532 |
| 67 | 136.92 | Developed Open Space | 49 | 69 | 79 | 84 | Urban land | 0 | 0 | | 0.00005 | 84 | 0.00444 |
| 68 | 209.25 | Low Intensity Developed | 61 | 75 | 83 | 87 | Urban land | 0 | 0 | | 0.00008 | 87 | 0.00703 |
| 69 | 3422.25 | Medium Intensity Developed | 77 | 85 | 90 | 92 | Urban land | 0 | 0 | | 0.00132 | 92 | 0.12156 |
| 70 | 2633.25 | Low Intensity Developed | 61 | 75 | 83 | 87 | Urban land | 0 | 0 | | 0.00102 | 87 | 0.08845 |
| 71 | 900.00 | Scrub/Shrub | 30 | 48 | 65 | 73 | Urban land | 0 | 0 | | 0.00035 | 73 | 0.02537 |
| 72 | 271.50 | Scrub/Shrub | 30 | 48 | 65 | 73 | Urban land | 0 | 0 | | 0.00010 | 73 | 0.00765 |
| 73 | 574.70 | Mixed Forest | 30 | 55 | 70 | 77 | Urban land | 0 | 0 | | 0.00022 | 77 | 0.01709 |
| 74 | 900.00 | Medium Intensity Developed | 77 | 85 | 90 | 92 | Urban land | 0 | 0 | | 0.00035 | 92 | 0.03197 |
| 75 | 1800.00 | Low Intensity Developed | 61 | 75 | 83 | 87 | Urban land | 0 | 0 | | 0.00069 | 87 | 0.06046 |
| 76 | 1800.00 | Medium Intensity Developed | 77 | 85 | 90 | 92 | Urban land | 0 | 0 | | 0.00069 | 92 | 0.06394 |
| 77 | 897.00 | Low Intensity Developed | 61 | 75 | 83 | 87 | Urban land | 0 | 0 | | 0.00035 | 87 | 0.03013 |
| 78 | 301.75 | Low Intensity Developed | 61 | 75 | 83 | 87 | Urban land | 0 | 0 | | 0.00012 | 87 | 0.01014 |
| 79 | 900.00 | Low Intensity Developed | 61 | 75 | 83 | 87 | Urban land | 0 | 0 | | 0.00035 | 87 | 0.03023 |
| 80 | 3130.69 | Low Intensity Developed | 61 | 75 | 83 | 87 | Urban land | 0 | 0 | | 0.00121 | 87 | 0.10516 |

| ITEM | AREA | LAND COVER | Curve Number | | | | MUSYM | muname | hydgrpdcd | | AREA, A | Curve | A × CN |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | ($m^2$) | (Coastal Change Analisys Program C-CAP) | A | B | C | D | (Soil Class) | (Soil Description) | (H. Group) | | ($mi^2$) | Number, CN | |
| 81 | 2700.00 | Medium Intensity Developed | 77 | 85 | 90 | 92 | Urban land | 0 | 0 | | 0.00104 | 92 | 0.09591 |
| 82 | 1723.50 | Scrub/Shrub | 30 | 48 | 65 | 73 | Urban land | 0 | 0 | | 0.00067 | 73 | 0.04858 |
| 83 | 873.09 | Grassland | 30 | 58 | 71 | 78 | Urban land | 0 | 0 | | 0.00034 | 78 | 0.02629 |
| 84 | 516.90 | Grassland | 30 | 58 | 71 | 78 | Urban land | 0 | 0 | | 0.00020 | 78 | 0.01557 |
| 85 | 691.50 | Mixed Forest | 30 | 55 | 70 | 77 | Urban land | 0 | 0 | | 0.00027 | 77 | 0.02056 |
| 86 | 1278.95 | Scrub/Shrub | 30 | 48 | 65 | 73 | Urban land | 0 | 0 | | 0.00049 | 73 | 0.03605 |
| 87 | 1473.57 | Mixed Forest | 30 | 55 | 70 | 77 | Urban land | 0 | 0 | | 0.00057 | 77 | 0.04381 |
| 88 | 4409.01 | Low Intensity Developed | 61 | 75 | 83 | 87 | Urban land | 0 | 0 | | 0.00170 | 87 | 0.14810 |
| 89 | 1283.83 | Low Intensity Developed | 61 | 75 | 83 | 87 | Urban land | 0 | 0 | | 0.00050 | 87 | 0.04312 |
| 90 | 2699.58 | Medium Intensity Developed | 77 | 85 | 90 | 92 | Urban land | 0 | 0 | | 0.00104 | 92 | 0.09589 |
| 91 | 900.00 | Low Intensity Developed | 61 | 75 | 83 | 87 | Urban land | 0 | 0 | | 0.00035 | 87 | 0.03023 |
| 92 | 226.00 | High Intensity Developed | 89 | 92 | 94 | 95 | Urban land | 0 | 0 | | 0.00009 | 95 | 0.00829 |
| 93 | 900.00 | Low Intensity Developed | 61 | 75 | 83 | 87 | Urban land | 0 | 0 | | 0.00035 | 87 | 0.03023 |
| 94 | 900.00 | Medium Intensity Developed | 77 | 85 | 90 | 92 | Urban land | 0 | 0 | | 0.00035 | 92 | 0.03197 |
| 95 | 256.95 | Low Intensity Developed | 61 | 75 | 83 | 87 | Urban land | 0 | 0 | | 0.00010 | 87 | 0.00863 |
| 96 | 6994.53 | Bare Land | 77 | 86 | 91 | 94 | Urban land | 0 | 0 | | 0.00270 | 94 | 0.25386 |
| 97 | 5480.68 | Mixed Forest | 30 | 55 | 70 | 77 | Urban land | 0 | 0 | | 0.00212 | 77 | 0.16294 |
| 98 | 4901.61 | Mixed Forest | 30 | 55 | 70 | 77 | Urban land | 0 | 0 | | 0.00189 | 77 | 0.14572 |
| 99 | 134.22 | Scrub/Shrub | 30 | 48 | 65 | 73 | ay, 12 to 20 | 28 | D | | 0.00005 | 73 | 0.00378 |
| 100 | 16.32 | Scrub/Shrub | 30 | 48 | 65 | 73 | ay, 12 to 20 | 28 | D | | 0.00001 | 73 | 0.00046 |
| 101 | 631.50 | Scrub/Shrub | 30 | 48 | 65 | 73 | ay, 12 to 20 | 28 | D | | 0.00024 | 73 | 0.01780 |
| 102 | 1225.30 | Mixed Forest | 30 | 55 | 70 | 77 | ay, 12 to 20 | 28 | D | | 0.00047 | 77 | 0.03643 |
| 103 | 746.75 | Bare Land | 77 | 86 | 91 | 94 | ay, 12 to 20 | 28 | D | | 0.00029 | 94 | 0.02710 |
| 104 | 1388.12 | Low Intensity Developed | 61 | 75 | 83 | 87 | ay, 12 to 20 | 28 | D | | 0.00054 | 87 | 0.04663 |
| 105 | 3544.35 | Grassland | 30 | 58 | 71 | 78 | ay, 12 to 20 | 28 | D | | 0.00137 | 78 | 0.10674 |
| 106 | 208.50 | Mixed Forest | 30 | 55 | 70 | 77 | ay, 12 to 20 | 28 | D | | 0.00008 | 77 | 0.00620 |
| 107 | 19851.96 | Scrub/Shrub | 30 | 48 | 65 | 73 | ay, 12 to 20 | 28 | D | | 0.00766 | 73 | 0.55954 |
| 108 | 10226.43 | Mixed Forest | 30 | 55 | 70 | 77 | ay, 12 to 20 | 28 | D | | 0.00395 | 77 | 0.30403 |
| 109 | 15095.37 | Mixed Forest | 30 | 55 | 70 | 77 | ay, 12 to 20 | 28 | D | | 0.00583 | 77 | 0.44878 |
| 110 | 89.49 | Low Intensity Developed | 61 | 75 | 83 | 87 | ay, 12 to 20 | 28 | D | | 0.00003 | 87 | 0.00301 |
| 111 | 516.17 | Low Intensity Developed | 61 | 75 | 83 | 87 | ay, 12 to 20 | 28 | D | | 0.00020 | 87 | 0.01734 |
| 112 | 388.50 | Low Intensity Developed | 61 | 75 | 83 | 87 | ay, 12 to 20 | 28 | D | | 0.00015 | 87 | 0.01305 |
| 113 | 674.00 | High Intensity Developed | 89 | 92 | 94 | 95 | ay, 12 to 20 | 28 | D | | 0.00026 | 95 | 0.02472 |
| 114 | 8743.05 | Low Intensity Developed | 61 | 75 | 83 | 87 | ay, 12 to 20 | 28 | D | | 0.00338 | 87 | 0.29369 |
| 115 | 18595.77 | Scrub/Shrub | 30 | 48 | 65 | 73 | ay, 12 to 20 | 28 | D | | 0.00718 | 73 | 0.52413 |
| 116 | 900.00 | High Intensity Developed | 89 | 92 | 94 | 95 | ay, 12 to 20 | 28 | D | | 0.00035 | 95 | 0.03301 |
| 117 | 900.00 | Low Intensity Developed | 61 | 75 | 83 | 87 | ay, 12 to 20 | 28 | D | | 0.00035 | 87 | 0.03023 |
| 118 | 900.00 | Developed Open Space | 49 | 69 | 79 | 84 | ay, 12 to 20 | 28 | D | | 0.00035 | 84 | 0.02919 |
| 119 | 742.75 | Mixed Forest | 30 | 55 | 70 | 77 | ay, 12 to 20 | 28 | D | | 0.00029 | 77 | 0.02208 |
| 120 | 722.25 | Scrub/Shrub | 30 | 48 | 65 | 73 | ay, 12 to 20 | 28 | D | | 0.00028 | 73 | 0.02036 |
| 121 | 395.00 | Low Intensity Developed | 61 | 75 | 83 | 87 | ay, 12 to 20 | 28 | D | | 0.00015 | 87 | 0.01327 |
| 122 | 354.25 | Medium Intensity Developed | 77 | 85 | 90 | 92 | ay, 12 to 20 | 28 | D | | 0.00014 | 92 | 0.01258 |
| 123 | 5025.75 | Low Intensity Developed | 61 | 75 | 83 | 87 | ay, 12 to 20 | 28 | D | | 0.00194 | 87 | 0.16882 |
| 124 | 794.50 | Medium Intensity Developed | 77 | 85 | 90 | 92 | ay, 12 to 20 | 28 | D | | 0.00031 | 92 | 0.02822 |
| 125 | 302.50 | Mixed Forest | 30 | 55 | 70 | 77 | ay, 12 to 20 | 28 | D | | 0.00012 | 77 | 0.00899 |
| 126 | 1225.50 | Bare Land | 77 | 86 | 91 | 94 | ay, 12 to 20 | 28 | D | | 0.00047 | 94 | 0.04448 |
| 127 | 5374.21 | Mixed Forest | 30 | 55 | 70 | 77 | ay, 12 to 20 | 28 | D | | 0.00207 | 77 | 0.15977 |
| 128 | 8373.23 | Mixed Forest | 30 | 55 | 70 | 77 | ay, 12 to 20 | 28 | D | | 0.00323 | 77 | 0.24894 |
| 129 | 469.31 | Low Intensity Developed | 61 | 75 | 83 | 87 | ay, 20 to 60 | 28 | D | | 0.00018 | 87 | 0.01576 |
| 130 | 76.50 | Scrub/Shrub | 30 | 48 | 65 | 73 | ay, 20 to 60 | 28 | D | | 0.00003 | 73 | 0.00216 |
| 131 | 26.91 | Grassland | 30 | 58 | 71 | 78 | ay, 20 to 60 | 28 | D | | 0.00001 | 78 | 0.00081 |
| 132 | 383.10 | Grassland | 30 | 58 | 71 | 78 | ay, 20 to 60 | 28 | D | | 0.00015 | 78 | 0.01154 |
| 133 | 900.00 | Grassland | 30 | 58 | 71 | 78 | ay, 20 to 60 | 28 | D | | 0.00035 | 78 | 0.02710 |
| 134 | 37.75 | Mixed Forest | 30 | 55 | 70 | 77 | ay, 20 to 60 | 28 | D | | 0.00001 | 77 | 0.00112 |
| 135 | 3781.91 | Bare Land | 77 | 86 | 91 | 94 | ay, 20 to 60 | 28 | D | | 0.00146 | 94 | 0.13726 |
| 136 | 19845.87 | Mixed Forest | 30 | 55 | 70 | 77 | ay, 20 to 60 | 28 | D | | 0.00766 | 77 | 0.59002 |
| | | | | | | | | | | **TOTAL** | **0.420** | | **32.23** |
| | | | | | | | | | | **WEIGHTED CURVE NUMBER** | | | **77** |

## Time of Concentration and Travel Time

**Sheet Flow**

Surface description: Woods: Light underbrush

| | |
|---|---|
| Flow length, L (ft) (maximum of 300 feet) | 98.43 |
| 2-year, 24-hour rainfall, $P_2$ (in) | 4.38 |
| Slope of hydraulic grade line, s (ft/ft) | 0.176 |
| Manning's roughness coefficient, n | 0.4 |
| Travel time, $T_t$ (hr) | 0.127 |

**Shallow Concentrated Flow**

| | |
|---|---|
| Watercourse slope, s (ft/ft) | 0.146222 |
| Flow length, L (ft) | 1724.625 |
| Type of channel | Unpaved |
| Average velocity, V (ft/s) | 6.17 |
| Travel time, $T_t$ (hr) | 0.078 |

**Open Channels**

Average velocity, V (ft/s)
Cross sectional flow area, a ($ft^2$)
Wetted perimeter, $p_w$ (ft)
Slope of the hydraulic grade line (channel slope, ft/ft), s
Manning's roughness coefficient for open channel flow, n
Flow length, L (ft)
Travel time, $T_t$ (hr)

| Channel | a | $p_w$ | s | L | n | r | V | $T_t$ |
|---|---|---|---|---|---|---|---|---|
| 1 | 84.00155 | 25.346 | 0.021 | 7879.85 | 0.06 | 3.314 | 8.061 | 0.272 |
| 2 | | | | | | | | |
| 3 | | | | | | | | |
| 4 | | | | | | | | |
| 5 | | | | | | | | |
| 6 | | | | | | | | |
| 7 | | | | | | | | |

Travel time, $T_t$ (hr) 0.272

**Time of Concentration**

| | |
|---|---|
| Time of concentration, $T_c$ (min) | 28.545 |
| Lag time, $T_L$ (min) | 17.127 |

| ITEM | AREA ($m^2$) | LAND COVER (Coastal Change Analisys Program C-CAP) | Curve Number A | B | C | D | MUSYM (Soil Class) | muname (Soil Description) | hydgrpdcd (H. Group) | | AREA, A ($mi^2$) | Curve Number, CN | A × CN |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 6002.69 | Mixed Forest | 30 | 55 | 70 | 77 | , 12 to 20 p | 25 | C | | 0.00232 | 70 | 0.16224 |
| 2 | 505.50 | Scrub/Shrub | 30 | 48 | 65 | 73 | ay, 20 to 60 | 28 | D | | 0.00020 | 73 | 0.01425 |
| 3 | 417.25 | Medium Intensity Developed | 77 | 85 | 90 | 92 | ay, 20 to 60 | 28 | D | | 0.00016 | 92 | 0.01482 |
| 4 | 1965.57 | Low Intensity Developed | 61 | 75 | 83 | 87 | ay, 20 to 60 | 28 | D | | 0.00076 | 87 | 0.06603 |
| 5 | 10446.37 | Mixed Forest | 30 | 55 | 70 | 77 | ay, 20 to 60 | 28 | D | | 0.00403 | 77 | 0.31057 |
| 6 | 3170.00 | Scrub/Shrub | 30 | 48 | 65 | 73 | mplex, 20 | 25 | D | | 0.00122 | 73 | 0.08935 |
| 7 | 1.50 | Grassland | 30 | 58 | 71 | 78 | mplex, 20 | 25 | D | | 0.00000 | 78 | 0.00005 |
| 8 | 14.64 | Low Intensity Developed | 61 | 75 | 83 | 87 | mplex, 20 | 25 | D | | 0.00001 | 87 | 0.00049 |
| 9 | 226.91 | Medium Intensity Developed | 77 | 85 | 90 | 92 | mplex, 20 | 25 | D | | 0.00009 | 92 | 0.00806 |
| 10 | 0.25 | Scrub/Shrub | 30 | 48 | 65 | 73 | mplex, 20 | 25 | D | | 0.00000 | 73 | 0.00001 |
| 11 | 219.96 | Low Intensity Developed | 61 | 75 | 83 | 87 | mplex, 20 | 25 | D | | 0.00008 | 87 | 0.00739 |
| 12 | 149.31 | Low Intensity Developed | 61 | 75 | 83 | 87 | mplex, 20 | 25 | D | | 0.00006 | 87 | 0.00502 |
| 13 | 106.75 | Low Intensity Developed | 61 | 75 | 83 | 87 | mplex, 20 | 25 | D | | 0.00004 | 87 | 0.00359 |
| 14 | 96.79 | Mixed Forest | 30 | 55 | 70 | 77 | mplex, 20 | 25 | D | | 0.00004 | 77 | 0.00288 |
| 15 | 274.75 | Low Intensity Developed | 61 | 75 | 83 | 87 | mplex, 20 | 25 | D | | 0.00011 | 87 | 0.00923 |
| 16 | 58899.10 | Mixed Forest | 30 | 55 | 70 | 77 | mplex, 20 | 25 | D | | 0.02274 | 77 | 1.75106 |
| 17 | 376.75 | Grassland | 30 | 58 | 71 | 78 | , 20 to 40 p | 25 | C | | 0.00015 | 71 | 0.01033 |
| 18 | 21327.42 | Mixed Forest | 30 | 55 | 70 | 77 | , 20 to 40 p | 25 | C | | 0.00823 | 70 | 0.57642 |
| 19 | 885.36 | Low Intensity Developed | 61 | 75 | 83 | 87 | Urban land | 0 | 0 | | 0.00034 | 87 | 0.02974 |
| 20 | 673.09 | Medium Intensity Developed | 77 | 85 | 90 | 92 | Urban land | 0 | 0 | | 0.00026 | 92 | 0.02391 |
| 21 | 900.00 | Low Intensity Developed | 61 | 75 | 83 | 87 | Urban land | 0 | 0 | | 0.00035 | 87 | 0.03023 |
| 22 | 894.18 | Low Intensity Developed | 61 | 75 | 83 | 87 | Urban land | 0 | 0 | | 0.00035 | 87 | 0.03004 |
| 23 | 1800.00 | Low Intensity Developed | 61 | 75 | 83 | 87 | Urban land | 0 | 0 | | 0.00069 | 87 | 0.06046 |
| 24 | 5400.00 | Medium Intensity Developed | 77 | 85 | 90 | 92 | Urban land | 0 | 0 | | 0.00208 | 92 | 0.19182 |
| 25 | 900.00 | High Intensity Developed | 89 | 92 | 94 | 95 | Urban land | 0 | 0 | | 0.00035 | 95 | 0.03301 |
| 26 | 680.04 | Low Intensity Developed | 61 | 75 | 83 | 87 | Urban land | 0 | 0 | | 0.00026 | 87 | 0.02284 |
| 27 | 3450.69 | Low Intensity Developed | 61 | 75 | 83 | 87 | Urban land | 0 | 0 | | 0.00133 | 87 | 0.11591 |
| 28 | 2454.00 | High Intensity Developed | 89 | 92 | 94 | 95 | Urban land | 0 | 0 | | 0.00095 | 95 | 0.09001 |
| 29 | 803.21 | Mixed Forest | 30 | 55 | 70 | 77 | Urban land | 0 | 0 | | 0.00031 | 77 | 0.02388 |
| 30 | 50.00 | Low Intensity Developed | 61 | 75 | 83 | 87 | Urban land | 0 | 0 | | 0.00002 | 87 | 0.00168 |
| 31 | 580.00 | Low Intensity Developed | 61 | 75 | 83 | 87 | Urban land | 0 | 0 | | 0.00022 | 87 | 0.01948 |
| 32 | 74.25 | Scrub/Shrub | 30 | 48 | 65 | 73 | Urban land | 0 | 0 | | 0.00003 | 73 | 0.00209 |
| 33 | 900.00 | Medium Intensity Developed | 77 | 85 | 90 | 92 | Urban land | 0 | 0 | | 0.00035 | 92 | 0.03197 |
| 34 | 35.50 | Medium Intensity Developed | 77 | 85 | 90 | 92 | Urban land | 0 | 0 | | 0.00001 | 92 | 0.00126 |
| 35 | 265.00 | Mixed Forest | 30 | 55 | 70 | 77 | Urban land | 0 | 0 | | 0.00010 | 77 | 0.00788 |
| 36 | 1061.25 | Low Intensity Developed | 61 | 75 | 83 | 87 | Urban land | 0 | 0 | | 0.00041 | 87 | 0.03565 |
| 37 | 11430.17 | Mixed Forest | 30 | 55 | 70 | 77 | Urban land | 0 | 0 | | 0.00441 | 77 | 0.33982 |
| | | | | | | | | | **TOTAL** | | **0.053** | | **4.12** |
| | | | | | | | | | **WEIGHTED CURVE NUMBER** | | | | **78** |

## Time of Concentration and Travel Time

**Sheet Flow**

Surface description: Cultivated soils: Residue cover >20%

| | |
|---|---|
| Flow length, L (ft) (maximum of 300 feet) | 98.43 |
| 2-year, 24-hour rainfall, $P_2$ (in) | 4.38 |
| Slope of hydraulic grade line, s (ft/ft) | 0.194 |
| Manning's roughness coefficient, n | 0.17 |
| Travel time, $T_t$ (hr) | 0.061 |

**Shallow Concentrated Flow**

| | |
|---|---|
| Watercourse slope, s (ft/ft) | 0.090844 |
| Flow length, L (ft) | 2538.641 |
| Type of channel | Unpaved |
| Average velocity, V (ft/s) | 4.86 |
| Travel time, $T_t$ (hr) | 0.145 |

**Open Channels**

Average velocity, V (ft/s)
Cross sectional flow area, a ($ft^2$)
Wetted perimeter, $p_w$ (ft)
Slope of the hydraulic grade line (channel slope, ft/ft), s
Manning's roughness coefficient for open channel flow, n
Flow length, L (ft)
Travel time, $T_t$ (hr)

| Channel | a | $p_w$ | s | L | n | r | V | $T_t$ |
|---|---|---|---|---|---|---|---|---|
| 1 | 88.3717 | 29.595 | 0.020 | 328.00 | 0.045 | 2.986 | 9.687 | 0.009 |
| 2 | | | | | | | | |
| 3 | | | | | | | | |
| 4 | | | | | | | | |
| 5 | | | | | | | | |
| 6 | | | | | | | | |
| 7 | | | | | | | | |

Travel time, $T_t$ (hr) 0.009

**Time of Concentration**

| | |
|---|---|
| Time of concentration, $T_c$ (min) | 12.948 |
| Lag time, $T_L$ (min) | 7.769 |

| ITEM | AREA ($m^2$) | LAND COVER (Coastal Change Analisys Program C-CAP) | Curve Number A | B | C | D | MUSYM (Soil Class) | muname (Soil Description) | hydgrpdcd (H. Group) | | AREA, A ($mi^2$) | Curve Number, CN | A × CN |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 54616.05 | Mixed Forest | 30 | 55 | 70 | 77 | , 12 to 20 p | 25 | C | | 0.02109 | 70 | 1.47612 |
| 2 | 57.73 | Low Intensity Developed | 61 | 75 | 83 | 87 | , 40 to 60 p | 25 | C | | 0.00002 | 83 | 0.00185 |
| 3 | 237.50 | Scrub/Shrub | 30 | 48 | 65 | 73 | , 40 to 60 p | 25 | C | | 0.00009 | 65 | 0.00596 |
| 4 | 93528.00 | Mixed Forest | 30 | 55 | 70 | 77 | , 40 to 60 p | 25 | C | | 0.03611 | 70 | 2.52780 |
| 5 | 2302.49 | Grassland | 30 | 58 | 71 | 78 | omplex, 20 | 25 | D | | 0.00089 | 78 | 0.06934 |
| 6 | 3387.03 | Scrub/Shrub | 30 | 48 | 65 | 73 | omplex, 20 | 25 | D | | 0.00131 | 73 | 0.09547 |
| 7 | 10885.39 | Mixed Forest | 30 | 55 | 70 | 77 | omplex, 20 | 25 | D | | 0.00420 | 77 | 0.32362 |
| 8 | 699.90 | Grassland | 30 | 58 | 71 | 78 | , 20 to 40 p | 0 | C | | 0.00027 | 71 | 0.01919 |
| 9 | 3592.43 | Scrub/Shrub | 30 | 48 | 65 | 73 | , 20 to 40 p | 0 | C | | 0.00139 | 65 | 0.09016 |
| 10 | 900.00 | Scrub/Shrub | 30 | 48 | 65 | 73 | , 20 to 40 p | 0 | C | | 0.00035 | 65 | 0.02259 |
| 11 | 1172.51 | Grassland | 30 | 58 | 71 | 78 | , 20 to 40 p | 0 | C | | 0.00045 | 71 | 0.03214 |
| 12 | 900.00 | Scrub/Shrub | 30 | 48 | 65 | 73 | , 20 to 40 p | 0 | C | | 0.00035 | 65 | 0.02259 |
| 13 | 6904.15 | Mixed Forest | 30 | 55 | 70 | 77 | , 20 to 40 p | 0 | C | | 0.00267 | 70 | 0.18660 |
| 14 | 957.00 | Low Intensity Developed | 61 | 75 | 83 | 87 | , 20 to 40 p | 0 | C | | 0.00037 | 83 | 0.03067 |
| 15 | 667.02 | Low Intensity Developed | 61 | 75 | 83 | 87 | , 20 to 40 p | 0 | C | | 0.00026 | 83 | 0.02138 |
| 16 | 35477.40 | Mixed Forest | 30 | 55 | 70 | 77 | , 20 to 40 p | 0 | C | | 0.01370 | 70 | 0.95885 |
| 17 | 15.27 | Medium Intensity Developed | 77 | 85 | 90 | 92 | Urban land | 0 | 0 | | 0.00001 | 92 | 0.00054 |
| 18 | 527.23 | High Intensity Developed | 89 | 92 | 94 | 95 | Urban land | 0 | 0 | | 0.00020 | 95 | 0.01934 |
| 19 | 9.73 | Low Intensity Developed | 61 | 75 | 83 | 87 | Urban land | 0 | 0 | | 0.00000 | 87 | 0.00033 |
| 20 | 338.49 | Low Intensity Developed | 61 | 75 | 83 | 87 | Urban land | 0 | 0 | | 0.00013 | 87 | 0.01137 |
| 21 | 62.70 | Medium Intensity Developed | 77 | 85 | 90 | 92 | Urban land | 0 | 0 | | 0.00002 | 92 | 0.00223 |
| 22 | 149.02 | Mixed Forest | 30 | 55 | 70 | 77 | Urban land | 0 | 0 | | 0.00006 | 77 | 0.00443 |
| 23 | 163.73 | Medium Intensity Developed | 77 | 85 | 90 | 92 | , 20 to 40 p | 25 | C | | 0.00006 | 90 | 0.00569 |
| 24 | 221.02 | High Intensity Developed | 89 | 92 | 94 | 95 | , 20 to 40 p | 25 | C | | 0.00009 | 94 | 0.00802 |
| 25 | 890.27 | Low Intensity Developed | 61 | 75 | 83 | 87 | , 20 to 40 p | 25 | C | | 0.00034 | 83 | 0.02853 |
| 26 | 163.51 | Low Intensity Developed | 61 | 75 | 83 | 87 | , 20 to 40 p | 25 | C | | 0.00006 | 83 | 0.00524 |
| 27 | 835.80 | Medium Intensity Developed | 77 | 85 | 90 | 92 | , 20 to 40 p | 25 | C | | 0.00032 | 90 | 0.02904 |
| 28 | 125.50 | Low Intensity Developed | 61 | 75 | 83 | 87 | , 20 to 40 p | 25 | C | | 0.00005 | 83 | 0.00402 |
| 29 | 900.00 | Scrub/Shrub | 30 | 48 | 65 | 73 | , 20 to 40 p | 25 | C | | 0.00035 | 65 | 0.02259 |
| 30 | 1800.00 | Scrub/Shrub | 30 | 48 | 65 | 73 | , 20 to 40 p | 25 | C | | 0.00069 | 65 | 0.04517 |
| 31 | 6500.10 | Grassland | 30 | 58 | 71 | 78 | , 20 to 40 p | 25 | C | | 0.00251 | 71 | 0.17819 |
| 32 | 7.57 | Scrub/Shrub | 30 | 48 | 65 | 73 | , 20 to 40 p | 25 | C | | 0.00000 | 65 | 0.00019 |
| 33 | 2501.72 | Scrub/Shrub | 30 | 48 | 65 | 73 | , 20 to 40 p | 25 | C | | 0.00097 | 65 | 0.06278 |
| 34 | 117598.24 | Mixed Forest | 30 | 55 | 70 | 77 | , 20 to 40 p | 25 | C | | 0.04540 | 70 | 3.17835 |
| | | | | | | | | | **TOTAL** | | **0.135** | | **9.49** |
| | | | | | | | | | **WEIGHTED CURVE NUMBER** | | | | **71** |

## Time of Concentration and Travel Time

**Sheet Flow**

Surface description: Woods: Light underbrush

| | |
|---|---|
| Flow length, L (ft) (maximum of 300 feet) | 98.43 |
| 2-year, 24-hour rainfall, $P_2$ (in) | 4.38 |
| Slope of hydraulic grade line, s (ft/ft) | 0.101 |
| Manning's roughness coefficient, n | 0.4 |
| Travel time, $T_t$ (hr) | 0.158 |

**Shallow Concentrated Flow**

| | |
|---|---|
| Watercourse slope, s (ft/ft) | 0.118992 |
| Flow length, L (ft) | 4075.33 |
| Type of channel | Unpaved |
| Average velocity, V (ft/s) | 5.57 |
| Travel time, $T_t$ (hr) | 0.203 |

**Open Channels**

Average velocity, V (ft/s)
Cross sectional flow area, a ($ft^2$)
Wetted perimeter, $p_w$ (ft)
Slope of the hydraulic grade line (channel slope, ft/ft), s
Manning's roughness coefficient for open channel flow, n
Flow length, L (ft)
Travel time, $T_t$ (hr)

| Channel | a | $p_w$ | s | L | n | r | V | $T_t$ |
|---|---|---|---|---|---|---|---|---|
| 1 | 106.8856 | 28.118 | 0.018 | 547.93 | 0.045 | 3.801 | 10.701 | 0.014 |
| 2 | | | | | | | | |
| 3 | | | | | | | | |
| 4 | | | | | | | | |
| 5 | | | | | | | | |
| 6 | | | | | | | | |
| 7 | | | | | | | | |

Travel time, $T_t$ (hr) 0.014

**Time of Concentration**

| | |
|---|---|
| Time of concentration, $T_c$ (min) | 22.540 |
| Lag time, $T_L$ (min) | 13.524 |

| ITEM | AREA | LAND COVER | Curve Number | | | | MUSYM | muname | hydgrpdcd | | AREA, A | Curve | A × CN |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | ($m^2$) | (Coastal Change Analisys Program C-CAP) | A | B | C | D | (Soil Class) | (Soil Description) | (H. Group) | | ($mi^2$) | Number, CN | |
| 1 | 722.70 | Grassland | 30 | 58 | 71 | 78 | , 20 to 40 p | 25 | C | | 0.00028 | 71 | 0.01981 |
| 2 | 818.00 | Grassland | 30 | 58 | 71 | 78 | , 20 to 40 p | 25 | C | | 0.00032 | 71 | 0.02242 |
| 3 | 900.00 | Mixed Forest | 30 | 55 | 70 | 77 | , 20 to 40 p | 25 | C | | 0.00035 | 70 | 0.02432 |
| 4 | 1826.62 | Mixed Forest | 30 | 55 | 70 | 77 | , 20 to 40 p | 25 | C | | 0.00071 | 70 | 0.04937 |
| 5 | 891.60 | Mixed Forest | 30 | 55 | 70 | 77 | , 20 to 40 p | 25 | C | | 0.00034 | 70 | 0.02410 |
| 6 | 33.17 | Grassland | 30 | 58 | 71 | 78 | , 20 to 40 p | 25 | C | | 0.00001 | 71 | 0.00091 |
| 7 | 15429.43 | Scrub/Shrub | 30 | 48 | 65 | 73 | , 20 to 40 p | 25 | C | | 0.00596 | 65 | 0.38723 |
| 8 | 2894.90 | Mixed Forest | 30 | 55 | 70 | 77 | , 20 to 40 p | 25 | C | | 0.00112 | 70 | 0.07824 |
| 9 | 51.00 | Medium Intensity Developed | 77 | 85 | 90 | 92 | , 20 to 40 p | 0 | C | | 0.00002 | 90 | 0.00177 |
| 10 | 15893.67 | Mixed Forest | 30 | 55 | 70 | 77 | , 20 to 40 p | 0 | C | | 0.00614 | 70 | 0.42956 |
| 11 | 20098.47 | Scrub/Shrub | 30 | 48 | 65 | 73 | , 40 to 60 p | 25 | C | | 0.00776 | 65 | 0.50440 |
| 12 | 54230.26 | Mixed Forest | 30 | 55 | 70 | 77 | , 40 to 60 p | 25 | C | | 0.02094 | 70 | 1.46569 |
| 13 | 1220.25 | Pasture/Hay | 39 | 61 | 74 | 80 | , 40 to 60 p | 25 | C | | 0.00047 | 74 | 0.03486 |
| 14 | 900.00 | Grassland | 30 | 58 | 71 | 78 | , 40 to 60 p | 25 | C | | 0.00035 | 71 | 0.02467 |
| 15 | 2310.59 | Scrub/Shrub | 30 | 48 | 65 | 73 | , 40 to 60 p | 25 | C | | 0.00089 | 65 | 0.05799 |
| 16 | 900.00 | Grassland | 30 | 58 | 71 | 78 | , 40 to 60 p | 25 | C | | 0.00035 | 71 | 0.02467 |
| 17 | 900.00 | Mixed Forest | 30 | 55 | 70 | 77 | , 40 to 60 p | 25 | C | | 0.00035 | 70 | 0.02432 |
| 18 | 11640.71 | Scrub/Shrub | 30 | 48 | 65 | 73 | , 40 to 60 p | 25 | C | | 0.00449 | 65 | 0.29214 |
| 19 | 523.92 | Low Intensity Developed | 61 | 75 | 83 | 87 | , 40 to 60 p | 25 | C | | 0.00020 | 83 | 0.01679 |
| 20 | 270.09 | High Intensity Developed | 89 | 92 | 94 | 95 | , 40 to 60 p | 25 | C | | 0.00010 | 94 | 0.00980 |
| 21 | 1922.32 | Scrub/Shrub | 30 | 48 | 65 | 73 | , 40 to 60 p | 25 | C | | 0.00074 | 65 | 0.04824 |
| 22 | 122557.03 | Mixed Forest | 30 | 55 | 70 | 77 | , 40 to 60 p | 25 | C | | 0.04732 | 70 | 3.31237 |
| 23 | 0.33 | Grassland | 30 | 58 | 71 | 78 | omplex, 20 | 25 | D | | 0.00000 | 78 | 0.00001 |
| 24 | 1420.50 | Scrub/Shrub | 30 | 48 | 65 | 73 | omplex, 20 | 25 | D | | 0.00055 | 73 | 0.04004 |
| 25 | 524.50 | Grassland | 30 | 58 | 71 | 78 | omplex, 20 | 25 | D | | 0.00020 | 78 | 0.01580 |
| 26 | 1244.50 | Scrub/Shrub | 30 | 48 | 65 | 73 | omplex, 20 | 25 | D | | 0.00048 | 73 | 0.03508 |
| 27 | 37489.79 | Mixed Forest | 30 | 55 | 70 | 77 | omplex, 20 | 25 | D | | 0.01447 | 77 | 1.11457 |
| 28 | 2784.42 | Grassland | 30 | 58 | 71 | 78 | , 20 to 40 p | 0 | C | | 0.00108 | 71 | 0.07633 |
| 29 | 1433.75 | Low Intensity Developed | 61 | 75 | 83 | 87 | , 20 to 40 p | 0 | C | | 0.00055 | 83 | 0.04595 |
| 30 | 900.00 | Medium Intensity Developed | 77 | 85 | 90 | 92 | , 20 to 40 p | 0 | C | | 0.00035 | 90 | 0.03127 |
| 31 | 613.16 | High Intensity Developed | 89 | 92 | 94 | 95 | , 20 to 40 p | 0 | C | | 0.00024 | 94 | 0.02225 |
| 32 | 893.17 | Low Intensity Developed | 61 | 75 | 83 | 87 | , 20 to 40 p | 0 | C | | 0.00034 | 83 | 0.02862 |
| 33 | 3243.50 | Scrub/Shrub | 30 | 48 | 65 | 73 | , 20 to 40 p | 0 | C | | 0.00125 | 65 | 0.08140 |
| 34 | 776.25 | Scrub/Shrub | 30 | 48 | 65 | 73 | , 20 to 40 p | 0 | C | | 0.00030 | 65 | 0.01948 |
| 35 | 212432.64 | Mixed Forest | 30 | 55 | 70 | 77 | , 20 to 40 p | 0 | C | | 0.08202 | 70 | 5.74145 |
| 36 | 17.28 | High Intensity Developed | 89 | 92 | 94 | 95 | 12 to 20 pe | 81 | C | | 0.00001 | 94 | 0.00063 |
| 37 | 5259.30 | Mixed Forest | 30 | 55 | 70 | 77 | , 20 to 40 p | 0 | C | | 0.00203 | 70 | 0.14214 |
| 38 | 8.40 | Mixed Forest | 30 | 55 | 70 | 77 | , 20 to 40 p | 0 | C | | 0.00000 | 70 | 0.00023 |
| 39 | 900.00 | Grassland | 30 | 58 | 71 | 78 | , 20 to 40 p | 0 | C | | 0.00035 | 71 | 0.02467 |
| 40 | 1800.00 | Scrub/Shrub | 30 | 48 | 65 | 73 | , 20 to 40 p | 0 | C | | 0.00069 | 65 | 0.04517 |
| 41 | 30.08 | Scrub/Shrub | 30 | 48 | 65 | 73 | , 20 to 40 p | 0 | C | | 0.00001 | 65 | 0.00075 |
| 42 | 5366.83 | Grassland | 30 | 58 | 71 | 78 | , 20 to 40 p | 0 | C | | 0.00207 | 71 | 0.14712 |
| 43 | 3079.85 | Pasture/Hay | 39 | 61 | 74 | 80 | , 20 to 40 p | 0 | C | | 0.00119 | 74 | 0.08800 |
| 44 | 900.00 | Mixed Forest | 30 | 55 | 70 | 77 | , 20 to 40 p | 0 | C | | 0.00035 | 70 | 0.02432 |
| 45 | 2700.00 | Mixed Forest | 30 | 55 | 70 | 77 | , 20 to 40 p | 0 | C | | 0.00104 | 70 | 0.07297 |
| 46 | 367.90 | Mixed Forest | 30 | 55 | 70 | 77 | , 20 to 40 p | 0 | C | | 0.00014 | 70 | 0.00994 |
| 47 | 7086.85 | Grassland | 30 | 58 | 71 | 78 | , 20 to 40 p | 0 | C | | 0.00274 | 71 | 0.19427 |
| 48 | 60698.08 | Scrub/Shrub | 30 | 48 | 65 | 73 | , 20 to 40 p | 0 | C | | 0.02344 | 65 | 1.52332 |
| 49 | 19.04 | Scrub/Shrub | 30 | 48 | 65 | 73 | , 20 to 40 p | 0 | C | | 0.00001 | 65 | 0.00048 |
| 50 | 87554.99 | Mixed Forest | 30 | 55 | 70 | 77 | , 20 to 40 p | 0 | C | | 0.03381 | 70 | 2.36636 |
| 51 | 59.25 | Mixed Forest | 30 | 55 | 70 | 77 | Urban land | 0 | 0 | | 0.00002 | 77 | 0.00176 |
| 52 | 2321.65 | Scrub/Shrub | 30 | 48 | 65 | 73 | Urban land | 0 | 0 | | 0.00090 | 73 | 0.06544 |
| 53 | 524.40 | Low Intensity Developed | 61 | 75 | 83 | 87 | Urban land | 0 | 0 | | 0.00020 | 87 | 0.01762 |
| 54 | 1045.86 | Mixed Forest | 30 | 55 | 70 | 77 | Urban land | 0 | 0 | | 0.00040 | 77 | 0.03109 |
| 55 | 39.50 | Low Intensity Developed | 61 | 75 | 83 | 87 | Urban land | 0 | 0 | | 0.00002 | 87 | 0.00133 |
| 56 | 307.92 | Low Intensity Developed | 61 | 75 | 83 | 87 | Urban land | 0 | 0 | | 0.00012 | 87 | 0.01034 |
| 57 | 460.00 | Medium Intensity Developed | 77 | 85 | 90 | 92 | Urban land | 0 | 0 | | 0.00018 | 92 | 0.01634 |
| 58 | 88.20 | Mixed Forest | 30 | 55 | 70 | 77 | Urban land | 0 | 0 | | 0.00003 | 77 | 0.00262 |
| 59 | 716.47 | Low Intensity Developed | 61 | 75 | 83 | 87 | Urban land | 0 | 0 | | 0.00028 | 87 | 0.02407 |
| 60 | 3115.13 | High Intensity Developed | 89 | 92 | 94 | 95 | Urban land | 0 | 0 | | 0.00120 | 95 | 0.11426 |
| 61 | 50.35 | Mixed Forest | 30 | 55 | 70 | 77 | Urban land | 0 | 0 | | 0.00002 | 77 | 0.00150 |
| 62 | 88.21 | Low Intensity Developed | 61 | 75 | 83 | 87 | Urban land | 0 | 0 | | 0.00003 | 87 | 0.00296 |
| 63 | 986.62 | Medium Intensity Developed | 77 | 85 | 90 | 92 | Urban land | 0 | 0 | | 0.00038 | 92 | 0.03505 |
| 64 | 551.13 | Low Intensity Developed | 61 | 75 | 83 | 87 | Urban land | 0 | 0 | | 0.00021 | 87 | 0.01851 |
| 65 | 1867.22 | High Intensity Developed | 89 | 92 | 94 | 95 | Urban land | 0 | 0 | | 0.00072 | 95 | 0.06849 |
| 66 | 17.75 | Low Intensity Developed | 61 | 75 | 83 | 87 | Urban land | 0 | 0 | | 0.00001 | 87 | 0.00060 |
| 67 | 940.37 | Medium Intensity Developed | 77 | 85 | 90 | 92 | Urban land | 0 | 0 | | 0.00036 | 92 | 0.03340 |
| 68 | 472.56 | Mixed Forest | 30 | 55 | 70 | 77 | Urban land | 0 | 0 | | 0.00018 | 77 | 0.01405 |
| 69 | 19927.14 | Scrub/Shrub | 30 | 48 | 65 | 73 | , 20 to 40 p | 25 | C | | 0.00769 | 65 | 0.50010 |
| 70 | 3600.00 | Low Intensity Developed | 61 | 75 | 83 | 87 | , 20 to 40 p | 25 | C | | 0.00139 | 83 | 0.11537 |
| 71 | 900.00 | Scrub/Shrub | 30 | 48 | 65 | 73 | , 20 to 40 p | 25 | C | | 0.00035 | 65 | 0.02259 |
| 72 | 172.73 | Grassland | 30 | 58 | 71 | 78 | , 20 to 40 p | 25 | C | | 0.00007 | 71 | 0.00473 |
| 73 | 900.00 | Scrub/Shrub | 30 | 48 | 65 | 73 | , 20 to 40 p | 25 | C | | 0.00035 | 65 | 0.02259 |
| 74 | 900.00 | Grassland | 30 | 58 | 71 | 78 | , 20 to 40 p | 25 | C | | 0.00035 | 71 | 0.02467 |
| 75 | 900.00 | Scrub/Shrub | 30 | 48 | 65 | 73 | , 20 to 40 p | 25 | C | | 0.00035 | 65 | 0.02259 |
| 76 | 900.00 | Grassland | 30 | 58 | 71 | 78 | , 20 to 40 p | 25 | C | | 0.00035 | 71 | 0.02467 |
| 77 | 19.75 | Low Intensity Developed | 61 | 75 | 83 | 87 | , 20 to 40 p | 25 | C | | 0.00001 | 83 | 0.00063 |
| 78 | 6872.08 | Scrub/Shrub | 30 | 48 | 65 | 73 | , 20 to 40 p | 25 | C | | 0.00265 | 65 | 0.17247 |
| 79 | 900.00 | Grassland | 30 | 58 | 71 | 78 | , 20 to 40 p | 25 | C | | 0.00035 | 71 | 0.02467 |
| 80 | 1203.06 | Grassland | 30 | 58 | 71 | 78 | , 20 to 40 p | 25 | C | | 0.00046 | 71 | 0.03298 |

| ITEM | AREA | LAND COVER | Curve Number | | | | MUSYM | muname | hydgrpdcd | | AREA, A | Curve | A × CN |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | ($m^2$) | (Coastal Change Analisys Program C-CAP) | A | B | C | D | (Soil Class) | (Soil Description) | | (H. Group) | | ($mi^2$) | Number, CN | |
| 81 | 24581.51 | Scrub/Shrub | 30 | 48 | 65 | 73 | , 20 to 40 p | 25 | C | | 0.00949 | 65 | 0.61691 |
| 82 | 2700.00 | Grassland | 30 | 58 | 71 | 78 | , 20 to 40 p | 25 | C | | 0.00104 | 71 | 0.07402 |
| 83 | 1800.00 | Grassland | 30 | 58 | 71 | 78 | , 20 to 40 p | 25 | C | | 0.00069 | 71 | 0.04934 |
| 84 | 2094.10 | Grassland | 30 | 58 | 71 | 78 | , 20 to 40 p | 25 | C | | 0.00081 | 71 | 0.05741 |
| 85 | 2700.00 | Low Intensity Developed | 61 | 75 | 83 | 87 | , 20 to 40 p | 25 | C | | 0.00104 | 83 | 0.08653 |
| 86 | 6300.00 | Scrub/Shrub | 30 | 48 | 65 | 73 | , 20 to 40 p | 25 | C | | 0.00243 | 65 | 0.15811 |
| 87 | 900.00 | Mixed Forest | 30 | 55 | 70 | 77 | , 20 to 40 p | 25 | C | | 0.00035 | 70 | 0.02432 |
| 88 | 900.00 | Scrub/Shrub | 30 | 48 | 65 | 73 | , 20 to 40 p | 25 | C | | 0.00035 | 65 | 0.02259 |
| 89 | 900.00 | Medium Intensity Developed | 77 | 85 | 90 | 92 | , 20 to 40 p | 25 | C | | 0.00035 | 90 | 0.03127 |
| 90 | 900.00 | Low Intensity Developed | 61 | 75 | 83 | 87 | , 20 to 40 p | 25 | C | | 0.00035 | 83 | 0.02884 |
| 91 | 2700.00 | Grassland | 30 | 58 | 71 | 78 | , 20 to 40 p | 25 | C | | 0.00104 | 71 | 0.07402 |
| 92 | 900.00 | Grassland | 30 | 58 | 71 | 78 | , 20 to 40 p | 25 | C | | 0.00035 | 71 | 0.02467 |
| 93 | 900.00 | Grassland | 30 | 58 | 71 | 78 | , 20 to 40 p | 25 | C | | 0.00035 | 71 | 0.02467 |
| 94 | 2700.00 | Scrub/Shrub | 30 | 48 | 65 | 73 | , 20 to 40 p | 25 | C | | 0.00104 | 65 | 0.06776 |
| 95 | 900.00 | Grassland | 30 | 58 | 71 | 78 | , 20 to 40 p | 25 | C | | 0.00035 | 71 | 0.02467 |
| 96 | 900.00 | Low Intensity Developed | 61 | 75 | 83 | 87 | , 20 to 40 p | 25 | C | | 0.00035 | 83 | 0.02884 |
| 97 | 2379.75 | Pasture/Hay | 39 | 61 | 74 | 80 | , 20 to 40 p | 25 | C | | 0.00092 | 74 | 0.06799 |
| 98 | 6300.00 | Pasture/Hay | 39 | 61 | 74 | 80 | , 20 to 40 p | 25 | C | | 0.00243 | 74 | 0.18000 |
| 99 | 2700.00 | Scrub/Shrub | 30 | 48 | 65 | 73 | , 20 to 40 p | 25 | C | | 0.00104 | 65 | 0.06776 |
| 100 | 900.00 | Mixed Forest | 30 | 55 | 70 | 77 | , 20 to 40 p | 25 | C | | 0.00035 | 70 | 0.02432 |
| 101 | 900.00 | Mixed Forest | 30 | 55 | 70 | 77 | , 20 to 40 p | 25 | C | | 0.00035 | 70 | 0.02432 |
| 102 | 900.00 | Grassland | 30 | 58 | 71 | 78 | , 20 to 40 p | 25 | C | | 0.00035 | 71 | 0.02467 |
| 103 | 389.41 | Scrub/Shrub | 30 | 48 | 65 | 73 | , 20 to 40 p | 25 | C | | 0.00015 | 65 | 0.00977 |
| 104 | 2700.00 | Scrub/Shrub | 30 | 48 | 65 | 73 | , 20 to 40 p | 25 | C | | 0.00104 | 65 | 0.06776 |
| 105 | 8100.00 | Pasture/Hay | 39 | 61 | 74 | 80 | , 20 to 40 p | 25 | C | | 0.00313 | 74 | 0.23143 |
| 106 | 1800.00 | Scrub/Shrub | 30 | 48 | 65 | 73 | , 20 to 40 p | 25 | C | | 0.00069 | 65 | 0.04517 |
| 107 | 900.00 | Low Intensity Developed | 61 | 75 | 83 | 87 | , 20 to 40 p | 25 | C | | 0.00035 | 83 | 0.02884 |
| 108 | 900.00 | Scrub/Shrub | 30 | 48 | 65 | 73 | , 20 to 40 p | 25 | C | | 0.00035 | 65 | 0.02259 |
| 109 | 1800.00 | Low Intensity Developed | 61 | 75 | 83 | 87 | , 20 to 40 p | 25 | C | | 0.00069 | 83 | 0.05768 |
| 110 | 889.25 | Low Intensity Developed | 61 | 75 | 83 | 87 | , 20 to 40 p | 25 | C | | 0.00034 | 83 | 0.02850 |
| 111 | 900.00 | Mixed Forest | 30 | 55 | 70 | 77 | , 20 to 40 p | 25 | C | | 0.00035 | 70 | 0.02432 |
| 112 | 900.00 | Mixed Forest | 30 | 55 | 70 | 77 | , 20 to 40 p | 25 | C | | 0.00035 | 70 | 0.02432 |
| 113 | 7200.00 | Grassland | 30 | 58 | 71 | 78 | , 20 to 40 p | 25 | C | | 0.00278 | 71 | 0.19738 |
| 114 | 535.25 | Low Intensity Developed | 61 | 75 | 83 | 87 | , 20 to 40 p | 25 | C | | 0.00021 | 83 | 0.01715 |
| 115 | 50459.29 | Scrub/Shrub | 30 | 48 | 65 | 73 | , 20 to 40 p | 25 | C | | 0.01948 | 65 | 1.26636 |
| 116 | 1800.00 | Scrub/Shrub | 30 | 48 | 65 | 73 | , 20 to 40 p | 25 | C | | 0.00069 | 65 | 0.04517 |
| 117 | 882.75 | Medium Intensity Developed | 77 | 85 | 90 | 92 | , 20 to 40 p | 25 | C | | 0.00034 | 90 | 0.03067 |
| 118 | 55.75 | Scrub/Shrub | 30 | 48 | 65 | 73 | , 20 to 40 p | 25 | C | | 0.00002 | 65 | 0.00140 |
| 119 | 1662.08 | Low Intensity Developed | 61 | 75 | 83 | 87 | , 20 to 40 p | 25 | C | | 0.00064 | 83 | 0.05326 |
| 120 | 4317.50 | Mixed Forest | 30 | 55 | 70 | 77 | , 20 to 40 p | 25 | C | | 0.00167 | 70 | 0.11669 |
| 121 | 876.93 | Scrub/Shrub | 30 | 48 | 65 | 73 | , 20 to 40 p | 25 | C | | 0.00034 | 65 | 0.02201 |
| 122 | 607008.51 | Mixed Forest | 30 | 55 | 70 | 77 | , 20 to 40 p | 25 | C | | 0.23437 | 70 | 16.40571 |
| 123 | 2.66 | Pasture/Hay | 39 | 61 | 74 | 80 | , 20 to 40 p | 25 | C | | 0.00000 | 74 | 0.00008 |
| 124 | 2791.72 | Medium Intensity Developed | 77 | 85 | 90 | 92 | , 20 to 40 p | 25 | C | | 0.00108 | 90 | 0.09701 |
| 125 | 28.44 | Medium Intensity Developed | 77 | 85 | 90 | 92 | , 20 to 40 p | 25 | C | | 0.00001 | 90 | 0.00099 |
| 126 | 919.03 | Mixed Forest | 30 | 55 | 70 | 77 | , 20 to 40 p | 25 | C | | 0.00035 | 70 | 0.02484 |
| 127 | 6578.47 | Low Intensity Developed | 61 | 75 | 83 | 87 | , 20 to 40 p | 25 | C | | 0.00254 | 83 | 0.21082 |
| 128 | 2669.92 | Scrub/Shrub | 30 | 48 | 65 | 73 | , 20 to 40 p | 25 | C | | 0.00103 | 65 | 0.06701 |
| 129 | 2700.00 | Mixed Forest | 30 | 55 | 70 | 77 | , 20 to 40 p | 25 | C | | 0.00104 | 70 | 0.07297 |
| 130 | 4500.00 | Medium Intensity Developed | 77 | 85 | 90 | 92 | , 20 to 40 p | 25 | C | | 0.00174 | 90 | 0.15637 |
| 131 | 1800.00 | Low Intensity Developed | 61 | 75 | 83 | 87 | , 20 to 40 p | 25 | C | | 0.00069 | 83 | 0.05768 |
| 132 | 1599.63 | Developed Open Space | 49 | 69 | 79 | 84 | , 20 to 40 p | 25 | C | | 0.00062 | 79 | 0.04879 |
| 133 | 3220.15 | Pasture/Hay | 39 | 61 | 74 | 80 | , 20 to 40 p | 25 | C | | 0.00124 | 74 | 0.09200 |
| 134 | 1800.00 | Scrub/Shrub | 30 | 48 | 65 | 73 | , 20 to 40 p | 25 | C | | 0.00069 | 65 | 0.04517 |
| 135 | 3600.00 | Mixed Forest | 30 | 55 | 70 | 77 | , 20 to 40 p | 25 | C | | 0.00139 | 70 | 0.09730 |
| 136 | 3600.00 | Grassland | 30 | 58 | 71 | 78 | , 20 to 40 p | 25 | C | | 0.00139 | 71 | 0.09869 |
| 137 | 900.00 | Scrub/Shrub | 30 | 48 | 65 | 73 | , 20 to 40 p | 25 | C | | 0.00035 | 65 | 0.02259 |
| 138 | 532.10 | Mixed Forest | 30 | 55 | 70 | 77 | , 20 to 40 p | 25 | C | | 0.00021 | 70 | 0.01438 |
| 139 | 900.00 | Scrub/Shrub | 30 | 48 | 65 | 73 | , 20 to 40 p | 25 | C | | 0.00035 | 65 | 0.02259 |
| 140 | 9113.15 | Grassland | 30 | 58 | 71 | 78 | , 20 to 40 p | 25 | C | | 0.00352 | 71 | 0.24982 |
| 141 | 645.73 | Scrub/Shrub | 30 | 48 | 65 | 73 | , 20 to 40 p | 25 | C | | 0.00025 | 65 | 0.01621 |
| 142 | 12205.19 | Mixed Forest | 30 | 55 | 70 | 77 | , 20 to 40 p | 25 | C | | 0.00471 | 70 | 0.32987 |
| 143 | 1581.00 | Scrub/Shrub | 30 | 48 | 65 | 73 | , 40 to 60 p | 25 | C | | 0.00061 | 65 | 0.03968 |
| 144 | 5140.52 | Grassland | 30 | 58 | 71 | 78 | , 40 to 60 p | 25 | C | | 0.00198 | 71 | 0.14092 |
| 145 | 1227.92 | Scrub/Shrub | 30 | 48 | 65 | 73 | , 40 to 60 p | 25 | C | | 0.00047 | 65 | 0.03082 |
| 146 | 5096.94 | Grassland | 30 | 58 | 71 | 78 | , 40 to 60 p | 25 | C | | 0.00197 | 71 | 0.13972 |
| 147 | 14099.46 | Scrub/Shrub | 30 | 48 | 65 | 73 | , 40 to 60 p | 25 | C | | 0.00544 | 65 | 0.35385 |
| 148 | 605.90 | Grassland | 30 | 58 | 71 | 78 | , 40 to 60 p | 25 | C | | 0.00023 | 71 | 0.01661 |
| 149 | 167438.89 | Mixed Forest | 30 | 55 | 70 | 77 | , 40 to 60 p | 25 | C | | 0.06465 | 70 | 4.52540 |
| 150 | 2254.85 | Scrub/Shrub | 30 | 48 | 65 | 73 | lay, 2 to 12 | 0 | D | | 0.00087 | 73 | 0.06355 |
| 151 | 443.85 | Low Intensity Developed | 61 | 75 | 83 | 87 | lay, 2 to 12 | 0 | D | | 0.00017 | 87 | 0.01491 |
| 152 | 519.14 | Mixed Forest | 30 | 55 | 70 | 77 | lay, 2 to 12 | 0 | D | | 0.00020 | 77 | 0.01543 |
| 153 | 94.58 | Low Intensity Developed | 61 | 75 | 83 | 87 | lay, 2 to 12 | 0 | D | | 0.00004 | 87 | 0.00318 |
| 154 | 7189.04 | Grassland | 30 | 58 | 71 | 78 | lay, 2 to 12 | 0 | D | | 0.00278 | 78 | 0.21650 |
| 155 | 811.80 | Mixed Forest | 30 | 55 | 70 | 77 | lay, 2 to 12 | 0 | D | | 0.00031 | 77 | 0.02413 |
| 156 | 168.78 | Low Intensity Developed | 61 | 75 | 83 | 87 | lay, 2 to 12 | 0 | D | | 0.00007 | 87 | 0.00567 |
| 157 | 204.12 | High Intensity Developed | 89 | 92 | 94 | 95 | lay, 2 to 12 | 0 | D | | 0.00008 | 95 | 0.00749 |
| 158 | 453.84 | Low Intensity Developed | 61 | 75 | 83 | 87 | lay, 2 to 12 | 0 | D | | 0.00018 | 87 | 0.01524 |
| 159 | 1749.65 | Mixed Forest | 30 | 55 | 70 | 77 | lay, 2 to 12 | 0 | D | | 0.00068 | 77 | 0.05202 |
| 160 | 813.29 | Low Intensity Developed | 61 | 75 | 83 | 87 | lay, 2 to 12 | 0 | D | | 0.00031 | 87 | 0.02732 |
| 161 | 42.88 | Medium Intensity Developed | 77 | 85 | 90 | 92 | lay, 2 to 12 | 0 | D | | 0.00002 | 92 | 0.00152 |

| ITEM | AREA | LAND COVER | Curve Number | | | | MUSYM | muname | hydgrpdcd | | AREA, A | Curve | A × CN |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | ($m^2$) | (Coastal Change Analisys Program C-CAP) | A | B | C | D | (Soil Class) | (Soil Description) | (H. Group) | | ($mi^2$) | Number, CN | |
| 162 | 402.56 | Low Intensity Developed | 61 | 75 | 83 | 87 | lay, 2 to 12 | 0 | D | | 0.00016 | 87 | 0.01352 |
| 163 | 900.00 | Mixed Forest | 30 | 55 | 70 | 77 | lay, 2 to 12 | 0 | D | | 0.00035 | 77 | 0.02676 |
| 164 | 348.87 | Low Intensity Developed | 61 | 75 | 83 | 87 | lay, 2 to 12 | 0 | D | | 0.00013 | 87 | 0.01172 |
| 165 | 3.15 | Medium Intensity Developed | 77 | 85 | 90 | 92 | lay, 2 to 12 | 0 | D | | 0.00000 | 92 | 0.00011 |
| 166 | 721.50 | Low Intensity Developed | 61 | 75 | 83 | 87 | lay, 2 to 12 | 0 | D | | 0.00028 | 87 | 0.02424 |
| 167 | 184.07 | Low Intensity Developed | 61 | 75 | 83 | 87 | lay, 2 to 12 | 0 | D | | 0.00007 | 87 | 0.00618 |
| 168 | 22.80 | Medium Intensity Developed | 77 | 85 | 90 | 92 | lay, 2 to 12 | 0 | D | | 0.00001 | 92 | 0.00081 |
| 169 | 4279.19 | Pasture/Hay | 39 | 61 | 74 | 80 | lay, 2 to 12 | 0 | D | | 0.00165 | 80 | 0.13218 |
| 170 | 1786.43 | Mixed Forest | 30 | 55 | 70 | 77 | lay, 2 to 12 | 0 | D | | 0.00069 | 77 | 0.05311 |
| 171 | 2084.86 | Mixed Forest | 30 | 55 | 70 | 77 | lay, 2 to 12 | 0 | D | | 0.00080 | 77 | 0.06198 |
| 172 | 10.96 | Grassland | 30 | 58 | 71 | 78 | ex, 20 to 60 | 28 | D | | 0.00000 | 78 | 0.00033 |
| 173 | 422.50 | Low Intensity Developed | 61 | 75 | 83 | 87 | ex, 20 to 60 | 28 | D | | 0.00016 | 87 | 0.01419 |
| 174 | 1346.16 | Low Intensity Developed | 61 | 75 | 83 | 87 | ex, 20 to 60 | 28 | D | | 0.00052 | 87 | 0.04522 |
| 175 | 497.44 | Low Intensity Developed | 61 | 75 | 83 | 87 | ex, 20 to 60 | 28 | D | | 0.00019 | 87 | 0.01671 |
| 176 | 150.30 | Grassland | 30 | 58 | 71 | 78 | ex, 20 to 60 | 28 | D | | 0.00006 | 78 | 0.00453 |
| 177 | 1800.00 | Low Intensity Developed | 61 | 75 | 83 | 87 | ex, 20 to 60 | 28 | D | | 0.00069 | 87 | 0.06046 |
| 178 | 896.85 | Medium Intensity Developed | 77 | 85 | 90 | 92 | ex, 20 to 60 | 28 | D | | 0.00035 | 92 | 0.03186 |
| 179 | 1078.50 | Low Intensity Developed | 61 | 75 | 83 | 87 | ex, 20 to 60 | 28 | D | | 0.00042 | 87 | 0.03623 |
| 180 | 900.00 | High Intensity Developed | 89 | 92 | 94 | 95 | ex, 20 to 60 | 28 | D | | 0.00035 | 95 | 0.03301 |
| 181 | 900.00 | Mixed Forest | 30 | 55 | 70 | 77 | ex, 20 to 60 | 28 | D | | 0.00035 | 77 | 0.02676 |
| 182 | 715.93 | Low Intensity Developed | 61 | 75 | 83 | 87 | ex, 20 to 60 | 28 | D | | 0.00028 | 87 | 0.02405 |
| 183 | 136.33 | Medium Intensity Developed | 77 | 85 | 90 | 92 | ex, 20 to 60 | 28 | D | | 0.00005 | 92 | 0.00484 |
| 184 | 2018.15 | Pasture/Hay | 39 | 61 | 74 | 80 | ex, 20 to 60 | 28 | D | | 0.00078 | 80 | 0.06234 |
| 185 | 1708.28 | Medium Intensity Developed | 77 | 85 | 90 | 92 | ex, 20 to 60 | 28 | D | | 0.00066 | 92 | 0.06068 |
| 186 | 871.56 | Medium Intensity Developed | 77 | 85 | 90 | 92 | ex, 20 to 60 | 28 | D | | 0.00034 | 92 | 0.03096 |
| 187 | 12543.70 | Mixed Forest | 30 | 55 | 70 | 77 | ex, 20 to 60 | 28 | D | | 0.00484 | 77 | 0.37292 |
| 188 | 621.53 | Low Intensity Developed | 61 | 75 | 83 | 87 | ex, 20 to 60 | 28 | D | | 0.00024 | 87 | 0.02088 |
| 189 | 9401.00 | Scrub/Shrub | 30 | 48 | 65 | 73 | ex, 20 to 60 | 28 | D | | 0.00363 | 73 | 0.26497 |
| 190 | 200.37 | Developed Open Space | 49 | 69 | 79 | 84 | ex, 20 to 60 | 28 | D | | 0.00008 | 84 | 0.00650 |
| 191 | 45.82 | Scrub/Shrub | 30 | 48 | 65 | 73 | ex, 20 to 60 | 28 | D | | 0.00002 | 73 | 0.00129 |
| 192 | 15408.80 | Mixed Forest | 30 | 55 | 70 | 77 | ex, 20 to 60 | 28 | D | | 0.00595 | 77 | 0.45810 |
| | | | | | | | | | **TOTAL** | | **0.711** | | **49.98** |
| | | | | | | | | | **WEIGHTED CURVE NUMBER** | | | | **71** |

## Time of Concentration and Travel Time

**Sheet Flow**

Surface description: Smooth surfaces (concrete, asphalt, gravel, or bare soil)

| | |
|---|---|
| Flow length, L (ft) (maximum of 300 feet) | 98.43 |
| 2-year, 24-hour rainfall, $P_2$ (in) | 4.38 |
| Slope of hydraulic grade line, s (ft/ft) | 0.031 |
| Manning's roughness coefficient, n | 0.011 |
| Travel time, $T_t$ (hr) | 0.014 |

**Shallow Concentrated Flow**

| | |
|---|---|
| Watercourse slope, s (ft/ft) | 0.158703 |
| Flow length, L (ft) | 1032.039 |
| Type of channel | Paved |
| Average velocity, V (ft/s) | 8.10 |
| Travel time, $T_t$ (hr) | 0.035 |
| Watercourse slope, s (ft/ft) | 0.232014 |
| Flow length, L (ft) | 924.8483 |
| Type of channel | Unpaved |
| Average velocity, V (ft/s) | 6.43 |
| Travel time, $T_t$ (hr) | 0.040 |

**Open Channels**

Average velocity, V (ft/s)
Cross sectional flow area, a ($ft^2$)
Wetted perimeter, $p_w$ (ft)
Slope of the hydraulic grade line (channel slope, ft/ft), s
Manning's roughness coefficient for open channel flow, n
Flow length, L (ft)
Travel time, $T_t$ (hr)

| Channel | a | $p_w$ | s | L | n | r | V | $T_t$ |
|---|---|---|---|---|---|---|---|---|
| 1 | 261.1325 | 55.022 | 0.028 | 5133.32 | 0.06 | 4.746 | 11.828 | 0.121 |
| 2 | 510.7475 | 66.047 | 0.013 | 3733.48 | 0.045 | 7.733 | 14.667 | 0.071 |
| 3 | | | | | | | | |

Travel time, $T_t$ (hr) 0.191

**Time of Concentration**

| | |
|---|---|
| Time of concentration, $T_c$ (min) | 16.856 |
| Lag time, $T_L$ (min) | 10.114 |

**Project:** Pr122
**Simulation Run:** 100_S1
**Simulation Start:** 31 December 1999, 24:00
**Simulation End:** 1 January 2000, 04:00

**HMS Version:** 4.10
**Executed:** 16 November 2022, 18:44

## Global Parameter Summary - Subbasin

**Location**

| Element Name | Longitude Degrees | Latitude Degrees |
|---|---|---|
| Subbasin - 4 | -67.03 | 18.07 |
| Subbasin - 1 | -67.04 | 18.06 |
| Subbasin - 2 | -67.05 | 18.07 |
| Subbasin - 3 | -67.04 | 18.07 |

**Area (KM2)**

| Element Name | Area (KM2) |
|---|---|
| Subbasin - 4 | 1.84 |
| Subbasin - 1 | 1.09 |
| Subbasin - 2 | 0.14 |
| Subbasin - 3 | 0.35 |

**Downstream**

| Element Name | Downstream |
|---|---|
| Subbasin - 4 | Sink - 2 |
| Subbasin - 1 | Reach - 1 |
| Subbasin - 2 | Junction - 1 |
| Subbasin - 3 | Sink - 1 |

**Loss Rate: Scs**

| Element Name | Percent Impervious Area | Curve Number |
|---|---|---|
| Subbasin - 4 | 0 | 71 |
| Subbasin - 1 | 0 | 77 |
| Subbasin - 2 | 0 | 78 |
| Subbasin - 3 | 0 | 71 |

**Transform: Scs**

| Element Name | Lag | Unitgraph Type |
|---|---|---|
| Subbasin - 4 | 10.11 | Standard |
| Subbasin - 1 | 17.13 | Standard |
| Subbasin - 2 | 7.77 | Standard |
| Subbasin - 3 | 13.52 | Standard |

## Global Parameter Summary - Reach

**Downstream**

| Element Name | Downstream |
|---|---|
| Reach - 1 | Junction - 1 |
| Reach - 2 | Sink - 1 |

**Route: Lag**

| Element Name | Method | Initial Variable | Lag |
|---|---|---|---|
| Reach - 1 | Lag | Combined Inflow | 1 |
| Reach - 2 | Lag | Combined Inflow | 1 |

## Global Results Summary

| Hydrologic Element | Drainage Area (KM2) | Peak Discharge (M3/S) | Time of Peak | Volume (MM) |
|---|---|---|---|---|
| Subbasin - 4 | 1.84 | 26.52 | 01Jan2000, 00:27 | 37.06 |
| Sink - 2 | 1.84 | 26.52 | 01Jan2000, 00:27 | 37.06 |
| Subbasin - 1 | 1.09 | 17.68 | 01Jan2000, 00:37 | 47.91 |
| Reach - 1 | 1.09 | 17.68 | 01Jan2000, 00:38 | 47.91 |
| Subbasin - 2 | 0.14 | 3.1 | 01Jan2000, 00:23 | 49.85 |
| Junction - 1 | 1.23 | 19.87 | 01Jan2000, 00:37 | 48.12 |
| Reach - 2 | 1.23 | 19.87 | 01Jan2000, 00:38 | 48.12 |
| Subbasin - 3 | 0.35 | 4.57 | 01Jan2000, 00:33 | 37.06 |
| Sink - 1 | 1.57 | 24.36 | 01Jan2000, 00:38 | 45.67 |

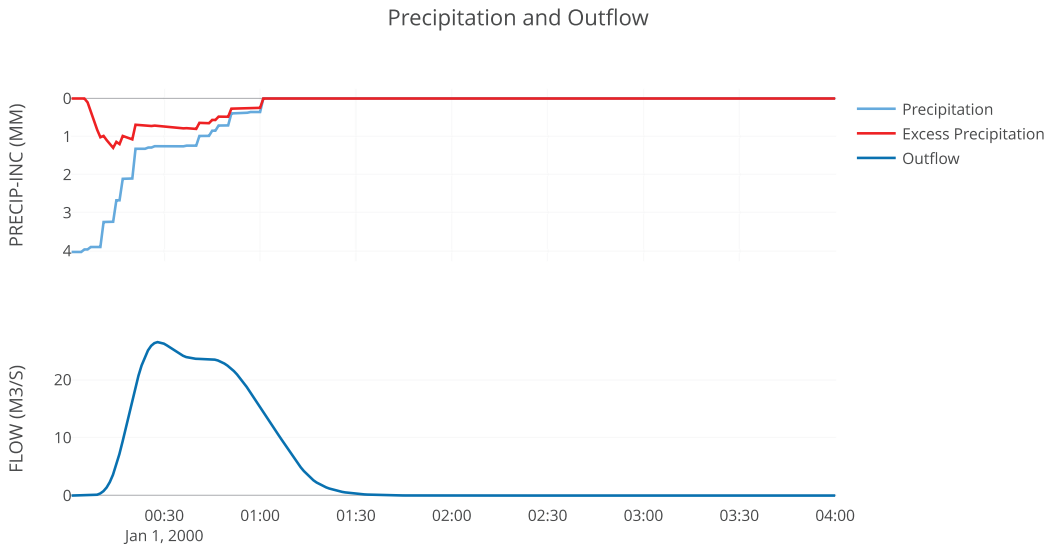
# Subbasin: Subbasin-4

**Area (KM2)** : 1.84
**Latitude Degrees** : 18.07
**Longitude Degrees** : -67.03
**Downstream** : Sink - 2

| Loss Rate: Scs | |
|---|---|
| Percent Impervious Area | 0 |
| Curve Number | 71 |

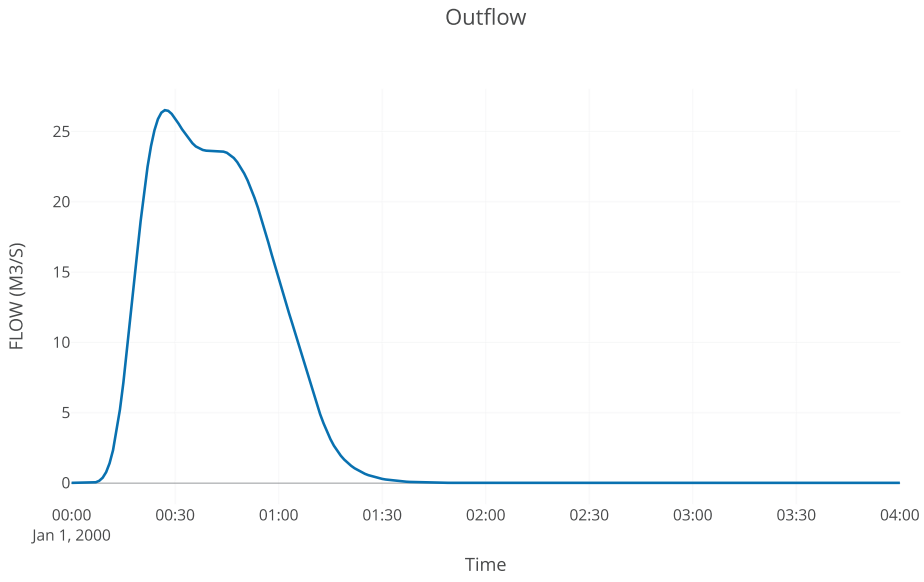
| Transform: Scs | |
|---|---|
| Lag | 10.11 |
| Unitgraph Type | Standard |

| Results: Subbasin-4 | |
|---|---|
| Peak Discharge (M3/S) | 26.52 |
| Time of Peak Discharge | 01Jan2000, 00:27 |
| Volume (MM) | 37.06 |
| Precipitation Volume (M3) | 1.91E5 |
| Loss Volume (M3) | 1.23E5 |
| Excess Volume (M3) | 68221.9 |
| Direct Runoff Volume (M3) | 68221.9 |
| Baseflow Volume (M3) | 0 |



## Sink: Sink-2

| Results: Sink-2 | |
|---|---|
| Peak Discharge (M3/S) | 26.52 |
| Time of Peak Discharge | 01Jan2000, 00:27 |
| Volume (MM) | 37.06 |



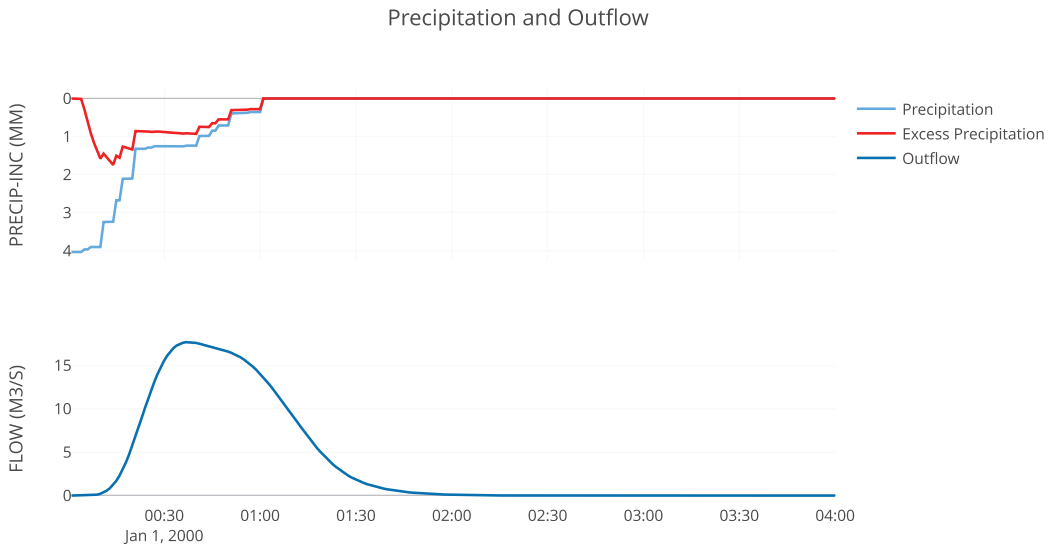
# Subbasin: Subbasin-1

**Area (KM2)** : 1.09
**Latitude Degrees** : 18.06
**Longitude Degrees** : -67.04
**Downstream** : Reach - 1

| Loss Rate: Scs | |
|---|---|
| Percent Impervious Area | 0 |
| Curve Number | 77 |

| Transform: Scs | |
|---|---|
| Lag | 17.13 |
| Unitgraph Type | Standard |

| Results: Subbasin-1 | |
|---|---|
| Peak Discharge (M3/S) | 17.68 |
| Time of Peak Discharge | 01Jan2000, 00:37 |
| Volume (MM) | 47.91 |
| Precipitation Volume (M3) | 1.13E5 |
| Loss Volume (M3) | 61035.07 |
| Excess Volume (M3) | 52127.33 |
| Direct Runoff Volume (M3) | 52127.33 |
| Baseflow Volume (M3) | 0 |



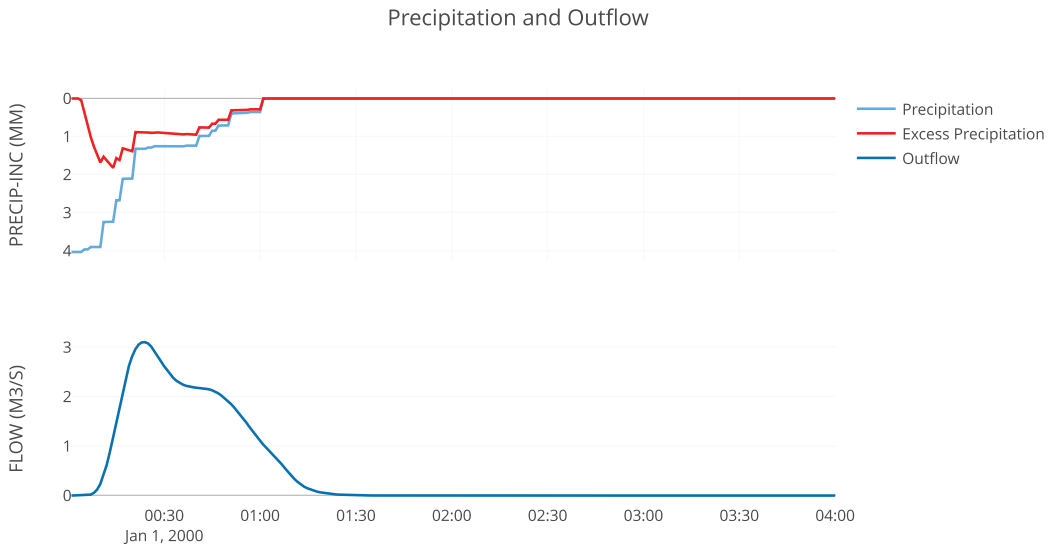
# Subbasin: Subbasin-2

**Area (KM2)** : 0.14
**Latitude Degrees** : 18.07
**Longitude Degrees** : -67.05
**Downstream** : Junction - 1

| Loss Rate: Scs | |
|---|---|
| Percent Impervious Area | 0 |
| Curve Number | 78 |

| Transform: Scs | |
|---|---|
| Lag | 7.77 |
| Unitgraph Type | Standard |

| Results: Subbasin-2 | |
|---|---|
| Peak Discharge (M3/S) | 3.1 |
| Time of Peak Discharge | 01Jan2000, 00:23 |
| Volume (MM) | 49.85 |
| Precipitation Volume (M3) | 14293.76 |
| Loss Volume (M3) | 7442.73 |
| Excess Volume (M3) | 6851.03 |
| Direct Runoff Volume (M3) | 6851.03 |
| Baseflow Volume (M3) | 0 |



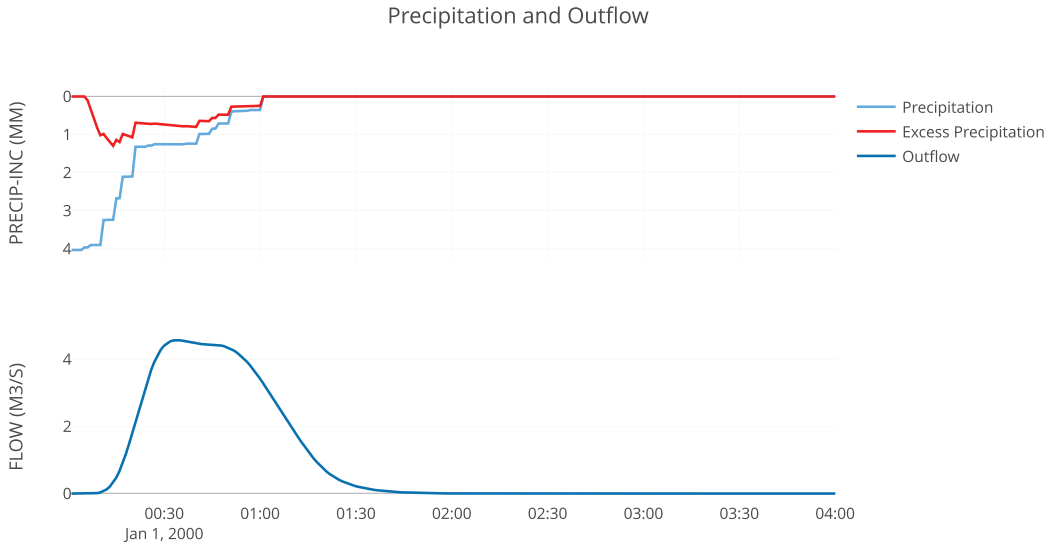
# Subbasin: Subbasin-3

**Area (KM2)** : 0.35
**Latitude Degrees** : 18.07
**Longitude Degrees** : -67.04
**Downstream** : Sink - 1

| Loss Rate: Scs | |
|---|---|
| Percent Impervious Area | 0 |
| Curve Number | 71 |

| Transform: Scs | |
|---|---|
| Lag | 13.52 |
| Unitgraph Type | Standard |

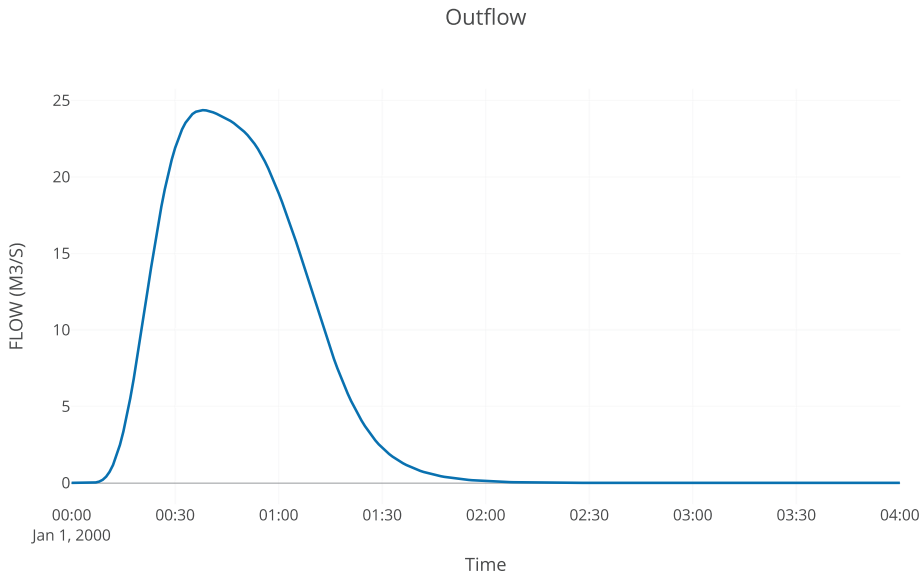
| Results: Subbasin-3 | |
|---|---|
| Peak Discharge (M3/S) | 4.57 |
| Time of Peak Discharge | 01Jan2000, 00:33 |
| Volume (MM) | 37.06 |
| Precipitation Volume (M3) | 36305.36 |
| Loss Volume (M3) | 23367.03 |
| Excess Volume (M3) | 12938.33 |
| Direct Runoff Volume (M3) | 12938.33 |
| Baseflow Volume (M3) | 0 |



# Sink: Sink-1

**Results: Sink-1**

| | |
|---|---|
| Peak Discharge (M3/S) | 24.36 |
| Time of Peak Discharge | 01Jan2000, 00:38 |
| Volume (MM) | 45.67 |



**Project:** Pr122
**Simulation Run:** 100_S2
**Simulation Start:** 31 December 1999, 24:00
**Simulation End:** 1 January 2000, 04:00

**HMS Version:** 4.10
**Executed:** 16 November 2022, 18:44

## Global Parameter Summary - Subbasin

**Location**

| Element Name | Longitude Degrees | Latitude Degrees |
|---|---|---|
| Subbasin - 4 | -67.03 | 18.07 |
| Subbasin - 1 | -67.04 | 18.06 |
| Subbasin - 2 | -67.05 | 18.07 |
| Subbasin - 3 | -67.04 | 18.07 |

**Area (KM2)**

| Element Name | Area (KM2) |
|---|---|
| Subbasin - 4 | 1.84 |
| Subbasin - 1 | 1.09 |
| Subbasin - 2 | 0.14 |
| Subbasin - 3 | 0.35 |

**Downstream**

| Element Name | Downstream |
|---|---|
| Subbasin - 4 | Sink - 2 |
| Subbasin - 1 | Reach - 1 |
| Subbasin - 2 | Junction - 1 |
| Subbasin - 3 | Sink - 1 |

**Loss Rate: Scs**

| Element Name | Percent Impervious Area | Curve Number |
|---|---|---|
| Subbasin - 4 | 0 | 71 |
| Subbasin - 1 | 0 | 77 |
| Subbasin - 2 | 0 | 78 |
| Subbasin - 3 | 0 | 71 |

**Transform: Scs**

| Element Name | Lag | Unitgraph Type |
|---|---|---|
| Subbasin - 4 | 10.11 | Standard |
| Subbasin - 1 | 17.13 | Standard |
| Subbasin - 2 | 7.77 | Standard |
| Subbasin - 3 | 13.52 | Standard |

## Global Parameter Summary - Reach

**Downstream**

| Element Name | Downstream |
|---|---|
| Reach - 1 | Junction - 1 |
| Reach - 2 | Sink - 1 |

**Route: Lag**

| Element Name | Method | Initial Variable | Lag |
|---|---|---|---|
| Reach - 1 | Lag | Combined Inflow | 1 |
| Reach - 2 | Lag | Combined Inflow | 1 |

## Global Results Summary

| Hydrologic Element | Drainage Area (KM2) | Peak Discharge (M3/S) | Time of Peak | Volume (MM) |
|---|---|---|---|---|
| Subbasin - 4 | 1.84 | 61.43 | 01Jan2000, 01:05 | 37.06 |
| Sink - 2 | 1.84 | 61.43 | 01Jan2000, 01:05 | 37.06 |
| Subbasin - 1 | 1.09 | 32.08 | 01Jan2000, 01:11 | 47.91 |
| Reach - 1 | 1.09 | 32.08 | 01Jan2000, 01:12 | 47.91 |
| Subbasin - 2 | 0.14 | 6.57 | 01Jan2000, 01:03 | 49.85 |
| Junction - 1 | 1.23 | 34.61 | 01Jan2000, 01:11 | 48.12 |
| Reach - 2 | 1.23 | 34.61 | 01Jan2000, 01:12 | 48.12 |
| Subbasin - 3 | 0.35 | 9.73 | 01Jan2000, 01:08 | 37.06 |
| Sink - 1 | 1.57 | 43.78 | 01Jan2000, 01:11 | 45.67 |

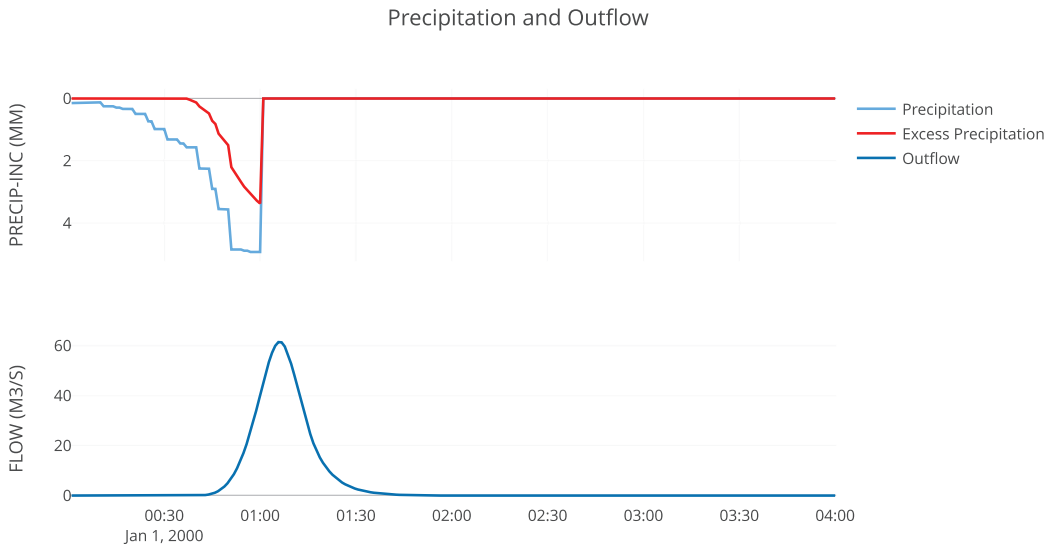
# Subbasin: Subbasin-4

**Area (KM2)** : 1.84
**Latitude Degrees** : 18.07
**Longitude Degrees** : -67.03
**Downstream** : Sink - 2

| Loss Rate: Scs | |
|---|---|
| Percent Impervious Area | 0 |
| Curve Number | 71 |

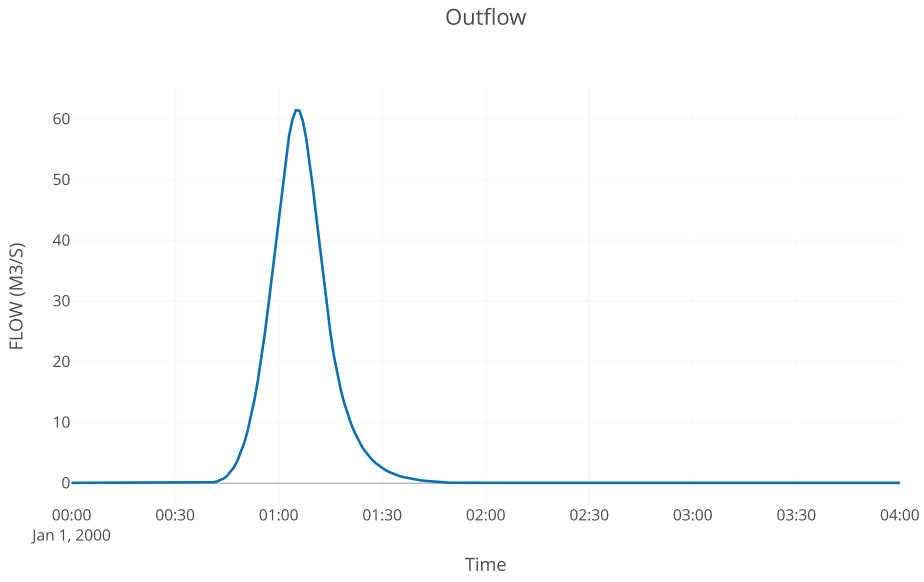
| Transform: Scs | |
|---|---|
| Lag | 10.11 |
| Unitgraph Type | Standard |

| Results: Subbasin-4 | |
|---|---|
| Peak Discharge (M3/S) | 61.43 |
| Time of Peak Discharge | 01Jan2000, 01:05 |
| Volume (MM) | 37.06 |
| Precipitation Volume (M3) | 1.91E5 |
| Loss Volume (M3) | 1.23E5 |
| Excess Volume (M3) | 68221.9 |
| Direct Runoff Volume (M3) | 68221.9 |
| Baseflow Volume (M3) | 0 |



## Sink: Sink-2

| Results: Sink-2 | |
|---|---|
| Peak Discharge (M3/S) | 61.43 |
| Time of Peak Discharge | 01Jan2000, 01:05 |
| Volume (MM) | 37.06 |



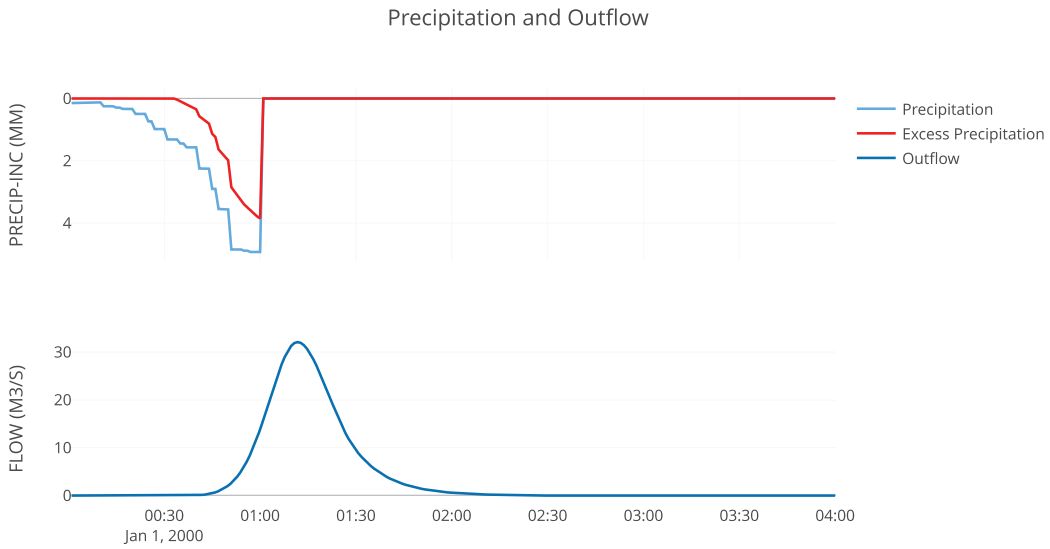
# Subbasin: Subbasin-1

**Area (KM2)** : 1.09
**Latitude Degrees** : 18.06
**Longitude Degrees** : -67.04
**Downstream** : Reach - 1

| Loss Rate: Scs | |
|---|---|
| Percent Impervious Area | 0 |
| Curve Number | 77 |

| Transform: Scs | |
|---|---|
| Lag | 17.13 |
| Unitgraph Type | Standard |

| Results: Subbasin-1 | |
|---|---|
| Peak Discharge (M3/S) | 32.08 |
| Time of Peak Discharge | 01Jan2000, 01:11 |
| Volume (MM) | 47.91 |
| Precipitation Volume (M3) | 1.13E5 |
| Loss Volume (M3) | 61035.07 |
| Excess Volume (M3) | 52127.33 |
| Direct Runoff Volume (M3) | 52127.33 |
| Baseflow Volume (M3) | 0 |



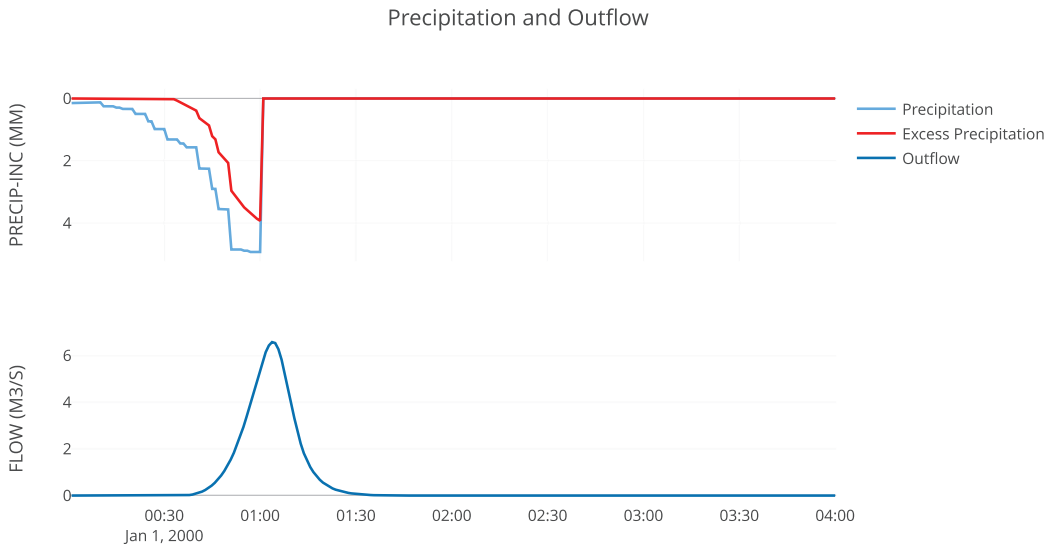
# Subbasin: Subbasin-2

**Area (KM2)** : 0.14
**Latitude Degrees** : 18.07
**Longitude Degrees** : -67.05
**Downstream** : Junction - 1

| Loss Rate: Scs | |
|---|---|
| Percent Impervious Area | 0 |
| Curve Number | 78 |

| Transform: Scs | |
|---|---|
| Lag | 7.77 |
| Unitgraph Type | Standard |

| Results: Subbasin-2 | |
|---|---|
| Peak Discharge (M3/S) | 6.57 |
| Time of Peak Discharge | 01Jan2000, 01:03 |
| Volume (MM) | 49.85 |
| Precipitation Volume (M3) | 14293.76 |
| Loss Volume (M3) | 7442.73 |
| Excess Volume (M3) | 6851.03 |
| Direct Runoff Volume (M3) | 6851.03 |
| Baseflow Volume (M3) | 0 |



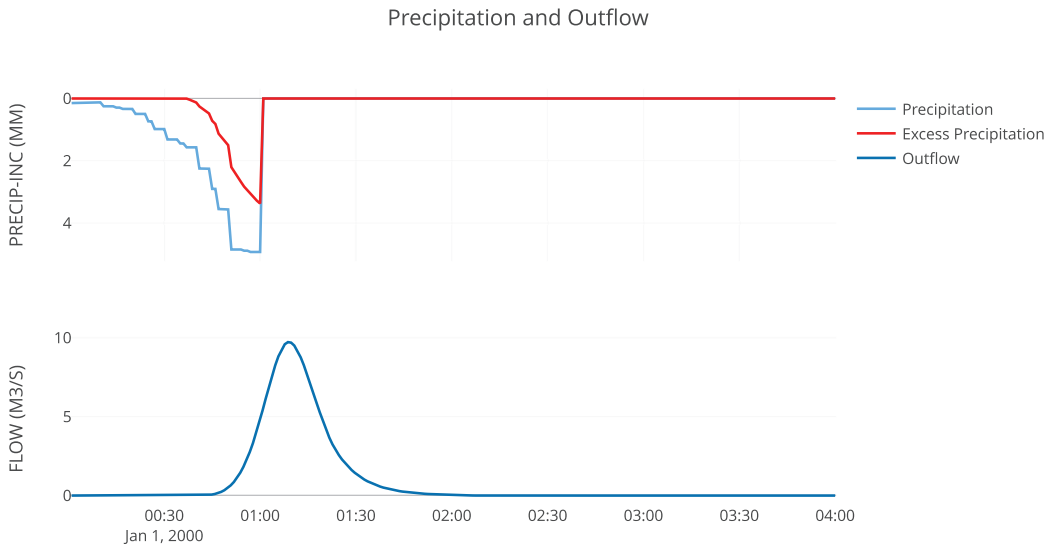
# Subbasin: Subbasin-3

**Area (KM2)** : 0.35
**Latitude Degrees** : 18.07
**Longitude Degrees** : -67.04
**Downstream** : Sink - 1

| Loss Rate: Scs | |
|---|---|
| Percent Impervious Area | 0 |
| Curve Number | 71 |

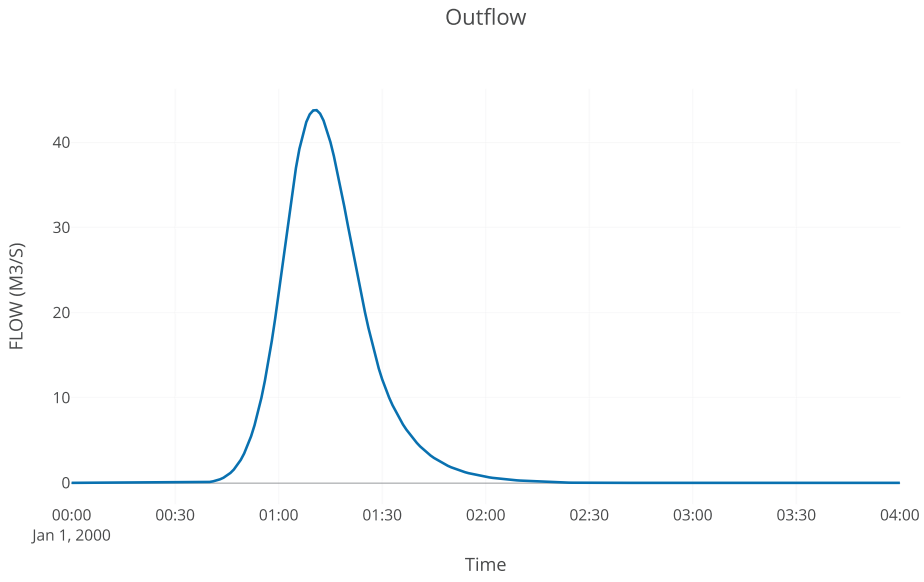
| Transform: Scs | |
|---|---|
| Lag | 13.52 |
| Unitgraph Type | Standard |

| Results: Subbasin-3 | |
|---|---|
| Peak Discharge (M3/S) | 9.73 |
| Time of Peak Discharge | 01Jan2000, 01:08 |
| Volume (MM) | 37.06 |
| Precipitation Volume (M3) | 36305.36 |
| Loss Volume (M3) | 23367.03 |
| Excess Volume (M3) | 12938.33 |
| Direct Runoff Volume (M3) | 12938.33 |
| Baseflow Volume (M3) | 0 |



## Sink: Sink-1

| Results: Sink-1 | |
|---|---|
| Peak Discharge (M3/S) | 43.78 |
| Time of Peak Discharge | 01Jan2000, 01:11 |
| Volume (MM) | 45.67 |



**Project:** Pr122
**Simulation Run:** 100_S3
**Simulation Start:** 31 December 1999, 24:00
**Simulation End:** 1 January 2000, 12:00

**HMS Version:** 4.10
**Executed:** 16 November 2022, 18:44

## Global Parameter Summary - Subbasin

**Location**

| Element Name | Longitude Degrees | Latitude Degrees |
|---|---|---|
| Subbasin - 4 | -67.03 | 18.07 |
| Subbasin - 1 | -67.04 | 18.06 |
| Subbasin - 2 | -67.05 | 18.07 |
| Subbasin - 3 | -67.04 | 18.07 |

**Area (KM2)**

| Element Name | Area (KM2) |
|---|---|
| Subbasin - 4 | 1.84 |
| Subbasin - 1 | 1.09 |
| Subbasin - 2 | 0.14 |
| Subbasin - 3 | 0.35 |

**Downstream**

| Element Name | Downstream |
|---|---|
| Subbasin - 4 | Sink - 2 |
| Subbasin - 1 | Reach - 1 |
| Subbasin - 2 | Junction - 1 |
| Subbasin - 3 | Sink - 1 |

**Loss Rate: Scs**

| Element Name | Percent Impervious Area | Curve Number |
|---|---|---|
| Subbasin - 4 | 0 | 71 |
| Subbasin - 1 | 0 | 77 |
| Subbasin - 2 | 0 | 78 |
| Subbasin - 3 | 0 | 71 |

**Transform: Scs**

| Element Name | Lag | Unitgraph Type |
|---|---|---|
| Subbasin - 4 | 10.11 | Standard |
| Subbasin - 1 | 17.13 | Standard |
| Subbasin - 2 | 7.77 | Standard |
| Subbasin - 3 | 13.52 | Standard |

## Global Parameter Summary - Reach

**Downstream**

| Element Name | Downstream |
|---|---|
| Reach - 1 | Junction - 1 |
| Reach - 2 | Sink - 1 |

**Route: Lag**

| Element Name | Method | Initial Variable | Lag |
|---|---|---|---|
| Reach - 1 | Lag | Combined Inflow | 1 |
| Reach - 2 | Lag | Combined Inflow | 1 |

## Global Results Summary

| Hydrologic Element | Drainage Area (KM2) | Peak Discharge (M3/S) | Time of Peak | Volume (MM) |
|---|---|---|---|---|
| Subbasin - 4 | 1.84 | 52.03 | 01Jan2000, 01:04 | 135.45 |
| Sink - 2 | 1.84 | 52.03 | 01Jan2000, 01:04 | 135.45 |
| Subbasin - 1 | 1.09 | 32.52 | 01Jan2000, 01:08 | 154.1 |
| Reach - 1 | 1.09 | 32.52 | 01Jan2000, 01:09 | 154.1 |
| Subbasin - 2 | 0.14 | 4.43 | 01Jan2000, 01:02 | 157.21 |
| Junction - 1 | 1.23 | 36.51 | 01Jan2000, 01:07 | 154.45 |
| Reach - 2 | 1.23 | 36.51 | 01Jan2000, 01:08 | 154.45 |
| Subbasin - 3 | 0.35 | 9.59 | 01Jan2000, 01:06 | 135.45 |
| Sink - 1 | 1.57 | 46.07 | 01Jan2000, 01:07 | 150.24 |

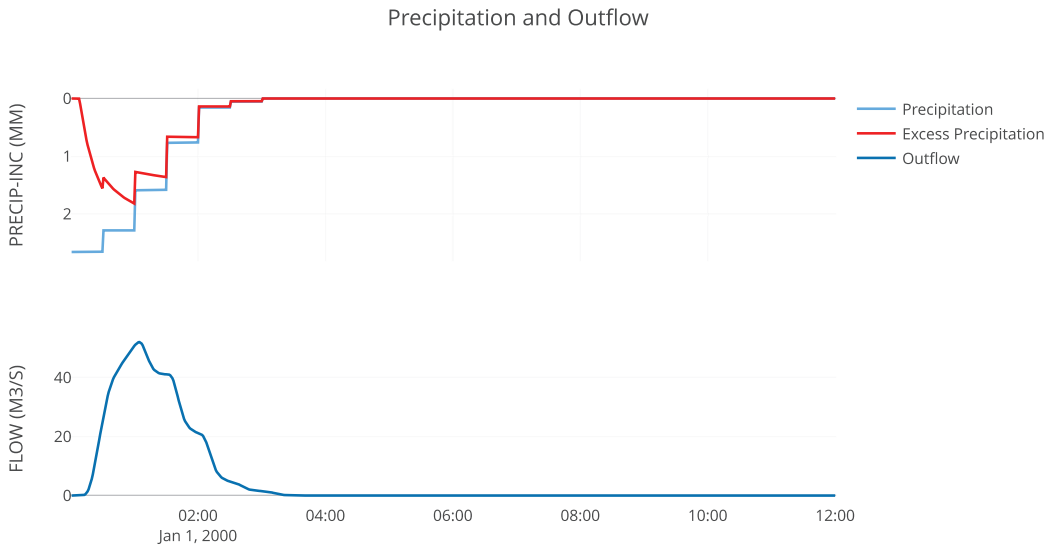
# Subbasin: Subbasin-4

**Area (KM2)** : 1.84
**Latitude Degrees** : 18.07
**Longitude Degrees** : -67.03
**Downstream** : Sink - 2

| Loss Rate: Scs | |
|---|---|
| Percent Impervious Area | 0 |
| Curve Number | 71 |

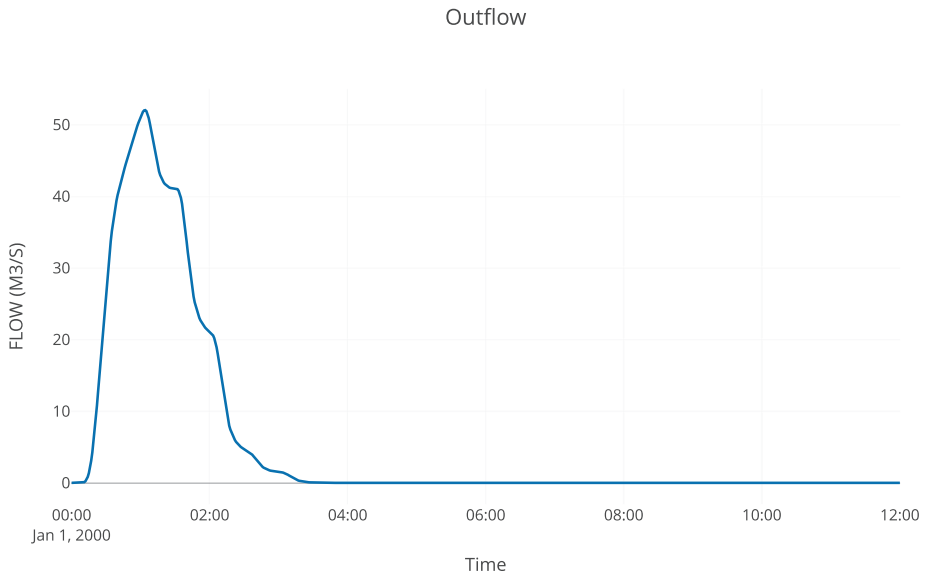
| Transform: Scs | |
|---|---|
| Lag | 10.11 |
| Unitgraph Type | Standard |

| Results: Subbasin-4 | |
|---|---|
| Peak Discharge (M3/S) | 52.03 |
| Time of Peak Discharge | 01Jan2000, 01:04 |
| Volume (MM) | 135.45 |
| Precipitation Volume (M3) | 4.14E5 |
| Loss Volume (M3) | 1.65E5 |
| Excess Volume (M3) | 2.49E5 |
| Direct Runoff Volume (M3) | 2.49E5 |
| Baseflow Volume (M3) | 0 |



## Sink: Sink-2

| Results: Sink-2 | |
|---|---|
| Peak Discharge (M3/S) | 52.03 |
| Time of Peak Discharge | 01Jan2000, 01:04 |
| Volume (MM) | 135.45 |



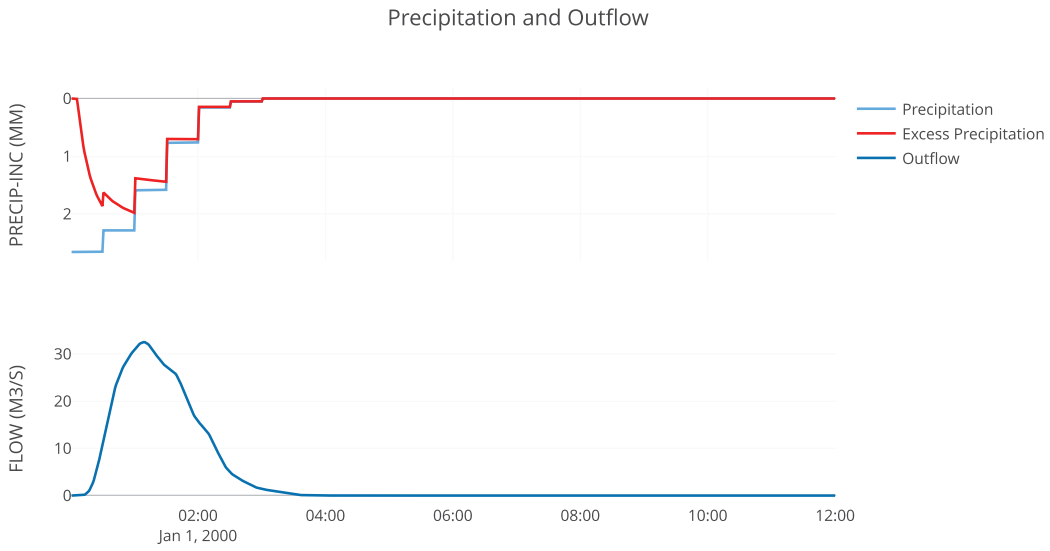
# Subbasin: Subbasin-1

**Area (KM2)** : 1.09
**Latitude Degrees** : 18.06
**Longitude Degrees** : -67.04
**Downstream** : Reach - 1

| Loss Rate: Scs | |
|---|---|
| Percent Impervious Area | 0 |
| Curve Number | 77 |

| Transform: Scs | |
|---|---|
| Lag | 17.13 |
| Unitgraph Type | Standard |

| Results: Subbasin-1 | |
|---|---|
| Peak Discharge (M3/S) | 32.52 |
| Time of Peak Discharge | 01Jan2000, 01:08 |
| Volume (MM) | 154.1 |
| Precipitation Volume (M3) | 2.45E5 |
| Loss Volume (M3) | 77141.83 |
| Excess Volume (M3) | 1.68E5 |
| Direct Runoff Volume (M3) | 1.68E5 |
| Baseflow Volume (M3) | 0 |



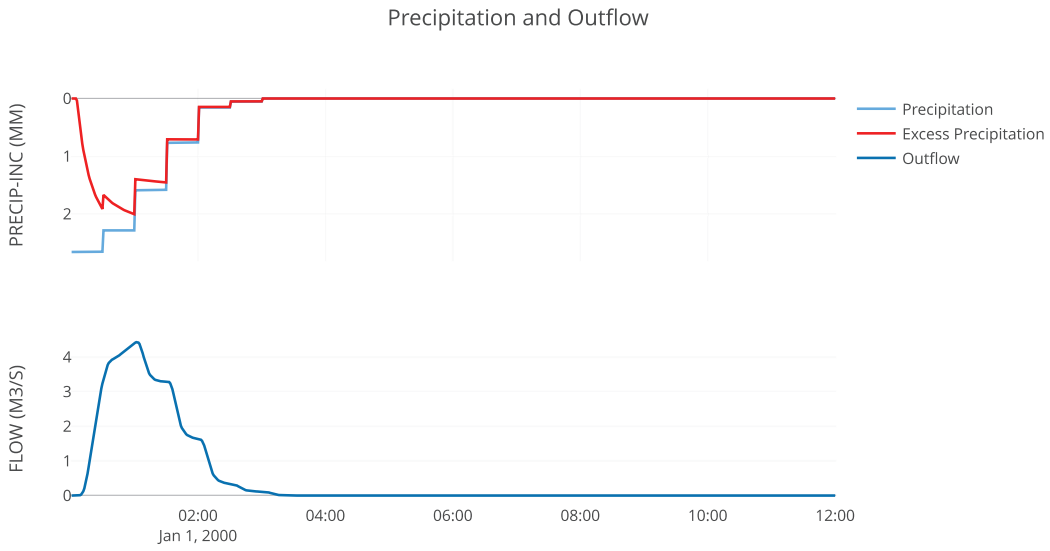
# Subbasin: Subbasin-2

**Area (KM2)** : 0.14
**Latitude Degrees** : 18.07
**Longitude Degrees** : -67.05
**Downstream** : Junction - 1

| Loss Rate: Scs | |
|---|---|
| Percent Impervious Area | 0 |
| Curve Number | 78 |

| Transform: Scs | |
|---|---|
| Lag | 7.77 |
| Unitgraph Type | Standard |

| Results: Subbasin-2 | |
|---|---|
| Peak Discharge (M3/S) | 4.43 |
| Time of Peak Discharge | 01Jan2000, 01:02 |
| Volume (MM) | 157.21 |
| Precipitation Volume (M3) | 30924 |
| Loss Volume (M3) | 9316.96 |
| Excess Volume (M3) | 21607.04 |
| Direct Runoff Volume (M3) | 21607.04 |
| Baseflow Volume (M3) | 0 |



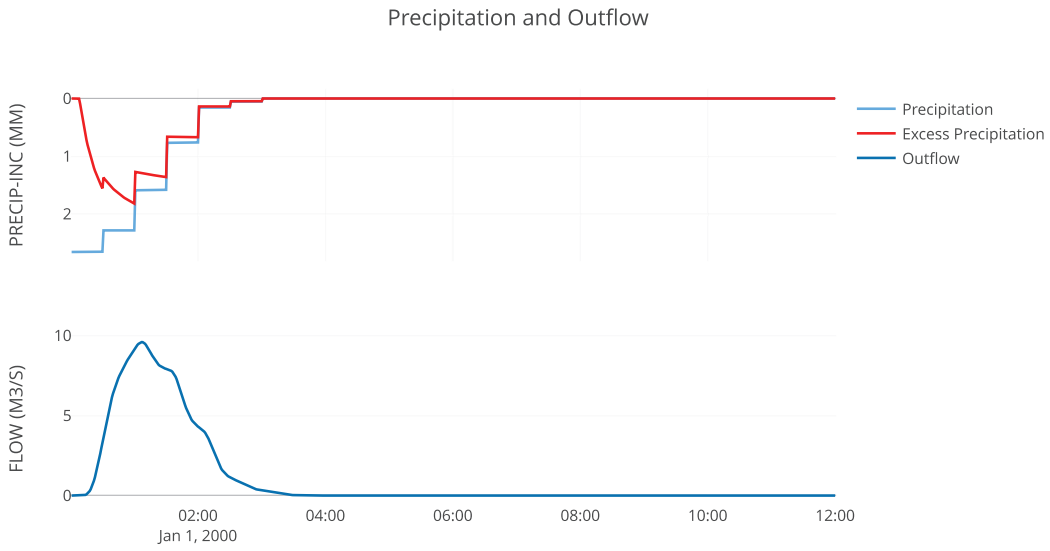
# Subbasin: Subbasin-3

**Area (KM2)** : 0.35
**Latitude Degrees** : 18.07
**Longitude Degrees** : -67.04
**Downstream** : Sink - 1

| Loss Rate: Scs | |
|---|---|
| Percent Impervious Area | 0 |
| Curve Number | 71 |

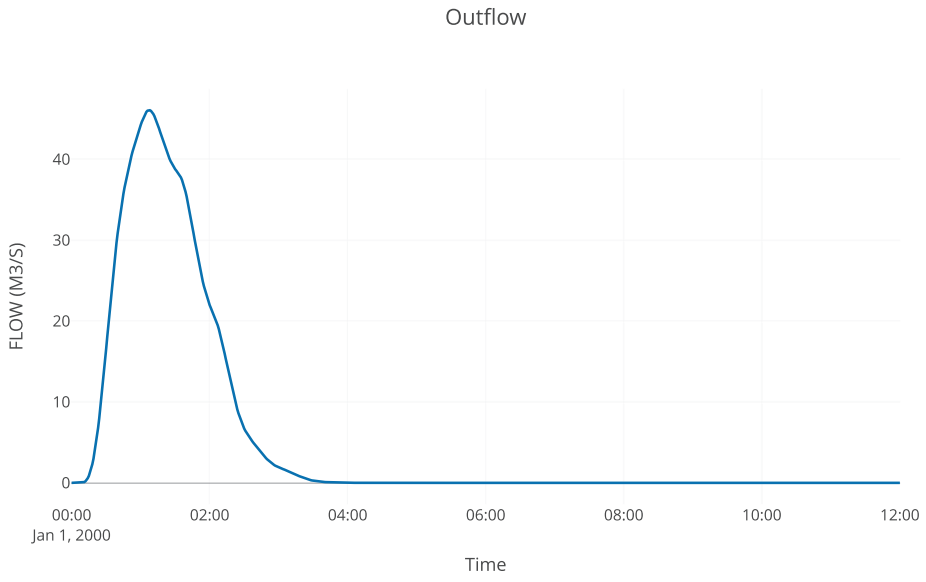
| Transform: Scs | |
|---|---|
| Lag | 13.52 |
| Unitgraph Type | Standard |

| Results: Subbasin-3 | |
|---|---|
| Peak Discharge (M3/S) | 9.59 |
| Time of Peak Discharge | 01Jan2000, 01:06 |
| Volume (MM) | 135.45 |
| Precipitation Volume (M3) | 78545.25 |
| Loss Volume (M3) | 31260.86 |
| Excess Volume (M3) | 47284.39 |
| Direct Runoff Volume (M3) | 47284.39 |
| Baseflow Volume (M3) | 0 |



## Sink: Sink-1

| Results: Sink-1 | |
|---|---|
| Peak Discharge (M3/S) | 46.07 |
| Time of Peak Discharge | 01Jan2000, 01:07 |
| Volume (MM) | 150.24 |



**Project:** Pr122
**Simulation Run:** 100_S4
**Simulation Start:** 31 December 1999, 24:00
**Simulation End:** 1 January 2000, 12:00

**HMS Version:** 4.10
**Executed:** 16 November 2022, 18:44

## Global Parameter Summary - Subbasin

**Location**

| Element Name | Longitude Degrees | Latitude Degrees |
|---|---|---|
| Subbasin - 4 | -67.03 | 18.07 |
| Subbasin - 1 | -67.04 | 18.06 |
| Subbasin - 2 | -67.05 | 18.07 |
| Subbasin - 3 | -67.04 | 18.07 |

**Area (KM2)**

| Element Name | Area (KM2) |
|---|---|
| Subbasin - 4 | 1.84 |
| Subbasin - 1 | 1.09 |
| Subbasin - 2 | 0.14 |
| Subbasin - 3 | 0.35 |

**Downstream**

| Element Name | Downstream |
|---|---|
| Subbasin - 4 | Sink - 2 |
| Subbasin - 1 | Reach - 1 |
| Subbasin - 2 | Junction - 1 |
| Subbasin - 3 | Sink - 1 |

**Loss Rate: Scs**

| Element Name | Percent Impervious Area | Curve Number |
|---|---|---|
| Subbasin - 4 | 0 | 71 |
| Subbasin - 1 | 0 | 77 |
| Subbasin - 2 | 0 | 78 |
| Subbasin - 3 | 0 | 71 |

**Transform: Scs**

| Element Name | Lag | Unitgraph Type |
|---|---|---|
| Subbasin - 4 | 10.11 | Standard |
| Subbasin - 1 | 17.13 | Standard |
| Subbasin - 2 | 7.77 | Standard |
| Subbasin - 3 | 13.52 | Standard |

## Global Parameter Summary - Reach

**Downstream**

| Element Name | Downstream |
|---|---|
| Reach - 1 | Junction - 1 |
| Reach - 2 | Sink - 1 |

**Route: Lag**

| Element Name | Method | Initial Variable | Lag |
|---|---|---|---|
| Reach - 1 | Lag | Combined Inflow | 1 |
| Reach - 2 | Lag | Combined Inflow | 1 |

## Global Results Summary

| Hydrologic Element | Drainage Area (KM2) | Peak Discharge (M3/S) | Time of Peak | Volume (MM) |
|---|---|---|---|---|
| Subbasin - 4 | 1.84 | 41.05 | 01Jan2000, 06:01 | 135.45 |
| Sink - 2 | 1.84 | 41.05 | 01Jan2000, 06:01 | 135.45 |
| Subbasin - 1 | 1.09 | 24.97 | 01Jan2000, 06:02 | 154.1 |
| Reach - 1 | 1.09 | 24.97 | 01Jan2000, 06:03 | 154.1 |
| Subbasin - 2 | 0.14 | 3.28 | 01Jan2000, 06:00 | 157.21 |
| Junction - 1 | 1.23 | 28.17 | 01Jan2000, 06:02 | 154.45 |
| Reach - 2 | 1.23 | 28.17 | 01Jan2000, 06:03 | 154.45 |
| Subbasin - 3 | 0.35 | 7.69 | 01Jan2000, 06:01 | 135.45 |
| Sink - 1 | 1.57 | 35.82 | 01Jan2000, 06:02 | 150.24 |

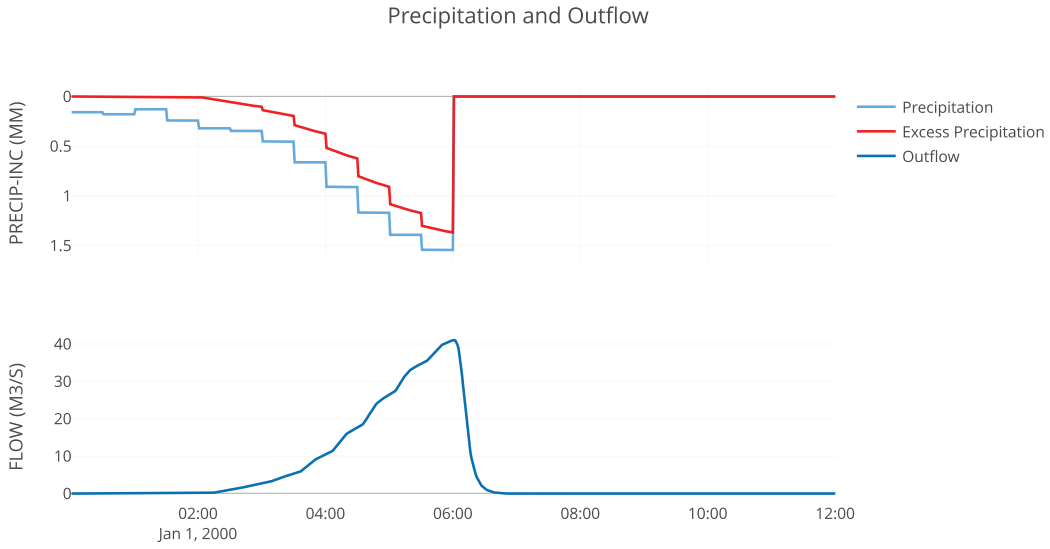
# Subbasin: Subbasin-4

**Area (KM2)** : 1.84
**Latitude Degrees** : 18.07
**Longitude Degrees** : -67.03
**Downstream** : Sink - 2

| Loss Rate: Scs | |
|---|---|
| Percent Impervious Area | 0 |
| Curve Number | 71 |

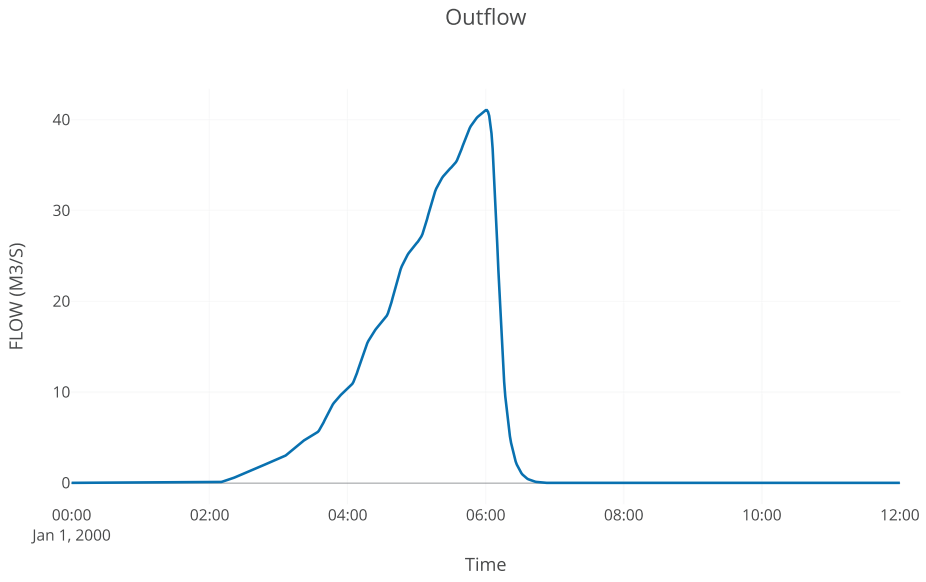
| Transform: Scs | |
|---|---|
| Lag | 10.11 |
| Unitgraph Type | Standard |

| Results: Subbasin-4 | |
|---|---|
| Peak Discharge (M3/S) | 41.05 |
| Time of Peak Discharge | 01Jan2000, 06:01 |
| Volume (MM) | 135.45 |
| Precipitation Volume (M3) | 4.14E5 |
| Loss Volume (M3) | 1.65E5 |
| Excess Volume (M3) | 2.49E5 |
| Direct Runoff Volume (M3) | 2.49E5 |
| Baseflow Volume (M3) | 0 |



## Sink: Sink-2

| Results: Sink-2 | |
|---|---|
| Peak Discharge (M3/S) | 41.05 |
| Time of Peak Discharge | 01Jan2000, 06:01 |
| Volume (MM) | 135.45 |



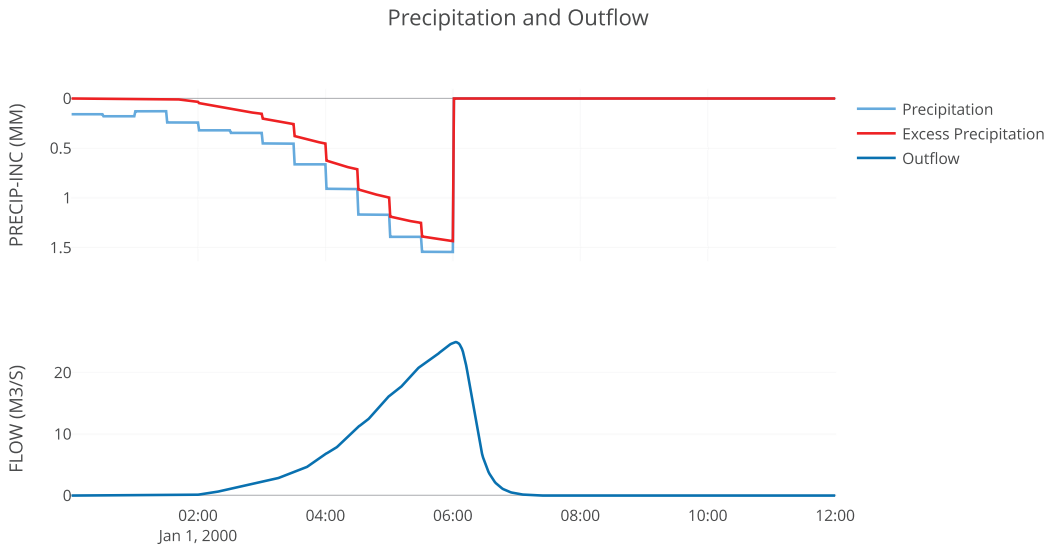
# Subbasin: Subbasin-1

**Area (KM2)** : 1.09
**Latitude Degrees** : 18.06
**Longitude Degrees** : -67.04
**Downstream** : Reach - 1

| Loss Rate: Scs | |
|---|---|
| Percent Impervious Area | 0 |
| Curve Number | 77 |

| Transform: Scs | |
|---|---|
| Lag | 17.13 |
| Unitgraph Type | Standard |

| Results: Subbasin-1 | |
|---|---|
| Peak Discharge (M3/S) | 24.97 |
| Time of Peak Discharge | 01Jan2000, 06:02 |
| Volume (MM) | 154.1 |
| Precipitation Volume (M3) | 2.45E5 |
| Loss Volume (M3) | 77141.83 |
| Excess Volume (M3) | 1.68E5 |
| Direct Runoff Volume (M3) | 1.68E5 |
| Baseflow Volume (M3) | 0 |



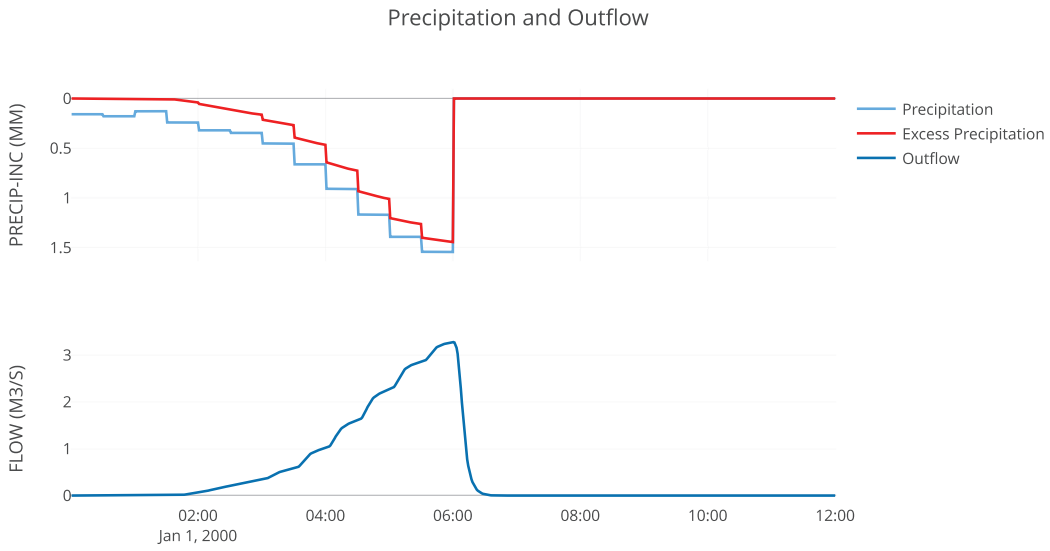
# Subbasin: Subbasin-2

**Area (KM2)** : 0.14
**Latitude Degrees** : 18.07
**Longitude Degrees** : -67.05
**Downstream** : Junction - 1

| Loss Rate: Scs | |
|---|---|
| Percent Impervious Area | 0 |
| Curve Number | 78 |

| Transform: Scs | |
|---|---|
| Lag | 7.77 |
| Unitgraph Type | Standard |

| Results: Subbasin-2 | |
|---|---|
| Peak Discharge (M3/S) | 3.28 |
| Time of Peak Discharge | 01Jan2000, 06:00 |
| Volume (MM) | 157.21 |
| Precipitation Volume (M3) | 30924 |
| Loss Volume (M3) | 9316.96 |
| Excess Volume (M3) | 21607.04 |
| Direct Runoff Volume (M3) | 21607.04 |
| Baseflow Volume (M3) | 0 |



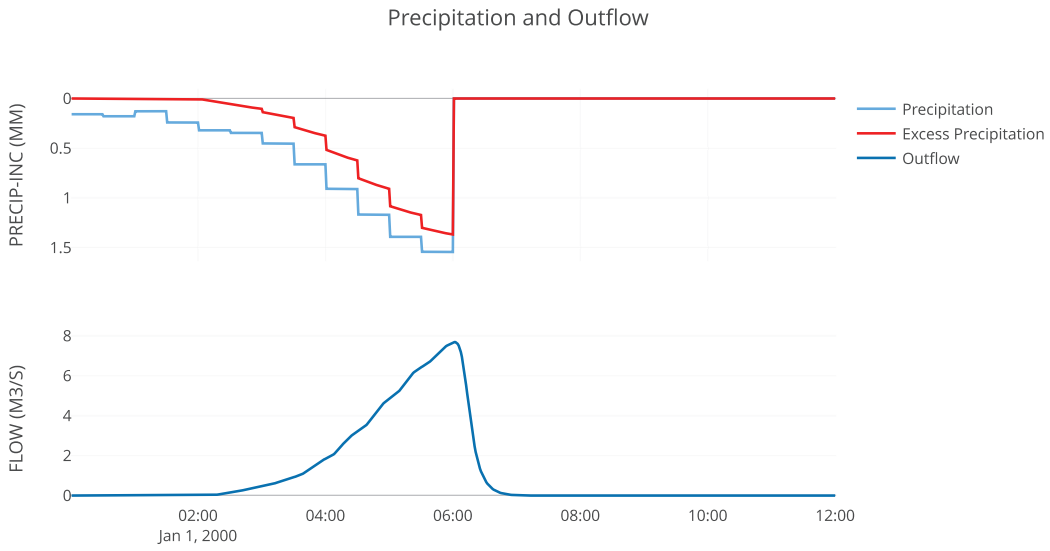
# Subbasin: Subbasin-3

**Area (KM2)** : 0.35
**Latitude Degrees** : 18.07
**Longitude Degrees** : -67.04
**Downstream** : Sink - 1

| Loss Rate: Scs | |
|---|---|
| Percent Impervious Area | 0 |
| Curve Number | 71 |

| Transform: Scs | |
|---|---|
| Lag | 13.52 |
| Unitgraph Type | Standard |

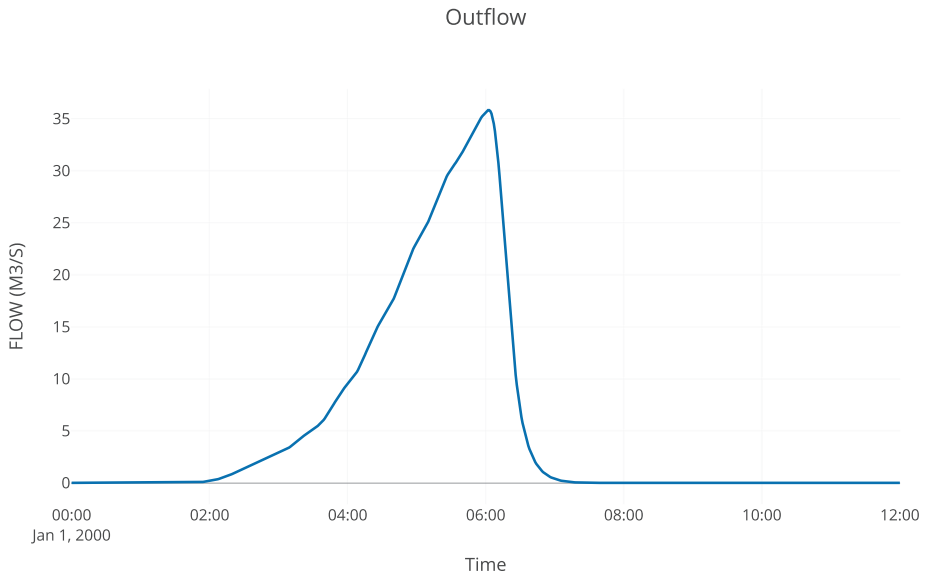
| Results: Subbasin-3 | |
|---|---|
| Peak Discharge (M3/S) | 7.69 |
| Time of Peak Discharge | 01Jan2000, 06:01 |
| Volume (MM) | 135.45 |
| Precipitation Volume (M3) | 78545.25 |
| Loss Volume (M3) | 31260.86 |
| Excess Volume (M3) | 47284.39 |
| Direct Runoff Volume (M3) | 47284.39 |
| Baseflow Volume (M3) | 0 |



## Sink: Sink-1

**Results: Sink-1**

| | |
|---|---|
| Peak Discharge (M3/S) | 35.82 |
| Time of Peak Discharge | 01Jan2000, 06:02 |
| Volume (MM) | 150.24 |



**Project:** Pr122
**Simulation Run:** 100_S5
**Simulation Start:** 31 December 1999, 24:00
**Simulation End:** 1 January 2000, 24:00

**HMS Version:** 4.10
**Executed:** 16 November 2022, 18:44

## Global Parameter Summary - Subbasin

**Location**

| Element Name | Longitude Degrees | Latitude Degrees |
|---|---|---|
| Subbasin - 4 | -67.03 | 18.07 |
| Subbasin - 1 | -67.04 | 18.06 |
| Subbasin - 2 | -67.05 | 18.07 |
| Subbasin - 3 | -67.04 | 18.07 |

**Area (KM2)**

| Element Name | Area (KM2) |
|---|---|
| Subbasin - 4 | 1.84 |
| Subbasin - 1 | 1.09 |
| Subbasin - 2 | 0.14 |
| Subbasin - 3 | 0.35 |

**Downstream**

| Element Name | Downstream |
|---|---|
| Subbasin - 4 | Sink - 2 |
| Subbasin - 1 | Reach - 1 |
| Subbasin - 2 | Junction - 1 |
| Subbasin - 3 | Sink - 1 |

**Loss Rate: Scs**

| Element Name | Percent Impervious Area | Curve Number |
|---|---|---|
| Subbasin - 4 | 0 | 71 |
| Subbasin - 1 | 0 | 77 |
| Subbasin - 2 | 0 | 78 |
| Subbasin - 3 | 0 | 71 |

**Transform: Scs**

| Element Name | Lag | Unitgraph Type |
|---|---|---|
| Subbasin - 4 | 10.11 | Standard |
| Subbasin - 1 | 17.13 | Standard |
| Subbasin - 2 | 7.77 | Standard |
| Subbasin - 3 | 13.52 | Standard |

## Global Parameter Summary - Reach

**Downstream**

| Element Name | Downstream |
|---|---|
| Reach - 1 | Junction - 1 |
| Reach - 2 | Sink - 1 |

**Route: Lag**

| Element Name | Method | Initial Variable | Lag |
|---|---|---|---|
| Reach - 1 | Lag | Combined Inflow | 1 |
| Reach - 2 | Lag | Combined Inflow | 1 |

## Global Results Summary

| Hydrologic Element | Drainage Area (KM2) | Peak Discharge (M3/S) | Time of Peak | Volume (MM) |
|---|---|---|---|---|
| Subbasin - 4 | 1.84 | 53.39 | 01Jan2000, 01:05 | 218.48 |
| Sink - 2 | 1.84 | 53.39 | 01Jan2000, 01:05 | 218.48 |
| Subbasin - 1 | 1.09 | 33.25 | 01Jan2000, 01:10 | 240.24 |
| Reach - 1 | 1.09 | 33.25 | 01Jan2000, 01:11 | 240.24 |
| Subbasin - 2 | 0.14 | 4.58 | 01Jan2000, 01:02 | 243.78 |
| Junction - 1 | 1.23 | 37.3 | 01Jan2000, 01:10 | 240.63 |
| Reach - 2 | 1.23 | 37.3 | 01Jan2000, 01:11 | 240.63 |
| Subbasin - 3 | 0.35 | 9.82 | 01Jan2000, 01:08 | 218.48 |
| Sink - 1 | 1.57 | 47.06 | 01Jan2000, 01:10 | 235.72 |

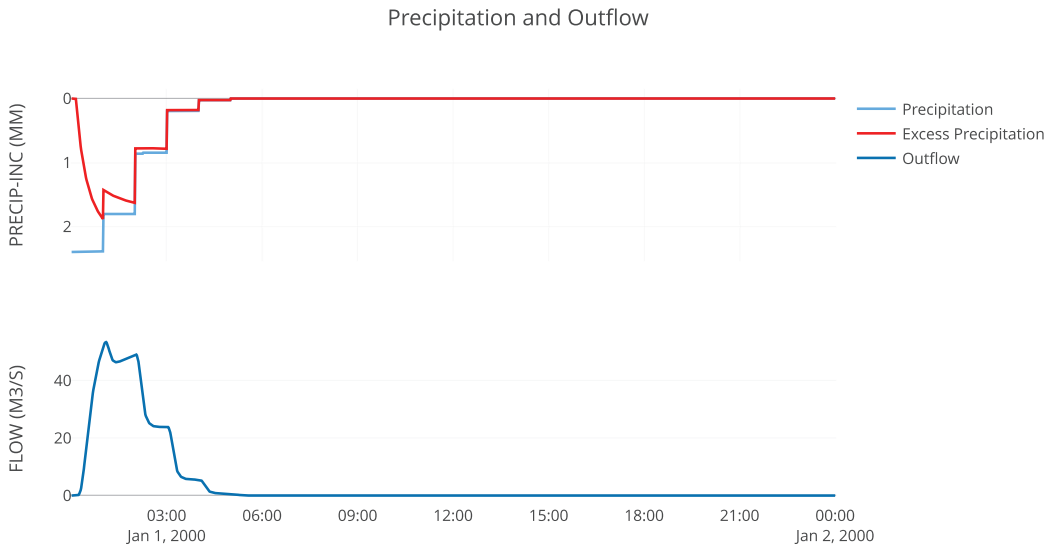
# Subbasin: Subbasin-4

**Area (KM2)** : 1.84
**Latitude Degrees** : 18.07
**Longitude Degrees** : -67.03
**Downstream** : Sink - 2

| Loss Rate: Scs | |
|---|---|
| Percent Impervious Area | 0 |
| Curve Number | 71 |

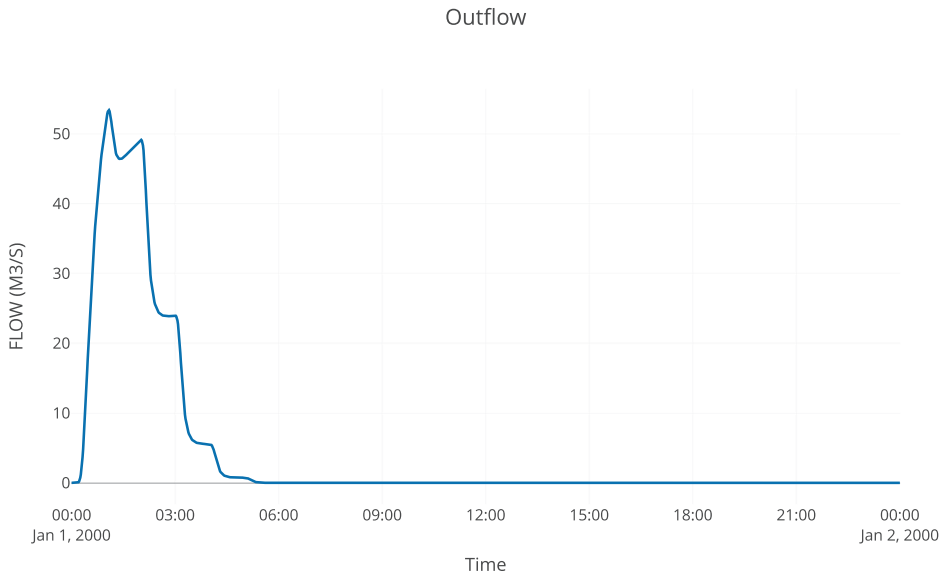
| Transform: Scs | |
|---|---|
| Lag | 10.11 |
| Unitgraph Type | Standard |

| Results: Subbasin-4 | |
|---|---|
| Peak Discharge (M3/S) | 53.39 |
| Time of Peak Discharge | 01Jan2000, 01:05 |
| Volume (MM) | 218.48 |
| Precipitation Volume (M3) | 5.82E5 |
| Loss Volume (M3) | 1.8E5 |
| Excess Volume (M3) | 4.02E5 |
| Direct Runoff Volume (M3) | 4.02E5 |
| Baseflow Volume (M3) | 0 |



## Sink: Sink-2

| Results: Sink-2 | |
|---|---|
| Peak Discharge (M3/S) | 53.39 |
| Time of Peak Discharge | 01Jan2000, 01:05 |
| Volume (MM) | 218.48 |



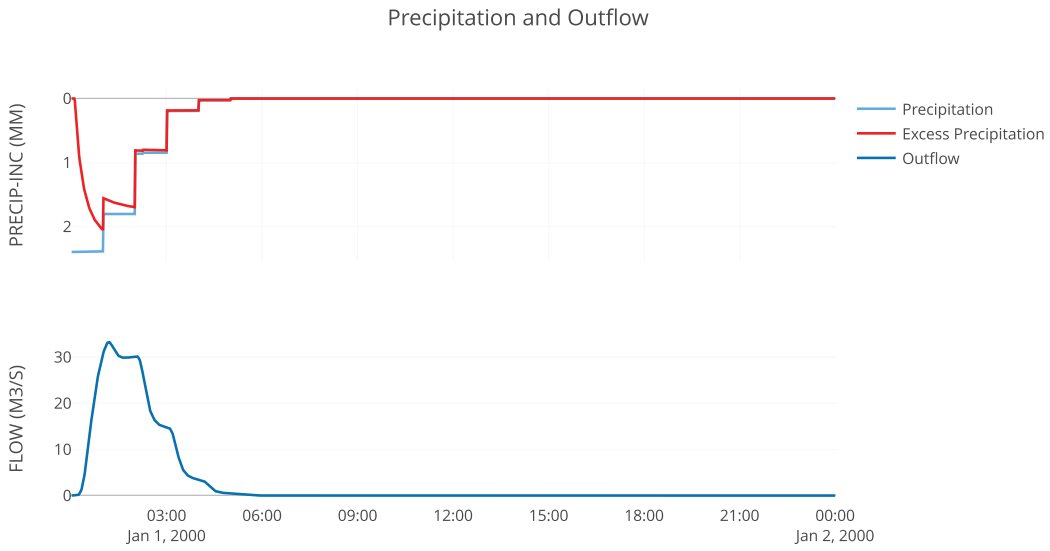
# Subbasin: Subbasin-1

**Area (KM2)** : 1.09
**Latitude Degrees** : 18.06
**Longitude Degrees** : -67.04
**Downstream** : Reach - 1

| Loss Rate: Scs | |
|---|---|
| Percent Impervious Area | 0 |
| Curve Number | 77 |

| Transform: Scs | |
|---|---|
| Lag | 17.13 |
| Unitgraph Type | Standard |

| Results: Subbasin-1 | |
|---|---|
| Peak Discharge (M3/S) | 33.25 |
| Time of Peak Discharge | 01Jan2000, 01:10 |
| Volume (MM) | 240.24 |
| Precipitation Volume (M3) | 3.44E5 |
| Loss Volume (M3) | 82437.94 |
| Excess Volume (M3) | 2.61E5 |
| Direct Runoff Volume (M3) | 2.61E5 |
| Baseflow Volume (M3) | 0 |



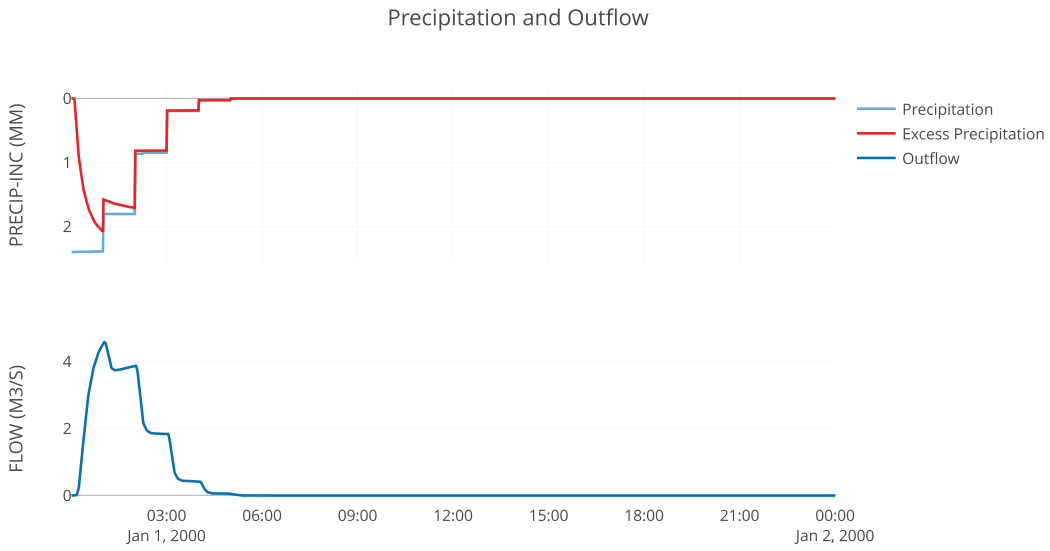
# Subbasin: Subbasin-2

**Area (KM2)** : 0.14
**Latitude Degrees** : 18.07
**Longitude Degrees** : -67.05
**Downstream** : Junction - 1

| Loss Rate: Scs | |
|---|---|
| Percent Impervious Area | 0 |
| Curve Number | 78 |

| Transform: Scs | |
|---|---|
| Lag | 7.77 |
| Unitgraph Type | Standard |

| Results: Subbasin-2 | |
|---|---|
| Peak Discharge (M3/S) | 4.58 |
| Time of Peak Discharge | 01Jan2000, 01:02 |
| Volume (MM) | 243.78 |
| Precipitation Volume (M3) | 43431.04 |
| Loss Volume (M3) | 9926.04 |
| Excess Volume (M3) | 33505 |
| Direct Runoff Volume (M3) | 33505 |
| Baseflow Volume (M3) | 0 |



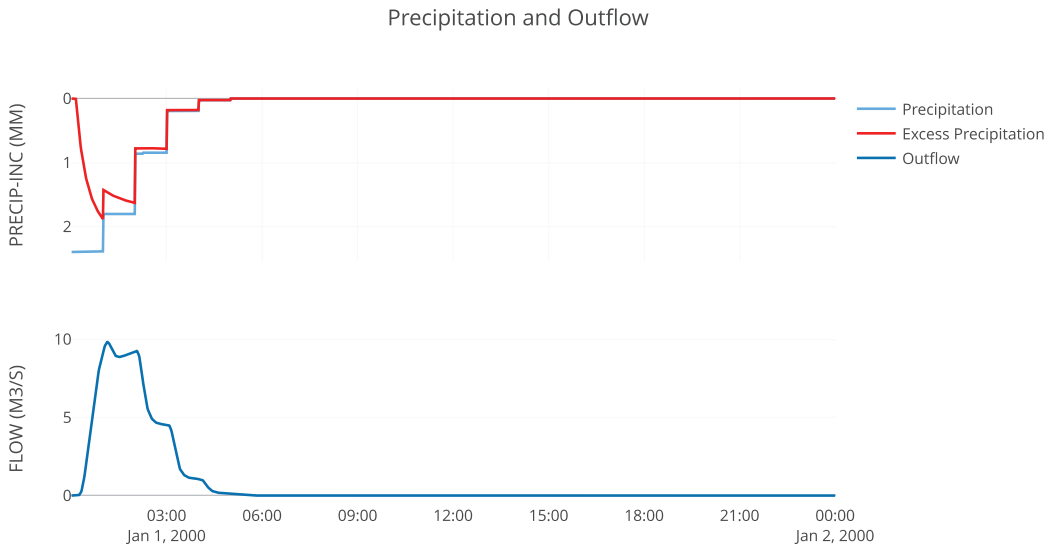
# Subbasin: Subbasin-3

**Area (KM2)** : 0.35
**Latitude Degrees** : 18.07
**Longitude Degrees** : -67.04
**Downstream** : Sink - 1

| Loss Rate: Scs | |
|---|---|
| Percent Impervious Area | 0 |
| Curve Number | 71 |

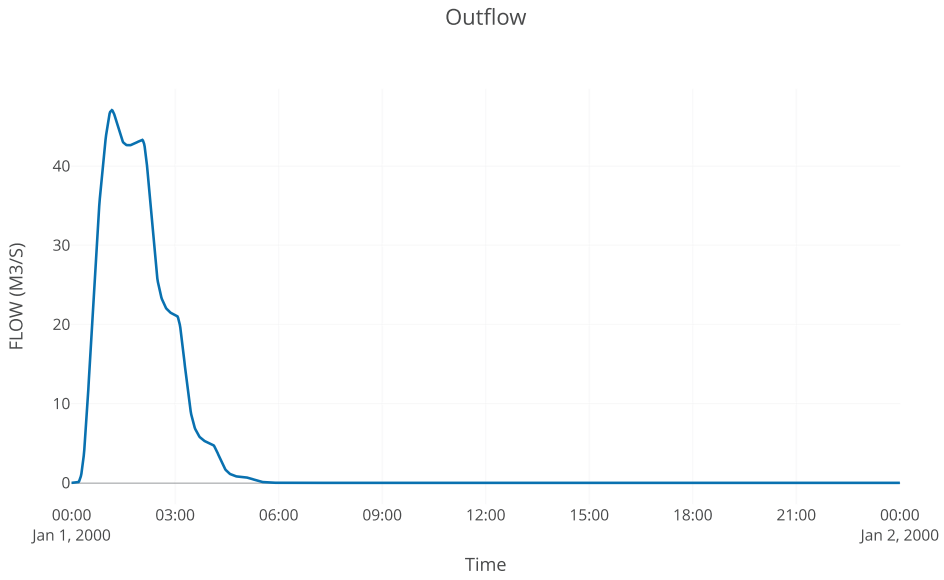
| Transform: Scs | |
|---|---|
| Lag | 13.52 |
| Unitgraph Type | Standard |

| Results: Subbasin-3 | |
|---|---|
| Peak Discharge (M3/S) | 9.82 |
| Time of Peak Discharge | 01Jan2000, 01:08 |
| Volume (MM) | 218.48 |
| Precipitation Volume (M3) | 1.1E5 |
| Loss Volume (M3) | 34043.19 |
| Excess Volume (M3) | 76269.25 |
| Direct Runoff Volume (M3) | 76269.25 |
| Baseflow Volume (M3) | 0 |



## Sink: Sink-1

| Results: Sink-1 | |
|---|---|
| Peak Discharge (M3/S) | 47.06 |
| Time of Peak Discharge | 01Jan2000, 01:10 |
| Volume (MM) | 235.72 |



**Project:** Pr122
**Simulation Run:** 100_S6
**Simulation Start:** 31 December 1999, 24:00
**Simulation End:** 1 January 2000, 24:00

**HMS Version:** 4.10
**Executed:** 16 November 2022, 18:44

## Global Parameter Summary - Subbasin

**Location**

| Element Name | Longitude Degrees | Latitude Degrees |
|---|---|---|
| Subbasin - 4 | -67.03 | 18.07 |
| Subbasin - 1 | -67.04 | 18.06 |
| Subbasin - 2 | -67.05 | 18.07 |
| Subbasin - 3 | -67.04 | 18.07 |

**Area (KM2)**

| Element Name | Area (KM2) |
|---|---|
| Subbasin - 4 | 1.84 |
| Subbasin - 1 | 1.09 |
| Subbasin - 2 | 0.14 |
| Subbasin - 3 | 0.35 |

**Downstream**

| Element Name | Downstream |
|---|---|
| Subbasin - 4 | Sink - 2 |
| Subbasin - 1 | Reach - 1 |
| Subbasin - 2 | Junction - 1 |
| Subbasin - 3 | Sink - 1 |

**Loss Rate: Scs**

| Element Name | Percent Impervious Area | Curve Number |
|---|---|---|
| Subbasin - 4 | 0 | 71 |
| Subbasin - 1 | 0 | 77 |
| Subbasin - 2 | 0 | 78 |
| Subbasin - 3 | 0 | 71 |

**Transform: Scs**

| Element Name | Lag | Unitgraph Type |
|---|---|---|
| Subbasin - 4 | 10.11 | Standard |
| Subbasin - 1 | 17.13 | Standard |
| Subbasin - 2 | 7.77 | Standard |
| Subbasin - 3 | 13.52 | Standard |

## Global Parameter Summary - Reach

**Downstream**

| Element Name | Downstream |
|---|---|
| Reach - 1 | Junction - 1 |
| Reach - 2 | Sink - 1 |

**Route: Lag**

| Element Name | Method | Initial Variable | Lag |
|---|---|---|---|
| Reach - 1 | Lag | Combined Inflow | 1 |
| Reach - 2 | Lag | Combined Inflow | 1 |

## Global Results Summary

| Hydrologic Element | Drainage Area (KM2) | Peak Discharge (M3/S) | Time of Peak | Volume (MM) |
|---|---|---|---|---|
| Subbasin - 4 | 1.84 | 43.36 | 01Jan2000, 12:00 | 218.48 |
| Sink - 2 | 1.84 | 43.36 | 01Jan2000, 12:00 | 218.48 |
| Subbasin - 1 | 1.09 | 26.27 | 01Jan2000, 12:01 | 240.24 |
| Reach - 1 | 1.09 | 26.27 | 01Jan2000, 12:02 | 240.24 |
| Subbasin - 2 | 0.14 | 3.36 | 01Jan2000, 12:00 | 243.78 |
| Junction - 1 | 1.23 | 29.61 | 01Jan2000, 12:01 | 240.63 |
| Reach - 2 | 1.23 | 29.61 | 01Jan2000, 12:02 | 240.63 |
| Subbasin - 3 | 0.35 | 8.19 | 01Jan2000, 12:00 | 218.48 |
| Sink - 1 | 1.57 | 37.79 | 01Jan2000, 12:01 | 235.72 |

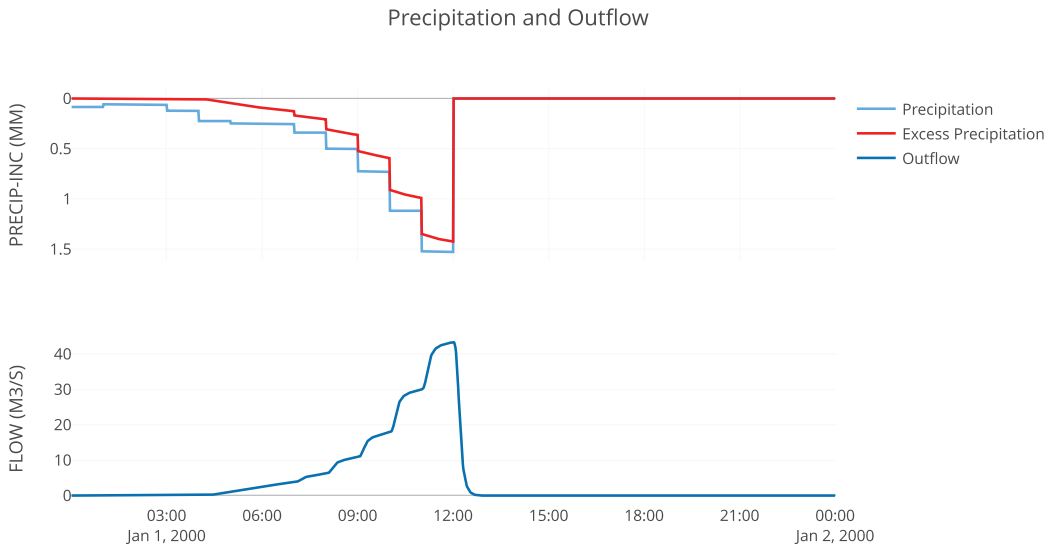
# Subbasin: Subbasin-4

**Area (KM2)** : 1.84
**Latitude Degrees** : 18.07
**Longitude Degrees** : -67.03
**Downstream** : Sink - 2

| Loss Rate: Scs | |
|---|---|
| Percent Impervious Area | 0 |
| Curve Number | 71 |

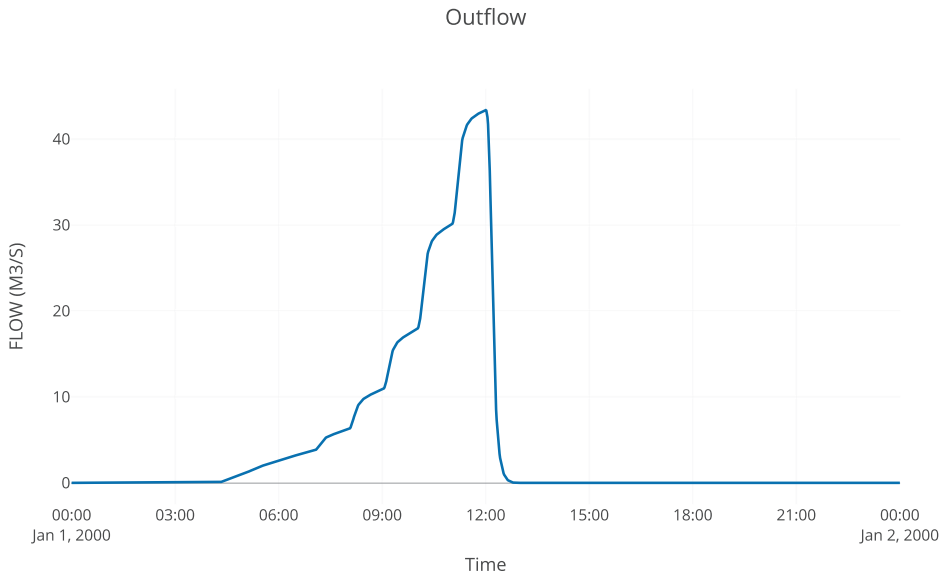
| Transform: Scs | |
|---|---|
| Lag | 10.11 |
| Unitgraph Type | Standard |

| Results: Subbasin-4 | |
|---|---|
| Peak Discharge (M3/S) | 43.36 |
| Time of Peak Discharge | 01Jan2000, 12:00 |
| Volume (MM) | 218.48 |
| Precipitation Volume (M3) | 5.82E5 |
| Loss Volume (M3) | 1.8E5 |
| Excess Volume (M3) | 4.02E5 |
| Direct Runoff Volume (M3) | 4.02E5 |
| Baseflow Volume (M3) | 0 |



## Sink: Sink-2

| Results: Sink-2 | |
|---|---|
| Peak Discharge (M3/S) | 43.36 |
| Time of Peak Discharge | 01Jan2000, 12:00 |
| Volume (MM) | 218.48 |



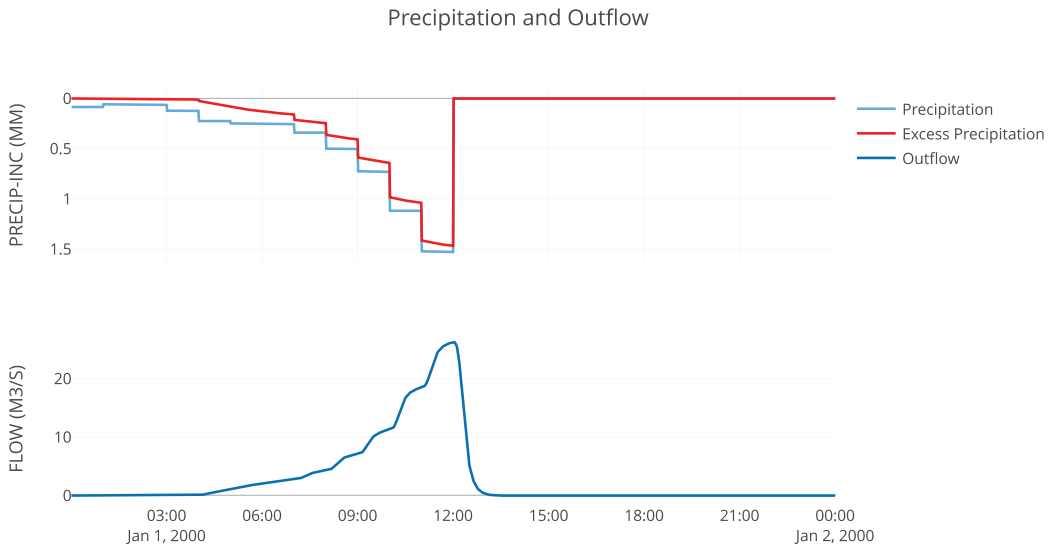
# Subbasin: Subbasin-1

**Area (KM2)** : 1.09
**Latitude Degrees** : 18.06
**Longitude Degrees** : -67.04
**Downstream** : Reach - 1

| Loss Rate: Scs | |
|---|---|
| Percent Impervious Area | 0 |
| Curve Number | 77 |

| Transform: Scs | |
|---|---|
| Lag | 17.13 |
| Unitgraph Type | Standard |

| Results: Subbasin-1 | |
|---|---|
| Peak Discharge (M3/S) | 26.27 |
| Time of Peak Discharge | 01Jan2000, 12:01 |
| Volume (MM) | 240.24 |
| Precipitation Volume (M3) | 3.44E5 |
| Loss Volume (M3) | 82437.94 |
| Excess Volume (M3) | 2.61E5 |
| Direct Runoff Volume (M3) | 2.61E5 |
| Baseflow Volume (M3) | 0 |



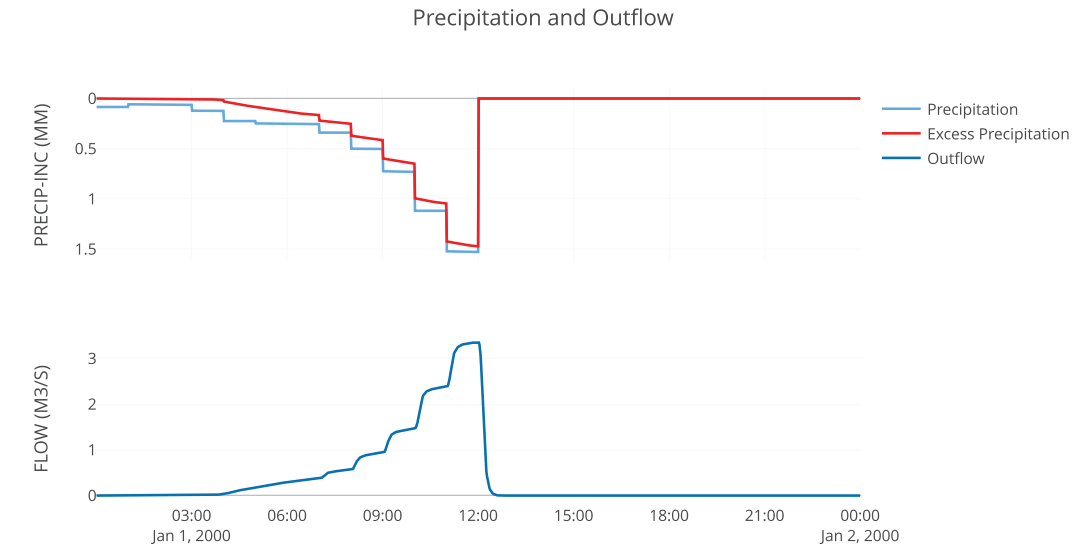
# Subbasin: Subbasin-2

**Area (KM2)** : 0.14
**Latitude Degrees** : 18.07
**Longitude Degrees** : -67.05
**Downstream** : Junction - 1

| Loss Rate: Scs | |
|---|---|
| Percent Impervious Area | 0 |
| Curve Number | 78 |

| Transform: Scs | |
|---|---|
| Lag | 7.77 |
| Unitgraph Type | Standard |

| Results: Subbasin-2 | |
|---|---|
| Peak Discharge (M3/S) | 3.36 |
| Time of Peak Discharge | 01Jan2000, 12:00 |
| Volume (MM) | 243.78 |
| Precipitation Volume (M3) | 43431.04 |
| Loss Volume (M3) | 9926.04 |
| Excess Volume (M3) | 33505 |
| Direct Runoff Volume (M3) | 33505 |
| Baseflow Volume (M3) | 0 |



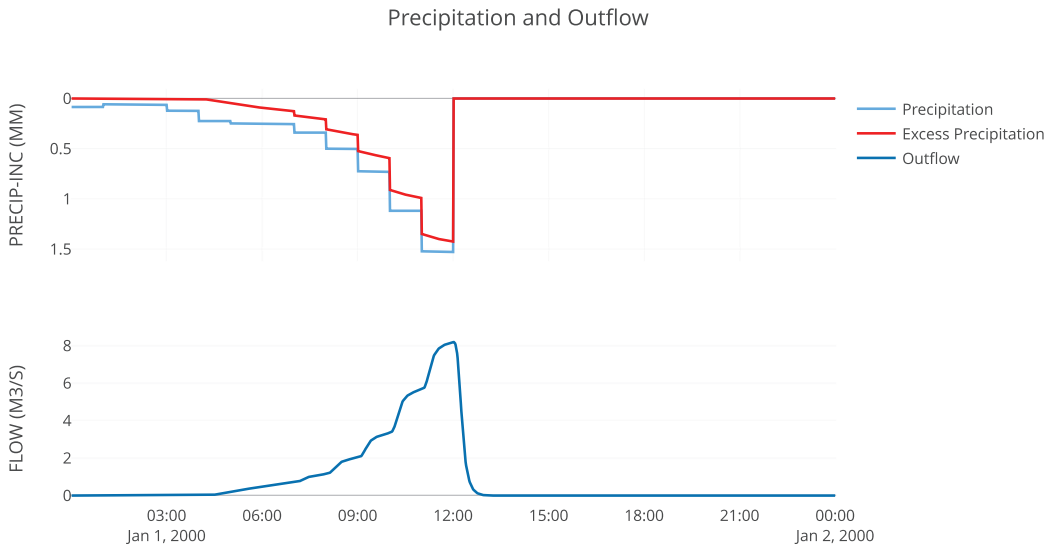
# Subbasin: Subbasin-3

**Area (KM2)** : 0.35
**Latitude Degrees** : 18.07
**Longitude Degrees** : -67.04
**Downstream** : Sink - 1

| Loss Rate: Scs | |
|---|---|
| Percent Impervious Area | 0 |
| Curve Number | 71 |

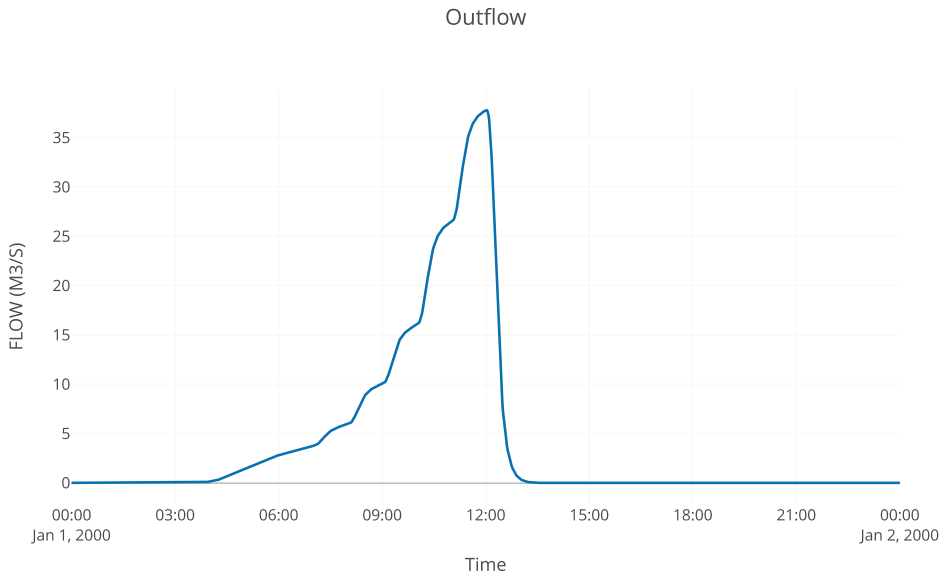
| Transform: Scs | |
|---|---|
| Lag | 13.52 |
| Unitgraph Type | Standard |

| Results: Subbasin-3 | |
|---|---|
| Peak Discharge (M3/S) | 8.19 |
| Time of Peak Discharge | 01Jan2000, 12:00 |
| Volume (MM) | 218.48 |
| Precipitation Volume (M3) | 1.1E5 |
| Loss Volume (M3) | 34043.19 |
| Excess Volume (M3) | 76269.25 |
| Direct Runoff Volume (M3) | 76269.25 |
| Baseflow Volume (M3) | 0 |



## Sink: Sink-1

| Results: Sink-1 | |
|---|---|
| Peak Discharge (M3/S) | 37.79 |
| Time of Peak Discharge | 01Jan2000, 12:01 |
| Volume (MM) | 235.72 |



**Project:** Pr122
**Simulation Run:** 100_S7
**Simulation Start:** 31 December 1999, 24:00
**Simulation End:** 2 January 2000, 24:00

**HMS Version:** 4.10
**Executed:** 16 November 2022, 18:44

## Global Parameter Summary - Subbasin

**Location**

| Element Name | Longitude Degrees | Latitude Degrees |
|---|---|---|
| Subbasin - 4 | -67.03 | 18.07 |
| Subbasin - 1 | -67.04 | 18.06 |
| Subbasin - 2 | -67.05 | 18.07 |
| Subbasin - 3 | -67.04 | 18.07 |

**Area (KM2)**

| Element Name | Area (KM2) |
|---|---|
| Subbasin - 4 | 1.84 |
| Subbasin - 1 | 1.09 |
| Subbasin - 2 | 0.14 |
| Subbasin - 3 | 0.35 |

**Downstream**

| Element Name | Downstream |
|---|---|
| Subbasin - 4 | Sink - 2 |
| Subbasin - 1 | Reach - 1 |
| Subbasin - 2 | Junction - 1 |
| Subbasin - 3 | Sink - 1 |

**Loss Rate: Scs**

| Element Name | Percent Impervious Area | Curve Number |
|---|---|---|
| Subbasin - 4 | 0 | 71 |
| Subbasin - 1 | 0 | 77 |
| Subbasin - 2 | 0 | 78 |
| Subbasin - 3 | 0 | 71 |

**Transform: Scs**

| Element Name | Lag | Unitgraph Type |
|---|---|---|
| Subbasin - 4 | 10.11 | Standard |
| Subbasin - 1 | 17.13 | Standard |
| Subbasin - 2 | 7.77 | Standard |
| Subbasin - 3 | 13.52 | Standard |

## Global Parameter Summary - Reach

**Downstream**

| Element Name | Downstream |
|---|---|
| Reach - 1 | Junction - 1 |
| Reach - 2 | Sink - 1 |

**Route: Lag**

| Element Name | Method | Initial Variable | Lag |
|---|---|---|---|
| Reach - 1 | Lag | Combined Inflow | 1 |
| Reach - 2 | Lag | Combined Inflow | 1 |

## Global Results Summary

| Hydrologic Element | Drainage Area (KM2) | Peak Discharge (M3/S) | Time of Peak | Volume (MM) |
|---|---|---|---|---|
| Subbasin - 4 | 1.84 | 51.94 | 01Jan2000, 02:01 | 314.99 |
| Sink - 2 | 1.84 | 51.94 | 01Jan2000, 02:01 | 314.99 |
| Subbasin - 1 | 1.09 | 31.97 | 01Jan2000, 02:03 | 338.98 |
| Reach - 1 | 1.09 | 31.97 | 01Jan2000, 02:04 | 338.98 |
| Subbasin - 2 | 0.14 | 4.13 | 01Jan2000, 02:00 | 342.83 |
| Junction - 1 | 1.23 | 36.05 | 01Jan2000, 02:02 | 339.41 |
| Reach - 2 | 1.23 | 36.05 | 01Jan2000, 02:03 | 339.41 |
| Subbasin - 3 | 0.35 | 9.77 | 01Jan2000, 02:02 | 314.99 |
| Sink - 1 | 1.57 | 45.81 | 01Jan2000, 02:03 | 334 |

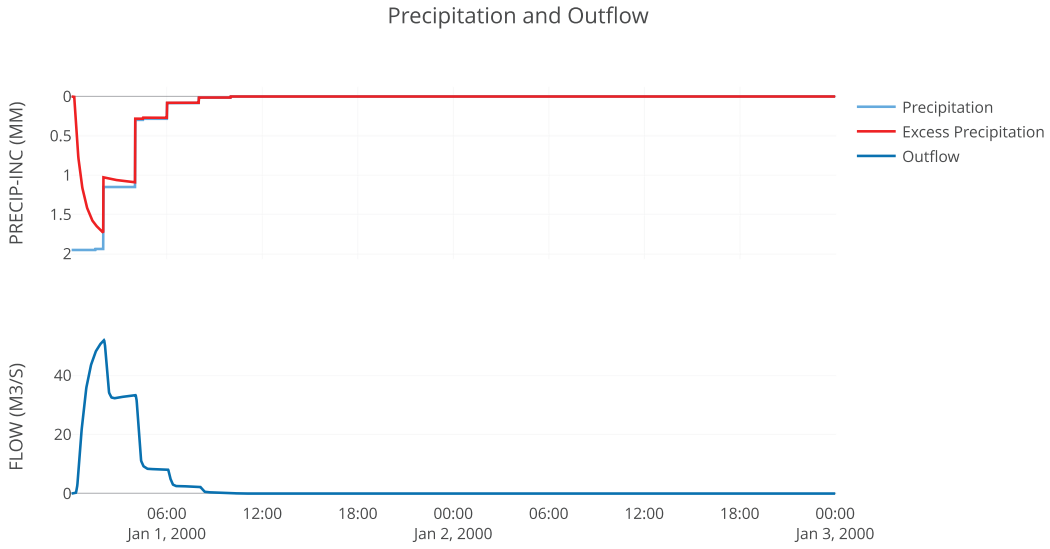
# Subbasin: Subbasin-4

**Area (KM2)** : 1.84
**Latitude Degrees** : 18.07
**Longitude Degrees** : -67.03
**Downstream** : Sink - 2

| Loss Rate: Scs | |
|---|---|
| Percent Impervious Area | 0 |
| Curve Number | 71 |

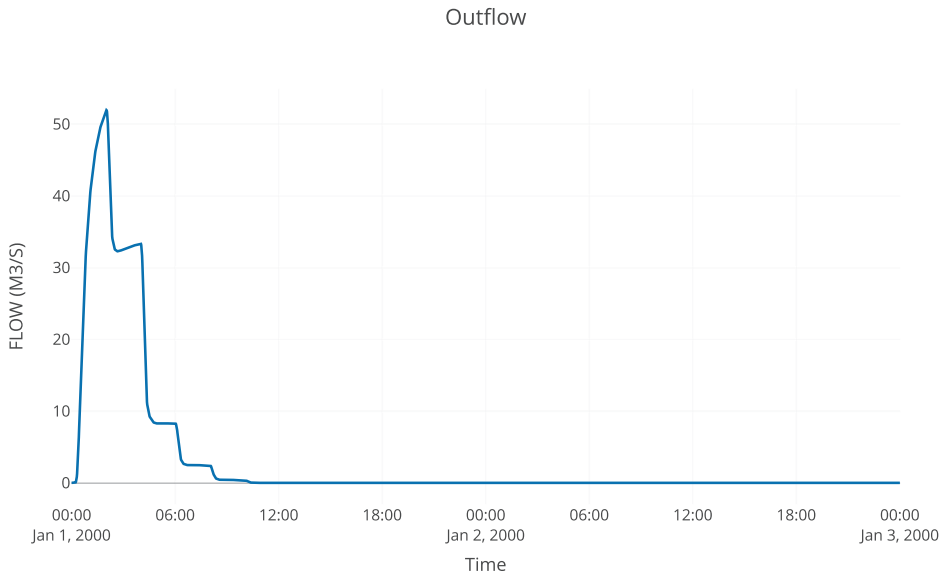
| Transform: Scs | |
|---|---|
| Lag | 10.11 |
| Unitgraph Type | Standard |

| Results: Subbasin-4 | |
|---|---|
| Peak Discharge (M3/S) | 51.94 |
| Time of Peak Discharge | 01Jan2000, 02:01 |
| Volume (MM) | 314.99 |
| Precipitation Volume (M3) | 7.69E5 |
| Loss Volume (M3) | 1.9E5 |
| Excess Volume (M3) | 5.8E5 |
| Direct Runoff Volume (M3) | 5.8E5 |
| Baseflow Volume (M3) | 0 |



## Sink: Sink-2

| Results: Sink-2 | |
|---|---|
| Peak Discharge (M3/S) | 51.94 |
| Time of Peak Discharge | 01Jan2000, 02:01 |
| Volume (MM) | 314.99 |



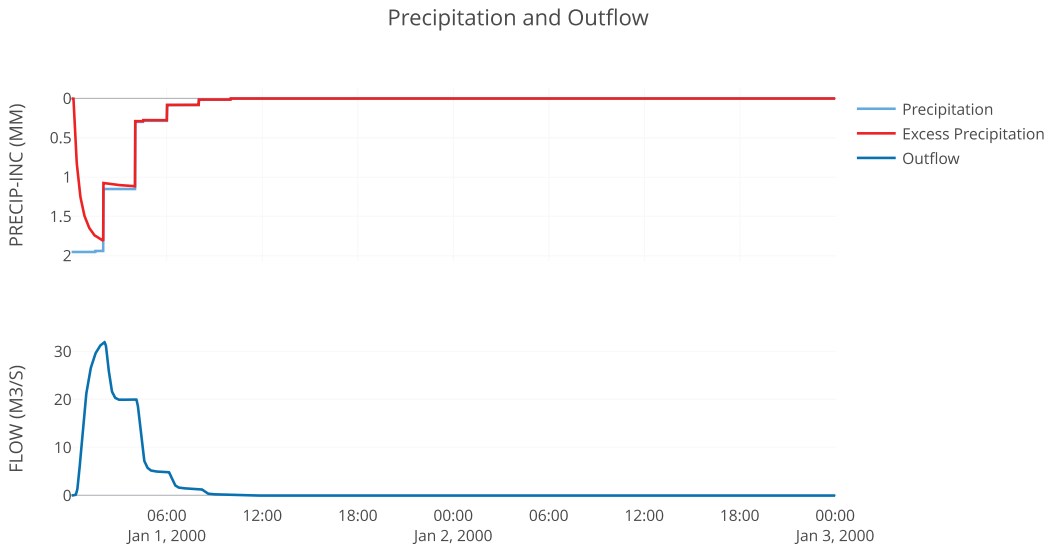
# Subbasin: Subbasin-1

**Area (KM2)** : 1.09
**Latitude Degrees** : 18.06
**Longitude Degrees** : -67.04
**Downstream** : Reach - 1

| Loss Rate: Scs | |
|---|---|
| Percent Impervious Area | 0 |
| Curve Number | 77 |

| Transform: Scs | |
|---|---|
| Lag | 17.13 |
| Unitgraph Type | Standard |

| Results: Subbasin-1 | |
|---|---|
| Peak Discharge (M3/S) | 31.97 |
| Time of Peak Discharge | 01Jan2000, 02:03 |
| Volume (MM) | 338.98 |
| Precipitation Volume (M3) | 4.55E5 |
| Loss Volume (M3) | 85980.84 |
| Excess Volume (M3) | 3.69E5 |
| Direct Runoff Volume (M3) | 3.69E5 |
| Baseflow Volume (M3) | 0 |



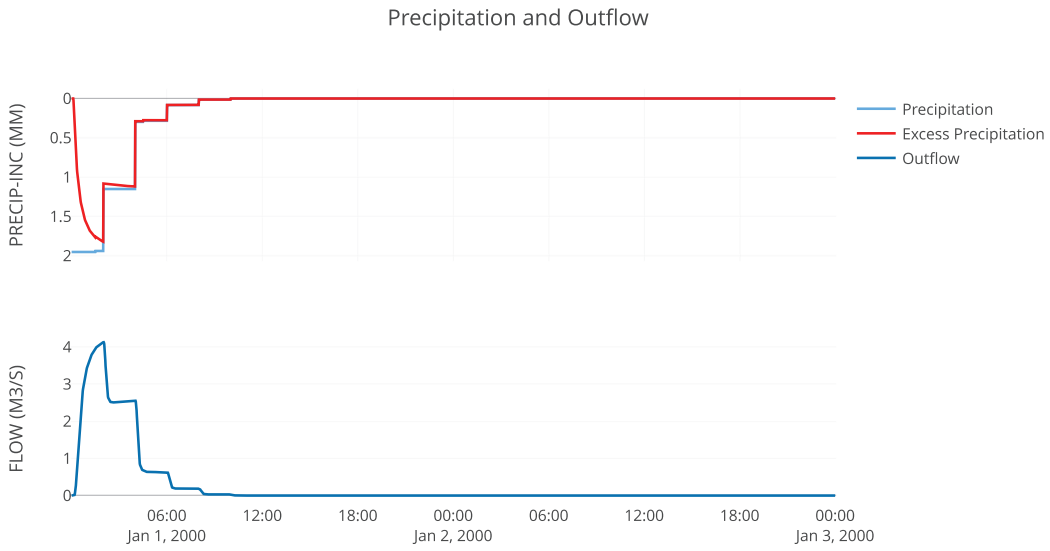
# Subbasin: Subbasin-2

**Area (KM2)** : 0.14
**Latitude Degrees** : 18.07
**Longitude Degrees** : -67.05
**Downstream** : Junction - 1

| Loss Rate: Scs | |
|---|---|
| Percent Impervious Area | 0 |
| Curve Number | 78 |

| Transform: Scs | |
|---|---|
| Lag | 7.77 |
| Unitgraph Type | Standard |

| Results: Subbasin-2 | |
|---|---|
| Peak Discharge (M3/S) | 4.13 |
| Time of Peak Discharge | 01Jan2000, 02:00 |
| Volume (MM) | 342.83 |
| Precipitation Volume (M3) | 57449.92 |
| Loss Volume (M3) | 10331.53 |
| Excess Volume (M3) | 47118.39 |
| Direct Runoff Volume (M3) | 47118.39 |
| Baseflow Volume (M3) | 0 |



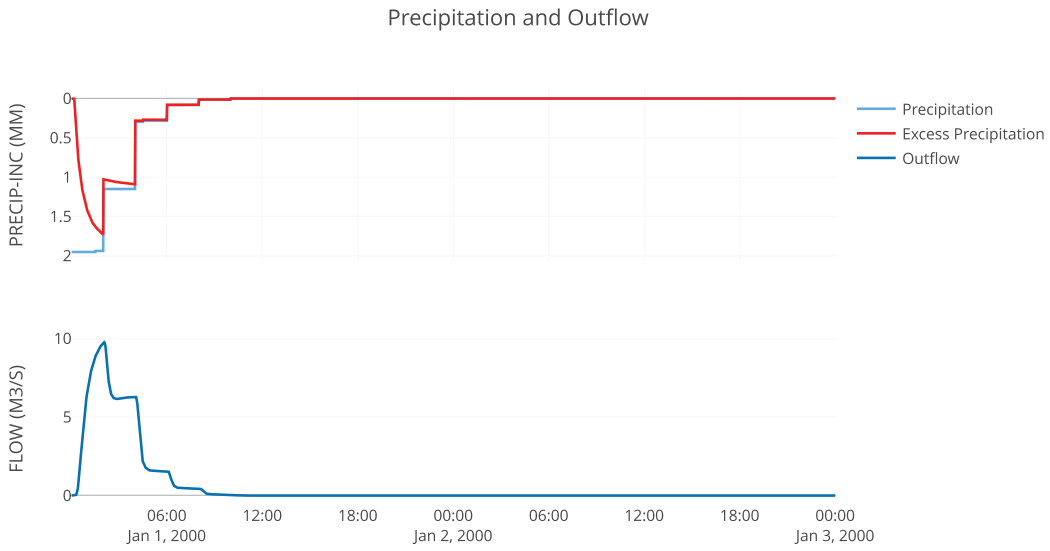
# Subbasin: Subbasin-3

**Area (KM2)** : 0.35
**Latitude Degrees** : 18.07
**Longitude Degrees** : -67.04
**Downstream** : Sink - 1

| Loss Rate: Scs | |
|---|---|
| Percent Impervious Area | 0 |
| Curve Number | 71 |

| Transform: Scs | |
|---|---|
| Lag | 13.52 |
| Unitgraph Type | Standard |

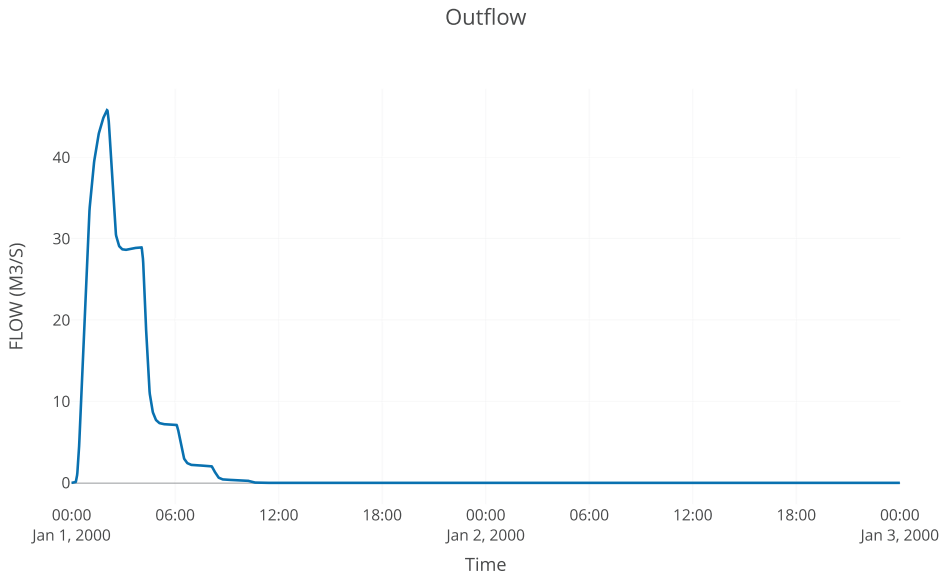
| Results: Subbasin-3 | |
|---|---|
| Peak Discharge (M3/S) | 9.77 |
| Time of Peak Discharge | 01Jan2000, 02:02 |
| Volume (MM) | 314.99 |
| Precipitation Volume (M3) | 1.46E5 |
| Loss Volume (M3) | 35960.44 |
| Excess Volume (M3) | 1.1E5 |
| Direct Runoff Volume (M3) | 1.1E5 |
| Baseflow Volume (M3) | 0 |



## Sink: Sink-1

**Results: Sink-1**

| | |
|---|---|
| Peak Discharge (M3/S) | 45.81 |
| Time of Peak Discharge | 01Jan2000, 02:03 |
| Volume (MM) | 334 |



**Project:** Pr122
**Simulation Run:** 100_S8
**Simulation Start:** 31 December 1999, 24:00
**Simulation End:** 2 January 2000, 24:00

**HMS Version:** 4.10
**Executed:** 16 November 2022, 18:44

## Global Parameter Summary - Subbasin

**Location**

| Element Name | Longitude Degrees | Latitude Degrees |
|---|---|---|
| Subbasin - 4 | -67.03 | 18.07 |
| Subbasin - 1 | -67.04 | 18.06 |
| Subbasin - 2 | -67.05 | 18.07 |
| Subbasin - 3 | -67.04 | 18.07 |

**Area (KM2)**

| Element Name | Area (KM2) |
|---|---|
| Subbasin - 4 | 1.84 |
| Subbasin - 1 | 1.09 |
| Subbasin - 2 | 0.14 |
| Subbasin - 3 | 0.35 |

**Downstream**

| Element Name | Downstream |
|---|---|
| Subbasin - 4 | Sink - 2 |
| Subbasin - 1 | Reach - 1 |
| Subbasin - 2 | Junction - 1 |
| Subbasin - 3 | Sink - 1 |

**Loss Rate: Scs**

| Element Name | Percent Impervious Area | Curve Number |
|---|---|---|
| Subbasin - 4 | 0 | 71 |
| Subbasin - 1 | 0 | 77 |
| Subbasin - 2 | 0 | 78 |
| Subbasin - 3 | 0 | 71 |

**Transform: Scs**

| Element Name | Lag | Unitgraph Type |
|---|---|---|
| Subbasin - 4 | 10.11 | Standard |
| Subbasin - 1 | 17.13 | Standard |
| Subbasin - 2 | 7.77 | Standard |
| Subbasin - 3 | 13.52 | Standard |

## Global Parameter Summary - Reach

**Downstream**

| Element Name | Downstream |
|---|---|
| Reach - 1 | Junction - 1 |
| Reach - 2 | Sink - 1 |

**Route: Lag**

| Element Name | Method | Initial Variable | Lag |
|---|---|---|---|
| Reach - 1 | Lag | Combined Inflow | 1 |
| Reach - 2 | Lag | Combined Inflow | 1 |

## Global Results Summary

| Hydrologic Element | Drainage Area (KM2) | Peak Discharge (M3/S) | Time of Peak | Volume (MM) |
|---|---|---|---|---|
| Subbasin - 4 | 1.84 | 43.89 | 01Jan2000, 24:00 | 314.99 |
| Sink - 2 | 1.84 | 43.89 | 01Jan2000, 24:00 | 314.99 |
| Subbasin - 1 | 1.09 | 26.42 | 01Jan2000, 24:00 | 338.98 |
| Reach - 1 | 1.09 | 26.42 | 02Jan2000, 00:01 | 338.98 |
| Subbasin - 2 | 0.14 | 3.35 | 01Jan2000, 24:00 | 342.83 |
| Junction - 1 | 1.23 | 29.76 | 01Jan2000, 24:00 | 339.41 |
| Reach - 2 | 1.23 | 29.76 | 02Jan2000, 00:01 | 339.41 |
| Subbasin - 3 | 0.35 | 8.31 | 01Jan2000, 24:00 | 314.99 |
| Sink - 1 | 1.57 | 38.07 | 02Jan2000, 00:01 | 334 |

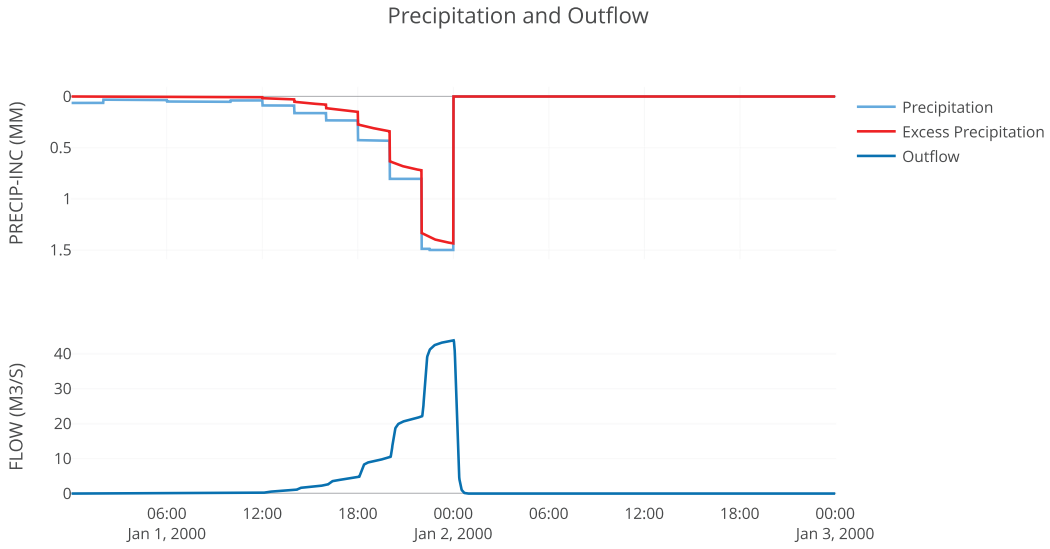
# Subbasin: Subbasin-4

**Area (KM2)** : 1.84
**Latitude Degrees** : 18.07
**Longitude Degrees** : -67.03
**Downstream** : Sink - 2

| Loss Rate: Scs | |
|---|---|
| Percent Impervious Area | 0 |
| Curve Number | 71 |

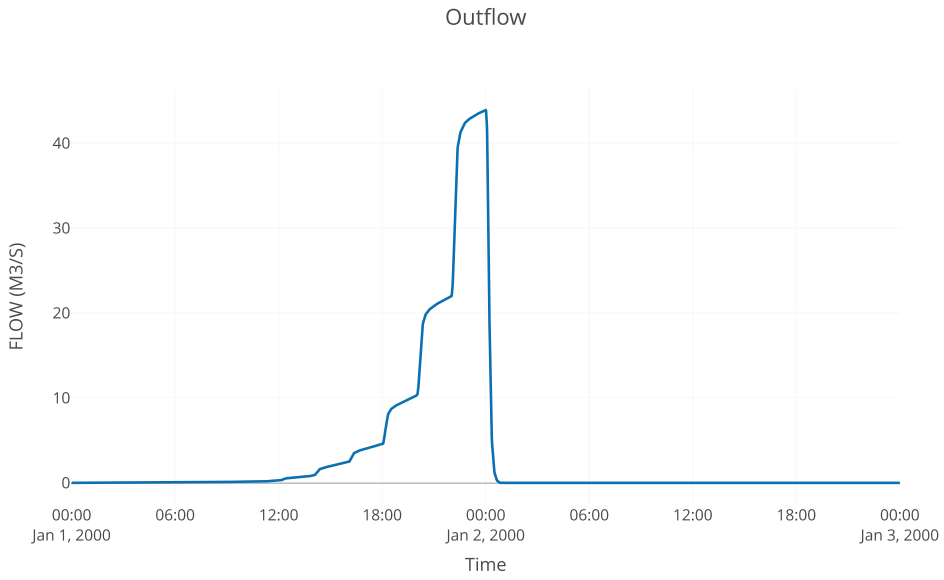
| Transform: Scs | |
|---|---|
| Lag | 10.11 |
| Unitgraph Type | Standard |

| Results: Subbasin-4 | |
|---|---|
| Peak Discharge (M3/S) | 43.89 |
| Time of Peak Discharge | 01Jan2000, 24:00 |
| Volume (MM) | 314.99 |
| Precipitation Volume (M3) | 7.69E5 |
| Loss Volume (M3) | 1.9E5 |
| Excess Volume (M3) | 5.8E5 |
| Direct Runoff Volume (M3) | 5.8E5 |
| Baseflow Volume (M3) | 0 |



## Sink: Sink-2

| Results: Sink-2 | |
|---|---|
| Peak Discharge (M3/S) | 43.89 |
| Time of Peak Discharge | 01Jan2000, 24:00 |
| Volume (MM) | 314.99 |



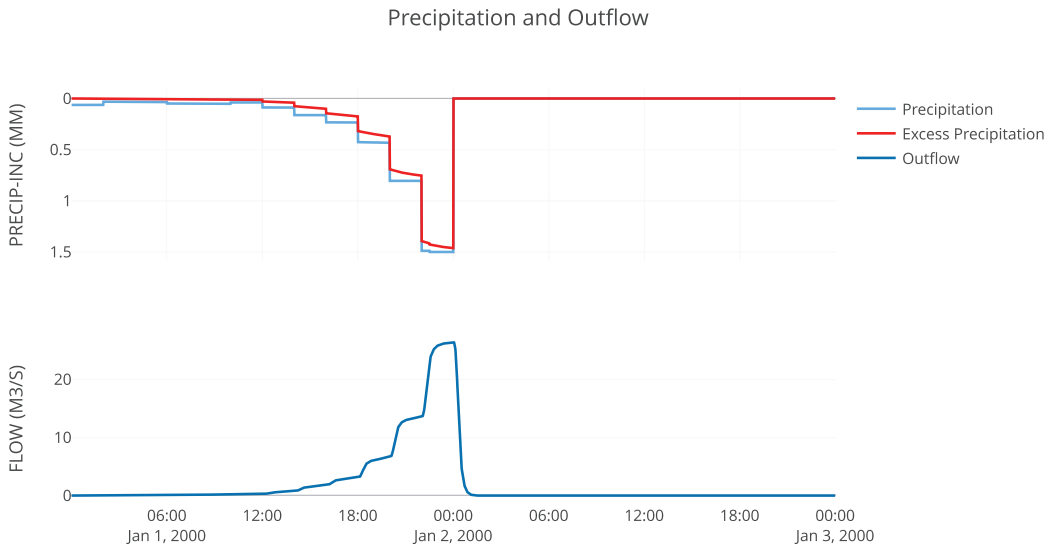
# Subbasin: Subbasin-1

**Area (KM2)** : 1.09
**Latitude Degrees** : 18.06
**Longitude Degrees** : -67.04
**Downstream** : Reach - 1

| Loss Rate: Scs | |
|---|---|
| Percent Impervious Area | 0 |
| Curve Number | 77 |

| Transform: Scs | |
|---|---|
| Lag | 17.13 |
| Unitgraph Type | Standard |

| Results: Subbasin-1 | |
|---|---|
| Peak Discharge (M3/S) | 26.42 |
| Time of Peak Discharge | 01Jan2000, 24:00 |
| Volume (MM) | 338.98 |
| Precipitation Volume (M3) | 4.55E5 |
| Loss Volume (M3) | 85980.84 |
| Excess Volume (M3) | 3.69E5 |
| Direct Runoff Volume (M3) | 3.69E5 |
| Baseflow Volume (M3) | 0 |



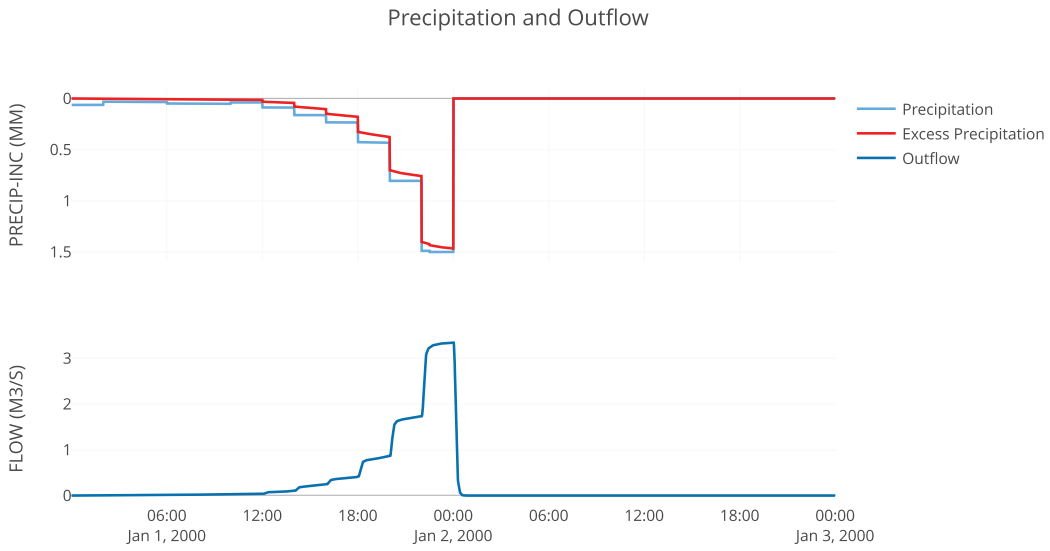
# Subbasin: Subbasin-2

**Area (KM2)** : 0.14
**Latitude Degrees** : 18.07
**Longitude Degrees** : -67.05
**Downstream** : Junction - 1

| Loss Rate: Scs | |
|---|---|
| Percent Impervious Area | 0 |
| Curve Number | 78 |

| Transform: Scs | |
|---|---|
| Lag | 7.77 |
| Unitgraph Type | Standard |

| Results: Subbasin-2 | |
|---|---|
| Peak Discharge (M3/S) | 3.35 |
| Time of Peak Discharge | 01Jan2000, 24:00 |
| Volume (MM) | 342.83 |
| Precipitation Volume (M3) | 57449.92 |
| Loss Volume (M3) | 10331.53 |
| Excess Volume (M3) | 47118.39 |
| Direct Runoff Volume (M3) | 47118.39 |
| Baseflow Volume (M3) | 0 |



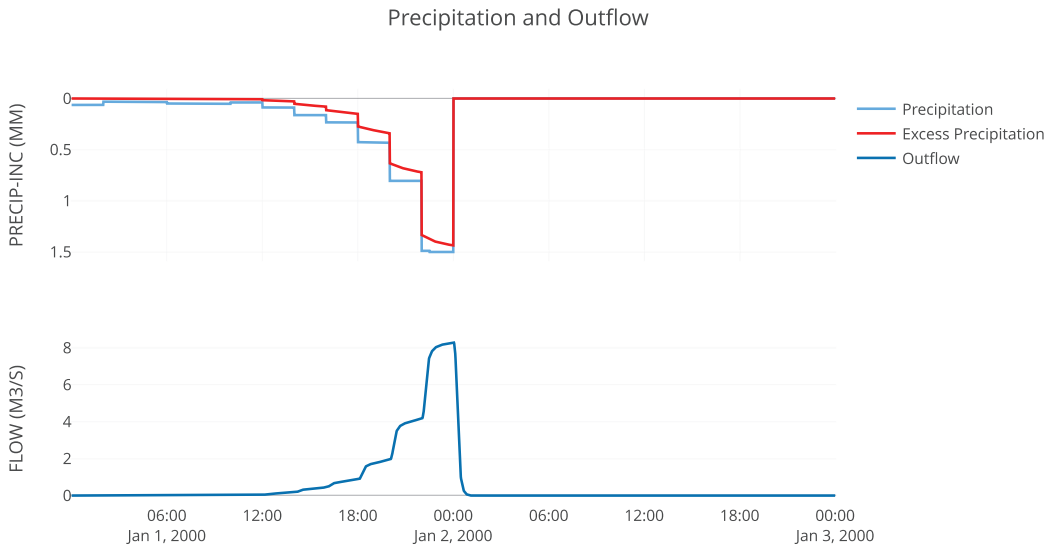
# Subbasin: Subbasin-3

**Area (KM2)** : 0.35
**Latitude Degrees** : 18.07
**Longitude Degrees** : -67.04
**Downstream** : Sink - 1

| Loss Rate: Scs | |
|---|---|
| Percent Impervious Area | 0 |
| Curve Number | 71 |

| Transform: Scs | |
|---|---|
| Lag | 13.52 |
| Unitgraph Type | Standard |

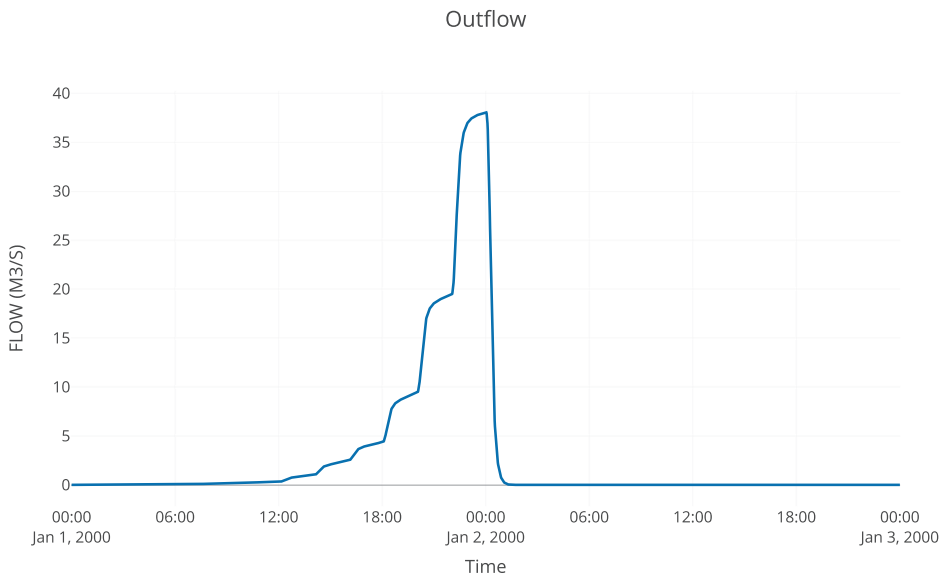
| Results: Subbasin-3 | |
|---|---|
| Peak Discharge (M3/S) | 8.31 |
| Time of Peak Discharge | 01Jan2000, 24:00 |
| Volume (MM) | 314.99 |
| Precipitation Volume (M3) | 1.46E5 |
| Loss Volume (M3) | 35960.44 |
| Excess Volume (M3) | 1.1E5 |
| Direct Runoff Volume (M3) | 1.1E5 |
| Baseflow Volume (M3) | 0 |



## Sink: Sink-1

**Results: Sink-1**

| | |
|---|---|
| Peak Discharge (M3/S) | 38.07 |
| Time of Peak Discharge | 02Jan2000, 00:01 |
| Volume (MM) | 334 |



# Appendix C:

## *HEC-RAS Model Input and Output Report for the Existing Condition Model*

HEC-RAS HEC-RAS 6.4.1 June 2023
U.S. Army Corps of Engineers
Hydrologic Engineering Center
609 Second Street
Davis, California

```
X     X  XXXXXX    XXXX        XXXX       XX      XXXX
X     X  X        X    X       X   X     X  X    X
X     X  X        X            X   X    X    X   X
XXXXXXX  XXXX     X       XXX  XXXX     XXXXXX    XXXX
X     X  X        X            X  X     X    X        X
X     X  X        X    X       X   X    X    X        X
X     X  XXXXXX    XXXX        X    X   X    X   XXXXX
```

PROJECT DATA
Project Title: PR122
Project File : PR122.prj
Run Date and Time: 5/27/2025 12:30:20 PM

Project in SI units

PLAN DATA

Plan Title: Existing Condition Qda Maresua R2025
Plan File : e:\WORKING\0000_BYA_WORKING\20-PR-122\HH-SCOUR\REPORT\HH\APPENDICES\Models CD\HEC-RAS PR-122\REV_MAY2025\PR-122\PR122.p09

Geometry Title: Existing Qda_Maresua_rev2025
Geometry File : e:\WORKING\0000_BYA_WORKING\20-PR-122\HH-SCOUR\REPORT\HH\APPENDICES\Models CD\HEC-RAS PR-122\REV_MAY2025\PR-122\PR122.g04

Flow Title : Qda Maresua
Flow File : e:\WORKING\0000_BYA_WORKING\20-PR-122\HH-SCOUR\REPORT\HH\APPENDICES\Models CD\HEC-RAS PR-122\REV_MAY2025\PR-122\PR122.f02

Plan Summary Information:
Number of: Cross Sections = 11 Multiple Openings = 0
Culverts = 0 Inline Structures = 0
Bridges = 0 Lateral Structures = 0

Computational Information
Water surface calculation tolerance = 0.003
Critical depth calculation tolerance = 0.003
Maximum number of iterations = 20
Maximum difference tolerance = 0.1
Flow tolerance factor = 0.001

Computation Options
Critical depth computed only where necessary
Conveyance Calculation Method: At breaks in n values only
Friction Slope Method: Average Conveyance
Computational Flow Regime: Supercritical Flow

FLOW DATA

Flow Title: Qda Maresua
Flow File : e:\WORKING\0000_BYA_WORKING\20-PR-122\HH-SCOUR\REPORT\HH\APPENDICES\Models CD\HEC-RAS PR-122\REV_MAY2025\PR-122\PR122.f02

Flow Data (m3/s)

| River | Reach | RS | 100YR |
|---|---|---|---|
| QdaMaresua | PR122 | 557 | 33.3 |
| QdaMaresua | PR122 | 204 | 37.3 |
| QdaMaresua | PR122 | 8 | 47.1 |

Boundary Conditions

| River | Reach | Profile | Upstream | Downstream |
|---|---|---|---|---|

QdaMaresua PR122 100YR Normal S = 0.013 Normal S = 0.02

GEOMETRY DATA

Geometry Title: Existing Qda_Maresua_rev2025
Geometry File : e:\WORKING\0000_BYA_WORKING\20-PR-122\HH-SCOUR\REPORT\HH\APPENDICES\Models CD\HEC-RAS PR-122\REV_MAY2025\PR-122\PR122.g04

CROSS SECTION

RIVER: QdaMaresua
REACH: PR122 RS: 557

INPUT
Description: XS-12
Station Elevation Data num= 23

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 104.84 | 21.79 | 97 | 32.49 | 94.38 | 40.97 | 92.78 | 56.67 | 89.46 |
| 62.97 | 87.93 | 72.11 | 87.4 | 84.63 | 86.96 | 96.4 | 84.73 | 100.39 | 84.03 |
| 107.61 | 83.61 | 112.3 | 83.51 | 113.61 | 83.82 | 114.3 | 83.76 | 116.7 | 81.44 |
| 119.37 | 81.78 | 121.07 | 83.35 | 125.25 | 83.8 | 129.43 | 87.14 | 132.92 | 89.8 |
| 137.88 | 92 | 145.51 | 96 | 152.18 | 98 | | | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .1 | 114.3 | .04 | 121.07 | .1 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 114.3 | 121.07 | 31.4 | 31.4 | .1 | .3 |

CROSS SECTION

RIVER: QdaMaresua
REACH: PR122 RS: 526

INPUT
Description: XS-13
Station Elevation Data num= 20

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 110 | 3.69 | 108.15 | 15.95 | 102.06 | 25.96 | 98.04 | 39.04 | 92.61 |
| 51.25 | 88.41 | 62.14 | 85.3 | 69.2 | 83.31 | 74.45 | 82.63 | 76.92 | 82.4 |
| 77.58 | 81.68 | 79.46 | 81.48 | 82.55 | 82.32 | 83.47 | 82.16 | 85.28 | 82.85 |
| 94.13 | 84.16 | 105.68 | 88 | 111.92 | 91 | 122.7 | 96 | 127.81 | 98 |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .1 | 76.92 | .04 | 82.55 | .1 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 76.92 | 82.55 | 18.6 | 18.6 | .1 | .3 |

CROSS SECTION

RIVER: QdaMaresua
REACH: PR122 RS: 507

INPUT
Description: XS-14
Station Elevation Data num= 20

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 114 | 3.86 | 113.09 | 10.26 | 109.73 | 19.67 | 105.17 | 28.84 | 100.82 |
| 40.44 | 94.91 | 50.81 | 89.61 | 51.51 | 88.77 | 56.13 | 88.31 | 61.99 | 82.544 |
| 63.6 | 80.96 | 67.34 | 81.39 | 69.74 | 82.55 | 76.1 | 82.57 | 81.33 | 82.95 |
| 88.73 | 84.95 | 102.31 | 90 | 111.3 | 94 | 117.46 | 97 | 120.79 | 98 |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .1 | 61.99 | .04 | 76.1 | .1 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 61.99 | 69.74 | 20.4 | 20.4 | .1 | .3 |

CROSS SECTION

```
RIVER: QdaMaresua
REACH: PR122              RS: 487

INPUT
Description: XS-15
Station Elevation Data    num=      16
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0  109.32   17.78  103.79   31.08    98.3   38.63   94.75    45.1   92.06
   56.79   83.48    58.8   81.21   60.15   80.91   62.77   80.91   64.74   81.34
   65.35   81.22      72   81.37   76.83   83.03   93.98      89   102.4      93
  114.06      98

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0      .1    58.8     .04   64.74      .1

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         56.79   64.74            109.9   109.9   109.9             .1       .3

CROSS SECTION


RIVER: QdaMaresua
REACH: PR122              RS: 377

INPUT
Description: XS-16
Station Elevation Data    num=      13
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0   87.61    16.7    84.8   32.65   80.19   64.44   78.96   68.05   78.93
   69.29   77.99   70.98   77.75   72.88   78.56   80.42   78.98   95.04   78.82
  111.29   90.02   129.2   96.83  146.53    97.8

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0      .1   68.05     .04   72.88      .1

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         68.05   72.88             99.4    99.4    99.4             .1       .3

CROSS SECTION


RIVER: QdaMaresua
REACH: PR122              RS: 278

INPUT
Description: XS-17
Station Elevation Data    num=      21
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0      87    7.83      86   19.48      85   26.22   83.42   37.19    80.7
   43.92   79.72   46.19    78.3   48.73   78.07   55.82   77.72   59.84   77.38
   61.79   76.81   65.35   75.06   65.93   75.11   68.91   77.07   74.16   76.57
   82.03   76.82   94.31   77.06  100.66   77.27  110.97   80.46  128.53   81.84
  151.02      84

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0      .1   61.79     .04   68.91      .1

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         61.79   68.91             16.3    16.3    16.3             .1       .3
Right Levee     Station=   68.91      Elevation=   77.07

CROSS SECTION


RIVER: QdaMaresua
REACH: PR122              RS: 262

INPUT
Description:
Station Elevation Data    num=      34
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0  86.282   7.579  85.338   9.936  85.123  18.855  84.252  25.379  82.853
  26.813   82.53  34.112  80.773  35.997  80.303  42.511  79.204  44.551   78.09
  44.708  78.009  47.166   77.77  50.251   77.57  54.029  77.423   57.92  77.164
  59.807  76.731  61.783  75.618  63.835  74.976  64.694  74.727  65.237  74.844
```

```
  68.029  76.742  73.193   76.34  80.934  76.497  83.728  76.527  86.389  76.907
  89.947  77.018  93.013  77.227  99.259  77.716  100.24  78.003 107.525  79.901
 109.401  80.367 126.673  81.573 137.615  82.485 142.843  83.607

Manning's n Values        num=       4
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
       0      .1  59.807     .04  68.029      .1 142.843      .1

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        59.807  68.029              9.1     9.1     9.1            .1       .3
Right Levee     Station=  68.029      Elevation=  76.742

CROSS SECTION


RIVER: QdaMaresua
REACH: PR122              RS: 253

INPUT
Description:
Station Elevation Data    num=      34
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0  85.942    7.46  85.026   9.781  84.807   18.56  83.898  24.981  82.585
  26.394  82.283  33.578  80.579  35.433  80.116  41.845   78.96  43.854  77.943
  44.008  77.871  46.428  77.628  49.465  77.408  53.183  77.283  57.013  77.063
  58.871  76.694  61.101  75.389  63.415   74.79  64.384   74.57   64.91  74.719
  67.613  76.587  72.736  76.231  80.417  76.344  83.189  76.362  85.828  76.897
  89.358  77.028  92.401  77.305  98.598  77.927  99.571  78.203 106.799  79.916
  108.66  80.323 125.797  81.447 136.652  82.285   140.2  83.422

Manning's n Values        num=       4
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
       0      .1  58.871     .04  67.613      .1   140.2      .1

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        58.871  67.613              5.6     5.6     5.6            .1       .3
Right Levee     Station=  67.613      Elevation=  76.587

CROSS SECTION


RIVER: QdaMaresua
REACH: PR122              RS: 247

INPUT
Description:
Station Elevation Data    num=      34
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0  85.737   7.388  84.837   9.687  84.616  18.381  83.684  24.741  82.423
   26.14  82.134  33.255  80.462  35.092  80.002  41.443  78.812  43.431  77.854
  43.584  77.788  45.981  77.542  48.988   77.31  52.671  77.198  56.465  77.001
  58.305  76.671  60.687  75.251  63.161  74.678  64.197  74.475  64.712  74.643
  67.361  76.493   72.46  76.165  80.104  76.252  82.862  76.263  85.489  76.891
  89.002  77.033   92.03  77.353  98.198  78.055  99.166  78.324 106.359  79.925
 108.211  80.296 125.266  81.371  136.07  82.164     139   83.31

Manning's n Values        num=       4
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
       0      .1  58.305     .04  67.361      .1     139      .1

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        58.305  67.361             42.5    42.5    42.5            .1       .3
Right Levee     Station=  67.361      Elevation=  76.493

CROSS SECTION


RIVER: QdaMaresua
REACH: PR122              RS: 204

INPUT
Description: XS-18
Station Elevation Data    num=      18
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0      84    8.89      83   23.99   80.87   30.52   79.47   39.86    77.1
   44.96   76.48   53.51   76.48   57.19   74.08   61.01   73.73   62.61   73.67
   65.23    75.7    80.1   75.42   82.62   76.84   85.99   77.08   95.74   79.35
  102.64      80  131.14   81.14  141.73   82.36

Manning's n Values        num=       3
```

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .1 | 53.51 | .04 | 65.23 | .1 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 53.51 | 65.23 | 196.1 | 196.1 | .1 | .3 |

CROSS SECTION

RIVER: QdaMaresua
REACH: PR122 RS: 8

INPUT
Description: XS-19
Station Elevation Data num= 17

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 77.44 | 6.41 | 76.87 | 12.5 | 75.68 | 18.19 | 72.04 | 20.88 | 69.64 |
| 22.87 | 69.66 | 24.74 | 70.12 | 25.49 | 71.62 | 30.22 | 71.65 | 33.41 | 71.63 |
| 35.49 | 72.8 | 44.9 | 72.29 | 55.12 | 73.14 | 62.45 | 74.29 | 68.38 | 75.22 |
| 82 | 78 | 97.81 | 80 | | | | | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .1 | 18.19 | .04 | 25.49 | .1 |

| Bank Sta: Left | Right | Coeff Contr. | Expan. |
|---|---|---|---|
| 18.19 | 25.49 | .1 | .3 |

SUMMARY OF MANNING'S N VALUES

River:QdaMaresua

| Reach | River Sta. | n1 | n2 | n3 | n4 |
|---|---|---|---|---|---|
| PR122 | 557 | .1 | .04 | .1 | |
| PR122 | 526 | .1 | .04 | .1 | |
| PR122 | 507 | .1 | .04 | .1 | |
| PR122 | 487 | .1 | .04 | .1 | |
| PR122 | 377 | .1 | .04 | .1 | |
| PR122 | 278 | .1 | .04 | .1 | |
| PR122 | 262 | .1 | .04 | .1 | .1 |
| PR122 | 253 | .1 | .04 | .1 | .1 |
| PR122 | 247 | .1 | .04 | .1 | .1 |
| PR122 | 204 | .1 | .04 | .1 | |
| PR122 | 8 | .1 | .04 | .1 | |

SUMMARY OF REACH LENGTHS

River: QdaMaresua

| Reach | River Sta. | Left | Channel | Right |
|---|---|---|---|---|
| PR122 | 557 | 31.4 | 31.4 | 31.4 |
| PR122 | 526 | 18.6 | 18.6 | 18.6 |
| PR122 | 507 | 20.4 | 20.4 | 20.4 |
| PR122 | 487 | 109.9 | 109.9 | 109.9 |
| PR122 | 377 | 99.4 | 99.4 | 99.4 |
| PR122 | 278 | 16.3 | 16.3 | 16.3 |
| PR122 | 262 | 9.1 | 9.1 | 9.1 |
| PR122 | 253 | 5.6 | 5.6 | 5.6 |
| PR122 | 247 | 42.5 | 42.5 | 42.5 |
| PR122 | 204 | 196.1 | 196.1 | 196.1 |
| PR122 | 8 | | | |

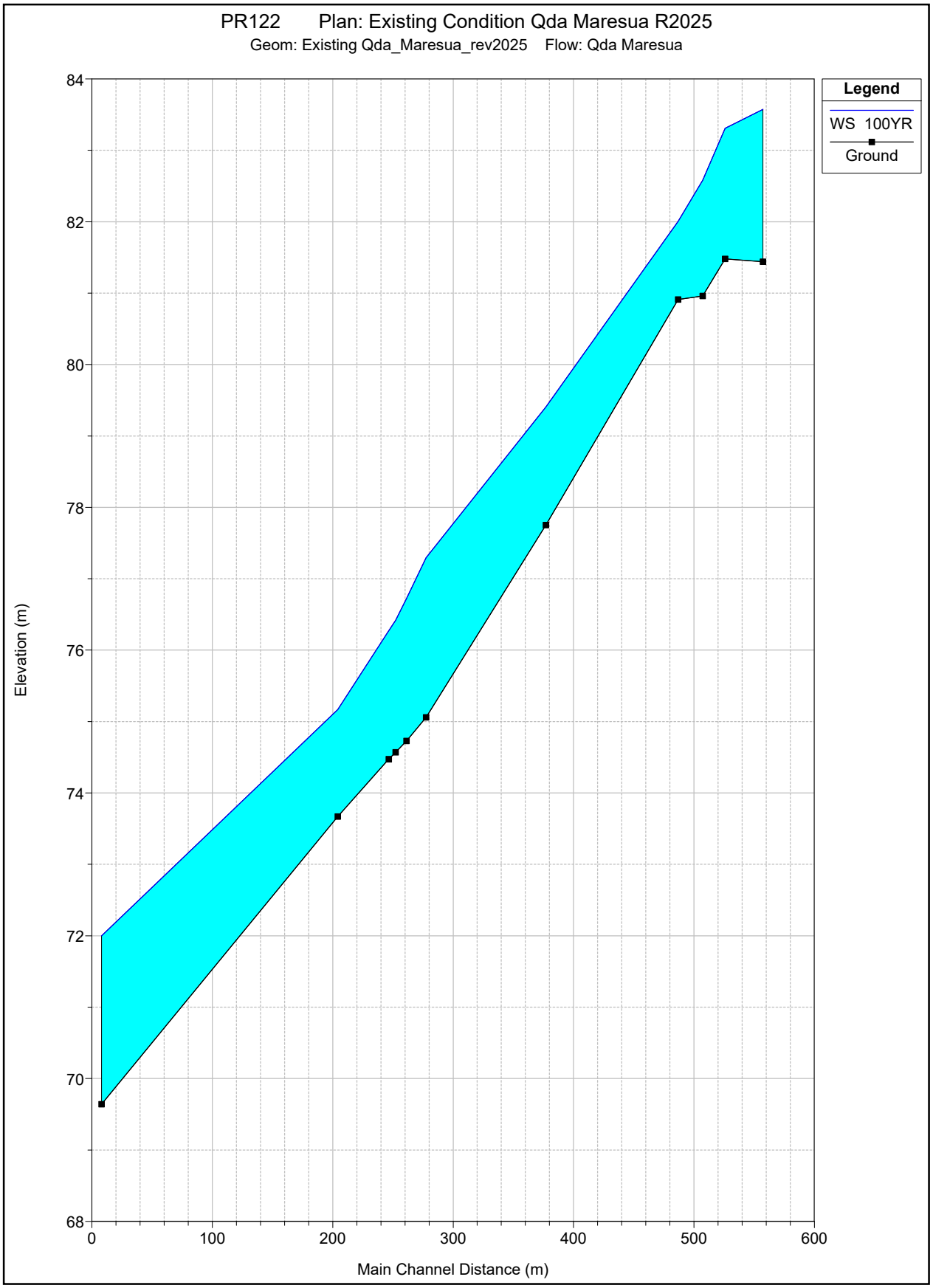
SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS
River: QdaMaresua

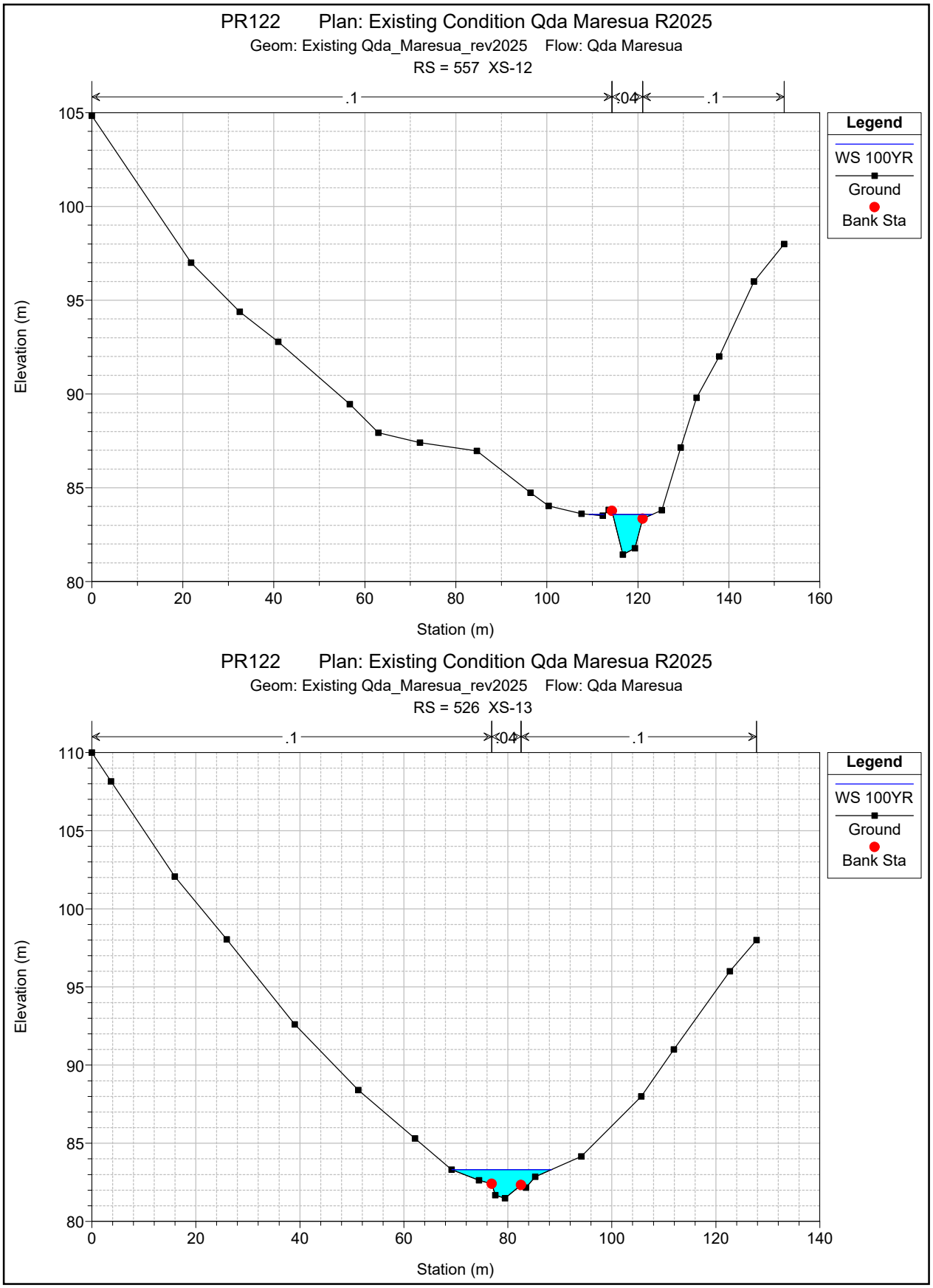
| Reach | River Sta. | Contr. | Expan. |
|---|---|---|---|
| PR122 | 557 | .1 | .3 |
| PR122 | 526 | .1 | .3 |

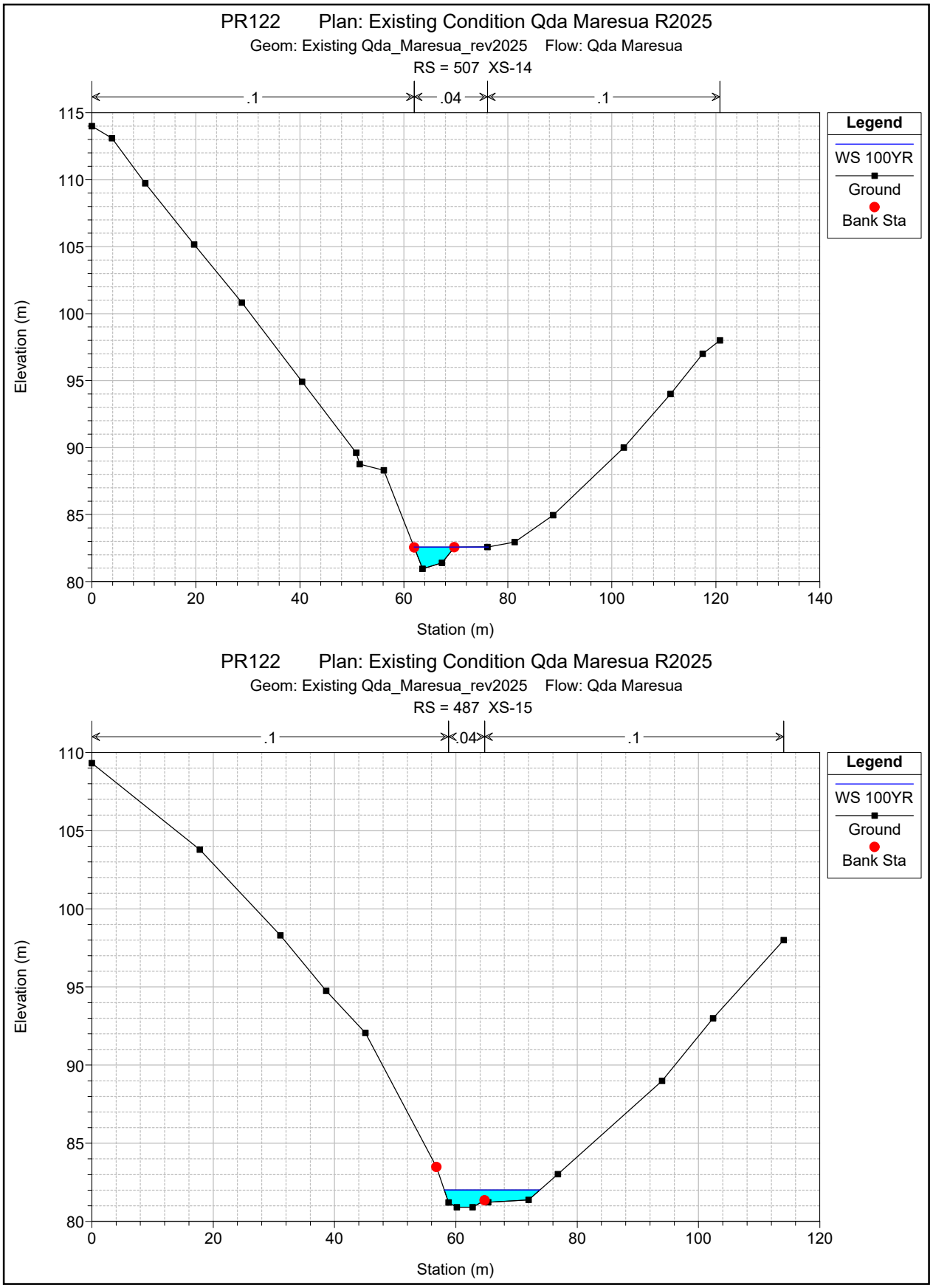
| | | | |
|---|---|---|---|
| PR122 | 507 | .1 | .3 |
| PR122 | 487 | .1 | .3 |
| PR122 | 377 | .1 | .3 |
| PR122 | 278 | .1 | .3 |
| PR122 | 262 | .1 | .3 |
| PR122 | 253 | .1 | .3 |
| PR122 | 247 | .1 | .3 |
| PR122 | 204 | .1 | .3 |
| PR122 | 8 | .1 | .3 |

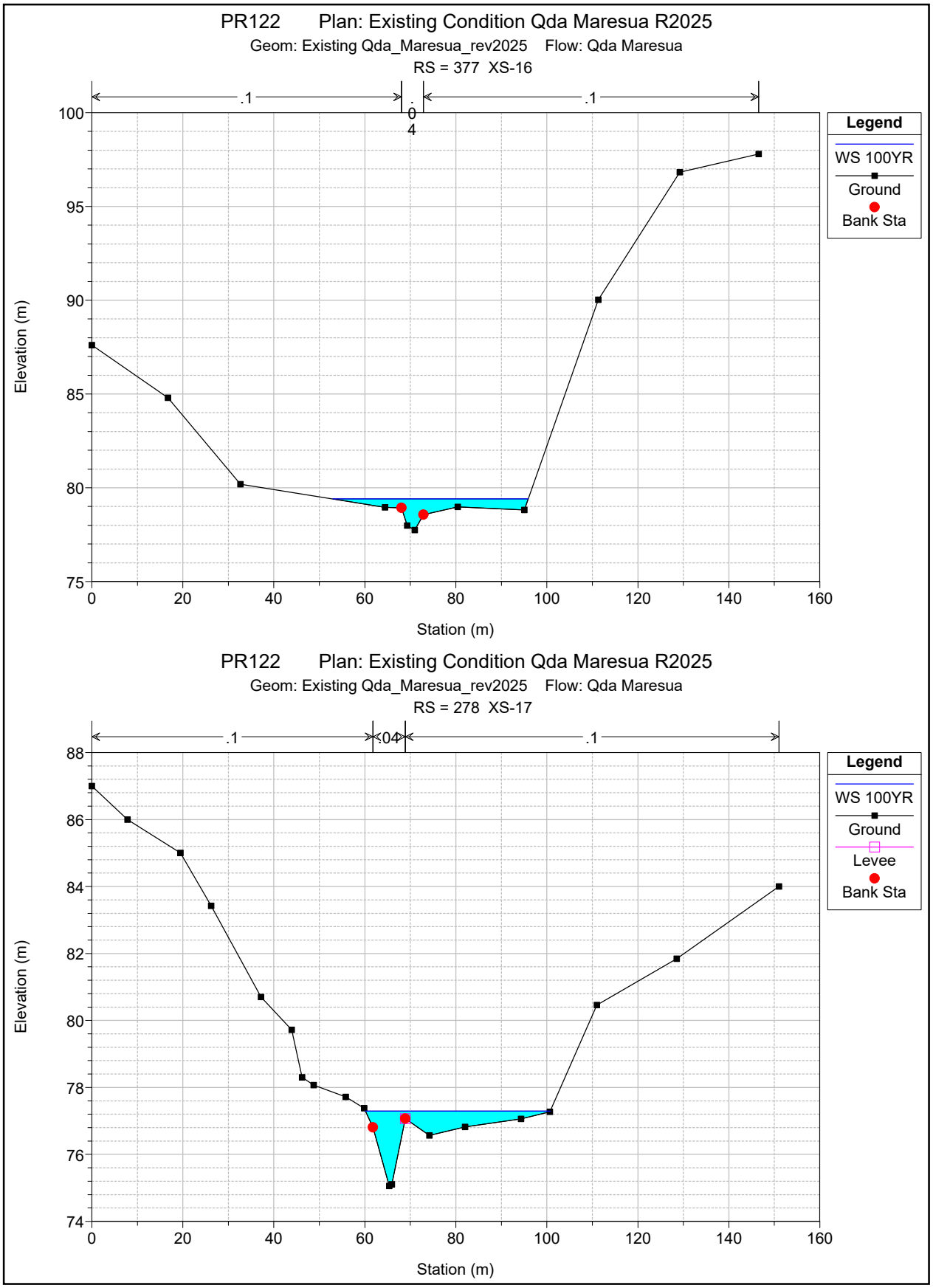
HEC-RAS Plan: Ex Qda Maresua rev2025 River: QdaMaresua Reach: PR122 Profile: 100YR

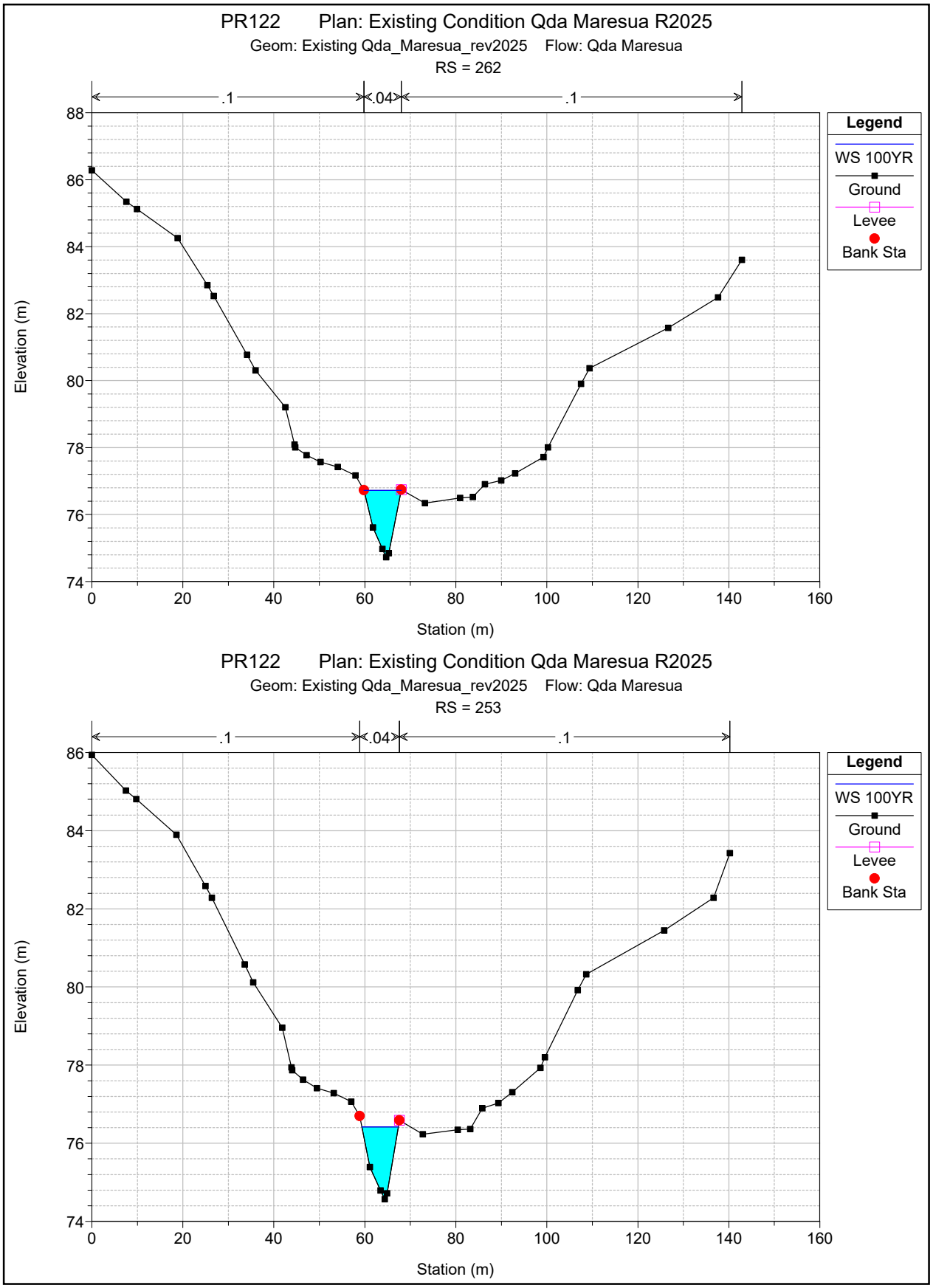
| Reach | River Sta | Profile | Q Total | Min Ch El | W.S. Elev | Crit W.S. | E.G. Elev | E.G. Slope | Vel Chnl | Flow Area | Top Width | Froude # Chl |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | (m3/s) | (m) | (m) | (m) | (m) | (m/m) | (m/s) | (m2) | (m) | |
| PR122 | 557 | 100YR | 33.30 | 81.44 | 83.57 | 83.57 | 84.22 | 0.016788 | 3.56 | 9.66 | 11.99 | 0.96 |
| PR122 | 526 | 100YR | 33.30 | 81.48 | 83.31 | 83.31 | 83.81 | 0.011819 | 3.39 | 15.33 | 19.17 | 0.88 |
| PR122 | 507 | 100YR | 33.30 | 80.96 | 82.58 | 82.88 | 83.45 | 0.029969 | 4.12 | 8.22 | 14.32 | 1.29 |
| PR122 | 487 | 100YR | 33.30 | 80.91 | 82.01 | 82.15 | 82.60 | 0.047801 | 3.90 | 11.94 | 15.76 | 1.29 |
| PR122 | 377 | 100YR | 33.30 | 77.75 | 79.40 | 79.48 | 79.79 | 0.015378 | 3.41 | 22.77 | 42.94 | 0.97 |
| PR122 | 278 | 100YR | 33.30 | 75.06 | 77.30 | 77.30 | 77.61 | 0.009485 | 2.75 | 22.55 | 40.62 | 0.75 |
| PR122 | 262 | 100YR | 33.30 | 74.73 | 76.72 | 76.85 | 77.38 | 0.020464 | 3.59 | 9.26 | 8.18 | 1.08 |
| PR122 | 253 | 100YR | 33.30 | 74.57 | 76.42 | 76.66 | 77.17 | 0.024514 | 3.83 | 8.68 | 8.03 | 1.18 |
| PR122 | 247 | 100YR | 33.30 | 74.48 | 76.27 | 76.42 | 77.03 | 0.024979 | 3.85 | 8.64 | 8.07 | 1.19 |
| PR122 | 204 | 100YR | 37.30 | 73.67 | 75.17 | 75.33 | 75.95 | 0.025676 | 3.91 | 9.53 | 9.02 | 1.22 |
| PR122 | 8 | 100YR | 47.10 | 69.64 | 72.00 | 72.00 | 72.64 | 0.013588 | 3.61 | 15.57 | 15.83 | 0.87 |

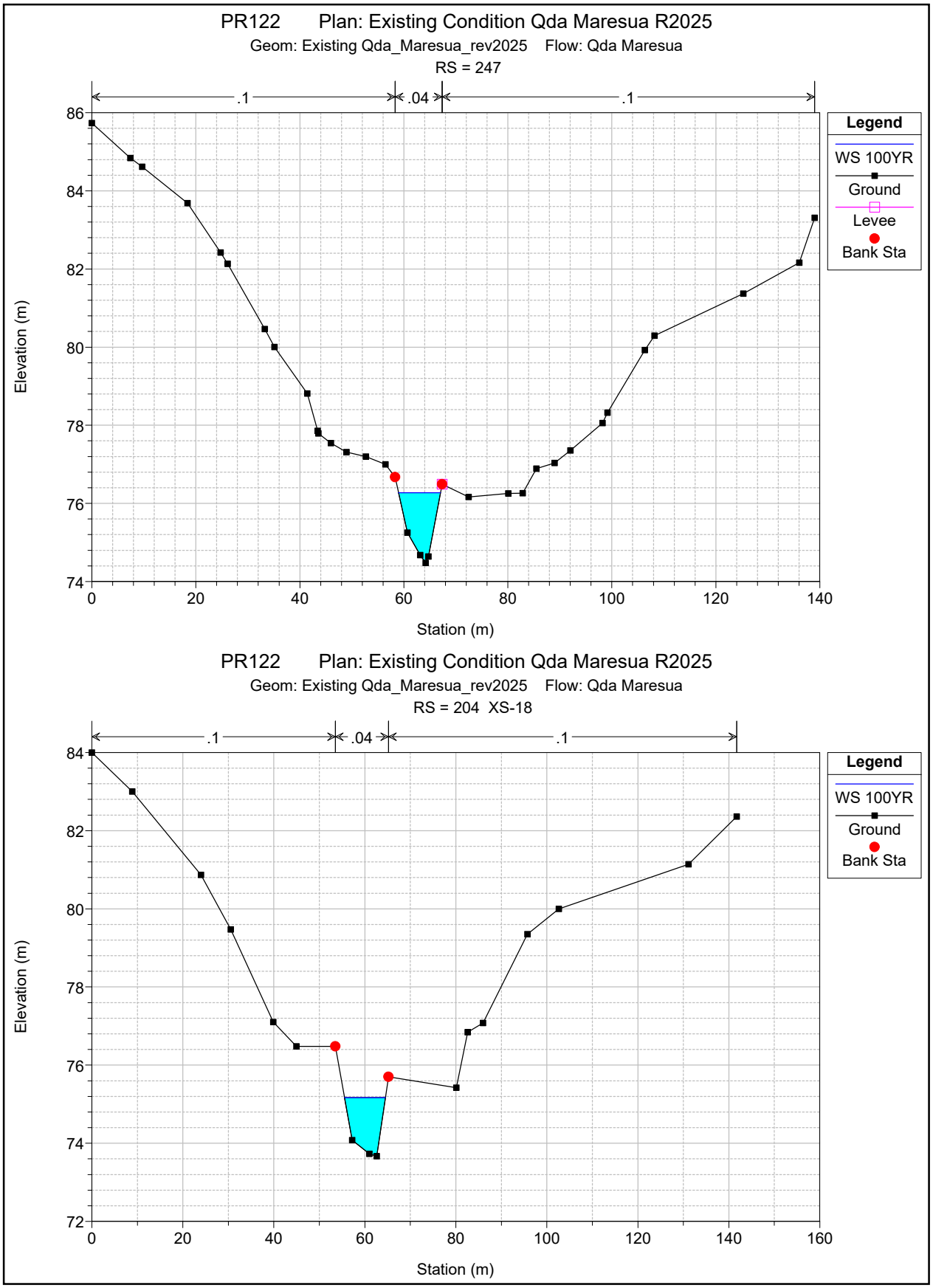

PR122 Plan: Existing Condition Qda Maresua R2025
Geom: Existing Qda_Maresua_rev2025 Flow: Qda Maresua
Legend
WS 100YR
Ground
Elevation (m)
84
82
80
78
76
74
72
70
68
0
100
200
300
400
500
600
Main Channel Distance (m)


PR122 Plan: Existing Condition Qda Maresua R2025
Geom: Existing Qda_Maresua_rev2025 Flow: Qda Maresua
RS = 557 XS-12
.1
.04
.1
Legend
WS 100YR
Ground
Bank Sta
Elevation (m)
Station (m)
105
100
95
90
85
80
0
20
40
60
80
100
120
140
160
PR122 Plan: Existing Condition Qda Maresua R2025
Geom: Existing Qda_Maresua_rev2025 Flow: Qda Maresua
RS = 526 XS-13
.1
.04
.1
Legend
WS 100YR
Ground
Bank Sta
Elevation (m)
Station (m)
110
105
100
95
90
85
80
0
20
40
60
80
100
120
140


PR122 Plan: Existing Condition Qda Maresua R2025
Geom: Existing Qda_Maresua_rev2025 Flow: Qda Maresua
RS = 507 XS-14
.1
.04
.1
Legend
WS 100YR
Ground
Bank Sta
Elevation (m)
Station (m)
PR122 Plan: Existing Condition Qda Maresua R2025
Geom: Existing Qda_Maresua_rev2025 Flow: Qda Maresua
RS = 487 XS-15
.1
.04
.1
Legend
WS 100YR
Ground
Bank Sta
Elevation (m)
Station (m)


PR122 Plan: Existing Condition Qda Maresua R2025
Geom: Existing Qda_Maresua_rev2025 Flow: Qda Maresua
RS = 377 XS-16
.1
.04
.1
Legend
WS 100YR
Ground
Bank Sta
Elevation (m)
Station (m)
PR122 Plan: Existing Condition Qda Maresua R2025
Geom: Existing Qda_Maresua_rev2025 Flow: Qda Maresua
RS = 278 XS-17
.1
.04
.1
Legend
WS 100YR
Ground
Levee
Bank Sta
Elevation (m)
Station (m)

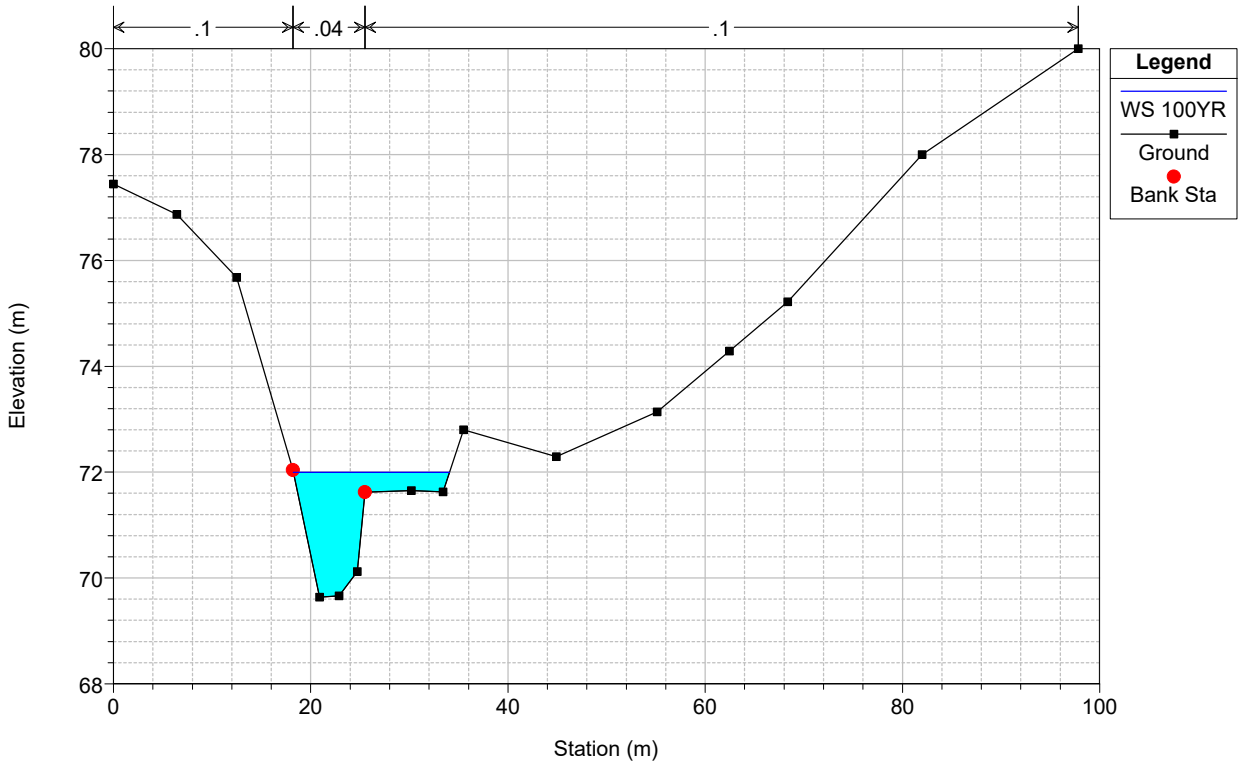

PR122 Plan: Existing Condition Qda Maresua R2025
Geom: Existing Qda_Maresua_rev2025 Flow: Qda Maresua
RS = 262
.1
.04
.1
Legend
WS 100YR
Ground
Levee
Bank Sta
Elevation (m)
Station (m)
PR122 Plan: Existing Condition Qda Maresua R2025
Geom: Existing Qda_Maresua_rev2025 Flow: Qda Maresua
RS = 253
.1
.04
.1
Legend
WS 100YR
Ground
Levee
Bank Sta
Elevation (m)
Station (m)


PR122 Plan: Existing Condition Qda Maresua R2025
Geom: Existing Qda_Maresua_rev2025 Flow: Qda Maresua
RS = 247
.1
.04
.1
Legend
WS 100YR
Ground
Levee
Bank Sta
Elevation (m)
Station (m)
PR122 Plan: Existing Condition Qda Maresua R2025
Geom: Existing Qda_Maresua_rev2025 Flow: Qda Maresua
RS = 204 XS-18
.1
.04
.1
Legend
WS 100YR
Ground
Bank Sta
Elevation (m)
Station (m)

PR122 Plan: Existing Condition Qda Maresua R2025

Geom: Existing Qda_Maresua_rev2025 Flow: Qda Maresua

RS = 8 XS-19



HEC-RAS HEC-RAS 6.4.1 June 2023
U.S. Army Corps of Engineers
Hydrologic Engineering Center
609 Second Street
Davis, California

```
X     X  XXXXXX    XXXX        XXXX       XX      XXXX
X     X  X        X    X       X   X     X  X    X
X     X  X        X            X   X    X    X   X
XXXXXXX  XXXX     X       XXX  XXXX     XXXXXX    XXXX
X     X  X        X            X  X     X    X        X
X     X  X        X    X       X   X    X    X        X
X     X  XXXXXX    XXXX        X    X   X    X   XXXXX
```

PROJECT DATA
Project Title: PR122
Project File : PR122.prj
Run Date and Time: 5/26/2025 4:04:28 PM

Project in SI units

PLAN DATA

Plan Title: Existing Cond Qda Maresua Floodway 2025
Plan File : e:\WORKING\0000_BYA_WORKING\20-PR-122\HH-SCOUR\REPORT\HH\APPENDICES\Models CD\HEC-RAS PR-122\REV_MAY2025\PR-122\PR122.p11

Geometry Title: Existing Qda_Maresua_rev2025
Geometry File : e:\WORKING\0000_BYA_WORKING\20-PR-122\HH-SCOUR\REPORT\HH\APPENDICES\Models CD\HEC-RAS PR-122\REV_MAY2025\PR-122\PR122.g04

Flow Title : Qda Maresua_Floodway
Flow File : e:\WORKING\0000_BYA_WORKING\20-PR-122\HH-SCOUR\REPORT\HH\APPENDICES\Models CD\HEC-RAS PR-122\REV_MAY2025\PR-122\PR122.f03

Plan Summary Information:
Number of: Cross Sections = 11 Multiple Openings = 0
Culverts = 0 Inline Structures = 0
Bridges = 0 Lateral Structures = 0

Computational Information
Water surface calculation tolerance = 0.003
Critical depth calculation tolerance = 0.003
Maximum number of iterations = 20
Maximum difference tolerance = 0.1
Flow tolerance factor = 0.001

Computation Options
Critical depth computed only where necessary
Conveyance Calculation Method: At breaks in n values only
Friction Slope Method: Average Conveyance
Computational Flow Regime: Supercritical Flow

Encroachment Data
Equal Conveyance = True
Left Offset = 0
Right Offset = 0

River = QdaMaresua Reach = PR122

| RS | Profile | Method | Value1 | Value2 |
|---|---|---|---|---|
| 557 | 100YR_FW | 1 | 114.3 | 121.07 |
| 526 | 100YR_FW | 1 | 74.75 | 85.28 |
| 507 | 100YR_FW | 1 | 61.99 | 69.74 |
| 487 | 100YR_FW | 1 | 56.79 | 72 |
| 377 | 100YR_FW | 1 | 58.87 | 75.43 |
| 278 | 100YR_FW | 1 | 58.216 | 73.536 |
| 262 | 100YR_FW | 1 | 55.648 | 77.161 |
| 253 | 100YR_FW | 1 | 58.762 | 72.736 |
| 247 | 100YR_FW | 1 | 59.422 | 72.407 |
| 204 | 100YR_FW | 1 | 53.51 | 65.23 |
| 8 | 100YR_FW | 1 | 18.19 | 25.49 |

FLOW DATA

Flow Title: Qda Maresua_Floodway
Flow File : e:\WORKING\0000_BYA_WORKING\20-PR-122\HH-SCOUR\REPORT\HH\APPENDICES\Models CD\HEC-RAS PR-122\REV_MAY2025\PR-122\PR122.f03

Flow Data (m3/s)

| River | Reach | RS | 100YR | 100YR_FW |
|---|---|---|---|---|
| QdaMaresua | PR122 | 557 | 33.3 | 33.3 |
| QdaMaresua | PR122 | 204 | 37.3 | 37.3 |
| QdaMaresua | PR122 | 8 | 47.1 | 47.1 |

Boundary Conditions

| River | Reach | Profile | Upstream | Downstream |
|---|---|---|---|---|
| QdaMaresua | PR122 | 100YR | Normal S = 0.013 | Normal S = 0.02 |
| QdaMaresua | PR122 | 100YR_FW | Normal S = 0.013 | Normal S = 0.02 |

GEOMETRY DATA

Geometry Title: Existing Qda_Maresua_rev2025
Geometry File : e:\WORKING\0000_BYA_WORKING\20-PR-122\HH-SCOUR\REPORT\HH\APPENDICES\Models CD\HEC-RAS PR-122\REV_MAY2025\PR-122\PR122.g04

CROSS SECTION

RIVER: QdaMaresua
REACH: PR122 RS: 557

INPUT
Description: XS-12
Station Elevation Data num= 23

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 104.84 | 21.79 | 97 | 32.49 | 94.38 | 40.97 | 92.78 | 56.67 | 89.46 |
| 62.97 | 87.93 | 72.11 | 87.4 | 84.63 | 86.96 | 96.4 | 84.73 | 100.39 | 84.03 |
| 107.61 | 83.61 | 112.3 | 83.51 | 113.61 | 83.82 | 114.3 | 83.76 | 116.7 | 81.44 |
| 119.37 | 81.78 | 121.07 | 83.35 | 125.25 | 83.8 | 129.43 | 87.14 | 132.92 | 89.8 |
| 137.88 | 92 | 145.51 | 96 | 152.18 | 98 | | | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .1 | 114.3 | .04 | 121.07 | .1 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 114.3 | 121.07 | 31.4 | 31.4 | .1 | .3 |

CROSS SECTION

RIVER: QdaMaresua
REACH: PR122 RS: 526

INPUT
Description: XS-13
Station Elevation Data num= 20

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 110 | 3.69 | 108.15 | 15.95 | 102.06 | 25.96 | 98.04 | 39.04 | 92.61 |
| 51.25 | 88.41 | 62.14 | 85.3 | 69.2 | 83.31 | 74.45 | 82.63 | 76.92 | 82.4 |
| 77.58 | 81.68 | 79.46 | 81.48 | 82.55 | 82.32 | 83.47 | 82.16 | 85.28 | 82.85 |
| 94.13 | 84.16 | 105.68 | 88 | 111.92 | 91 | 122.7 | 96 | 127.81 | 98 |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .1 | 76.92 | .04 | 82.55 | .1 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 76.92 | 82.55 | 18.6 | 18.6 | .1 | .3 |

CROSS SECTION

RIVER: QdaMaresua
REACH: PR122 RS: 507

INPUT
Description: XS-14
Station Elevation Data num= 20

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 114 | 3.86 | 113.09 | 10.26 | 109.73 | 19.67 | 105.17 | 28.84 | 100.82 |
| 40.44 | 94.91 | 50.81 | 89.61 | 51.51 | 88.77 | 56.13 | 88.31 | 61.99 | 82.544 |
| 63.6 | 80.96 | 67.34 | 81.39 | 69.74 | 82.55 | 76.1 | 82.57 | 81.33 | 82.95 |
| 88.73 | 84.95 | 102.31 | 90 | 111.3 | 94 | 117.46 | 97 | 120.79 | 98 |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .1 | 61.99 | .04 | 76.1 | .1 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 61.99 | 69.74 | 20.4 | 20.4 | .1 | .3 |

CROSS SECTION

RIVER: QdaMaresua
REACH: PR122 RS: 487

INPUT
Description: XS-15
Station Elevation Data num= 16

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 109.32 | 17.78 | 103.79 | 31.08 | 98.3 | 38.63 | 94.75 | 45.1 | 92.06 |
| 56.79 | 83.48 | 58.8 | 81.21 | 60.15 | 80.91 | 62.77 | 80.91 | 64.74 | 81.34 |
| 65.35 | 81.22 | 72 | 81.37 | 76.83 | 83.03 | 93.98 | 89 | 102.4 | 93 |
| 114.06 | 98 | | | | | | | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .1 | 58.8 | .04 | 64.74 | .1 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 56.79 | 64.74 | 109.9 | 109.9 | .1 | .3 |

CROSS SECTION

RIVER: QdaMaresua
REACH: PR122 RS: 377

INPUT
Description: XS-16
Station Elevation Data num= 13

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 87.61 | 16.7 | 84.8 | 32.65 | 80.19 | 64.44 | 78.96 | 68.05 | 78.93 |
| 69.29 | 77.99 | 70.98 | 77.75 | 72.88 | 78.56 | 80.42 | 78.98 | 95.04 | 78.82 |
| 111.29 | 90.02 | 129.2 | 96.83 | 146.53 | 97.8 | | | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .1 | 68.05 | .04 | 72.88 | .1 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 68.05 | 72.88 | 99.4 | 99.4 | .1 | .3 |

CROSS SECTION

RIVER: QdaMaresua
REACH: PR122 RS: 278

INPUT
Description: XS-17
Station Elevation Data num= 21

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 87 | 7.83 | 86 | 19.48 | 85 | 26.22 | 83.42 | 37.19 | 80.7 |
| 43.92 | 79.72 | 46.19 | 78.3 | 48.73 | 78.07 | 55.82 | 77.72 | 59.84 | 77.38 |
| 61.79 | 76.81 | 65.35 | 75.06 | 65.93 | 75.11 | 68.91 | 77.07 | 74.16 | 76.57 |
| 82.03 | 76.82 | 94.31 | 77.06 | 100.66 | 77.27 | 110.97 | 80.46 | 128.53 | 81.84 |
| 151.02 | 84 | | | | | | | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|

```
       0      .1   61.79     .04   68.91      .1

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         61.79   68.91             16.3    16.3    16.3            .1       .3
Right Levee     Station=   68.91      Elevation=   77.07

CROSS SECTION


RIVER: QdaMaresua
REACH: PR122              RS: 262

INPUT
Description:
Station Elevation Data    num=      34
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0  86.282   7.579  85.338   9.936  85.123  18.855  84.252  25.379  82.853
  26.813   82.53  34.112  80.773  35.997  80.303  42.511  79.204  44.551   78.09
  44.708  78.009  47.166   77.77  50.251   77.57  54.029  77.423   57.92  77.164
  59.807  76.731  61.783  75.618  63.835  74.976  64.694  74.727  65.237  74.844
  68.029  76.742  73.193   76.34  80.934  76.497  83.728  76.527  86.389  76.907
  89.947  77.018  93.013  77.227  99.259  77.716  100.24  78.003 107.525  79.901
 109.401  80.367 126.673  81.573 137.615  82.485 142.843  83.607

Manning's n Values        num=       4
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
       0      .1  59.807     .04  68.029      .1 142.843      .1

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        59.807  68.029             9.1     9.1     9.1            .1       .3
Right Levee     Station=  68.029      Elevation=  76.742

CROSS SECTION


RIVER: QdaMaresua
REACH: PR122              RS: 253

INPUT
Description:
Station Elevation Data    num=      34
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0  85.942    7.46  85.026   9.781  84.807   18.56  83.898  24.981  82.585
  26.394  82.283  33.578  80.579  35.433  80.116  41.845   78.96  43.854  77.943
  44.008  77.871  46.428  77.628  49.465  77.408  53.183  77.283  57.013  77.063
  58.871  76.694  61.101  75.389  63.415   74.79  64.384   74.57   64.91  74.719
  67.613  76.587  72.736  76.231  80.417  76.344  83.189  76.362  85.828  76.897
  89.358  77.028  92.401  77.305  98.598  77.927  99.571  78.203 106.799  79.916
  108.66  80.323 125.797  81.447 136.652  82.285   140.2  83.422

Manning's n Values        num=       4
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
       0      .1  58.871     .04  67.613      .1   140.2      .1

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        58.871  67.613             5.6     5.6     5.6            .1       .3
Right Levee     Station=  67.613      Elevation=  76.587

CROSS SECTION


RIVER: QdaMaresua
REACH: PR122              RS: 247

INPUT
Description:
Station Elevation Data    num=      34
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0  85.737   7.388  84.837   9.687  84.616  18.381  83.684  24.741  82.423
   26.14  82.134  33.255  80.462  35.092  80.002  41.443  78.812  43.431  77.854
  43.584  77.788  45.981  77.542  48.988   77.31  52.671  77.198  56.465  77.001
  58.305  76.671  60.687  75.251  63.161  74.678  64.197  74.475  64.712  74.643
  67.361  76.493   72.46  76.165  80.104  76.252  82.862  76.263  85.489  76.891
  89.002  77.033   92.03  77.353  98.198  78.055  99.166  78.324 106.359  79.925
 108.211  80.296 125.266  81.371  136.07  82.164     139   83.31

Manning's n Values        num=       4
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
       0      .1  58.305     .04  67.361      .1     139      .1
```

```
Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        58.305  67.361             42.5    42.5    42.5             .1       .3
Right Levee     Station=  67.361      Elevation=  76.493

CROSS SECTION


RIVER: QdaMaresua
REACH: PR122              RS: 204

INPUT
Description: XS-18
Station Elevation Data    num=      18
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0      84    8.89      83   23.99   80.87   30.52   79.47   39.86    77.1
   44.96   76.48   53.51   76.48   57.19   74.08   61.01   73.73   62.61   73.67
   65.23    75.7    80.1   75.42   82.62   76.84   85.99   77.08   95.74   79.35
  102.64      80  131.14   81.14  141.73   82.36

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0      .1   53.51     .04   65.23      .1

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         53.51   65.23            196.1   196.1   196.1             .1       .3

CROSS SECTION


RIVER: QdaMaresua
REACH: PR122              RS: 8

INPUT
Description: XS-19
Station Elevation Data    num=      17
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0   77.44    6.41   76.87    12.5   75.68   18.19   72.04   20.88   69.64
   22.87   69.66   24.74   70.12   25.49   71.62   30.22   71.65   33.41   71.63
   35.49    72.8    44.9   72.29   55.12   73.14   62.45   74.29   68.38   75.22
      82      78   97.81      80

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0      .1   18.19     .04   25.49      .1

Bank Sta: Left   Right    Coeff Contr.   Expan.
         18.19   25.49             .1       .3


SUMMARY OF MANNING'S N VALUES

River:QdaMaresua

      Reach          River Sta.       n1        n2        n3        n4

 PR122                557                 .1       .04       .1
 PR122                526                 .1       .04       .1
 PR122                507                 .1       .04       .1
 PR122                487                 .1       .04       .1
 PR122                377                 .1       .04       .1
 PR122                278                 .1       .04       .1
 PR122                262                 .1       .04       .1        .1
 PR122                253                 .1       .04       .1        .1
 PR122                247                 .1       .04       .1        .1
 PR122                204                 .1       .04       .1
 PR122                8                   .1       .04       .1



SUMMARY OF REACH LENGTHS

River: QdaMaresua

      Reach          River Sta.      Left     Channel    Right

 PR122                557              31.4      31.4      31.4
 PR122                526              18.6      18.6      18.6
 PR122                507              20.4      20.4      20.4
```

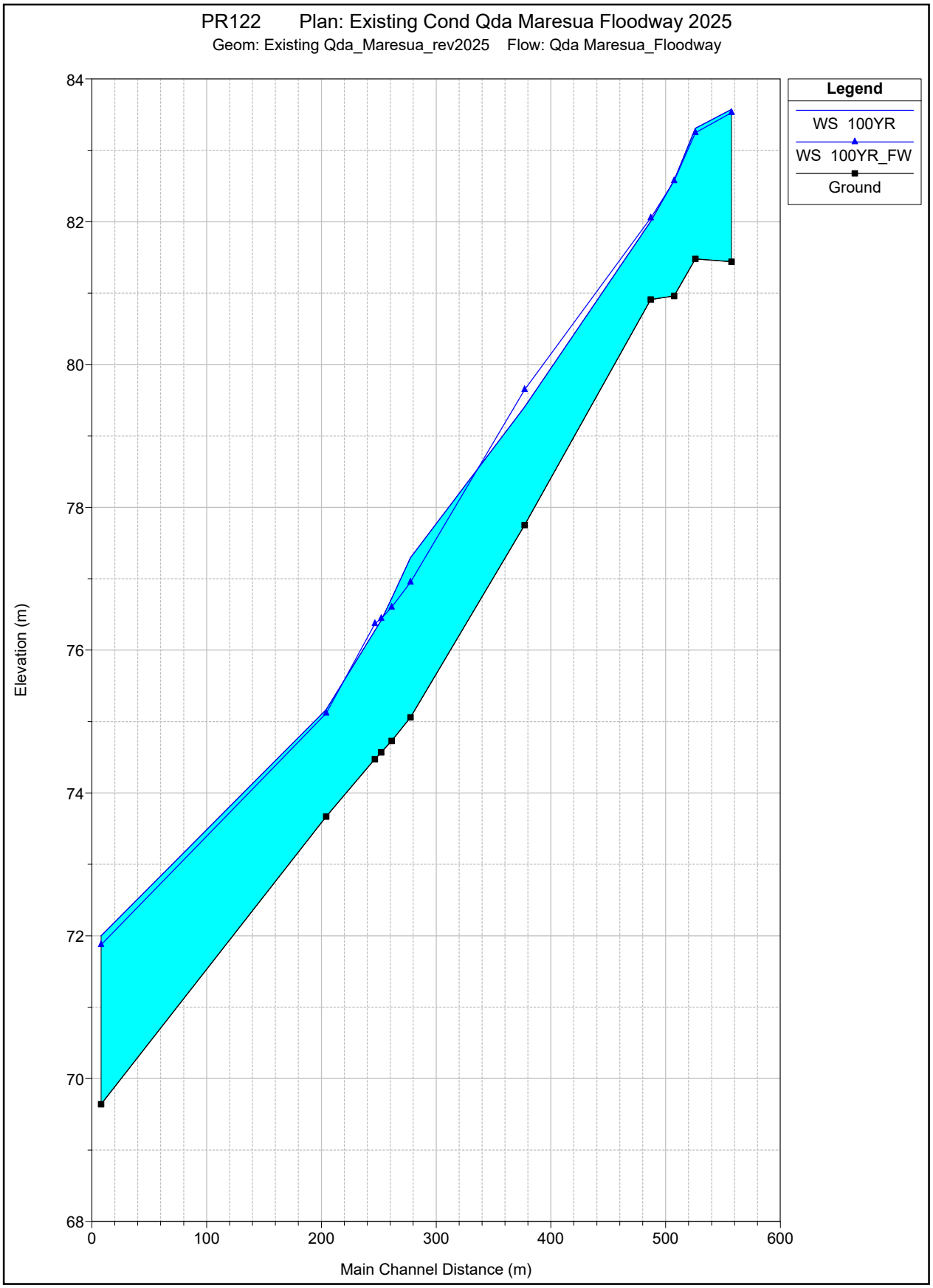
| | | | | |
|---|---|---|---|---|
| PR122 | 487 | 109.9 | 109.9 | 109.9 |
| PR122 | 377 | 99.4 | 99.4 | 99.4 |
| PR122 | 278 | 16.3 | 16.3 | 16.3 |
| PR122 | 262 | 9.1 | 9.1 | 9.1 |
| PR122 | 253 | 5.6 | 5.6 | 5.6 |
| PR122 | 247 | 42.5 | 42.5 | 42.5 |
| PR122 | 204 | 196.1 | 196.1 | 196.1 |
| PR122 | 8 | | | |

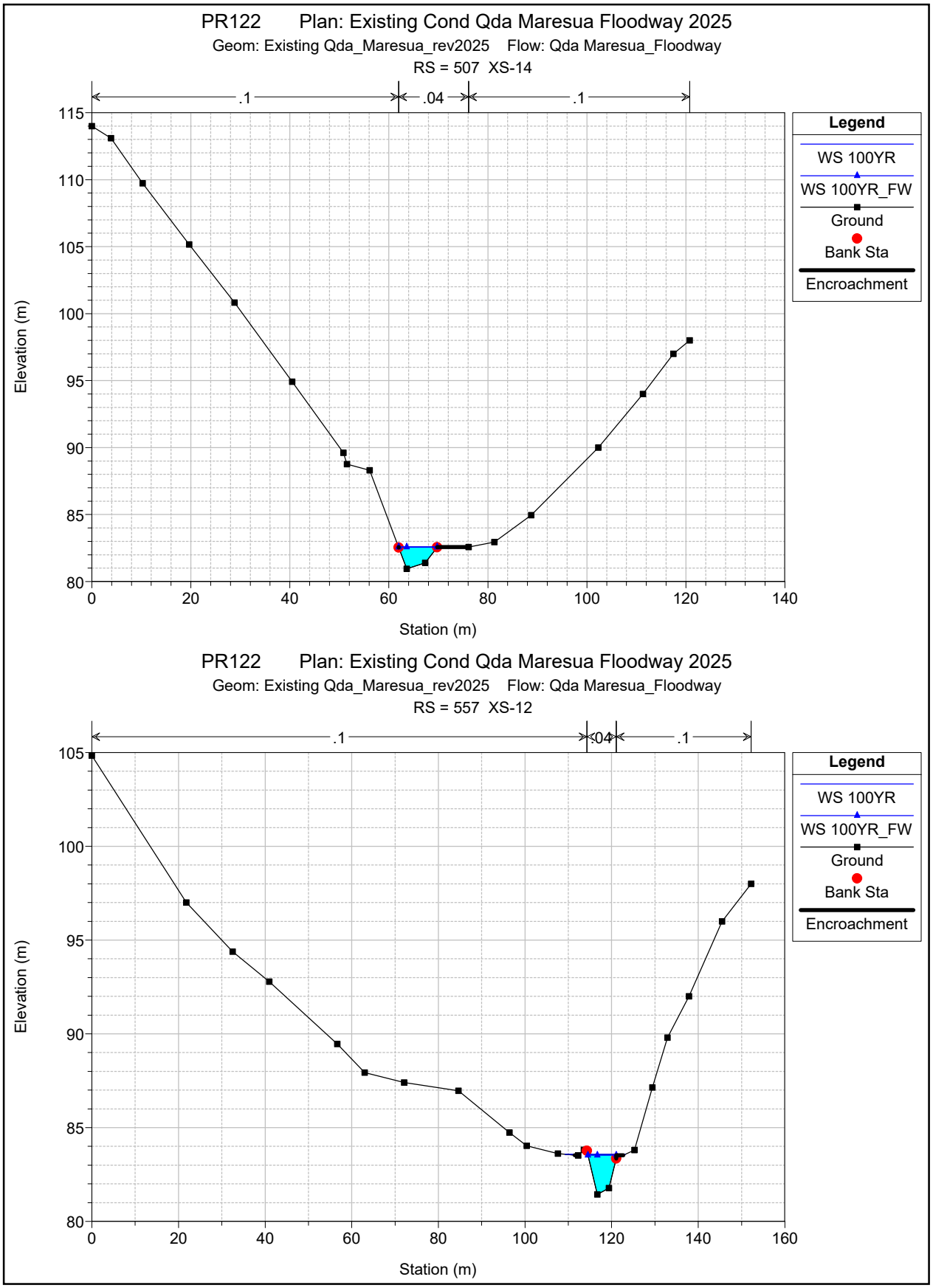
SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS
River: QdaMaresua

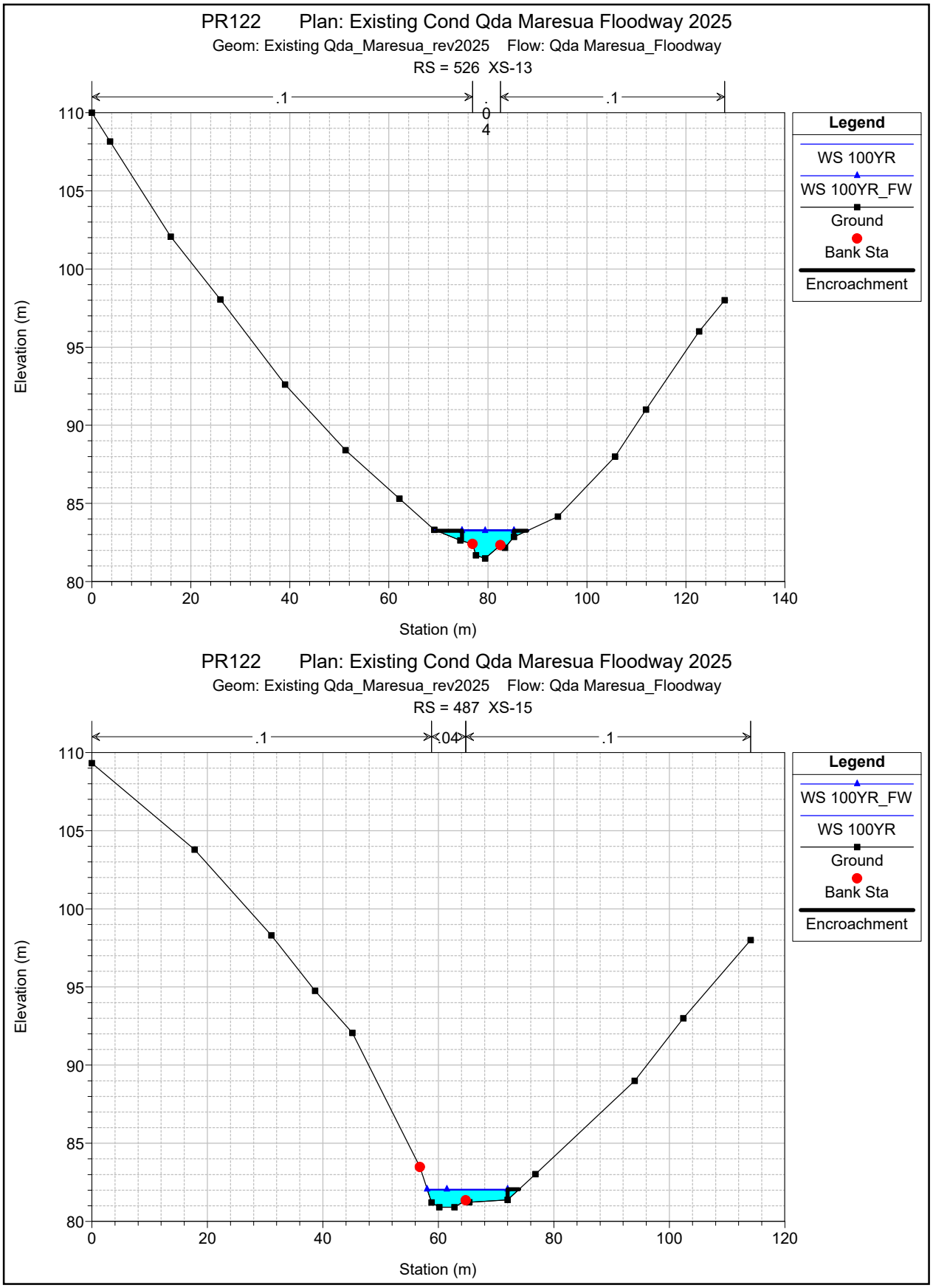
| Reach | River Sta. | Contr. | Expan. |
|---|---|---|---|
| PR122 | 557 | .1 | .3 |
| PR122 | 526 | .1 | .3 |
| PR122 | 507 | .1 | .3 |
| PR122 | 487 | .1 | .3 |
| PR122 | 377 | .1 | .3 |
| PR122 | 278 | .1 | .3 |
| PR122 | 262 | .1 | .3 |
| PR122 | 253 | .1 | .3 |
| PR122 | 247 | .1 | .3 |
| PR122 | 204 | .1 | .3 |
| PR122 | 8 | .1 | .3 |

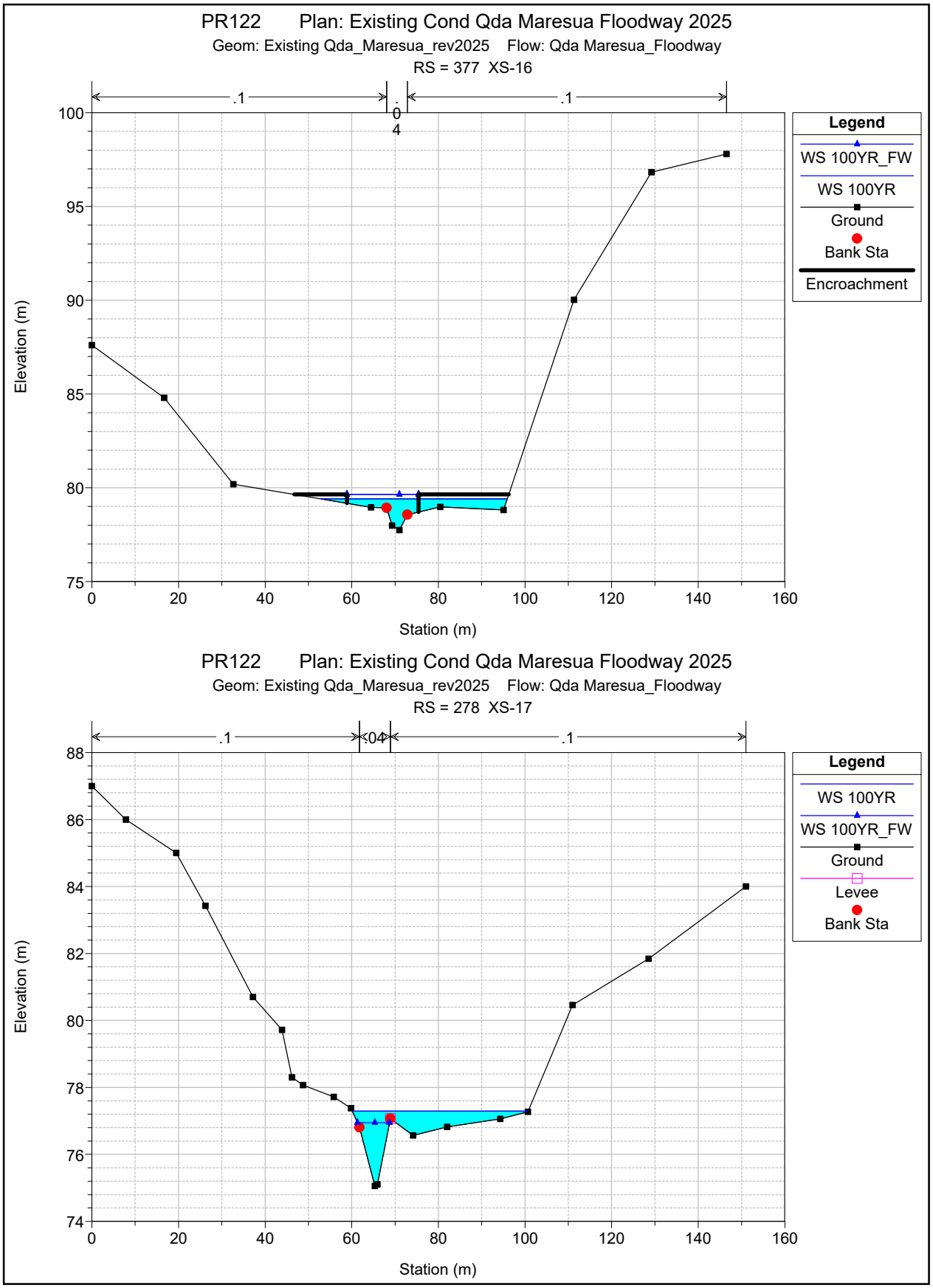
HEC-RAS Plan: Ex Qda Maresua Floodway rev2025 River: QdaMaresua Reach: PR122

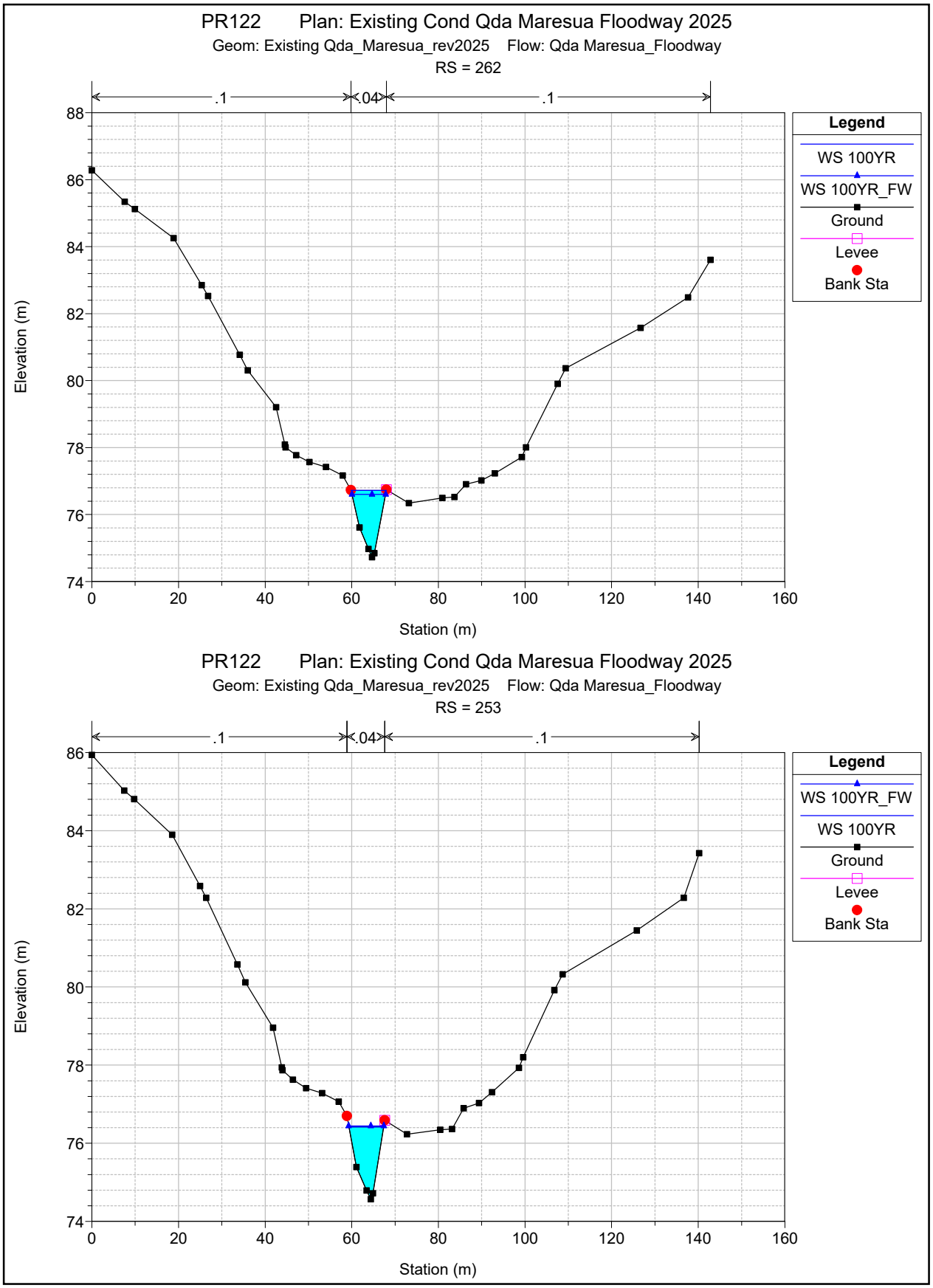
| Reach | River Sta | Profile | Q Total | Min Ch El | W.S. Elev | Crit W.S. | E.G. Elev | E.G. Slope | Vel Chnl | Flow Area | Top Width | Froude # Chl |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | (m3/s) | (m) | (m) | (m) | (m) | (m/m) | (m/s) | (m2) | (m) | |
| PR122 | 557 | 100YR | 33.30 | 81.44 | 83.57 | 83.57 | 84.22 | 0.016788 | 3.56 | 9.66 | 11.99 | 0.96 |
| PR122 | 557 | 100YR_FW | 33.30 | 81.44 | 83.53 | 83.53 | 84.22 | 0.019231 | 3.70 | 9.01 | 6.53 | 1.00 |
| | | | | | | | | | | | | |
| PR122 | 526 | 100YR | 33.30 | 81.48 | 83.31 | 83.31 | 83.81 | 0.011819 | 3.39 | 15.33 | 19.17 | 0.88 |
| PR122 | 526 | 100YR_FW | 33.30 | 81.48 | 83.24 | 83.24 | 83.87 | 0.014846 | 3.69 | 11.96 | 10.53 | 0.98 |
| | | | | | | | | | | | | |
| PR122 | 507 | 100YR | 33.30 | 80.96 | 82.58 | 82.88 | 83.45 | 0.029969 | 4.12 | 8.22 | 14.32 | 1.29 |
| PR122 | 507 | 100YR_FW | 33.30 | 80.96 | 82.57 | 82.78 | 83.46 | 0.031355 | 4.17 | 7.99 | 7.75 | 1.31 |
| | | | | | | | | | | | | |
| PR122 | 487 | 100YR | 33.30 | 80.91 | 82.01 | 82.15 | 82.60 | 0.047801 | 3.90 | 11.94 | 15.76 | 1.29 |
| PR122 | 487 | 100YR_FW | 33.30 | 80.91 | 82.05 | 82.16 | 82.62 | 0.043255 | 3.77 | 11.96 | 13.94 | 1.23 |
| | | | | | | | | | | | | |
| PR122 | 377 | 100YR | 33.30 | 77.75 | 79.40 | 79.48 | 79.79 | 0.015378 | 3.41 | 22.77 | 42.94 | 0.97 |
| PR122 | 377 | 100YR_FW | 33.30 | 77.75 | 79.65 | 79.66 | 80.17 | 0.013455 | 3.58 | 15.64 | 16.56 | 0.93 |
| | | | | | | | | | | | | |
| PR122 | 278 | 100YR | 33.30 | 75.06 | 77.30 | 77.30 | 77.61 | 0.009485 | 2.75 | 22.55 | 40.62 | 0.75 |
| PR122 | 278 | 100YR_FW | 33.30 | 75.06 | 76.95 | 77.27 | 78.02 | 0.037482 | 4.58 | 7.30 | 7.42 | 1.43 |
| | | | | | | | | | | | | |
| PR122 | 262 | 100YR | 33.30 | 74.73 | 76.72 | 76.85 | 77.38 | 0.020464 | 3.59 | 9.26 | 8.18 | 1.08 |
| PR122 | 262 | 100YR_FW | 33.30 | 74.73 | 76.60 | 76.83 | 77.42 | 0.027721 | 4.02 | 8.28 | 7.78 | 1.24 |
| | | | | | | | | | | | | |
| PR122 | 253 | 100YR | 33.30 | 74.57 | 76.42 | 76.66 | 77.17 | 0.024514 | 3.83 | 8.68 | 8.03 | 1.18 |
| PR122 | 253 | 100YR_FW | 33.30 | 74.57 | 76.44 | 76.61 | 77.16 | 0.023048 | 3.75 | 8.88 | 8.10 | 1.14 |
| | | | | | | | | | | | | |
| PR122 | 247 | 100YR | 33.30 | 74.48 | 76.27 | 76.42 | 77.03 | 0.024979 | 3.85 | 8.64 | 8.07 | 1.19 |
| PR122 | 247 | 100YR_FW | 33.30 | 74.48 | 76.37 | 76.40 | 77.02 | 0.019350 | 3.57 | 9.34 | 7.76 | 1.04 |
| | | | | | | | | | | | | |
| PR122 | 204 | 100YR | 37.30 | 73.67 | 75.17 | 75.33 | 75.95 | 0.025676 | 3.91 | 9.53 | 9.02 | 1.22 |
| PR122 | 204 | 100YR_FW | 37.30 | 73.67 | 75.12 | 75.33 | 75.98 | 0.029576 | 4.11 | 9.07 | 8.88 | 1.30 |
| | | | | | | | | | | | | |
| PR122 | 8 | 100YR | 47.10 | 69.64 | 72.00 | 72.00 | 72.64 | 0.013588 | 3.61 | 15.57 | 15.83 | 0.87 |
| PR122 | 8 | 100YR_FW | 47.10 | 69.64 | 71.87 | 71.87 | 72.70 | 0.018958 | 4.03 | 11.67 | 7.11 | 1.01 |

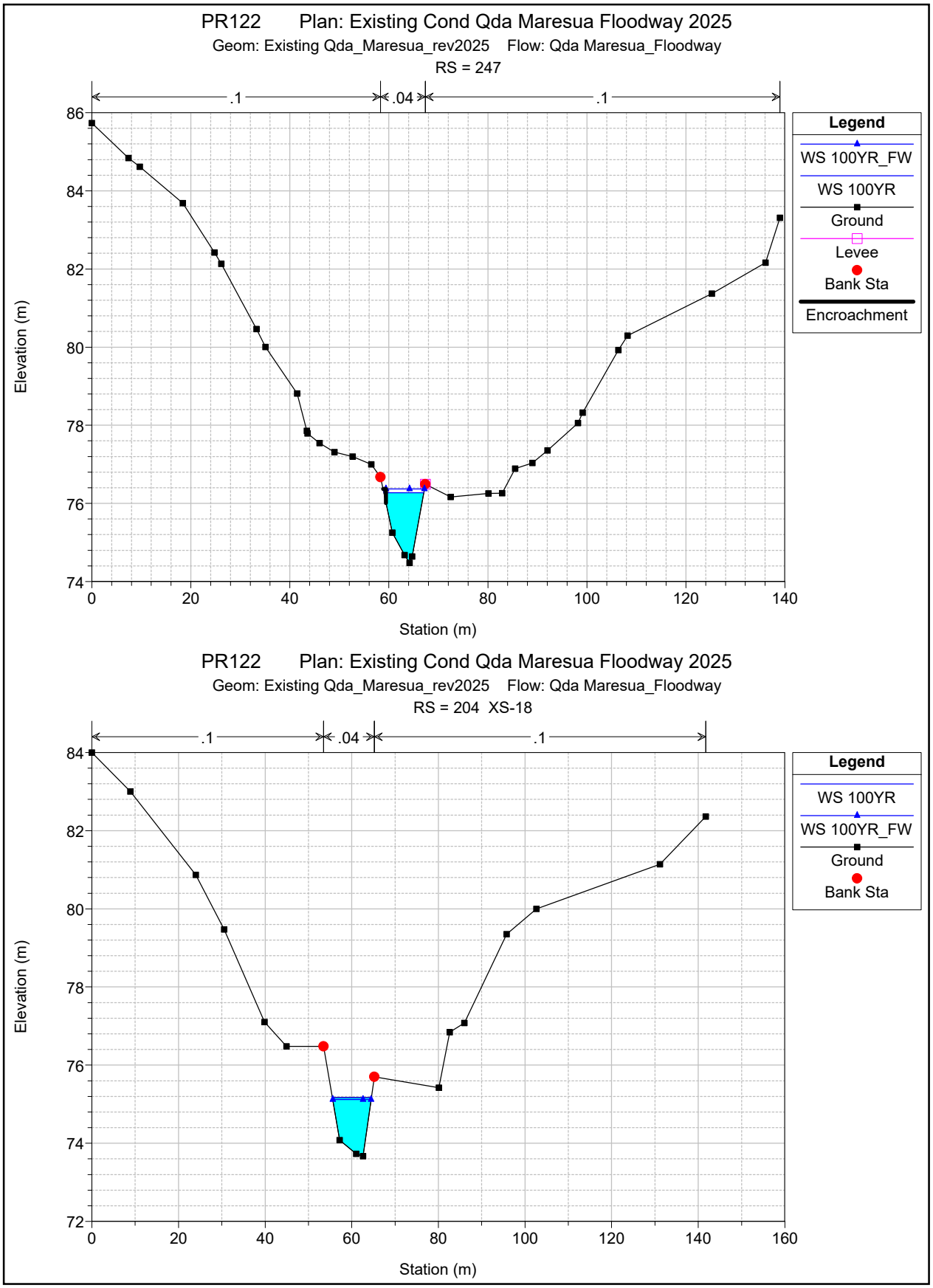

PR122 Plan: Existing Cond Qda Maresua Floodway 2025
Geom: Existing Qda_Maresua_rev2025 Flow: Qda Maresua_Floodway
Legend
WS 100YR
WS 100YR_FW
Ground
Elevation (m)
84
82
80
78
76
74
72
70
68
0
100
200
300
400
500
600
Main Channel Distance (m)


PR122 Plan: Existing Cond Qda Maresua Floodway 2025
Geom: Existing Qda_Maresua_rev2025 Flow: Qda Maresua_Floodway
RS = 507 XS-14
.1
.04
.1
Elevation (m)
Station (m)
Legend
WS 100YR
WS 100YR_FW
Ground
Bank Sta
Encroachment
PR122 Plan: Existing Cond Qda Maresua Floodway 2025
Geom: Existing Qda_Maresua_rev2025 Flow: Qda Maresua_Floodway
RS = 557 XS-12
.1
.04
.1
Elevation (m)
Station (m)
Legend
WS 100YR
WS 100YR_FW
Ground
Bank Sta
Encroachment


PR122 Plan: Existing Cond Qda Maresua Floodway 2025
Geom: Existing Qda_Maresua_rev2025 Flow: Qda Maresua_Floodway
RS = 526 XS-13
.1
.04
.1
Legend
WS 100YR
WS 100YR_FW
Ground
Bank Sta
Encroachment
Elevation (m)
Station (m)
PR122 Plan: Existing Cond Qda Maresua Floodway 2025
Geom: Existing Qda_Maresua_rev2025 Flow: Qda Maresua_Floodway
RS = 487 XS-15
.1
.04
.1
Legend
WS 100YR_FW
WS 100YR
Ground
Bank Sta
Encroachment
Elevation (m)
Station (m)


PR122 Plan: Existing Cond Qda Maresua Floodway 2025
Geom: Existing Qda_Maresua_rev2025 Flow: Qda Maresua_Floodway
RS = 377 XS-16
.1
.04
.1
Legend
WS 100YR_FW
WS 100YR
Ground
Bank Sta
Encroachment
Elevation (m)
Station (m)
PR122 Plan: Existing Cond Qda Maresua Floodway 2025
Geom: Existing Qda_Maresua_rev2025 Flow: Qda Maresua_Floodway
RS = 278 XS-17
.1
.04
.1
Legend
WS 100YR
WS 100YR_FW
Ground
Levee
Bank Sta
Elevation (m)
Station (m)

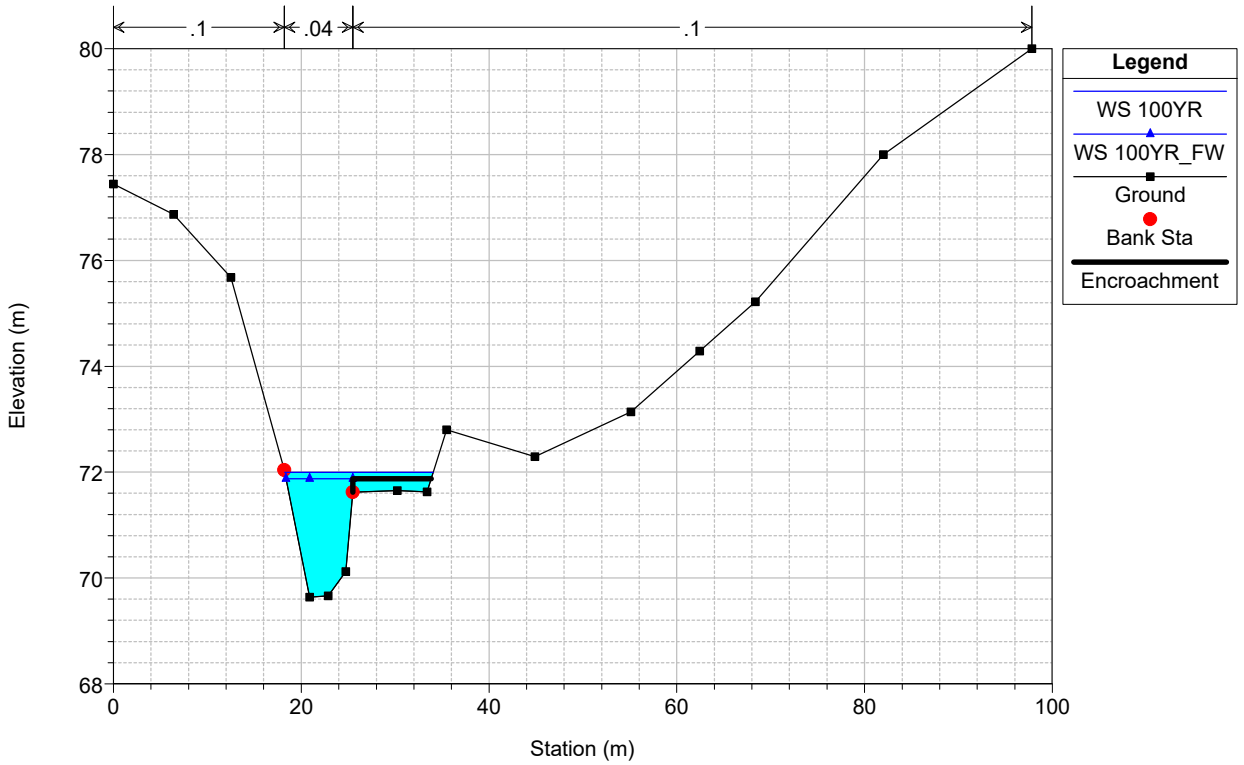

PR122 Plan: Existing Cond Qda Maresua Floodway 2025
Geom: Existing Qda_Maresua_rev2025 Flow: Qda Maresua_Floodway
RS = 262
.1
.04
.1
Legend
WS 100YR
WS 100YR_FW
Ground
Levee
Bank Sta
Elevation (m)
Station (m)
PR122 Plan: Existing Cond Qda Maresua Floodway 2025
Geom: Existing Qda_Maresua_rev2025 Flow: Qda Maresua_Floodway
RS = 253
.1
.04
.1
Legend
WS 100YR_FW
WS 100YR
Ground
Levee
Bank Sta
Elevation (m)
Station (m)


PR122 Plan: Existing Cond Qda Maresua Floodway 2025
Geom: Existing Qda_Maresua_rev2025 Flow: Qda Maresua_Floodway
RS = 247
.1
.04
.1
Elevation (m)
Station (m)
Legend
WS 100YR_FW
WS 100YR
Ground
Levee
Bank Sta
Encroachment
PR122 Plan: Existing Cond Qda Maresua Floodway 2025
Geom: Existing Qda_Maresua_rev2025 Flow: Qda Maresua_Floodway
RS = 204 XS-18
.1
.04
.1
Elevation (m)
Station (m)
Legend
WS 100YR
WS 100YR_FW
Ground
Bank Sta

PR122 Plan: Existing Cond Qda Maresua Floodway 2025

Geom: Existing Qda_Maresua_rev2025 Flow: Qda Maresua_Floodway

RS = 8 XS-19



HEC-RAS HEC-RAS 6.4.1 June 2023
U.S. Army Corps of Engineers
Hydrologic Engineering Center
609 Second Street
Davis, California

```
X     X  XXXXXX    XXXX        XXXX       XX      XXXX
X     X  X        X    X      X   X     X  X    X
X     X  X        X           X   X    X    X   X
XXXXXXX  XXXX     X       XXX  XXXX     XXXXXX    XXXX
X     X  X        X           X  X     X    X        X
X     X  X        X    X      X   X    X    X        X
X     X  XXXXXX    XXXX       X    X   X    X   XXXXX
```

PROJECT DATA
Project Title: PR122
Project File : PR122.prj
Run Date and Time: 10/5/2023 4:14:46 PM

Project in SI units

PLAN DATA

Plan Title: Existing Condition Qda Sin Nombre
Plan File : e:\WORKING\0000_BYA_WORKING\20-PR-122\HH-SCOUR\HYDRAULIC\HEC-RAS\PR-122\PR122.p01

Geometry Title: Existing Qda Sin Nombre
Geometry File : e:\WORKING\0000_BYA_WORKING\20-PR-122\HH-SCOUR\HYDRAULIC\HEC-RAS\PR-122\PR122.g01

Flow Title : Qda Sin Nombre
Flow File : e:\WORKING\0000_BYA_WORKING\20-PR-122\HH-SCOUR\HYDRAULIC\HEC-RAS\PR-122\PR122.f01

Plan Summary Information:
Number of: Cross Sections = 11 Multiple Openings = 0
Culverts = 0 Inline Structures = 0
Bridges = 0 Lateral Structures = 0

Computational Information
Water surface calculation tolerance = 0.003
Critical depth calculation tolerance = 0.003
Maximum number of iterations = 20
Maximum difference tolerance = 0.1
Flow tolerance factor = 0.001

Computation Options
Critical depth computed at all cross sections
Conveyance Calculation Method: At breaks in n values only
Friction Slope Method: Average Conveyance
Computational Flow Regime: Supercritical Flow

FLOW DATA

Flow Title: Qda Sin Nombre
Flow File : e:\WORKING\0000_BYA_WORKING\20-PR-122\HH-SCOUR\HYDRAULIC\HEC-RAS\PR-122\PR122.f01

Flow Data (m3/s)

| River | Reach | RS | 100YR |
|---|---|---|---|
| Qda Sin Nombre | PR122 | 1003 | 61.4 |

Boundary Conditions

| River | Reach | Profile | Upstream | Downstream |
|---|---|---|---|---|
| Qda Sin Nombre | PR122 | 100YR | Normal S = 0.02 | Normal S = 0.003 |

GEOMETRY DATA

Geometry Title: Existing Qda Sin Nombre
Geometry File : e:\WORKING\0000_BYA_WORKING\20-PR-122\HH-SCOUR\HYDRAULIC\HEC-RAS\PR-122\PR122.g01

CROSS SECTION

RIVER: Qda Sin Nombre
REACH: PR122 RS: 1003

INPUT
Description: XS-1
Station Elevation Data num= 24

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 102.32 | 13.27 | 97.99 | 23.46 | 94.94 | 30.98 | 91.94 | 36.75 | 89.72 |
| 42.78 | 86.89 | 49.42 | 86.43 | 55.77 | 83.58 | 64.09 | 80.78 | 80.89 | 76 |
| 91.44 | 73 | 98.89 | 70.24 | 101.57 | 69.98 | 116.72 | 67.81 | 120.28 | 67.78 |
| 123.93 | 67.62 | 127.36 | 67.36 | 134.88 | 63.16 | 138.95 | 63.12 | 143.02 | 63.08 |
| 147.06 | 65.15 | 165.85 | 70.23 | 178.48 | 70.54 | 189.55 | 72 | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .1 | 127.36 | .04 | 147.06 | .1 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 127.36 | 147.06 | 125.7 | 125.7 | 125.7 | .1 | .3 |

CROSS SECTION

RIVER: Qda Sin Nombre
REACH: PR122 RS: 877

INPUT
Description: XS-2
Station Elevation Data num= 24

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 109.42 | 16.57 | 101.47 | 21.73 | 99.08 | 30.85 | 95.48 | 38.22 | 91.02 |
| 42.35 | 88.61 | 43.94 | 85.61 | 48.58 | 85.13 | 55.45 | 81 | 59.93 | 78 |
| 64.88 | 75 | 70.38 | 72 | 77.91 | 68.05 | 82.18 | 65.46 | 86.36 | 62.88 |
| 90 | 62.91 | 93.05 | 60.86 | 96.56 | 61.2 | 100.07 | 61.55 | 102.28 | 64.02 |
| 117.65 | 72.27 | 126.56 | 76.67 | 142.6 | 86 | 161.39 | 96 | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .1 | 90 | .04 | 102.28 | .1 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 90 | 102.28 | 97.4 | 97.4 | 97.4 | .1 | .3 |

CROSS SECTION

RIVER: Qda Sin Nombre
REACH: PR122 RS: 780

INPUT
Description: XS-3
Station Elevation Data num= 24

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 98.88 | 12.11 | 95.55 | 23.31 | 92.34 | 33.41 | 85.67 | 39.89 | 83.91 |
| 46.2 | 83.03 | 52.69 | 80.75 | 62.29 | 75.37 | 68.85 | 71.26 | 75.64 | 68.16 |
| 82.06 | 64.98 | 87.03 | 62.22 | 89.94 | 61.83 | 93.59 | 61.76 | 96.17 | 61.64 |
| 98.28 | 58.8 | 100.63 | 59.13 | 102.97 | 59.46 | 105.65 | 61.56 | 117.99 | 64.98 |
| 133.13 | 72.09 | 140.14 | 77 | 150.99 | 82 | 160.29 | 86 | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .1 | 96.17 | .04 | 105.65 | .1 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 96.17 | 105.65 | 117.9 | 117.9 | 117.9 | .1 | .3 |

CROSS SECTION

RIVER: Qda Sin Nombre
REACH: PR122 RS: 662

```
INPUT
Description: XS-4
Station Elevation Data    num=      21
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0   80.53    2.93   79.55   10.86   77.72   22.06   74.89   29.57   71.98
   45.12      67    53.1   65.63   58.66   65.25   72.55   62.48   78.34   61.83
   81.57   61.85   85.15   61.39   87.36   61.56   88.41   60.27      93   56.81
   95.53   56.95   98.07   57.09   99.18   60.52  113.19   61.02  135.18   64.93
  182.39   78.71

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0      .1   87.36     .04   99.18      .1

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         87.36   99.18             64.7    64.7    64.7             .1       .3

CROSS SECTION


RIVER: Qda Sin Nombre
REACH: PR122              RS: 597

INPUT
Description: XS-5
Station Elevation Data    num=      23
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0    74.4    7.36   73.63    26.5   70.93   33.94   69.27   41.61   67.65
   49.96   65.57   52.31   63.72   53.46   63.78   57.42   63.71   60.88   63.94
   72.52   62.59   91.36   61.52   95.17   60.58   99.05   59.62   101.5   55.89
  104.86   56.37  108.22   56.84  112.53      60  126.56   61.83  134.96   65.39
  157.43   72.32   162.6      79  170.69      83

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0      .1   99.05     .04  112.53      .1

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         99.05  112.53             76.2    76.2    76.2             .1       .3

CROSS SECTION


RIVER: Qda Sin Nombre
REACH: PR122              RS: 521

INPUT
Description: XS-6
Station Elevation Data    num=      26
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0   76.03    6.78   74.84   15.35   73.65   25.29      72   31.47      71
   41.51   69.92   41.79   67.34   43.29   67.22   46.08   67.11   47.79   67.02
   52.24      67   67.11   64.49   78.45   60.86   82.97   60.92   85.67   59.89
   99.13   59.41  101.85   59.31   102.6   59.25  108.32   55.68  111.73   55.34
  115.14      55  120.59   59.67   135.5   62.53  148.43      69  152.85      70
  158.56      72

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0      .1   102.6     .04  120.59      .1

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         102.6  120.59             95.3    95.3    95.3             .1       .3

CROSS SECTION


RIVER: Qda Sin Nombre
REACH: PR122              RS: 426

INPUT
Description: XS-7
Station Elevation Data    num=      17
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0      73   14.48      70   28.61      67   38.81      66   67.12      63
   82.22   62.05   90.63      59  103.79      58  118.59      57     121      55
  125.66   54.34  127.99   54.41  137.18    58.8  157.27   63.69  164.86      66
  174.86      67  179.72      69

Manning's n Values        num=       3
```

```
     Sta   n Val     Sta   n Val     Sta   n Val
       0      .1  118.59     .04  137.18      .1

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        118.59  137.18             103.1   103.1   103.1             .1      .3

CROSS SECTION


RIVER: Qda Sin Nombre
REACH: PR122              RS: 323

INPUT
Description: XS-8
Station Elevation Data    num=      22
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0      69   15.33      68   19.56   67.57   22.96   67.27   32.18   66.41
   42.18   65.32   54.35   63.95   62.35   63.21   70.19   62.39   81.24   61.26
   89.23   60.47   99.42   59.05  112.86   54.55  115.81   53.69  118.17    53.6
  120.53   53.51  123.41    54.1  128.58   55.94  128.69   56.78   131.3   57.36
  131.46   57.36  144.88      59

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .08  112.86     .04  123.41     .08

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        112.86  123.41             101.2   101.2   101.2             .1      .3

CROSS SECTION


RIVER: Qda Sin Nombre
REACH: PR122              RS: 222

INPUT
Description: XS-9
Station Elevation Data    num=      19
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0      77    9.65      73   14.13      71   17.72      69   29.09   66.02
   32.43   65.86   35.11   64.56   44.52   63.34   49.58   62.36   60.38   60.51
   72.02   59.39   82.73   58.96   99.64      58  111.67      55  116.35   53.99
   119.2   53.46  121.72      54  123.55      55  132.82      56

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .08  111.67     .04  123.55     .08

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        111.67  123.55              91.6    91.6    91.6             .1      .3

CROSS SECTION


RIVER: Qda Sin Nombre
REACH: PR122              RS: 130

INPUT
Description: XS-10
Station Elevation Data    num=      21
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0      72   20.45   66.61    24.3   65.31   27.47   65.31   33.88   64.75
    36.6   63.72   47.13      62   59.91    60.4   77.12   57.78   89.04      57
  109.86   55.24  115.15      55  124.58   54.59  128.89    54.1  129.04    52.6
  135.15   52.41  141.26   52.69   141.3   52.69  142.78   55.77  148.55   54.53
  148.58   54.53

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .08  128.89    .017  142.78     .08

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        128.89  142.78             125.6   125.6   125.6             .1      .3

CROSS SECTION


RIVER: Qda Sin Nombre
REACH: PR122              RS: 4
```

INPUT
Description: XS-11
Station Elevation Data num= 18

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 54 | 9.31 | 53.06 | 11.69 | 52.9 | 19.72 | 52.87 | 22.19 | 53.05 |
| 49.96 | 52.79 | 51.49 | 52.43 | 58.29 | 53.08 | 59.13 | 53.5 | 59.26 | 48.2 |
| 63.67 | 48.61 | 68.09 | 49.02 | 68.19 | 53.42 | 69.03 | 53.08 | 69.73 | 53.02 |
| 73.97 | 51.91 | 75.24 | 52.12 | 89.99 | 53 | | | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .08 | 59.13 | .017 | 68.19 | .08 |

| Bank Sta: Left | Right | Coeff Contr. | Expan. |
|---|---|---|---|
| 59.13 | 68.19 | .1 | .3 |

SUMMARY OF MANNING'S N VALUES

River:Qda Sin Nombre

| Reach | River Sta. | n1 | n2 | n3 |
|---|---|---|---|---|
| PR122 | 1003 | .1 | .04 | .1 |
| PR122 | 877 | .1 | .04 | .1 |
| PR122 | 780 | .1 | .04 | .1 |
| PR122 | 662 | .1 | .04 | .1 |
| PR122 | 597 | .1 | .04 | .1 |
| PR122 | 521 | .1 | .04 | .1 |
| PR122 | 426 | .1 | .04 | .1 |
| PR122 | 323 | .08 | .04 | .08 |
| PR122 | 222 | .08 | .04 | .08 |
| PR122 | 130 | .08 | .017 | .08 |
| PR122 | 4 | .08 | .017 | .08 |

SUMMARY OF REACH LENGTHS

River: Qda Sin Nombre

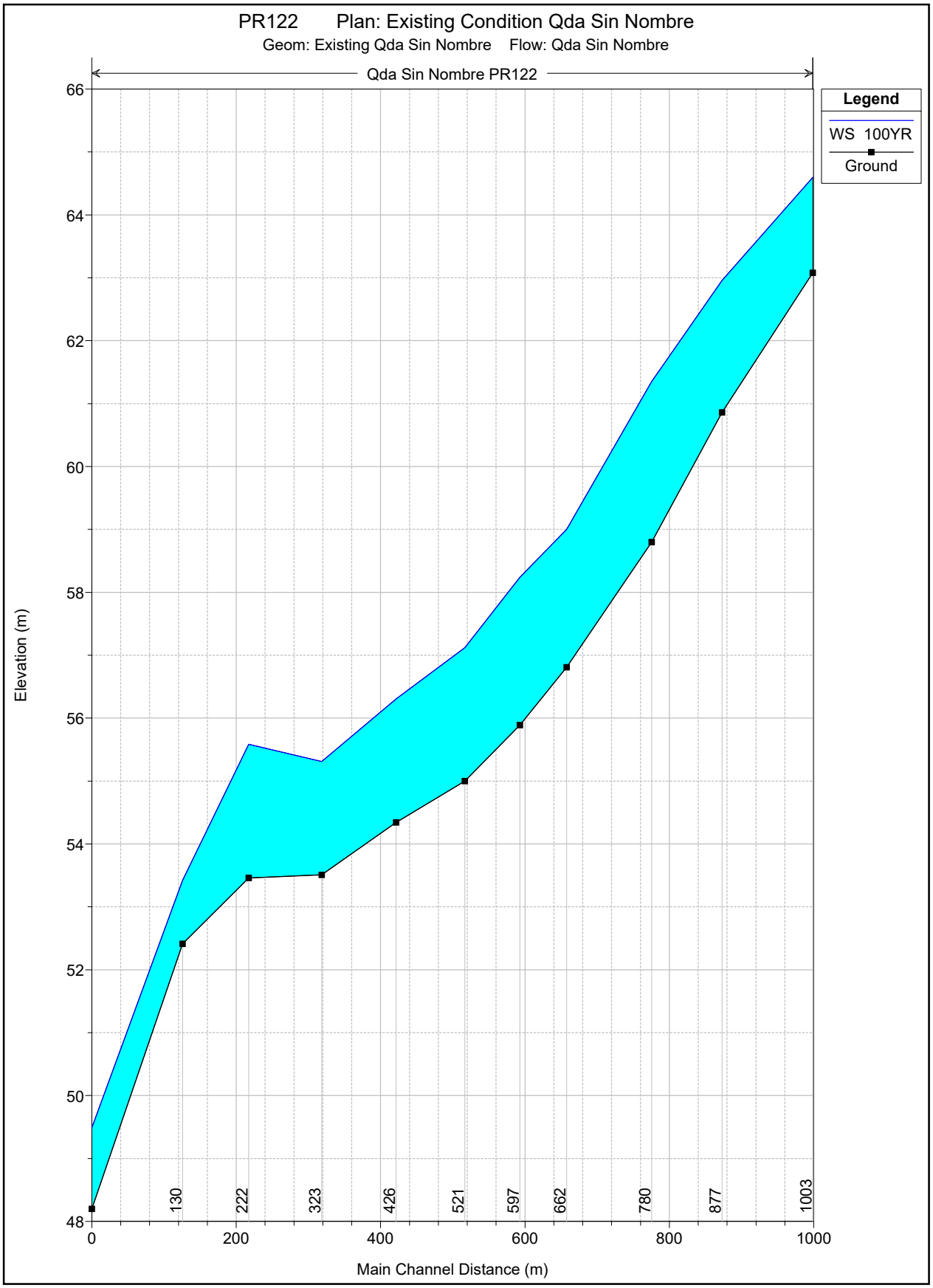
| Reach | River Sta. | Left | Channel | Right |
|---|---|---|---|---|
| PR122 | 1003 | 125.7 | 125.7 | 125.7 |
| PR122 | 877 | 97.4 | 97.4 | 97.4 |
| PR122 | 780 | 117.9 | 117.9 | 117.9 |
| PR122 | 662 | 64.7 | 64.7 | 64.7 |
| PR122 | 597 | 76.2 | 76.2 | 76.2 |
| PR122 | 521 | 95.3 | 95.3 | 95.3 |
| PR122 | 426 | 103.1 | 103.1 | 103.1 |
| PR122 | 323 | 101.2 | 101.2 | 101.2 |
| PR122 | 222 | 91.6 | 91.6 | 91.6 |
| PR122 | 130 | 125.6 | 125.6 | 125.6 |
| PR122 | 4 | | | |

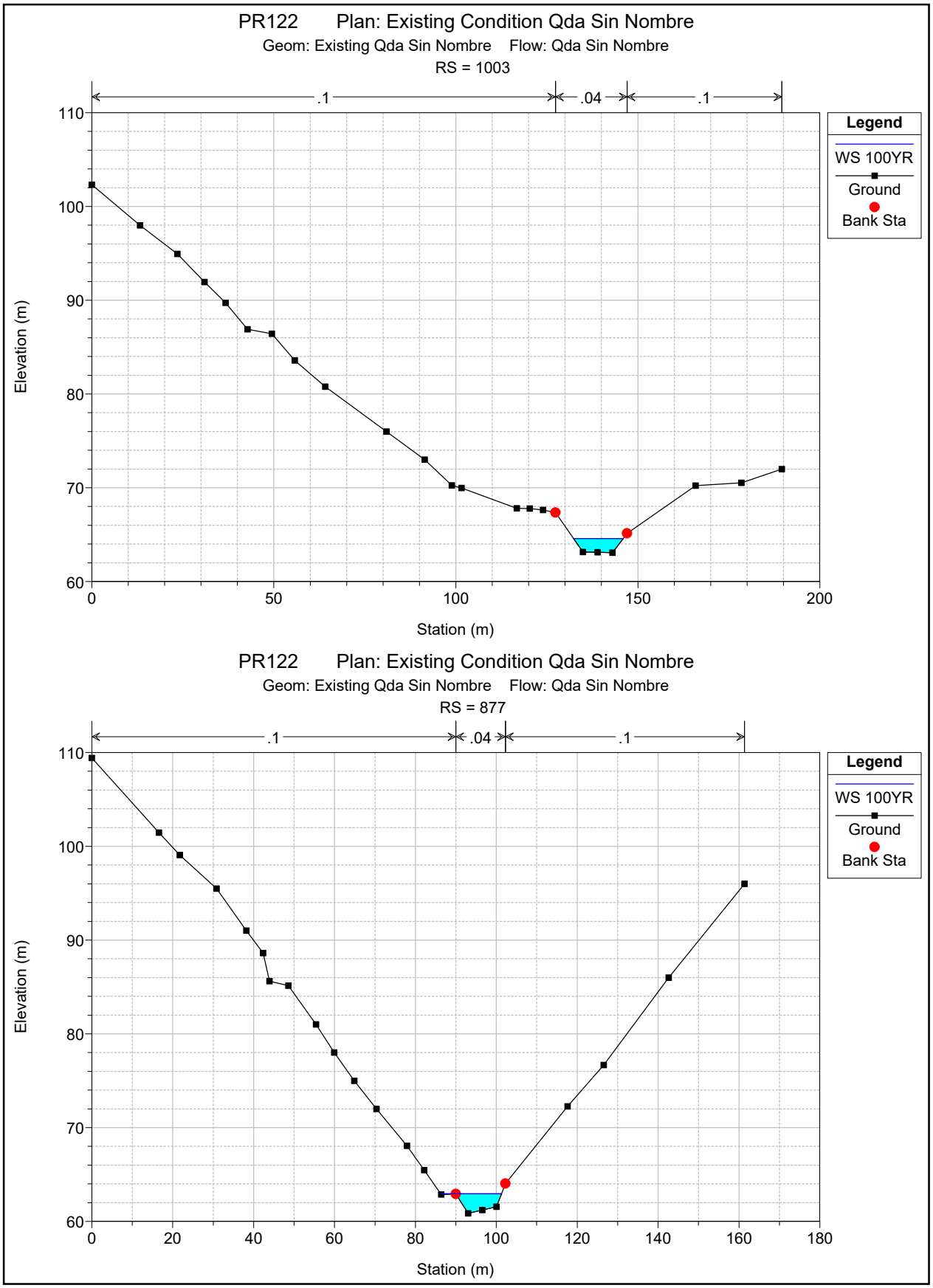
SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS
River: Qda Sin Nombre

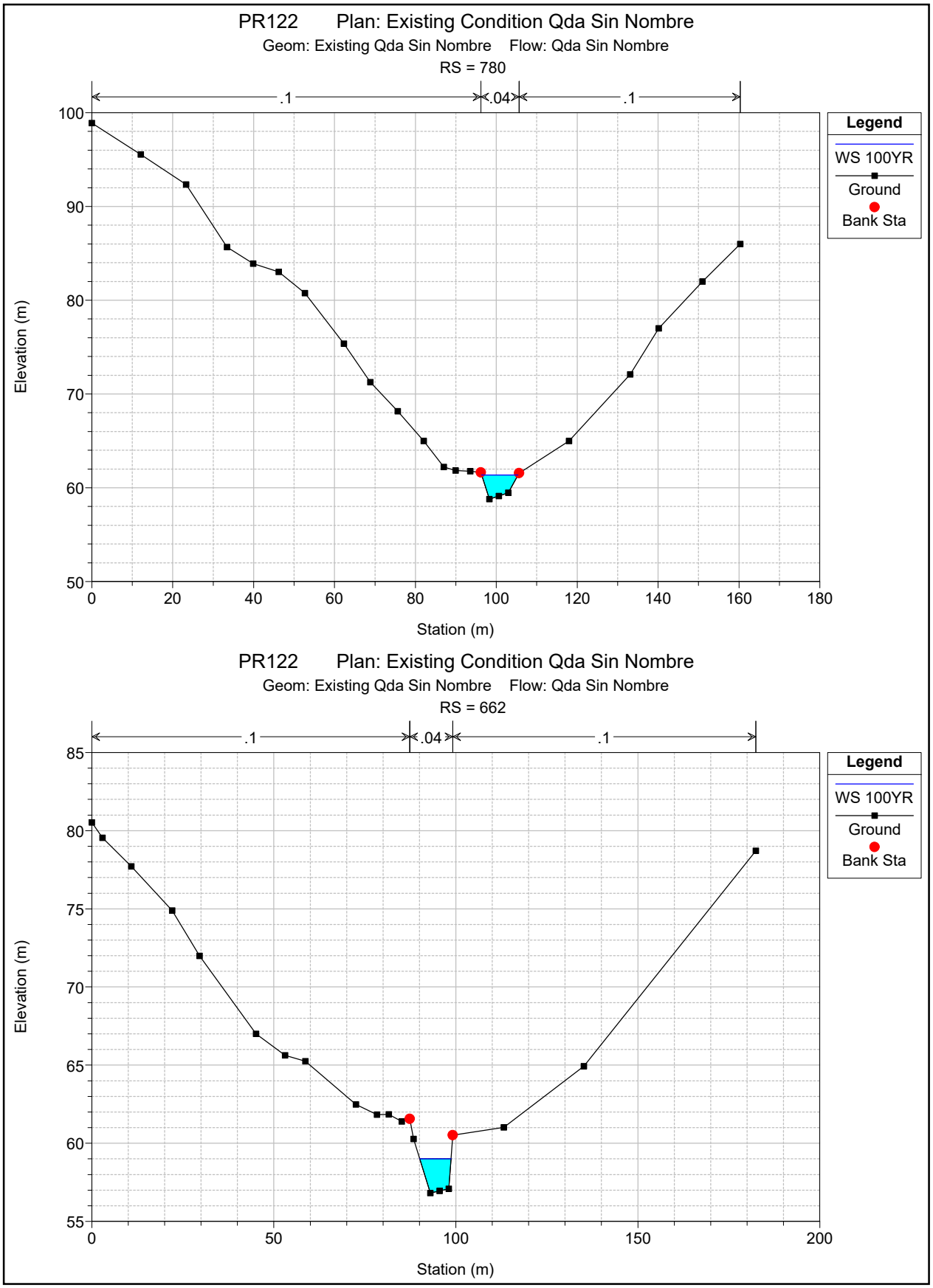
| Reach | River Sta. | Contr. | Expan. |
|---|---|---|---|
| PR122 | 1003 | .1 | .3 |
| PR122 | 877 | .1 | .3 |
| PR122 | 780 | .1 | .3 |
| PR122 | 662 | .1 | .3 |
| PR122 | 597 | .1 | .3 |
| PR122 | 521 | .1 | .3 |
| PR122 | 426 | .1 | .3 |
| PR122 | 323 | .1 | .3 |
| PR122 | 222 | .1 | .3 |
| PR122 | 130 | .1 | .3 |
| PR122 | 4 | .1 | .3 |

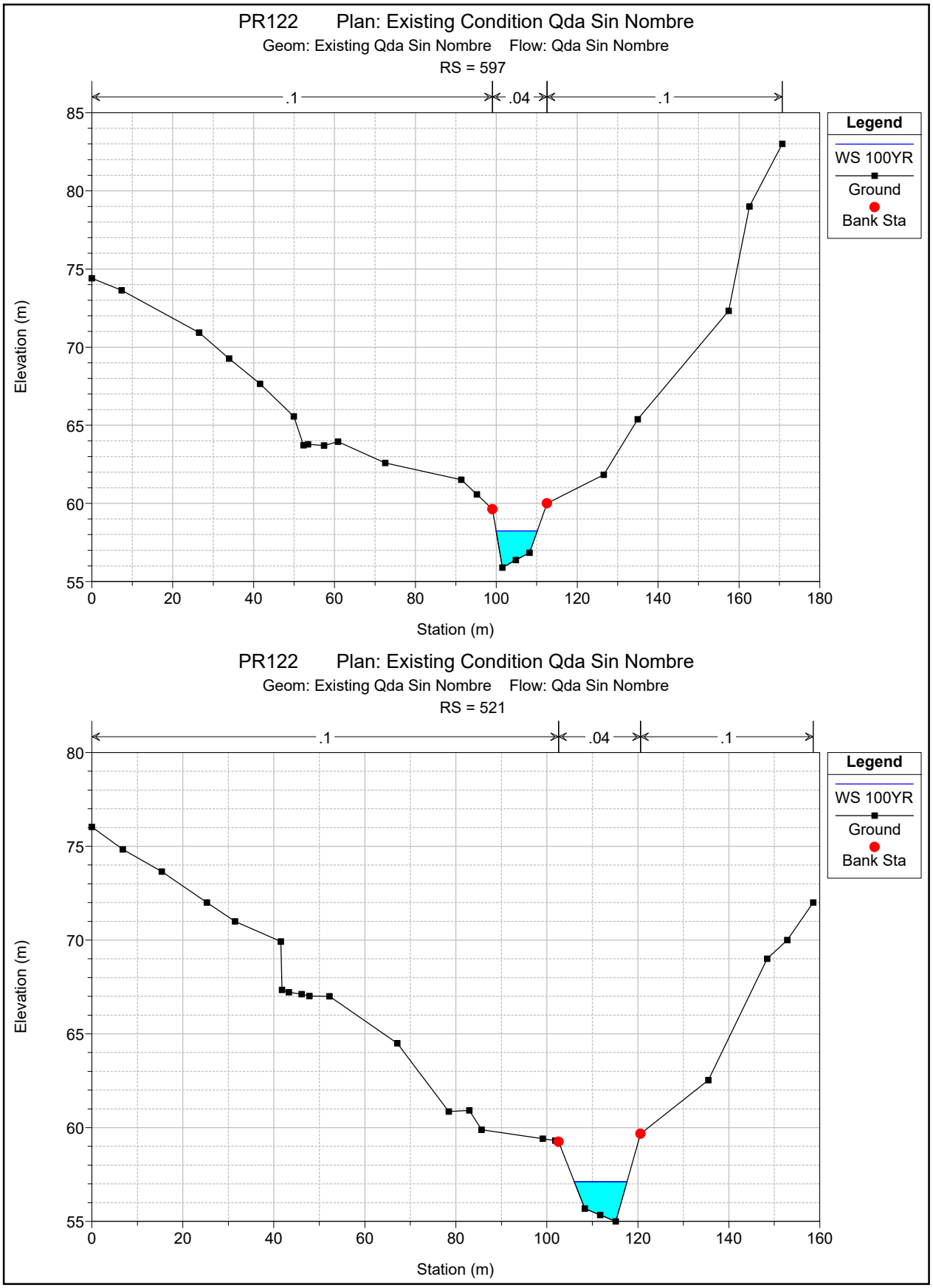
HEC-RAS Plan: Ex QSN River: Qda Sin Nombre Reach: PR122 Profile: 100YR

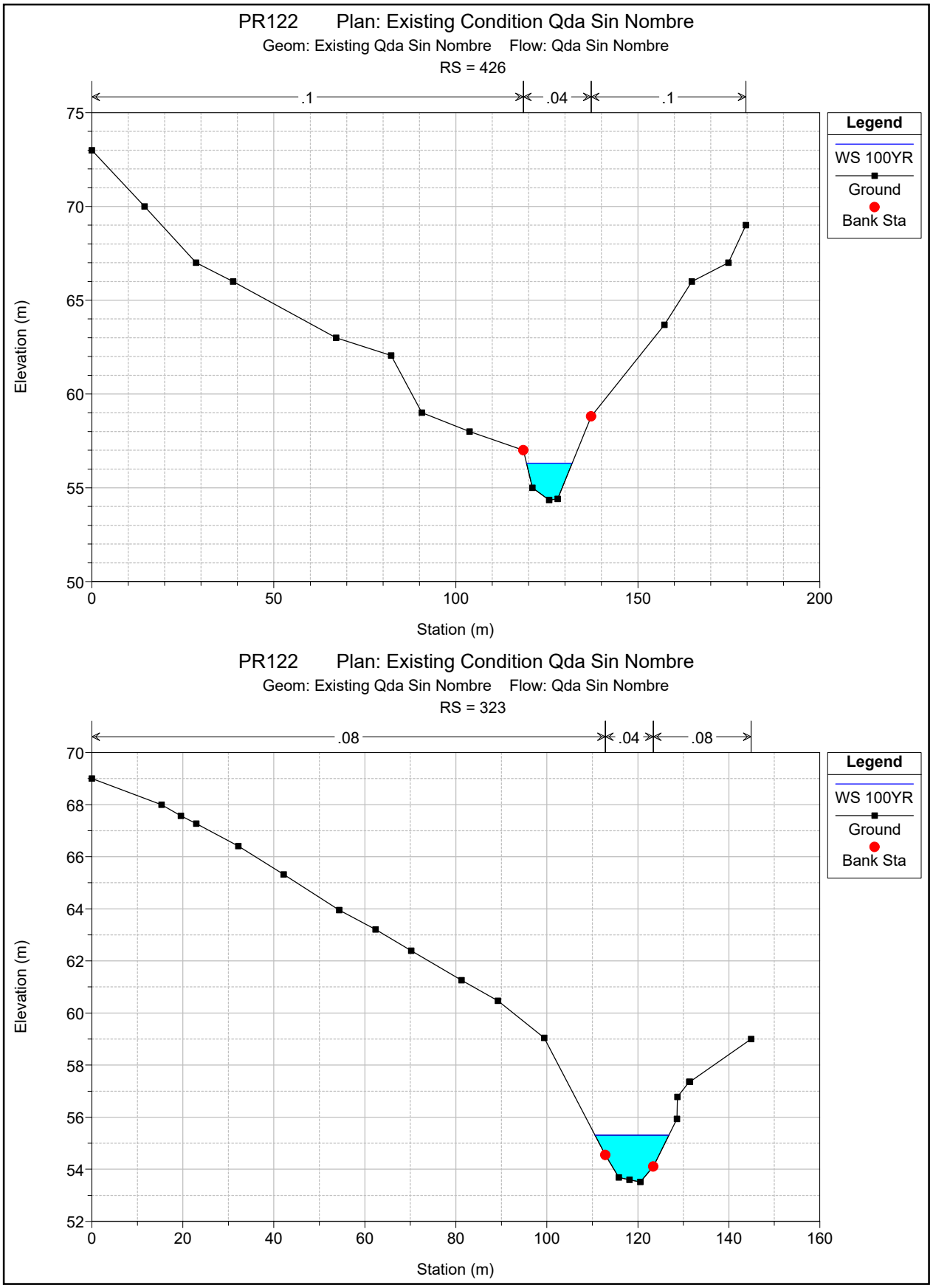
| Reach | River Sta | Profile | Q Total | Min Ch El | W.S. Elev | Crit W.S. | E.G. Elev | E.G. Slope | Vel Chnl | Flow Area | Top Width | Froude # Chl |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | (m3/s) | (m) | (m) | (m) | (m) | (m/m) | (m/s) | (m2) | (m) | |
| PR122 | 1003 | 100YR | 61.40 | 63.08 | 64.60 | 64.70 | 65.34 | 0.020014 | 3.81 | 16.12 | 13.67 | 1.12 |
| PR122 | 877 | 100YR | 61.40 | 60.86 | 62.96 | 62.96 | 63.66 | 0.015497 | 3.72 | 16.73 | 15.10 | 0.98 |
| PR122 | 780 | 100YR | 61.40 | 58.80 | 61.35 | 61.35 | 62.19 | 0.017219 | 4.06 | 15.12 | 9.00 | 1.00 |
| PR122 | 662 | 100YR | 61.40 | 56.81 | 59.00 | 59.09 | 59.96 | 0.020734 | 4.33 | 14.17 | 8.59 | 1.08 |
| PR122 | 597 | 100YR | 61.40 | 55.89 | 58.24 | 58.24 | 59.02 | 0.016889 | 3.90 | 15.74 | 10.17 | 1.00 |
| PR122 | 521 | 100YR | 61.40 | 55.00 | 57.12 | 57.12 | 57.83 | 0.016082 | 3.74 | 16.43 | 11.60 | 1.00 |
| PR122 | 426 | 100YR | 61.40 | 54.34 | 56.30 | 56.30 | 56.98 | 0.015660 | 3.64 | 16.88 | 12.53 | 1.00 |
| PR122 | 323 | 100YR | 61.40 | 53.51 | 55.31 | 55.31 | 55.98 | 0.012878 | 3.69 | 18.85 | 16.22 | 0.96 |
| PR122 | 222 | 100YR | 61.40 | 53.46 | 55.58 | 55.58 | 56.20 | 0.012866 | 3.52 | 19.33 | 19.64 | 0.94 |
| PR122 | 130 | 100YR | 61.40 | 52.41 | 53.42 | 53.88 | 54.98 | 0.011876 | 5.52 | 11.12 | 12.69 | 1.88 |
| PR122 | 4 | 100YR | 61.40 | 48.20 | 49.49 | 50.31 | 52.65 | 0.027126 | 7.88 | 7.79 | 8.87 | 2.68 |

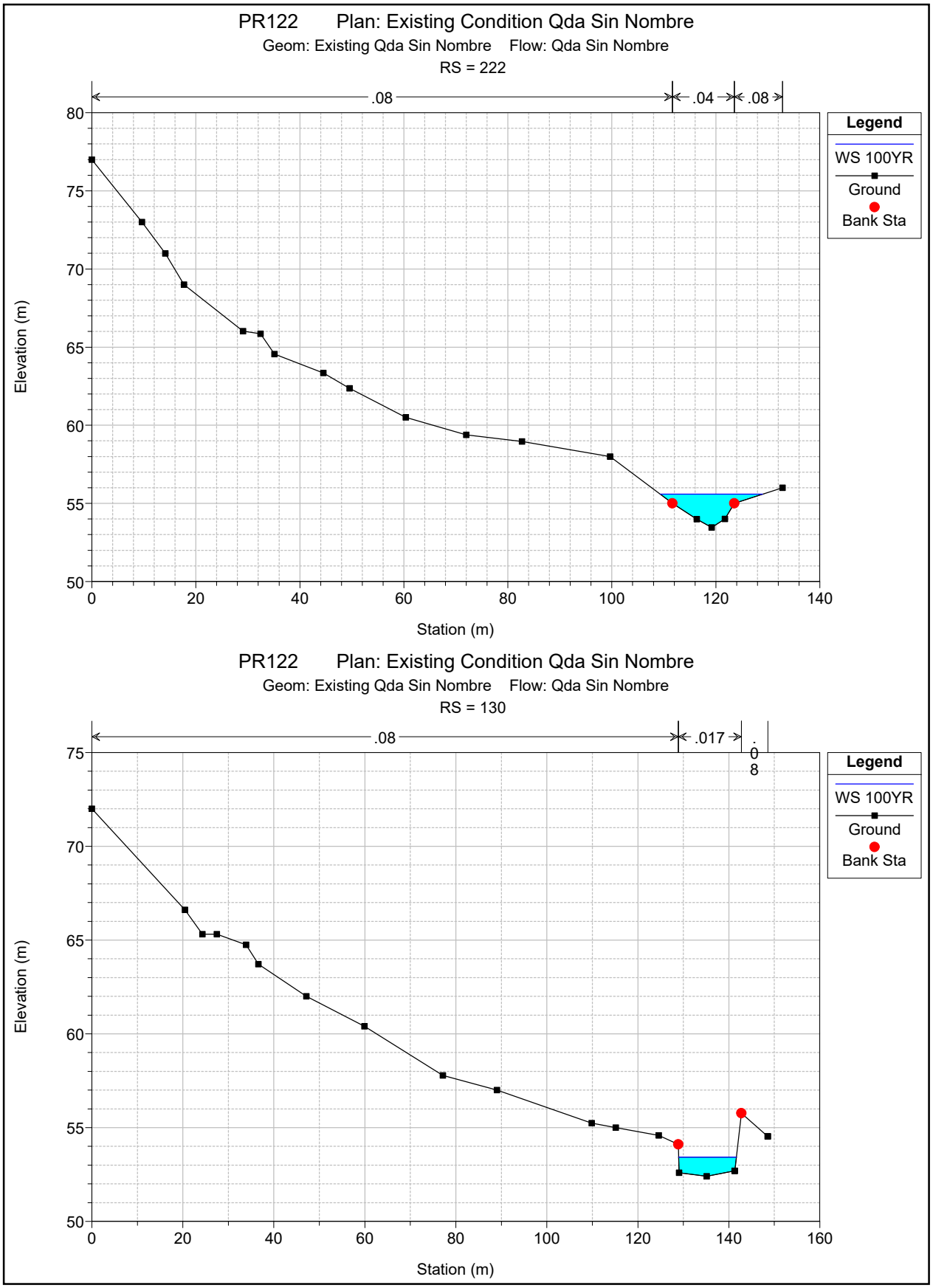

PR122 Plan: Existing Condition Qda Sin Nombre
Geom: Existing Qda Sin Nombre Flow: Qda Sin Nombre
Qda Sin Nombre PR122
Legend
WS 100YR
Ground
Elevation (m)
66
64
62
60
58
56
54
52
50
48
0
200
400
600
800
1000
Main Channel Distance (m)
130
222
323
426
521
597
662
780
877
1003

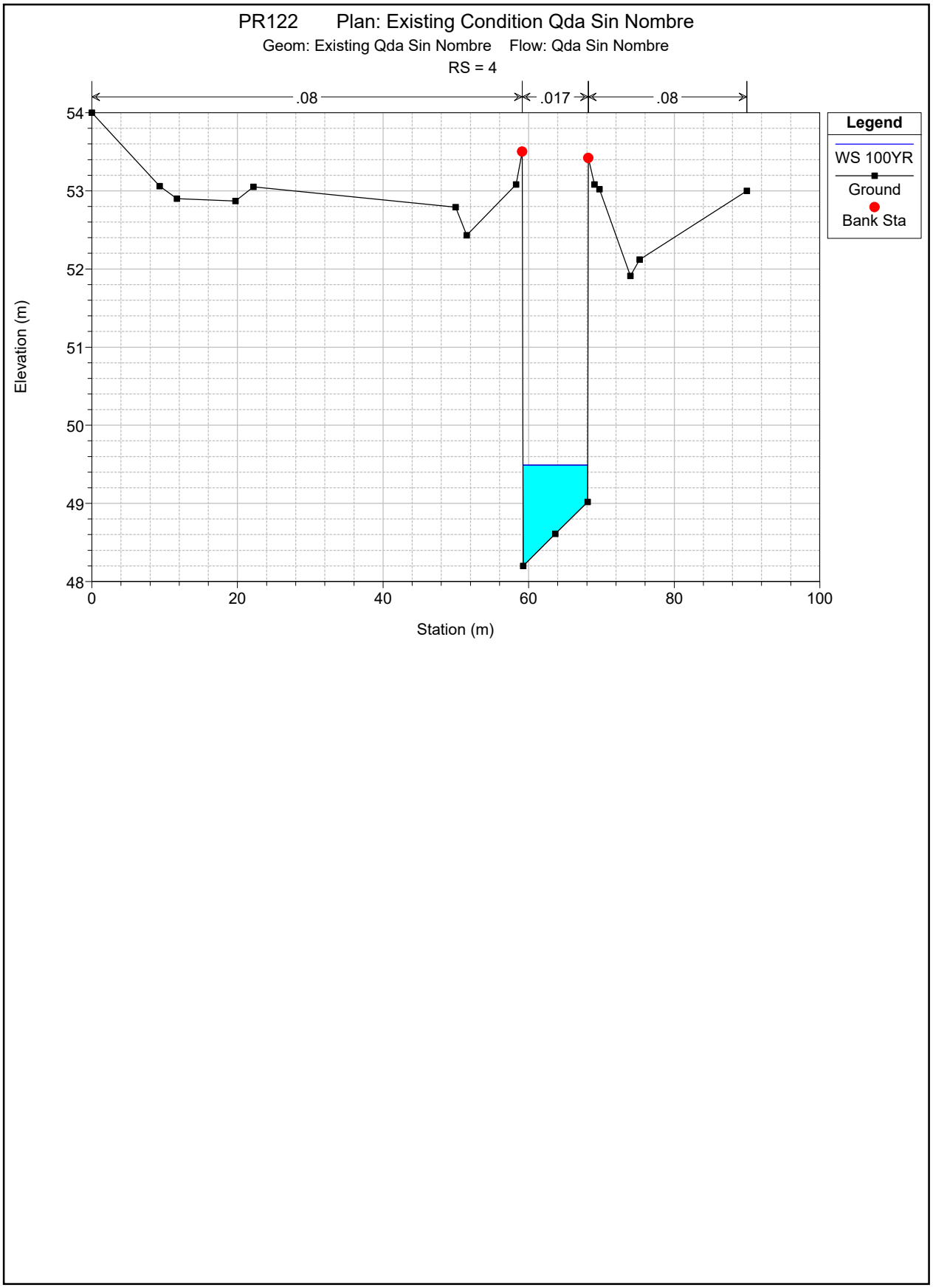

PR122 Plan: Existing Condition Qda Sin Nombre
Geom: Existing Qda Sin Nombre Flow: Qda Sin Nombre
RS = 1003
.1
.04
.1
Legend
WS 100YR
Ground
Bank Sta
Elevation (m)
Station (m)
PR122 Plan: Existing Condition Qda Sin Nombre
Geom: Existing Qda Sin Nombre Flow: Qda Sin Nombre
RS = 877
.1
.04
.1
Legend
WS 100YR
Ground
Bank Sta
Elevation (m)
Station (m)


PR122 Plan: Existing Condition Qda Sin Nombre
Geom: Existing Qda Sin Nombre Flow: Qda Sin Nombre
RS = 780
.1
.04
.1
Legend
WS 100YR
Ground
Bank Sta
Elevation (m)
Station (m)
PR122 Plan: Existing Condition Qda Sin Nombre
Geom: Existing Qda Sin Nombre Flow: Qda Sin Nombre
RS = 662
.1
.04
.1
Legend
WS 100YR
Ground
Bank Sta
Elevation (m)
Station (m)


PR122 Plan: Existing Condition Qda Sin Nombre
Geom: Existing Qda Sin Nombre Flow: Qda Sin Nombre
RS = 597
.1
.04
.1
Legend
WS 100YR
Ground
Bank Sta
Elevation (m)
Station (m)
PR122 Plan: Existing Condition Qda Sin Nombre
Geom: Existing Qda Sin Nombre Flow: Qda Sin Nombre
RS = 521
.1
.04
.1
Legend
WS 100YR
Ground
Bank Sta
Elevation (m)
Station (m)


PR122 Plan: Existing Condition Qda Sin Nombre
Geom: Existing Qda Sin Nombre Flow: Qda Sin Nombre
RS = 426
.1
.04
.1
Legend
WS 100YR
Ground
Bank Sta
Elevation (m)
Station (m)
75
70
65
60
55
50
0
50
100
150
200
PR122 Plan: Existing Condition Qda Sin Nombre
Geom: Existing Qda Sin Nombre Flow: Qda Sin Nombre
RS = 323
.08
.04
.08
Legend
WS 100YR
Ground
Bank Sta
Elevation (m)
Station (m)
70
68
66
64
62
60
58
56
54
52
0
20
40
60
80
100
120
140
160


PR122 Plan: Existing Condition Qda Sin Nombre
Geom: Existing Qda Sin Nombre Flow: Qda Sin Nombre
RS = 222
.08
.04
.08
Legend
WS 100YR
Ground
Bank Sta
Elevation (m)
Station (m)
80
75
70
65
60
55
50
0
20
40
60
80
100
120
140
PR122 Plan: Existing Condition Qda Sin Nombre
Geom: Existing Qda Sin Nombre Flow: Qda Sin Nombre
RS = 130
.08
.017
.08
Legend
WS 100YR
Ground
Bank Sta
Elevation (m)
Station (m)
75
70
65
60
55
50
0
20
40
60
80
100
120
140
160


PR122 Plan: Existing Condition Qda Sin Nombre
Geom: Existing Qda Sin Nombre Flow: Qda Sin Nombre
RS = 4
.08
.017
.08
Legend
WS 100YR
Ground
Bank Sta
Elevation (m)
Station (m)
54
53
52
51
50
49
48
0
20
40
60
80
100

HEC-RAS HEC-RAS 6.4.1 June 2023
U.S. Army Corps of Engineers
Hydrologic Engineering Center
609 Second Street
Davis, California

```
X     X  XXXXXX    XXXX        XXXX       XX      XXXX
X     X  X        X    X       X   X     X  X    X
X     X  X        X            X   X    X    X   X
XXXXXXX  XXXX     X       XXX  XXXX     XXXXXX    XXXX
X     X  X        X            X  X     X    X        X
X     X  X        X    X       X   X    X    X        X
X     X  XXXXXX    XXXX        X    X   X    X   XXXXX
```

PROJECT DATA
Project Title: PR122
Project File : PR122.prj
Run Date and Time: 10/5/2023 4:16:12 PM

Project in SI units

PLAN DATA

Plan Title: Existing Cond Qda Sin Nombre Floodway
Plan File : e:\WORKING\0000_BYA_WORKING\20-PR-122\HH-SCOUR\HYDRAULIC\HEC-RAS\PR-122\PR122.p07

Geometry Title: Existing Qda Sin Nombre
Geometry File : e:\WORKING\0000_BYA_WORKING\20-PR-122\HH-SCOUR\HYDRAULIC\HEC-RAS\PR-122\PR122.g01

Flow Title : Qda Sin Nombre_Floodway
Flow File : e:\WORKING\0000_BYA_WORKING\20-PR-122\HH-SCOUR\HYDRAULIC\HEC-RAS\PR-122\PR122.f04

Plan Summary Information:
Number of: Cross Sections = 11 Multiple Openings = 0
Culverts = 0 Inline Structures = 0
Bridges = 0 Lateral Structures = 0

Computational Information
Water surface calculation tolerance = 0.003
Critical depth calculation tolerance = 0.003
Maximum number of iterations = 20
Maximum difference tolerance = 0.1
Flow tolerance factor = 0.001

Computation Options
Critical depth computed at all cross sections
Conveyance Calculation Method: At breaks in n values only
Friction Slope Method: Average Conveyance
Computational Flow Regime: Supercritical Flow

Encroachment Data
Equal Conveyance = True
Left Offset = 0
Right Offset = 0

River = Qda Sin Nombre Reach = PR122

| RS | Profile | Method | Value1 | Value2 |
|---|---|---|---|---|
| 1003 | 100YR_FW | 1 | 127.36 | 147.06 |
| 877 | 100YR_FW | 1 | 90 | 102.28 |
| 780 | 100YR_FW | 1 | 96.17 | 105.65 |
| 662 | 100YR_FW | 1 | 87.36 | 99.18 |
| 597 | 100YR_FW | 1 | 99.05 | 112.53 |
| 521 | 100YR_FW | 1 | 102.6 | 120.59 |
| 426 | 100YR_FW | 1 | 117.65 | 144.46 |
| 323 | 100YR_FW | 1 | 112.86 | 123.41 |
| 222 | 100YR_FW | 1 | 111.67 | 123.55 |
| 130 | 100YR_FW | 1 | 128.89 | 142.78 |
| 4 | 100YR_FW | 1 | 59.13 | 68.19 |

FLOW DATA

Flow Title: Qda Sin Nombre_Floodway
Flow File : e:\WORKING\0000_BYA_WORKING\20-PR-122\HH-SCOUR\HYDRAULIC\HEC-RAS\PR-122\PR122.f04

Flow Data (m3/s)

| River | Reach | RS | 100YR | 100YR_FW |
|---|---|---|---|---|
| Qda Sin Nombre | PR122 | 1003 | 61.4 | 61.4 |

Boundary Conditions

| River | Reach | Profile | Upstream | Downstream |
|---|---|---|---|---|
| Qda Sin Nombre | PR122 | 100YR | Normal S = 0.02 | Normal S = 0.003 |

GEOMETRY DATA

Geometry Title: Existing Qda Sin Nombre
Geometry File : e:\WORKING\0000_BYA_WORKING\20-PR-122\HH-SCOUR\HYDRAULIC\HEC-RAS\PR-122\PR122.g01

CROSS SECTION

RIVER: Qda Sin Nombre
REACH: PR122 RS: 1003

INPUT
Description: XS-1
Station Elevation Data num= 24

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 102.32 | 13.27 | 97.99 | 23.46 | 94.94 | 30.98 | 91.94 | 36.75 | 89.72 |
| 42.78 | 86.89 | 49.42 | 86.43 | 55.77 | 83.58 | 64.09 | 80.78 | 80.89 | 76 |
| 91.44 | 73 | 98.89 | 70.24 | 101.57 | 69.98 | 116.72 | 67.81 | 120.28 | 67.78 |
| 123.93 | 67.62 | 127.36 | 67.36 | 134.88 | 63.16 | 138.95 | 63.12 | 143.02 | 63.08 |
| 147.06 | 65.15 | 165.85 | 70.23 | 178.48 | 70.54 | 189.55 | 72 | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .1 | 127.36 | .04 | 147.06 | .1 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 127.36 | 147.06 | 125.7 | 125.7 | 125.7 | .1 | .3 |

CROSS SECTION

RIVER: Qda Sin Nombre
REACH: PR122 RS: 877

INPUT
Description: XS-2
Station Elevation Data num= 24

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 109.42 | 16.57 | 101.47 | 21.73 | 99.08 | 30.85 | 95.48 | 38.22 | 91.02 |
| 42.35 | 88.61 | 43.94 | 85.61 | 48.58 | 85.13 | 55.45 | 81 | 59.93 | 78 |
| 64.88 | 75 | 70.38 | 72 | 77.91 | 68.05 | 82.18 | 65.46 | 86.36 | 62.88 |
| 90 | 62.91 | 93.05 | 60.86 | 96.56 | 61.2 | 100.07 | 61.55 | 102.28 | 64.02 |
| 117.65 | 72.27 | 126.56 | 76.67 | 142.6 | 86 | 161.39 | 96 | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .1 | 90 | .04 | 102.28 | .1 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 90 | 102.28 | 97.4 | 97.4 | 97.4 | .1 | .3 |

CROSS SECTION

RIVER: Qda Sin Nombre
REACH: PR122 RS: 780

INPUT
Description: XS-3
Station Elevation Data num= 24

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|

```
       0   98.88   12.11   95.55   23.31   92.34   33.41   85.67   39.89   83.91
    46.2   83.03   52.69   80.75   62.29   75.37   68.85   71.26   75.64   68.16
   82.06   64.98   87.03   62.22   89.94   61.83   93.59   61.76   96.17   61.64
   98.28    58.8  100.63   59.13  102.97   59.46  105.65   61.56  117.99   64.98
  133.13   72.09  140.14      77  150.99      82  160.29      86

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0      .1   96.17     .04  105.65      .1

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         96.17  105.65             117.9   117.9   117.9             .1       .3

CROSS SECTION


RIVER: Qda Sin Nombre
REACH: PR122              RS: 662

INPUT
Description: XS-4
Station Elevation Data    num=      21
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0   80.53    2.93   79.55   10.86   77.72   22.06   74.89   29.57   71.98
   45.12      67    53.1   65.63   58.66   65.25   72.55   62.48   78.34   61.83
   81.57   61.85   85.15   61.39   87.36   61.56   88.41   60.27      93   56.81
   95.53   56.95   98.07   57.09   99.18   60.52  113.19   61.02  135.18   64.93
  182.39   78.71

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0      .1   87.36     .04   99.18      .1

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         87.36   99.18             64.7    64.7    64.7             .1       .3

CROSS SECTION


RIVER: Qda Sin Nombre
REACH: PR122              RS: 597

INPUT
Description: XS-5
Station Elevation Data    num=      23
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0    74.4    7.36   73.63    26.5   70.93   33.94   69.27   41.61   67.65
   49.96   65.57   52.31   63.72   53.46   63.78   57.42   63.71   60.88   63.94
   72.52   62.59   91.36   61.52   95.17   60.58   99.05   59.62   101.5   55.89
  104.86   56.37  108.22   56.84  112.53      60  126.56   61.83  134.96   65.39
  157.43   72.32   162.6      79  170.69      83

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0      .1   99.05     .04  112.53      .1

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         99.05  112.53             76.2    76.2    76.2             .1       .3

CROSS SECTION


RIVER: Qda Sin Nombre
REACH: PR122              RS: 521

INPUT
Description: XS-6
Station Elevation Data    num=      26
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0   76.03    6.78   74.84   15.35   73.65   25.29      72   31.47      71
   41.51   69.92   41.79   67.34   43.29   67.22   46.08   67.11   47.79   67.02
   52.24      67   67.11   64.49   78.45   60.86   82.97   60.92   85.67   59.89
   99.13   59.41  101.85   59.31   102.6   59.25  108.32   55.68  111.73   55.34
  115.14      55  120.59   59.67   135.5   62.53  148.43      69  152.85      70
  158.56      72

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0      .1   102.6     .04  120.59      .1
```

```
Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         102.6  120.59             95.3    95.3    95.3             .1       .3

CROSS SECTION


RIVER: Qda Sin Nombre
REACH: PR122             RS: 426

INPUT
Description: XS-7
Station Elevation Data    num=      17
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0      73   14.48      70   28.61      67   38.81      66   67.12      63
   82.22   62.05   90.63      59  103.79      58  118.59      57     121      55
  125.66   54.34  127.99   54.41  137.18    58.8  157.27   63.69  164.86      66
  174.86      67  179.72      69

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0      .1  118.59     .04  137.18      .1

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        118.59  137.18            103.1   103.1   103.1             .1       .3

CROSS SECTION


RIVER: Qda Sin Nombre
REACH: PR122             RS: 323

INPUT
Description: XS-8
Station Elevation Data    num=      22
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0      69   15.33      68   19.56   67.57   22.96   67.27   32.18   66.41
   42.18   65.32   54.35   63.95   62.35   63.21   70.19   62.39   81.24   61.26
   89.23   60.47   99.42   59.05  112.86   54.55  115.81   53.69  118.17    53.6
  120.53   53.51  123.41    54.1  128.58   55.94  128.69   56.78   131.3   57.36
  131.46   57.36  144.88      59

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .08  112.86     .04  123.41     .08

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        112.86  123.41            101.2   101.2   101.2             .1       .3

CROSS SECTION


RIVER: Qda Sin Nombre
REACH: PR122             RS: 222

INPUT
Description: XS-9
Station Elevation Data    num=      19
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0      77    9.65      73   14.13      71   17.72      69   29.09   66.02
   32.43   65.86   35.11   64.56   44.52   63.34   49.58   62.36   60.38   60.51
   72.02   59.39   82.73   58.96   99.64      58  111.67      55  116.35   53.99
   119.2   53.46  121.72      54  123.55      55  132.82      56

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .08  111.67     .04  123.55     .08

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        111.67  123.55             91.6    91.6    91.6             .1       .3

CROSS SECTION


RIVER: Qda Sin Nombre
REACH: PR122             RS: 130

INPUT
Description: XS-10
Station Elevation Data    num=      21
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
```

```
       0      72   20.45   66.61    24.3   65.31   27.47   65.31   33.88   64.75
    36.6   63.72   47.13      62   59.91    60.4   77.12   57.78   89.04      57
  109.86   55.24  115.15      55  124.58   54.59  128.89    54.1  129.04    52.6
  135.15   52.41  141.26   52.69   141.3   52.69  142.78   55.77  148.55   54.53
  148.58   54.53

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .08  128.89    .017  142.78     .08

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        128.89  142.78            125.6   125.6   125.6             .1       .3

CROSS SECTION


RIVER: Qda Sin Nombre
REACH: PR122              RS: 4

INPUT
Description: XS-11
Station Elevation Data    num=      18
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0      54    9.31   53.06   11.69    52.9   19.72   52.87   22.19   53.05
   49.96   52.79   51.49   52.43   58.29   53.08   59.13    53.5   59.26    48.2
   63.67   48.61   68.09   49.02   68.19   53.42   69.03   53.08   69.73   53.02
   73.97   51.91   75.24   52.12   89.99      53

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .08   59.13    .017   68.19     .08

Bank Sta: Left   Right    Coeff Contr.   Expan.
         59.13   68.19             .1       .3


SUMMARY OF MANNING'S N VALUES

River:Qda Sin Nombre

      Reach          River Sta.       n1        n2        n3

 PR122                1003               .1       .04        .1
 PR122                877                .1       .04        .1
 PR122                780                .1       .04        .1
 PR122                662                .1       .04        .1
 PR122                597                .1       .04        .1
 PR122                521                .1       .04        .1
 PR122                426                .1       .04        .1
 PR122                323               .08       .04       .08
 PR122                222               .08       .04       .08
 PR122                130               .08      .017       .08
 PR122                4                 .08      .017       .08



SUMMARY OF REACH LENGTHS

River: Qda Sin Nombre

      Reach          River Sta.      Left     Channel    Right

 PR122                1003            125.7     125.7     125.7
 PR122                877              97.4      97.4      97.4
 PR122                780             117.9     117.9     117.9
 PR122                662              64.7      64.7      64.7
 PR122                597              76.2      76.2      76.2
 PR122                521              95.3      95.3      95.3
 PR122                426             103.1     103.1     103.1
 PR122                323             101.2     101.2     101.2
 PR122                222              91.6      91.6      91.6
 PR122                130             125.6     125.6     125.6
 PR122                4



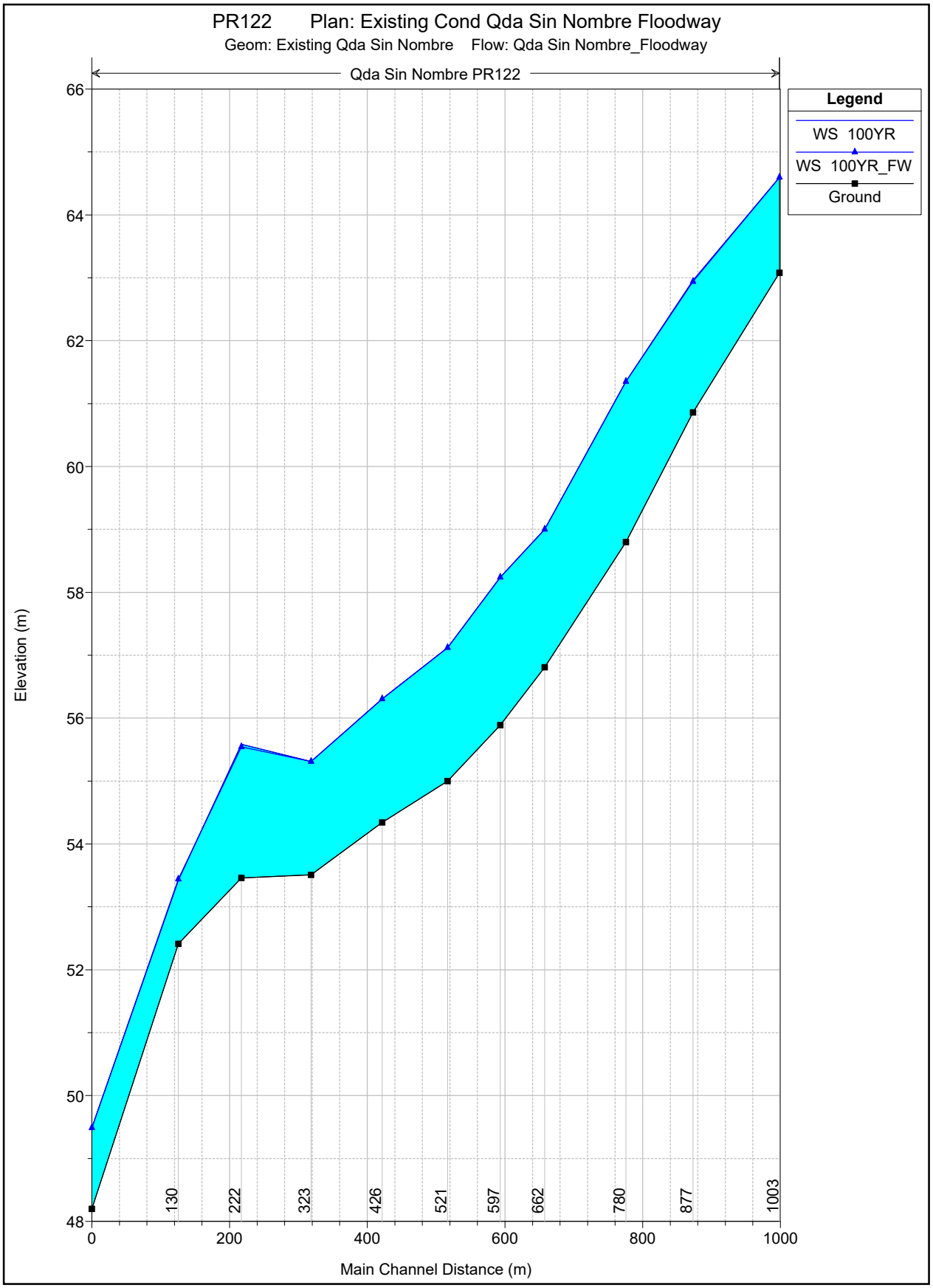
SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS
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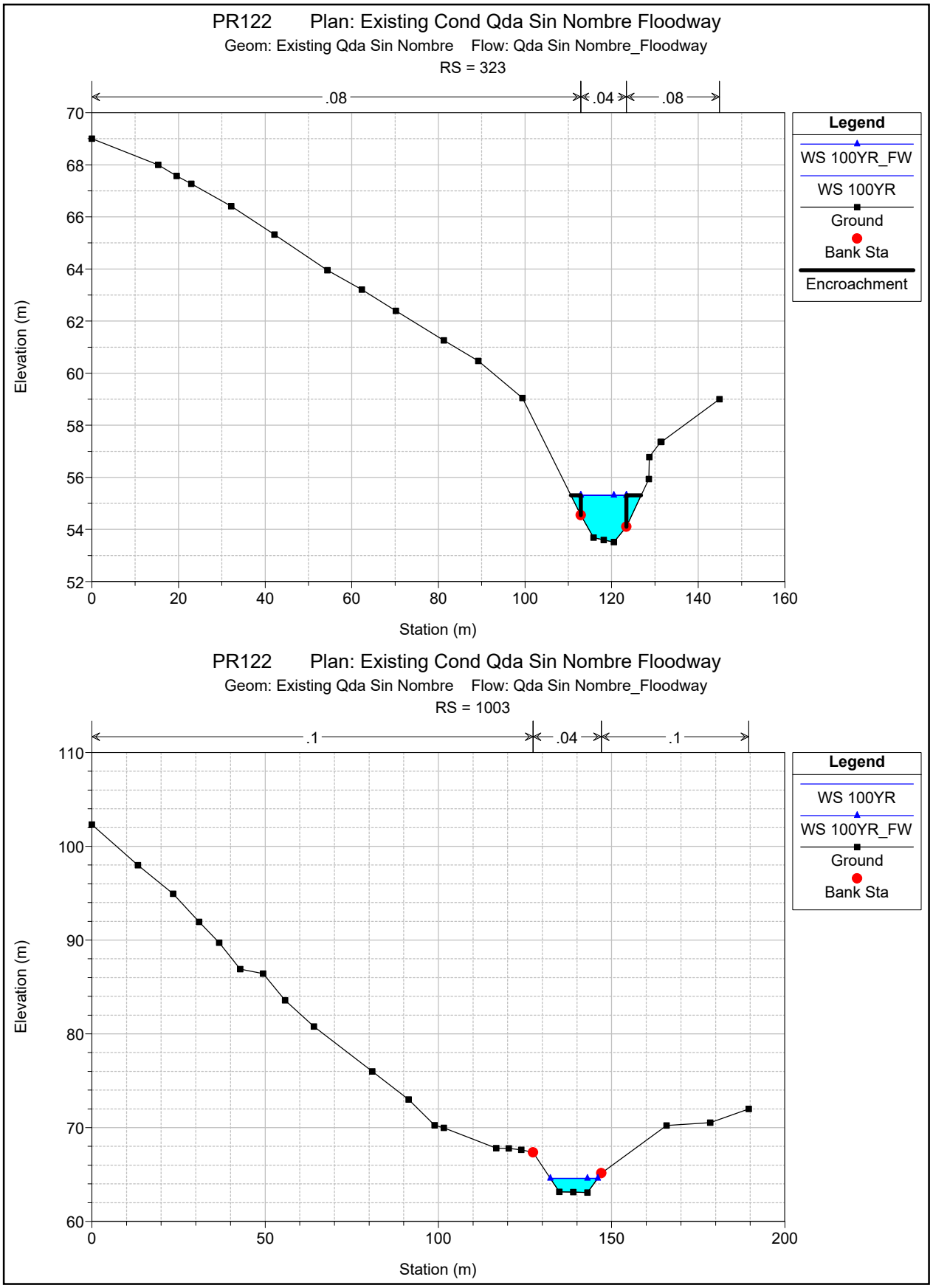
River: Qda Sin Nombre

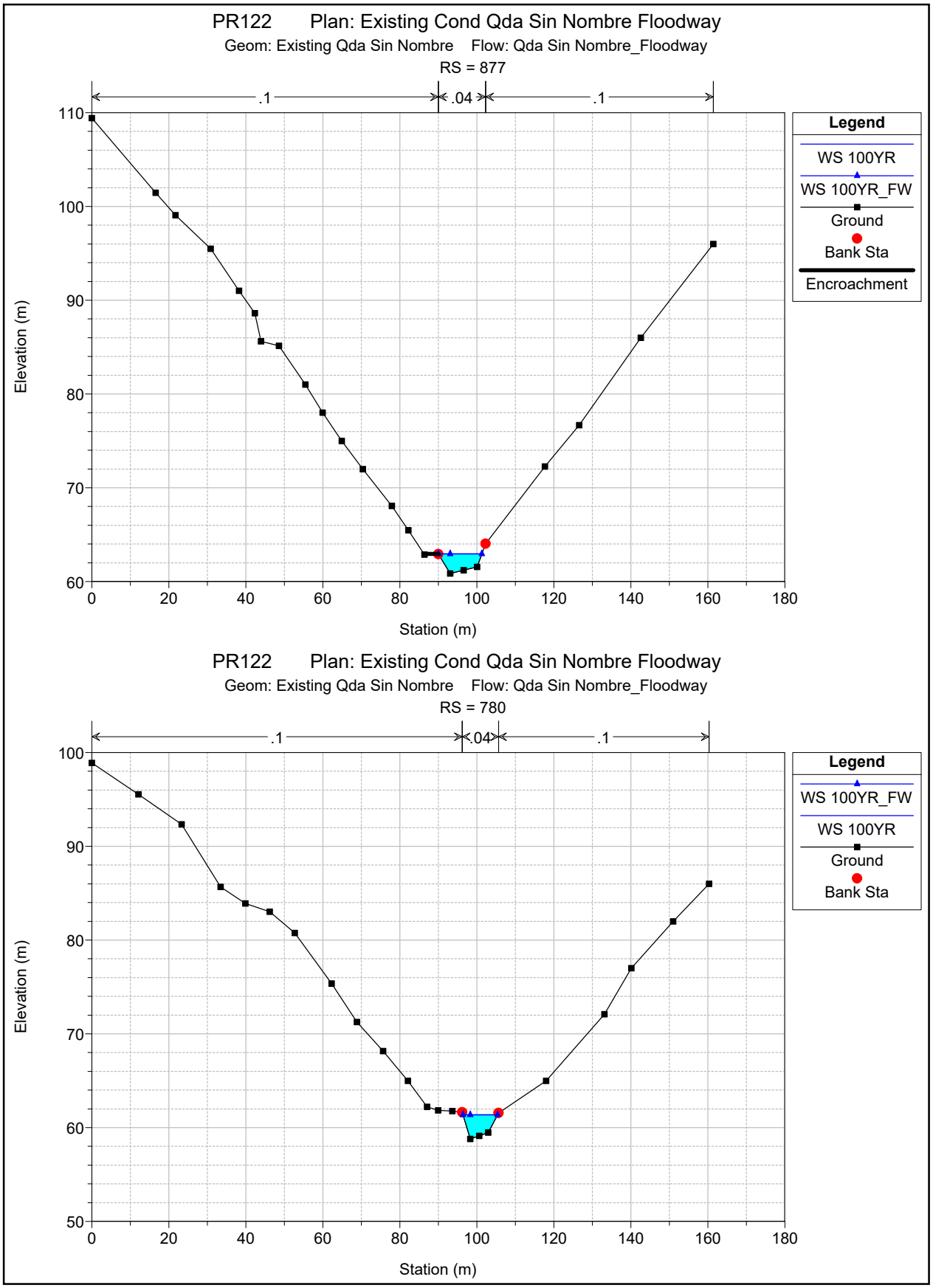
| Reach | River Sta. | Contr. | Expan. |
|---|---|---|---|
| PR122 | 1003 | .1 | .3 |
| PR122 | 877 | .1 | .3 |
| PR122 | 780 | .1 | .3 |
| PR122 | 662 | .1 | .3 |
| PR122 | 597 | .1 | .3 |
| PR122 | 521 | .1 | .3 |
| PR122 | 426 | .1 | .3 |
| PR122 | 323 | .1 | .3 |
| PR122 | 222 | .1 | .3 |
| PR122 | 130 | .1 | .3 |
| PR122 | 4 | .1 | .3 |

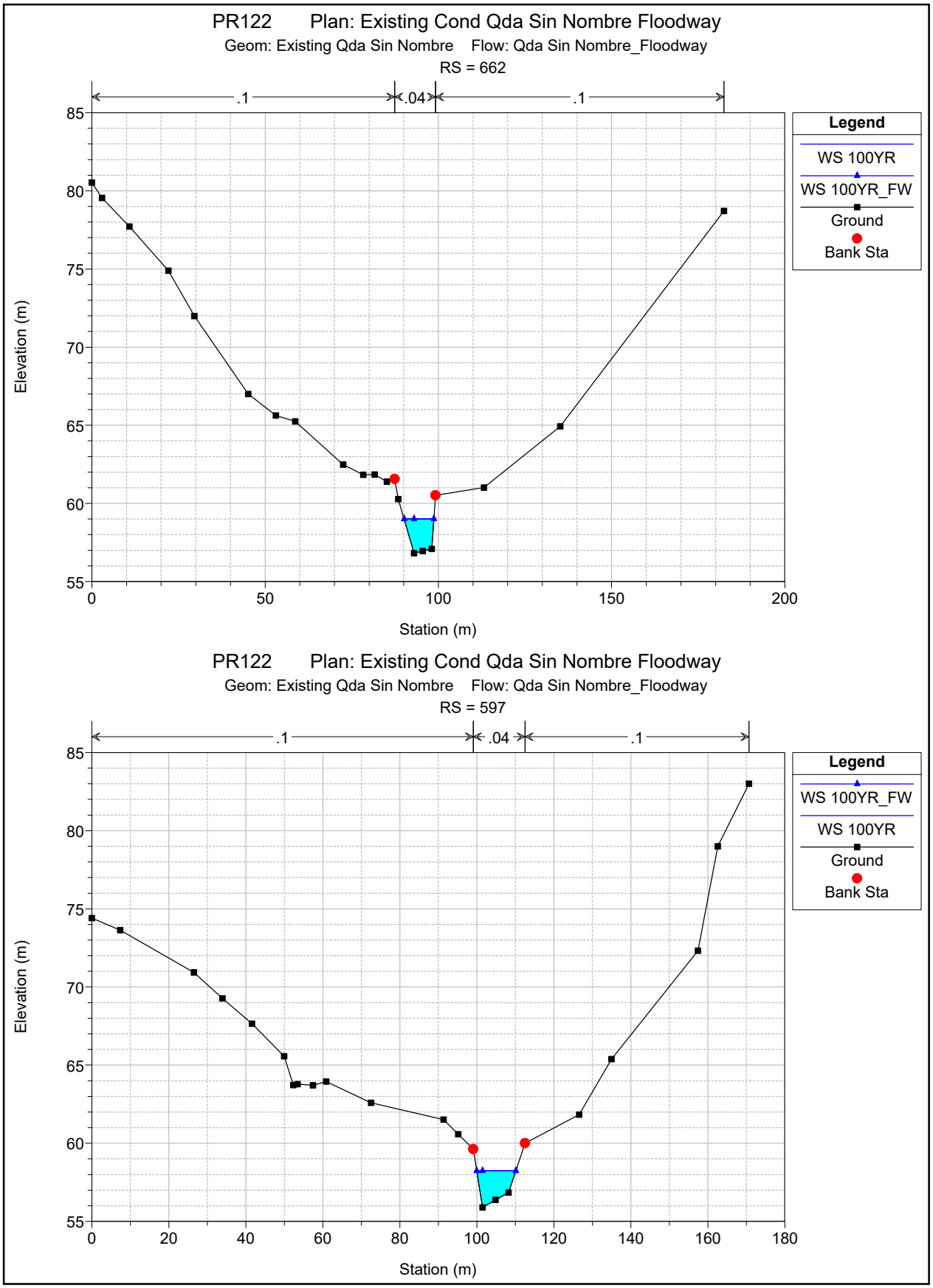
HEC-RAS Plan: Ex QSN Floodway River: Qda Sin Nombre Reach: PR122

| Reach | River Sta | Profile | Q Total | Min Ch El | W.S. Elev | Crit W.S. | E.G. Elev | E.G. Slope | Vel Chnl | Flow Area | Top Width | Froude # Chl |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | (m3/s) | (m) | (m) | (m) | (m) | (m/m) | (m/s) | (m2) | (m) | |
| PR122 | 1003 | 100YR | 61.40 | 63.08 | 64.60 | 64.70 | 65.34 | 0.020014 | 3.81 | 16.12 | 13.67 | 1.12 |
| PR122 | 1003 | 100YR_FW | 61.40 | 63.08 | 64.60 | 64.70 | 65.34 | 0.020014 | 3.81 | 16.12 | 13.67 | 1.12 |
| | | | | | | | | | | | | |
| PR122 | 877 | 100YR | 61.40 | 60.86 | 62.96 | 62.96 | 63.66 | 0.015497 | 3.72 | 16.73 | 15.10 | 0.98 |
| PR122 | 877 | 100YR_FW | 61.40 | 60.86 | 62.94 | 62.94 | 63.67 | 0.016156 | 3.77 | 16.30 | 11.32 | 1.00 |
| | | | | | | | | | | | | |
| PR122 | 780 | 100YR | 61.40 | 58.80 | 61.35 | 61.35 | 62.19 | 0.017219 | 4.06 | 15.12 | 9.00 | 1.00 |
| PR122 | 780 | 100YR_FW | 61.40 | 58.80 | 61.35 | 61.35 | 62.19 | 0.017215 | 4.06 | 15.12 | 9.00 | 1.00 |
| | | | | | | | | | | | | |
| PR122 | 662 | 100YR | 61.40 | 56.81 | 59.00 | 59.09 | 59.96 | 0.020734 | 4.33 | 14.17 | 8.59 | 1.08 |
| PR122 | 662 | 100YR_FW | 61.40 | 56.81 | 59.00 | 59.09 | 59.96 | 0.020739 | 4.33 | 14.17 | 8.59 | 1.08 |
| | | | | | | | | | | | | |
| PR122 | 597 | 100YR | 61.40 | 55.89 | 58.24 | 58.24 | 59.02 | 0.016889 | 3.90 | 15.74 | 10.17 | 1.00 |
| PR122 | 597 | 100YR_FW | 61.40 | 55.89 | 58.24 | 58.24 | 59.02 | 0.016889 | 3.90 | 15.74 | 10.17 | 1.00 |
| | | | | | | | | | | | | |
| PR122 | 521 | 100YR | 61.40 | 55.00 | 57.12 | 57.12 | 57.83 | 0.016082 | 3.74 | 16.43 | 11.60 | 1.00 |
| PR122 | 521 | 100YR_FW | 61.40 | 55.00 | 57.12 | 57.12 | 57.83 | 0.016082 | 3.74 | 16.43 | 11.60 | 1.00 |
| | | | | | | | | | | | | |
| PR122 | 426 | 100YR | 61.40 | 54.34 | 56.30 | 56.30 | 56.98 | 0.015660 | 3.64 | 16.88 | 12.53 | 1.00 |
| PR122 | 426 | 100YR_FW | 61.40 | 54.34 | 56.30 | 56.30 | 56.98 | 0.015660 | 3.64 | 16.88 | 12.53 | 1.00 |
| | | | | | | | | | | | | |
| PR122 | 323 | 100YR | 61.40 | 53.51 | 55.31 | 55.31 | 55.98 | 0.012878 | 3.69 | 18.85 | 16.22 | 0.96 |
| PR122 | 323 | 100YR_FW | 61.40 | 53.51 | 55.31 | 55.31 | 56.07 | 0.017572 | 3.85 | 15.93 | 10.55 | 1.00 |
| | | | | | | | | | | | | |
| PR122 | 222 | 100YR | 61.40 | 53.46 | 55.58 | 55.58 | 56.20 | 0.012866 | 3.52 | 19.33 | 19.64 | 0.94 |
| PR122 | 222 | 100YR_FW | 61.40 | 53.46 | 55.55 | 55.55 | 56.24 | 0.016559 | 3.70 | 16.59 | 11.88 | 1.00 |
| | | | | | | | | | | | | |
| PR122 | 130 | 100YR | 61.40 | 52.41 | 53.42 | 53.88 | 54.98 | 0.011876 | 5.52 | 11.12 | 12.69 | 1.88 |
| PR122 | 130 | 100YR_FW | 61.40 | 52.41 | 53.44 | 53.88 | 54.93 | 0.011139 | 5.41 | 11.35 | 12.70 | 1.83 |
| | | | | | | | | | | | | |
| PR122 | 4 | 100YR | 61.40 | 48.20 | 49.49 | 50.31 | 52.65 | 0.027126 | 7.88 | 7.79 | 8.87 | 2.68 |
| PR122 | 4 | 100YR_FW | 61.40 | 48.20 | 49.49 | 50.31 | 52.68 | 0.027442 | 7.91 | 7.76 | 8.87 | 2.70 |


PR122 Plan: Existing Cond Qda Sin Nombre Floodway
Geom: Existing Qda Sin Nombre Flow: Qda Sin Nombre_Floodway
Qda Sin Nombre PR122
Legend
WS 100YR
WS 100YR_FW
Ground
Elevation (m)
Main Channel Distance (m)
66
64
62
60
58
56
54
52
50
48
0
200
400
600
800
1000
130
222
323
426
521
597
662
780
877
1003


PR122 Plan: Existing Cond Qda Sin Nombre Floodway
Geom: Existing Qda Sin Nombre Flow: Qda Sin Nombre_Floodway
RS = 323
.08
.04
.08
Legend
WS 100YR_FW
WS 100YR
Ground
Bank Sta
Encroachment
Elevation (m)
Station (m)
PR122 Plan: Existing Cond Qda Sin Nombre Floodway
Geom: Existing Qda Sin Nombre Flow: Qda Sin Nombre_Floodway
RS = 1003
.1
.04
.1
Legend
WS 100YR
WS 100YR_FW
Ground
Bank Sta
Elevation (m)
Station (m)

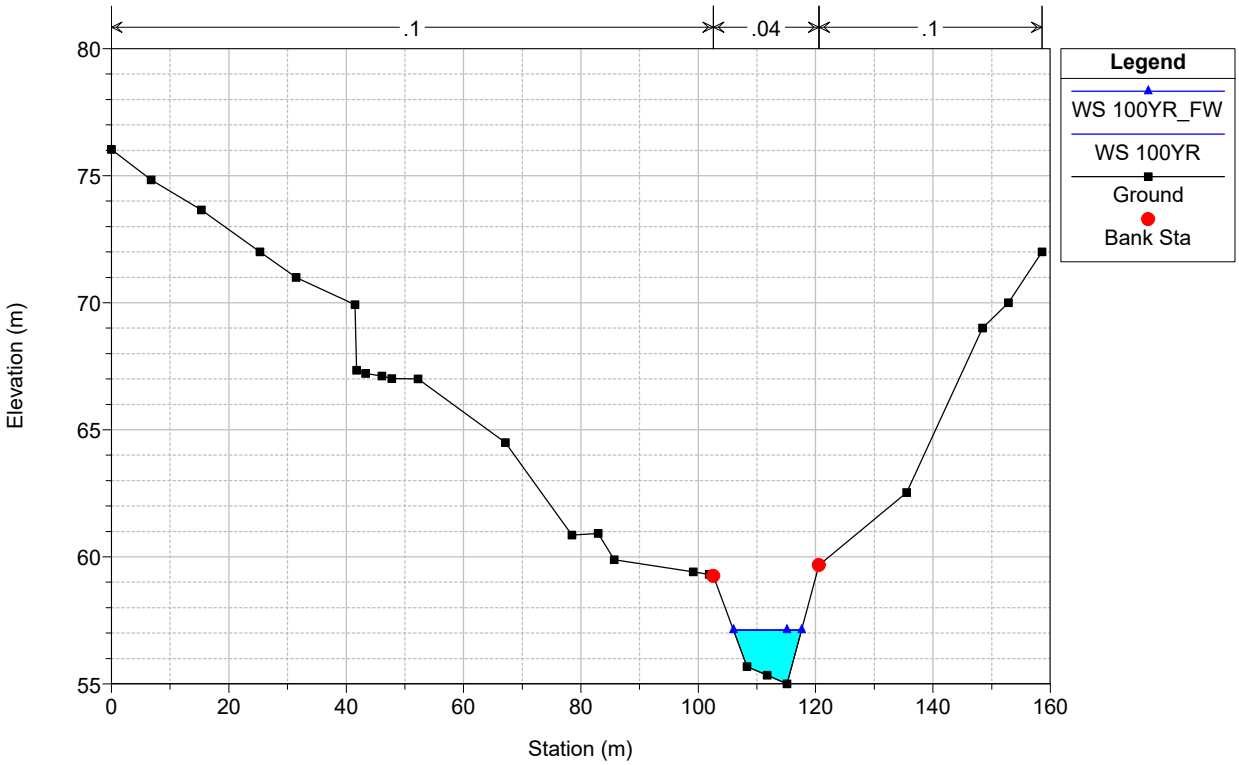

PR122 Plan: Existing Cond Qda Sin Nombre Floodway
Geom: Existing Qda Sin Nombre Flow: Qda Sin Nombre_Floodway
RS = 877
.1
.04
.1
Legend
WS 100YR
WS 100YR_FW
Ground
Bank Sta
Encroachment
Elevation (m)
Station (m)
PR122 Plan: Existing Cond Qda Sin Nombre Floodway
Geom: Existing Qda Sin Nombre Flow: Qda Sin Nombre_Floodway
RS = 780
.1
.04
.1
Legend
WS 100YR_FW
WS 100YR
Ground
Bank Sta
Elevation (m)
Station (m)


PR122 Plan: Existing Cond Qda Sin Nombre Floodway
Geom: Existing Qda Sin Nombre Flow: Qda Sin Nombre_Floodway
RS = 662
.1
.04
.1
Legend
WS 100YR
WS 100YR_FW
Ground
Bank Sta
Elevation (m)
Station (m)
PR122 Plan: Existing Cond Qda Sin Nombre Floodway
Geom: Existing Qda Sin Nombre Flow: Qda Sin Nombre_Floodway
RS = 597
.1
.04
.1
Legend
WS 100YR_FW
WS 100YR
Ground
Bank Sta
Elevation (m)
Station (m)

PR122 Plan: Existing Cond Qda Sin Nombre Floodway

Geom: Existing Qda Sin Nombre Flow: Qda Sin Nombre_Floodway

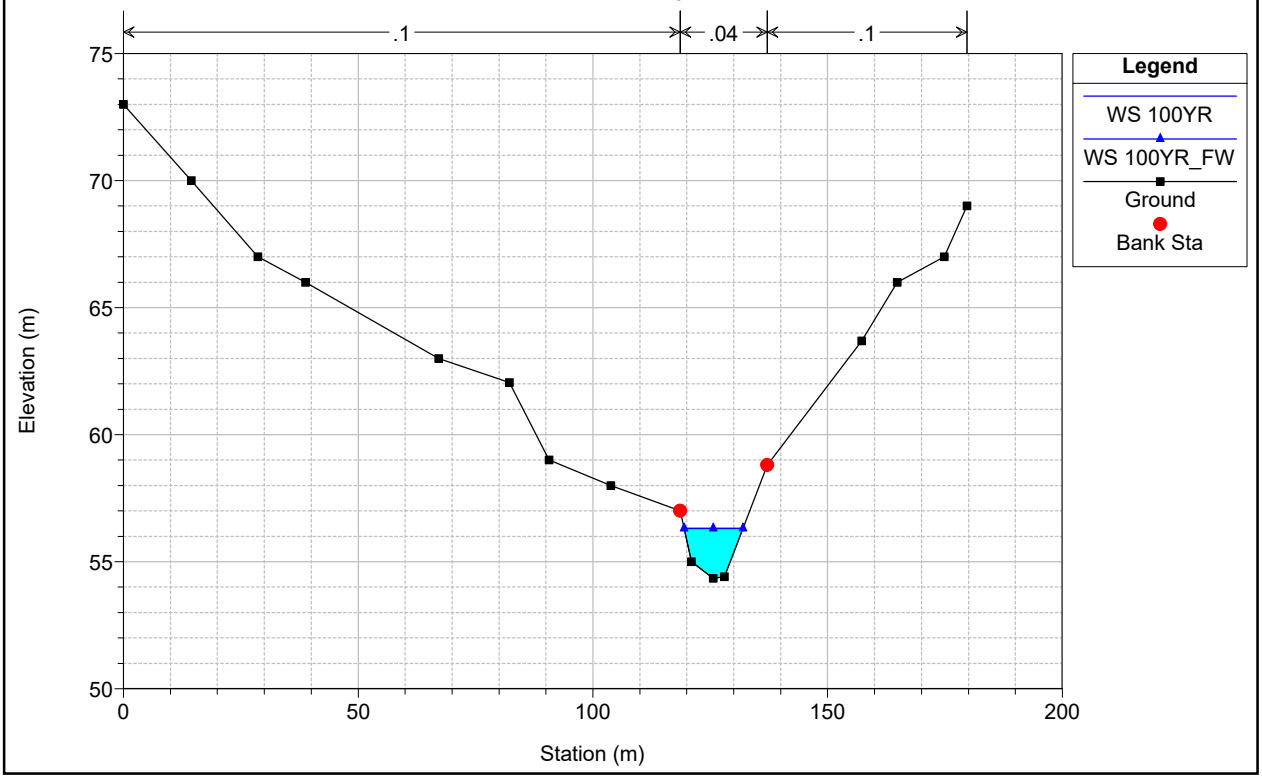
RS = 521




PR122 Plan: Existing Cond Qda Sin Nombre Floodway

Geom: Existing Qda Sin Nombre Flow: Qda Sin Nombre_Floodway

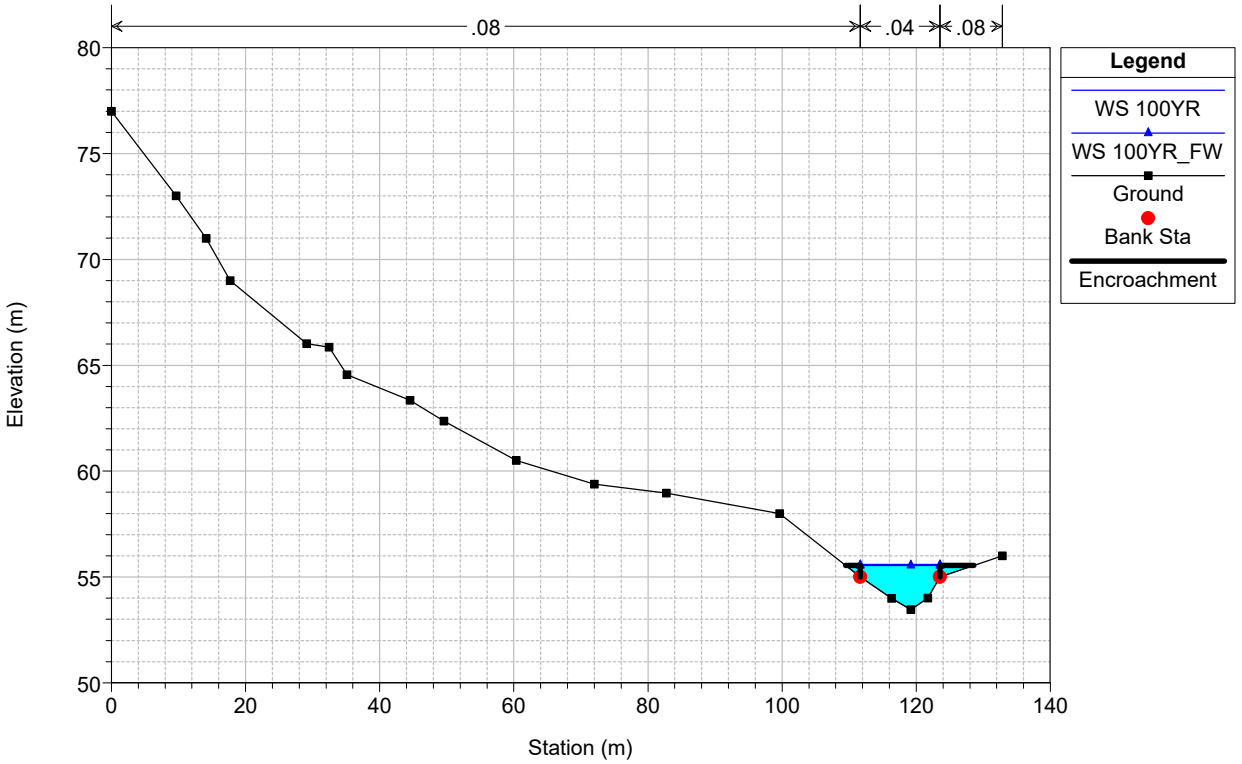
RS = 426



PR122 Plan: Existing Cond Qda Sin Nombre Floodway

Geom: Existing Qda Sin Nombre Flow: Qda Sin Nombre_Floodway

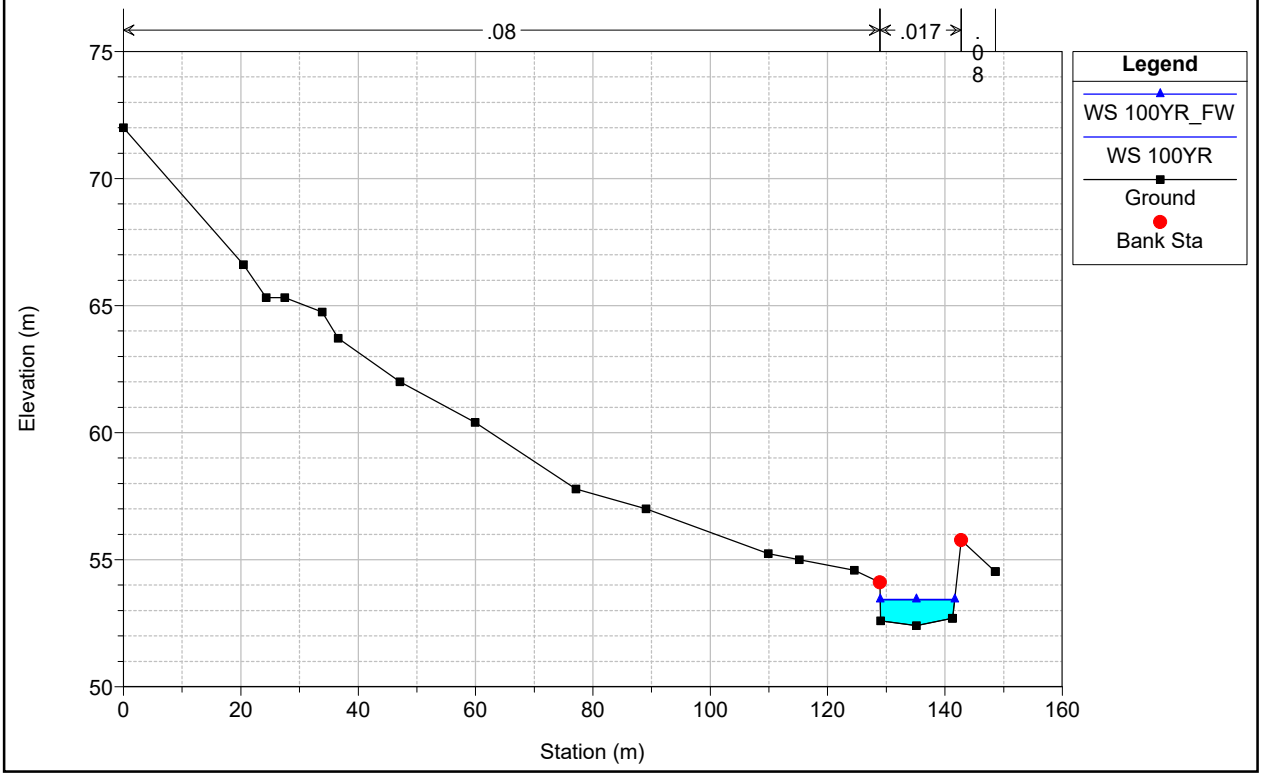
RS = 222




PR122 Plan: Existing Cond Qda Sin Nombre Floodway

Geom: Existing Qda Sin Nombre Flow: Qda Sin Nombre_Floodway

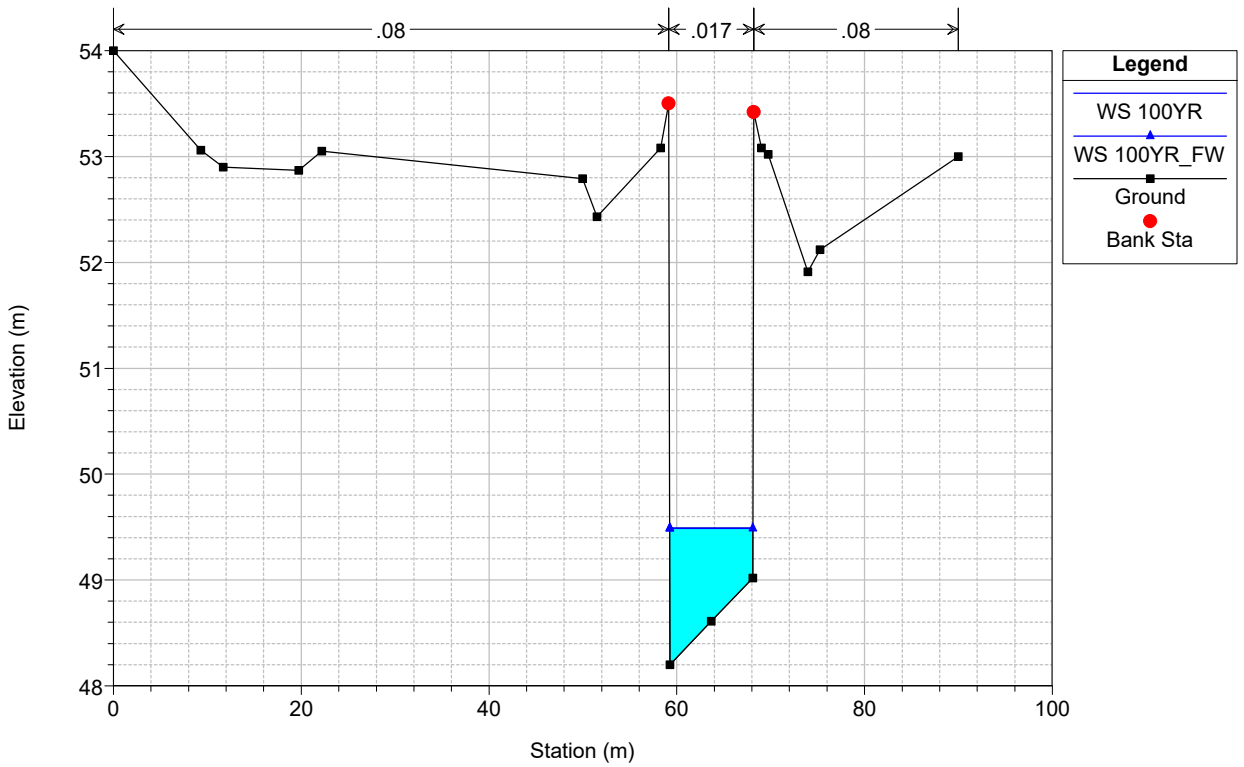
RS = 130



PR122 Plan: Existing Cond Qda Sin Nombre Floodway

Geom: Existing Qda Sin Nombre Flow: Qda Sin Nombre_Floodway

RS = 4



# Appendix D:

## *HEC-RAS Model Input and Output Report for the Proposed Condition Model*

HEC-RAS HEC-RAS 6.4.1 June 2023
U.S. Army Corps of Engineers
Hydrologic Engineering Center
609 Second Street
Davis, California

```
X     X  XXXXXX    XXXX        XXXX       XX      XXXX
X     X  X        X    X       X   X     X  X    X
X     X  X        X            X   X    X    X   X
XXXXXXX  XXXX     X       XXX  XXXX     XXXXXX    XXXX
X     X  X        X            X  X     X    X        X
X     X  X        X    X       X   X    X    X        X
X     X  XXXXXX    XXXX        X    X   X    X   XXXXX
```

PROJECT DATA
Project Title: PR122
Project File : PR122.prj
Run Date and Time: 5/23/2025 8:19:44 AM

Project in SI units

PLAN DATA

Plan Title: Prop Condition Qda Maresua 3cell R2025
Plan File : e:\WORKING\0000_BYA_WORKING\20-PR-122\HH-SCOUR\REPORT\HH\APPENDICES\Models CD\HEC-RAS PR-122\REV_MAY2025\PR-122\PR122.p10

Geometry Title: Proposed Qda_Maresua_3cell_rev2025
Geometry File : e:\WORKING\0000_BYA_WORKING\20-PR-122\HH-SCOUR\REPORT\HH\APPENDICES\Models CD\HEC-RAS PR-122\REV_MAY2025\PR-122\PR122.g06

Flow Title : Qda Maresua
Flow File : e:\WORKING\0000_BYA_WORKING\20-PR-122\HH-SCOUR\REPORT\HH\APPENDICES\Models CD\HEC-RAS PR-122\REV_MAY2025\PR-122\PR122.f02

Plan Summary Information:
Number of: Cross Sections = 11 Multiple Openings = 0
Culverts = 1 Inline Structures = 0
Bridges = 0 Lateral Structures = 0

Computational Information
Water surface calculation tolerance = 0.003
Critical depth calculation tolerance = 0.003
Maximum number of iterations = 20
Maximum difference tolerance = 0.1
Flow tolerance factor = 0.001

Computation Options
Critical depth computed at all cross sections
Conveyance Calculation Method: At breaks in n values only
Friction Slope Method: Average Conveyance
Computational Flow Regime: Mixed Flow

FLOW DATA

Flow Title: Qda Maresua
Flow File : e:\WORKING\0000_BYA_WORKING\20-PR-122\HH-SCOUR\REPORT\HH\APPENDICES\Models CD\HEC-RAS PR-122\REV_MAY2025\PR-122\PR122.f02

Flow Data (m3/s)

| River | Reach | RS | 100YR |
|---|---|---|---|
| QdaMaresua | PR122 | 557 | 33.3 |
| QdaMaresua | PR122 | 204 | 37.3 |
| QdaMaresua | PR122 | 8 | 47.1 |

Boundary Conditions

| River | Reach | Profile | Upstream | Downstream |
|---|---|---|---|---|

QdaMaresua PR122 100YR Normal S = 0.013 Normal S = 0.02

GEOMETRY DATA

Geometry Title: Proposed Qda_Maresua_3cell_rev2025
Geometry File : e:\WORKING\0000_BYA_WORKING\20-PR-122\HH-SCOUR\REPORT\HH\APPENDICES\Models CD\HEC-RAS PR-122\REV_MAY2025\PR-122\PR122.g06

CROSS SECTION

RIVER: QdaMaresua
REACH: PR122 RS: 557

INPUT
Description: XS-12
Station Elevation Data num= 27

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 104.84 | 13.5 | 99.98 | 16.53 | 97.96 | 18.53 | 97.96 | 23.35 | 100.38 |
| 24.8 | 100.43 | 26 | 100.48 | 46.2 | 100.48 | 47.4 | 100.43 | 48.85 | 100.38 |
| 75.01 | 87.3 | 84.63 | 86.96 | 96.4 | 84.73 | 100.39 | 84.03 | 107.61 | 83.61 |
| 112.3 | 83.51 | 113.61 | 83.82 | 114.3 | 83.76 | 116.7 | 81.44 | 119.37 | 81.78 |
| 121.07 | 83.35 | 125.25 | 83.8 | 129.43 | 87.14 | 132.92 | 89.8 | 137.88 | 92 |
| 145.51 | 96 | 152.18 | 98 | | | | | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .1 | 114.3 | .04 | 121.07 | .1 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 114.3 | 121.07 | 31.4 | 31.4 | .1 | .3 |

CROSS SECTION

RIVER: QdaMaresua
REACH: PR122 RS: 526

INPUT
Description: XS-13
Station Elevation Data num= 30

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 110 | 5.86 | 107.07 | 23.84 | 95.08 | 25.84 | 95.08 | 31.84 | 96.08 |
| 33.04 | 96.13 | 34.84 | 96.2 | 42.14 | 96.35 | 43.14 | 96.37 | 44.14 | 96.35 |
| 51.44 | 96.2 | 53.24 | 96.13 | 54.44 | 96.08 | 55.89 | 96.03 | 56.07 | 96.02 |
| 56.07 | 87.03 | 62.14 | 85.3 | 69.2 | 83.31 | 74.45 | 82.63 | 76.92 | 82.4 |
| 77.58 | 81.68 | 79.46 | 81.48 | 82.55 | 82.32 | 83.47 | 82.16 | 85.28 | 82.85 |
| 94.13 | 84.16 | 105.68 | 88 | 111.92 | 91 | 122.7 | 96 | 127.81 | 98 |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .1 | 76.92 | .04 | 82.55 | .1 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 76.92 | 82.55 | 18.6 | 18.6 | .1 | .3 |

CROSS SECTION

RIVER: QdaMaresua
REACH: PR122 RS: 507

INPUT
Description: XS-14
Station Elevation Data num= 27

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 108.05 | 21.49 | 93.72 | 23.49 | 93.72 | 29.49 | 94.72 | 30.69 | 94.77 |
| 32.49 | 94.84 | 39.79 | 94.96 | 40.79 | 94.97 | 41.79 | 94.95 | 49.09 | 94.81 |
| 50.89 | 94.74 | 52.09 | 94.69 | 53.54 | 94.63 | 53.72 | 94.62 | 53.72 | 88.55 |
| 56.13 | 88.31 | 61.99 | 82.544 | 63.6 | 80.96 | 67.34 | 81.39 | 69.74 | 82.55 |
| 76.1 | 82.57 | 81.33 | 82.95 | 88.73 | 84.95 | 102.31 | 90 | 111.3 | 94 |
| 117.46 | 97 | 120.79 | 98 | | | | | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .1 | 61.99 | .04 | 69.74 | .1 |

```
Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         61.99   69.74             20.4    20.4    20.4             .1       .3

CROSS SECTION


RIVER: QdaMaresua
REACH: PR122              RS: 487

INPUT
Description: XS-15
Station Elevation Data    num=      21
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0   100.1   12.26   91.92   14.26   91.92   20.26   92.92   21.46   92.93
   41.66    92.3   42.86   92.25   44.83   92.17    45.1   92.06   51.98   87.34
   56.79   83.48    58.8   81.21   60.15   80.91   62.77   80.91   64.74   81.34
   65.35   81.22      72   81.37   76.83   83.03   93.98      89   102.4      93
  114.06      98

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0      .1   56.79     .04   64.74      .1

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         56.79   64.74            109.9   109.9   109.9             .1       .3

CROSS SECTION


RIVER: QdaMaresua
REACH: PR122              RS: 377

INPUT
Description: XS-16
Station Elevation Data    num=      12
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0   87.61    16.7    84.8   32.65   80.19   58.87   79.18   61.79   77.75
   71.55   77.75   75.43   78.71   80.42   78.98   95.04   78.82  111.29   90.02
   129.2   96.83  146.53    97.8

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0      .1   58.87     .04   75.43      .1

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         58.87   75.43             99.4    99.4    99.4             .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
       0   58.87               F
   75.43  146.53               F

CULVERT


RIVER: QdaMaresua
REACH: PR122              RS: 327

INPUT
Description:
Distance from Upstream XS =   10.02
Deck/Roadway Width        =   73.94
Weir Coefficient          =    1.4
Upstream  Deck/Roadway Coordinates
    num=      30
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
       0   91.55            3.05   91.42            6.88   91.28
   10.71   91.13           18.37   90.87           22.19   90.74
   26.02   90.62           33.68    90.4           37.51    90.3
   41.34   90.21           45.16   90.12           48.99   90.03
   52.82   89.95           56.65   89.88           60.48   89.82
    64.3   89.75           71.96   89.65           79.62   89.57
   83.44   89.54           87.27   89.51           94.93   89.47
   98.76   89.46          106.41   89.46          110.24   89.47
  121.73   89.53          125.55   89.56          133.21   89.64
  140.87   89.74          144.69    89.8          146.53   89.84

Upstream Bridge Cross Section Data
Station Elevation Data    num=      12
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
```

```
       0   87.61    16.7    84.8   32.65   80.19   58.87   79.18   61.79   77.75
   71.55   77.75   75.43   78.71   80.42   78.98   95.04   78.82  111.29   90.02
   129.2   96.83  146.53    97.8

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0      .1   58.87     .04   75.43      .1

Bank Sta: Left   Right    Coeff Contr.   Expan.
         58.87   75.43            .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
       0   58.87               F
   75.43  146.53               F

Downstream  Deck/Roadway Coordinates
    num=      31
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
       0   90.73            3.39   90.62            7.22   90.51
   11.04    90.4           14.87    90.3           26.36   90.03
   30.18   89.95           34.01   89.88           37.84   89.82
   41.67   89.75           49.33   89.65           53.15   89.61
   56.98   89.57           64.64   89.51           68.47   89.49
   72.29   89.47           76.12   89.46           83.78   89.46
   87.61   89.47           91.43   89.49           99.09   89.53
  102.92   89.56          110.58   89.64           114.4   89.69
  118.23   89.74          122.06    89.8          129.72   89.94
  133.54   90.02          137.37    90.1           141.2   90.19
  151.02   90.43

Downstream Bridge Cross Section Data
Station Elevation Data    num=      20
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0      87   7.831      86  19.483      85  26.216  83.419  37.194  80.695
  43.918  79.719  46.191  78.297  48.726  78.069  55.824  77.718  58.216  77.519
   61.58  73.769  70.726  73.769  73.536  76.632  74.162  76.572   82.03  76.815
  94.313   77.06 100.656  77.271 110.969  80.465 128.527  81.838 151.024  84.003

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0      .1  58.216     .04   82.03      .1

Bank Sta: Left   Right    Coeff Contr.   Expan.
        58.216  73.536            .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
       0   58.95               F
   73.64 151.024               F

Upstream Embankment side slope             =       0 horiz. to 1.0 vertical
Downstream Embankment side slope           =       0 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow =     .98
Elevation at which weir flow begins        =
Energy head used in spillway design        =
Spillway height used in design             =
Weir crest shape                           = Broad Crested

Number of Culverts =  2

Culvert Name     Shape      Rise    Span
Culvert #1           Box    3.05    3.05
FHWA Chart # 8 - flared wingwalls
FHWA Scale # 1 - Wingwall flared 30 to 75 deg.
Solution Criteria = Highest U.S. EG
Culvert Upstrm Dist  Length    Top n  Bottom n  Depth Blocked  Entrance Loss Coef   Exit Loss Coef
              10.02   73.94     .013     .013        0                  .4                1
Number of Barrels =  2
Upstream   Elevation =  77.55
Centerline Stations
    Sta.    Sta.
   63.02   70.32
Downstream Elevation =  76.07
Centerline Stations
    Sta.    Sta.
   62.06   69.36

Culvert Name     Shape      Rise    Span
Culvert #2           Box    3.05    3.05
FHWA Chart # 8 - flared wingwalls
FHWA Scale # 1 - Wingwall flared 30 to 75 deg.
```

```
Solution Criteria = Highest U.S. EG
Culvert Upstrm Dist  Length    Top n  Bottom n  Depth Blocked  Entrance Loss Coef   Exit Loss Coef
              10.02   73.94     .013     .013        0                  .4                1
Upstream   Elevation =  77.25
           Centerline Station =  66.67
Downstream Elevation =  75.77
           Centerline Station =  65.71

CROSS SECTION


RIVER: QdaMaresua
REACH: PR122              RS: 278

INPUT
Description: XS-17
Station Elevation Data    num=      20
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0      87   7.831      86  19.483      85  26.216  83.419  37.194  80.695
  43.918  79.719  46.191  78.297  48.726  78.069  55.824  77.718  58.216  77.519
   61.58  73.769  70.726  73.769  73.536  76.632  74.162  76.572   82.03  76.815
  94.313   77.06 100.656  77.271 110.969  80.465 128.527  81.838 151.024  84.003

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0      .1  58.216     .04   82.03      .1

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        58.216  73.536             16.3    16.3    16.3             .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
       0   58.95               F
   73.64 151.024               F

CROSS SECTION


RIVER: QdaMaresua
REACH: PR122              RS: 262

INPUT
Description:
Station Elevation Data    num=      30
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0  86.282   7.579  85.338   9.936  85.123  18.855  84.252  25.379  82.853
  26.813   82.53  34.112  80.773  35.997  80.303  42.511  79.204  44.551   78.09
  44.708  78.009  47.166   77.77  50.251   77.57  54.029  77.423  55.648  77.315
  60.427  73.769  69.845  73.769  77.161   76.42  80.934  76.497  83.728  76.527
  86.389  76.907  89.947  77.018  93.013  77.227  99.259  77.716  100.24  78.003
 107.525  79.901 109.401  80.367 126.673  81.573 137.615  82.485 142.843  83.607

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0      .1  55.648     .04  77.161      .1

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        55.648  77.161              9.1     9.1     9.1              .1       .3

CROSS SECTION


RIVER: QdaMaresua
REACH: PR122              RS: 253

INPUT
Description:
Station Elevation Data    num=      32
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0  85.942    7.46  85.026   9.781  84.807   18.56  83.898  24.981  82.585
  26.394  82.283  33.578  80.579  35.433  80.116  41.845   78.96  43.854  77.943
  44.008  77.871  46.428  77.628  49.465  77.408  53.183  77.283  57.013  77.063
  58.762  76.716  63.233   74.48  69.118   74.48  72.634  76.238  72.736  76.231
  80.417  76.344  83.189  76.362  85.828  76.897  89.358  77.028  92.401  77.305
  98.598  77.927  99.571  78.203 106.799  79.916  108.66  80.323 125.797  81.447
 136.652  82.285   140.2  83.422

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0      .1  58.762     .04  72.736      .1
```

```
Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        58.762  72.736              5.6     5.6     5.6             .1       .3

CROSS SECTION


RIVER: QdaMaresua
REACH: PR122              RS: 247

INPUT
Description:
Station Elevation Data    num=      33
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0  85.737   7.388  84.837   9.687  84.616  18.381  83.684  24.741  82.423
   26.14  82.134  33.255  80.462  35.092  80.002  41.443  78.812  43.431  77.854
  43.584  77.788  45.981  77.542  48.988   77.31  52.671  77.198  56.465  77.001
  58.305  76.671  59.422  76.005  62.472   74.48   69.03   74.48  72.407  76.168
   72.46  76.165  80.104  76.252  82.862  76.263  85.489  76.891  89.002  77.033
   92.03  77.353  98.198  78.055  99.166  78.324 106.359  79.925 108.211  80.296
 125.266  81.371  136.07  82.164     139   83.31

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0      .1  59.422     .04  72.407      .1

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        59.422  72.407             42.5    42.5    42.5             .1       .3

CROSS SECTION


RIVER: QdaMaresua
REACH: PR122              RS: 204

INPUT
Description: XS-18
Station Elevation Data    num=      18
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0      84    8.89      83   23.99   80.87   30.52   79.47   39.86    77.1
   44.96   76.48   53.51   76.48   57.19   74.08   61.01   73.73   62.61   73.67
   65.23    75.7    80.1   75.42   82.62   76.84   85.99   77.08   95.74   79.35
  102.64      80  131.14   81.14  141.73   82.36

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0      .1   53.51     .04   65.23      .1

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         53.51   65.23            196.1   196.1   196.1             .1       .3

CROSS SECTION


RIVER: QdaMaresua
REACH: PR122              RS: 8

INPUT
Description: XS-19
Station Elevation Data    num=      17
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0   77.44    6.41   76.87    12.5   75.68   18.19   72.04   20.88   69.64
   22.87   69.66   24.74   70.12   25.49   71.62   30.22   71.65   33.41   71.63
   35.49    72.8    44.9   72.29   55.12   73.14   62.45   74.29   68.38   75.22
      82      78   97.81      80

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0      .1   18.19     .04   25.49      .1

Bank Sta: Left   Right    Coeff Contr.   Expan.
         18.19   25.49             .1       .3


SUMMARY OF MANNING'S N VALUES

River:QdaMaresua

      Reach          River Sta.       n1        n2        n3
```

| | | | | |
|---|---|---|---|---|
| PR122 | 557 | .1 | .04 | .1 |
| PR122 | 526 | .1 | .04 | .1 |
| PR122 | 507 | .1 | .04 | .1 |
| PR122 | 487 | .1 | .04 | .1 |
| PR122 | 377 | .1 | .04 | .1 |
| PR122 | 327 | Culvert | | |
| PR122 | 278 | .1 | .04 | .1 |
| PR122 | 262 | .1 | .04 | .1 |
| PR122 | 253 | .1 | .04 | .1 |
| PR122 | 247 | .1 | .04 | .1 |
| PR122 | 204 | .1 | .04 | .1 |
| PR122 | 8 | .1 | .04 | .1 |

SUMMARY OF REACH LENGTHS

River: QdaMaresua

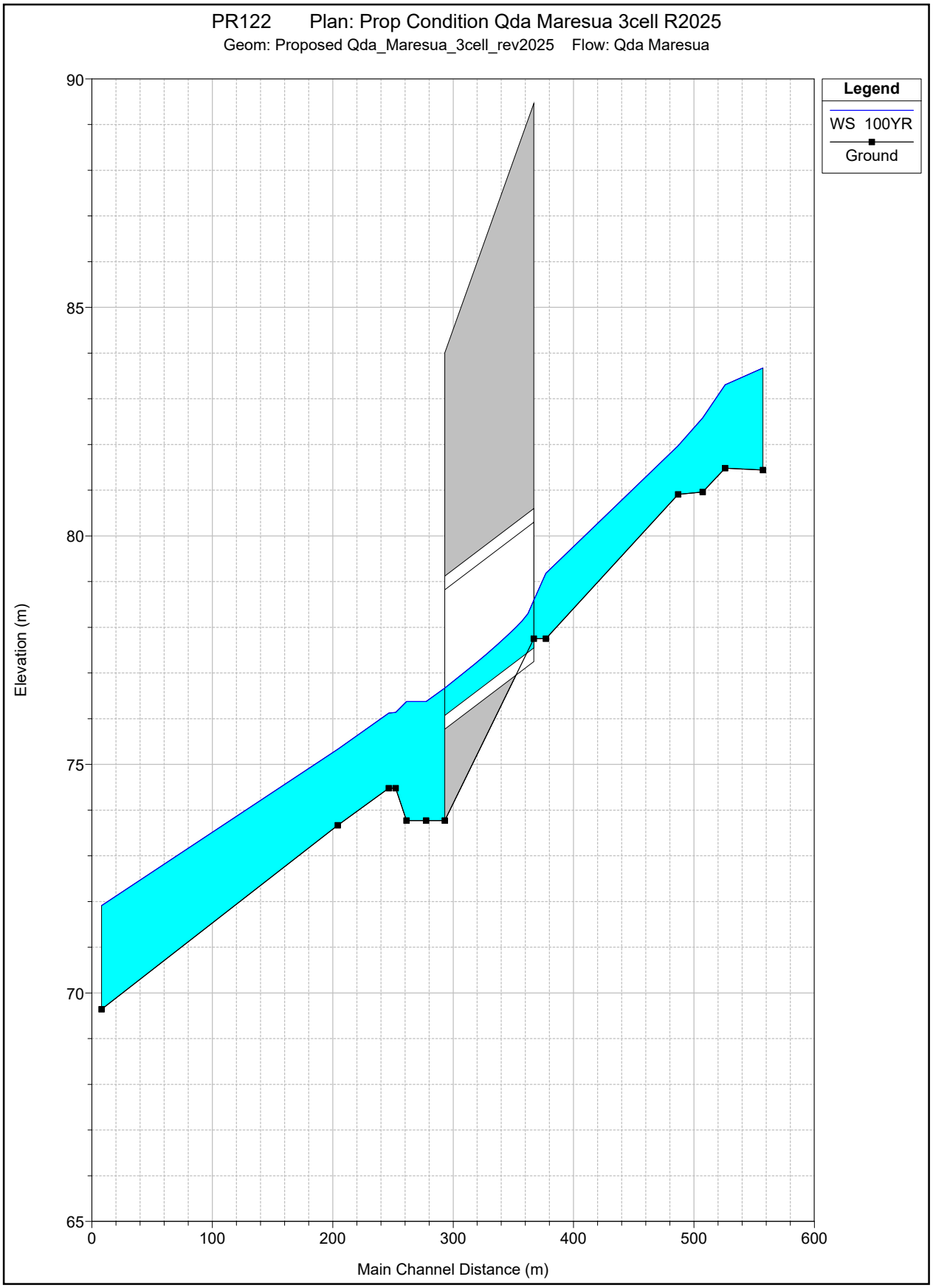
| Reach | River Sta. | Left | Channel | Right |
|---|---|---|---|---|
| PR122 | 557 | 31.4 | 31.4 | 31.4 |
| PR122 | 526 | 18.6 | 18.6 | 18.6 |
| PR122 | 507 | 20.4 | 20.4 | 20.4 |
| PR122 | 487 | 109.9 | 109.9 | 109.9 |
| PR122 | 377 | 99.4 | 99.4 | 99.4 |
| PR122 | 327 | Culvert | | |
| PR122 | 278 | 16.3 | 16.3 | 16.3 |
| PR122 | 262 | 9.1 | 9.1 | 9.1 |
| PR122 | 253 | 5.6 | 5.6 | 5.6 |
| PR122 | 247 | 42.5 | 42.5 | 42.5 |
| PR122 | 204 | 196.1 | 196.1 | 196.1 |
| PR122 | 8 | | | |

SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS
River: QdaMaresua

| Reach | River Sta. | Contr. | Expan. |
|---|---|---|---|
| PR122 | 557 | .1 | .3 |
| PR122 | 526 | .1 | .3 |
| PR122 | 507 | .1 | .3 |
| PR122 | 487 | .1 | .3 |
| PR122 | 377 | .3 | .5 |
| PR122 | 327 | Culvert | |
| PR122 | 278 | .3 | .5 |
| PR122 | 262 | .1 | .3 |
| PR122 | 253 | .1 | .3 |
| PR122 | 247 | .1 | .3 |
| PR122 | 204 | .1 | .3 |
| PR122 | 8 | .1 | .3 |

HEC-RAS Plan: Prop Cond Qda Maresua 3cell R2025 River: QdaMaresua Reach: PR122 Profile: 100YR

| Reach | River Sta | Profile | Q Total | Min Ch El | W.S. Elev | Crit W.S. | E.G. Elev | E.G. Slope | Vel Chnl | Flow Area | Top Width | Froude # Chl |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | (m3/s) | (m) | (m) | (m) | (m) | (m/m) | (m/s) | (m2) | (m) | |
| PR122 | 557 | 100YR | 33.30 | 81.44 | 83.67 | 83.58 | 84.23 | 0.013566 | 3.31 | 11.06 | 16.10 | 0.87 |
| PR122 | 526 | 100YR | 33.30 | 81.48 | 83.31 | 83.31 | 83.81 | 0.011819 | 3.39 | 15.33 | 19.17 | 0.88 |
| PR122 | 507 | 100YR | 33.30 | 80.96 | 82.58 | 82.84 | 83.45 | 0.029780 | 4.11 | 8.25 | 14.36 | 1.29 |
| PR122 | 487 | 100YR | 33.30 | 80.91 | 81.97 | 82.19 | 82.74 | 0.037681 | 4.34 | 11.40 | 15.63 | 1.46 |
| PR122 | 377 | 100YR | 33.30 | 77.75 | 79.18 | 78.70 | 79.33 | 0.003723 | 1.69 | 19.76 | 36.73 | 0.49 |
| PR122 | 327 | | Culvert | | | | | | | | | |
| PR122 | 278 | 100YR | 33.30 | 73.77 | 76.37 | 74.83 | 76.44 | 0.000855 | 1.10 | 30.19 | 14.04 | 0.24 |
| PR122 | 262 | 100YR | 33.30 | 73.77 | 76.37 | 74.77 | 76.41 | 0.000549 | 0.87 | 38.48 | 20.12 | 0.20 |
| PR122 | 253 | 100YR | 33.30 | 74.48 | 76.14 | 75.75 | 76.38 | 0.006371 | 2.19 | 15.24 | 12.51 | 0.63 |
| PR122 | 247 | 100YR | 33.30 | 74.48 | 76.12 | 75.69 | 76.34 | 0.005427 | 2.06 | 16.16 | 13.09 | 0.59 |
| PR122 | 204 | 100YR | 37.30 | 73.67 | 75.33 | 75.33 | 75.91 | 0.017024 | 3.38 | 11.02 | 9.48 | 1.00 |
| PR122 | 8 | 100YR | 47.10 | 69.64 | 71.91 | 72.00 | 72.65 | 0.016235 | 3.85 | 14.18 | 15.57 | 0.95 |

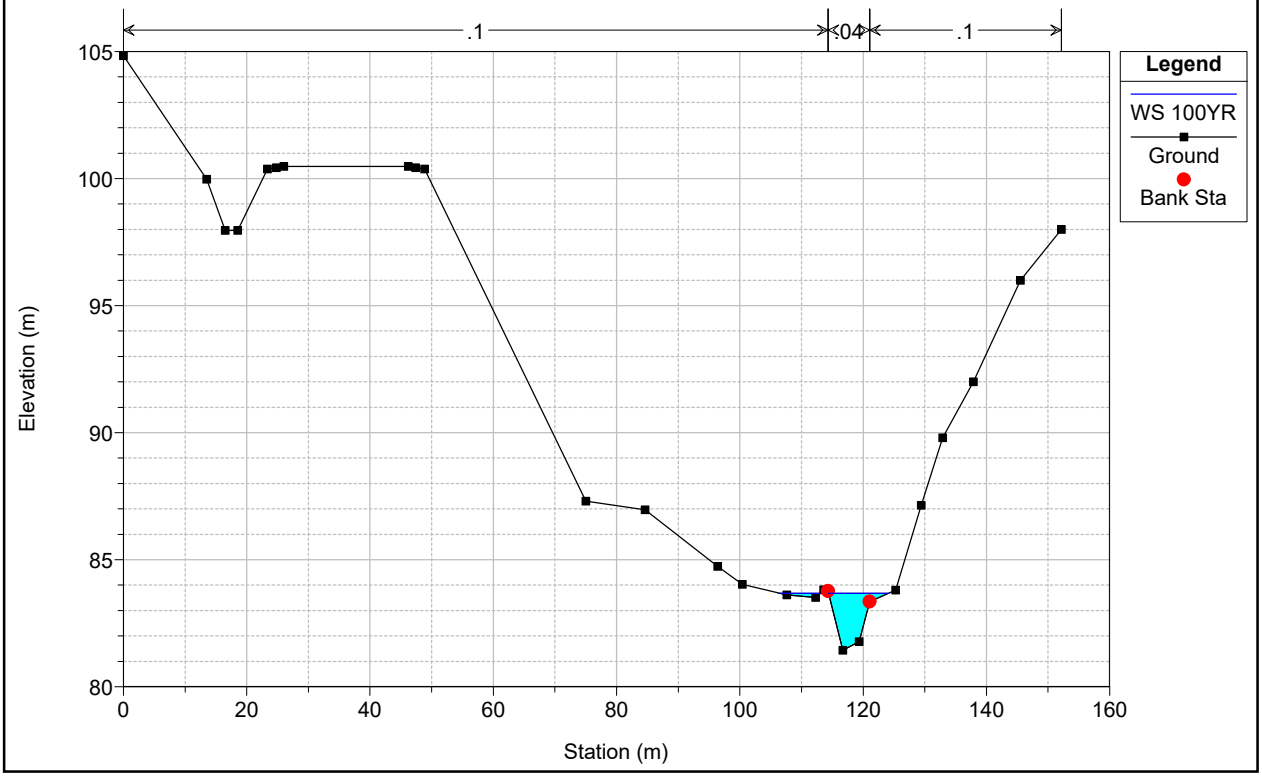

PR122 Plan: Prop Condition Qda Maresua 3cell R2025
Geom: Proposed Qda_Maresua_3cell_rev2025 Flow: Qda Maresua
Legend
WS 100YR
Ground
Elevation (m)
90
85
80
75
70
65
0
100
200
300
400
500
600
Main Channel Distance (m)

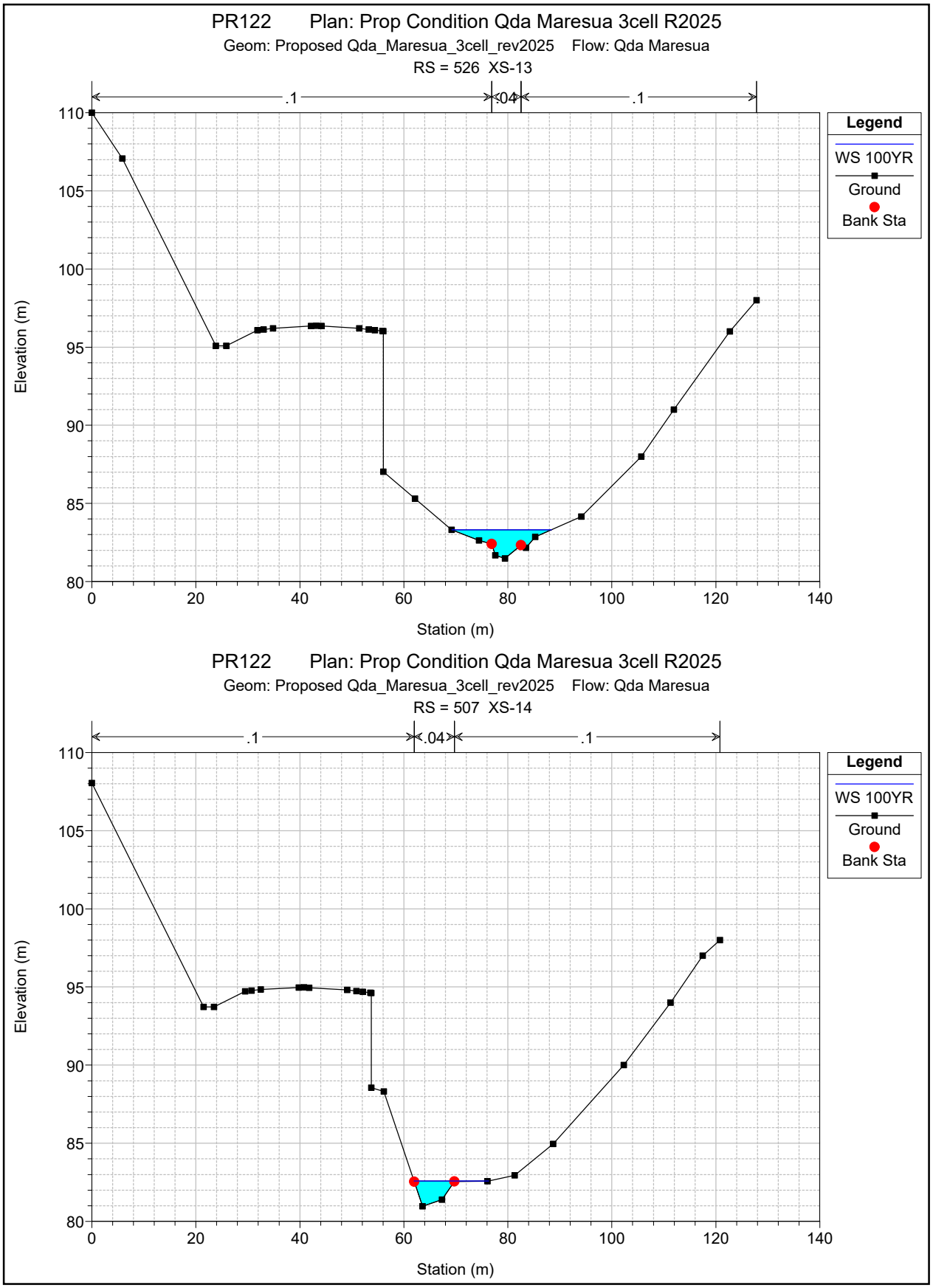
No Data for Plot

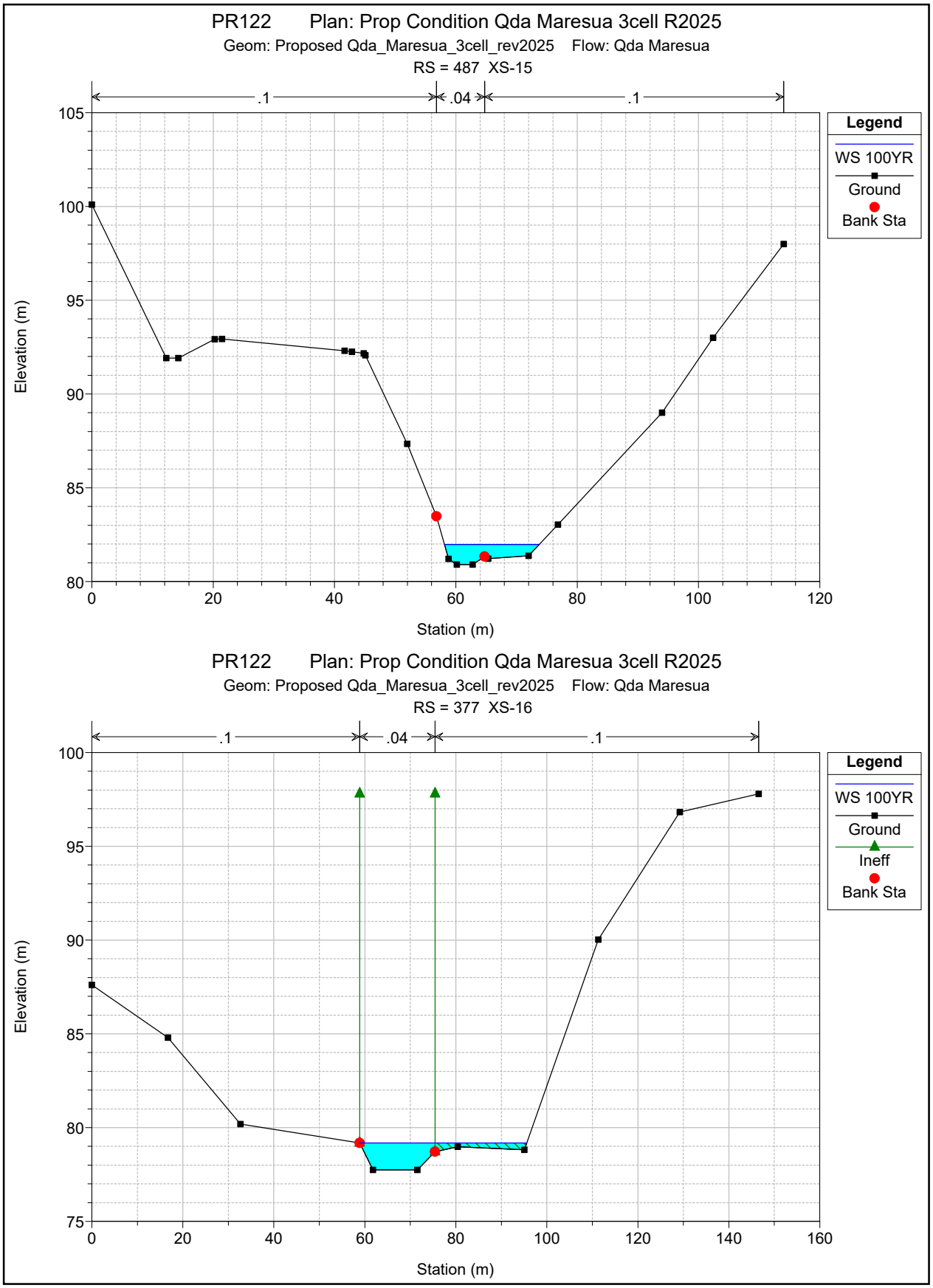
PR122 Plan: Prop Condition Qda Maresua 3cell R2025

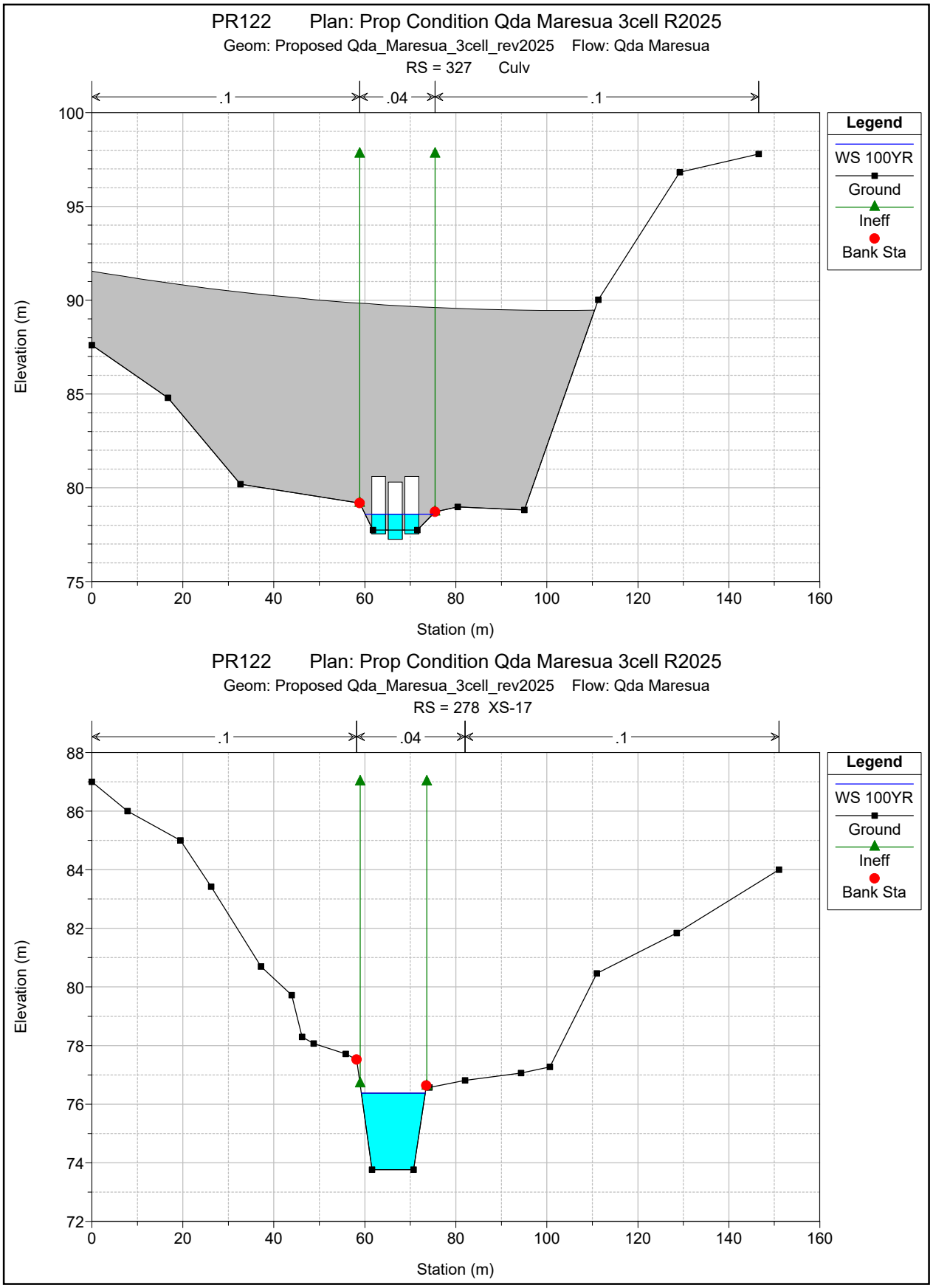
Geom: Proposed Qda_Maresua_3cell_rev2025 Flow: Qda Maresua

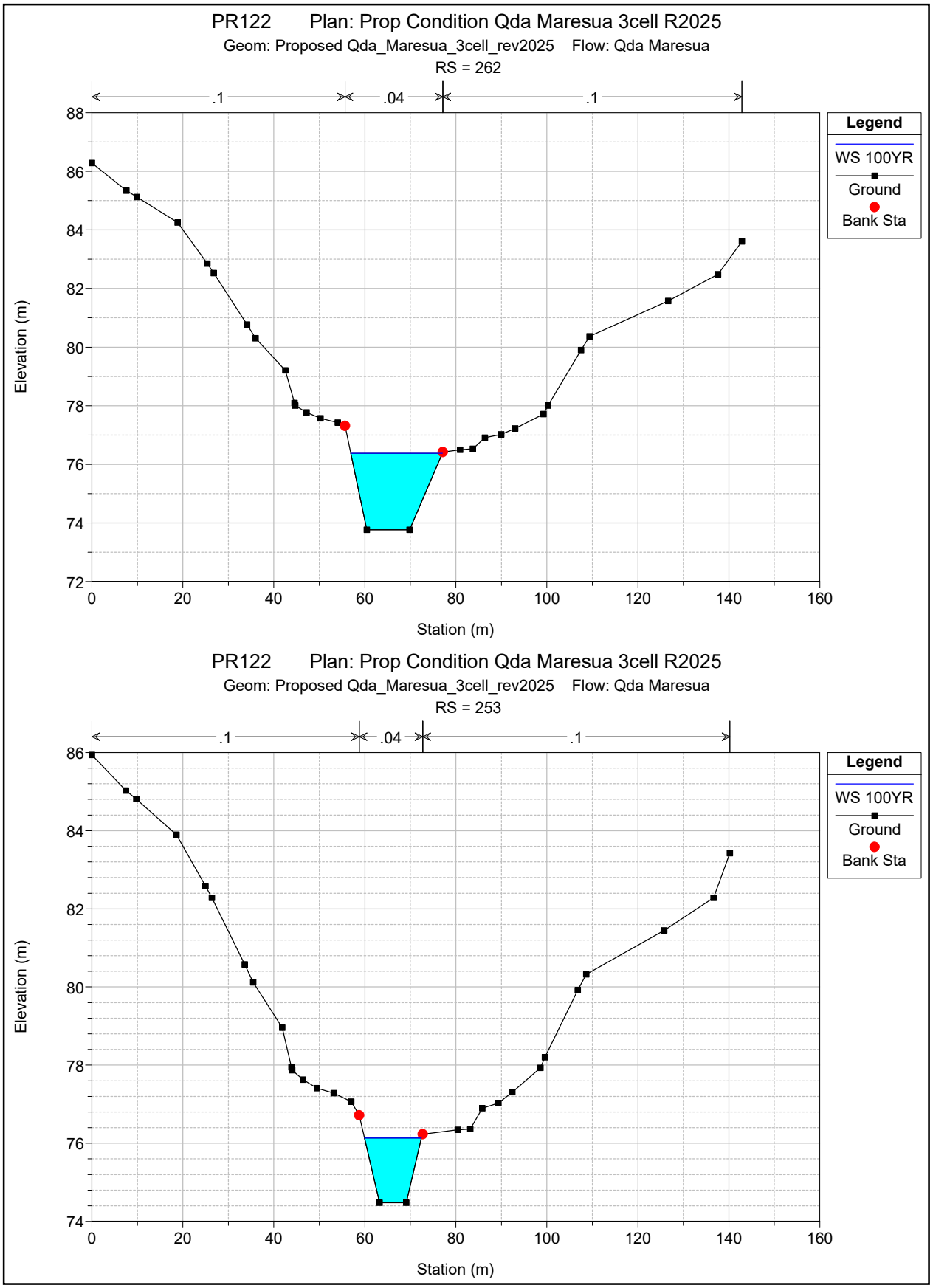
RS = 557 XS-12

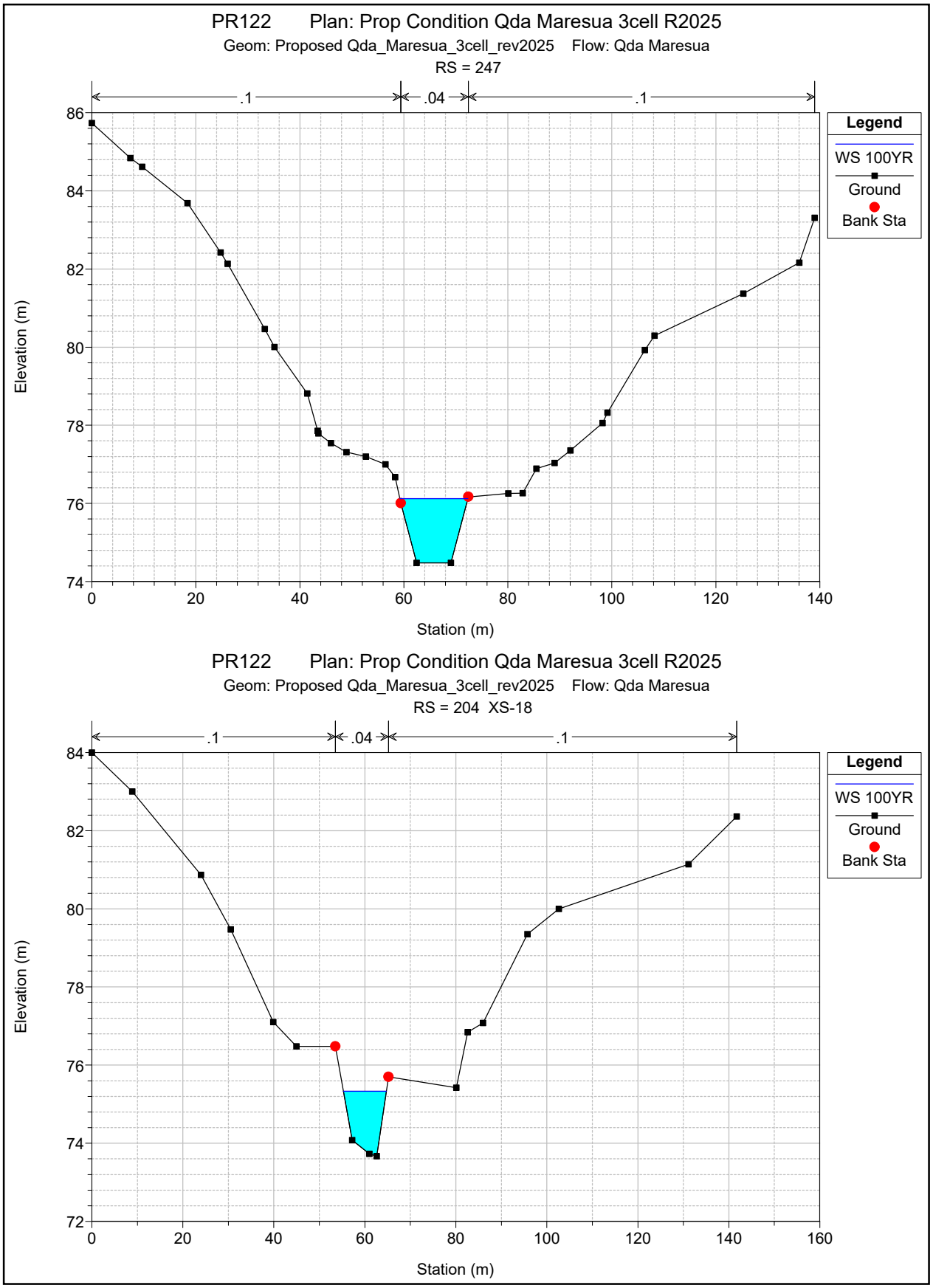



PR122 Plan: Prop Condition Qda Maresua 3cell R2025
Geom: Proposed Qda_Maresua_3cell_rev2025 Flow: Qda Maresua
RS = 526 XS-13
.1
.04
.1
Legend
WS 100YR
Ground
Bank Sta
Elevation (m)
Station (m)
PR122 Plan: Prop Condition Qda Maresua 3cell R2025
Geom: Proposed Qda_Maresua_3cell_rev2025 Flow: Qda Maresua
RS = 507 XS-14
.1
.04
.1
Legend
WS 100YR
Ground
Bank Sta
Elevation (m)
Station (m)


PR122 Plan: Prop Condition Qda Maresua 3cell R2025
Geom: Proposed Qda_Maresua_3cell_rev2025 Flow: Qda Maresua
RS = 487 XS-15
.1
.04
.1
Legend
WS 100YR
Ground
Bank Sta
Elevation (m)
Station (m)
105
100
95
90
85
80
0
20
40
60
80
100
120
PR122 Plan: Prop Condition Qda Maresua 3cell R2025
Geom: Proposed Qda_Maresua_3cell_rev2025 Flow: Qda Maresua
RS = 377 XS-16
.1
.04
.1
Legend
WS 100YR
Ground
Ineff
Bank Sta
Elevation (m)
Station (m)
100
95
90
85
80
75
0
20
40
60
80
100
120
140
160


PR122 Plan: Prop Condition Qda Maresua 3cell R2025
Geom: Proposed Qda_Maresua_3cell_rev2025 Flow: Qda Maresua
RS = 327 Culv
.1
.04
.1
Legend
WS 100YR
Ground
Ineff
Bank Sta
Elevation (m)
Station (m)
PR122 Plan: Prop Condition Qda Maresua 3cell R2025
Geom: Proposed Qda_Maresua_3cell_rev2025 Flow: Qda Maresua
RS = 278 XS-17
.1
.04
.1
Legend
WS 100YR
Ground
Ineff
Bank Sta
Elevation (m)
Station (m)

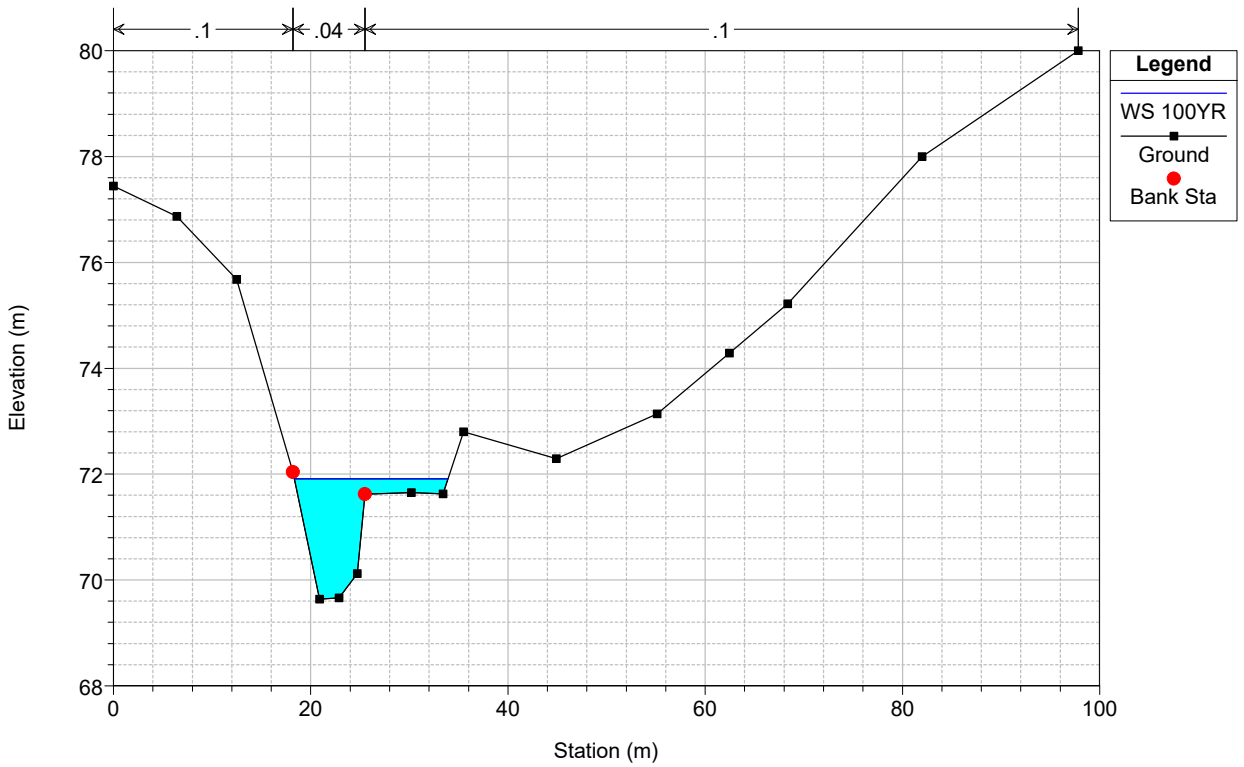

PR122 Plan: Prop Condition Qda Maresua 3cell R2025
Geom: Proposed Qda_Maresua_3cell_rev2025 Flow: Qda Maresua
RS = 262
.1
.04
.1
Legend
WS 100YR
Ground
Bank Sta
Elevation (m)
Station (m)
PR122 Plan: Prop Condition Qda Maresua 3cell R2025
Geom: Proposed Qda_Maresua_3cell_rev2025 Flow: Qda Maresua
RS = 253
.1
.04
.1
Legend
WS 100YR
Ground
Bank Sta
Elevation (m)
Station (m)


PR122 Plan: Prop Condition Qda Maresua 3cell R2025
Geom: Proposed Qda_Maresua_3cell_rev2025 Flow: Qda Maresua
RS = 247
.1
.04
.1
Legend
WS 100YR
Ground
Bank Sta
Elevation (m)
Station (m)
PR122 Plan: Prop Condition Qda Maresua 3cell R2025
Geom: Proposed Qda_Maresua_3cell_rev2025 Flow: Qda Maresua
RS = 204 XS-18
.1
.04
.1
Legend
WS 100YR
Ground
Bank Sta
Elevation (m)
Station (m)

PR122 Plan: Prop Condition Qda Maresua 3cell R2025

Geom: Proposed Qda_Maresua_3cell_rev2025 Flow: Qda Maresua

RS = 8 XS-19



HEC-RAS HEC-RAS 6.4.1 June 2023
U.S. Army Corps of Engineers
Hydrologic Engineering Center
609 Second Street
Davis, California

```
X     X  XXXXXX    XXXX        XXXX       XX      XXXX
X     X  X        X    X       X   X     X  X    X
X     X  X        X            X   X    X    X   X
XXXXXXX  XXXX     X       XXX  XXXX     XXXXXX    XXXX
X     X  X        X            X  X     X    X        X
X     X  X        X    X       X   X    X    X        X
X     X  XXXXXX    XXXX        X    X   X    X   XXXXX
```

PROJECT DATA
Project Title: PR122
Project File : PR122.prj
Run Date and Time: 5/26/2025 4:09:22 PM

Project in SI units

PLAN DATA

Plan Title: Prop Condition Qda Maresua Floodwa R2025
Plan File : e:\WORKING\0000_BYA_WORKING\20-PR-122\HH-SCOUR\REPORT\HH\APPENDICES\Models CD\HEC-RAS PR-122\REV_MAY2025\PR-122\PR122.p12

Geometry Title: Proposed Qda_Maresua_3cell_rev2025
Geometry File : e:\WORKING\0000_BYA_WORKING\20-PR-122\HH-SCOUR\REPORT\HH\APPENDICES\Models CD\HEC-RAS PR-122\REV_MAY2025\PR-122\PR122.g06

Flow Title : Qda Maresua_Floodway
Flow File : e:\WORKING\0000_BYA_WORKING\20-PR-122\HH-SCOUR\REPORT\HH\APPENDICES\Models CD\HEC-RAS PR-122\REV_MAY2025\PR-122\PR122.f03

Plan Summary Information:
Number of: Cross Sections = 11 Multiple Openings = 0
Culverts = 1 Inline Structures = 0
Bridges = 0 Lateral Structures = 0

Computational Information
Water surface calculation tolerance = 0.003
Critical depth calculation tolerance = 0.003
Maximum number of iterations = 20
Maximum difference tolerance = 0.1
Flow tolerance factor = 0.001

Computation Options
Critical depth computed at all cross sections
Conveyance Calculation Method: At breaks in n values only
Friction Slope Method: Average Conveyance
Computational Flow Regime: Supercritical Flow

Encroachment Data
Equal Conveyance = True
Left Offset = 0
Right Offset = 0

River = QdaMaresua Reach = PR122

| RS | Profile | Method | Value1 | Value2 |
|---|---|---|---|---|
| 557 | 100YR_FW | 1 | 114.3 | 121.07 |
| 526 | 100YR_FW | 1 | 74.75 | 85.28 |
| 507 | 100YR_FW | 1 | 61.99 | 69.74 |
| 487 | 100YR_FW | 1 | 56.79 | 72 |
| 377 | 100YR_FW | 1 | 58.87 | 75.43 |
| 278 | 100YR_FW | 1 | 58.216 | 73.536 |
| 262 | 100YR_FW | 1 | 55.648 | 77.161 |
| 253 | 100YR_FW | 1 | 58.762 | 72.736 |
| 247 | 100YR_FW | 1 | 59.422 | 72.407 |
| 204 | 100YR_FW | 1 | 53.51 | 65.23 |
| 8 | 100YR_FW | 1 | 18.19 | 25.49 |

FLOW DATA

Flow Title: Qda Maresua_Floodway
Flow File : e:\WORKING\0000_BYA_WORKING\20-PR-122\HH-SCOUR\REPORT\HH\APPENDICES\Models CD\HEC-RAS PR-122\REV_MAY2025\PR-122\PR122.f03

Flow Data (m3/s)

| River | Reach | RS | 100YR | 100YR_FW |
|---|---|---|---|---|
| QdaMaresua | PR122 | 557 | 33.3 | 33.3 |
| QdaMaresua | PR122 | 204 | 37.3 | 37.3 |
| QdaMaresua | PR122 | 8 | 47.1 | 47.1 |

Boundary Conditions

| River | Reach | Profile | Upstream | Downstream |
|---|---|---|---|---|
| QdaMaresua | PR122 | 100YR | Normal S = 0.013 | Normal S = 0.02 |
| QdaMaresua | PR122 | 100YR_FW | Normal S = 0.013 | Normal S = 0.02 |

GEOMETRY DATA

Geometry Title: Proposed Qda_Maresua_3cell_rev2025
Geometry File : e:\WORKING\0000_BYA_WORKING\20-PR-122\HH-SCOUR\REPORT\HH\APPENDICES\Models CD\HEC-RAS PR-122\REV_MAY2025\PR-122\PR122.g06

CROSS SECTION

RIVER: QdaMaresua
REACH: PR122 RS: 557

INPUT
Description: XS-12
Station Elevation Data num= 27

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 104.84 | 13.5 | 99.98 | 16.53 | 97.96 | 18.53 | 97.96 | 23.35 | 100.38 |
| 24.8 | 100.43 | 26 | 100.48 | 46.2 | 100.48 | 47.4 | 100.43 | 48.85 | 100.38 |
| 75.01 | 87.3 | 84.63 | 86.96 | 96.4 | 84.73 | 100.39 | 84.03 | 107.61 | 83.61 |
| 112.3 | 83.51 | 113.61 | 83.82 | 114.3 | 83.76 | 116.7 | 81.44 | 119.37 | 81.78 |
| 121.07 | 83.35 | 125.25 | 83.8 | 129.43 | 87.14 | 132.92 | 89.8 | 137.88 | 92 |
| 145.51 | 96 | 152.18 | 98 | | | | | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .1 | 114.3 | .04 | 121.07 | .1 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 114.3 | 121.07 | 31.4 | 31.4 | .1 | .3 |

CROSS SECTION

RIVER: QdaMaresua
REACH: PR122 RS: 526

INPUT
Description: XS-13
Station Elevation Data num= 30

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 110 | 5.86 | 107.07 | 23.84 | 95.08 | 25.84 | 95.08 | 31.84 | 96.08 |
| 33.04 | 96.13 | 34.84 | 96.2 | 42.14 | 96.35 | 43.14 | 96.37 | 44.14 | 96.35 |
| 51.44 | 96.2 | 53.24 | 96.13 | 54.44 | 96.08 | 55.89 | 96.03 | 56.07 | 96.02 |
| 56.07 | 87.03 | 62.14 | 85.3 | 69.2 | 83.31 | 74.45 | 82.63 | 76.92 | 82.4 |
| 77.58 | 81.68 | 79.46 | 81.48 | 82.55 | 82.32 | 83.47 | 82.16 | 85.28 | 82.85 |
| 94.13 | 84.16 | 105.68 | 88 | 111.92 | 91 | 122.7 | 96 | 127.81 | 98 |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .1 | 76.92 | .04 | 82.55 | .1 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 76.92 | 82.55 | 18.6 | 18.6 | .1 | .3 |

CROSS SECTION

RIVER: QdaMaresua
REACH: PR122 RS: 507

INPUT
Description: XS-14
Station Elevation Data num= 27

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 108.05 | 21.49 | 93.72 | 23.49 | 93.72 | 29.49 | 94.72 | 30.69 | 94.77 |
| 32.49 | 94.84 | 39.79 | 94.96 | 40.79 | 94.97 | 41.79 | 94.95 | 49.09 | 94.81 |
| 50.89 | 94.74 | 52.09 | 94.69 | 53.54 | 94.63 | 53.72 | 94.62 | 53.72 | 88.55 |
| 56.13 | 88.31 | 61.99 | 82.544 | 63.6 | 80.96 | 67.34 | 81.39 | 69.74 | 82.55 |
| 76.1 | 82.57 | 81.33 | 82.95 | 88.73 | 84.95 | 102.31 | 90 | 111.3 | 94 |
| 117.46 | 97 | 120.79 | 98 | | | | | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .1 | 61.99 | .04 | 69.74 | .1 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 61.99 | 69.74 | 20.4 | 20.4 | .1 | .3 |

CROSS SECTION

RIVER: QdaMaresua
REACH: PR122 RS: 487

INPUT
Description: XS-15
Station Elevation Data num= 21

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 100.1 | 12.26 | 91.92 | 14.26 | 91.92 | 20.26 | 92.92 | 21.46 | 92.93 |
| 41.66 | 92.3 | 42.86 | 92.25 | 44.83 | 92.17 | 45.1 | 92.06 | 51.98 | 87.34 |
| 56.79 | 83.48 | 58.8 | 81.21 | 60.15 | 80.91 | 62.77 | 80.91 | 64.74 | 81.34 |
| 65.35 | 81.22 | 72 | 81.37 | 76.83 | 83.03 | 93.98 | 89 | 102.4 | 93 |
| 114.06 | 98 | | | | | | | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .1 | 56.79 | .04 | 64.74 | .1 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 56.79 | 64.74 | 109.9 | 109.9 | .1 | .3 |

CROSS SECTION

RIVER: QdaMaresua
REACH: PR122 RS: 377

INPUT
Description: XS-16
Station Elevation Data num= 12

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 87.61 | 16.7 | 84.8 | 32.65 | 80.19 | 58.87 | 79.18 | 61.79 | 77.75 |
| 71.55 | 77.75 | 75.43 | 78.71 | 80.42 | 78.98 | 95.04 | 78.82 | 111.29 | 90.02 |
| 129.2 | 96.83 | 146.53 | 97.8 | | | | | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .1 | 58.87 | .04 | 75.43 | .1 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 58.87 | 75.43 | 99.4 | 99.4 | .3 | .5 |

Ineffective Flow num= 2

| Sta L | Sta R | Elev | Permanent |
|---|---|---|---|
| 0 | 58.87 | | F |
| 75.43 | 146.53 | | F |

CULVERT

RIVER: QdaMaresua
REACH: PR122 RS: 327

INPUT
Description:

```
Distance from Upstream XS =   10.02
Deck/Roadway Width        =   73.94
Weir Coefficient          =     1.4
Upstream  Deck/Roadway Coordinates
    num=      30
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
       0   91.55            3.05   91.42            6.88   91.28
   10.71   91.13           18.37   90.87           22.19   90.74
   26.02   90.62           33.68    90.4           37.51    90.3
   41.34   90.21           45.16   90.12           48.99   90.03
   52.82   89.95           56.65   89.88           60.48   89.82
    64.3   89.75           71.96   89.65           79.62   89.57
   83.44   89.54           87.27   89.51           94.93   89.47
   98.76   89.46          106.41   89.46          110.24   89.47
  121.73   89.53          125.55   89.56          133.21   89.64
  140.87   89.74          144.69    89.8          146.53   89.84

Upstream Bridge Cross Section Data
Station Elevation Data    num=      12
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0   87.61    16.7    84.8   32.65   80.19   58.87   79.18   61.79   77.75
   71.55   77.75   75.43   78.71   80.42   78.98   95.04   78.82  111.29   90.02
   129.2   96.83  146.53    97.8

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0      .1   58.87     .04   75.43      .1

Bank Sta: Left   Right    Coeff Contr.   Expan.
         58.87   75.43             .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
       0   58.87               F
   75.43  146.53               F

Downstream  Deck/Roadway Coordinates
    num=      31
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
       0   90.73            3.39   90.62            7.22   90.51
   11.04    90.4           14.87    90.3           26.36   90.03
   30.18   89.95           34.01   89.88           37.84   89.82
   41.67   89.75           49.33   89.65           53.15   89.61
   56.98   89.57           64.64   89.51           68.47   89.49
   72.29   89.47           76.12   89.46           83.78   89.46
   87.61   89.47           91.43   89.49           99.09   89.53
  102.92   89.56          110.58   89.64           114.4   89.69
  118.23   89.74          122.06    89.8          129.72   89.94
  133.54   90.02          137.37    90.1           141.2   90.19
  151.02   90.43

Downstream Bridge Cross Section Data
Station Elevation Data    num=      20
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0      87   7.831      86  19.483      85  26.216  83.419  37.194  80.695
  43.918  79.719  46.191  78.297  48.726  78.069  55.824  77.718  58.216  77.519
   61.58  73.769  70.726  73.769  73.536  76.632  74.162  76.572   82.03  76.815
  94.313   77.06 100.656  77.271 110.969  80.465 128.527  81.838 151.024  84.003

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0      .1  58.216     .04   82.03      .1

Bank Sta: Left   Right    Coeff Contr.   Expan.
        58.216  73.536             .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
       0   58.95               F
   73.64 151.024               F

Upstream Embankment side slope             =       0 horiz. to 1.0 vertical
Downstream Embankment side slope           =       0 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow =     .98
Elevation at which weir flow begins        =
Energy head used in spillway design        =
Spillway height used in design             =
Weir crest shape                           = Broad Crested

Number of Culverts =  2

Culvert Name     Shape      Rise    Span
```

```
Culvert #1           Box    3.05    3.05
FHWA Chart # 8 - flared wingwalls
FHWA Scale # 1 - Wingwall flared 30 to 75 deg.
Solution Criteria = Highest U.S. EG
Culvert Upstrm Dist  Length    Top n  Bottom n  Depth Blocked  Entrance Loss Coef   Exit Loss Coef
              10.02   73.94     .013     .013        0                  .4               1
Number of Barrels =  2
Upstream   Elevation =  77.55
Centerline Stations
    Sta.    Sta.
   63.02   70.32
Downstream Elevation =  76.07
Centerline Stations
    Sta.    Sta.
   62.06   69.36

Culvert Name     Shape      Rise    Span
Culvert #2           Box    3.05    3.05
FHWA Chart # 8 - flared wingwalls
FHWA Scale # 1 - Wingwall flared 30 to 75 deg.
Solution Criteria = Highest U.S. EG
Culvert Upstrm Dist  Length    Top n  Bottom n  Depth Blocked  Entrance Loss Coef   Exit Loss Coef
              10.02   73.94     .013     .013        0                  .4               1
Upstream   Elevation =  77.25
           Centerline Station =  66.67
Downstream Elevation =  75.77
           Centerline Station =  65.71

CROSS SECTION


RIVER: QdaMaresua
REACH: PR122             RS: 278

INPUT
Description: XS-17
Station Elevation Data    num=      20
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0      87   7.831      86  19.483      85  26.216  83.419  37.194  80.695
  43.918  79.719  46.191  78.297  48.726  78.069  55.824  77.718  58.216  77.519
   61.58  73.769  70.726  73.769  73.536  76.632  74.162  76.572   82.03  76.815
  94.313   77.06 100.656  77.271 110.969  80.465 128.527  81.838 151.024  84.003

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0      .1  58.216     .04   82.03      .1

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        58.216  73.536             16.3    16.3    16.3             .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
       0   58.95               F
   73.64 151.024               F

CROSS SECTION


RIVER: QdaMaresua
REACH: PR122             RS: 262

INPUT
Description:
Station Elevation Data    num=      30
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0  86.282   7.579  85.338   9.936  85.123  18.855  84.252  25.379  82.853
  26.813   82.53  34.112  80.773  35.997  80.303  42.511  79.204  44.551   78.09
  44.708  78.009  47.166   77.77  50.251   77.57  54.029  77.423  55.648  77.315
  60.427  73.769  69.845  73.769  77.161   76.42  80.934  76.497  83.728  76.527
  86.389  76.907  89.947  77.018  93.013  77.227  99.259  77.716  100.24  78.003
 107.525  79.901 109.401  80.367 126.673  81.573 137.615  82.485 142.843  83.607

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0      .1  55.648     .04  77.161      .1

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        55.648  77.161              9.1     9.1     9.1             .1       .3

CROSS SECTION
```

RIVER: QdaMaresua
REACH: PR122 RS: 253

INPUT
Description:
Station Elevation Data num= 32

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 85.942 | 7.46 | 85.026 | 9.781 | 84.807 | 18.56 | 83.898 | 24.981 | 82.585 |
| 26.394 | 82.283 | 33.578 | 80.579 | 35.433 | 80.116 | 41.845 | 78.96 | 43.854 | 77.943 |
| 44.008 | 77.871 | 46.428 | 77.628 | 49.465 | 77.408 | 53.183 | 77.283 | 57.013 | 77.063 |
| 58.762 | 76.716 | 63.233 | 74.48 | 69.118 | 74.48 | 72.634 | 76.238 | 72.736 | 76.231 |
| 80.417 | 76.344 | 83.189 | 76.362 | 85.828 | 76.897 | 89.358 | 77.028 | 92.401 | 77.305 |
| 98.598 | 77.927 | 99.571 | 78.203 | 106.799 | 79.916 | 108.66 | 80.323 | 125.797 | 81.447 |
| 136.652 | 82.285 | 140.2 | 83.422 | | | | | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .1 | 58.762 | .04 | 72.736 | .1 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 58.762 | 72.736 | 5.6 | 5.6 | .1 | .3 |

CROSS SECTION

RIVER: QdaMaresua
REACH: PR122 RS: 247

INPUT
Description:
Station Elevation Data num= 33

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 85.737 | 7.388 | 84.837 | 9.687 | 84.616 | 18.381 | 83.684 | 24.741 | 82.423 |
| 26.14 | 82.134 | 33.255 | 80.462 | 35.092 | 80.002 | 41.443 | 78.812 | 43.431 | 77.854 |
| 43.584 | 77.788 | 45.981 | 77.542 | 48.988 | 77.31 | 52.671 | 77.198 | 56.465 | 77.001 |
| 58.305 | 76.671 | 59.422 | 76.005 | 62.472 | 74.48 | 69.03 | 74.48 | 72.407 | 76.168 |
| 72.46 | 76.165 | 80.104 | 76.252 | 82.862 | 76.263 | 85.489 | 76.891 | 89.002 | 77.033 |
| 92.03 | 77.353 | 98.198 | 78.055 | 99.166 | 78.324 | 106.359 | 79.925 | 108.211 | 80.296 |
| 125.266 | 81.371 | 136.07 | 82.164 | 139 | 83.31 | | | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .1 | 59.422 | .04 | 72.407 | .1 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 59.422 | 72.407 | 42.5 | 42.5 | .1 | .3 |

CROSS SECTION

RIVER: QdaMaresua
REACH: PR122 RS: 204

INPUT
Description: XS-18
Station Elevation Data num= 18

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 84 | 8.89 | 83 | 23.99 | 80.87 | 30.52 | 79.47 | 39.86 | 77.1 |
| 44.96 | 76.48 | 53.51 | 76.48 | 57.19 | 74.08 | 61.01 | 73.73 | 62.61 | 73.67 |
| 65.23 | 75.7 | 80.1 | 75.42 | 82.62 | 76.84 | 85.99 | 77.08 | 95.74 | 79.35 |
| 102.64 | 80 | 131.14 | 81.14 | 141.73 | 82.36 | | | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .1 | 53.51 | .04 | 65.23 | .1 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 53.51 | 65.23 | 196.1 | 196.1 | .1 | .3 |

CROSS SECTION

RIVER: QdaMaresua
REACH: PR122 RS: 8

INPUT
Description: XS-19
Station Elevation Data num= 17

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 77.44 | 6.41 | 76.87 | 12.5 | 75.68 | 18.19 | 72.04 | 20.88 | 69.64 |
| 22.87 | 69.66 | 24.74 | 70.12 | 25.49 | 71.62 | 30.22 | 71.65 | 33.41 | 71.63 |
| 35.49 | 72.8 | 44.9 | 72.29 | 55.12 | 73.14 | 62.45 | 74.29 | 68.38 | 75.22 |
| 82 | 78 | 97.81 | 80 | | | | | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .1 | 18.19 | .04 | 25.49 | .1 |

| Bank Sta: Left | Right | Coeff Contr. | Expan. |
|---|---|---|---|
| 18.19 | 25.49 | .1 | .3 |

SUMMARY OF MANNING'S N VALUES

River:QdaMaresua

| Reach | River Sta. | n1 | n2 | n3 |
|---|---|---|---|---|
| PR122 | 557 | .1 | .04 | .1 |
| PR122 | 526 | .1 | .04 | .1 |
| PR122 | 507 | .1 | .04 | .1 |
| PR122 | 487 | .1 | .04 | .1 |
| PR122 | 377 | .1 | .04 | .1 |
| PR122 | 327 | Culvert | | |
| PR122 | 278 | .1 | .04 | .1 |
| PR122 | 262 | .1 | .04 | .1 |
| PR122 | 253 | .1 | .04 | .1 |
| PR122 | 247 | .1 | .04 | .1 |
| PR122 | 204 | .1 | .04 | .1 |
| PR122 | 8 | .1 | .04 | .1 |

SUMMARY OF REACH LENGTHS

River: QdaMaresua

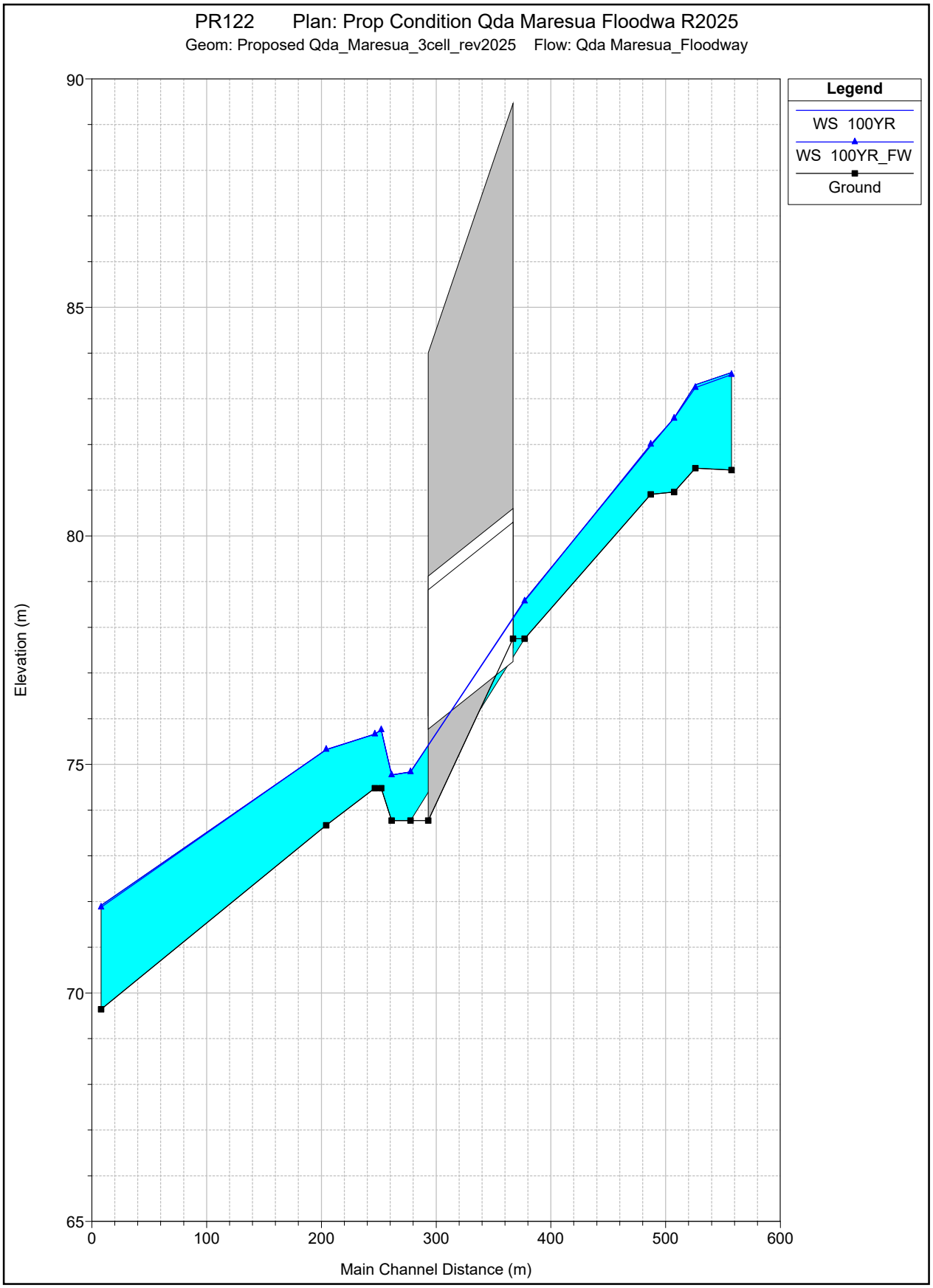
| Reach | River Sta. | Left | Channel | Right |
|---|---|---|---|---|
| PR122 | 557 | 31.4 | 31.4 | 31.4 |
| PR122 | 526 | 18.6 | 18.6 | 18.6 |
| PR122 | 507 | 20.4 | 20.4 | 20.4 |
| PR122 | 487 | 109.9 | 109.9 | 109.9 |
| PR122 | 377 | 99.4 | 99.4 | 99.4 |
| PR122 | 327 | Culvert | | |
| PR122 | 278 | 16.3 | 16.3 | 16.3 |
| PR122 | 262 | 9.1 | 9.1 | 9.1 |
| PR122 | 253 | 5.6 | 5.6 | 5.6 |
| PR122 | 247 | 42.5 | 42.5 | 42.5 |
| PR122 | 204 | 196.1 | 196.1 | 196.1 |
| PR122 | 8 | | | |

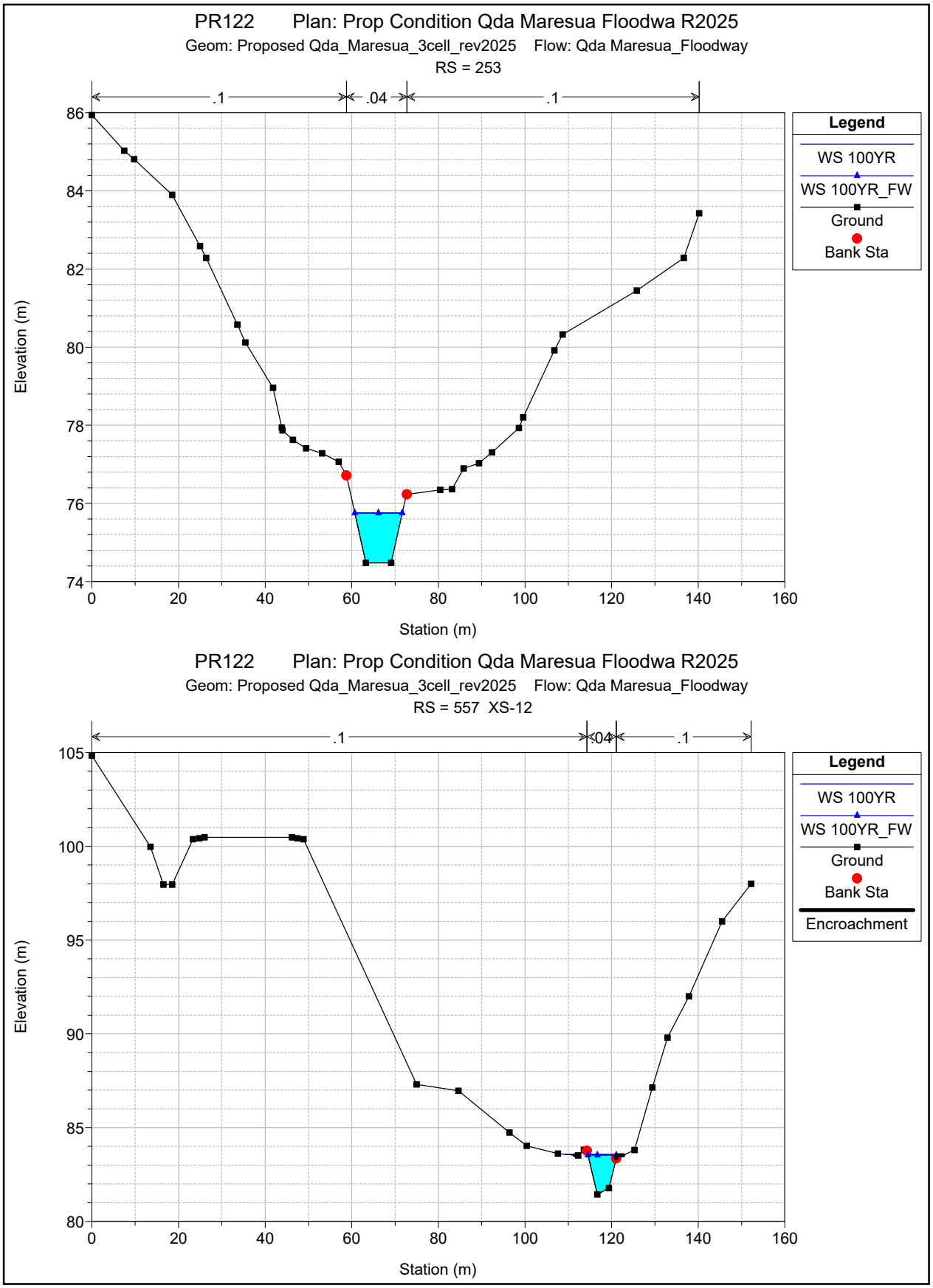
SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS
River: QdaMaresua

| Reach | River Sta. | Contr. | Expan. |
|---|---|---|---|
| PR122 | 557 | .1 | .3 |
| PR122 | 526 | .1 | .3 |
| PR122 | 507 | .1 | .3 |
| PR122 | 487 | .1 | .3 |
| PR122 | 377 | .3 | .5 |
| PR122 | 327 | Culvert | |
| PR122 | 278 | .3 | .5 |
| PR122 | 262 | .1 | .3 |
| PR122 | 253 | .1 | .3 |
| PR122 | 247 | .1 | .3 |
| PR122 | 204 | .1 | .3 |
| PR122 | 8 | .1 | .3 |

HEC-RAS Plan: Prop Cond Qda Maresua Floodway R2025 River: QdaMaresua Reach: PR122

| Reach | River Sta | Profile | Q Total | Min Ch El | W.S. Elev | Crit W.S. | E.G. Elev | E.G. Slope | Vel Chnl | Flow Area | Top Width | Froude # Chl |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | (m3/s) | (m) | (m) | (m) | (m) | (m/m) | (m/s) | (m2) | (m) | |
| PR122 | 557 | 100YR | 33.30 | 81.44 | 83.57 | 83.57 | 84.22 | 0.016788 | 3.56 | 9.66 | 11.99 | 0.96 |
| PR122 | 557 | 100YR_FW | 33.30 | 81.44 | 83.53 | 83.53 | 84.22 | 0.019231 | 3.70 | 9.01 | 6.53 | 1.00 |
| | | | | | | | | | | | | |
| PR122 | 526 | 100YR | 33.30 | 81.48 | 83.31 | 83.31 | 83.81 | 0.011819 | 3.39 | 15.33 | 19.17 | 0.88 |
| PR122 | 526 | 100YR_FW | 33.30 | 81.48 | 83.24 | 83.24 | 83.87 | 0.014846 | 3.69 | 11.96 | 10.53 | 0.98 |
| | | | | | | | | | | | | |
| PR122 | 507 | 100YR | 33.30 | 80.96 | 82.58 | 82.84 | 83.45 | 0.029780 | 4.11 | 8.25 | 14.36 | 1.29 |
| PR122 | 507 | 100YR_FW | 33.30 | 80.96 | 82.57 | 82.78 | 83.46 | 0.031355 | 4.17 | 7.99 | 7.75 | 1.31 |
| | | | | | | | | | | | | |
| PR122 | 487 | 100YR | 33.30 | 80.91 | 81.97 | 82.19 | 82.74 | 0.037681 | 4.34 | 11.40 | 15.63 | 1.46 |
| PR122 | 487 | 100YR_FW | 33.30 | 80.91 | 82.01 | 82.19 | 82.74 | 0.034507 | 4.23 | 11.33 | 13.90 | 1.40 |
| | | | | | | | | | | | | |
| PR122 | 377 | 100YR | 33.30 | 77.75 | 78.59 | 78.70 | 79.12 | 0.027311 | 3.21 | 10.38 | 14.89 | 1.23 |
| PR122 | 377 | 100YR_FW | 33.30 | 77.75 | 78.57 | 78.70 | 79.13 | 0.029866 | 3.31 | 10.07 | 14.76 | 1.28 |
| | | | | | | | | | | | | |
| PR122 | 327 | | Culvert | | | | | | | | | |
| | | | | | | | | | | | | |
| PR122 | 278 | 100YR | 33.30 | 73.77 | 74.83 | 74.83 | 75.32 | 0.017574 | 3.08 | 10.81 | 11.15 | 1.00 |
| PR122 | 278 | 100YR_FW | 33.30 | 73.77 | 74.83 | 74.83 | 75.32 | 0.017620 | 3.08 | 10.80 | 11.15 | 1.00 |
| | | | | | | | | | | | | |
| PR122 | 262 | 100YR | 33.30 | 73.77 | 74.77 | 74.77 | 75.20 | 0.017626 | 2.90 | 11.47 | 13.53 | 1.01 |
| PR122 | 262 | 100YR_FW | 33.30 | 73.77 | 74.77 | 74.77 | 75.20 | 0.017624 | 2.90 | 11.47 | 13.53 | 1.01 |
| | | | | | | | | | | | | |
| PR122 | 253 | 100YR | 33.30 | 74.48 | 75.75 | 75.75 | 76.24 | 0.016982 | 3.10 | 10.75 | 10.98 | 1.00 |
| PR122 | 253 | 100YR_FW | 33.30 | 74.48 | 75.75 | 75.75 | 76.24 | 0.016982 | 3.10 | 10.75 | 10.98 | 1.00 |
| | | | | | | | | | | | | |
| PR122 | 247 | 100YR | 33.30 | 74.48 | 75.66 | 75.69 | 76.17 | 0.018513 | 3.15 | 10.57 | 11.29 | 1.04 |
| PR122 | 247 | 100YR_FW | 33.30 | 74.48 | 75.66 | 75.69 | 76.17 | 0.018513 | 3.15 | 10.57 | 11.29 | 1.04 |
| | | | | | | | | | | | | |
| PR122 | 204 | 100YR | 37.30 | 73.67 | 75.32 | 75.32 | 75.91 | 0.017267 | 3.40 | 10.97 | 9.46 | 1.01 |
| PR122 | 204 | 100YR_FW | 37.30 | 73.67 | 75.33 | 75.33 | 75.91 | 0.017193 | 3.40 | 10.98 | 9.47 | 1.01 |
| | | | | | | | | | | | | |
| PR122 | 8 | 100YR | 47.10 | 69.64 | 71.91 | 72.00 | 72.65 | 0.016094 | 3.83 | 14.24 | 15.58 | 0.95 |
| PR122 | 8 | 100YR_FW | 47.10 | 69.64 | 71.87 | 71.87 | 72.70 | 0.018952 | 4.03 | 11.67 | 7.11 | 1.01 |

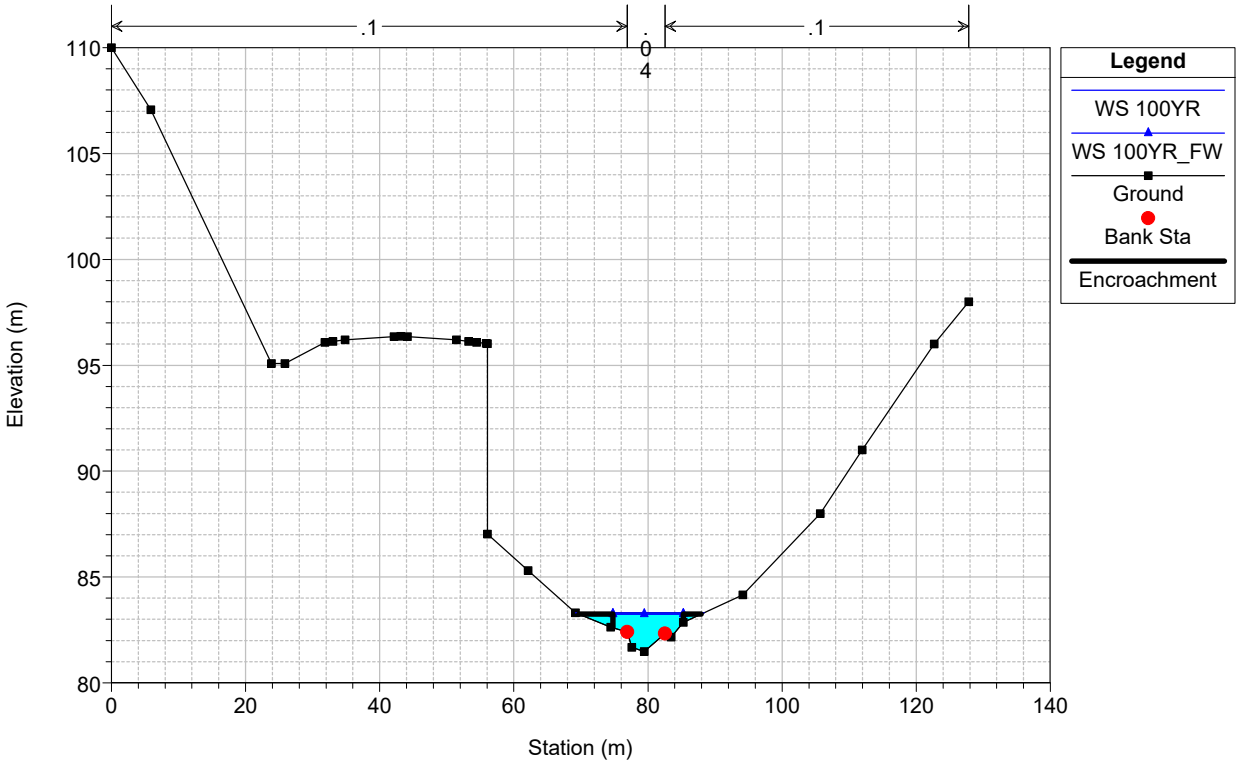

PR122 Plan: Prop Condition Qda Maresua Floodwa R2025
Geom: Proposed Qda_Maresua_3cell_rev2025 Flow: Qda Maresua_Floodway
Legend
WS 100YR
WS 100YR_FW
Ground
Elevation (m)
90
85
80
75
70
65
0
100
200
300
400
500
600
Main Channel Distance (m)


PR122 Plan: Prop Condition Qda Maresua Floodwa R2025
Geom: Proposed Qda_Maresua_3cell_rev2025 Flow: Qda Maresua_Floodway
RS = 253
.1
.04
.1
Legend
WS 100YR
WS 100YR_FW
Ground
Bank Sta
Elevation (m)
Station (m)
PR122 Plan: Prop Condition Qda Maresua Floodwa R2025
Geom: Proposed Qda_Maresua_3cell_rev2025 Flow: Qda Maresua_Floodway
RS = 557 XS-12
.1
.04
.1
Legend
WS 100YR
WS 100YR_FW
Ground
Bank Sta
Encroachment
Elevation (m)
Station (m)

PR122 Plan: Prop Condition Qda Maresua Floodwa R2025

Geom: Proposed Qda_Maresua_3cell_rev2025 Flow: Qda Maresua_Floodway

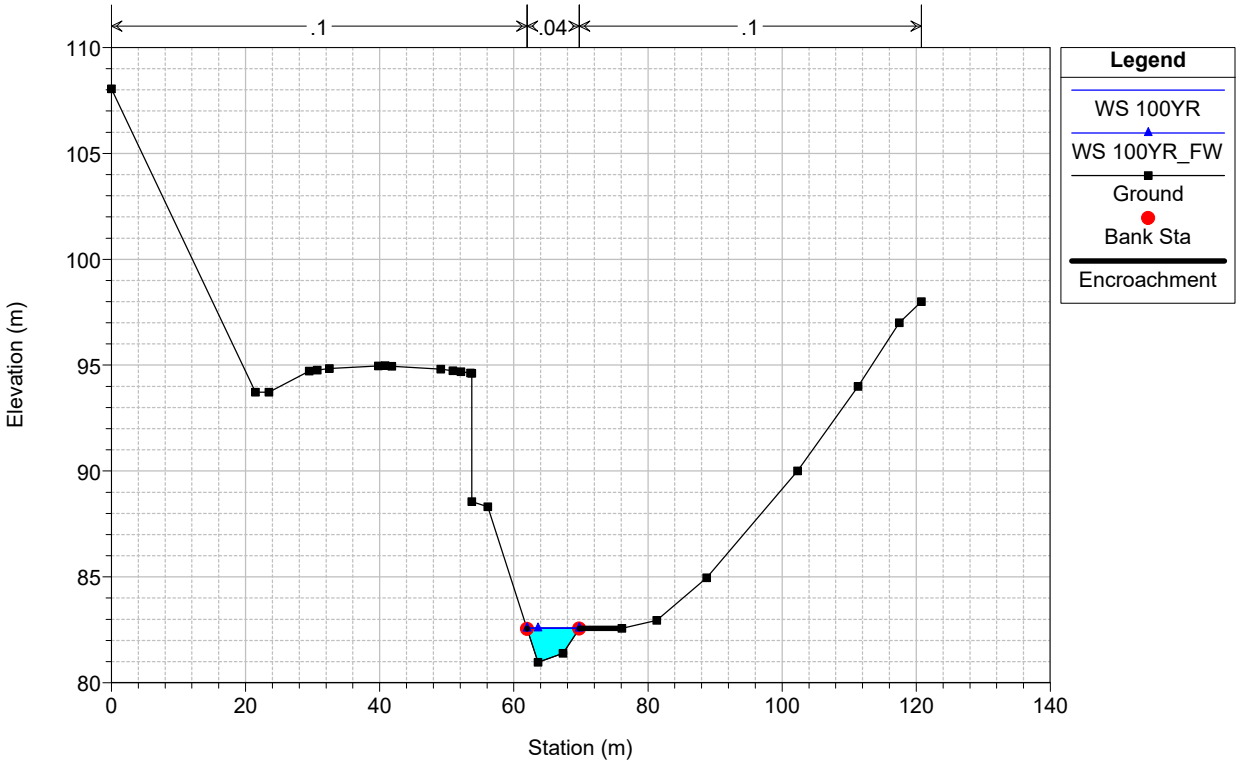
RS = 526 XS-13

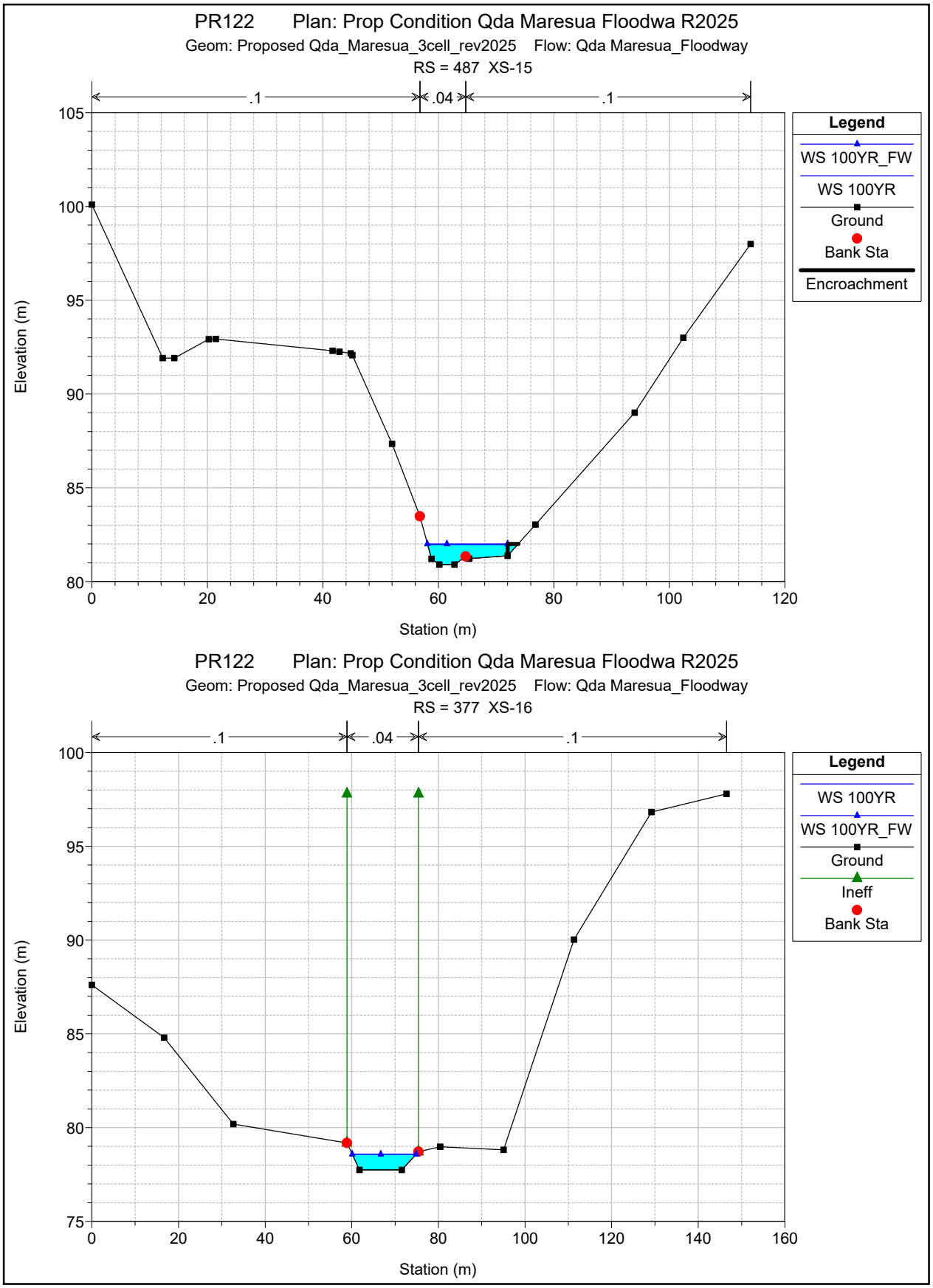


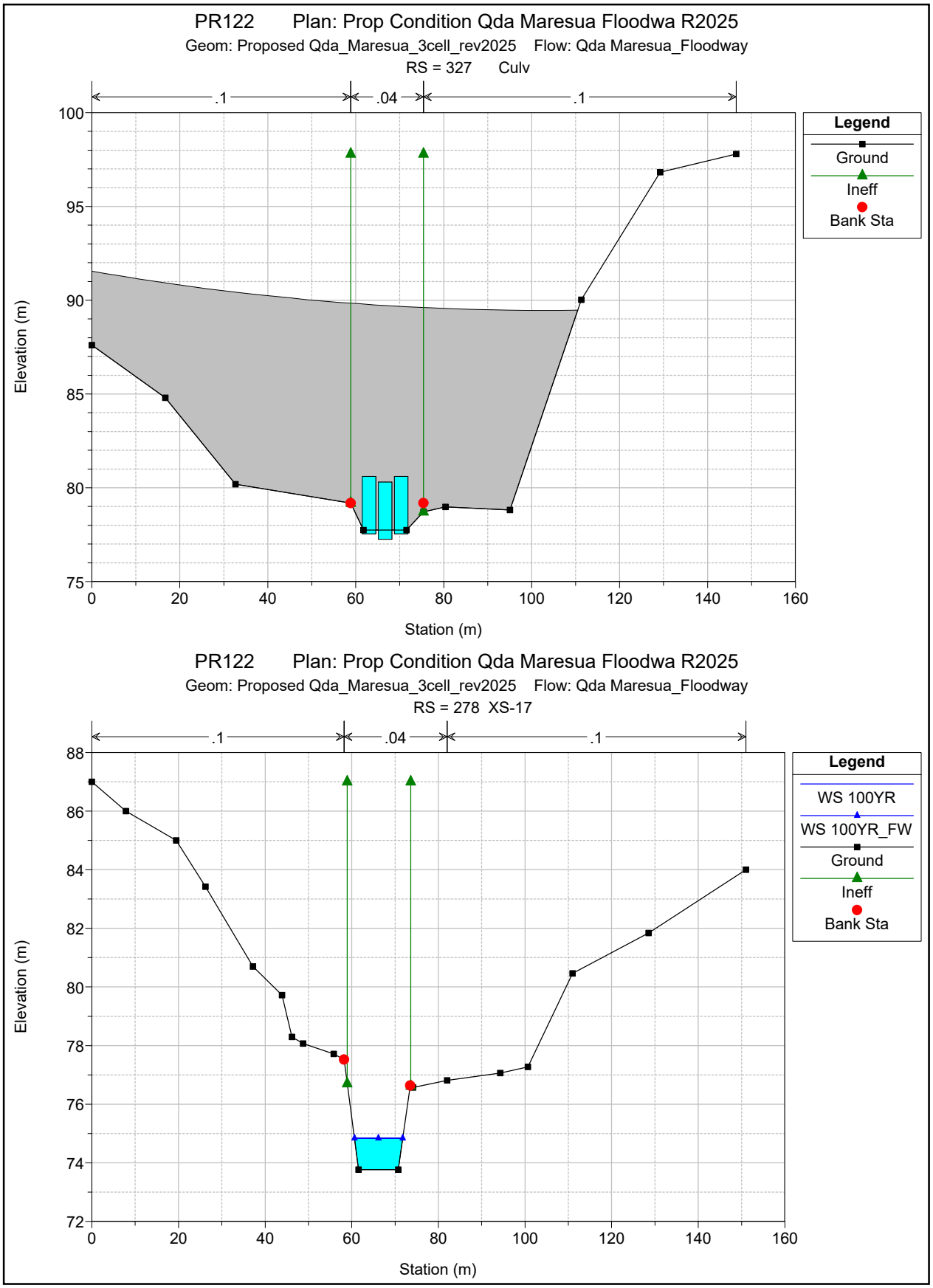

PR122 Plan: Prop Condition Qda Maresua Floodwa R2025

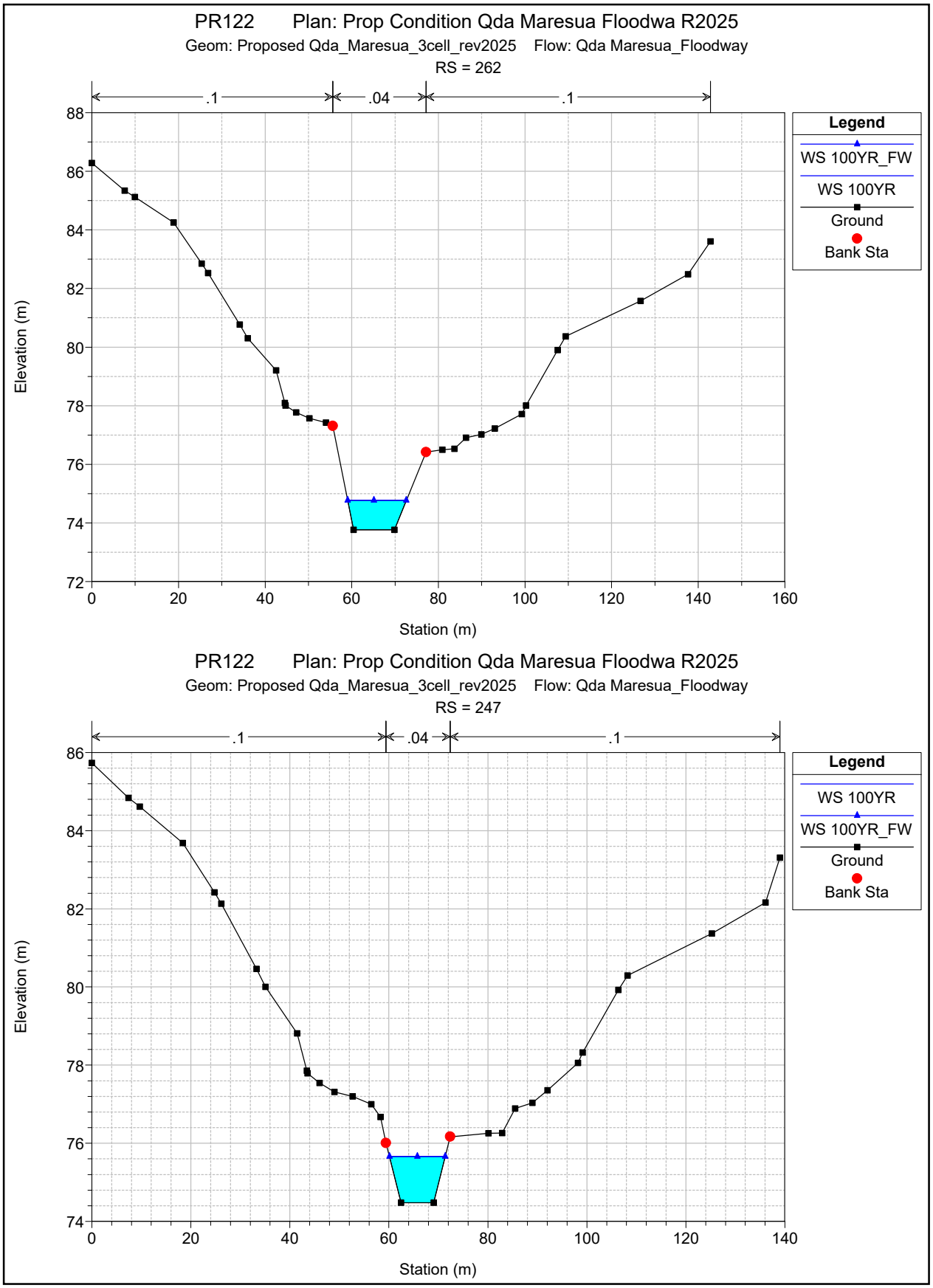
Geom: Proposed Qda_Maresua_3cell_rev2025 Flow: Qda Maresua_Floodway

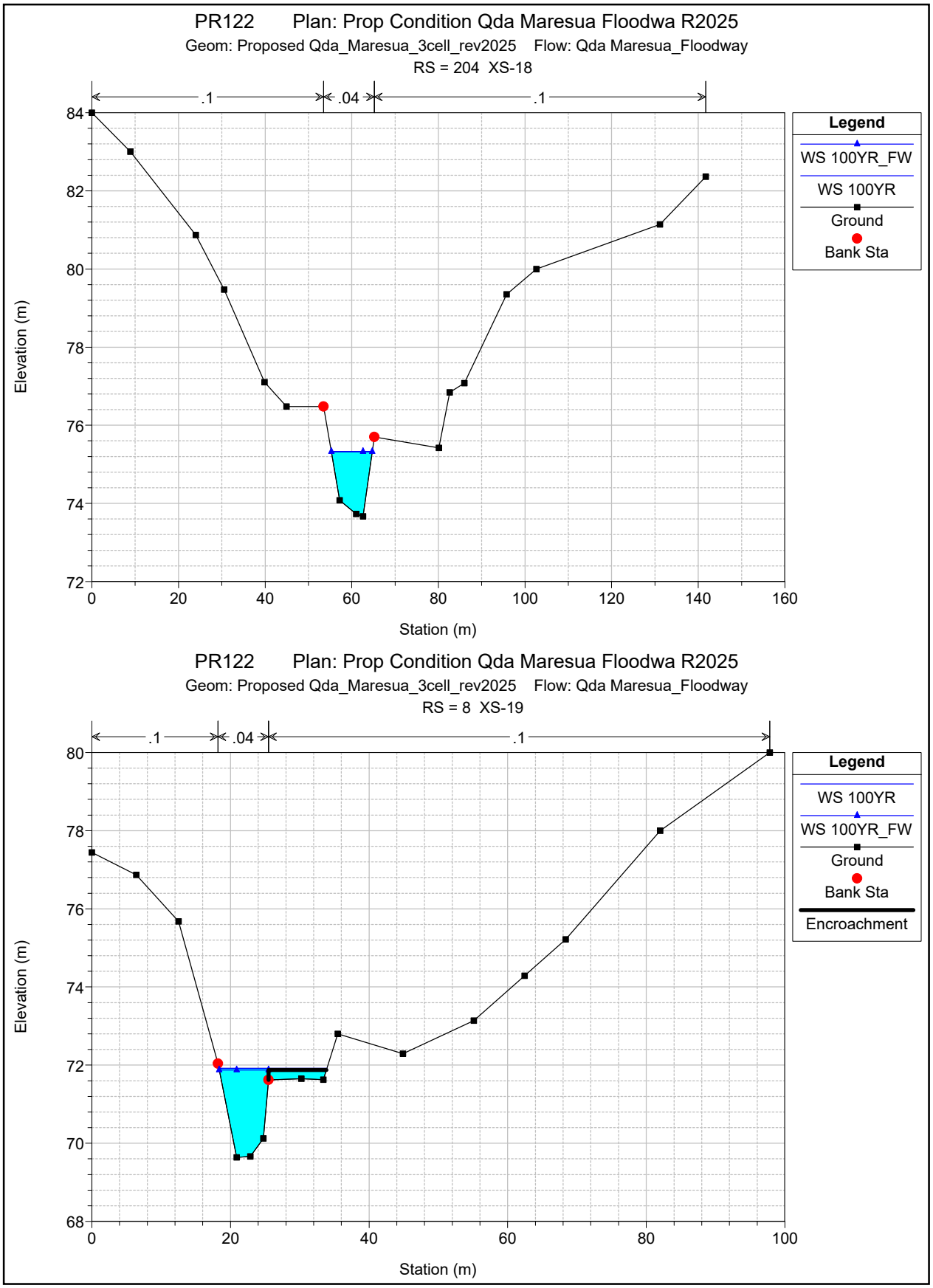
RS = 507 XS-14




PR122 Plan: Prop Condition Qda Maresua Floodwa R2025
Geom: Proposed Qda_Maresua_3cell_rev2025 Flow: Qda Maresua_Floodway
RS = 487 XS-15
.1
.04
.1
Elevation (m)
Station (m)
Legend
WS 100YR_FW
WS 100YR
Ground
Bank Sta
Encroachment
PR122 Plan: Prop Condition Qda Maresua Floodwa R2025
Geom: Proposed Qda_Maresua_3cell_rev2025 Flow: Qda Maresua_Floodway
RS = 377 XS-16
.1
.04
.1
Elevation (m)
Station (m)
Legend
WS 100YR
WS 100YR_FW
Ground
Ineff
Bank Sta


PR122 Plan: Prop Condition Qda Maresua Floodwa R2025
Geom: Proposed Qda_Maresua_3cell_rev2025 Flow: Qda Maresua_Floodway
RS = 327 Culv
.1
.04
.1
Legend
Ground
Ineff
Bank Sta
Elevation (m)
Station (m)
PR122 Plan: Prop Condition Qda Maresua Floodwa R2025
Geom: Proposed Qda_Maresua_3cell_rev2025 Flow: Qda Maresua_Floodway
RS = 278 XS-17
.1
.04
.1
Legend
WS 100YR
WS 100YR_FW
Ground
Ineff
Bank Sta
Elevation (m)
Station (m)


PR122 Plan: Prop Condition Qda Maresua Floodwa R2025
Geom: Proposed Qda_Maresua_3cell_rev2025 Flow: Qda Maresua_Floodway
RS = 262
.1
.04
.1
Legend
WS 100YR_FW
WS 100YR
Ground
Bank Sta
Elevation (m)
Station (m)
PR122 Plan: Prop Condition Qda Maresua Floodwa R2025
Geom: Proposed Qda_Maresua_3cell_rev2025 Flow: Qda Maresua_Floodway
RS = 247
.1
.04
.1
Legend
WS 100YR
WS 100YR_FW
Ground
Bank Sta
Elevation (m)
Station (m)


PR122 Plan: Prop Condition Qda Maresua Floodwa R2025
Geom: Proposed Qda_Maresua_3cell_rev2025 Flow: Qda Maresua_Floodway
RS = 204 XS-18
.1
.04
.1
Legend
WS 100YR_FW
WS 100YR
Ground
Bank Sta
Elevation (m)
Station (m)
84
82
80
78
76
74
72
0
20
40
60
80
100
120
140
160
PR122 Plan: Prop Condition Qda Maresua Floodwa R2025
Geom: Proposed Qda_Maresua_3cell_rev2025 Flow: Qda Maresua_Floodway
RS = 8 XS-19
.1
.04
.1
Legend
WS 100YR
WS 100YR_FW
Ground
Bank Sta
Encroachment
Elevation (m)
Station (m)
80
78
76
74
72
70
68
0
20
40
60
80
100

HEC-RAS HEC-RAS 6.4.1 June 2023
U.S. Army Corps of Engineers
Hydrologic Engineering Center
609 Second Street
Davis, California

```
X     X  XXXXXX    XXXX        XXXX       XX      XXXX
X     X  X        X    X       X   X     X  X    X
X     X  X        X            X   X    X    X   X
XXXXXXX  XXXX     X       XXX  XXXX     XXXXXX    XXXX
X     X  X        X            X  X     X    X        X
X     X  X        X    X       X   X    X    X        X
X     X  XXXXXX    XXXX        X    X   X    X   XXXXX
```

PROJECT DATA
Project Title: PR122
Project File : PR122.prj
Run Date and Time: 12/18/2023 9:47:22 AM

Project in SI units

PLAN DATA

Plan Title: Proposed Condition Qda Sin Nombre
Plan File : e:\WORKING\0000_BYA_WORKING\20-PR-122\HH-SCOUR\HYDRAULIC\HEC-RAS\PR-122\PR122.p03

Geometry Title: Proposed Qda Sin Nombre
Geometry File : e:\WORKING\0000_BYA_WORKING\20-PR-122\HH-SCOUR\HYDRAULIC\HEC-RAS\PR-122\PR122.g03

Flow Title : Qda Sin Nombre
Flow File : e:\WORKING\0000_BYA_WORKING\20-PR-122\HH-SCOUR\HYDRAULIC\HEC-RAS\PR-122\PR122.f01

Plan Summary Information:
Number of: Cross Sections = 11 Multiple Openings = 0
Culverts = 0 Inline Structures = 0
Bridges = 0 Lateral Structures = 0

Computational Information
Water surface calculation tolerance = 0.003
Critical depth calculation tolerance = 0.003
Maximum number of iterations = 20
Maximum difference tolerance = 0.1
Flow tolerance factor = 0.001

Computation Options
Critical depth computed at all cross sections
Conveyance Calculation Method: At breaks in n values only
Friction Slope Method: Average Conveyance
Computational Flow Regime: Supercritical Flow

FLOW DATA

Flow Title: Qda Sin Nombre
Flow File : e:\WORKING\0000_BYA_WORKING\20-PR-122\HH-SCOUR\HYDRAULIC\HEC-RAS\PR-122\PR122.f01

Flow Data (m3/s)

| River | Reach | RS | 100YR |
|---|---|---|---|
| Qda Sin Nombre | PR122 | 1003 | 61.4 |

Boundary Conditions

| River | Reach | Profile | Upstream | Downstream |
|---|---|---|---|---|
| Qda Sin Nombre | PR122 | 100YR | Normal S = 0.02 | Normal S = 0.003 |

GEOMETRY DATA

Geometry Title: Proposed Qda Sin Nombre
Geometry File : e:\WORKING\0000_BYA_WORKING\20-PR-122\HH-SCOUR\HYDRAULIC\HEC-RAS\PR-122\PR122.g03

CROSS SECTION

RIVER: Qda Sin Nombre
REACH: PR122 RS: 1003

INPUT
Description: XS-1
Station Elevation Data num= 28

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 91.35 | 1.27 | 90.08 | 5.27 | 90.16 | 6.49 | 87.12 | 9.49 | 87.12 |
| 9.49 | 87.93 | 32.92 | 89.04 | 34.12 | 89.06 | 38.54 | 88.88 | 42.78 | 86.89 |
| 49.42 | 86.43 | 55.77 | 83.58 | 64.09 | 80.78 | 80.89 | 76 | 91.44 | 73 |
| 98.89 | 70.24 | 101.57 | 69.98 | 116.72 | 67.81 | 120.28 | 67.78 | 123.93 | 67.62 |
| 127.36 | 67.36 | 134.88 | 63.16 | 138.95 | 63.12 | 143.02 | 63.08 | 147.06 | 65.15 |
| 165.85 | 70.23 | 178.48 | 70.54 | 189.55 | 72 | | | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .1 | 127.36 | .04 | 147.06 | .1 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 127.36 | 147.06 | 125.7 | 125.7 | .1 | .3 |

CROSS SECTION

RIVER: Qda Sin Nombre
REACH: PR122 RS: 877

INPUT
Description: XS-2
Station Elevation Data num= 30

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 100.71 | 7.21 | 93.5 | 11.21 | 93.58 | 15.6 | 82.6 | 18.6 | 82.6 |
| 18.6 | 83.41 | 19.8 | 83.46 | 21.6 | 83.53 | 28.9 | 83.91 | 33.79 | 84.16 |
| 41.09 | 84.54 | 42.89 | 84.56 | 44.09 | 84.58 | 49.88 | 84.35 | 55.45 | 81 |
| 59.93 | 78 | 64.88 | 75 | 70.38 | 72 | 77.91 | 68.05 | 82.18 | 65.46 |
| 86.36 | 62.88 | 90 | 62.91 | 93.05 | 60.86 | 96.56 | 61.2 | 100.07 | 61.55 |
| 102.28 | 64.02 | 117.65 | 72.27 | 126.56 | 76.67 | 142.6 | 86 | 161.39 | 96 |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .1 | 90 | .04 | 102.28 | .1 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 90 | 102.28 | 97.4 | 97.4 | .1 | .3 |

CROSS SECTION

RIVER: Qda Sin Nombre
REACH: PR122 RS: 780

INPUT
Description: XS-3
Station Elevation Data num= 25

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 92.96 | 1.18 | 92.17 | 5.18 | 92.25 | 17.26 | 80.18 | 21.26 | 80.26 |
| 22.17 | 77.98 | 25.17 | 77.98 | 25.17 | 78.79 | 26.37 | 78.83 | 50.43 | 80.2 |
| 51.63 | 80.23 | 53.08 | 80.17 | 89.71 | 61.86 | 89.94 | 61.83 | 93.59 | 61.76 |
| 96.17 | 61.64 | 98.28 | 58.8 | 100.63 | 59.13 | 102.97 | 59.46 | 105.65 | 61.56 |
| 117.99 | 64.98 | 133.13 | 72.09 | 140.14 | 77 | 150.99 | 82 | 160.29 | 86 |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .1 | 96.17 | .04 | 105.65 | .1 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 96.17 | 105.65 | 117.9 | 117.9 | .1 | .3 |

CROSS SECTION

RIVER: Qda Sin Nombre

REACH: PR122 RS: 662

INPUT
Description: XS-4
Station Elevation Data num= 25

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 80.53 | 2.93 | 79.55 | 9.2 | 78.1 | 15.24 | 74.08 | 18.24 | 74.08 |
| 24.24 | 75.08 | 25.69 | 75.14 | 26.89 | 75.18 | 51.09 | 76.66 | 52.29 | 76.69 |
| 53.74 | 76.63 | 75.99 | 65.51 | 75.99 | 62.09 | 78.34 | 61.83 | 81.57 | 61.85 |
| 85.15 | 61.39 | 87.36 | 61.56 | 88.41 | 60.27 | 93 | 56.81 | 95.53 | 56.95 |
| 98.07 | 57.09 | 99.18 | 60.52 | 113.19 | 61.02 | 135.18 | 64.93 | 182.39 | 78.71 |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .1 | 87.36 | .04 | 99.18 | .1 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 87.36 | 99.18 | 64.7 | 64.7 | .1 | .3 |

CROSS SECTION

RIVER: Qda Sin Nombre
REACH: PR122 RS: 597

INPUT
Description: XS-5
Station Elevation Data num= 24

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 74.4 | 7.36 | 73.63 | 13.53 | 72.76 | 18.53 | 69.43 | 21.53 | 69.43 |
| 26.05 | 71.68 | 27.5 | 71.74 | 28.7 | 71.79 | 52.9 | 73.27 | 54.1 | 73.3 |
| 55.55 | 73.24 | 77.41 | 62.31 | 91.36 | 61.52 | 95.17 | 60.58 | 99.05 | 59.62 |
| 101.5 | 55.89 | 104.86 | 56.37 | 108.22 | 56.84 | 112.53 | 60 | 126.56 | 61.83 |
| 134.96 | 65.39 | 157.43 | 72.32 | 162.6 | 79 | 170.69 | 83 | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .1 | 99.05 | .04 | 112.53 | .1 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 99.05 | 112.53 | 76.2 | 76.2 | .1 | .3 |

CROSS SECTION

RIVER: Qda Sin Nombre
REACH: PR122 RS: 521

INPUT
Description: XS-6
Station Elevation Data num= 25

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 76.03 | 6.78 | 74.84 | 15.35 | 73.65 | 25.29 | 72 | 28.81 | 71.43 |
| 33.62 | 68.22 | 36.62 | 68.22 | 40.68 | 70.25 | 42.13 | 70.31 | 43.33 | 70.36 |
| 67.53 | 71.84 | 68.73 | 71.87 | 70.18 | 71.81 | 94.67 | 59.57 | 99.13 | 59.41 |
| 101.85 | 59.31 | 102.6 | 59.25 | 108.32 | 55.68 | 111.73 | 55.34 | 115.14 | 55 |
| 120.59 | 59.67 | 135.5 | 62.53 | 148.43 | 69 | 152.85 | 70 | 158.56 | 72 |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .1 | 102.6 | .04 | 120.59 | .1 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 102.6 | 120.59 | 95.3 | 95.3 | .1 | .3 |

CROSS SECTION

RIVER: Qda Sin Nombre
REACH: PR122 RS: 426

INPUT
Description: XS-7 (gabions section)
Station Elevation Data num= 22

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 73 | 14.48 | 70 | 28.61 | 67 | 38.81 | 66 | 61.01 | 63.65 |
| 68.64 | 67 | 73.88 | 67.47 | 82.49 | 67.95 | 92.25 | 68.23 | 96.82 | 68 |
| 111.48 | 60.67 | 113.3 | 60.85 | 113.65 | 57.33 | 118.59 | 57 | 121 | 55 |
| 125.66 | 54.34 | 127.99 | 54.41 | 137.18 | 58.8 | 157.27 | 63.69 | 164.86 | 66 |
| 174.86 | 67 | 179.72 | 69 | | | | | | |

```
Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0      .1  118.59     .04  127.99      .1

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        118.59  137.18             103.1   103.1   103.1             .1       .3

CROSS SECTION


RIVER: Qda Sin Nombre
REACH: PR122              RS: 323

INPUT
Description: XS-8
Station Elevation Data    num=      26
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0      69   15.33      68   19.56   67.57   22.96   67.27   32.18   66.41
   39.75   65.58   43.51   63.08   44.51   63.08   50.51   64.08   51.71   64.12
   75.91    65.6   77.11   65.63   78.56   65.58   88.65   60.53   89.23   60.47
   99.42   59.05  112.86   54.55  115.81   53.69  118.17    53.6  120.53   53.51
  123.41    54.1  128.58   55.94  128.69   56.78   131.3   57.36  131.46   57.36
  144.88      59

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .08  112.86     .04  123.41     .08

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        112.86  123.41             101.2   101.2   101.2             .1       .3

CROSS SECTION


RIVER: Qda Sin Nombre
REACH: PR122              RS: 222

INPUT
Description: XS-9
Station Elevation Data    num=      25
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0      77    9.65      73   14.13      71   17.72      69   29.09   66.02
   32.43   65.86   35.11   64.56   44.52   63.34   49.16   62.44    51.6   60.82
    52.6   60.82    58.6   61.82   60.05   61.87   61.25   61.92   85.45    63.4
   86.65   63.43    88.1   63.37   98.75   58.05   99.64      58  111.67      55
  116.35   53.99   119.2   53.46  121.72      54  123.55      55  132.82      56

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .08  111.67     .04  123.55     .08

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        111.67  123.55              91.6    91.6    91.6             .1       .3

CROSS SECTION


RIVER: Qda Sin Nombre
REACH: PR122              RS: 130

INPUT
Description: XS-10
Station Elevation Data    num=      28
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0      72   20.45   66.61    24.3   65.31   27.47   65.31   33.88   64.75
    36.6   63.72   47.13      62   54.22   61.11    56.5   59.59    57.5   59.59
   63.44   61.07   64.89   61.13   66.09   61.18   90.29   62.66   91.49   62.69
   92.94   62.63  107.29   55.46  109.86   55.24  115.15      55  124.58   54.59
  128.89    54.1  129.04    52.6  135.15   52.41  141.26   52.69   141.3   52.69
  142.78   55.77  148.55   54.53  148.58   54.53

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .08  128.89    .017  142.78     .08

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        128.89  142.78             125.6   125.6   125.6             .1       .3

CROSS SECTION
```

RIVER: Qda Sin Nombre
REACH: PR122 RS: 4

INPUT
Description: XS-11
Station Elevation Data num= 18

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 54 | 9.31 | 53.06 | 11.69 | 52.9 | 19.72 | 52.87 | 22.19 | 53.05 |
| 49.96 | 52.79 | 51.49 | 52.43 | 58.29 | 53.08 | 59.13 | 53.5 | 59.26 | 48.2 |
| 63.67 | 48.61 | 68.09 | 49.02 | 68.19 | 53.42 | 69.03 | 53.08 | 69.73 | 53.02 |
| 73.97 | 51.91 | 75.24 | 52.12 | 89.99 | 53 | | | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .08 | 59.13 | .017 | 68.19 | .08 |

| Bank Sta: Left | Right | Coeff Contr. | Expan. |
|---|---|---|---|
| 59.13 | 68.19 | .1 | .3 |

SUMMARY OF MANNING'S N VALUES

River:Qda Sin Nombre

| Reach | River Sta. | n1 | n2 | n3 |
|---|---|---|---|---|
| PR122 | 1003 | .1 | .04 | .1 |
| PR122 | 877 | .1 | .04 | .1 |
| PR122 | 780 | .1 | .04 | .1 |
| PR122 | 662 | .1 | .04 | .1 |
| PR122 | 597 | .1 | .04 | .1 |
| PR122 | 521 | .1 | .04 | .1 |
| PR122 | 426 | .1 | .04 | .1 |
| PR122 | 323 | .08 | .04 | .08 |
| PR122 | 222 | .08 | .04 | .08 |
| PR122 | 130 | .08 | .017 | .08 |
| PR122 | 4 | .08 | .017 | .08 |

SUMMARY OF REACH LENGTHS

River: Qda Sin Nombre

| Reach | River Sta. | Left | Channel | Right |
|---|---|---|---|---|
| PR122 | 1003 | 125.7 | 125.7 | 125.7 |
| PR122 | 877 | 97.4 | 97.4 | 97.4 |
| PR122 | 780 | 117.9 | 117.9 | 117.9 |
| PR122 | 662 | 64.7 | 64.7 | 64.7 |
| PR122 | 597 | 76.2 | 76.2 | 76.2 |
| PR122 | 521 | 95.3 | 95.3 | 95.3 |
| PR122 | 426 | 103.1 | 103.1 | 103.1 |
| PR122 | 323 | 101.2 | 101.2 | 101.2 |
| PR122 | 222 | 91.6 | 91.6 | 91.6 |
| PR122 | 130 | 125.6 | 125.6 | 125.6 |
| PR122 | 4 | | | |

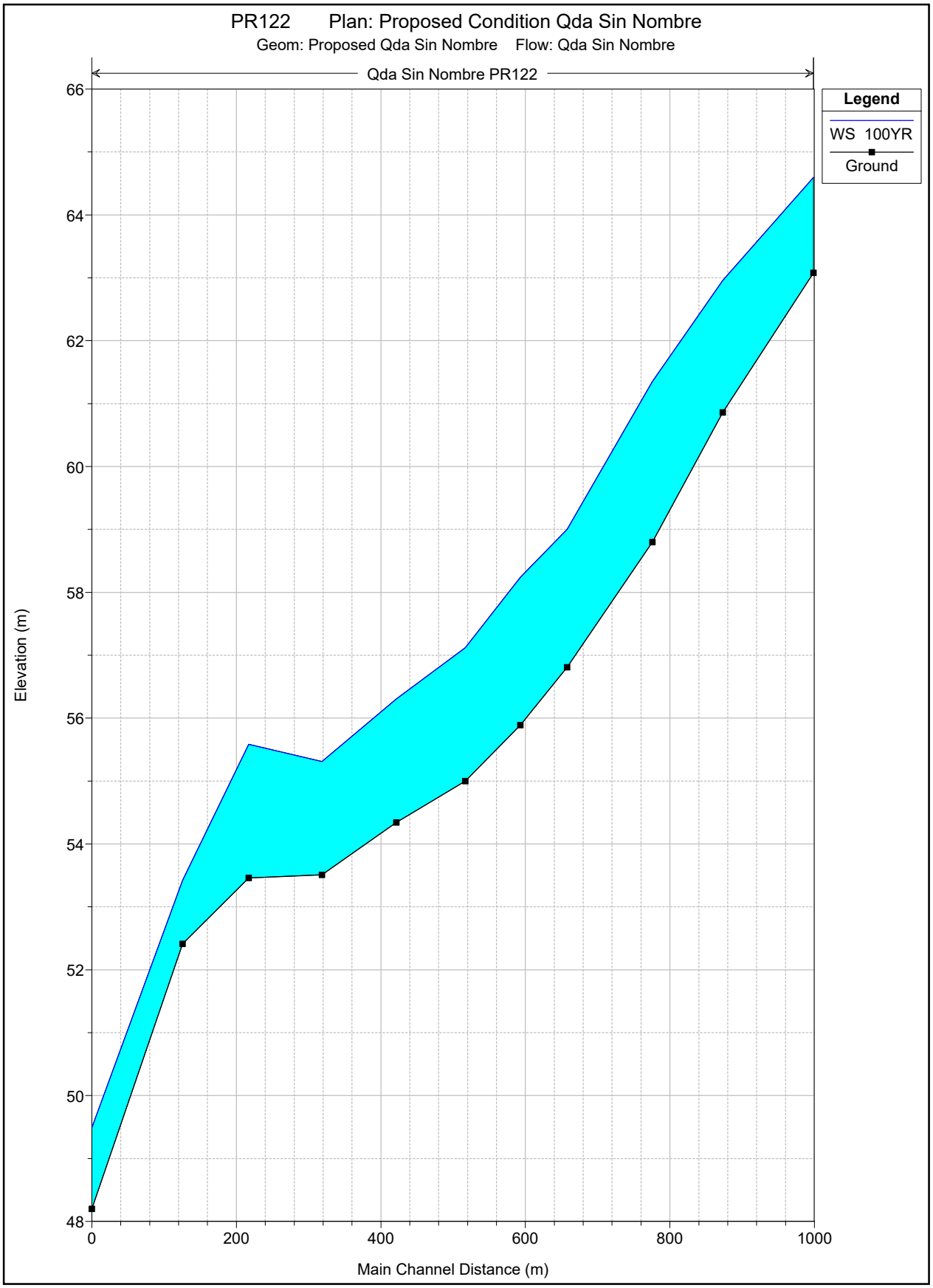
SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS
River: Qda Sin Nombre

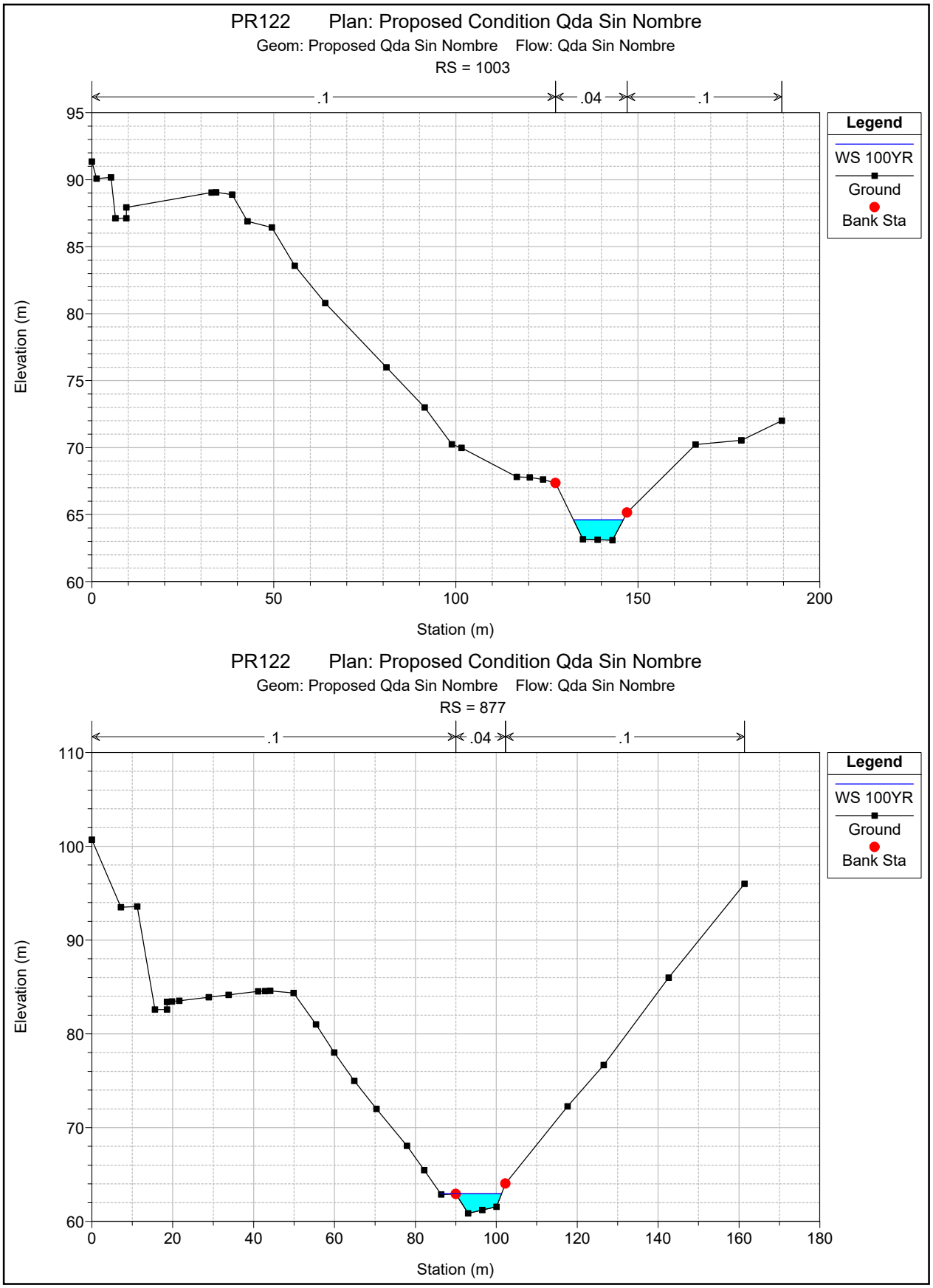
| Reach | River Sta. | Contr. | Expan. |
|---|---|---|---|
| PR122 | 1003 | .1 | .3 |
| PR122 | 877 | .1 | .3 |
| PR122 | 780 | .1 | .3 |
| PR122 | 662 | .1 | .3 |
| PR122 | 597 | .1 | .3 |
| PR122 | 521 | .1 | .3 |
| PR122 | 426 | .1 | .3 |
| PR122 | 323 | .1 | .3 |
| PR122 | 222 | .1 | .3 |

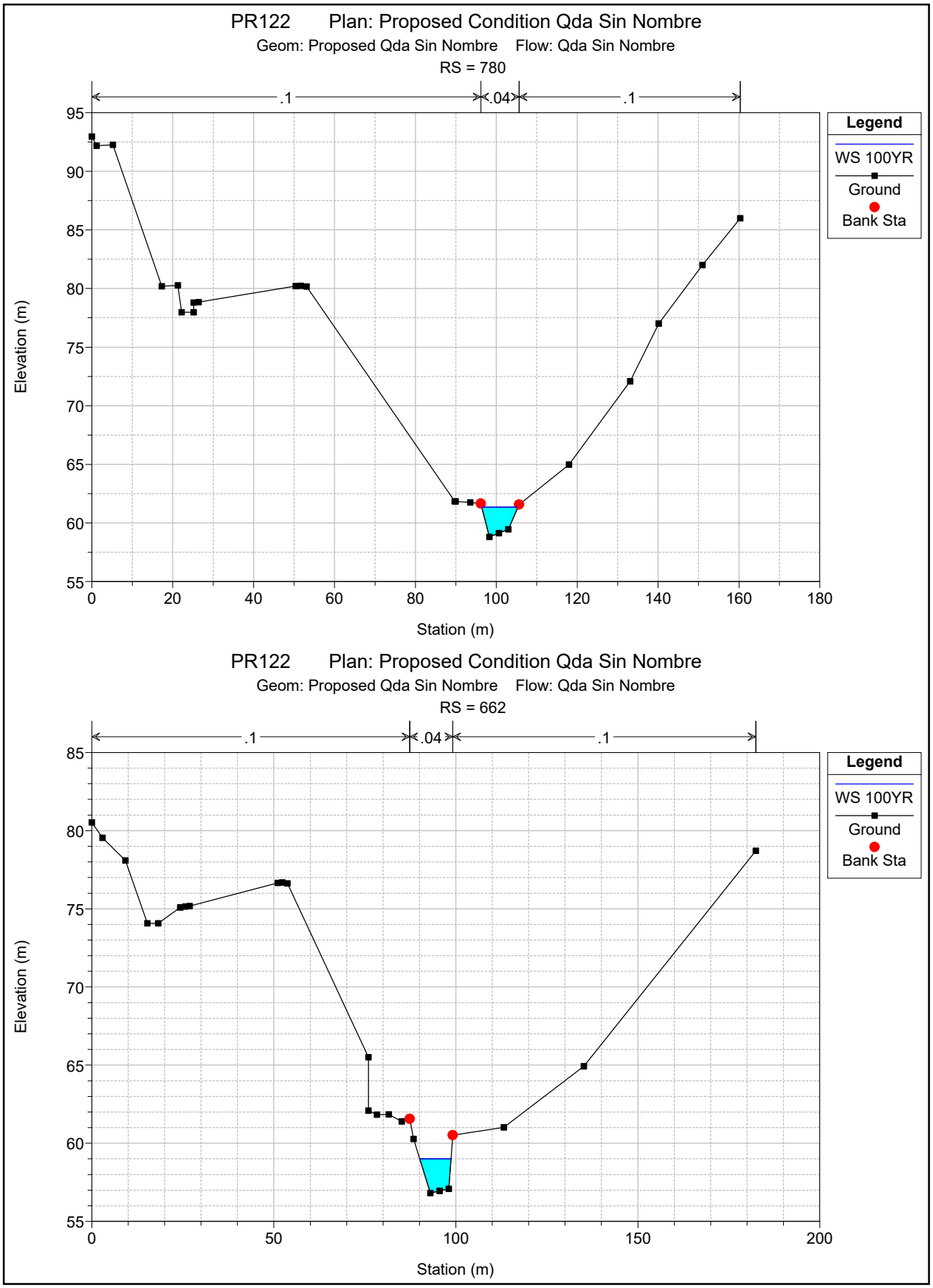
| | | | |
|---|---|---|---|
| PR122 | 130 | .1 | .3 |
| PR122 | 4 | .1 | .3 |

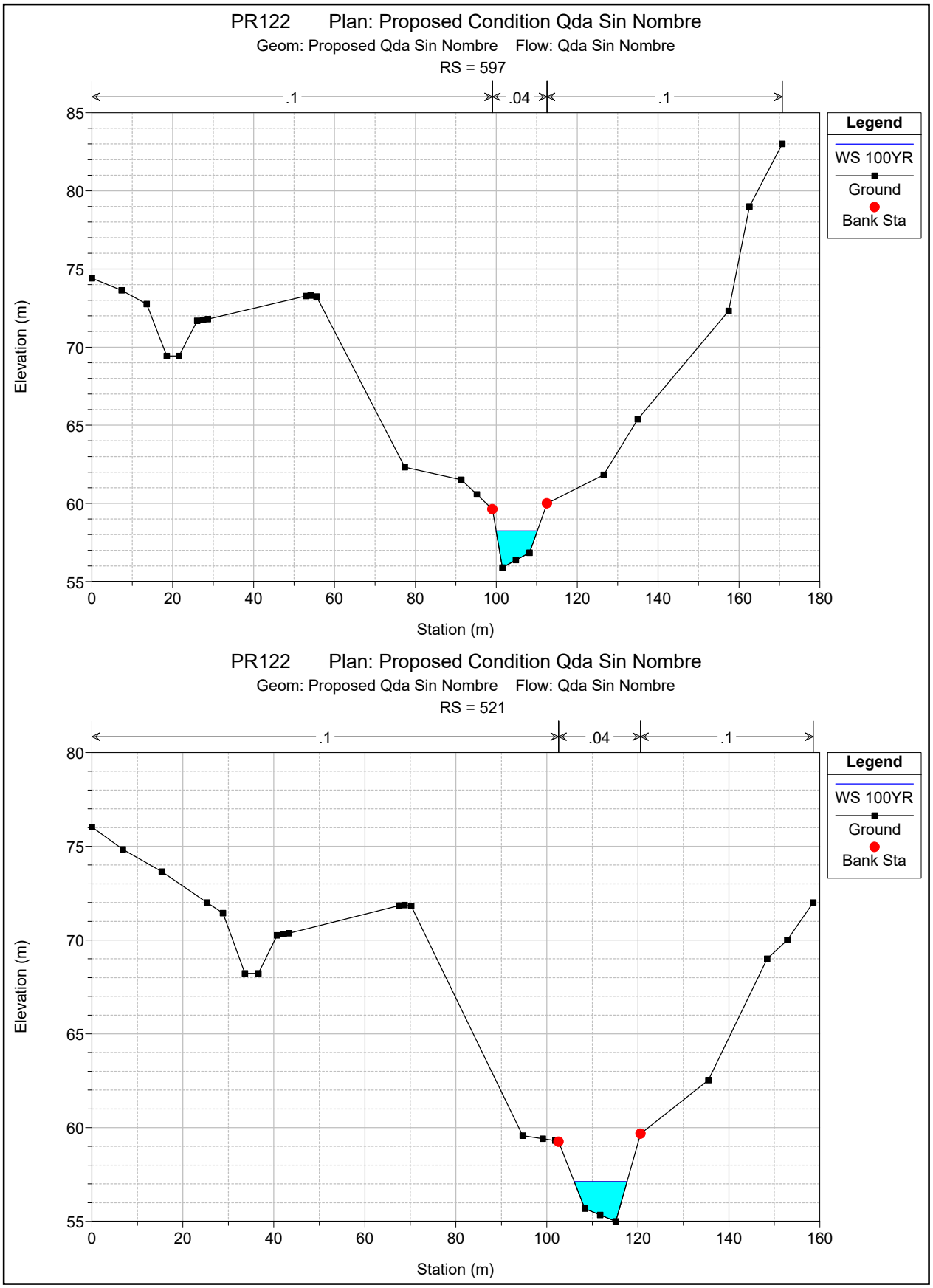
HEC-RAS Plan: Proposed QSN River: Qda Sin Nombre Reach: PR122 Profile: 100YR

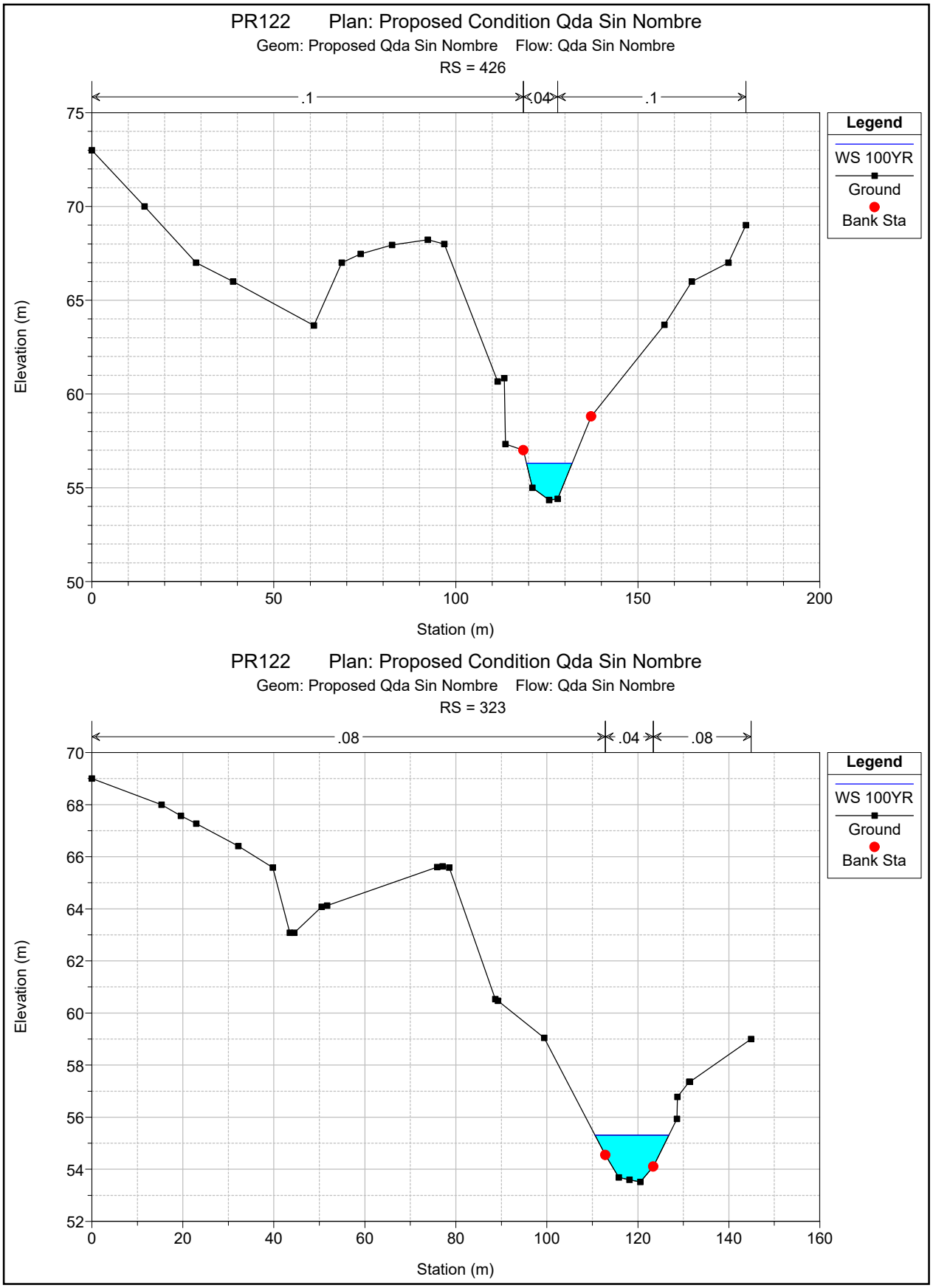
| Reach | River Sta | Profile | Q Total | Min Ch El | W.S. Elev | Crit W.S. | E.G. Elev | E.G. Slope | Vel Chnl | Flow Area | Top Width | Froude # Chl |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | (m3/s) | (m) | (m) | (m) | (m) | (m/m) | (m/s) | (m2) | (m) | |
| PR122 | 1003 | 100YR | 61.40 | 63.08 | 64.60 | 64.70 | 65.34 | 0.020014 | 3.81 | 16.12 | 13.67 | 1.12 |
| PR122 | 877 | 100YR | 61.40 | 60.86 | 62.96 | 62.96 | 63.66 | 0.015497 | 3.72 | 16.73 | 15.10 | 0.98 |
| PR122 | 780 | 100YR | 61.40 | 58.80 | 61.35 | 61.35 | 62.19 | 0.017219 | 4.06 | 15.12 | 9.00 | 1.00 |
| PR122 | 662 | 100YR | 61.40 | 56.81 | 59.00 | 59.09 | 59.96 | 0.020734 | 4.33 | 14.17 | 8.59 | 1.08 |
| PR122 | 597 | 100YR | 61.40 | 55.89 | 58.24 | 58.24 | 59.02 | 0.016889 | 3.90 | 15.74 | 10.17 | 1.00 |
| PR122 | 521 | 100YR | 61.40 | 55.00 | 57.12 | 57.12 | 57.83 | 0.016082 | 3.74 | 16.43 | 11.60 | 1.00 |
| PR122 | 426 | 100YR | 61.40 | 54.34 | 56.30 | 56.30 | 56.98 | 0.038488 | 3.64 | 16.88 | 12.53 | 1.00 |
| PR122 | 323 | 100YR | 61.40 | 53.51 | 55.31 | 55.31 | 55.98 | 0.012878 | 3.69 | 18.85 | 16.22 | 0.96 |
| PR122 | 222 | 100YR | 61.40 | 53.46 | 55.58 | 55.58 | 56.20 | 0.012866 | 3.52 | 19.33 | 19.64 | 0.94 |
| PR122 | 130 | 100YR | 61.40 | 52.41 | 53.42 | 53.88 | 54.98 | 0.011876 | 5.52 | 11.12 | 12.69 | 1.88 |
| PR122 | 4 | 100YR | 61.40 | 48.20 | 49.49 | 50.31 | 52.65 | 0.027126 | 7.88 | 7.79 | 8.87 | 2.68 |

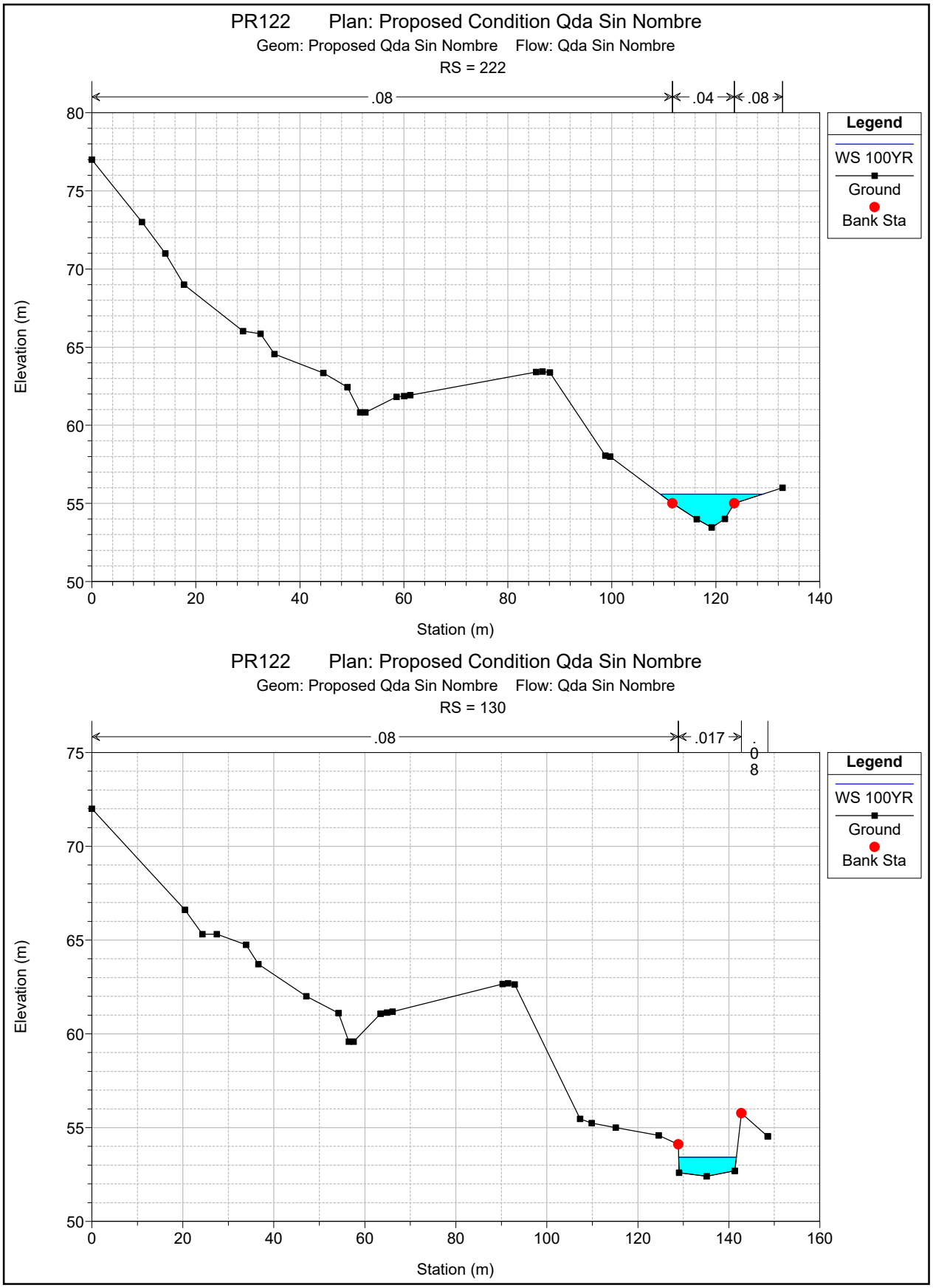

PR122 Plan: Proposed Condition Qda Sin Nombre
Geom: Proposed Qda Sin Nombre Flow: Qda Sin Nombre
Qda Sin Nombre PR122
Legend
WS 100YR
Ground
Elevation (m)
66
64
62
60
58
56
54
52
50
48
0
200
400
600
800
1000
Main Channel Distance (m)


PR122 Plan: Proposed Condition Qda Sin Nombre
Geom: Proposed Qda Sin Nombre Flow: Qda Sin Nombre
RS = 1003
.1
.04
.1
Legend
WS 100YR
Ground
Bank Sta
Elevation (m)
Station (m)
PR122 Plan: Proposed Condition Qda Sin Nombre
Geom: Proposed Qda Sin Nombre Flow: Qda Sin Nombre
RS = 877
.1
.04
.1
Legend
WS 100YR
Ground
Bank Sta
Elevation (m)
Station (m)


PR122 Plan: Proposed Condition Qda Sin Nombre
Geom: Proposed Qda Sin Nombre Flow: Qda Sin Nombre
RS = 780
.1
.04
.1
Legend
WS 100YR
Ground
Bank Sta
Elevation (m)
Station (m)
PR122 Plan: Proposed Condition Qda Sin Nombre
Geom: Proposed Qda Sin Nombre Flow: Qda Sin Nombre
RS = 662
.1
.04
.1
Legend
WS 100YR
Ground
Bank Sta
Elevation (m)
Station (m)


PR122 Plan: Proposed Condition Qda Sin Nombre
Geom: Proposed Qda Sin Nombre Flow: Qda Sin Nombre
RS = 597
.1
.04
.1
Legend
WS 100YR
Ground
Bank Sta
Elevation (m)
Station (m)
PR122 Plan: Proposed Condition Qda Sin Nombre
Geom: Proposed Qda Sin Nombre Flow: Qda Sin Nombre
RS = 521
.1
.04
.1
Legend
WS 100YR
Ground
Bank Sta
Elevation (m)
Station (m)

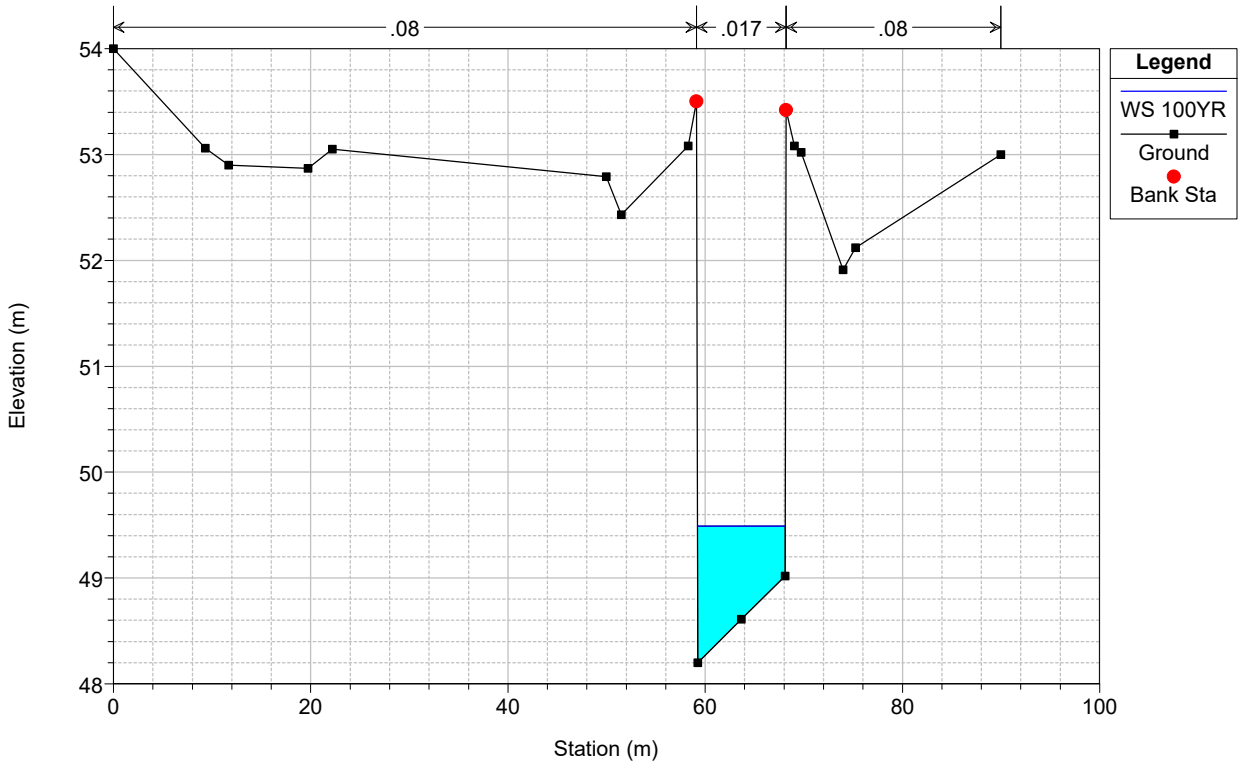

PR122 Plan: Proposed Condition Qda Sin Nombre
Geom: Proposed Qda Sin Nombre Flow: Qda Sin Nombre
RS = 426
.1
.04
.1
Legend
WS 100YR
Ground
Bank Sta
Elevation (m)
Station (m)
75
70
65
60
55
50
0
50
100
150
200
PR122 Plan: Proposed Condition Qda Sin Nombre
Geom: Proposed Qda Sin Nombre Flow: Qda Sin Nombre
RS = 323
.08
.04
.08
Legend
WS 100YR
Ground
Bank Sta
Elevation (m)
Station (m)
70
68
66
64
62
60
58
56
54
52
0
20
40
60
80
100
120
140
160


PR122 Plan: Proposed Condition Qda Sin Nombre
Geom: Proposed Qda Sin Nombre Flow: Qda Sin Nombre
RS = 222
.08
.04
.08
Legend
WS 100YR
Ground
Bank Sta
Elevation (m)
Station (m)
80
75
70
65
60
55
50
0
20
40
60
80
100
120
140
PR122 Plan: Proposed Condition Qda Sin Nombre
Geom: Proposed Qda Sin Nombre Flow: Qda Sin Nombre
RS = 130
.08
.017
.08
Legend
WS 100YR
Ground
Bank Sta
Elevation (m)
Station (m)
75
70
65
60
55
50
0
20
40
60
80
100
120
140
160

PR122 Plan: Proposed Condition Qda Sin Nombre

Geom: Proposed Qda Sin Nombre Flow: Qda Sin Nombre

RS = 4



HEC-RAS HEC-RAS 6.4.1 June 2023
U.S. Army Corps of Engineers
Hydrologic Engineering Center
609 Second Street
Davis, California

```
X     X  XXXXXX    XXXX        XXXX       XX      XXXX
X     X  X        X    X       X   X     X  X    X
X     X  X        X            X   X    X    X   X
XXXXXXX  XXXX     X       XXX  XXXX     XXXXXX    XXXX
X     X  X        X            X  X     X    X        X
X     X  X        X    X       X   X    X    X        X
X     X  XXXXXX    XXXX        X    X   X    X   XXXXX
```

PROJECT DATA
Project Title: PR122
Project File : PR122.prj
Run Date and Time: 12/18/2023 8:40:26 AM

Project in SI units

PLAN DATA

Plan Title: Proposed Cond Qda Sin Nombre Floodway
Plan File : e:\WORKING\0000_BYA_WORKING\20-PR-122\HH-SCOUR\HYDRAULIC\HEC-RAS\PR-122\PR122.p08

Geometry Title: Proposed Qda Sin Nombre
Geometry File : e:\WORKING\0000_BYA_WORKING\20-PR-122\HH-SCOUR\HYDRAULIC\HEC-RAS\PR-122\PR122.g03

Flow Title : Qda Sin Nombre_Floodway
Flow File : e:\WORKING\0000_BYA_WORKING\20-PR-122\HH-SCOUR\HYDRAULIC\HEC-RAS\PR-122\PR122.f04

Plan Summary Information:
Number of: Cross Sections = 11 Multiple Openings = 0
Culverts = 0 Inline Structures = 0
Bridges = 0 Lateral Structures = 0

Computational Information
Water surface calculation tolerance = 0.003
Critical depth calculation tolerance = 0.003
Maximum number of iterations = 20
Maximum difference tolerance = 0.1
Flow tolerance factor = 0.001

Computation Options
Critical depth computed at all cross sections
Conveyance Calculation Method: At breaks in n values only
Friction Slope Method: Average Conveyance
Computational Flow Regime: Supercritical Flow

Encroachment Data
Equal Conveyance = True
Left Offset = 0
Right Offset = 0

River = Qda Sin Nombre Reach = PR122

| RS | Profile | Method | Value1 | Value2 |
|---|---|---|---|---|
| 1003 | 100YR_FW | 1 | 127.36 | 147.06 |
| 877 | 100YR_FW | 1 | 90 | 102.28 |
| 780 | 100YR_FW | 1 | 96.17 | 105.65 |
| 662 | 100YR_FW | 1 | 87.36 | 99.18 |
| 597 | 100YR_FW | 1 | 99.05 | 112.53 |
| 521 | 100YR_FW | 1 | 102.6 | 120.59 |
| 426 | 100YR_FW | 1 | 117.65 | 144.46 |
| 323 | 100YR_FW | 1 | 112.86 | 123.41 |
| 222 | 100YR_FW | 1 | 111.67 | 123.55 |
| 130 | 100YR_FW | 1 | 128.89 | 142.78 |
| 4 | 100YR_FW | 1 | 59.13 | 68.19 |

FLOW DATA

Flow Title: Qda Sin Nombre_Floodway
Flow File : e:\WORKING\0000_BYA_WORKING\20-PR-122\HH-SCOUR\HYDRAULIC\HEC-RAS\PR-122\PR122.f04

Flow Data (m3/s)

| River | Reach | RS | 100YR | 100YR_FW |
|---|---|---|---|---|
| Qda Sin Nombre | PR122 | 1003 | 61.4 | 61.4 |

Boundary Conditions

| River | Reach | Profile | Upstream | Downstream |
|---|---|---|---|---|
| Qda Sin Nombre | PR122 | 100YR | Normal S = 0.02 | Normal S = 0.003 |

GEOMETRY DATA

Geometry Title: Proposed Qda Sin Nombre
Geometry File : e:\WORKING\0000_BYA_WORKING\20-PR-122\HH-SCOUR\HYDRAULIC\HEC-RAS\PR-122\PR122.g03

CROSS SECTION

RIVER: Qda Sin Nombre
REACH: PR122 RS: 1003

INPUT
Description: XS-1
Station Elevation Data num= 28

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 91.35 | 1.27 | 90.08 | 5.27 | 90.16 | 6.49 | 87.12 | 9.49 | 87.12 |
| 9.49 | 87.93 | 32.92 | 89.04 | 34.12 | 89.06 | 38.54 | 88.88 | 42.78 | 86.89 |
| 49.42 | 86.43 | 55.77 | 83.58 | 64.09 | 80.78 | 80.89 | 76 | 91.44 | 73 |
| 98.89 | 70.24 | 101.57 | 69.98 | 116.72 | 67.81 | 120.28 | 67.78 | 123.93 | 67.62 |
| 127.36 | 67.36 | 134.88 | 63.16 | 138.95 | 63.12 | 143.02 | 63.08 | 147.06 | 65.15 |
| 165.85 | 70.23 | 178.48 | 70.54 | 189.55 | 72 | | | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .1 | 127.36 | .04 | 147.06 | .1 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 127.36 | 147.06 | 125.7 | 125.7 | 125.7 | .1 | .3 |

CROSS SECTION

RIVER: Qda Sin Nombre
REACH: PR122 RS: 877

INPUT
Description: XS-2
Station Elevation Data num= 30

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 100.71 | 7.21 | 93.5 | 11.21 | 93.58 | 15.6 | 82.6 | 18.6 | 82.6 |
| 18.6 | 83.41 | 19.8 | 83.46 | 21.6 | 83.53 | 28.9 | 83.91 | 33.79 | 84.16 |
| 41.09 | 84.54 | 42.89 | 84.56 | 44.09 | 84.58 | 49.88 | 84.35 | 55.45 | 81 |
| 59.93 | 78 | 64.88 | 75 | 70.38 | 72 | 77.91 | 68.05 | 82.18 | 65.46 |
| 86.36 | 62.88 | 90 | 62.91 | 93.05 | 60.86 | 96.56 | 61.2 | 100.07 | 61.55 |
| 102.28 | 64.02 | 117.65 | 72.27 | 126.56 | 76.67 | 142.6 | 86 | 161.39 | 96 |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .1 | 90 | .04 | 102.28 | .1 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 90 | 102.28 | 97.4 | 97.4 | 97.4 | .1 | .3 |

CROSS SECTION

RIVER: Qda Sin Nombre
REACH: PR122 RS: 780

INPUT
Description: XS-3

Station Elevation Data num= 25

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 92.96 | 1.18 | 92.17 | 5.18 | 92.25 | 17.26 | 80.18 | 21.26 | 80.26 |
| 22.17 | 77.98 | 25.17 | 77.98 | 25.17 | 78.79 | 26.37 | 78.83 | 50.43 | 80.2 |
| 51.63 | 80.23 | 53.08 | 80.17 | 89.71 | 61.86 | 89.94 | 61.83 | 93.59 | 61.76 |
| 96.17 | 61.64 | 98.28 | 58.8 | 100.63 | 59.13 | 102.97 | 59.46 | 105.65 | 61.56 |
| 117.99 | 64.98 | 133.13 | 72.09 | 140.14 | 77 | 150.99 | 82 | 160.29 | 86 |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .1 | 96.17 | .04 | 105.65 | .1 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 96.17 | 105.65 | 117.9 | 117.9 | .1 | .3 |

CROSS SECTION

RIVER: Qda Sin Nombre
REACH: PR122 RS: 662

INPUT
Description: XS-4
Station Elevation Data num= 25

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 80.53 | 2.93 | 79.55 | 9.2 | 78.1 | 15.24 | 74.08 | 18.24 | 74.08 |
| 24.24 | 75.08 | 25.69 | 75.14 | 26.89 | 75.18 | 51.09 | 76.66 | 52.29 | 76.69 |
| 53.74 | 76.63 | 75.99 | 65.51 | 75.99 | 62.09 | 78.34 | 61.83 | 81.57 | 61.85 |
| 85.15 | 61.39 | 87.36 | 61.56 | 88.41 | 60.27 | 93 | 56.81 | 95.53 | 56.95 |
| 98.07 | 57.09 | 99.18 | 60.52 | 113.19 | 61.02 | 135.18 | 64.93 | 182.39 | 78.71 |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .1 | 87.36 | .04 | 99.18 | .1 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 87.36 | 99.18 | 64.7 | 64.7 | .1 | .3 |

CROSS SECTION

RIVER: Qda Sin Nombre
REACH: PR122 RS: 597

INPUT
Description: XS-5
Station Elevation Data num= 24

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 74.4 | 7.36 | 73.63 | 13.53 | 72.76 | 18.53 | 69.43 | 21.53 | 69.43 |
| 26.05 | 71.68 | 27.5 | 71.74 | 28.7 | 71.79 | 52.9 | 73.27 | 54.1 | 73.3 |
| 55.55 | 73.24 | 77.41 | 62.31 | 91.36 | 61.52 | 95.17 | 60.58 | 99.05 | 59.62 |
| 101.5 | 55.89 | 104.86 | 56.37 | 108.22 | 56.84 | 112.53 | 60 | 126.56 | 61.83 |
| 134.96 | 65.39 | 157.43 | 72.32 | 162.6 | 79 | 170.69 | 83 | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .1 | 99.05 | .04 | 112.53 | .1 |

| Bank Sta: Left | Right | Lengths: Left Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|
| 99.05 | 112.53 | 76.2 | 76.2 | .1 | .3 |

CROSS SECTION

RIVER: Qda Sin Nombre
REACH: PR122 RS: 521

INPUT
Description: XS-6
Station Elevation Data num= 25

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 76.03 | 6.78 | 74.84 | 15.35 | 73.65 | 25.29 | 72 | 28.81 | 71.43 |
| 33.62 | 68.22 | 36.62 | 68.22 | 40.68 | 70.25 | 42.13 | 70.31 | 43.33 | 70.36 |
| 67.53 | 71.84 | 68.73 | 71.87 | 70.18 | 71.81 | 94.67 | 59.57 | 99.13 | 59.41 |
| 101.85 | 59.31 | 102.6 | 59.25 | 108.32 | 55.68 | 111.73 | 55.34 | 115.14 | 55 |
| 120.59 | 59.67 | 135.5 | 62.53 | 148.43 | 69 | 152.85 | 70 | 158.56 | 72 |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .1 | 102.6 | .04 | 120.59 | .1 |

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
102.6 120.59 95.3 95.3 95.3 .1 .3

CROSS SECTION

RIVER: Qda Sin Nombre
REACH: PR122 RS: 426

INPUT
Description: XS-7 (gabions section)
Station Elevation Data num= 22

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 73 | 14.48 | 70 | 28.61 | 67 | 38.81 | 66 | 61.01 | 63.65 |
| 68.64 | 67 | 73.88 | 67.47 | 82.49 | 67.95 | 92.25 | 68.23 | 96.82 | 68 |
| 111.48 | 60.67 | 113.3 | 60.85 | 113.65 | 57.33 | 118.59 | 57 | 121 | 55 |
| 125.66 | 54.34 | 127.99 | 54.41 | 137.18 | 58.8 | 157.27 | 63.69 | 164.86 | 66 |
| 174.86 | 67 | 179.72 | 69 | | | | | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .1 | 118.59 | .04 | 127.99 | .1 |

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
118.59 137.18 103.1 103.1 103.1 .1 .3

CROSS SECTION

RIVER: Qda Sin Nombre
REACH: PR122 RS: 323

INPUT
Description: XS-8
Station Elevation Data num= 26

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 69 | 15.33 | 68 | 19.56 | 67.57 | 22.96 | 67.27 | 32.18 | 66.41 |
| 39.75 | 65.58 | 43.51 | 63.08 | 44.51 | 63.08 | 50.51 | 64.08 | 51.71 | 64.12 |
| 75.91 | 65.6 | 77.11 | 65.63 | 78.56 | 65.58 | 88.65 | 60.53 | 89.23 | 60.47 |
| 99.42 | 59.05 | 112.86 | 54.55 | 115.81 | 53.69 | 118.17 | 53.6 | 120.53 | 53.51 |
| 123.41 | 54.1 | 128.58 | 55.94 | 128.69 | 56.78 | 131.3 | 57.36 | 131.46 | 57.36 |
| 144.88 | 59 | | | | | | | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .08 | 112.86 | .04 | 123.41 | .08 |

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
112.86 123.41 101.2 101.2 101.2 .1 .3

CROSS SECTION

RIVER: Qda Sin Nombre
REACH: PR122 RS: 222

INPUT
Description: XS-9
Station Elevation Data num= 25

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 77 | 9.65 | 73 | 14.13 | 71 | 17.72 | 69 | 29.09 | 66.02 |
| 32.43 | 65.86 | 35.11 | 64.56 | 44.52 | 63.34 | 49.16 | 62.44 | 51.6 | 60.82 |
| 52.6 | 60.82 | 58.6 | 61.82 | 60.05 | 61.87 | 61.25 | 61.92 | 85.45 | 63.4 |
| 86.65 | 63.43 | 88.1 | 63.37 | 98.75 | 58.05 | 99.64 | 58 | 111.67 | 55 |
| 116.35 | 53.99 | 119.2 | 53.46 | 121.72 | 54 | 123.55 | 55 | 132.82 | 56 |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .08 | 111.67 | .04 | 123.55 | .08 |

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
111.67 123.55 91.6 91.6 91.6 .1 .3

CROSS SECTION

RIVER: Qda Sin Nombre
REACH: PR122 RS: 130

INPUT
Description: XS-10
Station Elevation Data num= 28

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 72 | 20.45 | 66.61 | 24.3 | 65.31 | 27.47 | 65.31 | 33.88 | 64.75 |
| 36.6 | 63.72 | 47.13 | 62 | 54.22 | 61.11 | 56.5 | 59.59 | 57.5 | 59.59 |
| 63.44 | 61.07 | 64.89 | 61.13 | 66.09 | 61.18 | 90.29 | 62.66 | 91.49 | 62.69 |
| 92.94 | 62.63 | 107.29 | 55.46 | 109.86 | 55.24 | 115.15 | 55 | 124.58 | 54.59 |
| 128.89 | 54.1 | 129.04 | 52.6 | 135.15 | 52.41 | 141.26 | 52.69 | 141.3 | 52.69 |
| 142.78 | 55.77 | 148.55 | 54.53 | 148.58 | 54.53 | | | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .08 | 128.89 | .017 | 142.78 | .08 |

| Bank Sta: Left | Right | Lengths: Left | Channel | Right | Coeff Contr. | Expan. |
|---|---|---|---|---|---|---|
| 128.89 | 142.78 | | 125.6 | 125.6 | .1 | .3 |

CROSS SECTION

RIVER: Qda Sin Nombre
REACH: PR122 RS: 4

INPUT
Description: XS-11
Station Elevation Data num= 18

| Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev | Sta | Elev |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 54 | 9.31 | 53.06 | 11.69 | 52.9 | 19.72 | 52.87 | 22.19 | 53.05 |
| 49.96 | 52.79 | 51.49 | 52.43 | 58.29 | 53.08 | 59.13 | 53.5 | 59.26 | 48.2 |
| 63.67 | 48.61 | 68.09 | 49.02 | 68.19 | 53.42 | 69.03 | 53.08 | 69.73 | 53.02 |
| 73.97 | 51.91 | 75.24 | 52.12 | 89.99 | 53 | | | | |

Manning's n Values num= 3

| Sta | n Val | Sta | n Val | Sta | n Val |
|---|---|---|---|---|---|
| 0 | .08 | 59.13 | .017 | 68.19 | .08 |

| Bank Sta: Left | Right | Coeff Contr. | Expan. |
|---|---|---|---|
| 59.13 | 68.19 | .1 | .3 |

SUMMARY OF MANNING'S N VALUES

River:Qda Sin Nombre

| Reach | River Sta. | n1 | n2 | n3 |
|---|---|---|---|---|
| PR122 | 1003 | .1 | .04 | .1 |
| PR122 | 877 | .1 | .04 | .1 |
| PR122 | 780 | .1 | .04 | .1 |
| PR122 | 662 | .1 | .04 | .1 |
| PR122 | 597 | .1 | .04 | .1 |
| PR122 | 521 | .1 | .04 | .1 |
| PR122 | 426 | .1 | .04 | .1 |
| PR122 | 323 | .08 | .04 | .08 |
| PR122 | 222 | .08 | .04 | .08 |
| PR122 | 130 | .08 | .017 | .08 |
| PR122 | 4 | .08 | .017 | .08 |

SUMMARY OF REACH LENGTHS

River: Qda Sin Nombre

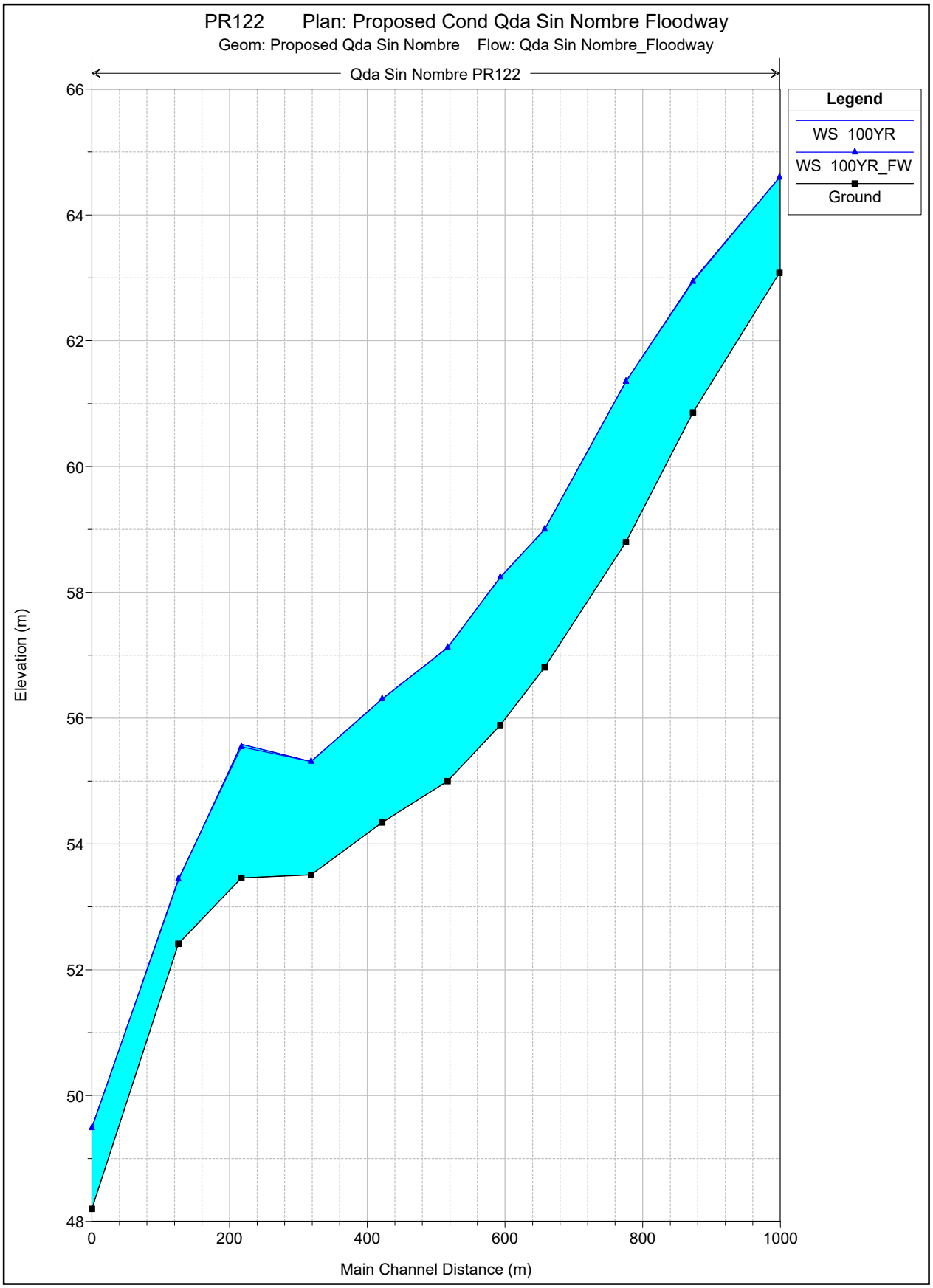
| Reach | River Sta. | Left | Channel | Right |
|---|---|---|---|---|
| PR122 | 1003 | 125.7 | 125.7 | 125.7 |
| PR122 | 877 | 97.4 | 97.4 | 97.4 |
| PR122 | 780 | 117.9 | 117.9 | 117.9 |
| PR122 | 662 | 64.7 | 64.7 | 64.7 |
| PR122 | 597 | 76.2 | 76.2 | 76.2 |
| PR122 | 521 | 95.3 | 95.3 | 95.3 |
| PR122 | 426 | 103.1 | 103.1 | 103.1 |
| PR122 | 323 | 101.2 | 101.2 | 101.2 |
| PR122 | 222 | 91.6 | 91.6 | 91.6 |
| PR122 | 130 | 125.6 | 125.6 | 125.6 |
| PR122 | 4 | | | |

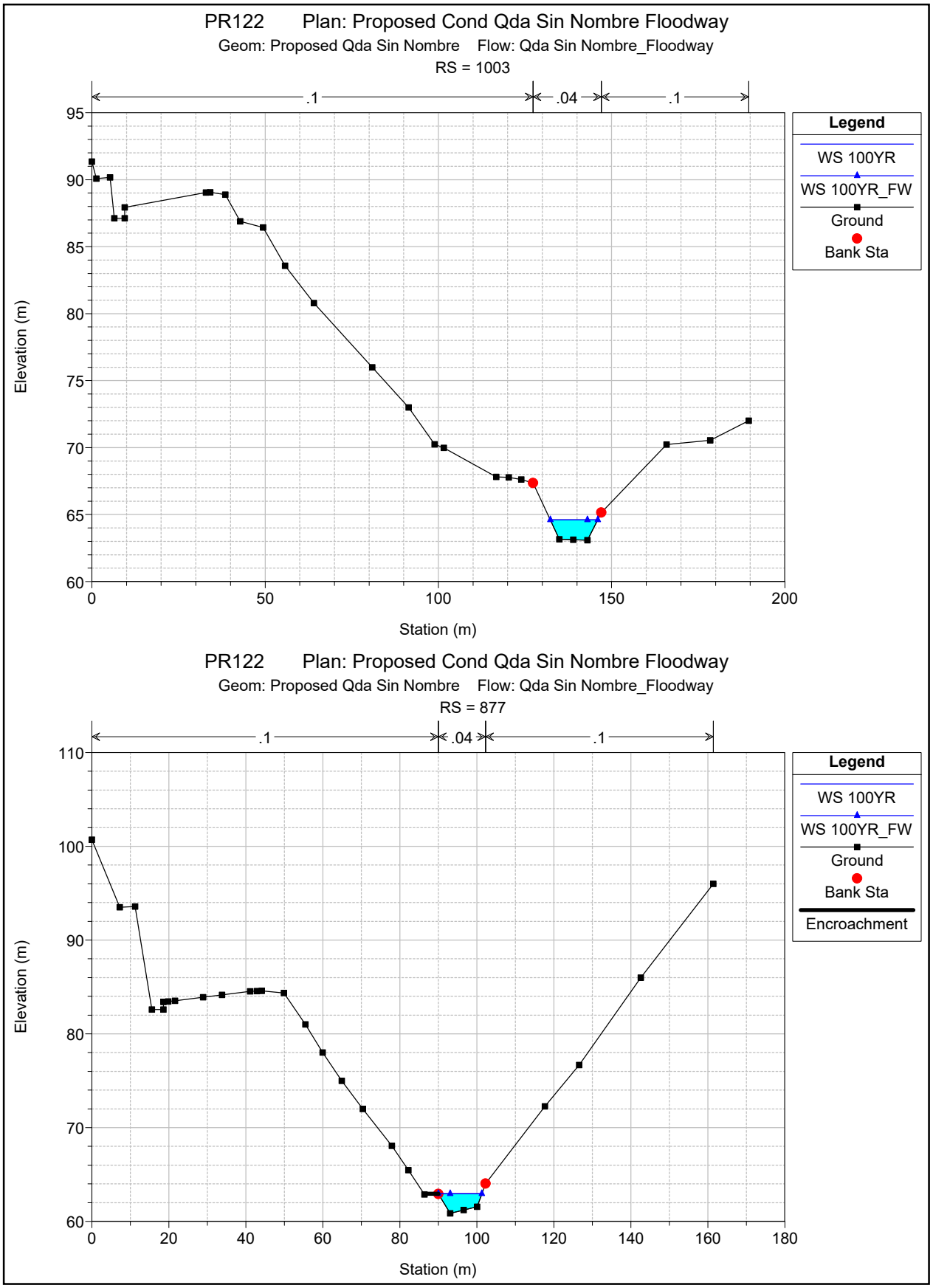
SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS
River: Qda Sin Nombre

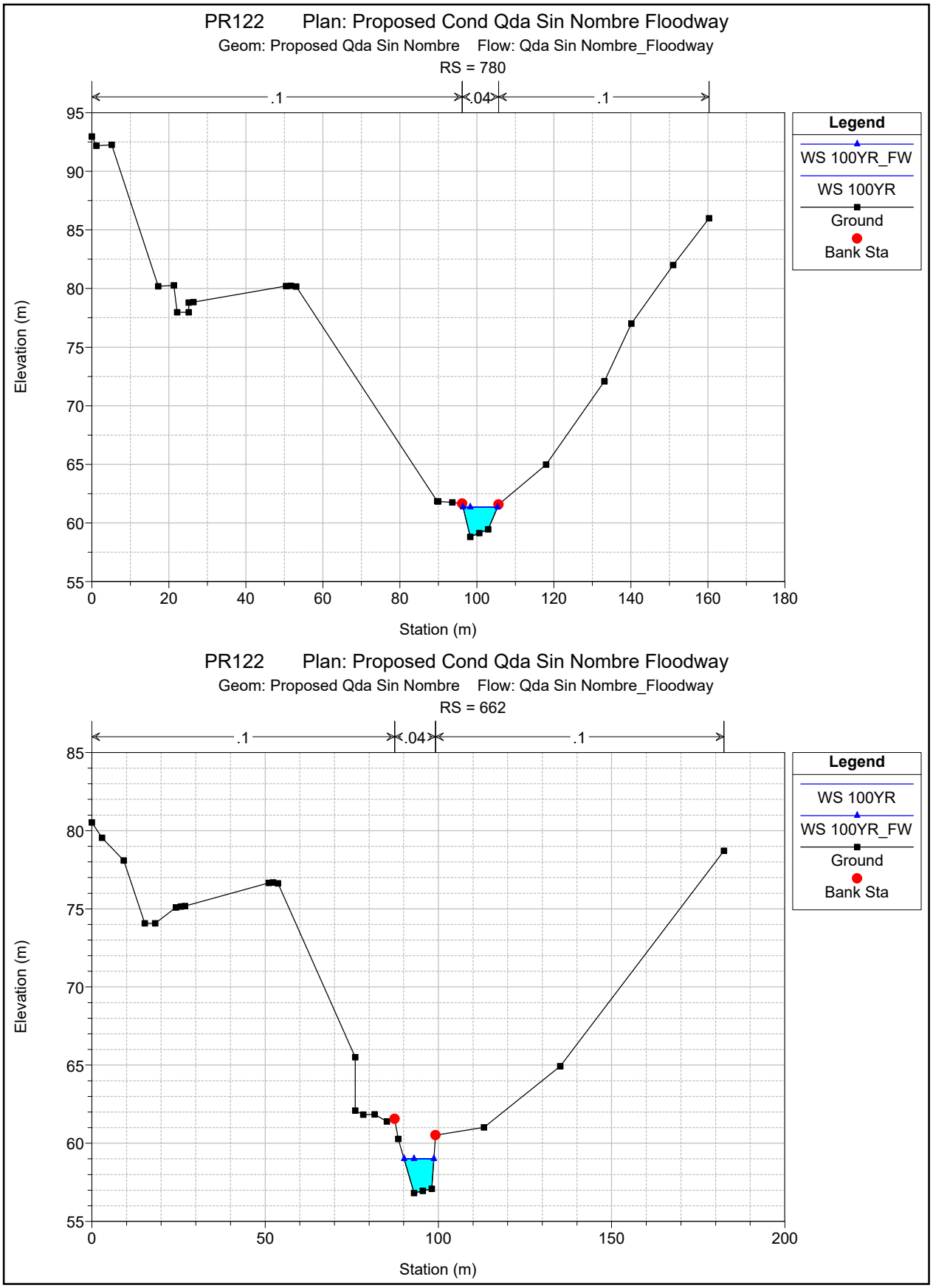
| Reach | River Sta. | Contr. | Expan. |
|---|---|---|---|
| PR122 | 1003 | .1 | .3 |
| PR122 | 877 | .1 | .3 |
| PR122 | 780 | .1 | .3 |
| PR122 | 662 | .1 | .3 |
| PR122 | 597 | .1 | .3 |
| PR122 | 521 | .1 | .3 |
| PR122 | 426 | .1 | .3 |
| PR122 | 323 | .1 | .3 |
| PR122 | 222 | .1 | .3 |
| PR122 | 130 | .1 | .3 |
| PR122 | 4 | .1 | .3 |

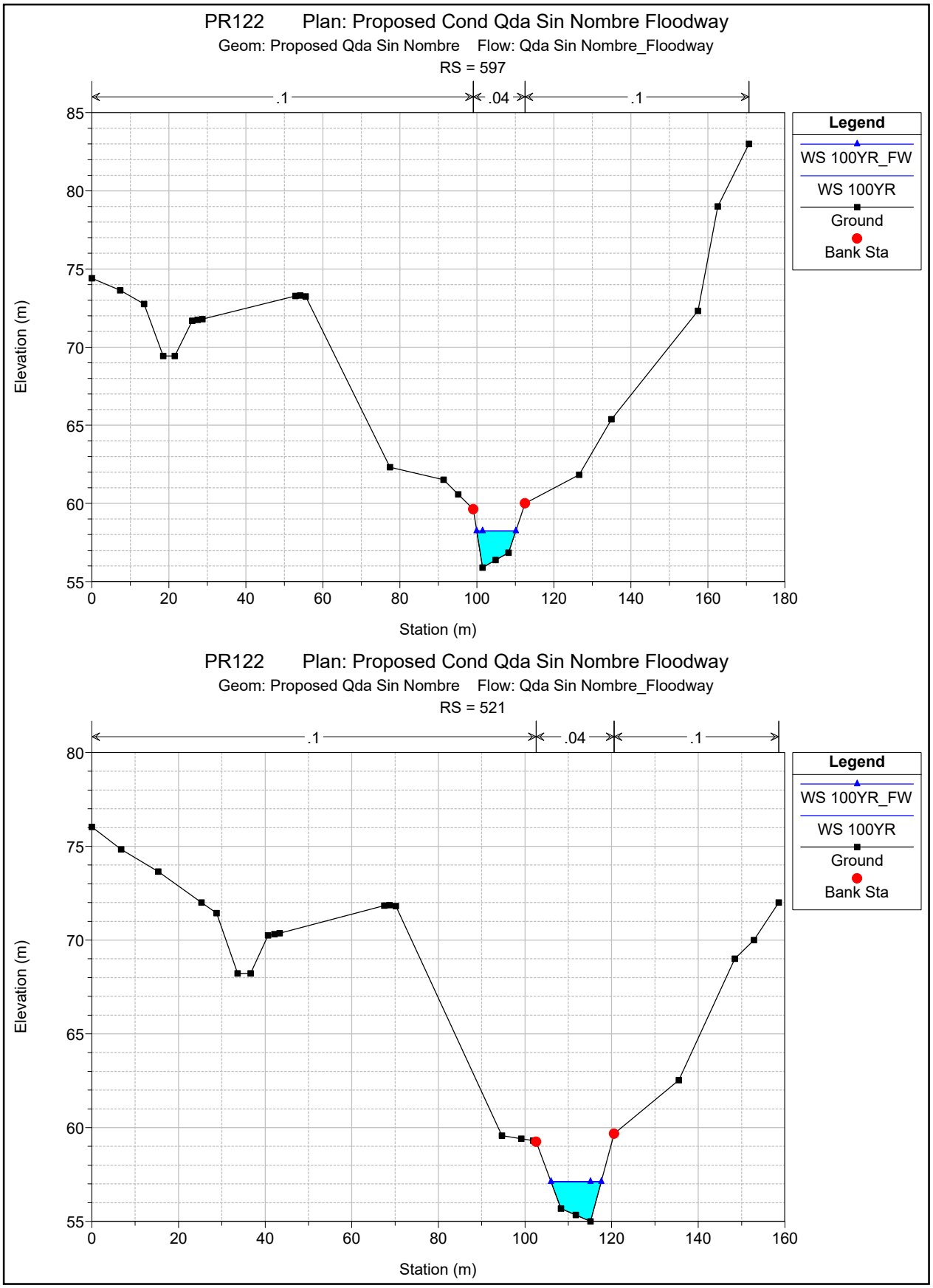
HEC-RAS Plan: Prop QSN Floodway River: Qda Sin Nombre Reach: PR122

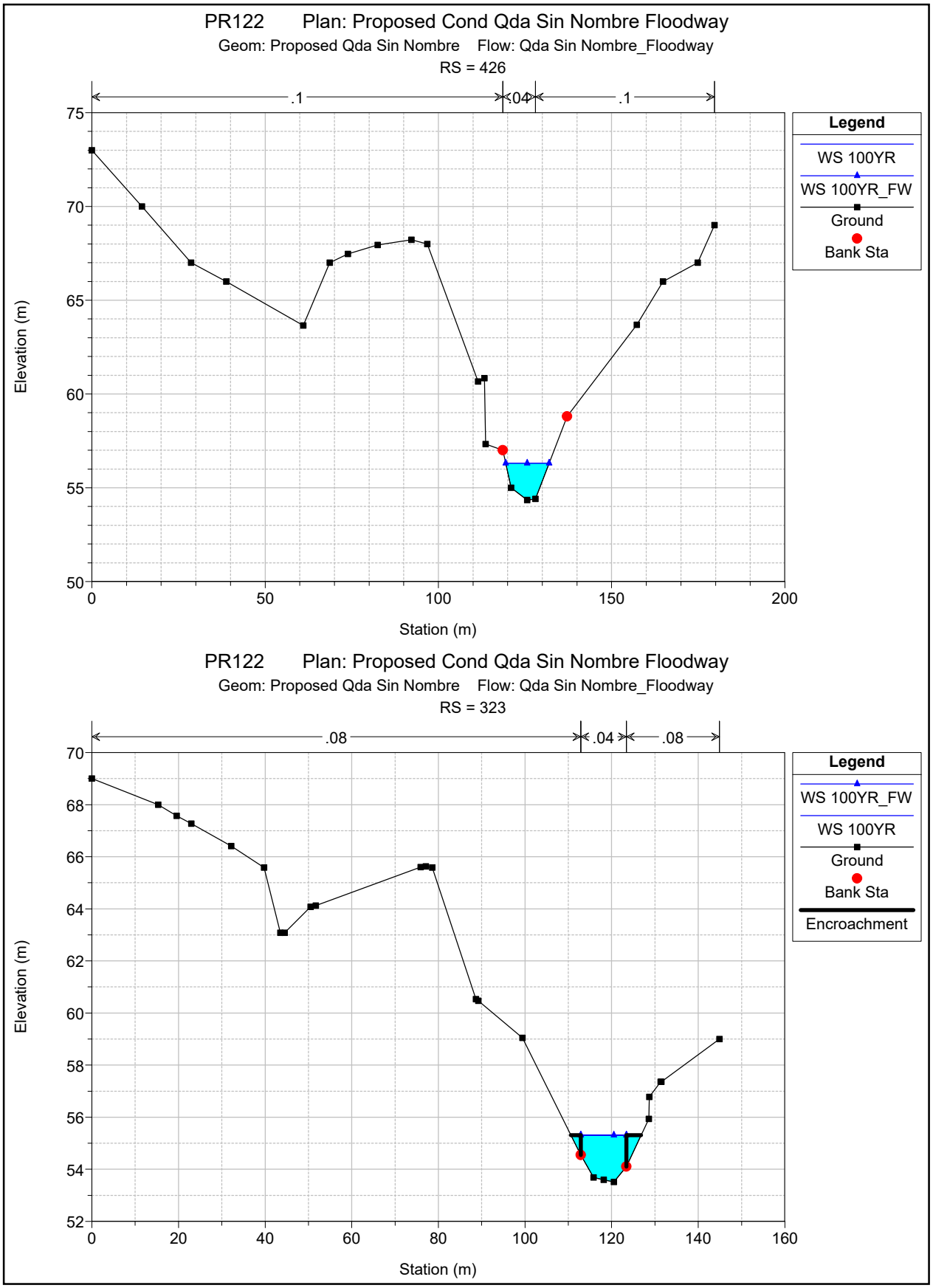
| Reach | River Sta | Profile | Q Total | Min Ch El | W.S. Elev | Crit W.S. | E.G. Elev | E.G. Slope | Vel Chnl | Flow Area | Top Width | Froude # Chl |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | (m3/s) | (m) | (m) | (m) | (m) | (m/m) | (m/s) | (m2) | (m) | |
| PR122 | 1003 | 100YR | 61.40 | 63.08 | 64.60 | 64.70 | 65.34 | 0.020014 | 3.81 | 16.12 | 13.67 | 1.12 |
| PR122 | 1003 | 100YR_FW | 61.40 | 63.08 | 64.60 | 64.70 | 65.34 | 0.020014 | 3.81 | 16.12 | 13.67 | 1.12 |
| | | | | | | | | | | | | |
| PR122 | 877 | 100YR | 61.40 | 60.86 | 62.96 | 62.96 | 63.66 | 0.015497 | 3.72 | 16.73 | 15.10 | 0.98 |
| PR122 | 877 | 100YR_FW | 61.40 | 60.86 | 62.94 | 62.94 | 63.67 | 0.016156 | 3.77 | 16.30 | 11.32 | 1.00 |
| | | | | | | | | | | | | |
| PR122 | 780 | 100YR | 61.40 | 58.80 | 61.35 | 61.35 | 62.19 | 0.017219 | 4.06 | 15.12 | 9.00 | 1.00 |
| PR122 | 780 | 100YR_FW | 61.40 | 58.80 | 61.35 | 61.35 | 62.19 | 0.017215 | 4.06 | 15.12 | 9.00 | 1.00 |
| | | | | | | | | | | | | |
| PR122 | 662 | 100YR | 61.40 | 56.81 | 59.00 | 59.09 | 59.96 | 0.020734 | 4.33 | 14.17 | 8.59 | 1.08 |
| PR122 | 662 | 100YR_FW | 61.40 | 56.81 | 59.00 | 59.09 | 59.96 | 0.020739 | 4.33 | 14.17 | 8.59 | 1.08 |
| | | | | | | | | | | | | |
| PR122 | 597 | 100YR | 61.40 | 55.89 | 58.24 | 58.24 | 59.02 | 0.016889 | 3.90 | 15.74 | 10.17 | 1.00 |
| PR122 | 597 | 100YR_FW | 61.40 | 55.89 | 58.24 | 58.24 | 59.02 | 0.016889 | 3.90 | 15.74 | 10.17 | 1.00 |
| | | | | | | | | | | | | |
| PR122 | 521 | 100YR | 61.40 | 55.00 | 57.12 | 57.12 | 57.83 | 0.016082 | 3.74 | 16.43 | 11.60 | 1.00 |
| PR122 | 521 | 100YR_FW | 61.40 | 55.00 | 57.12 | 57.12 | 57.83 | 0.016082 | 3.74 | 16.43 | 11.60 | 1.00 |
| | | | | | | | | | | | | |
| PR122 | 426 | 100YR | 61.40 | 54.34 | 56.30 | 56.30 | 56.98 | 0.038488 | 3.64 | 16.88 | 12.53 | 1.00 |
| PR122 | 426 | 100YR_FW | 61.40 | 54.34 | 56.30 | 56.30 | 56.98 | 0.038488 | 3.64 | 16.88 | 12.53 | 1.00 |
| | | | | | | | | | | | | |
| PR122 | 323 | 100YR | 61.40 | 53.51 | 55.31 | 55.31 | 55.98 | 0.012878 | 3.69 | 18.85 | 16.22 | 0.96 |
| PR122 | 323 | 100YR_FW | 61.40 | 53.51 | 55.31 | 55.31 | 56.07 | 0.017572 | 3.85 | 15.93 | 10.55 | 1.00 |
| | | | | | | | | | | | | |
| PR122 | 222 | 100YR | 61.40 | 53.46 | 55.58 | 55.58 | 56.20 | 0.012866 | 3.52 | 19.33 | 19.64 | 0.94 |
| PR122 | 222 | 100YR_FW | 61.40 | 53.46 | 55.55 | 55.55 | 56.24 | 0.016559 | 3.70 | 16.59 | 11.88 | 1.00 |
| | | | | | | | | | | | | |
| PR122 | 130 | 100YR | 61.40 | 52.41 | 53.42 | 53.88 | 54.98 | 0.011876 | 5.52 | 11.12 | 12.69 | 1.88 |
| PR122 | 130 | 100YR_FW | 61.40 | 52.41 | 53.44 | 53.88 | 54.93 | 0.011139 | 5.41 | 11.35 | 12.70 | 1.83 |
| | | | | | | | | | | | | |
| PR122 | 4 | 100YR | 61.40 | 48.20 | 49.49 | 50.31 | 52.65 | 0.027126 | 7.88 | 7.79 | 8.87 | 2.68 |
| PR122 | 4 | 100YR_FW | 61.40 | 48.20 | 49.49 | 50.31 | 52.68 | 0.027442 | 7.91 | 7.76 | 8.87 | 2.70 |

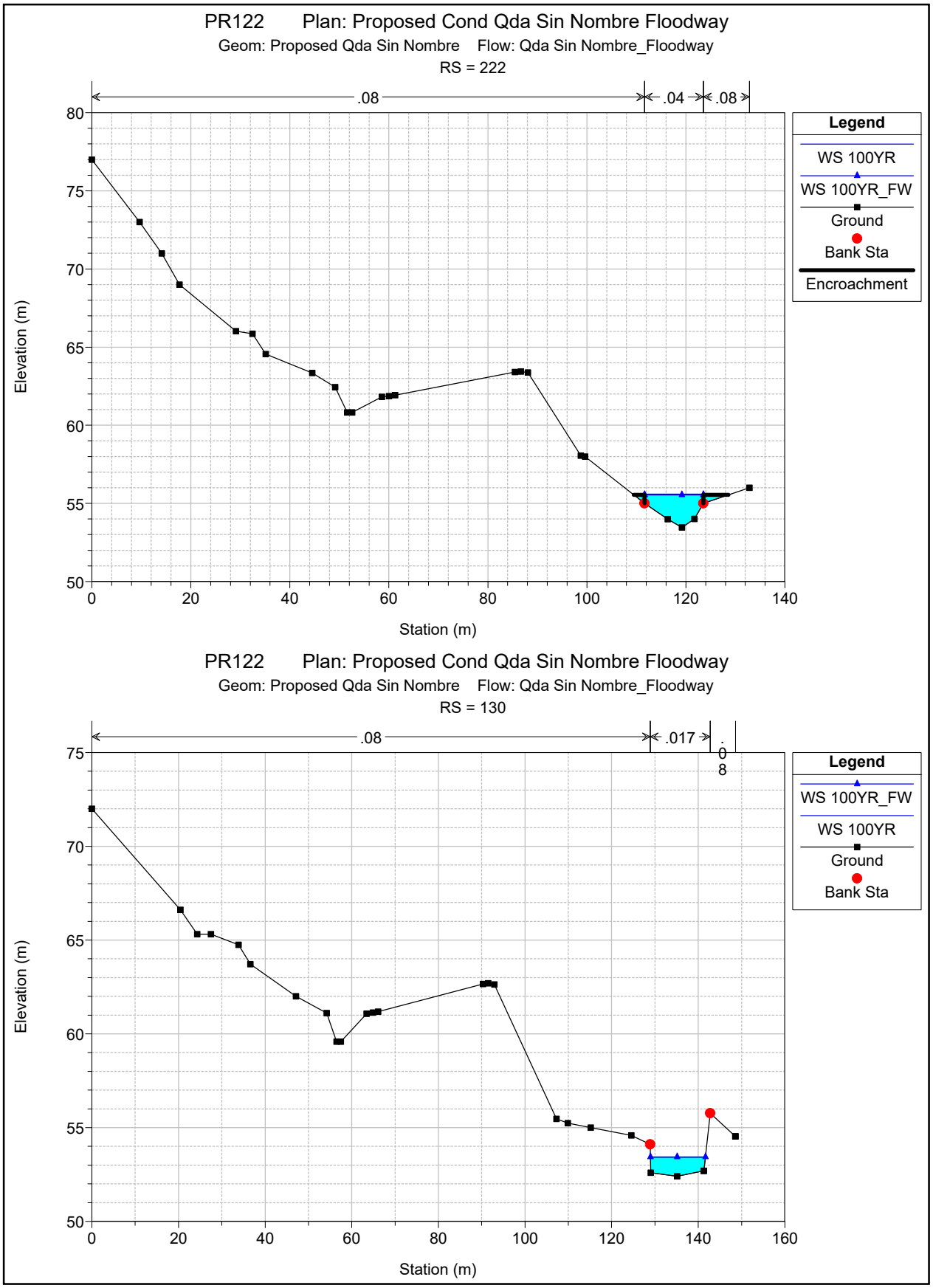

PR122 Plan: Proposed Cond Qda Sin Nombre Floodway
Geom: Proposed Qda Sin Nombre Flow: Qda Sin Nombre_Floodway
Qda Sin Nombre PR122
Legend
WS 100YR
WS 100YR_FW
Ground
Elevation (m)
66
64
62
60
58
56
54
52
50
48
0
200
400
600
800
1000
Main Channel Distance (m)


PR122 Plan: Proposed Cond Qda Sin Nombre Floodway
Geom: Proposed Qda Sin Nombre Flow: Qda Sin Nombre_Floodway
RS = 1003
.1
.04
.1
Legend
WS 100YR
WS 100YR_FW
Ground
Bank Sta
Elevation (m)
Station (m)
95
90
85
80
75
70
65
60
0
50
100
150
200
PR122 Plan: Proposed Cond Qda Sin Nombre Floodway
Geom: Proposed Qda Sin Nombre Flow: Qda Sin Nombre_Floodway
RS = 877
.1
.04
.1
Legend
WS 100YR
WS 100YR_FW
Ground
Bank Sta
Encroachment
Elevation (m)
Station (m)
110
100
90
80
70
60
0
20
40
60
80
100
120
140
160
180


PR122 Plan: Proposed Cond Qda Sin Nombre Floodway
Geom: Proposed Qda Sin Nombre Flow: Qda Sin Nombre_Floodway
RS = 780
.1
.04
.1
Legend
WS 100YR_FW
WS 100YR
Ground
Bank Sta
Elevation (m)
Station (m)
PR122 Plan: Proposed Cond Qda Sin Nombre Floodway
Geom: Proposed Qda Sin Nombre Flow: Qda Sin Nombre_Floodway
RS = 662
.1
.04
.1
Legend
WS 100YR
WS 100YR_FW
Ground
Bank Sta
Elevation (m)
Station (m)


PR122 Plan: Proposed Cond Qda Sin Nombre Floodway
Geom: Proposed Qda Sin Nombre Flow: Qda Sin Nombre_Floodway
RS = 597
.1
.04
.1
Legend
WS 100YR_FW
WS 100YR
Ground
Bank Sta
Elevation (m)
Station (m)
PR122 Plan: Proposed Cond Qda Sin Nombre Floodway
Geom: Proposed Qda Sin Nombre Flow: Qda Sin Nombre_Floodway
RS = 521
.1
.04
.1
Legend
WS 100YR_FW
WS 100YR
Ground
Bank Sta
Elevation (m)
Station (m)

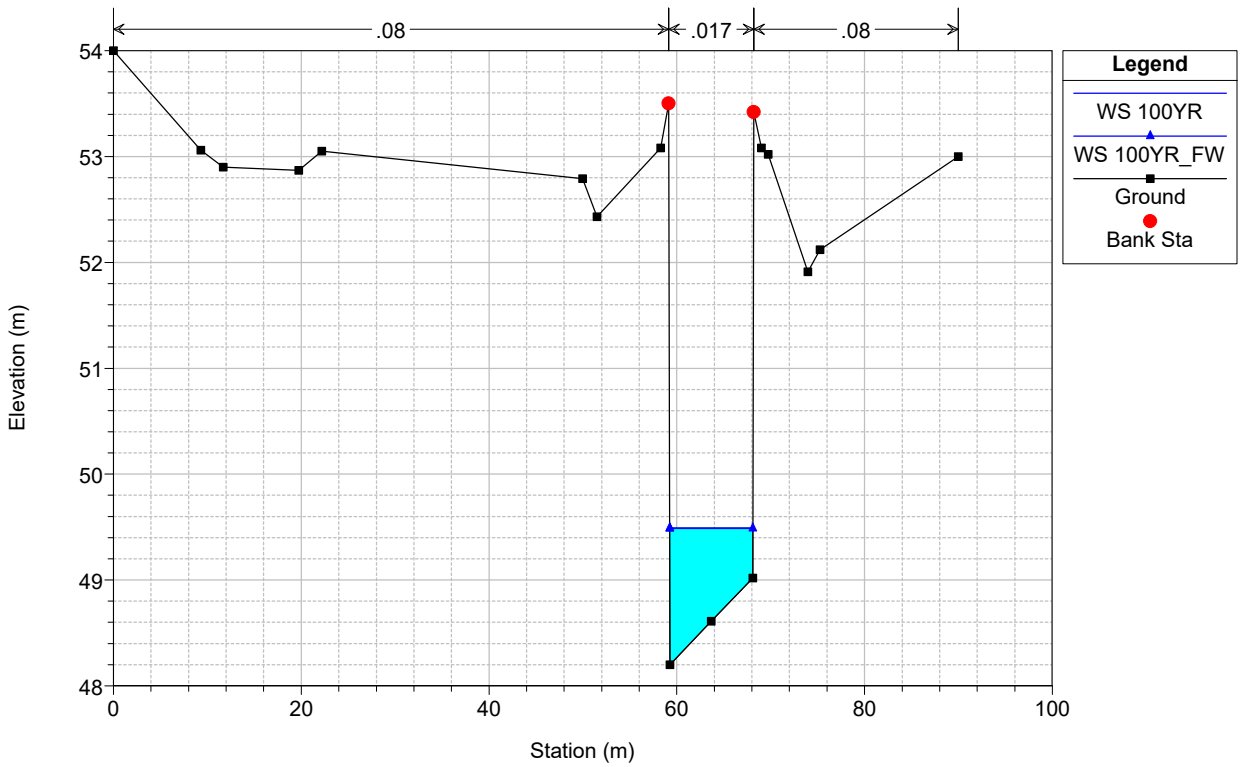

PR122 Plan: Proposed Cond Qda Sin Nombre Floodway
Geom: Proposed Qda Sin Nombre Flow: Qda Sin Nombre_Floodway
RS = 426
.1
.04
.1
Legend
WS 100YR
WS 100YR_FW
Ground
Bank Sta
Elevation (m)
Station (m)
PR122 Plan: Proposed Cond Qda Sin Nombre Floodway
Geom: Proposed Qda Sin Nombre Flow: Qda Sin Nombre_Floodway
RS = 323
.08
.04
.08
Legend
WS 100YR_FW
WS 100YR
Ground
Bank Sta
Encroachment
Elevation (m)
Station (m)


PR122 Plan: Proposed Cond Qda Sin Nombre Floodway
Geom: Proposed Qda Sin Nombre Flow: Qda Sin Nombre_Floodway
RS = 222
.08
.04
.08
Legend
WS 100YR
WS 100YR_FW
Ground
Bank Sta
Encroachment
Elevation (m)
Station (m)
PR122 Plan: Proposed Cond Qda Sin Nombre Floodway
Geom: Proposed Qda Sin Nombre Flow: Qda Sin Nombre_Floodway
RS = 130
.08
.017
.08
Legend
WS 100YR_FW
WS 100YR
Ground
Bank Sta
Elevation (m)
Station (m)

PR122 Plan: Proposed Cond Qda Sin Nombre Floodway

Geom: Proposed Qda Sin Nombre Flow: Qda Sin Nombre_Floodway

RS = 4



# Appendix E:

## *PARTIAL REPRODUCTION OF THE PR-122 DESIGN DRAWINGS*

| FEDERAL CODE NO. | AC. PROJECT CODE NO. | HIGHWAY | MUNICIPALITY | ISLAND | FISCAL YEAR | SHEET NO. | TOTAL SHEETS |
|---|---|---|---|---|---|---|---|
| -------- | AC-012201 R0000102001 | PR-122 | SAN GERMAN | PR | 2022 | 1 | 349 |

# SCHEDULE OF DRAWINGS

| SHEET NO. | DESCRIPTION | DWG. NO. |
|---|---|---|
| 1 | TITLE SHEET | GR/1 |
| 2 | GENERAL NOTES & ABBREVIATIONS | GR/2 |
| 3-7 | TYPICAL SECTIONS | GR/3-GR/7 |
| 8-10 | KEY PLAN AND VERTEX DATA | GR/8-GR/10 |
| 11-15 | MAINTENANCE OF TRAFFIC | MOT/1-MOT/5 |
| 16-29 | SOIL & SURVEY PLAN | SS/1-SS/14 |
| 30-53 | PLANS AND PROFILES | PP/1-PP/24 |
| 54-56 | INTERSECTION DETAILS PLANS | ID/1-ID/3 |
| 57-67 | DRAINAGE PLANS | DR/1-DR/11 |
| 68-77 | WATER UTILITY PLANS (P.R.A.S.A.) | UTW/1-UTW/10 |
| 78-87 | ELECTRICAL UTILITY PLANS (LUMA) | UTE/1-UTE/10 |
| 88-97 | TCABLE TV UTILITY PLANS | CTV/1-CTV/10 |
| 98-107 | P.R.T.C. UTILITY PLANS | UTT/1-UTT/10 |
| 108-118 | LIGHTING UTILITY PLANS | LT/1-LT/11 |
| 119-129 | TRAFFIC SIGNING AND PAVEMENT MARKING PLANS | TS/1-TS/11 |
| 130-139 | TREE INVENTORY AND MITIGATION PLANS | RD/1-RD/10 |
| 140-151 | BRIDGE No. 1 PLANS | BR/1-BR/12 |
| 152 | BRIDGE No. 1A PLANS | BR/1 |
| 153-164 | BRIDGE No. 2 PLANS | BR/1-BR/12 |
| 165 | PLAN AND ELEVATION BOX CULVERT | BC/1 |
| 166-172 | RETAINING WALL (GABION) | RW/1-RW/7 |
| 173-177 | M.S.E. RETAINING WALL SYSTEMS | MSEW/1-MSEW/5 |
| 178-314 | CROSS SECTIONS LINE PR-122 | CS/1-CS/137 |
| 315-317 | CROSS SECTIONS LINE PR-321 | CS/138-CS/140 |
| 318-325 | CROSS SECTIONS LINE LOCAL ROAD | CS/141-CS/148 |
| 326 | CROSS SECTIONS LINE ACCESS ROAD | CS/149 |
| 327-336 | CROSS SECTIONS LINE RAMP-AB | CS/150-CS/159 |
| 337-339 | CROSS SECTIONS LINE RAMP-CD | CS/160-CS/162 |
| 340-349 | RIGHT OF WAY PLANS | ROW/1-ROW/10 |

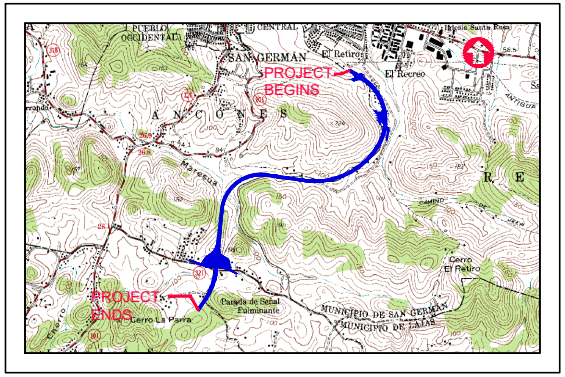
NOTE :

"ALL WORK ON THIS PROJECT SHALL BE PERFORMED AND ALL MATERIALS SHALL BE IN STRICT ACCORDANCE WITH THE STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION AND GENERAL PROVISIONS APPROVED BY THE PUERTO RICO HIGHWAY AND TRANSPORTATION AUTHORITY IN 2005 AND SUBSEQUENT AMENDMENTS IN EFFECT AT THE TIME OF BIDDING, WITH THE STANDARD DRAWINGS, WITH THESE PLANS AND WITH ALL SPECIAL PROVISION AND INSTRUCTIONS INCLUDED IN THE CONTRACT BOOK"

## GENERAL DESIGN CRITERIA — PR-122

| | |
|---|---|
| HIGHWAY DESIGN CODE | = HDM, AASHTO 2011 |
| STRUCTURE DESIGN CODE | = AASHTO LRFD 9TH EDITION, 2020 |
| DESIGN CLASS CODE (PRHTA GENERAL DESIGN STANDARD) | = R-5 |
| FUNCTIONAL HIGHWAY CLASSIFICATION (AASHTO) | = RURAL ALTERIAR |
| FUNCTIONAL HIGHWAY CLASSIFICATION (PRHTA) | = RURAL ALTERIAR |
| CONTROL OF ACCESS (FULL, PARTIAL, NONE) | = NONE |
| AVERAGE DAILY TRAFFIC. (2002) | = 24,039 |
| DESIGN HOURLY VOLUME (DHV) | = 1,863 |
| DIRECTIONAL DISTRIBUTION (D) | = 65% |
| PERCENT OF TRUCK (T) | = 5% |
| DESIGN SPEED (V) | = 50 M.P.H. |
| TYPE OF TERRAIN (LEVEL, ROLLING, MOUNTAINOUS) | = MOUNTAINOUS |
| MINIMUM CURVE. RADIUS | = 230 M |
| MAXIMUM SUPERELEVATION | = 8% |
| DESIGN LOAD FOR STRUCTURES | = HS30-44 |
| DESIGN EXCEPTION? (YES. OR NO). | = NO |

| EXCEPTION DESCRIPTION | APPROVAL DATE BY PRHTA |
|---|---|
| | |
| | |
| | |




LOCATION PLAN




NET LENGTH OF PROJECT ..... 2.893 Kms. = 1.798 Mi.
TOTAL LENGTH OF ROADWAY..... 2.789 Kms. = 1.733 Mi.
TOTAL LENGTH OF BRIDGRS ..... ... 0.104 Kms. = 0.065 Mi.

# PRELIMINARY PLANS

**A.C. CODE NO. AC-012201**

EXTENSION HIGHWAY PR-122
FROM EXISTING PR-321 TO EXISTING PR-166

**MUNICIPALITY OF SAN GERMAN, PUERTO RICO**

COMMONWEALTH OF PUERTO RICO
DEPARTMENT OF TRANSPORTATION
AND PUBLIC WORKS

# HIGHWAY & TRANSPORTATION AUTHORITY

## D E S I G N A R E A

COMMONWEALTH OF PUERTO RICO
HIGHWAY & TRANSPORTATION AUTHORITY

**SUBMITTED:**

LUIS E. RODRIGUEZ ROSA, PE — DATE
SUBDIRECTOR, PROGRAMMING AND SPECIAL STUDIES AREA

LISSETTE LUGO COLÓN, PE — DATE
DIRECTOR, TRAFFIC ENGINEERING AND OPERATIONS AREA

MARIA I. AYALA RIVERA, PE — DATE
DIRECTOR, CONSTRUCTION AREA

ALEXANDRA VELÁZQUEZ DELGADO, PE — DATE
SUBDIRECTOR, DESIGN AREA

CARLOS A. LLOVERAS MATTEI, PE — DATE
DIRECTOR, ESTIMATES AND BIDS OFFICE

**RECOMMENDED AND APPROVED:**

DR. EDWIN E. GONZÁLEZ MONTALVO, PE — DATE
EXECUTIVE DIRECTOR

PREPARED BY
*BEHAR-YBARRA & ASSOCIATES L.L.C.*
CONSULTING ENGINEERS AND ARCHITECTS

ENGINEER LIC. NO.19609 — DATE

| WORK | BY | DATE |
|---|---|---|
| DESIGN | | |
| DRAWING | | |
| TRACED | | |
| CHECKED | | |
| FINAL CHECK | | |

PLOT DATE: March 26, 2024

| FEDERAL CODE NO. | AC. PROJECT CODE NO. | HIGHWAY | MUNICIPALITY | ISLAND | FISCAL YEAR | SHEET NO. | TOTAL SHEETS |
|---|---|---|---|---|---|---|---|
| ------- | AC-012201 R0000102001 | PR-122 | SAN GERMAN | PR | 2022 | 2 | 349 |

# ABBREVIATIONS:

## ROAD ALIGNMENT HORIZONTAL

| | |
|---|---|
| △ | CENTRAL ANGLE OF CIRCULAR CURVE |
| DIST | DISTANCE |
| E | EXTERNAL |
| L | TOTAL LENGTH OF CURVE |
| PC | POINT OF CIRCULAR CURVE |
| PI | POINT OF INTERSECTION OF TWO TANGENTS |
| PT | POINT OF TANGENCY |
| R | RADIUS |
| T | TANGENT |

## ROAD ALIGNMENT VERTICAL

| | |
|---|---|
| PVC | POINT OF VERTICAL CURVE |
| PVI | POINT OF VERTICAL INTERSECTION |
| PVT | POINT OF VERTICAL TANGENCY |
| VC | VERTICAL CURVE |

## UTILITY COMPANY / AGENCY ABBREVIATIONS

| | |
|---|---|
| AASHTO | AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS |
| ACI | AMERICAN CONCRETE INSTITUTE |
| ASTM | AMERICAN SOCIETY FOR TESTING AND MATERIALS |
| CATV | CABLE TV |
| DTPW | DEPARTMENT OF TRANSPORTATION AND PUBLIC WORKS |
| FGCC | FEDERAL GEODETIC CONTROL COMMITTEE |
| FHWA | FEDERAL HIGHWAY ADMINISTRATION |
| NGS | NATIONAL GEODETIC SURVEY |
| PRASA | PUERTO RICO AQUEDUCT AND SEWER AUTHORITY |
| PREPA | PUERTO RICO ELECTRIC POWER AUTHORITY |
| PRHTA | PUERTO RICO HIGHWAY AND TRANSPORTATION AUTHORITY |
| PRTC | PUERTO RICO TELEPHONE COMPANY |
| USGS | UNITED STATES GEOLOGICAL SURVEY |

## MISCELLANEOUS

| | |
|---|---|
| & | AND |
| @ | AT |
| ∠ | ANGLE |
| ℄ | BASELINE |
| ⊏ | CHANNEL |
| ℄ | CENTER LINE |
| ∅ | DIAMETER |
| ℘ | PLATE OR PROPERTY LINE |
| ⊥ | PERPENDICULAR |
| A/E | ARCHITECT/ENGINEER |
| ABUT | ABUTMENT |
| A\C | AIR CONDITIONING |
| A.D.A. | AMERICAN DISABILITY ACT |
| ADJ | ADJUSTABLE |
| A.F.F | ABOVE FINISHED FLOOR |
| AGG | AGGREGATE |
| AL | ALUMINUM |
| ALIGN | ALIGNMENT |
| ALT | ALTERNATE |
| ANCH | ANCHOR |
| ANOD | ANODIZED |
| APP | APPROVED (REF) |
| APPROX | APPROXIMATELY |
| ARCH | ARCHITECT, ARCHITECTURAL |
| ASPH | ASPHALT |
| AUTO | AUTOMATIC |
| AUX | AUXILIARY |
| AVE | AVENUE |
| BEG | BEGIN OR BEGINNING |
| BF | BOTTOM FACE OR BACK FACE |
| BFP | BACKFLOW PREVENTER |
| BIT | BITUMINOUS |
| BITCONC | BITUMINOUS CONCRETE |
| BK | BACK |
| BL | BUILDING LINE |
| BLDG | BUILDING |
| BLVD | BOULEVARD |
| BM | BENCH MARK |
| B.O.P | BEGIN OF PROJECT |
| BOT | BOTTOM |
| B.P | BACK PLASTER/PLASTERED |
| BRG | BEARING |
| B.S | BOTH SIDES |
| BVL | BEVELED |
| BW | BOTTOM OF WALL OR BACK OF WALL |
| BWBF | BACK WALL BACK FACE |
| BWF | BARBED WIRE FENCE |
| B TO B | BACK TO BACK |
| CB | CATCH BASIN OR CONCRETE BASE |
| CEM | CEMENT |
| C.G | CORNER GUARD |
| CHAM | CHAMFER |
| CI | CAST IRON OR CURB INLET |
| CIP | CAST-IN-PLACE |
| CJ | CONTROL JOINT |
| ℄ | CENTERLINE |
| CLF | CHAIN LINK FENCE |
| CL | CLEARANCE OR CLEAR |
| CMP | CORRUGATED METAL PIPE |
| CO | CLEANOUT, COUNTRY, OR COMPANY |
| COL | COLUMN |
| COMM | COMMUNICATION |
| CONC | CONCRETE |
| COND | CONDUIT |
| CONN | CONNECT, CONNECTION, OR CONNECTOR |
| CONST | CONSTRUCT OR CONSTRUCTION |
| CONT | CONTINUED, CONTINUOUS, OR CONTINUATION |
| COORD | COORDINATE |
| CORR | CORRUGATE OR CORRUGATED |
| C.P.W. | CONCRETE PAVED WATERWAY |
| CP | CONCRETE PIPE OR CEMENT PIPE |
| CS | CONCRETE SLAB |
| CSW | CONCRETE SIDEWALK |
| C TO C | CENTER TO CENTER |
| CULV | CULVERT |
| CMU | CONCRETE MANSORY UNITS |
| CUM | CUBIC METER |
| D, d | DEPTH |
| DEG | DEGREES |
| DEPT | DEPARTMENT |
| DESC | DESCRIPTION |
| DET | DETAIL |
| DI | DUCTILE IRON, DROP INLET |
| DIA OR ∅ | DIAMETER |
| DIAG | DIAGRAM |
| DIM | DIMENSION |
| DIST | DISTANCE |
| DN | DOWN |
| DWG | DRAWING |
| E | EAST |
| EXP | EXPOSED, EXPANSION |
| EMERG | EMERGENCY |
| EA | EACH |
| EB | EASTBOUND |
| EF | EACH FACE |
| EG | EXISTING GROUND |
| EL | ELEVATION |
| ELEC | ELECTRIC OR ELECTRICAL |
| ELECT | ELECTRIC (REF) |
| ELEV | ELEVATION |
| EMH | ELECTRICAL MANHOLE |
| E.O.P | END OF PROJECT |
| EP | EDGE OF PAVEMENT |
| EQ | EQUAL |
| EQUIP | EQUIPMENT |
| ETC | ETCETERA |
| EW | EACH WAY |
| EX OR EXIST | EXISTING |
| EXP | EXPANSION |
| EXT | EXTERIOR, EXTERNAL |
| EST | ESTIMATE |
| EP | ELECTRIC POLE |
| F.A | FIRE ALARM |
| F.D | FLOOR DRAIN |
| FFE | FINISHED FLOOR ELEVATION |
| FG | FINISH GRADE |
| FH | FIRE HYDRANT |
| FIN | FINISH |
| FLR | FLOOR |
| F TO F | FACE TO FACE |
| FWD | FORWARD |
| G | GAS OR GAS LINE |
| GA | GAUGE (GAGE) |
| GALV | GALVANIZE OR GALVANIZED |
| GAL(S) | GALLON(S) |
| GEN | GENERAL |
| GRD | GROUND |
| GP | GENERAL |
| GRN | GRANITE |
| G.S.M | GALVANIZED SHEET METAL |
| GV | GATE VALVE, GAS VALVE |
| GW | GUY WIRE |
| GYP | GYPSUM |
| H | HEIGHT |
| HB | HOSE BIBB |
| H.D | HEAVY DUTY |
| HORIZ | HORIZONTAL |
| HOV | HIGH OCCUPANCY VEHICLE |
| HP | HIGH POINT |
| HW | HIGH WATER |
| HWY | HIGHWAY |
| HYD | HYDRANT |
| ID | INSIDE DIAMETER |
| IE | INVERT ELEVATION |
| INCL | INCLUDING |
| INV | INVERT |
| INT | INTERIOR |
| JB | JUNCTION BOX |
| J.F | JOINT FILLER |
| JT | JOINT |
| L | LINE, LINING, OR LENGTH OF CURVE |
| LAT | LATERAL |
| LIN | LINEAR |
| LM | LINEAR METER |
| LOC | LOCATION |
| LP | LOW POINT OR LIGHT POLE |
| LT | LIGHTING |
| LW | LIGHTWEIGHT |
| MAINT | MAINTENANCE |
| MAX | MAXIMUM |
| MECH | MECHANICAL |
| MED | MEDIUM |
| MH | MANHOLE |
| MIN | MINIMUM, MINUTE |
| MISC | MISCELLANEOUS |
| mm | MILLIMETERS |
| MON | MONUMENT |
| MSL | MEAN SEA LEVEL |
| M | METER |
| MTD | MOUNT, MOUNTED |
| MTG | MOUNTING |
| MTL, MET | METAL |
| N | NORTH |
| N/A | NOT APPLICABLE |
| NB | NORTHBOUND |
| NF | NEAR FACE |
| NIC | NOT IN CONTRACT |
| NO. OR # | NUMBER |
| NOM | NOMINAL |
| N/R | NON-RATED |
| NS | NEAR SIDE |
| N.T.S | NOT TO SCALE |
| O/ | OVER |
| O.A | OVERALL |
| OD | OUTSIDE DIAMETER |
| O.C | ON CENTER, CENTERS |
| OH | OVERHEAD |
| OPP | OPPOSITE |
| P | PIPE |
| PB | PULL BOX |
| PC | PRECAST |
| PCCP | PORTLAND CEMENT CONCRETE PAVEMENT |
| PED | PEDESTRIAN |
| PERF | PERFORATE, PERFORATED |
| PG | PROPOSED GRADE |
| PGL | PROFILE GRADE LINE |
| PM | PARKING METER |
| POB | PLASTIC OFFSET BLOCK |
| P.R | PUERTO RICO |
| PROD | PRODUCT |
| PROJ | PROJECTION OR PROJECT |
| PROP | PROPERTY OR PROPOSED |
| P/STRIP | PLANTING STRIP |
| PT | POINT |
| PVC | POLYVINYL CHLORIDE |
| PVMT | PAVEMENT |
| PWR | POWER |
| Q.T | QUARRY TILE |
| QTY | QUANTITY |
| QUAD | QUADRANT |
| RAD, R | RADIUS |
| RCP | REINFORCED CONCRETE PIPE |
| RD | ROAD |
| RDWAY | ROADWAY |
| REF | REFERENCE |
| REFL | REFLECT, REFLECTED, REFLECTIVE, REFLECTOR |
| REINF | REINFORCE, REINFORCED, OR REINFORCEMENT |
| REQ'D | REQUIRED OR REQUIRE |
| RET | RETAINING |
| RET/W | RETAINING WALL |
| REV | REVISE, REVISED, OR REVISION |
| ROW OR R/W | RIGHT-OF-WAY |
| RT | RIGHT |
| SCHED | SCHEDULE |
| SD | STORM DRAIN |
| SDMH | STORM DRAIN MANHOLE |
| SECT | SECTION |
| SHT | SHEET |
| SMH | SEWER MANHOLE |
| SPEC | SPECIFICATION(S) (REF) |
| SQ | SQUARE |
| SQM OR SM | SQUARE METER |
| SS | SANITARY SEWER OR STOP SIGN |
| SSMH | SANITARY SEWER MANHOLE |
| ST | STREET |
| STA | STATION |
| STD | STANDARD |
| STL | STEEL |
| STRUCT | STRUCTURE |
| SWK | SIDEWALK |
| SYM | SYMMETRICAL |
| SHDR | SHOULDER |
| T.D | TRENCH DRAIN |
| TE | TOP ELEVATION |
| TEL. OR T | TELEPHONE |
| TEMP | TEMPERATURE OR TEMPORARY |
| THK | THICK, THICKNESS |
| TL | TRAFFIC LIGHT |
| TMH | TELEPHONE MANHOLE |
| T.O.S | TOE OF SLOPE |
| T.O.C | TOP OF CONCRETE OR TOP OF CUT |
| T.O.W | TOP OF WALL |
| T.U. | TREN URBANO |
| TV | TELEVISION |
| TW | TOP OF WALL |
| TYP | TYPICAL |
| U.N.O. | UNLESS NOTED OTHERWISE |
| UD | UNDERDRAIN |
| V | VALVE, RATE OF SPEED, OR DESIGN SPEED |
| VERT | VERTICAL |
| W | WEST, WATER OR WOOD |
| W/ | WITH |
| WL | WATER LEVEL |
| WM | WATER MAIN OR WATER METER |
| WMH | WATER MANHOLE |
| W/O | WITHOUT |
| WP | WORKING POINT, WORK POINT OR WATERPROOFING |
| WV | WATER VALVE |
| X-DRAIN | CROSS DRAIN |
| X-ING | CROSSING |
| X-SECT | CROSS SECTION |
| ZR | ZINC ROOF |
| ZW | ZINC WALLS |

# PROJECT GENERAL NOTES:

1. ALL DISTANCES AND ELEVATIONS ARE IN METERS UNLESS OTHERWISE NOTED.
2. FIELD SURVEY WAS PERFORMED BY ANTONIO MELENDEZ AND ASOC, PSC. ON JANUARY-2023.
3. ALL STRUCTURES TO BE REMOVED, DEMOLITION, AND PROPER DISPOSAL SHALL BE PERFORMED BY THE CONTRACTOR UNLESS OTHERWISE NOTED, AND PAID UNDER REMOVAL OF STRUCTURES AND OBSTRUCTIONS. PRHTA SPEC.202.
4. IN CASE OF DOUBT IN THE INTERPRETATION OF ANY ASPECTS OF THESE DRAWINGS AND/OR SPECIFICATIONS, THE ENGINEER SHALL BE CONSULTED.
5. INFORMATION PROVIDED ON THESE PLANS MAY OR MAY NOT SHOW ALL EXISTING STRUCTURE AND UTILITIES ABOVE OR BELOW GROUND. BEFORE BEGINNING THE WORK CONTRACTOR SHALL BE RESPONSIBLE FOR VISITING THE ENTIRE PROJECT SITE AND VERIFY WITH THE UTILITY COMPANIES THE EXACT LOCATION OF ALL EXISTING UTILITIES.
6. IT IS THE CONTRACTOR'S RESPONSIBILITY TO RESTORE TO THE ORIGINAL CONDITION, DAMAGES MADE TO SIDEWALKS, CURBS, PAVEMENT OR PRIVATE PROPERTY OUTSIDE THE CONSTRUCTION LIMIT OR NOT INCLUDED IN THE SCOPE.
7. CONTRACTOR IS RESPONSIBLE TO COORDINATE WORK AMONG DISCIPLINES. IN CASE OF DOUBT, THE ENGINEER SHALL BE CONSULTED.
8. UTILITIES ARE NOT TO BE IMPACTED, THE CONTRACTOR SHALL MAINTAIN ALL UTILITIES IN SERVICE AT ALL TIMES DURING THE CONSTRUCTION.
9. CONTRACTOR IS RESPONSIBLE TO OBTAIN THE LATEST STANDARD DRAWINGS FROM THE PRHTA IN ORDER TO BE USED IN THE CONSTRUCTION OF THIS PROJECT.
10. ALL CONCRETE BARRIERS TO BE INSTALED IN THIS PROJECT SHALL BE DONE AS STANDARD DRAWINGS DATED DECEMBER 2017.
11. ALL METAL GUARDRAILS TO BE INSTALLED IN THIS PROJECT SHALL BE DONE AS STANDARD DRAWINGS DATED JUNE 2018.
12. EXISTING TEMPORARY CONCRETE BARRIERS, GUARDRAIL, AND TRAFFIC SIGNS THAT ARE GOING TO BE REMOVED, SHALL BE DELIVERY TO P.R.H.T.A. AT CONTRACTOR EXPENSES.
13. THE CONTRACTOR SHALL CONTACT THE PRHTA SOIL ENGINEERING OFFICE, FOR THE INSPECTION OF ALL NECESSARY EXCAVATIONS FOR THE STRUCTURES TO BE CONSTRUCTED.
14. ALL DRAINAGE STRUCTURES, (PIPES, MANHOLES, INLETS, HEADWALLS) INDICATED TO REMAIN SHALL BE CLEANED AND REPAIR AS PER SPEC. 632.
15. PAVEMENT MARKING SHALL BE AS PER SPEC. 618. PROPOSED PAVEMENT MARKING SHALL MATCH WITH EXISTING PAVEMENT MARKING OF THE ROADWAY.
16. ALL EXISTING SHOULDERS AND DITCHES SHALL BE RECONDITIONED AS PER SPEC. 212.
17. THE CONTRACTOR SHALL DOCUMENTS WITH PHOTOS THE EXISTING CONDITION OF ALL STRUCTURES OF THE AREA BEFORE THE BEGINNING OF WORKS. PERIODIC DOCUMENTATIONS SHALL BE REALIZED EVERY MONTH OR AFTER A MAJOR EVENT DURING THE CONSTRUCTION TIME.
18. AN ALLOWANCE WAS ESTABLISHED TO REALIZED GEOTHECNICAL FIELD TEST DURING THE CONSTRUCTION TO VERIFIED THE LOCATION AND FINAL PARAMETERS FOR THE FOOTING FOR THE INSTALLATION OF THE ROCKFALL BARRIER SYSTEM.
19. THE PROPOSED ROCKFALL BARRIER SYSTEM OR PROTECTIVE BARRIER SHALL COMPLY WITH THE SPECIFICATIONS OF "GEOBRUGG RXE-1000" OR APPROVED EQUAL AS INDICATED ON DWGS. SS OF THIS PLANS. ALL CONCRETE, GROUT, REBARS, MACHINARY, SPECIAL EQUIPMENT, AND ALL REQUIRED ELEMENTS FOR THE INSTALLATION AND CONSTRUCTION OF THE BARRIER SYSTEM SHALL BE SUBSIDIARY OF THE PROTECTIVE BARRIER PAID ITEM.

| WORK | BY | DATE |
|---|---|---|
| DESIGN | | |
| DRAWING | | |
| TRACED | | |
| CHECKED | | |
| FINAL CHECK | | |

PUERTO RICO HIGHWAY & TRANSPORTATION AUTHORITY
*BEHAR YBARRA & ASSOCIATES LLC*
*CONSULTING ENGINEERS AND ARCHITECTS*

EXTENSION HIGHWAY PR-122
FROM EXISTING PR-321 TO EXISTING PR-166

DATE | REVISION

NOT TO SCALE

GENERAL NOTES AND ABBREVIATIONS

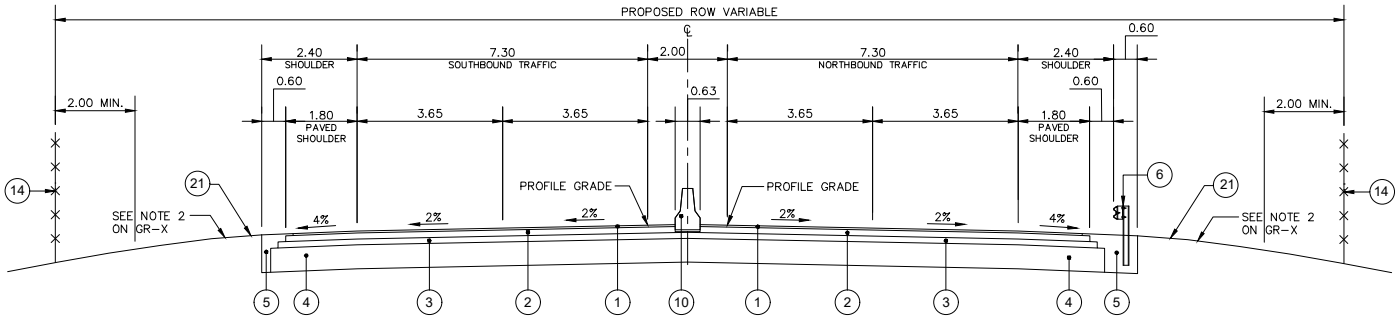
GR / 2

PLOT DATE: March 26, 2024
FILE NAME = BYA FILE:\\BYASERVER1\Projects\22002-PR-122 Preliminary Plans\04-Preliminary Plans\01-GV\002-AC-800845-GR-02.dwg

| FEDERAL CODE NO. | AC. PROJECT CODE NO. | HIGHWAY | MUNICIPALITY | ISLAND | FISCAL YEAR | SHEET NO. | TOTAL SHEETS |
|---|---|---|---|---|---|---|---|
| ------- | AC-012201 | PR-122 | SAN GERMAN | PR | 2022 | 3 | 349 |
| | R0000102001 | | | | | | |

## LEGEND:

1. 0.05m. HOT PLANT-MIX BITUMINOUS PAVEMENT MIX TYPE S-1 (75) (SPEC._____).
2. 0.15m. HOT PLANT-MIX BITUMINOUS PAVEMENT MIX TYPE B-1 (75) (SPEC._____).
3. 0.15m. AGREGATE BASE COURSE, CLASS "A".
4. 0.80m. BORROW MATERIAL, CLASS "B" (A-2-4) (SPEC. 203, 207, AND 301).
5. SELECTED BORROW MATERIAL, CLASS "O".
6. CORRUGATE STEEL BEAM GUARDRAIL, SINGLE FACE (WHERE CALLED FOR ON PLANS)
7. CONCRETE CURB TYPE-D (SPEC. 609 AND STD. DWG. DR-____)
8. 0.10m. CONCRETE MEDIAN (SPEC._____)
9. CONCRETE MEDIAN BARRIER TYPE "A" (SPEC. 610 AND STD. DWG. CB'S DATED DECEMBER 2017. (FOR LOCATION SEE DWG'S PP)
10. CONCRETE MEDIAN BARRIER TYPE "E" (SPEC. 610 AND STD. DWG. CB'S DATED DECEMBER 2017. (FOR LOCATION SEE DWG'S PP)
11. 0.05m. HOT PLANT-MIX BITUMINOUS PAVEMENT MIX TYPE S-1 (50) (SPEC._____).
12. 0.10m. HOT PLANT-MIX BITUMINOUS PAVEMENT MIX TYPE B-1 (50) (SPEC._____).
13. 0.50m. BORROW MATERIAL, CLASS "B" (A-2-4) (SPEC. 203, 207, AND 301).
14. BARBED WIRE FENCE, TYPE "A" (SPEC._____).
15. 0.30 LEAN CONCRETE (SPEC. 305).
16. CONCRETE BARRIER TYPE "B" (SPEC._____).
17. CONCRETE BARRIER TYPE "D" (SPEC._____).
18. GABION WALL (SEE PRHTA STD. DWG. GABI 10 OF 20) (SPEC. 614).
19. SLOTTED PIPE DRAIN (SEE DRAINAGE SHEETS FOR SIZES).
20. RETAINING WALL.
21. SEEDIMG WITH MULCH (SPEC. 622).



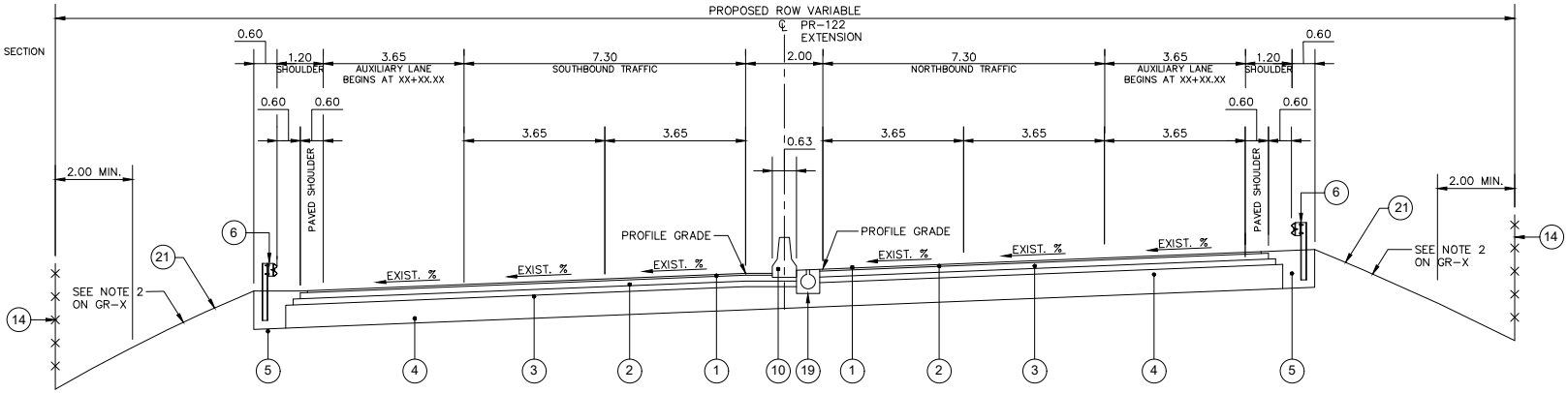

PR-122 EXTENSION W / MEDIAN BARRIER (1)
FROM STA. XX+XX.XX TO STA. XX+XX.XX (EXIST.=NC)
FROM STA. XX+XX.XX TO STA. XX+XX.XX (EXIST.=NC)
SCALE=1:60

## NOTE:

1-FOR CURB AND BARRIER DETAILS SEE P.R.H.T.A. STANDARD MODELS.

2-NORMAL SLOPES
FILL 6:1 (0.00 TO 2.0)
FILL 4:1 (2.00 TO 4.0)
FILL 2:1 (OVER 4.00 HEIGHT)
CUT (SEE DETAILS ON SHEET GR-___)

3-NFOR SUPERELEVATION TRANSITION SECTION SEE THE CROSS SECTION AND PROFILE DRAWINGS.




PR-122 EXTENSION - SUPERELEVATED SECTION W / MEDIAN BARRIER (2)
FROM STA. XX+XX.XX TO STA. XX+XX.XX (EXIST.=6.0%)
SCALE=1:60

| | | |
|---|---|---|
| WORK | DESIGN | |
| | DRAWING | |
| | TRACED | |
| | CHECKED | |
| | FINAL CHECK | |

| DATE | BY |
|---|---|
| | |

PUERTO RICO HIGHWAY & TRANSPORTATION AUTHORITY
*BEHAR YBARRA & ASSOCIATES LLC*
*CONSULTING ENGINEERS AND ARCHITECTS*

EXTENSION HIGHWAY PR-122
FROM EXISTING PR-321 TO EXISTING PR-166

| DATE | REVISION |
|---|---|
| | |

SCALE = 1 : 60
0 .5 1 2 3 4

TYPICAL SECTIONS

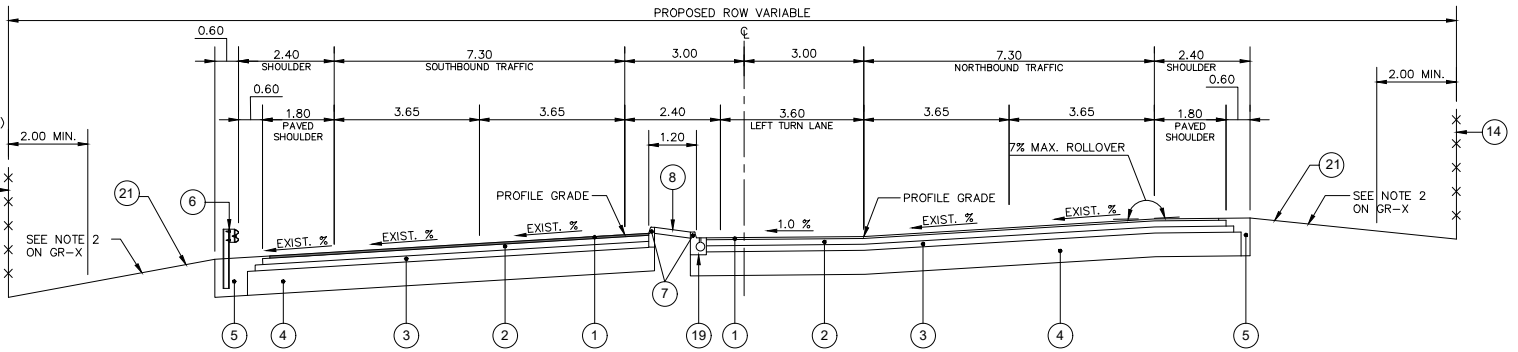
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3

PLOT DATE: March 26, 2024
BYA FILE: \\BYASERVER1\Projects\22002-PR-122 Preliminary Plans\04-Preliminary Plans\01-GR\003-AC-800645-GR-03.dwg

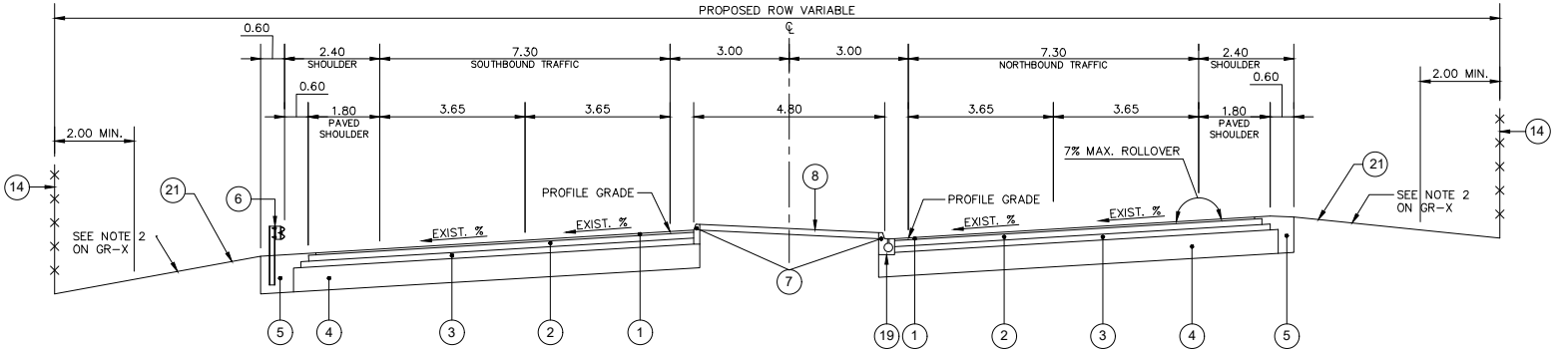
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|---|---|---|---|---|---|---|---|
| ------- | AC-012201 R0000102001 | PR-122 | SAN GERMAN | PR | 2022 | 4 | 349 |

## LEGEND:

1. 0.05m. HOT PLANT-MIX BITUMINOUS PAVEMENT MIX TYPE S-1 (75) (SPEC._____).
2. 0.15m. HOT PLANT-MIX BITUMINOUS PAVEMENT MIX TYPE B-1 (75) (SPEC._____).
3. 0.15m. AGREGATE BASE COURSE, CLASS "A".
4. 0.80m. BORROW MATERIAL, CLASS "B" (A-2-4) (SPEC. 203, 207, AND 301).
5. SELECTED BORROW MATERIAL, CLASS "O".
6. CORRUGATE STEEL BEAM GUARDRAIL, SINGLE FACE (WHERE CALLED FOR ON PLANS)
7. CONCRETE CURB TYPE-D (SPEC. 609 AND STD. DWG. DR-____)
8. 0.10m. CONCRETE MEDIAN (SPEC._____)
9. CONCRETE MEDIAN BARRIER TYPE "A" (SPEC. 610 AND STD. DWG. CB'S DATED DECEMBER 2017. (FOR LOCATION SEE DWG'S PP)
10. CONCRETE MEDIAN BARRIER TYPE "E" (SPEC. 610 AND STD. DWG. CB'S DATED DECEMBER 2017. (FOR LOCATION SEE DWG'S PP)
11. 0.05m. HOT PLANT-MIX BITUMINOUS PAVEMENT MIX TYPE S-1 (50) (SPEC._____).
12. 0.10m. HOT PLANT-MIX BITUMINOUS PAVEMENT MIX TYPE B-1 (50) (SPEC._____).
13. 0.50m. BORROW MATERIAL, CLASS "B" (A-2-4) (SPEC. 203, 207, AND 301).
14. BARBED WIRE FENCE, TYPE "A" (SPEC._____).
15. 0.30 LEAN CONCRETE (SPEC. 305).
16. CONCRETE BARRIER TYPE "B" (SPEC._____).
17. CONCRETE BARRIER TYPE "D" (SPEC._____).
18. GABION WALL (SEE PRHTA STD. DWG. GABI 10 OF 20) (SPEC. 614).
19. SLOTTED PIPE DRAIN (SEE DRAINAGE SHEETS FOR SIZES).
20. RETAINING WALL.
21. SEEDIMG WITH MULCH (SPEC. 622).




PR-122 EXTENSION – SUPERELEVATED SECTION W / LEFT TURN LANE (3)
FROM STA. XX+XX.XX TO STA. XX+XX.XX (EXIST.=TRANSITION)
SCALE=1:60




PR-122 EXTENSION – SUPERELEVATED SECTION W / MEDIAN BARRIER (4)
FROM STA. XX+XX.XX TO STA. XX+XX.XX (EXIST.=6.5%)
SCALE=1:60

## NOTE:

1-FOR CURB AND BARRIER DETAILS SEE P.R.H.T.A. STANDARD MODELS.

2-NORMAL SLOPES
FILL 6:1 (0.00 TO 2.0)
FILL 4:1 (2.00 TO 4.0)
FILL 2:1 (OVER 4.00 HEIGHT)
CUT (SEE DETAILS ON SHEET GR-___)

3-NFOR SUPERELEVATION TRANSITION SECTION SEE THE CROSS SECTION AND PROFILE DRAWINGS.

| DATE | BY | WORK |
|---|---|---|
| | | DESIGN |
| | | DRAWING |
| | | CHECKED |
| | | FINAL CHECK |

PUERTO RICO HIGHWAY & TRANSPORTATION AUTHORITY
*BEHAR YBARRA & ASSOCIATES LLC*
*CONSULTING ENGINEERS AND ARCHITECTS*

EXTENSION HIGHWAY PR-122
FROM EXISTING PR-321 TO EXISTING PR-166

DATE | REVISION

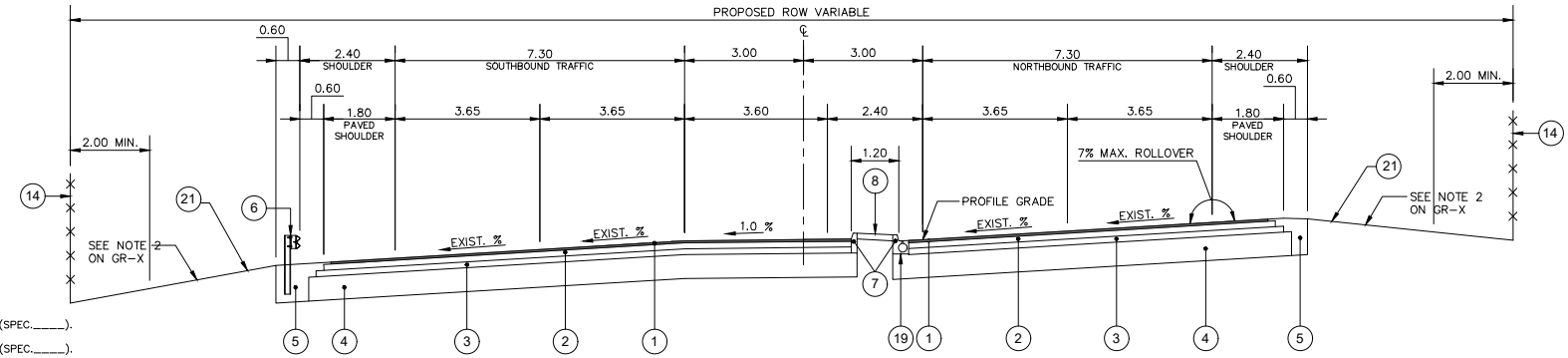
SCALE = 1 : 60
0 .5 1 2 3 4

TYPICAL SECTIONS

GR 4

PLOT DATE: March 26, 2024 BYA FILE: \\BYASERVER1\Projects\22002-PR-122 Preliminary Plans\04-Preliminary Plans\01-GI\004-AC-800545-GR-04.dwg

| FEDERAL CODE NO. | AC. PROJECT CODE NO. | HIGHWAY | MUNICIPALITY | ISLAND | FISCAL YEAR | SHEET NO. | TOTAL SHEETS |
|---|---|---|---|---|---|---|---|
| ------- | AC-012201<br>R0000102001 | PR-122 | SAN GERMAN | PR | 2022 | 5 | 349 |




PR-122 EXTENSION – SUPERELEVATED SECTION W / LEFT TURN LINE (5)
FROM STA. XX+XX.XX TO STA. XX+XX.XX (EXIST.=6.5%)
SCALE=1:60

## LEGEND:

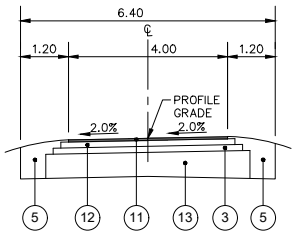
1. 0.05m. HOT PLANT-MIX BITUMINOUS PAVEMENT MIX TYPE S-1 (75) (SPEC._____).
2. 0.15m. HOT PLANT-MIX BITUMINOUS PAVEMENT MIX TYPE B-1 (75) (SPEC._____).
3. 0.15m. AGREGATE BASE COURSE, CLASS "A".
4. 0.80m. BORROW MATERIAL, CLASS "B" (A-2-4) (SPEC. 203, 207, AND 301).
5. SELECTED BORROW MATERIAL, CLASS "O".
6. CORRUGATE STEEL BEAM GUARDRAIL, SINGLE FACE (WHERE CALLED FOR ON PLANS)
7. CONCRETE CURB TYPE-D (SPEC. 609 AND STD. DWG. DR-____)
8. 0.10m. CONCRETE MEDIAN (SPEC._____)
9. CONCRETE MEDIAN BARRIER TYPE "A" (SPEC. 610 AND STD. DWG. CB'S DATED DECEMBER 2017. (FOR LOCATION SEE DWG'S PP)
10. CONCRETE MEDIAN BARRIER TYPE "E" (SPEC. 610 AND STD. DWG. CB'S DATED DECEMBER 2017. (FOR LOCATION SEE DWG'S PP)
11. 0.05m. HOT PLANT-MIX BITUMINOUS PAVEMENT MIX TYPE S-1 (50) (SPEC._____).
12. 0.10m. HOT PLANT-MIX BITUMINOUS PAVEMENT MIX TYPE B-1 (50) (SPEC._____).
13. 0.50m. BORROW MATERIAL, CLASS "B" (A-2-4) (SPEC. 203, 207, AND 301).
14. BARBED WIRE FENCE, TYPE "A" (SPEC._____).
15. 0.30 LEAN CONCRETE (SPEC. 305).
16. CONCRETE BARRIER TYPE "B" (SPEC._____).
17. CONCRETE BARRIER TYPE "D" (SPEC._____).
18. GABION WALL (SEE PRHTA STD. DWG. GABI 10 OF 20) (SPEC. 614).
19. SLOTTED PIPE DRAIN (SEE DRAINAGE SHEETS FOR SIZES).
20. RETAINING WALL.
21. SEEDIMG WITH MULCH (SPEC. 622).

## NOTE:

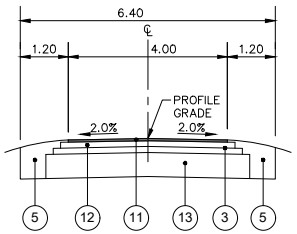
1-FOR CURB AND BARRIER DETAILS SEE P.R.H.T.A. STANDARD MODELS.

2-NORMAL SLOPES
FILL 6:1 (0.00 TO 2.0)
FILL 4:1 (2.00 TO 4.0)
FILL 2:1 (OVER 4.00 HEIGHT)
CUT (SEE DETAILS ON SHEET GR-___)

3-NFOR SUPERELEVATION TRANSITION SECTION SEE THE CROSS SECTION AND PROFILE DRAWINGS.




RELOCATION OF LOCAL ROAD STA. XX+XX (6)
SCALE=1:60




RELOCATION OF LOCAL ROAD STA. XX+XX (8)
SCALE=1:60

| WORK | BY | DATE |
|---|---|---|
| DESIGN | | |
| DRAWING | | |
| TRACING | | |
| CHECKED | | |
| FINAL CHECK | | |

PUERTO RICO HIGHWAY & TRANSPORTATION AUTHORITY
*BEHAR YBARRA & ASSOCIATES LLC*
*CONSULTING ENGINEERS AND ARCHITECTS*

EXTENSION HIGHWAY PR-122
FROM EXISTING PR-321 TO EXISTING PR-166

DATE | REVISION

SCALE = 1 : 60
0 .5 1 2 3 4

TYPICAL SECTIONS

GR
5

PLOT DATE: March 26, 2024 BYA FILE: \\BYASERVER1\Projects\22002-PR-122 Preliminary Plans\04-Preliminary Plans\01-GX\005-AC-8006545-GR-05.dwg

| FEDERAL CODE NO. | AC. PROJECT CODE NO. | HIGHWAY | MUNICIPALITY | ISLAND | FISCAL YEAR | SHEET NO. | TOTAL SHEETS |
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| ------- | AC-012201 | PR-122 | SAN GERMAN | PR | 2022 | 6 | 349 |
| | R0000102001 | | | | | | |

## LEGEND:

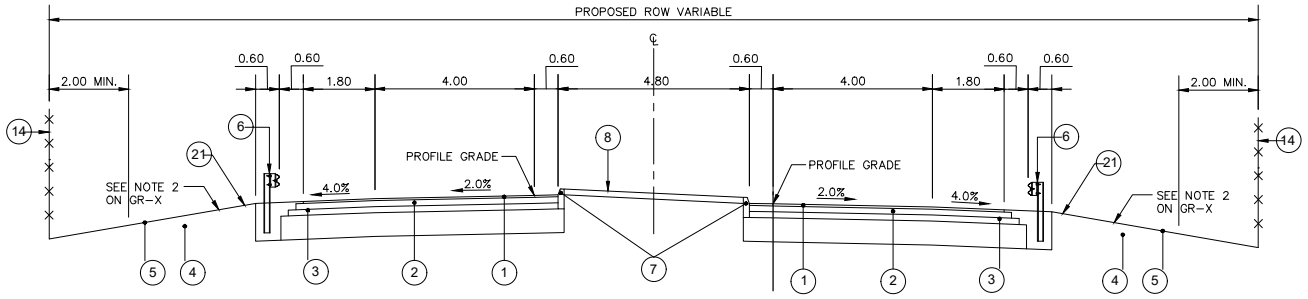
1. 0.05m. HOT PLANT-MIX BITUMINOUS PAVEMENT MIX TYPE S-1 (75) (SPEC._____).
2. 0.15m. HOT PLANT-MIX BITUMINOUS PAVEMENT MIX TYPE B-1 (75) (SPEC._____).
3. 0.15m. AGREGATE BASE COURSE, CLASS "A".
4. 0.80m. BORROW MATERIAL, CLASS "B" (A-2-4) (SPEC. 203, 207, AND 301).
5. SELECTED BORROW MATERIAL, CLASS "O".
6. CORRUGATE STEEL BEAM GUARDRAIL, SINGLE FACE (WHERE CALLED FOR ON PLANS)
7. CONCRETE CURB TYPE-D (SPEC. 609 AND STD. DWG. DR-____)
8. 0.10m. CONCRETE MEDIAN (SPEC._____)
9. CONCRETE MEDIAN BARRIER TYPE "A" (SPEC. 610 AND STD. DWG. CB'S DATED DECEMBER 2017. (FOR LOCATION SEE DWG'S PP)
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11. 0.05m. HOT PLANT-MIX BITUMINOUS PAVEMENT MIX TYPE S-1 (50) (SPEC._____).
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13. 0.50m. BORROW MATERIAL, CLASS "B" (A-2-4) (SPEC. 203, 207, AND 301).
14. BARBED WIRE FENCE, TYPE "A" (SPEC._____).
15. 0.30 LEAN CONCRETE (SPEC. 305).
16. CONCRETE BARRIER TYPE "B" (SPEC._____).
17. CONCRETE BARRIER TYPE "D" (SPEC._____).
18. GABION WALL (SEE PRHTA STD. DWG. GABI 10 OF 20) (SPEC. 614).
19. SLOTTED PIPE DRAIN (SEE DRAINAGE SHEETS FOR SIZES).
20. RETAINING WALL.
21. SEEDIMG WITH MULCH (SPEC. 622).

## NOTE:

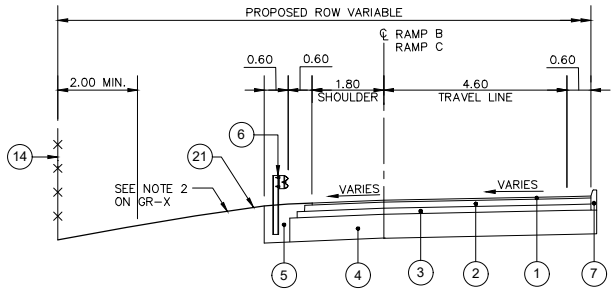
1-FOR CURB AND BARRIER DETAILS SEE P.R.H.T.A. STANDARD MODELS.

2-NORMAL SLOPES
FILL 6:1 (0.00 TO 2.0)
FILL 4:1 (2.00 TO 4.0)
FILL 2:1 (OVER 4.00 HEIGHT)
CUT (SEE DETAILS ON SHEET GR-__)

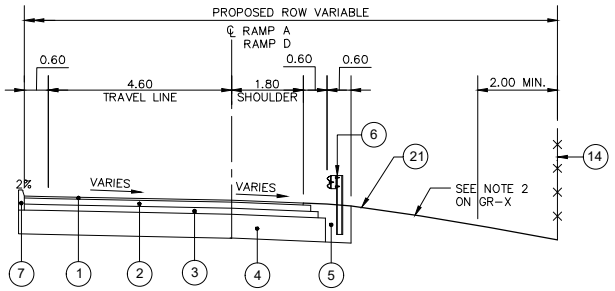
3-NFOR SUPERELEVATION TRANSITION SECTION SEE THE CROSS SECTION AND PROFILE DRAWINGS.




ACCES TO LOCAL ROAD AT STA. XX+XX.XX LEFT (7)
SCALE=1:60




TYPICAL SECTION RAMPS "B" & "C"(8)
RAMP "B" (EXIST.=8.00% MAX.)
RAMP "C" (EXIST.=8.00% MAX.)
SCALE=1:60




TYPICAL SECTION RAMPS "A" & "D"(8)
RAMP "B" (EXIST.=8.00% MAX.)
RAMP "CD" (EXIST.=8.00% MAX.)
SCALE=1:60

PLOT DATE: March 26, 2024 BYA FILE: \\BYASERVER1\Projects\22002-PR-122 Preliminary Plans\04-Preliminary Plans\01-GR\006-AC-800545-GR-006.dwg

| WORK | BY | DATE |
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| DRAWING | | |
| TRACING | | |
| CHECKED | | |
| FINAL CHECK | | |

PUERTO RICO HIGHWAY & TRANSPORTATION AUTHORITY
*BEHAR YBARRA & ASSOCIATES LLC*
*CONSULTING ENGINEERS AND ARCHITECTS*

EXTENSION HIGHWAY PR-122
FROM EXISTING PR-321 TO EXISTING PR-166

DATE | REVISION

SCALE = 1 : 60
0 .5 1 2 3 4

TYPICAL SECTIONS

GR
6

| FEDERAL CODE NO. | AC. PROJECT CODE NO. | HIGHWAY | MUNICIPALITY | ISLAND | FISCAL YEAR | SHEET NO. | TOTAL SHEETS |
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| ------- | AC-012201 | PR-122 | SAN GERMAN | PR | 2022 | 7 | 349 |
| | R0000102001 | | | | | | |

## LEGEND:

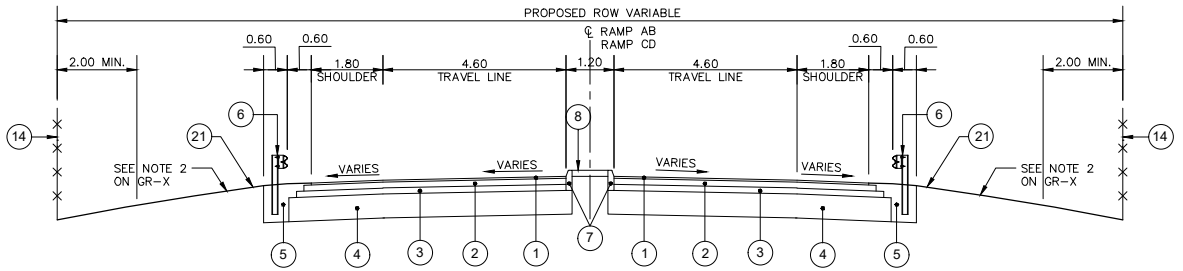
1. 0.05m. HOT PLANT-MIX BITUMINOUS PAVEMENT MIX TYPE S-1 (75) (SPEC._____).
2. 0.15m. HOT PLANT-MIX BITUMINOUS PAVEMENT MIX TYPE B-1 (75) (SPEC._____).
3. 0.15m. AGREGATE BASE COURSE, CLASS "A".
4. 0.80m. BORROW MATERIAL, CLASS "B" (A-2-4) (SPEC. 203, 207, AND 301).
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9. CONCRETE MEDIAN BARRIER TYPE "A" (SPEC. 610 AND STD. DWG. CB'S DATED DECEMBER 2017. (FOR LOCATION SEE DWG'S PP)
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11. 0.05m. HOT PLANT-MIX BITUMINOUS PAVEMENT MIX TYPE S-1 (50) (SPEC._____).
12. 0.10m. HOT PLANT-MIX BITUMINOUS PAVEMENT MIX TYPE B-1 (50) (SPEC._____).
13. 0.50m. BORROW MATERIAL, CLASS "B" (A-2-4) (SPEC. 203, 207, AND 301).
14. BARBED WIRE FENCE, TYPE "A" (SPEC._____).
15. 0.30 LEAN CONCRETE (SPEC. 305).
16. CONCRETE BARRIER TYPE "B" (SPEC._____).
17. CONCRETE BARRIER TYPE "D" (SPEC._____).
18. GABION WALL (SEE PRHTA STD. DWG. GABI 10 OF 20) (SPEC. 614).
19. SLOTTED PIPE DRAIN (SEE DRAINAGE SHEETS FOR SIZES).
20. RETAINING WALL.
21. SEEDIMG WITH MULCH (SPEC. 622).

## NOTE:

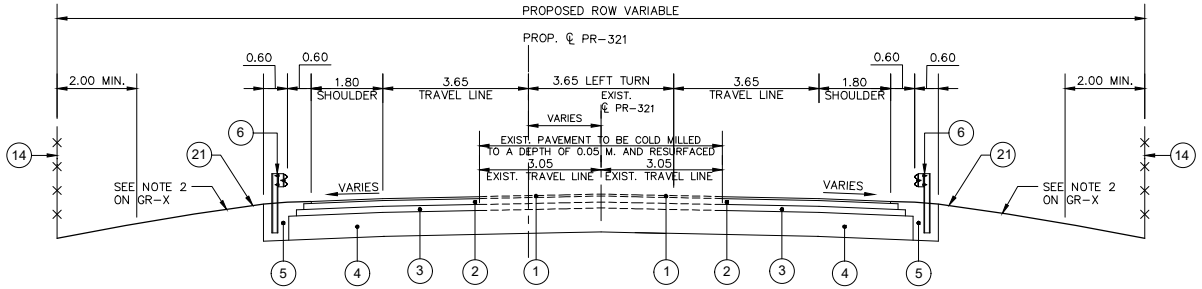
1-FOR CURB AND BARRIER DETAILS SEE P.R.H.T.A. STANDARD MODELS.

2-NORMAL SLOPES
FILL 6:1 (0.00 TO 2.0)
FILL 4:1 (2.00 TO 4.0)
FILL 2:1 (OVER 4.00 HEIGHT)
CUT (SEE DETAILS ON SHEET GR-__)

3-NFOR SUPERELEVATION TRANSITION SECTION SEE THE CROSS SECTION AND PROFILE DRAWINGS.




TYPICAL SECTION RAMPS "AB" & "CD "(9)
RAMP "AB" (EXIST.=8.00% MAX.)
RAMP "CD" (EXIST.=8.00% MAX.)
SCALE=1:60



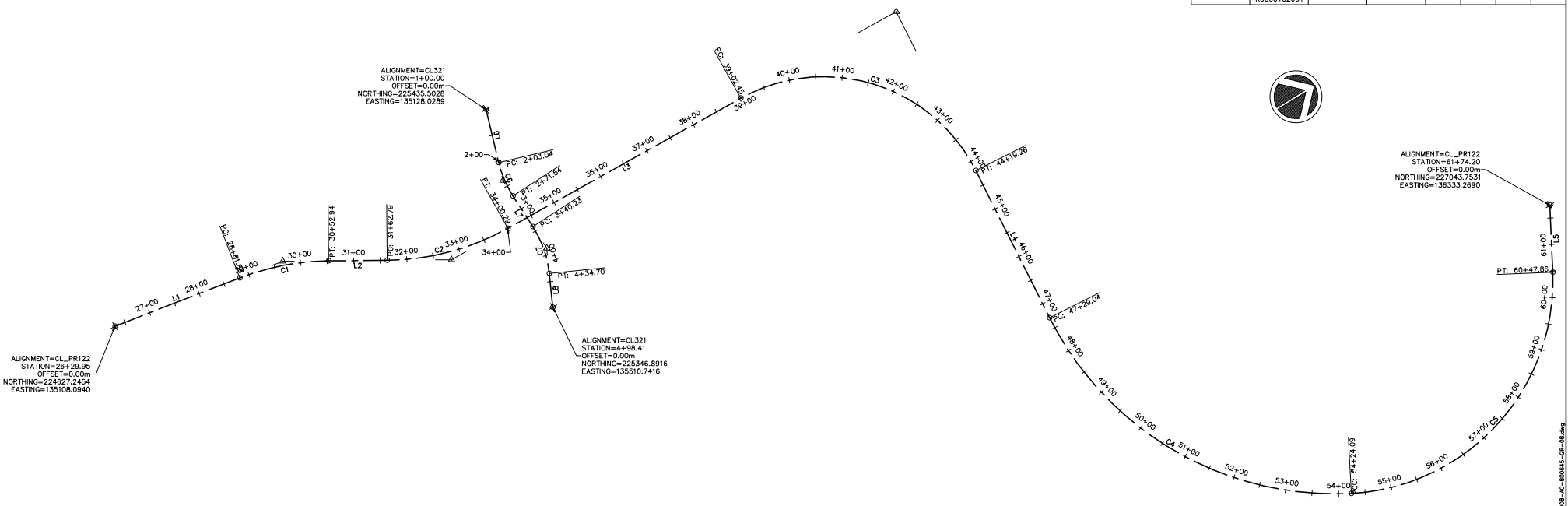

TYPICAL SECTION RAMPS ÄB & "CD "(10)
PR-321 (EXIST.=2.00% MAX.)
SCALE=1:60

| | BY | DATE |
|---|---|---|
| WORK | | |
| DESIGN | | |
| DRAWING | | |
| TRACING | | |
| CHECKED | | |
| FINAL CHECK | | |

| | | | | |
|---|---|---|---|---|
| PUERTO RICO HIGHWAY & TRANSPORTATION AUTHORITY<br>*BEHAR YBARRA & ASSOCIATES LLC*<br>*CONSULTING ENGINEERS AND ARCHITECTS* | EXTENSION HIGHWAY PR-122<br>FROM EXISTING PR-321 TO EXISTING PR-166 | DATE / REVISION | SCALE = 1 : 60<br>0 .5 1 2 3 4 | TYPICAL SECTIONS | GR<br>7 |

PLOT DATE: March 26, 2024 BYA FILE: \\BYASERVER1\Projects\22002-PR-122 Preliminary Plans\04-Preliminary Plans\01-GR\007-AC-800645-GR-07.dwg

| FEDERAL CODE NO. | AC. PROJECT CODE NO. | HIGHWAY | MUNICIPALITY | ISLAND | FISCAL YEAR | SHEET NO. | TOTAL SHEETS |
|---|---|---|---|---|---|---|---|
| -------- | AC-012201 | PR-122 | SAN GERMAN | PR | 2022 | 8 | 349 |
| | R0000102001 | | | | | | |




| CL_PR122 | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Number | Start Station | End Station | Length | Line/Chord Direction | DELTA | Radius | Tangent | External | Northing | Easting | Start Northing | Start Easting | End Northing | End Easting |
| L1 | 26+29.95 | 28+81.88 | 251.93 | N10° 33' 21.48"E | | | | | | | 224627.2454 | 135108.0940 | 224874.9139 | 135154.2469 |
| C1 | | | 171.05 | N20° 52' 20.86"E | 20.6330 | 20.6330 | 86.463 | 7.805 | 224959.9140 | 135170.0867 | | | | |
| L2 | 30+52.94 | 31+62.79 | 109.86 | N31° 11' 20.24"E | | | | | | | 225033.8804 | 135214.8628 | 225127.8591 | 135271.7536 |
| C2 | | | 237.49 | N16° 51' 55.29"E | 28.6472 | 28.6472 | 121.284 | 15.240 | 225231.6135 | 135334.5622 | | | | |
| L3 | 34+00.29 | 39+02.45 | 502.16 | N2° 32' 30.34"E | | | | | | | 225352.7786 | 135339.9409 | 225854.4489 | 135362.2106 |
| C3 | | | 516.81 | N48° 48' 32.64"E | 92.5346 | 92.5346 | 334.479 | 142.899 | 226188.5984 | 135377.0439 | | | | |
| L4 | 44+19.26 | 47+29.04 | 309.78 | S84° 55' 25.06"E | | | | | | | 226159.0025 | 135710.2105 | 226131.5920 | 136018.7769 |
| C4 | | | 695.05 | N61° 53' 25.02"E | 66.3722 | 66.3722 | 392.421 | 116.934 | 226096.8692 | 136409.6587 | | | | |
| C5 | | | 623.76 | N15° 58' 10.79"W | 89.3477 | 89.3477 | 395.472 | 162.493 | 226787.9387 | 136788.0740 | | | | |
| L5 | 60+47.86 | 61+74.20 | 126.34 | N60° 38' 36.68"W | | | | | | | 226981.8156 | 136443.3860 | 227043.7531 | 136333.2690 |

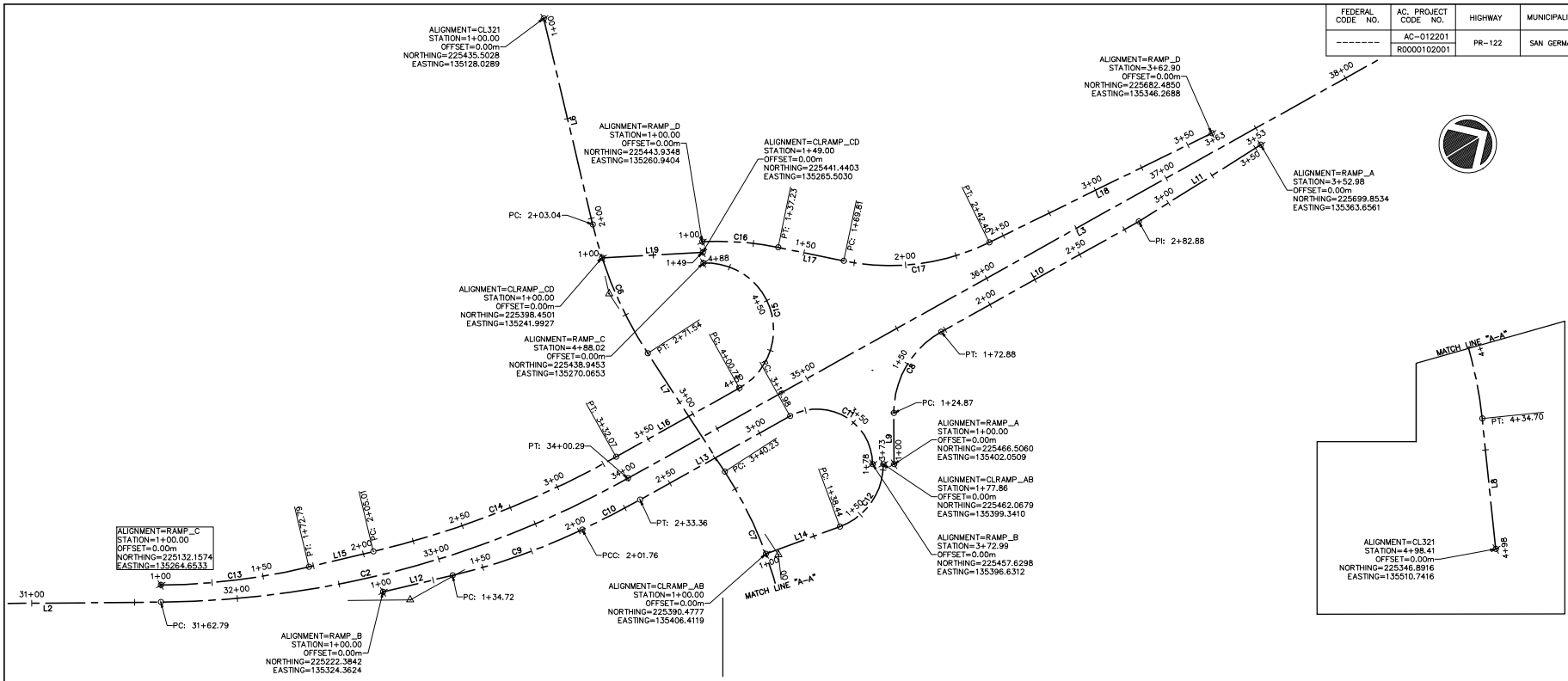
| CL321 | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Number | Start Station | End Station | Length | Line/Chord Direction | DELTA | Radius | Tangent | External | Northing | Easting | Start Northing | Start Easting | End Northing | End Easting |
| L6 | 1+00.00 | 2+03.04 | 103.04 | S71° 39' 05.11"E | | | | | | | 225435.5028 | 135128.0289 | 225403.0670 | 135225.8276 |
| C6 | | | 68.50 | S81° 27' 50.16"E | 19.6250 | 19.6250 | 34.591 | 2.969 | 225392.1778 | 135258.6599 | | | | |
| L7 | 2+71.54 | 3+40.23 | 68.68 | N88° 43' 24.79"E | | | | | | | 225392.9484 | 135293.2423 | 225394.4784 | 135361.9100 |
| C7 | | | 94.47 | S77° 44' 38.36"E | 27.0649 | 27.0649 | 48.136 | 5.711 | 225395.5507 | 135410.0337 | | | | |
| L8 | 4+34.70 | 4+98.41 | 63.71 | S64° 12' 41.51"E | | | | | | | 225374.6093 | 135453.3753 | 225346.8916 | 135510.7416 |

| WORK | BY | DATE |
|---|---|---|
| DESIGN | | |
| DRAWN | | |
| TRACED | | |
| CHECKED | | |
| FINAL CHECK | | |

| PUERTO RICO HIGHWAY & TRANSPORTATION AUTHORITY | EXTENSION HIGHWAY PR-122 | DATE | REVISION | SCALE=1:3,500 | KEY PLAN, VERTEX DATA AND GEOMETRY DATA TABLE | GR |
|---|---|---|---|---|---|---|
| *BEHAR YBARRA & ASSOCIATES LLC* | FROM EXISTING PR-321 TO EXISTING PR-166 | | | | | 8 |
| *CONSULTING ENGINEERS AND ARCHITECTS* | | | | | | |

PLOT DATE: March 26, 2024 BYA FILE: \\BYASERVER1\Projects\22002-PR-122 Preliminary Plans\04-Preliminary Plans\01-GA\008-AC-800845-GR-08.dwg

| FEDERAL CODE NO. | AC. PROJECT CODE NO. | HIGHWAY | MUNICIPALITY | ISLAND | FISCAL YEAR | SHEET NO. | TOTAL SHEETS |
|---|---|---|---|---|---|---|---|
| -------- | AC-012201<br>R0000102001 | PR-122 | SAN GERMAN | PR | 2022 | 9 | 349 |




## RAMP_A

| Number | Start Station | End Station | Length | Line/Chord Direction | DELTA | Radius | Tangent | External | Northing | Easting | Start Northing | Start Easting | End Northing | End Easting |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| L9 | 1+00.00 | 1+24.87 | 24.87 | N58° 35' 31.68"W | | | | | | | 225466.5060 | 135402.0509 | 225479.4664 | 135380.8250 |
| C8 | | | 48.01 | N28° 01' 30.67"W | 61.1339 | 61.1339 | 26.578 | 7.263 | 225493.3168 | 135358.1413 | | | | |
| L10 | 1+72.88 | 2+82.88 | 110.00 | N2° 32' 30.34"E | | | | | | | 225519.8686 | 135359.3200 | 225629.7604 | 135364.1982 |
| L11 | 2+82.88 | 3+52.98 | 70.10 | N0° 26' 35.16"W | | | | | | | 225629.7604 | 135364.1982 | 225699.8534 | 135363.6561 |

## RAMP_B

| Number | Start Station | End Station | Length | Line/Chord Direction | DELTA | Radius | Tangent | External | Northing | Easting | Start Northing | Start Easting | End Northing | End Easting |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| L12 | 1+00.00 | 1+34.72 | 34.72 | N18° 15' 48.24"E | | | | | | | 225222.3842 | 135324.3624 | 225255.3544 | 135335.2428 |
| C9 | | | 67.04 | N12° 15' 43.06"E | 12.0029 | 12.0029 | 33.641 | 1.763 | 225287.3012 | 135345.7856 | | | | |
| C10 | | | 31.61 | N4° 24' 04.11"E | 3.7188 | 3.7188 | 15.808 | 0.257 | 225336.4560 | 135351.1780 | | | | |
| L13 | 2+33.36 | 3+16.98 | 83.62 | N2° 32' 30.34"E | | | | | | | 225352.2486 | 135351.8791 | 225435.7833 | 135355.5873 |
| C11 | | | 56.01 | N61° 58' 29.33"E | 118.8661 | 118.8661 | 45.715 | 26.093 | 225481.4530 | 135357.6146 | | | | |

## CLRAMP_AB

| Number | Start Station | End Station | Length | Line/Chord Direction | DELTA | Radius | Tangent | External | Northing | Easting | Start Northing | Start Easting | End Northing | End Easting |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| L14 | 1+00.00 | 1+38.44 | 38.44 | N11° 33' 02.09"E | | | | | | | 225390.4777 | 135406.4119 | 225428.1384 | 135414.1086 |
| C12 | | | 39.42 | N23° 31' 14.79"W | 70.1427 | 70.1427 | 22.606 | 7.143 | 225450.2871 | 135418.6352 | | | | |

## RAMP_C

| Number | Start Station | End Station | Length | Line/Chord Direction | DELTA | Radius | Tangent | External | Northing | Easting | Start Northing | Start Easting | End Northing | End Easting |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| C13 | | | 72.79 | N24° 43' 34.24"E | 12.9256 | 12.9256 | 36.549 | 2.063 | 225163.4238 | 135283.5806 | | | | |
| L15 | 1+72.79 | 2+05.01 | 32.22 | N18° 15' 48.24"E | | | | | | | 225198.1317 | 135295.0346 | 225228.7303 | 135305.1324 |
| C14 | | | 127.06 | N10° 24' 09.29"E | 15.7216 | 15.7216 | 63.931 | 4.392 | 225289.4406 | 135325.1674 | | | | |
| L16 | 3+32.07 | 4+00.74 | 68.67 | N2° 32' 30.34"E | | | | | | | 225353.3085 | 135328.0026 | 225421.9101 | 135331.0479 |
| C15 | | | 87.28 | N74° 23' 33.16"W | 153.8686 | 153.8686 | 140.040 | 111.262 | 225561.8126 | 135337.2584 | | | | |

## RAMP_D

| Number | Start Station | End Station | Length | Line/Chord Direction | DELTA | Radius | Tangent | External | Northing | Easting | Start Northing | Start Easting | End Northing | End Easting |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| C16 | | | 37.23 | N36° 00' 43.80"E | 14.6780 | 14.6780 | 18.718 | 1.200 | 225460.3573 | 135269.9214 | | | | |
| L17 | 1+37.23 | 1+69.81 | 32.58 | N43° 21' 04.28"E | | | | | | | 225473.9681 | 135282.7706 | 225497.6564 | 135305.1333 |
| C17 | | | 72.59 | N24° 26' 47.31"E | 37.8094 | 37.8094 | 37.672 | 6.272 | 225525.0496 | 135330.9936 | | | | |
| L18 | 2+42.40 | 3+62.90 | 120.50 | N5° 32' 30.34"E | | | | | | | 225562.5451 | 135334.6316 | 225682.4850 | 135346.2688 |

## CLRAMP_CD

| Number | Start Station | End Station | Length | Line/Chord Direction | DELTA | Radius | Tangent | External | Northing | Easting | Start Northing | Start Easting | End Northing | End Easting |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| L19 | 1+00.00 | 1+49.00 | 49.00 | N28° 40' 23.33"E | | | | | | | 225398.4501 | 135241.9927 | 225441.4403 | 135265.5030 |

| | | | |
|---|---|---|---|
| PUERTO RICO HIGHWAY & TRANSPORTATION AUTHORITY<br>*BEHAR YBARRA & ASSOCIATES LLC*<br>*CONSULTING ENGINEERS AND ARCHITECTS* | EXTENSION HIGHWAY PR-122<br>FROM EXISTING PR-321 TO EXISTING PR-166 | DATE / REVISION | SCALE = 1 : 1,000<br>0 10 20 40 60 80 |

KEY PLAN, VERTEX DATA AND GEOMETRY DATA TABLE

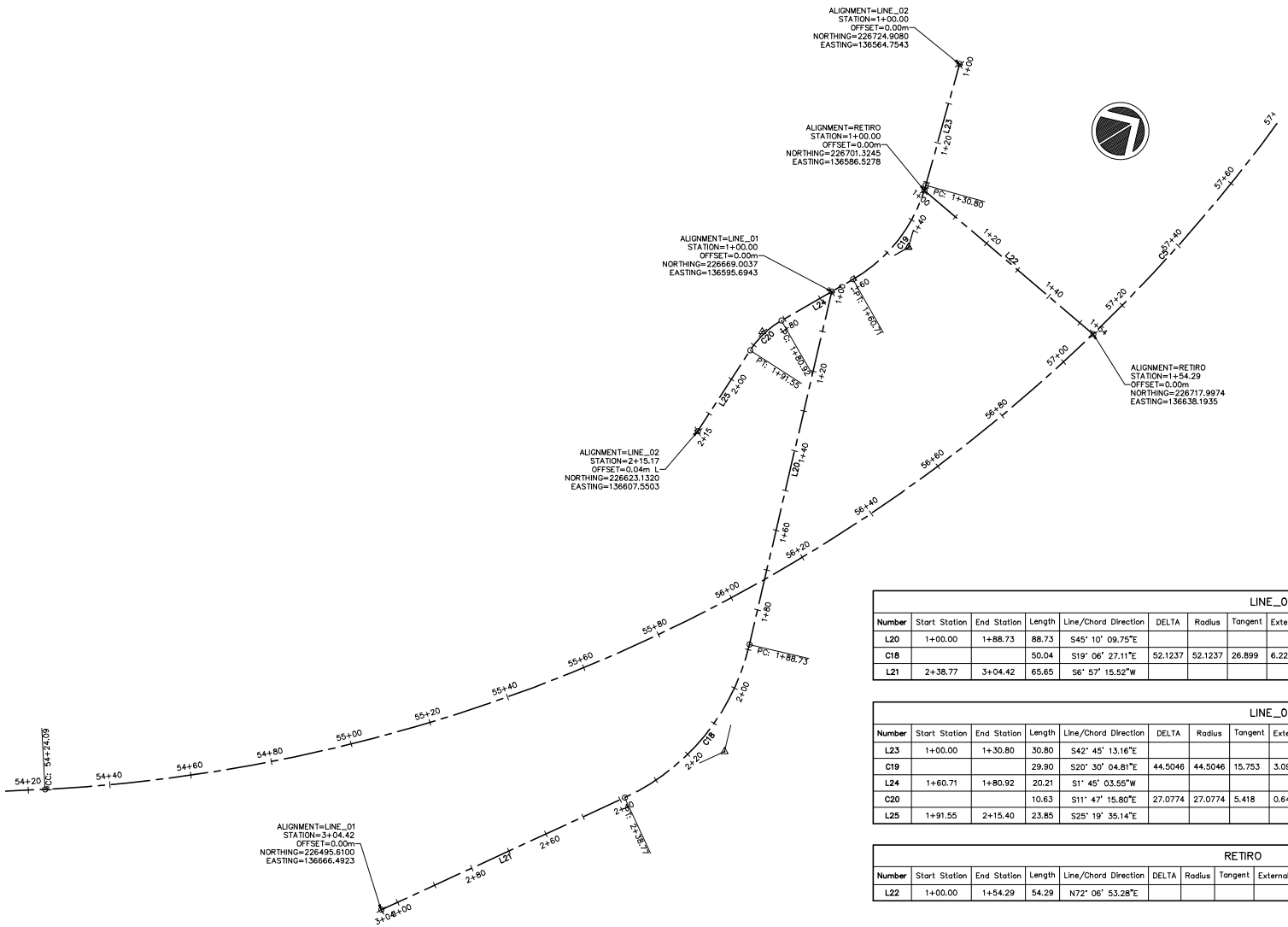
GR 9

DESIGN / DRAWN / TRACED / CHECKED / FINAL CHECK / BY / DATE

PLOT DATE: March 26, 2024

BYA FILE: \\BYASERVER\Projects\25002-PR-122 Preliminary Plans\04-Preliminary Plans\01-GA\009-AC-800645-GR-09.dwg

| FEDERAL CODE NO. | AC. PROJECT CODE NO. | HIGHWAY | MUNICIPALITY | ISLAND | FISCAL YEAR | SHEET NO. | TOTAL SHEETS |
|---|---|---|---|---|---|---|---|
| -------- | AC-012201<br>R0000102001 | PR-122 | SAN GERMAN | PR | 2022 | 10 | 349 |




LINE_01

| Number | Start Station | End Station | Length | Line/Chord Direction | DELTA | Radius | Tangent | External | Northing | Easting | Start Northing | Start Easting | End Northing | End Easting |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| L20 | 1+00.00 | 1+88.73 | 88.73 | S45° 10' 09.75"E | | | | | | | 226669.0037 | 136595.6943 | 226606.4468 | 136658.6221 |
| C18 | | | 50.04 | S19° 06' 27.11"E | 52.1237 | 52.1237 | 26.899 | 6.225 | 226587.4828 | 136677.6985 | | | | |
| L21 | 2+38.77 | 3+04.42 | 65.65 | S6° 57' 15.52"W | | | | | | | 226560.7819 | 136674.4417 | 226495.6100 | 136666.4923 |

LINE_02

| Number | Start Station | End Station | Length | Line/Chord Direction | DELTA | Radius | Tangent | External | Northing | Easting | Start Northing | Start Easting | End Northing | End Easting |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| L23 | 1+00.00 | 1+30.80 | 30.80 | S42° 45' 13.16"E | | | | | | | 226724.9080 | 136564.7543 | 226702.2903 | 136585.6646 |
| C19 | | | 29.90 | S20° 30' 04.81"E | 44.5046 | 44.5046 | 15.753 | 3.098 | 226690.7235 | 136596.3582 | | | | |
| L24 | 1+60.71 | 1+80.92 | 20.21 | S1° 45' 03.55"W | | | | | | | 226674.9782 | 136595.8769 | 226654.7768 | 136595.2594 |
| C20 | | | 10.63 | S11° 47' 15.80"E | 27.0774 | 27.0774 | 5.418 | 0.643 | 226649.3614 | 136595.0938 | | | | |
| L25 | 1+91.55 | 2+15.40 | 23.85 | S25° 19' 35.14"E | | | | | | | 226644.4643 | 136597.4114 | 226622.9095 | 136607.6125 |

RETIRO

| Number | Start Station | End Station | Length | Line/Chord Direction | DELTA | Radius | Tangent | External | Northing | Easting | Start Northing | Start Easting | End Northing | End Easting |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| L22 | 1+00.00 | 1+54.29 | 54.29 | N72° 06' 53.28"E | | | | | | | 226701.3245 | 136586.5278 | 226717.9974 | 136638.1935 |

| WORK | BY | DATE |
|---|---|---|
| DESIGN | | |
| DRAWN | | |
| TRACED | | |
| CHECKED | | |
| FINAL CHECK | | |

PUERTO RICO HIGHWAY & TRANSPORTATION AUTHORITY
*BEHAR YBARRA & ASSOCIATES LLC*
*CONSULTING ENGINEERS AND ARCHITECTS*

EXTENSION HIGHWAY PR-122
FROM EXISTING PR-321 TO EXISTING PR-166

| DATE | REVISION |
|---|---|
| | |

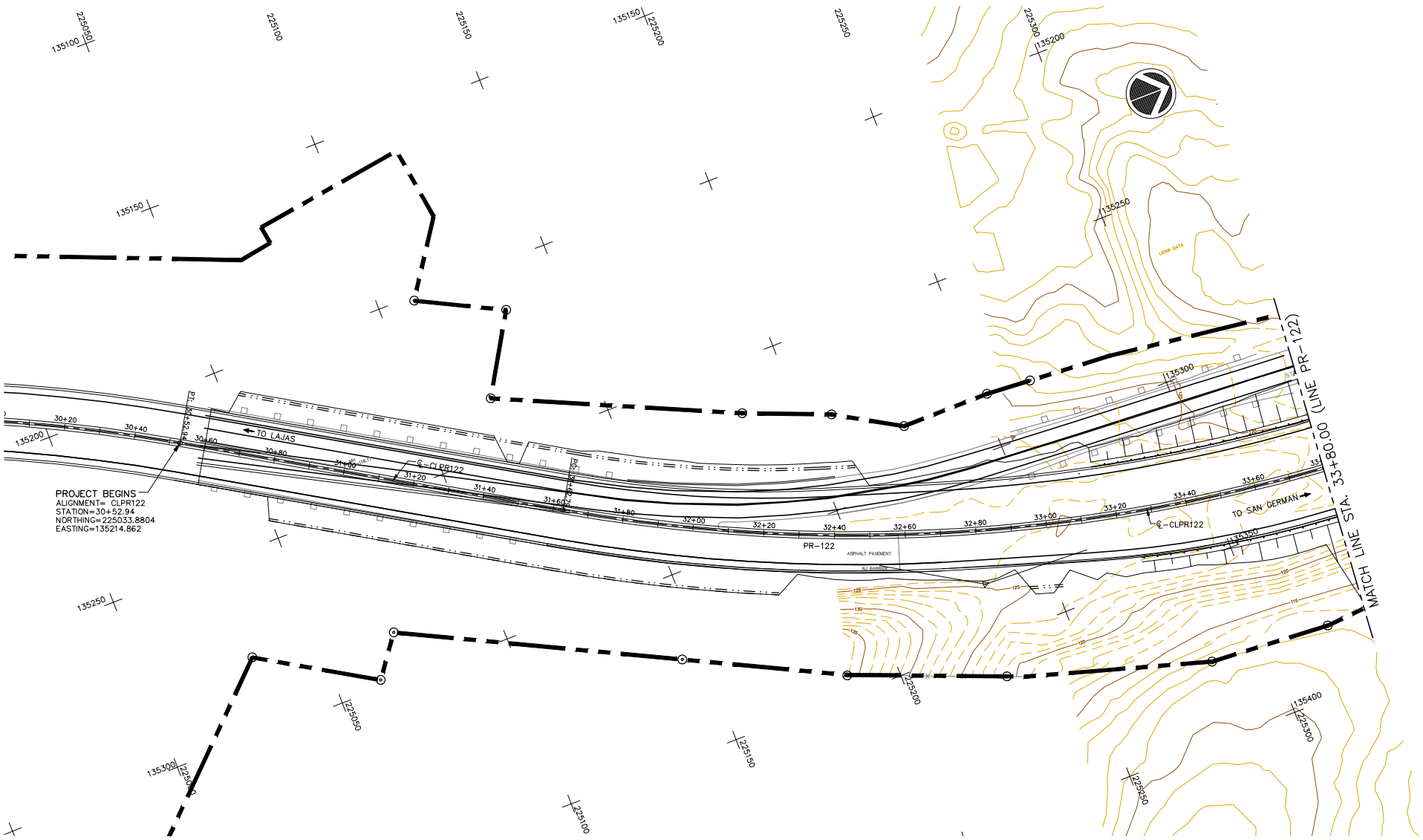
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KEY PLAN, VERTEX DATA AND GEOMETRY DATA TABLE

GR
10

PLOT DATE: March 26, 2024 BYA FILE: \\BYASERVER\Projects\22002-PR-122 Preliminary Plans\04-Preliminary Plans\01-GR\010-AC-800845-GR-10.dwg

| FEDERAL CODE NO. | AC. PROJECT CODE NO. | HIGHWAY | MUNICIPALITY | ISLAND | FISCAL YEAR | SHEET NO. | TOTAL SHEETS |
|---|---|---|---|---|---|---|---|
| ------- | AC-012201 / R0000102001 | PR-122 | SAN GERMAN | PR | 2022 | 30 | 349 |




PUERTO RICO HIGHWAY & TRANSPORTATION AUTHORITY
*BEHAR YBARRA & ASSOCIATES LLC*
*CONSULTING ENGINEERS AND ARCHITECTS*

EXTENSION HIGHWAY PR-122
FROM EXISTING PR-321 TO EXISTING PR-166

DATE | REVISION

SCALE = 1 : 500
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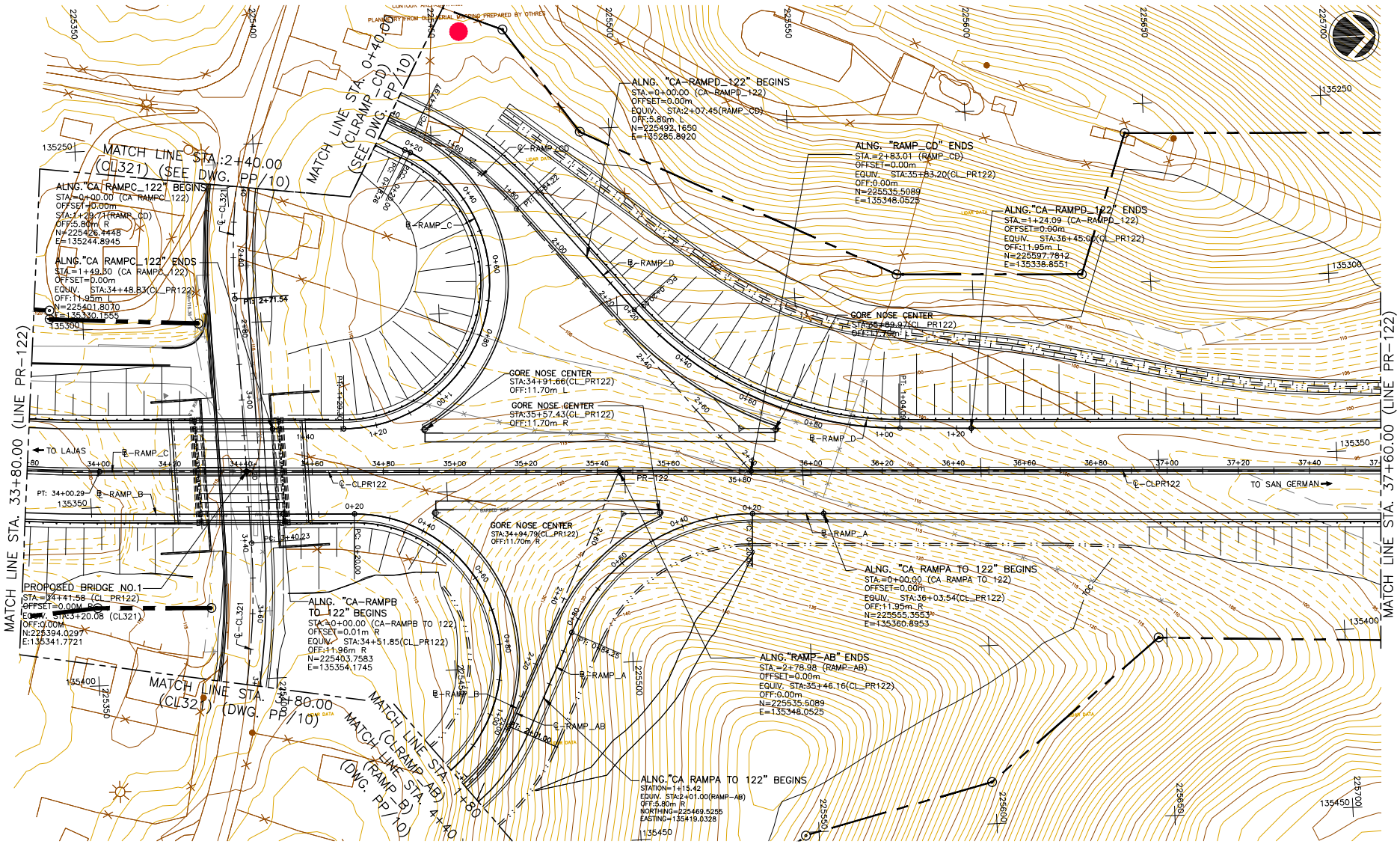
PLANS
FROM STA. 30+52.94 TO STA. 33+80.00

PP
1

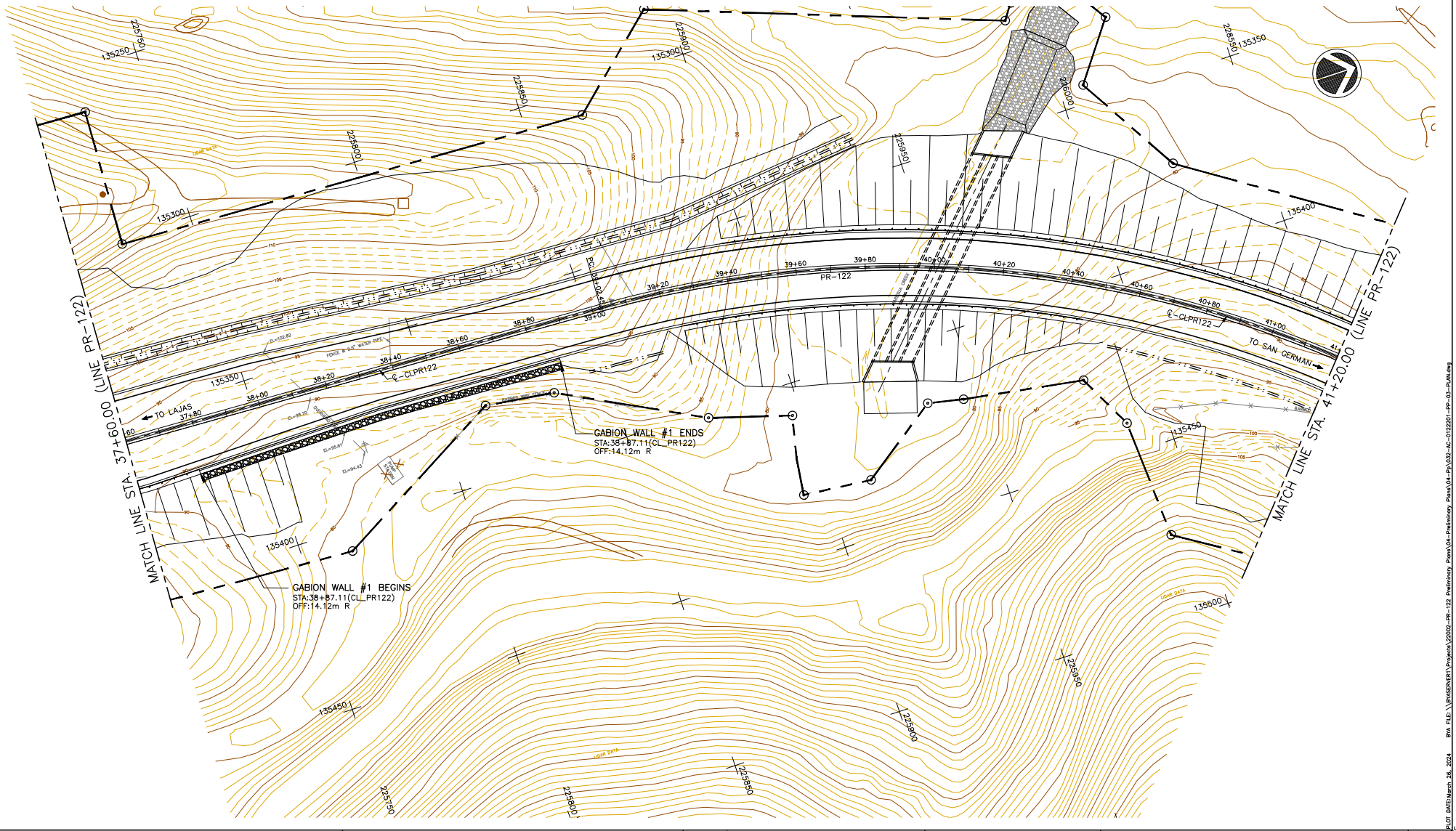
| WORK | BY | DATE |
|---|---|---|
| DESIGN | | |
| DRAWN | | |
| TRACED | | |
| CHECKED | | |
| FINAL CHECK | | |

PLOT DATE: March 26, 2024
BYA FILE: \\BYASERVER1\Projects\22002-PR-122 Preliminary Plans\04-Preliminary Plans\03-AC-012201-PP-01-PLAN.dwg
FILE NAME =

| FEDERAL CODE NO. | AC. PROJECT CODE NO. | HIGHWAY | MUNICIPALITY | ISLAND | FISCAL YEAR | SHEET NO. | TOTAL SHEETS |
|---|---|---|---|---|---|---|---|
| -------- | AC-012201<br>R0000102001 | PR-122 | SAN GERMAN | PR | 2022 | 31 | 349 |


MATCH LINE STA. 33+80.00 (LINE PR-122)
MATCH LINE STA. 37+60.00 (LINE PR-122)
MATCH LINE STA:2+40.00 (CL321) ($EE DWG. PP/10)
MATCH LINE STA. 0+40.00 (CLRAMP_CD) (SEE DWG. PP/10)
MATCH LINE STA. 1+80.00 (CLRAMP_AB) (DWG. PP/10)
MATCH LINE STA. 4+40.00 (CL321) (DWG. PP/10)
ALNG. "CA-RAMPD_122" BEGINS
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OFFSET=0.00m
EQUIV. STA:2+07.45(RAMP_CD)
OFF:5.80m L
N=225492.1650
E=135285.8920
ALNG. "RAMP_CD" ENDS
STA.=2+83.01 (RAMP_CD)
OFFSET=0.00m
EQUIV. STA:35+83.20(CL_PR122)
OFF:0.00m
N=225535.5089
E=135348.0525
ALNG."CA-RAMPD_122" ENDS
STA.=1+24.09 (CA-RAMPD_122)
OFFSET=0.00m
EQUIV. STA:36+45.00(CL_PR122)
OFF:11.95m L
N=225597.7812
E=135338.8551
ALNG."CA RAMPC_122" BEGINS
STA.=0+00.00 (CA RAMPC_122)
OFFSET=0.00m
STA:1+29.71(RAMP_CD)
OFF:5.80m R
N=225426.4448
E=135244.8945
ALNG."CA RAMPC_122" ENDS
STA.=1+49.30 (CA RAMPC_122)
OFFSET=0.00m
EQUIV. STA:34+48.83(CL_PR122)
OFF:11.95m L
N=225401.8070
E=135330.1555
PROPOSED BRIDGE NO.1
STA.=34+41.58 (CL_PR122)
OFFSET=0.00M RC
EQUIV. STA:3+20.08 (CL321)
OFF:0.00M
N:225394.0297
E:135341.7721
ALNG. "CA-RAMPB TO 122" BEGINS
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OFFSET=0.01m R
EQUIV. STA:34+51.85(CL_PR122)
OFF:11.95m R
N=225403.7583
E=135354.1745
ALNG."RAMP-AB" ENDS
STA.=2+78.98 (RAMP-AB)
OFFSET=0.00m
EQUIV. STA:35+46.16(CL_PR122)
OFF:0.00m
N=225535.5089
E=135348.0525
ALNG."CA RAMPA TO 122" BEGINS
STATION=1+15.42
EQUIV. STA:2+01.00(RAMP-AB)
OFF:5.80m R
NORTHING=225469.5255
EASTING=135419.0328
ALNG. "CA RAMPA TO 122" BEGINS
STA.=0+00.00 (CA RAMPA TO 122)
OFFSET=0.00m
EQUIV. STA:36+03.54(CL_PR122)
OFF:11.95m R
N=225555.3553
E=135360.8953
GORE NOSE CENTER
STA:34+91.66(CL_PR122)
OFF:11.70m L
GORE NOSE CENTER
STA:35+57.43(CL_PR122)
OFF:11.70m R
GORE NOSE CENTER
STA:35+89.97(CL_PR122)
OFF:11.70m L
GORE NOSE CENTER
STA:34+94.79(CL_PR122)
OFF:11.70m R
PR-122
TO LAJAS
TO SAN GERMAN
℄-RAMP_A
℄-RAMP_B
℄-RAMP_C
℄-RAMP_D
℄-RAMP_AB
℄-CLPR122
℄-CL321
PT: 2+71.54
PT: 34+00.29
PT: 1+04.09
PC: 0+40.23
PC: 2+80.00
PC: 0+00.00
PC: 0+00.00
PC: 0+00

| FEDERAL CODE NO. | AC. PROJECT CODE NO. | HIGHWAY | MUNICIPALITY | ISLAND | FISCAL YEAR | SHEET NO. | TOTAL SHEETS |
|---|---|---|---|---|---|---|---|
| ------- | AC-012201<br>R0000102001 | PR-122 | SAN GERMAN | PR | 2022 | 32 | 349 |



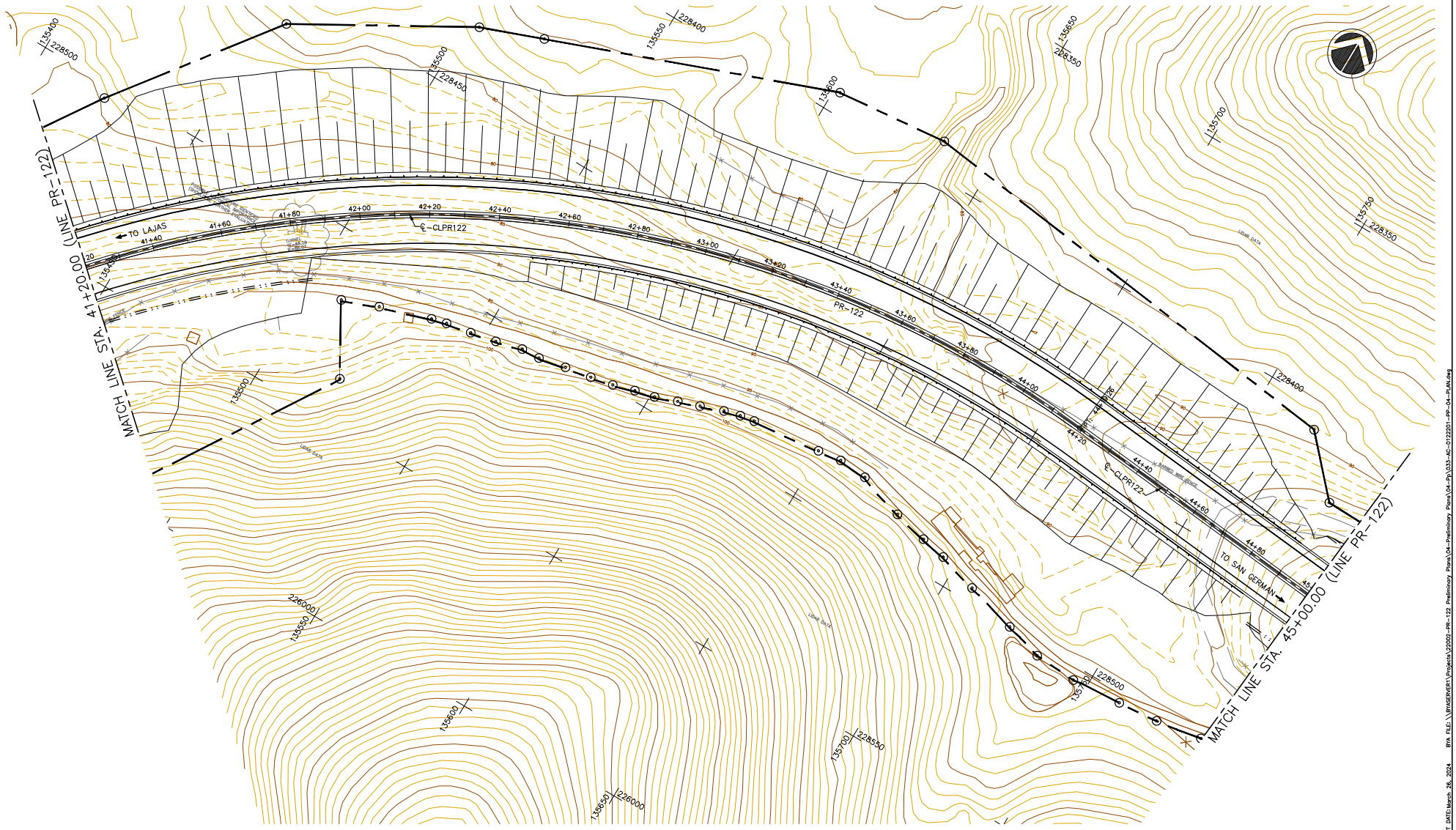

| | | | |
|---|---|---|---|
| PUERTO RICO HIGHWAY & TRANSPORTATION AUTHORITY<br>*BEHAR YBARRA & ASSOCIATES LLC*<br>*CONSULTING ENGINEERS AND ARCHITECTS* | EXTENSION HIGHWAY PR-122<br>FROM EXISTING PR-321 TO EXISTING PR-166 | DATE / REVISION | SCALE = 1 : 500<br>0 5 10 20 30 40 | PLANS<br>FROM STA. 37+60.00 TO STA. 41+20.00 | PP<br>3 |

| WORK | BY | DATE |
|---|---|---|
| DESIGN | | |
| DRAWN | | |
| TRACED | | |
| CHECKED | | |
| FINAL CHECK | | |

PLOT DATE: March 26, 2024 BYA FILE: \\BYASERVER1\Projects\22002-PR-122 Preliminary Plans\04-Preliminary Plans\032-AC-012201-PP-03-PLAN.dwg

FILE NAME =

| FEDERAL CODE NO. | AC. PROJECT CODE NO. | HIGHWAY | MUNICIPALITY | ISLAND | FISCAL YEAR | SHEET NO. | TOTAL SHEETS |
|---|---|---|---|---|---|---|---|
| ------- | AC-012201<br>R0000102001 | PR-122 | SAN GERMAN | PR | 2022 | 33 | 349 |




| WORK | BY | DATE |
|---|---|---|
| DESIGN | | |
| DRAWING | | |
| TRACED | | |
| CHECKED | | |
| FINAL CHECK | | |

PUERTO RICO HIGHWAY & TRANSPORTATION AUTHORITY
*BEHAR YBARRA & ASSOCIATES LLC*
*CONSULTING ENGINEERS AND ARCHITECTS*

EXTENSION HIGHWAY PR-122
FROM EXISTING PR-321 TO EXISTING PR-166

DATE | REVISION

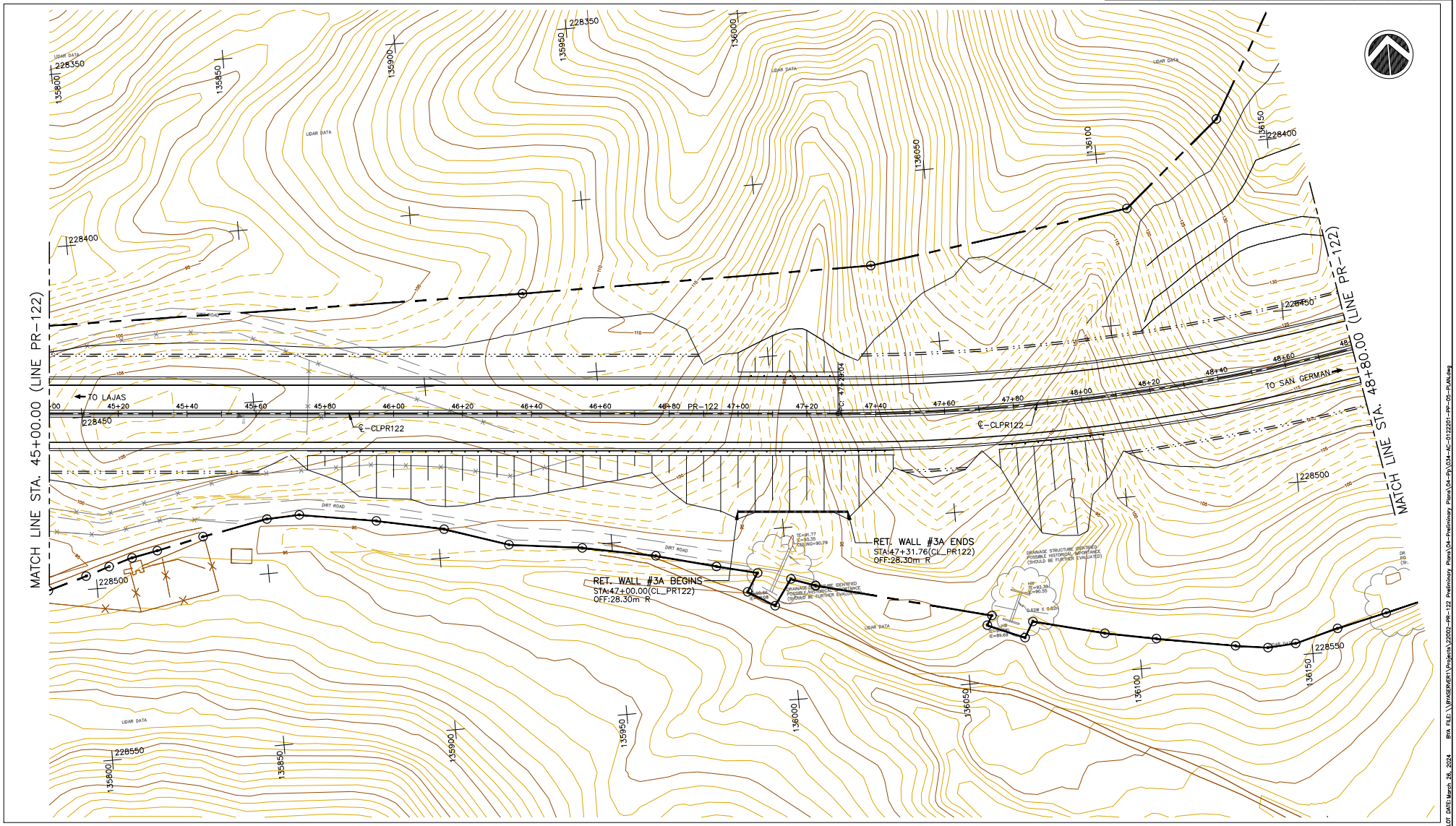
SCALE = 1 : 500
0 5 10 20 30 40

PLANS
FROM STA. 41+20.00 TO STA. 45+00.00

PP
4

PLOT DATE: March 26, 2024 BYA FILE: \\BYASERVER1\Projects\22002-PR-122 Preliminary Plans\04-Prelminary Plans\04-Prly\033-AC-012201-PP-04-PLAN.dwg
FILE NAME =

| FEDERAL CODE NO. | AC. PROJECT CODE NO. | HIGHWAY | MUNICIPALITY | ISLAND | FISCAL YEAR | SHEET NO. | TOTAL SHEETS |
|---|---|---|---|---|---|---|---|
| ------- | AC-012201<br>R0000102001 | PR-122 | SAN GERMAN | PR | 2022 | 34 | 349 |

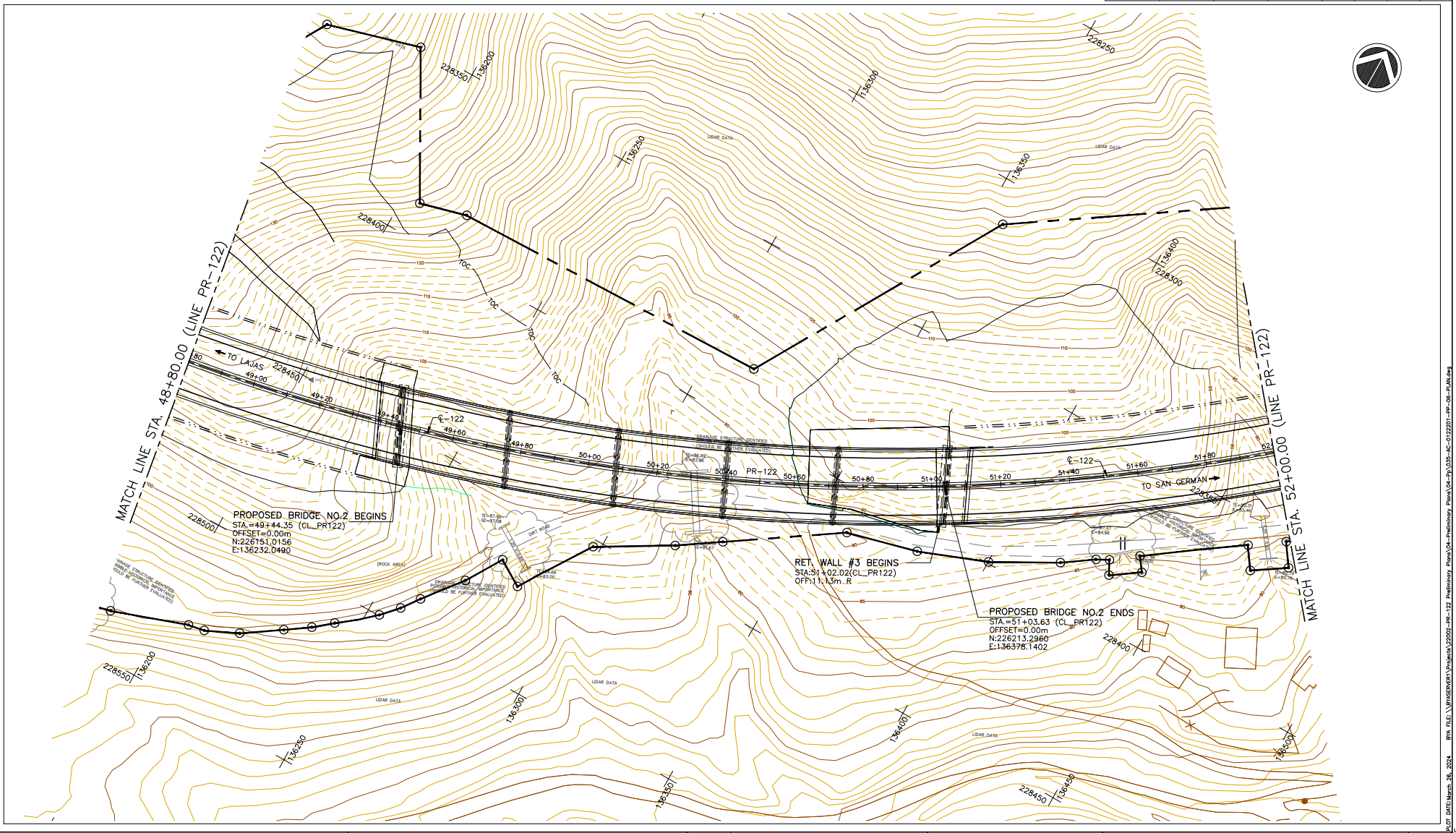



| | | | |
|---|---|---|---|
| PUERTO RICO HIGHWAY & TRANSPORTATION AUTHORITY<br>*BEHAR YBARRA & ASSOCIATES LLC*<br>*CONSULTING ENGINEERS AND ARCHITECTS* | EXTENSION HIGHWAY PR-122<br>FROM EXISTING PR-321 TO EXISTING PR-166 | DATE / REVISION | SCALE = 1 : 500<br>0 5 10 20 30 40 | PLANS<br>FROM STA. 45+00.00 TO STA. 48+80.00 | PP<br>5 |

| WORK | BY | DATE |
|---|---|---|
| DESIGN | | |
| DRAWING | | |
| TRACED | | |
| CHECKED | | |
| FINAL CHECK | | |

PLOT DATE: March 26, 2024
BYA FILE: \\BYASERVER1\Projects\22002-PR-122 Preliminary Plans\04-Preliminary Plans\034-AC-012201-PP-05-PLAN.dwg
FILE NAME =

| FEDERAL CODE NO. | AC. PROJECT CODE NO. | HIGHWAY | MUNICIPALITY | ISLAND | FISCAL YEAR | SHEET NO. | TOTAL SHEETS |
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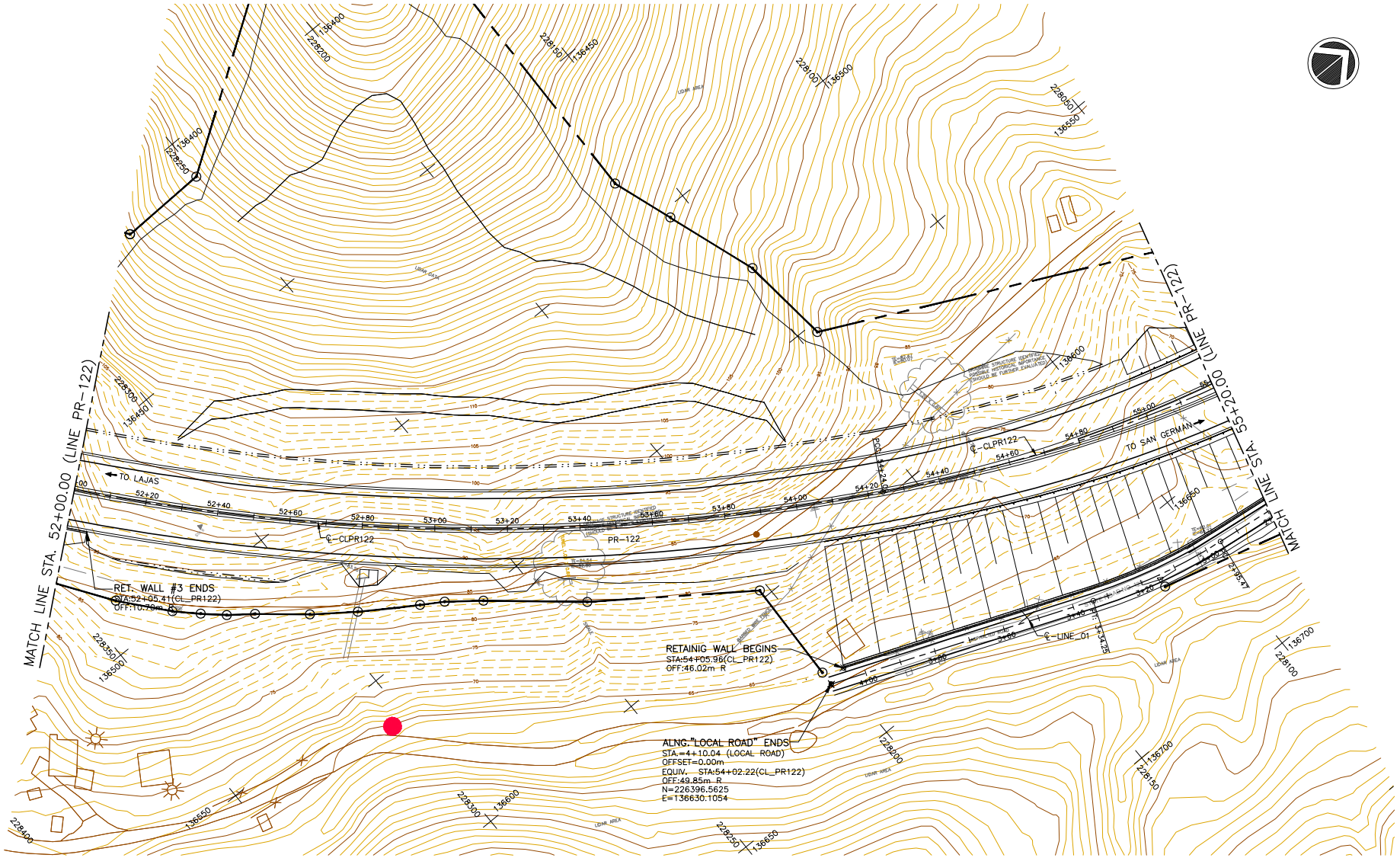



| WORK | BY | DATE |
|---|---|---|
| DESIGN | | |
| DRAWN | | |
| TRACED | | |
| CHECKED | | |
| FINAL CHECK | | |

| PUERTO RICO HIGHWAY & TRANSPORTATION AUTHORITY<br>*BEHAR YBARRA & ASSOCIATES LLC*<br>*CONSULTING ENGINEERS AND ARCHITECTS* | EXTENSION HIGHWAY PR-122<br>FROM EXISTING PR-321 TO EXISTING PR-166 | DATE / REVISION | SCALE = 1 : 500<br>0 5 10 20 30 40 | PLANS<br>FROM STA. 48+80.00 TO STA. 52+00.00 | PP<br>6 |
|---|---|---|---|---|---|

PLOT DATE: March 26, 2024 BYA FILE: \\BYASERVER1\Projects\22002-PR-122 Preliminary Plans\04-Preliminary Plans\035-AC-012201-PP-06-PLAN.dwg
FILE NAME =

| FEDERAL CODE NO. | AC. PROJECT CODE NO. | HIGHWAY | MUNICIPALITY | ISLAND | FISCAL YEAR | SHEET NO. | TOTAL SHEETS |
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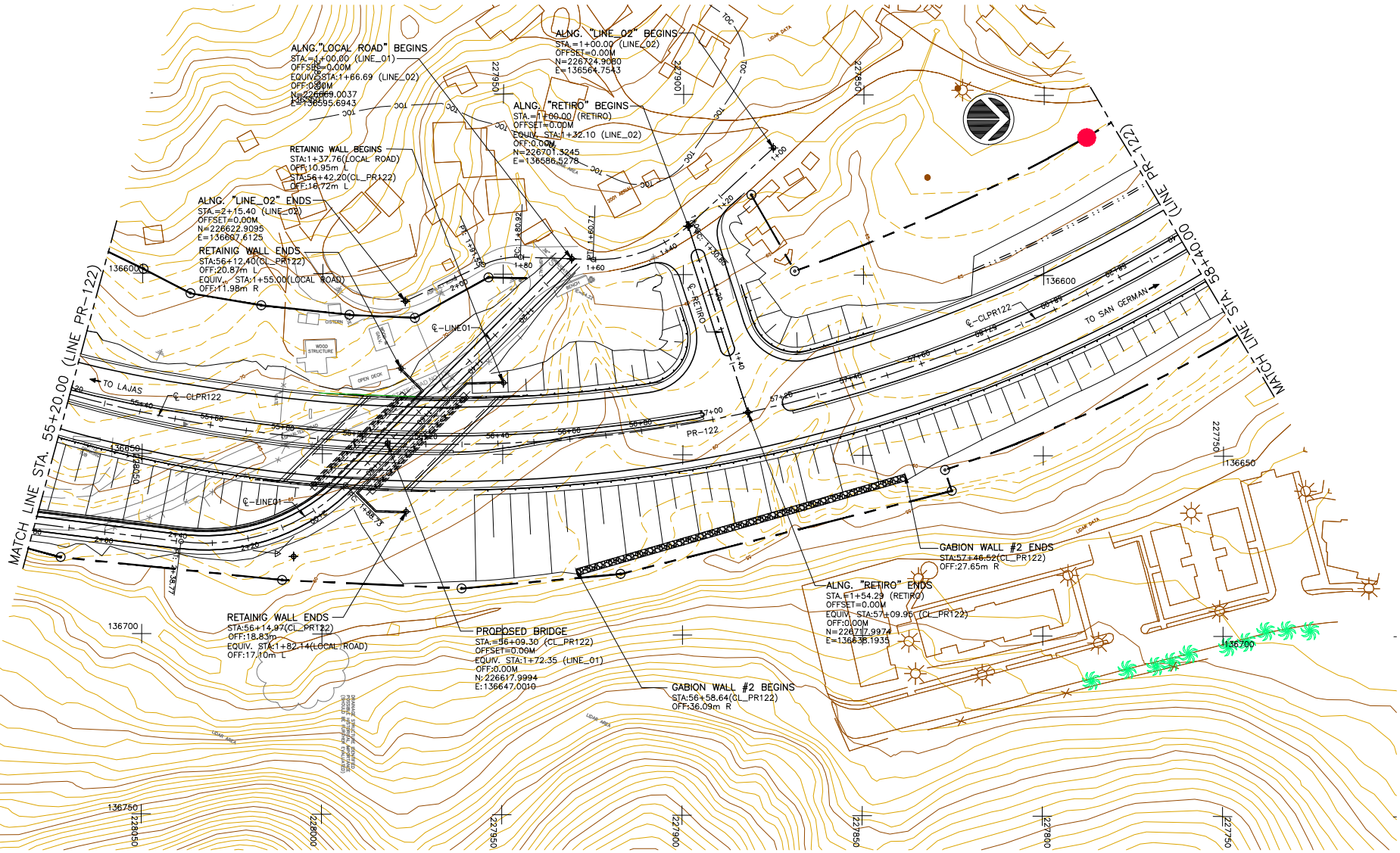



| PUERTO RICO HIGHWAY & TRANSPORTATION AUTHORITY<br>*BEHAR YBARRA & ASSOCIATES LLC*<br>*CONSULTING ENGINEERS AND ARCHITECTS* | EXTENSION HIGHWAY PR-122<br>FROM EXISTING PR-321 TO EXISTING PR-166 | DATE / REVISION | SCALE = 1 : 500<br>0 5 10 20 30 40 | PLANS<br>FROM STA. 52+00.00 TO STA. 55+20.00 | PP<br>7 |
|---|---|---|---|---|---|

| WORK | BY | DATE |
|---|---|---|
| DESIGN | | |
| DRAWN | | |
| TRACED | | |
| CHECKED | | |
| FINAL CHECK | | |

PLOT DATE: March 26, 2024 BYA FILE: \\BYASERVER1\Projects\22002-PR-122 Preliminary Plans\04-Preliminary Plans\04-Pp\036-AC-012201-PP-07-PLAN.dwg
FILE NAME =

| FEDERAL CODE NO. | AC. PROJECT CODE NO. | HIGHWAY | MUNICIPALITY | ISLAND | FISCAL YEAR | SHEET NO. | TOTAL SHEETS |
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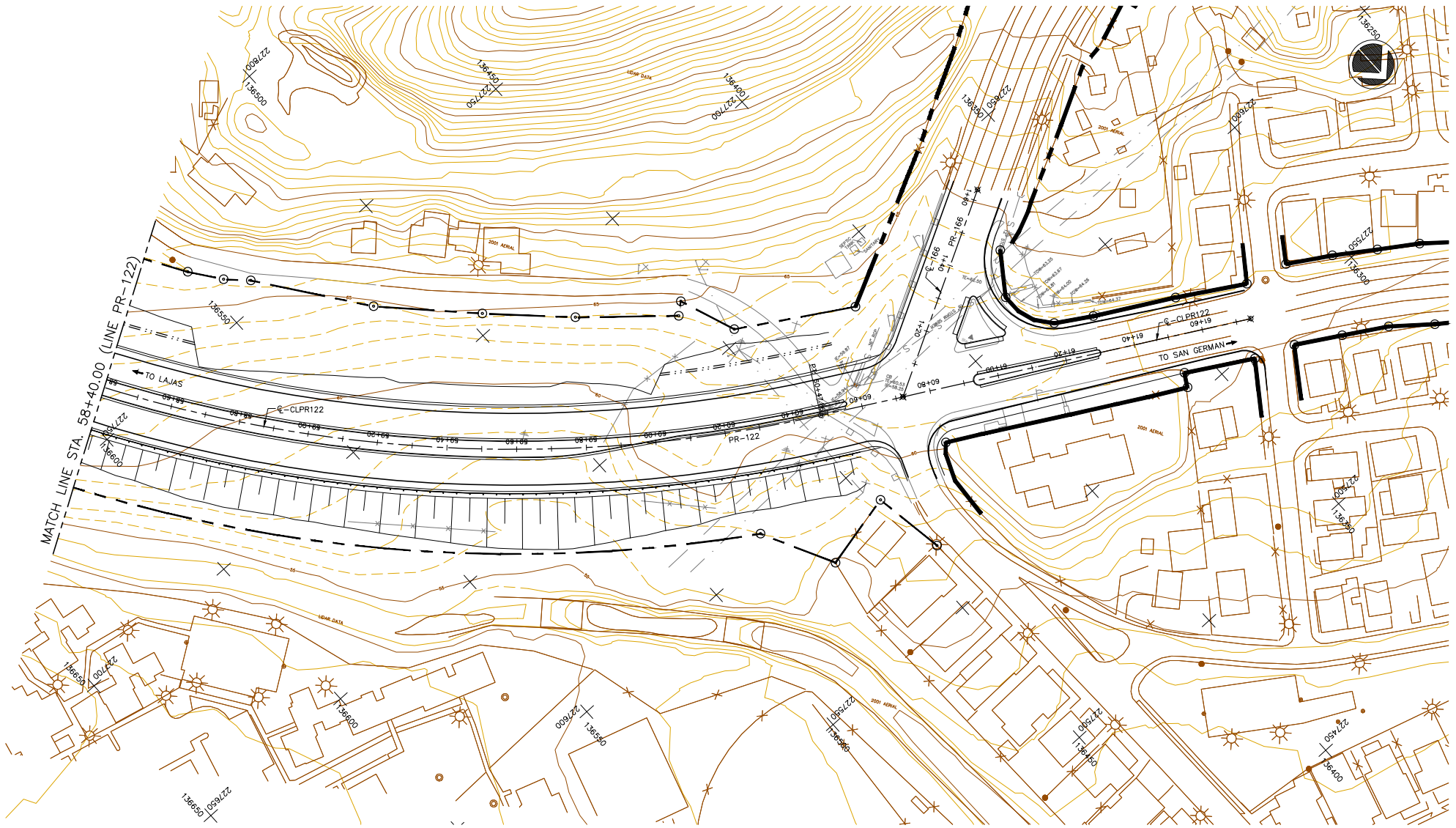



| | | | |
|---|---|---|---|
| PUERTO RICO HIGHWAY & TRANSPORTATION AUTHORITY<br>*BEHAR YBARRA & ASSOCIATES LLC*<br>*CONSULTING ENGINEERS AND ARCHITECTS* | EXTENSION HIGHWAY PR-122<br>FROM EXISTING PR-321 TO EXISTING PR-166 | DATE / REVISION | SCALE = 1 : 500<br>0 5 10 20 30 40 | PLANS<br>FROM STA. 55+20.00 TO STA. 58+40.00 | PP<br>8 |

| WORK | BY | DATE |
|---|---|---|
| DESIGN | | |
| DRAWN | | |
| TRACED | | |
| CHECKED | | |
| FINAL CHECK | | |

PLOT DATE: March 26, 2024 BYA FILE: \\BYASERVER1\Projects\22002-PR-122 Preliminary Plans\04-Preliminary Plans\037-AC-012201-PP-08-PLAN.dwg
FILE NAME =

| FEDERAL CODE NO. | AC. PROJECT CODE NO. | HIGHWAY | MUNICIPALITY | ISLAND | FISCAL YEAR | SHEET NO. | TOTAL SHEETS |
|---|---|---|---|---|---|---|---|
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| | R0000102001 | | | | | | |




| WORK | BY | DATE |
|---|---|---|
| DESIGN | | |
| DRAWN | | |
| TRACED | | |
| CHECKED | | |
| ENG. CHECK | | |

PUERTO RICO HIGHWAY & TRANSPORTATION AUTHORITY
*BEHAR YBARRA & ASSOCIATES LLC*
*CONSULTING ENGINEERS AND ARCHITECTS*

EXTENSION HIGHWAY PR-122
FROM EXISTING PR-321 TO EXISTING PR-166

DATE | REVISION

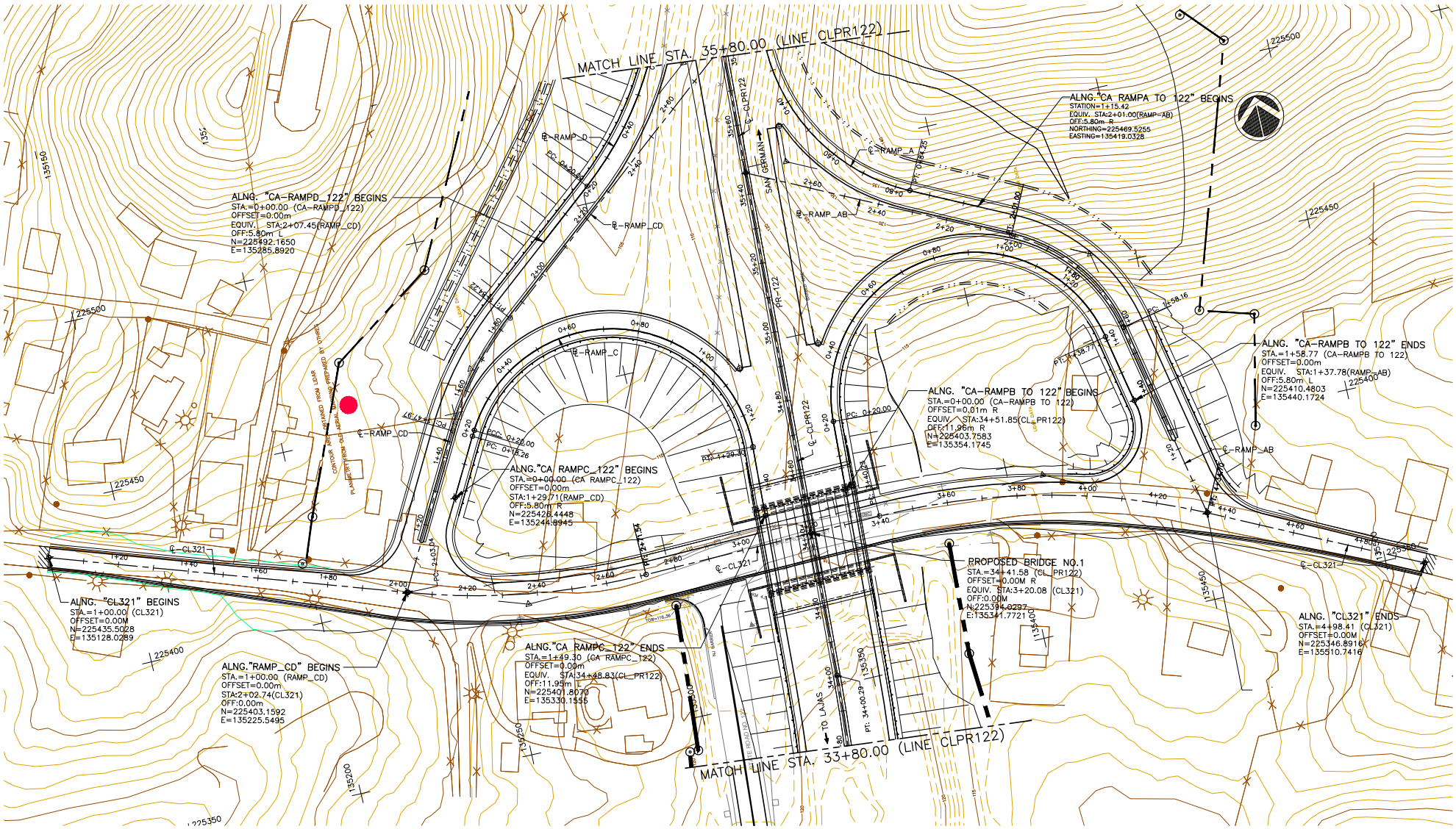
SCALE = 1 : 500
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PLANS
FROM STA. 58+40.00 TO STA. 61+74.20

PP
9

PLOT DATE: March 26, 2024 BYA FILE: \\BYASERVER1\Projects\22002-PR-122 Preliminary Plans\04-Preliminary Plans\04-Prly\038-AC-012201-PP-09-PLAN.dwg
FILE NAME =

| FEDERAL CODE NO. | AC. PROJECT CODE NO. | HIGHWAY | MUNICIPALITY | ISLAND | FISCAL YEAR | SHEET NO. | TOTAL SHEETS |
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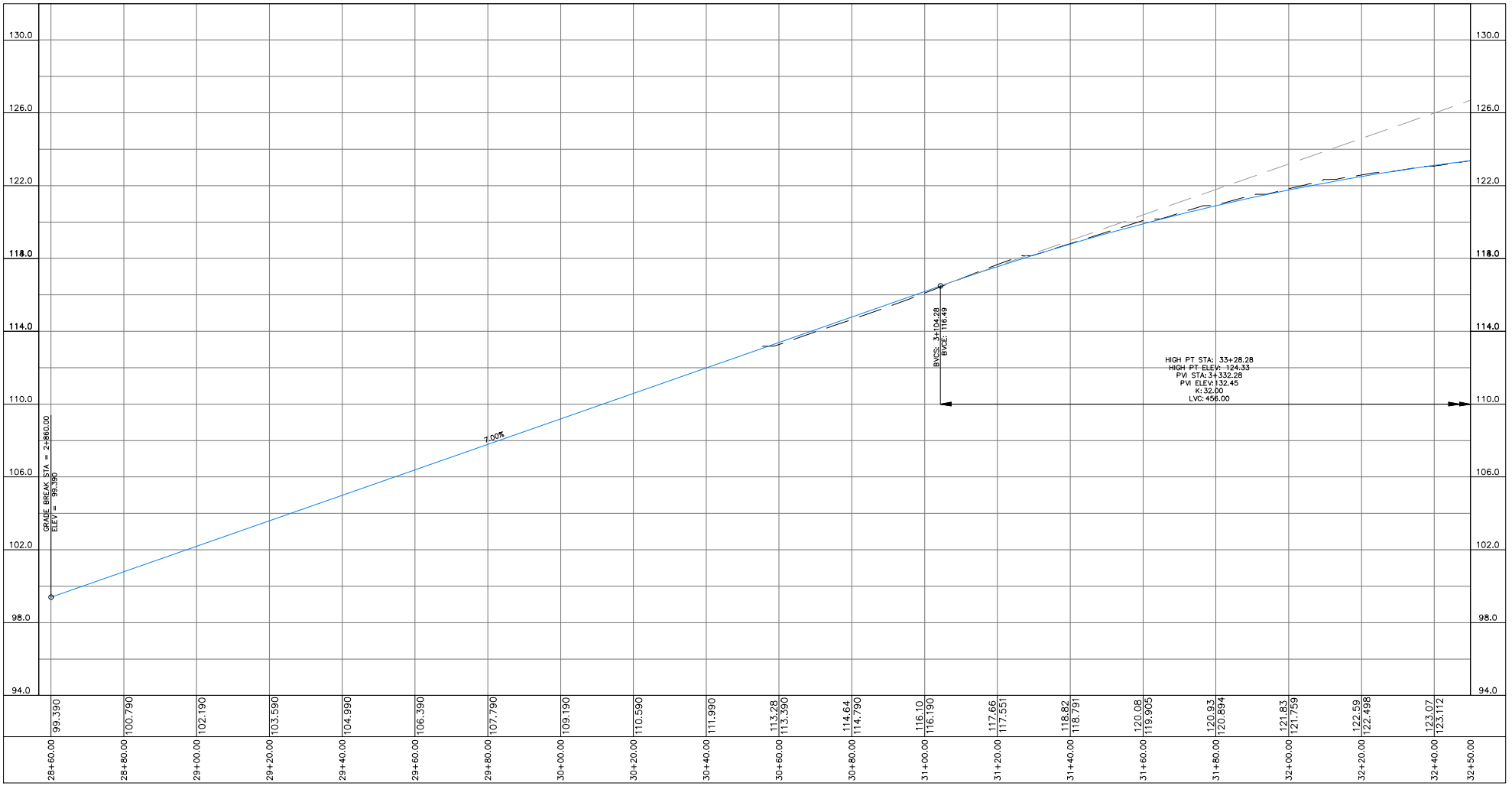



| PUERTO RICO HIGHWAY & TRANSPORTATION AUTHORITY | EXTENSION HIGHWAY PR-122 | DATE / REVISION | SCALE = 1 : 500 | PLANS | PP / 10 |
|---|---|---|---|---|---|
| *BEHAR YBARRA & ASSOCIATES LLC* | FROM EXISTING PR-321 TO EXISTING PR-166 | | 0 5 10 20 30 40 | FROM STA. 1+00.00 TO STA. 4+98.00 | |
| *CONSULTING ENGINEERS AND ARCHITECTS* | | | | | |

| WORK | BY | DATE |
|---|---|---|
| DESIGN | | |
| DRAWN | | |
| TRACED | | |
| CHECKED | | |
| ENG. CHECK | | |

PLOT DATE: March 26, 2024 BYA FILE: \\BYASERVER1\Projects\22002--PR--122 Preliminary Plans\04-Preliminary Plans\04-Prj\039--AC--0122201--PP--10--PLAN.dwg
FILE NAME =

| FEDERAL CODE NO. | AC. PROJECT CODE NO. | HIGHWAY | MUNICIPALITY | ISLAND | FISCAL YEAR | SHEET NO. | TOTAL SHEETS |
|---|---|---|---|---|---|---|---|
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| WORK | DESIGN | DRAWN | TRACED | CHECKED | FINAL CHECK |
|---|---|---|---|---|---|
| BY | | | | | |
| DATE | | | | | |

PUERTO RICO HIGHWAY & TRANSPORTATION AUTHORITY
*BEHAR YBARRA & ASSOCIATES LLC*
*CONSULTING ENGINEERS AND ARCHITECTS*

EXTENSION HIGHWAY PR-122
FROM EXISTING PR-321 TO EXISTING PR-166

| DATE | REVISION |
|---|---|
| | |

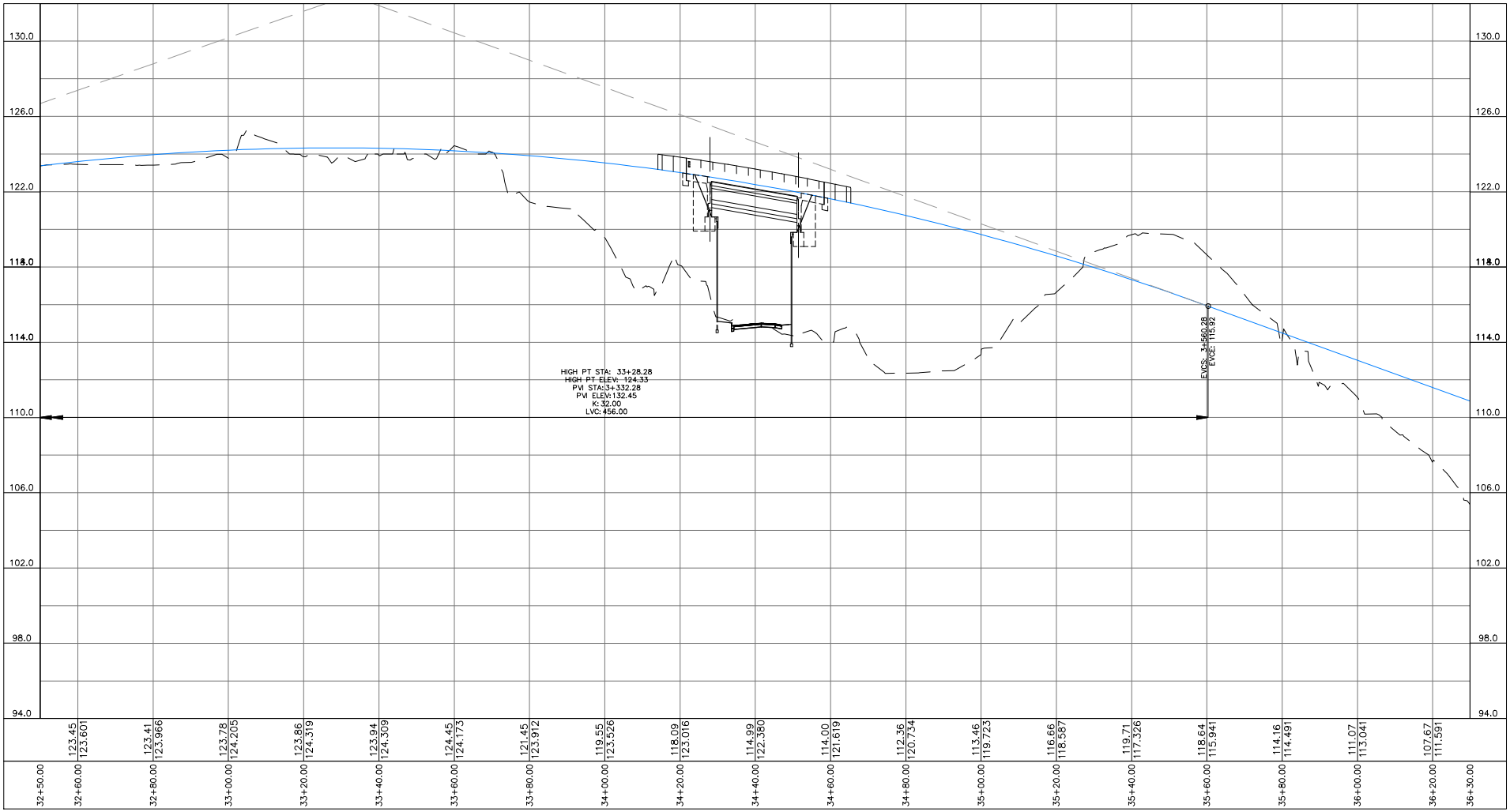
SCALE = 1 : 500
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PROFILE PLAN
PR-122
FROM STA. 28+60.00 TO STA. 32+50.00

PP
11

PLOT DATE: March 26, 2024
BYA FILE: \\BYASERVER1\Projects\22002-PR-122 Preliminary Plans\04-Prelim\04-PP\040-AC-012201-PP-11-PROFILE-122.dwg
FILE NAME =

| FEDERAL CODE NO. | AC. PROJECT CODE NO. | HIGHWAY | MUNICIPALITY | ISLAND | FISCAL YEAR | SHEET NO. | TOTAL SHEETS |
|---|---|---|---|---|---|---|---|
| ------- | AC-012201<br>R0000102001 | PR-122 | SAN GERMAN | PR | 2022 | 41 | 349 |




| WORK | BY | DATE |
|---|---|---|
| DESIGN | | |
| DRAWN | | |
| TRACED | | |
| CHECKED | | |
| FINAL CHECK | | |

PUERTO RICO HIGHWAY & TRANSPORTATION AUTHORITY
*BEHAR YBARRA & ASSOCIATES LLC*
*CONSULTING ENGINEERS AND ARCHITECTS*

EXTENSION HIGHWAY PR-122
FROM EXISTING PR-321 TO EXISTING PR-166

| DATE | REVISION |
|---|---|
| | |

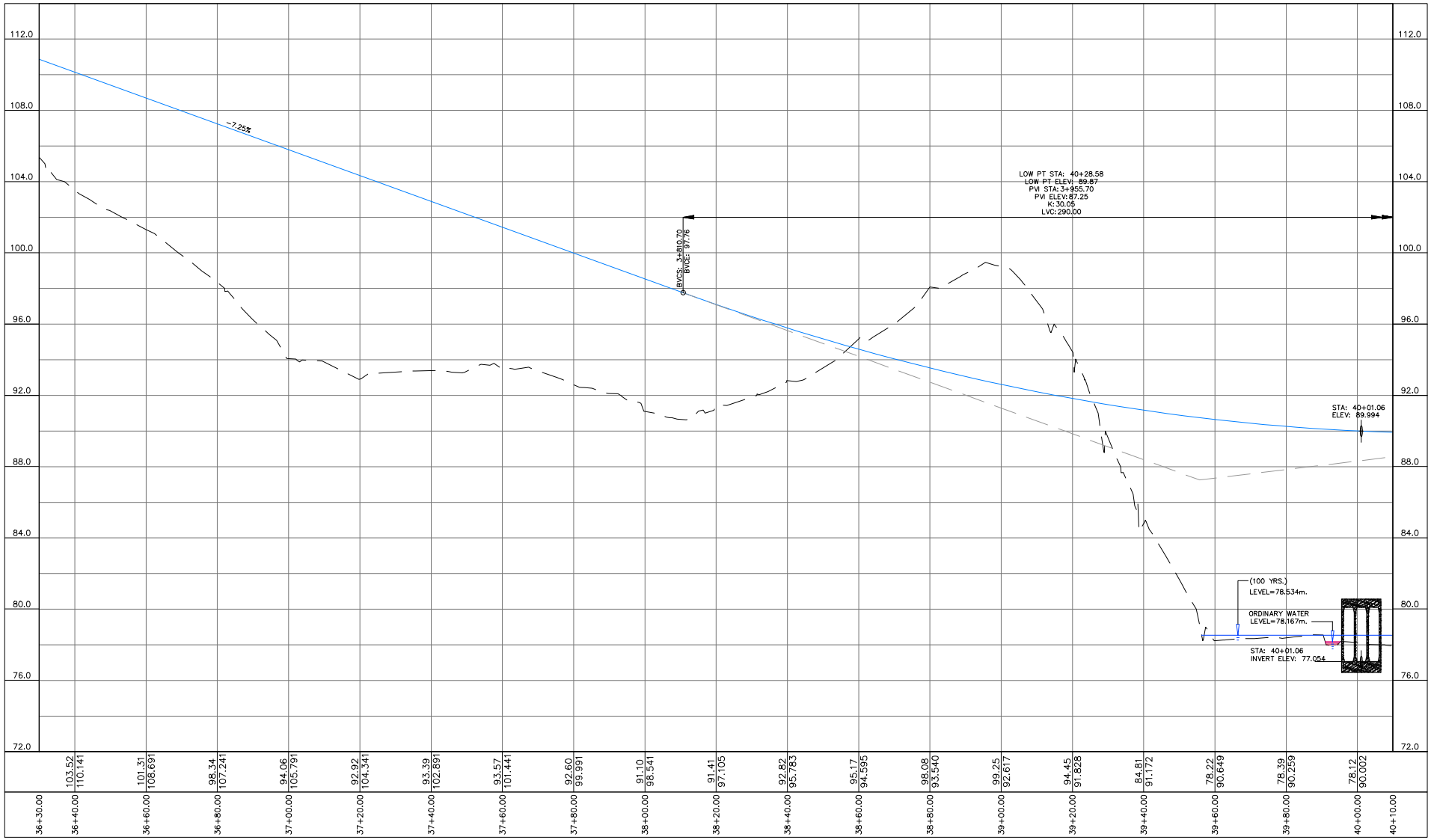
SCALE = 1 : 500
0 5 10 20 30 40

PROFILE PLAN
PR-122
FROM STA. 32+50.00 TO STA. 36+30.00

PP
12

PLOT DATE: March 26, 2024
BYA FILE: \\BYASERVER1\Projects\22002-PR-122 Preliminary Plans\04-Pre\041-AC-012201-PP-12-PROFILE-122.dwg
FILE NAME =

| FEDERAL CODE NO. | AC. PROJECT CODE NO. | HIGHWAY | MUNICIPALITY | ISLAND | FISCAL YEAR | SHEET NO. | TOTAL SHEETS |
|---|---|---|---|---|---|---|---|
| ------- | AC-012201<br>R0000102001 | PR-122 | SAN GERMAN | PR | 2022 | 42 | 349 |




| WORK | BY | DATE |
|---|---|---|
| DESIGN | | |
| DRAWN | | |
| TRACED | | |
| CHECKED | | |
| FINAL CHECK | | |

PUERTO RICO HIGHWAY & TRANSPORTATION AUTHORITY
*BEHAR YBARRA & ASSOCIATES LLC*
*CONSULTING ENGINEERS AND ARCHITECTS*

EXTENSION HIGHWAY PR-122
FROM EXISTING PR-321 TO EXISTING PR-166

| DATE | REVISION |
|---|---|
| | |

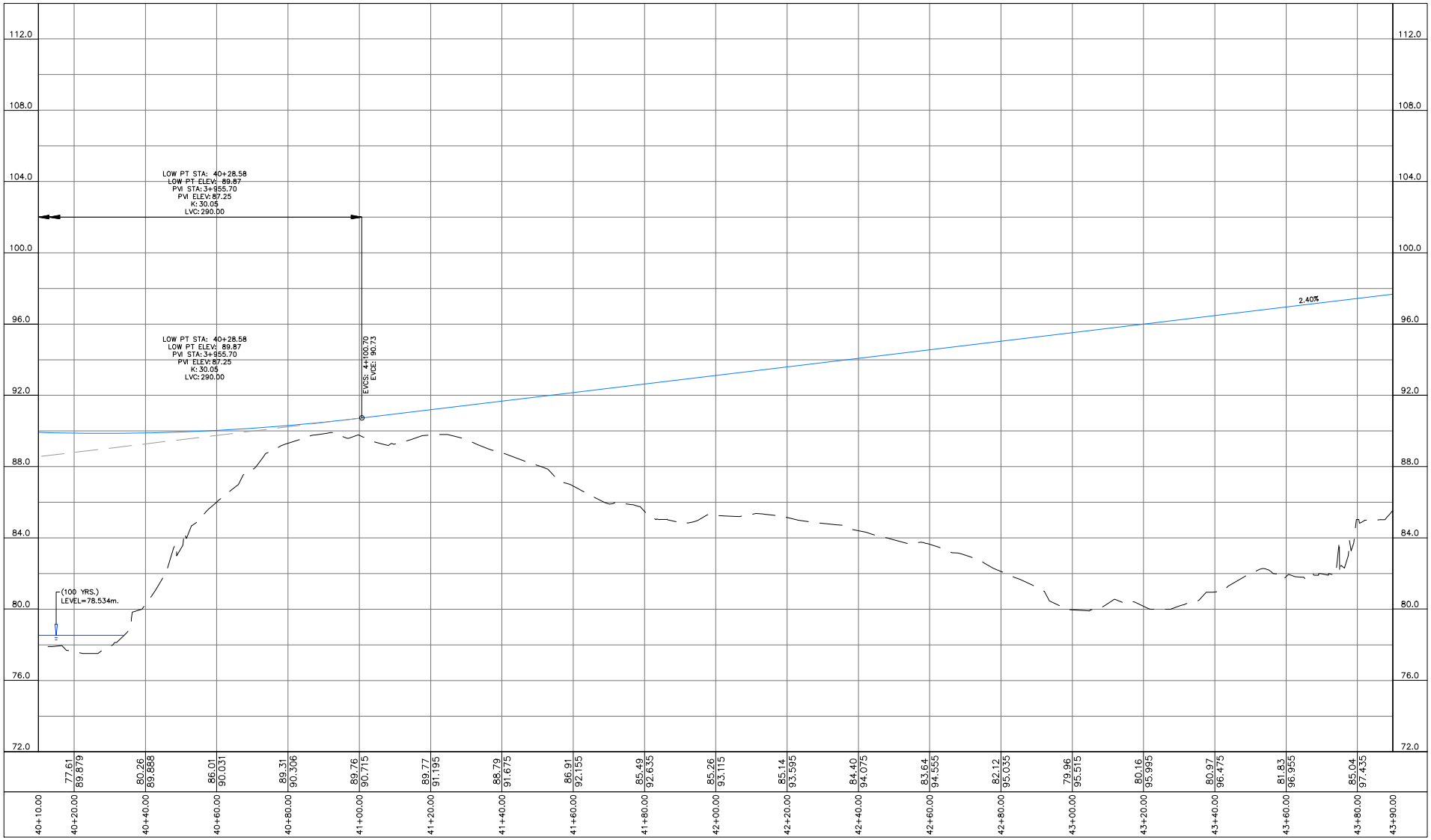
SCALE = 1 : 500
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PROFILE PLAN
PR-122
FROM STA. 36+30.00 TO STA. 40+10.00

PP
13

PLOT DATE: March 26, 2024
BYA FILE: \\BYASERVER1\Projects\22002-PR-122 Preliminary Plans\04-Pdf\042-AC-012201-PP-13-PROFILE-122.dwg
FILE NAME =

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|---|---|---|---|---|---|---|---|
| ------- | AC-012201<br>R0000102001 | PR-122 | SAN GERMAN | PR | 2022 | 43 | 349 |




| WORK | BY | DATE |
|---|---|---|
| DESIGN | | |
| DRAWING | | |
| TRACED | | |
| CHECKED | | |
| FINAL CHECK | | |

PUERTO RICO HIGHWAY & TRANSPORTATION AUTHORITY
*BEHAR YBARRA & ASSOCIATES LLC*
*CONSULTING ENGINEERS AND ARCHITECTS*

EXTENSION HIGHWAY PR-122
FROM EXISTING PR-321 TO EXISTING PR-166

| DATE | REVISION |
|---|---|
| | |

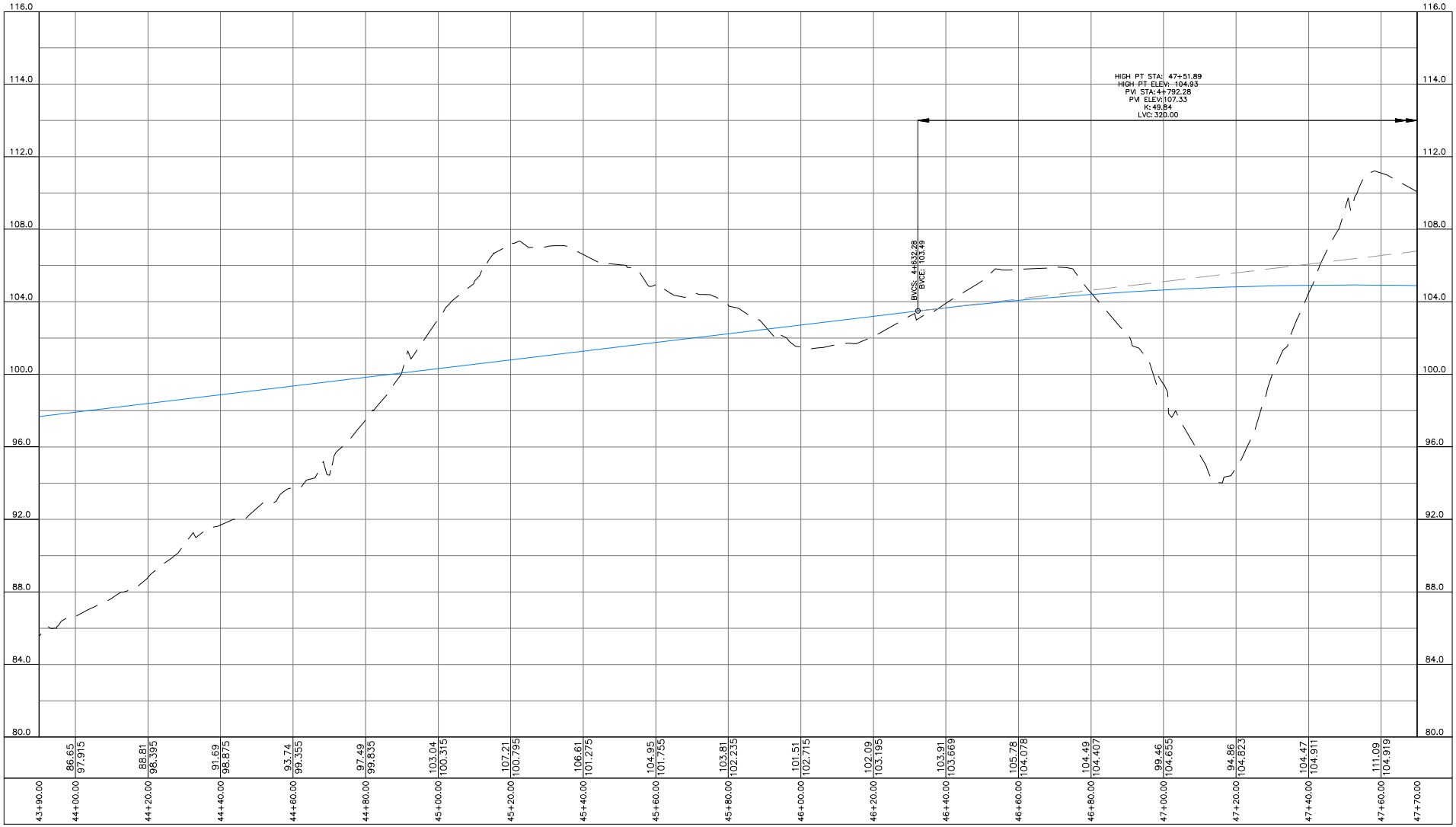
SCALE = 1 : 500
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PROFILE PLAN
PR-122
FROM STA. 40+10.00 TO STA. 43+90.00

PP
14

PLOT DATE: March 26, 2024
BYA FILE: \\BYASERVER1\Projects\22002-PR-122 Preliminary Plans\04-Preliminary Plans\043-AC-012201-PP-14-PROFILE-122.dwg
FILE NAME =

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|---|---|---|---|---|---|---|---|
| ------- | AC-012201<br>R0000102001 | PR-122 | SAN GERMAN | PR | 2022 | 44 | 349 |




| WORK | BY | DATE |
|---|---|---|
| DESIGN | | |
| DRAWN | | |
| TRACED | | |
| CHECKED | | |
| FINAL CHECK | | |

PUERTO RICO HIGHWAY & TRANSPORTATION AUTHORITY
*BEHAR YBARRA & ASSOCIATES LLC*
*CONSULTING ENGINEERS AND ARCHITECTS*

EXTENSION HIGHWAY PR-122
FROM EXISTING PR-321 TO EXISTING PR-166

| DATE | REVISION |
|---|---|
| | |

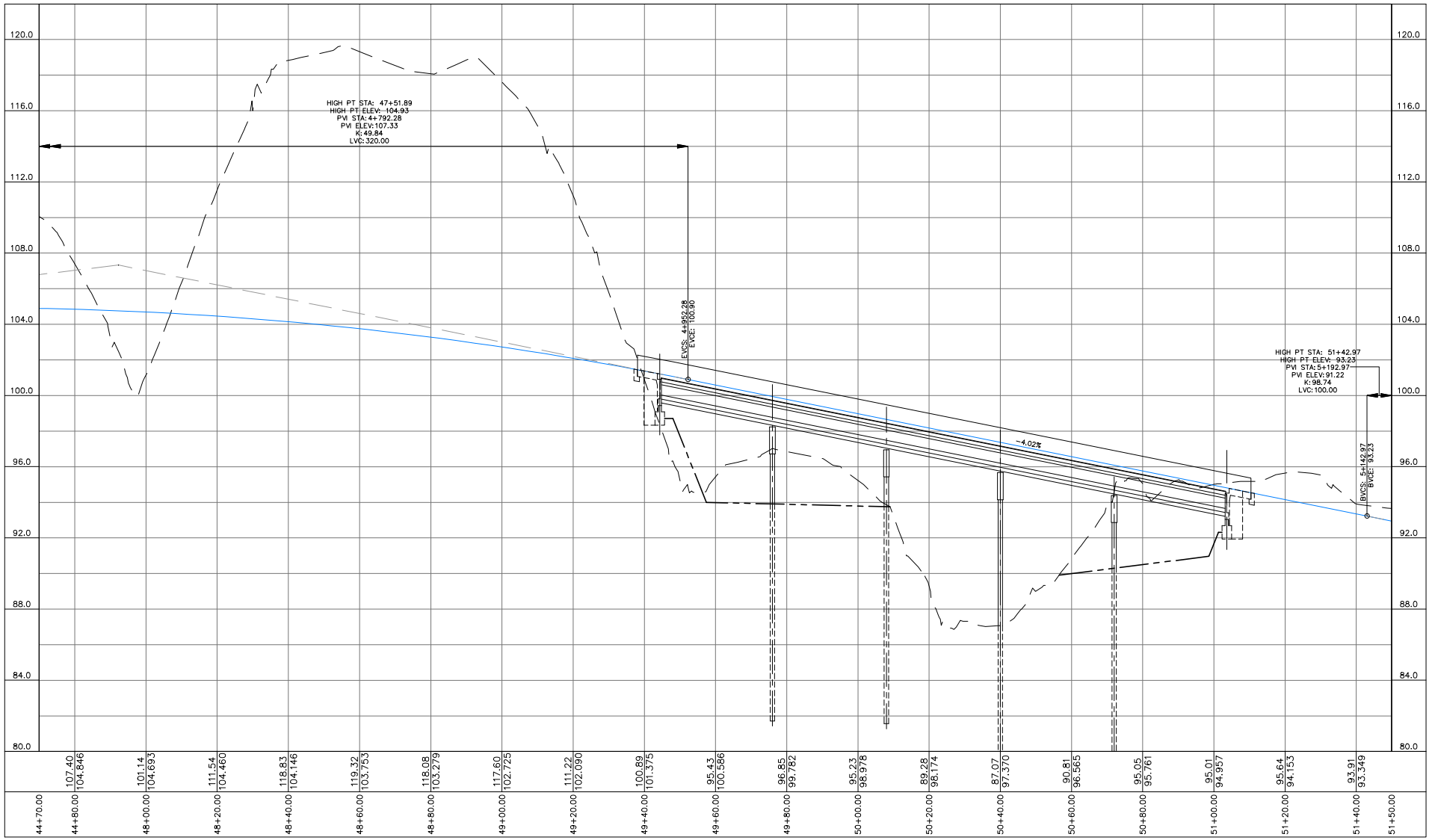
SCALE = 1 : 500
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PROFILE PLAN
PR-122
FROM STA. 43+90.00 TO STA. 47+70.00

PP
15

PLOT DATE: March 26, 2024 BYA FILE: \\BYASERVER1\Projects\22002-PR-122 Preliminary Plans\04-Prelim\044-AC-012201-PP-15-PROFILE-122.dwg
FILE NAME =

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| ------- | AC-012201<br>R0000102001 | PR-122 | SAN GERMAN | PR | 2022 | 45 | 349 |




| WORK | BY | DATE |
|---|---|---|
| DESIGN | | |
| DRAWN | | |
| TRACED | | |
| CHECKED | | |
| FINAL CHECK | | |

PUERTO RICO HIGHWAY & TRANSPORTATION AUTHORITY
*BEHAR YBARRA & ASSOCIATES LLC*
*CONSULTING ENGINEERS AND ARCHITECTS*

EXTENSION HIGHWAY PR-122
FROM EXISTING PR-321 TO EXISTING PR-166

| DATE | REVISION |
|---|---|
| | |

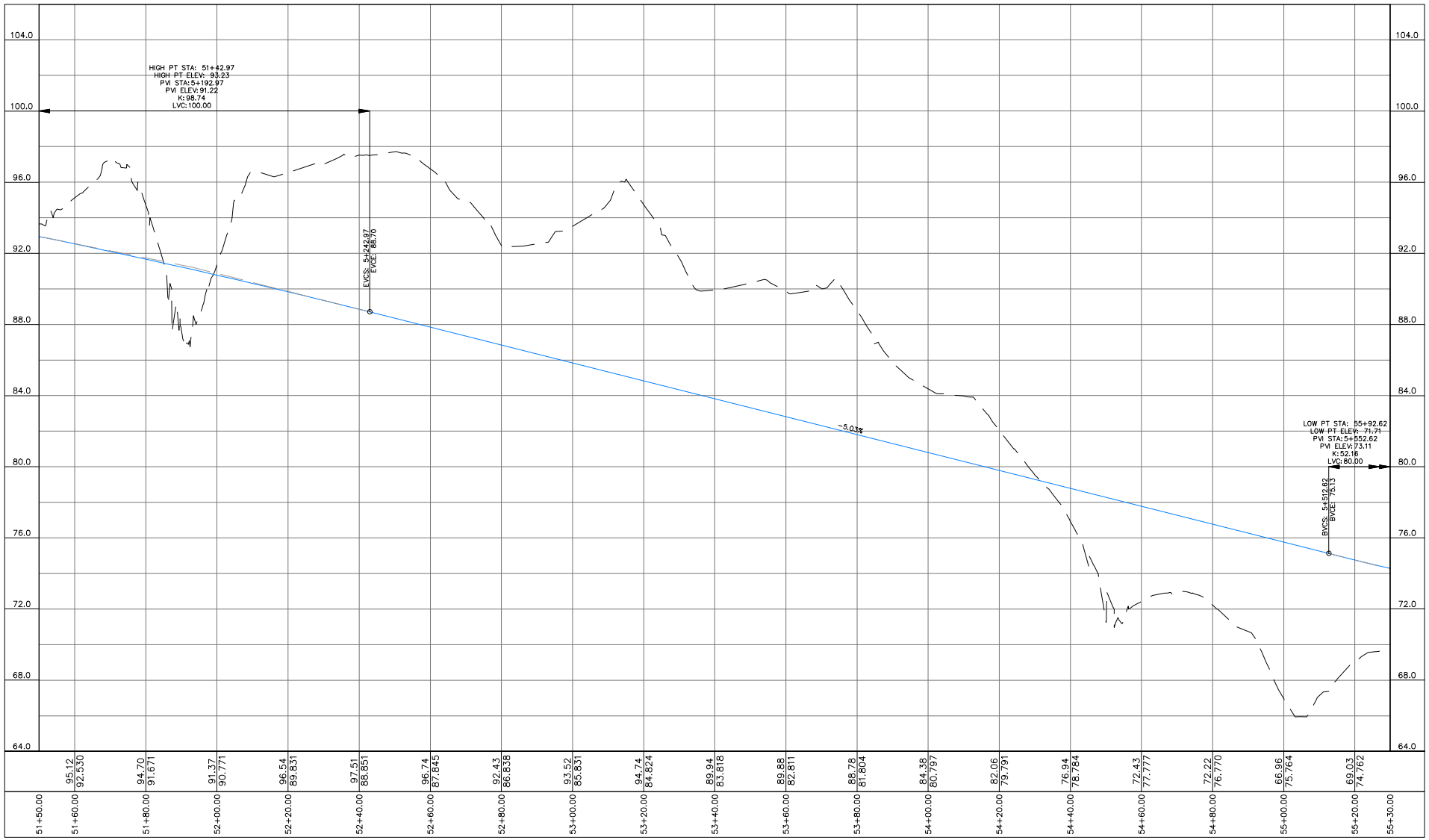
SCALE = 1 : 500
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PROFILE PLAN
PR-122
FROM STA. 44+70.00 TO STA. 51+50.00

PP
16

PLOT DATE: March 26, 2024
BYA FILE: \\BYASERVER1\Projects\22002-PR-122 Preliminary Plans\04-Prelim\04-Prelim Plans\04-Prelim Plans\045-AC-012201-PP-16-PROFILE-122.dwg
FILE NAME =

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| ------- | AC-012201<br>R0000102001 | PR-122 | SAN GERMAN | PR | 2022 | 46 | 349 |




| WORK | BY | DATE |
|---|---|---|
| DESIGN | | |
| DRAWN | | |
| TRACED | | |
| CHECKED | | |
| FINAL CHECK | | |

PUERTO RICO HIGHWAY & TRANSPORTATION AUTHORITY
*BEHAR YBARRA & ASSOCIATES LLC*
*CONSULTING ENGINEERS AND ARCHITECTS*

EXTENSION HIGHWAY PR-122
FROM EXISTING PR-321 TO EXISTING PR-166

| DATE | REVISION |
|---|---|
| | |

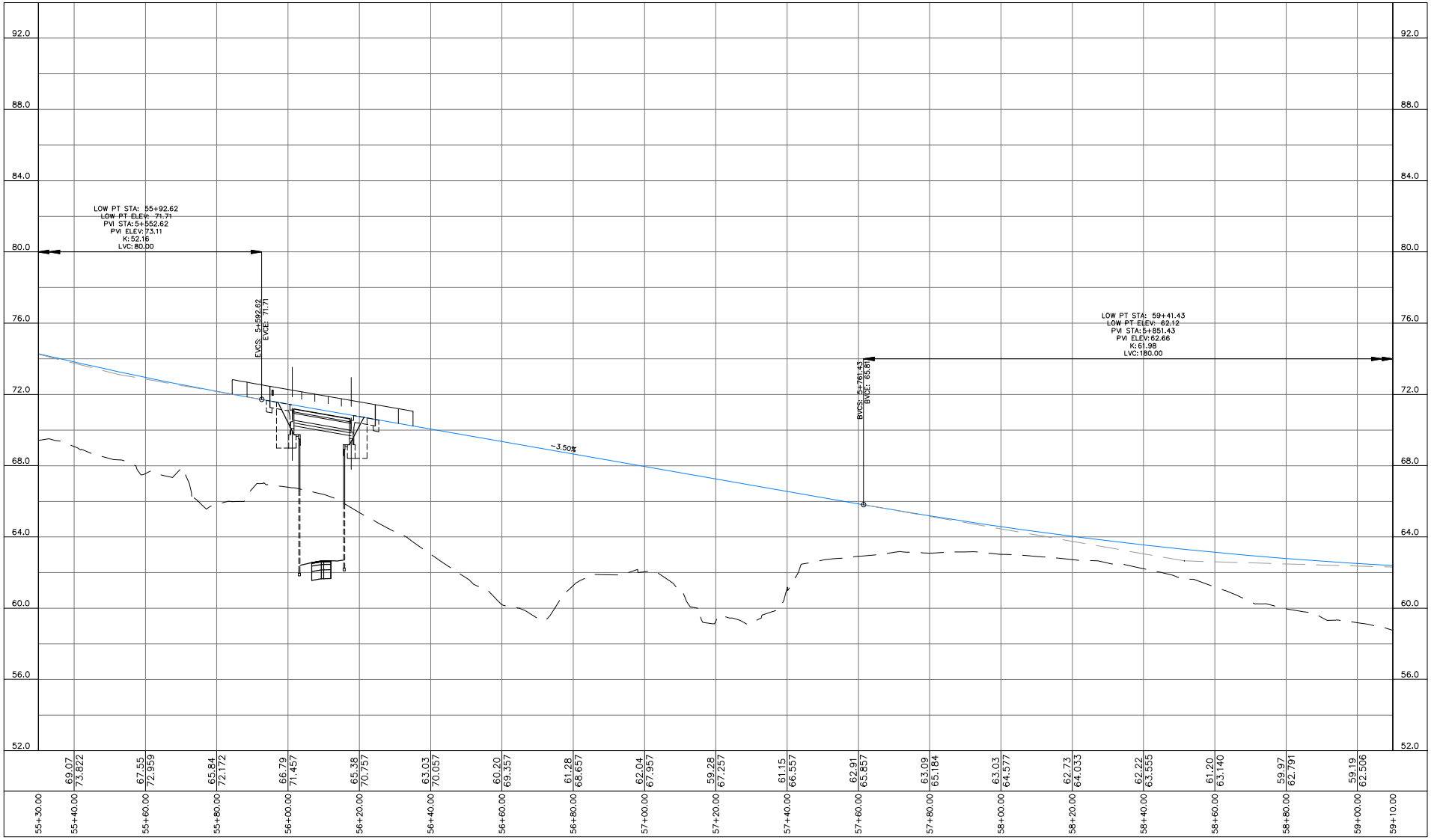
SCALE = 1 : 500
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PROFILE PLAN
PR-122
FROM STA. 51+50.00 TO STA. 55+30.00

PP
17

PLOT DATE: March 26, 2024
BYA FILE: \\BYASERVER1\Projects\22002-PR-122 Preliminary Plans\04-Preliminary Plans\04-PP\046-AC-012201-PP-17-PROFILE-122.dwg
FILE NAME =

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| ------- | AC-012201<br>R0000102001 | PR-122 | SAN GERMAN | PR | 2022 | 47 | 349 |




| WORK | BY | DATE |
|---|---|---|
| DESIGN | | |
| DRAWING | | |
| TRACED | | |
| CHECKED | | |
| ENG. CHECK | | |

PUERTO RICO HIGHWAY & TRANSPORTATION AUTHORITY
*BEHAR YBARRA & ASSOCIATES LLC*
*CONSULTING ENGINEERS AND ARCHITECTS*

EXTENSION HIGHWAY PR-122
FROM EXISTING PR-321 TO EXISTING PR-166

DATE | REVISION

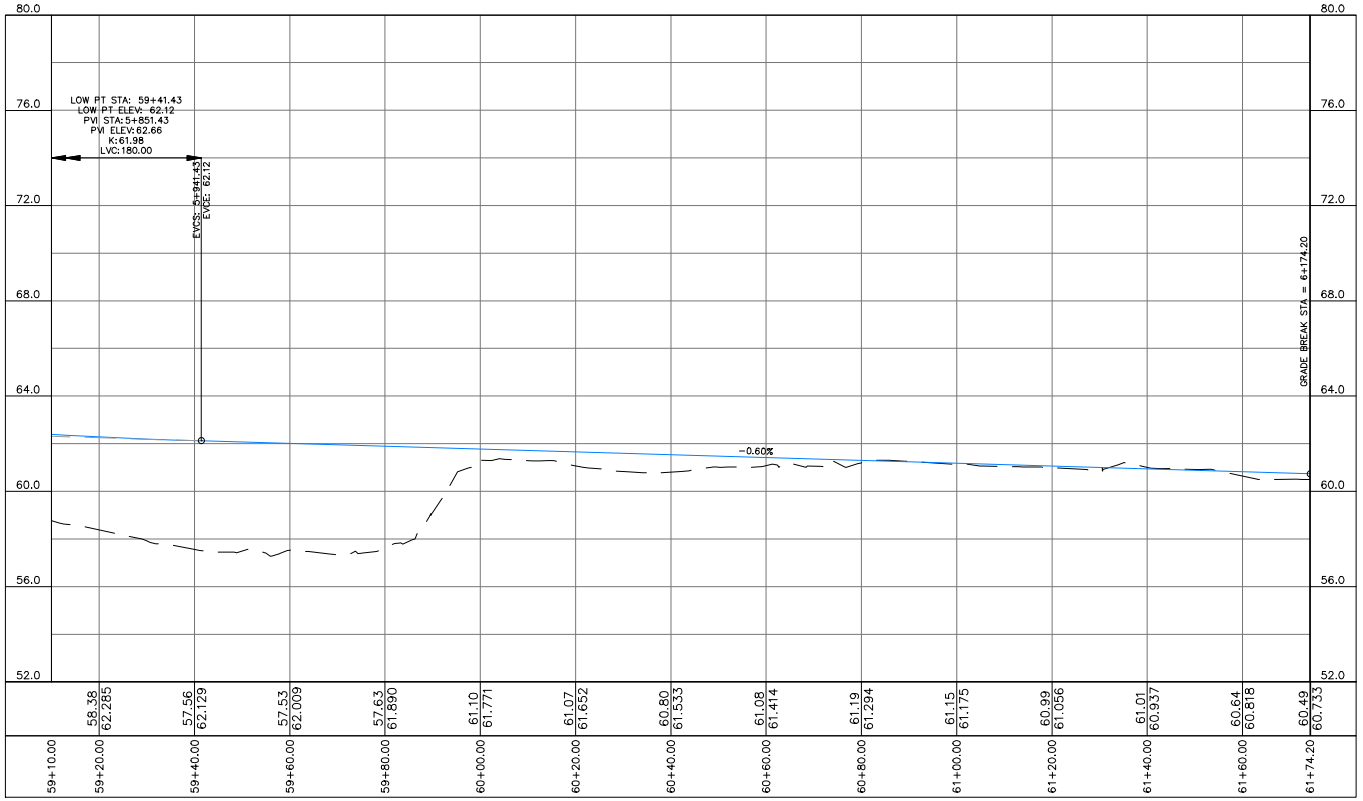
SCALE = 1 : 500
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PROFILE PLAN
PR-122
FROM STA. 55+30.00 TO STA. 59+10.00

PP
18

PLOT DATE: March 26, 2024 BYA FILE: \\BYASERVER1\Projects\22002-PR-122 Preliminary Plans\04-PS\047-AC-0122201-PP-18-PROFILE-122.dwg
FILE NAME =

| FEDERAL CODE NO. | AC. PROJECT CODE NO. | HIGHWAY | MUNICIPALITY | ISLAND | FISCAL YEAR | SHEET NO. | TOTAL SHEETS |
|---|---|---|---|---|---|---|---|
| ------- | AC-012201<br>R0000102001 | PR-122 | SAN GERMAN | PR | 2022 | 48 | 349 |




| WORK | BY | DATE |
|---|---|---|
| DESIGN | | |
| DRAWN | | |
| TRACED | | |
| CHECKED | | |
| ENG. CHECK | | |

PUERTO RICO HIGHWAY & TRANSPORTATION AUTHORITY
*BEHAR YBARRA & ASSOCIATES LLC*
*CONSULTING ENGINEERS AND ARCHITECTS*

EXTENSION HIGHWAY PR-122
FROM EXISTING PR-321 TO EXISTING PR-166

| DATE | REVISION |
|---|---|
| | |

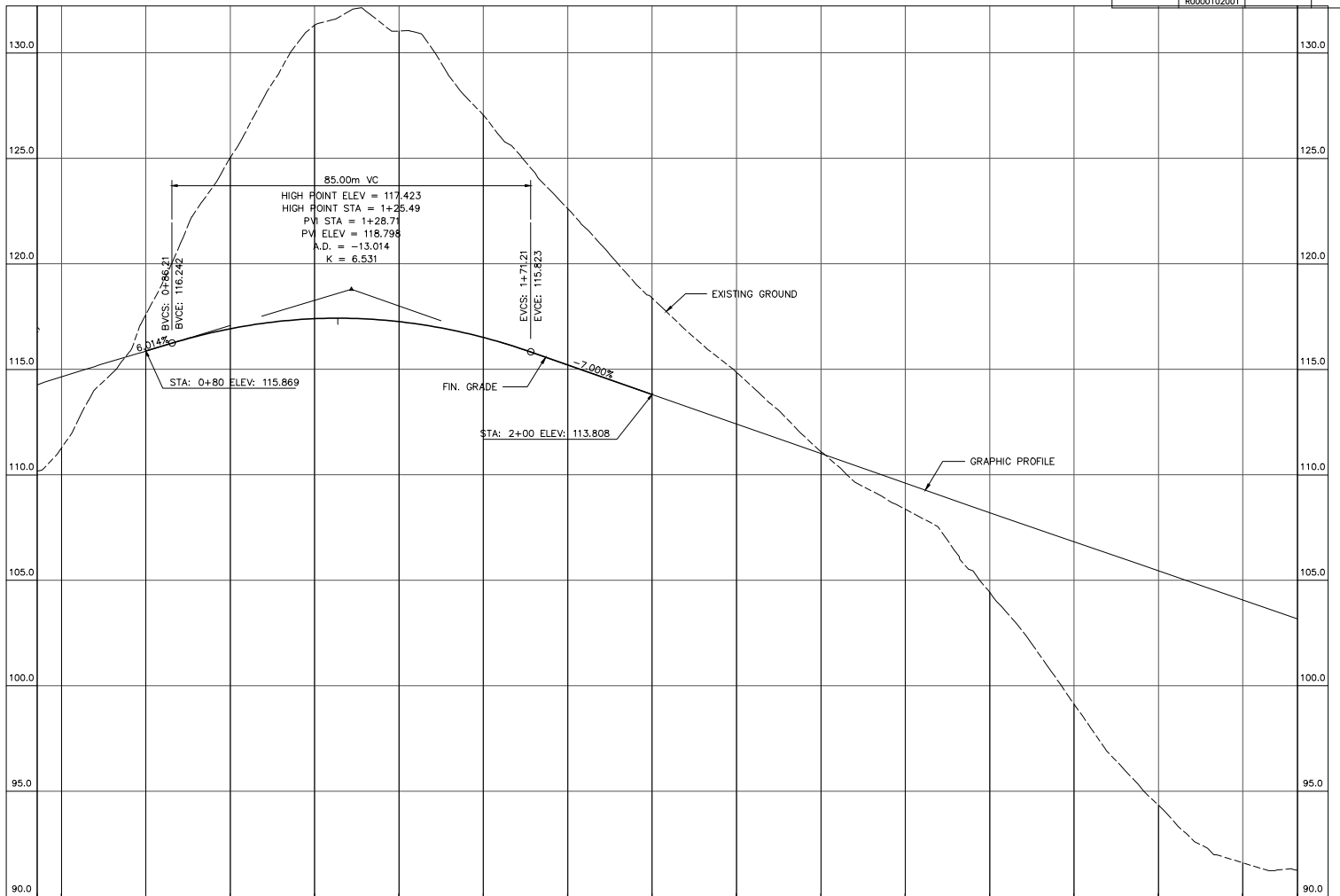
SCALE = 1 : 500
0 5 10 20 30 40

PROFILE PLAN
PR-122
FROM STA. 59+10.00 TO STA. 61+74.20

PP
19

PLOT DATE: March 26, 2024 BYA FILE: \\BYASERVER1\Projects\22002-PR-122 Preliminary Plans\04-Preliminary Plans\04-Pp\048-AC-012201-PP-19-PROFILE-122.dwg
FILE NAME =

| FEDERAL CODE NO. | AC. PROJECT CODE NO. | HIGHWAY | MUNICIPALITY | ISLAND | FISCAL YEAR | SHEET NO. | TOTAL SHEETS |
|---|---|---|---|---|---|---|---|
| ------- | AC-012201<br>R0000102001 | PR-122 | SAN GERMAN | PR | 2022 | 49 | 349 |




| STATION | 0+54.10 | 0+60 | 0+80 | 1+00 | 1+20 | 1+40 | 1+60 | 1+80 | 2+00 | 2+20 | 2+40 | 2+60 | 2+80 | 3+00 | 3+20 | 3+40 | 3+52.98 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| EXISTING GROUND AND PROFILE GRADE | 110.17 | 111.27 | 117.60<br>115.869 | 125.03<br>116.926 | 131.32<br>117.400 | 131.04<br>117.262 | 127.06<br>116.512 | 122.62<br>115.208 | 118.38<br>113.808 | 114.84 | 111.10 | 108.37 | 104.44 | 99.12 | 94.34 | 91.62 | 91.27 |

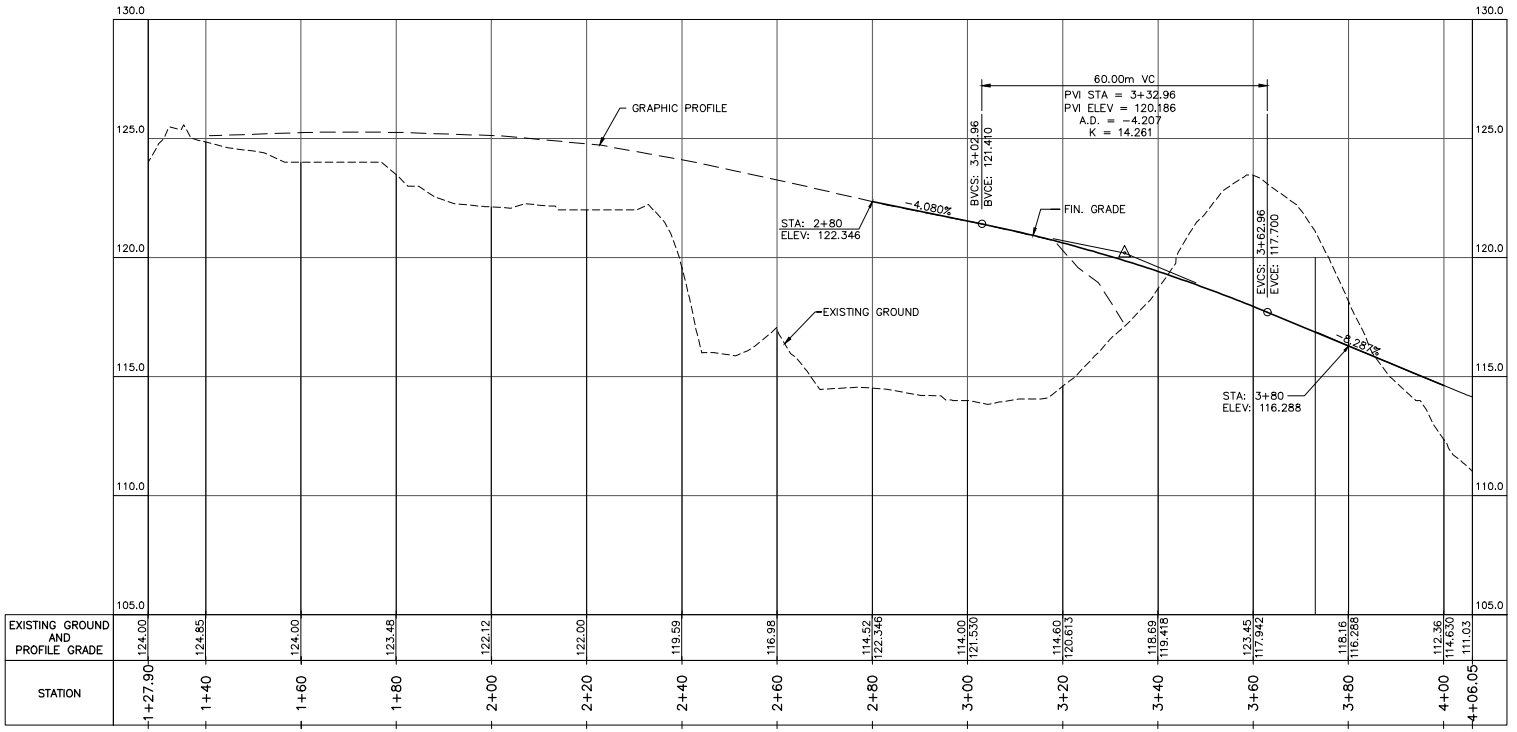
# RAMP PROFILES A

| PUERTO RICO HIGHWAY & TRANSPORTATION AUTHORITY<br>*BEHAR YBARRA & ASSOCIATES LLC*<br>*CONSULTING ENGINEERS AND ARCHITECTS* | EXTENSION HIGHWAY PR-122<br>FROM EXISTING PR-321 TO EXISTING PR-166 | DATE / REVISION | SCALE = 1 : 500<br>0 5 10 20 30 40 | PROFILES RAMP A | PP<br>20 |
|---|---|---|---|---|---|

| WORK | BY | DATE |
|---|---|---|
| DESIGN | | |
| DRAWN | | |
| TRACED | | |
| CHECKED | | |
| ENG. CHECK | | |

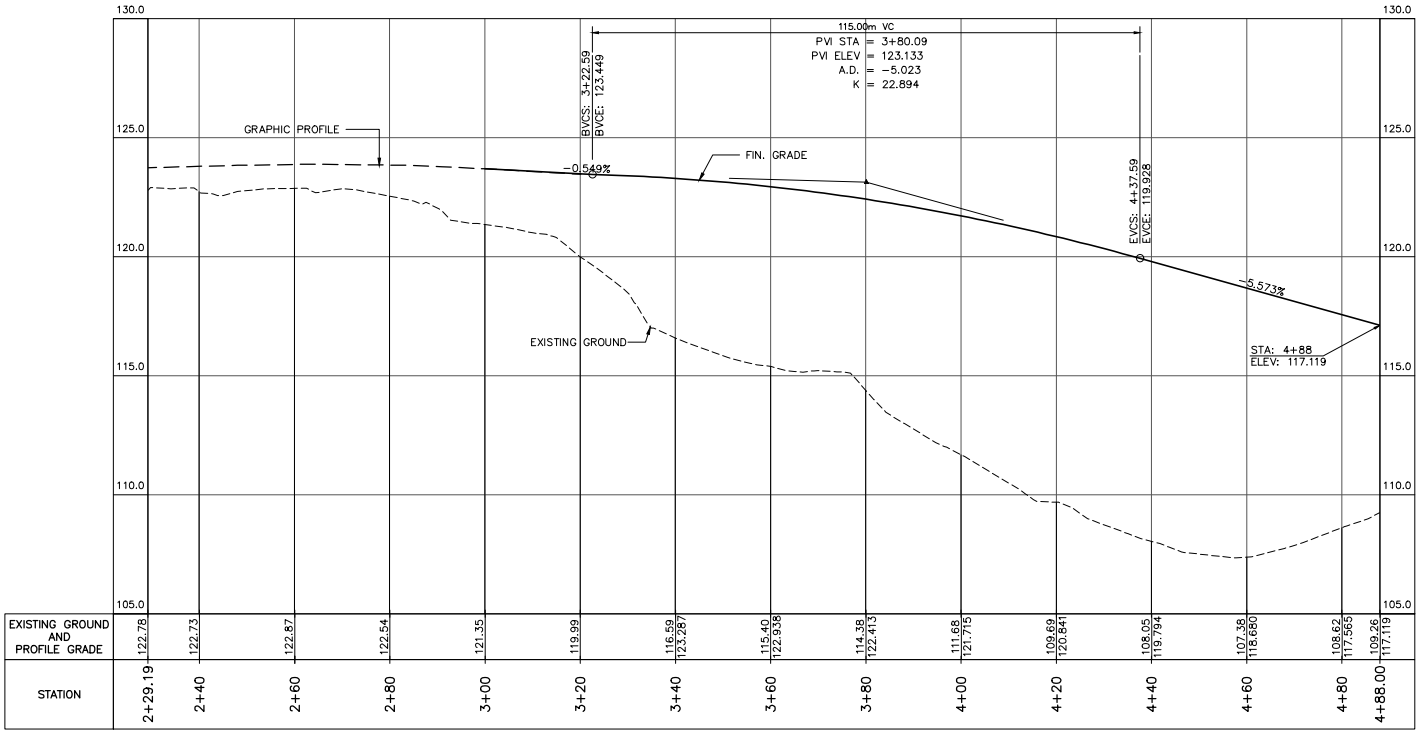
PLOT DATE: March 26, 2024 BYA FILE: \\BYASERVER1\Projects\22002-PR-122 Preliminary Plans\04-Preliminary Plans\049-AC-0122201-PP-20-PROFILE-RAMP-A.dwg
FILE NAME =

| FEDERAL CODE NO. | AC. PROJECT CODE NO. | HIGHWAY | MUNICIPALITY | ISLAND | FISCAL YEAR | SHEET NO. | TOTAL SHEETS |
|---|---|---|---|---|---|---|---|
| ------- | AC-012201<br>R0000102001 | PR-122 | SAN GERMAN | PR | 2022 | 50 | 349 |



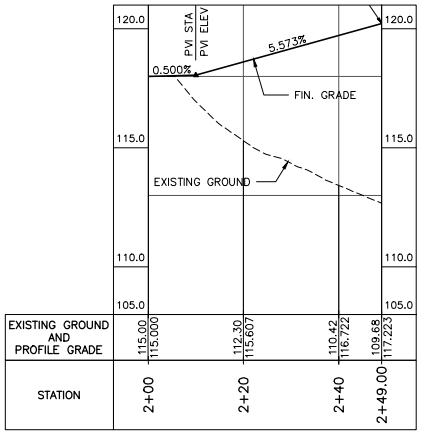

| | | |

| FEDERAL CODE NO. | AC. PROJECT CODE NO. | HIGHWAY | MUNICIPALITY | ISLAND | FISCAL YEAR | SHEET NO. | TOTAL SHEETS |
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| ------- | AC-012201<br>R0000102001 | PR-122 | SAN GERMAN | PR | 2022 | 51 | 349 |



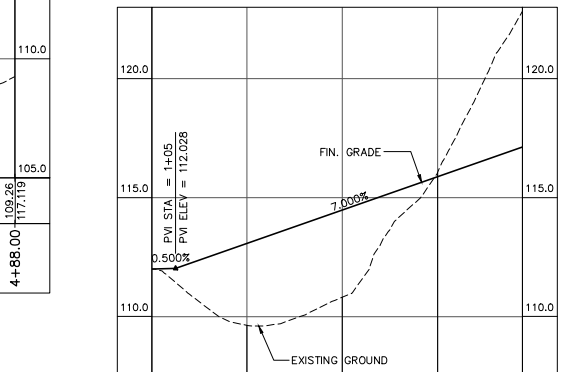

| STATION | 2+29.19 | 2+40 | 2+60 | 2+80 | 3+00 | 3+20 | 3+40 | 3+60 | 3+80 | 4+00 | 4+20 | 4+40 | 4+60 | 4+80 | 4+88.00 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| EXISTING GROUND AND PROFILE GRADE | 122.78 | 122.73 | 122.87 | 122.54 | 121.35 | 119.99 | 116.59<br>123.287 | 115.40<br>122.938 | 114.38<br>122.413 | 111.68<br>121.715 | 109.69<br>120.841 | 108.05<br>119.794 | 107.38<br>118.680 | 108.62<br>117.565 | 109.26<br>117.119 |

## RAMP PROFILES C




| STATION | 2+00 | 2+20 | 2+40 | 2+49.00 |
|---|---|---|---|---|
| EXISTING GROUND AND PROFILE GRADE | 115.00<br>115.000 | 112.30<br>115.607 | 110.42<br>116.722 | 109.68<br>117.223 |

## RAMP PROFILES CD




| STATION | 2+00 | 2+20 | 2+40 | 2+60 | 2+49.00 |
|---|---|---|---|---|---|
| EXISTING GROUND AND PROFILE GRADE | 112.00<br>112.003 | 109.64<br>113.078 | 110.82<br>114.478 | 116.05<br>115.878 | 122.82<br>117.128 |

## RAMP PROFILES AB

| WORK | BY | DATE |
|---|---|---|
| DESIGN | | |
| DRAWN | | |
| TRACED | | |
| CHECKED | | |
| ENG. CHECK | | |

PUERTO RICO HIGHWAY & TRANSPORTATION AUTHORITY
*BEHAR YBARRA & ASSOCIATES LLC*
*CONSULTING ENGINEERS AND ARCHITECTS*

EXTENSION HIGHWAY PR-122
FROM EXISTING PR-321 TO EXISTING PR-166

| DATE | REVISION |
|---|---|
| | |

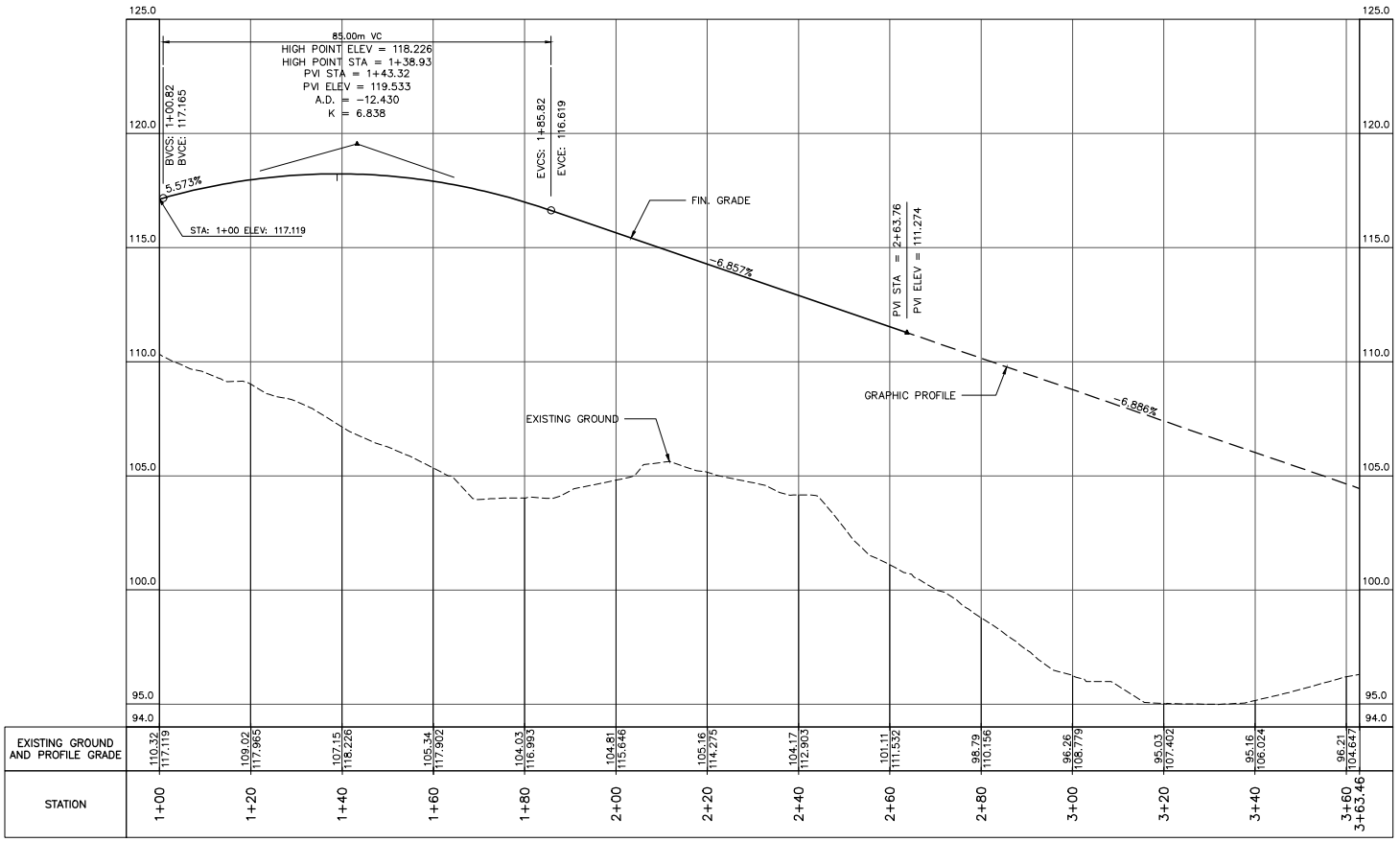
SCALE = 1 : 500
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PROFILES RAMP C, CD AND AB

PP
22

PLOT DATE: March 26, 2024 BYA FILE: \\BYASERVER1\Projects\22002-PR-122 Preliminary Plans\04-Preliminary Plans\04-Prl\051-AC-012201-PP-22-PROFILE-RAMP-C-CD-AB.dwg
FILE NAME =

| FEDERAL CODE NO. | AC. PROJECT CODE NO. | HIGHWAY | MUNICIPALITY | ISLAND | FISCAL YEAR | SHEET NO. | TOTAL SHEETS |
|---|---|---|---|---|---|---|---|
| ------- | AC-012201<br>R0000102001 | PR-122 | SAN GERMAN | PR | 2022 | 52 | 349 |




| EXISTING GROUND AND PROFILE GRADE | 110.32<br>117.119 | 109.02<br>117.965 | 107.15<br>118.226 | 105.34<br>117.902 | 104.03<br>116.993 | 104.81<br>115.646 | 105.16<br>114.275 | 104.17<br>112.903 | 101.11<br>111.532 | 98.79<br>110.156 | 96.26<br>108.779 | 95.03<br>107.402 | 95.16<br>106.024 | 96.21<br>104.647 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| STATION | 1+00 | 1+20 | 1+40 | 1+60 | 1+80 | 2+00 | 2+20 | 2+40 | 2+60 | 2+80 | 3+00 | 3+20 | 3+40 | 3+60<br>3+63.46 |

## RAMP PROFILES D

| WORK | BY | DATE |
|---|---|---|
| DESIGN | | |
| DRAWN | | |
| TRACED | | |
| CHECKED | | |
| FINAL CHECK | | |

PUERTO RICO HIGHWAY & TRANSPORTATION AUTHORITY
*BEHAR YBARRA & ASSOCIATES LLC*
*CONSULTING ENGINEERS AND ARCHITECTS*

EXTENSION HIGHWAY PR-122
FROM EXISTING PR-321 TO EXISTING PR-166

| DATE | REVISION |
|---|---|
| | |

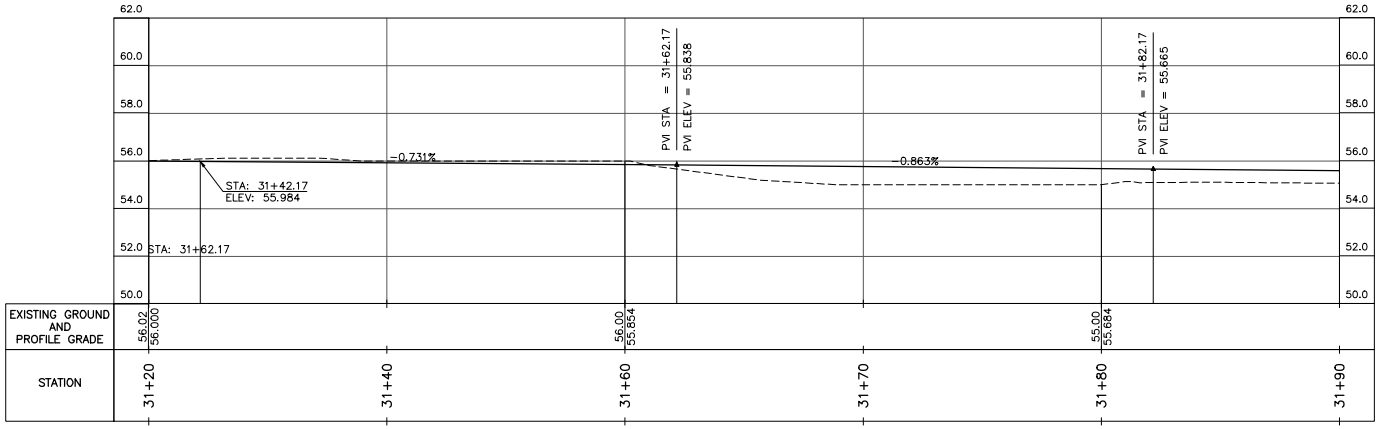
SCALE = 1 : 500
0 5 10 20 30 40

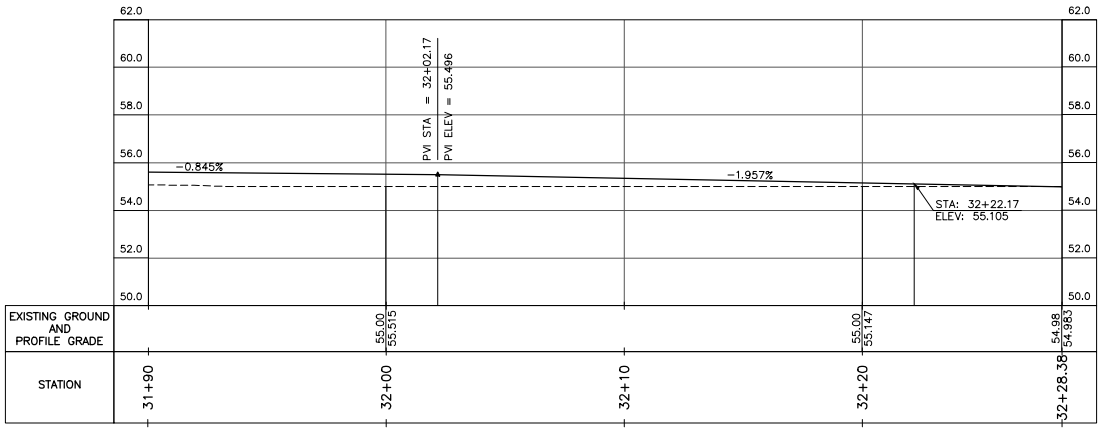
PROFILE RAMP D

PP
23

PLOT DATE: March 26, 2024 BYA FILE: \\BYASERVER1\Projects\22002-PR-122 Preliminary Plans\04-Preliminary Plans\052-AC-012201-PP-23-PROFILE-RAMP-D.dwg
FILE NAME =

| FEDERAL CODE NO. | AC. PROJECT CODE NO. | HIGHWAY | MUNICIPALITY | ISLAND | FISCAL YEAR | SHEET NO. | TOTAL SHEETS |
|---|---|---|---|---|---|---|---|
| ------- | AC-012201<br>R0000102001 | PR-122 | SAN GERMAN | PR | 2022 | 53 | 349 |




| | | | |
|---|---|---|---|
| WORK | | | |
| DESIGN | | | |
| DRAWN | | | |
| TRACED | | | |
| CHECKED | | | |
| ENG. CHECK | | | |

PUERTO RICO HIGHWAY & TRANSPORTATION AUTHORITY
*BEHAR YBARRA & ASSOCIATES LLC*
*CONSULTING ENGINEERS AND ARCHITECTS*

EXTENSION HIGHWAY PR-122
FROM EXISTING PR-321 TO EXISTING PR-166

| DATE | REVISION |
|---|---|
| | |

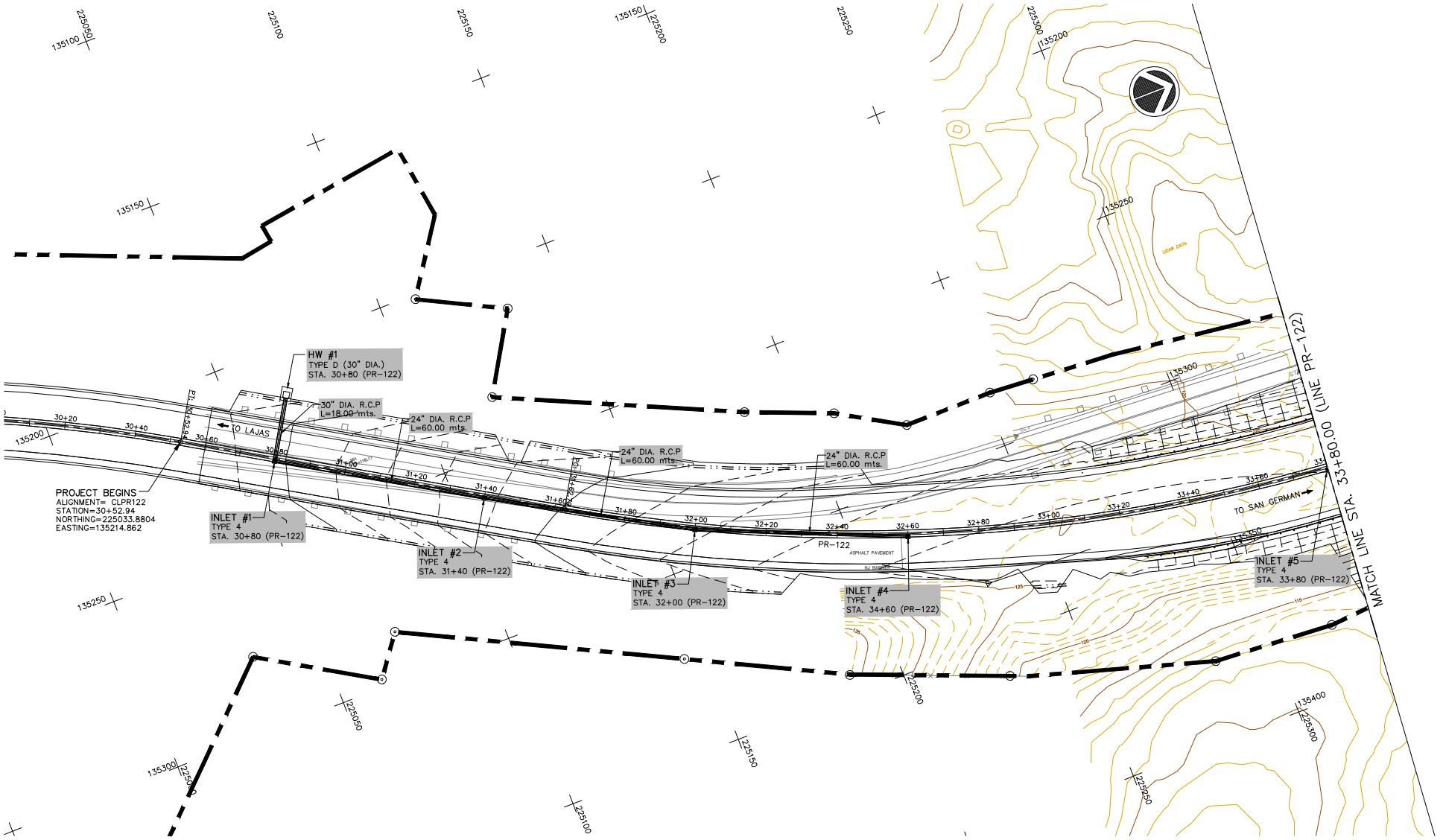
SCALE = 1 : 500
SCALE = 1 : 100
0 5 10 20 30 40

PROFILE CHANNEL

PP
24

PLOT DATE: March 26, 2024
BYA FILE: \\BYASERVER1\Projects\22002-PR-122 Preliminary Plans\04-Preliminary Plans\053-AC-012201-PP-24-PROFILE-CHANNEL.dwg
FILE NAME =

| FEDERAL CODE NO. | AC. PROJECT CODE NO. | HIGHWAY | MUNICIPALITY | ISLAND | FISCAL YEAR | SHEET NO. | TOTAL SHEETS |
|---|---|---|---|---|---|---|---|
| ------- | AC-012201<br>R0000102001 | PR-122 | SAN GERMAN | PR | 2022 | 57 | 349 |




| DESIGN | DRAWN | TRACED | CHECKED | FINAL CHECK | BY | DATE |
|---|---|---|---|---|---|---|
| | | | | | | |

PUERTO RICO HIGHWAY & TRANSPORTATION AUTHORITY
*BEHAR YBARRA & ASSOCIATES LLC*
*CONSULTING ENGINEERS AND ARCHITECTS*

EXTENSION HIGHWAY PR-122
FROM EXISTING PR-321 TO EXISTING PR-166

DATE | REVISION

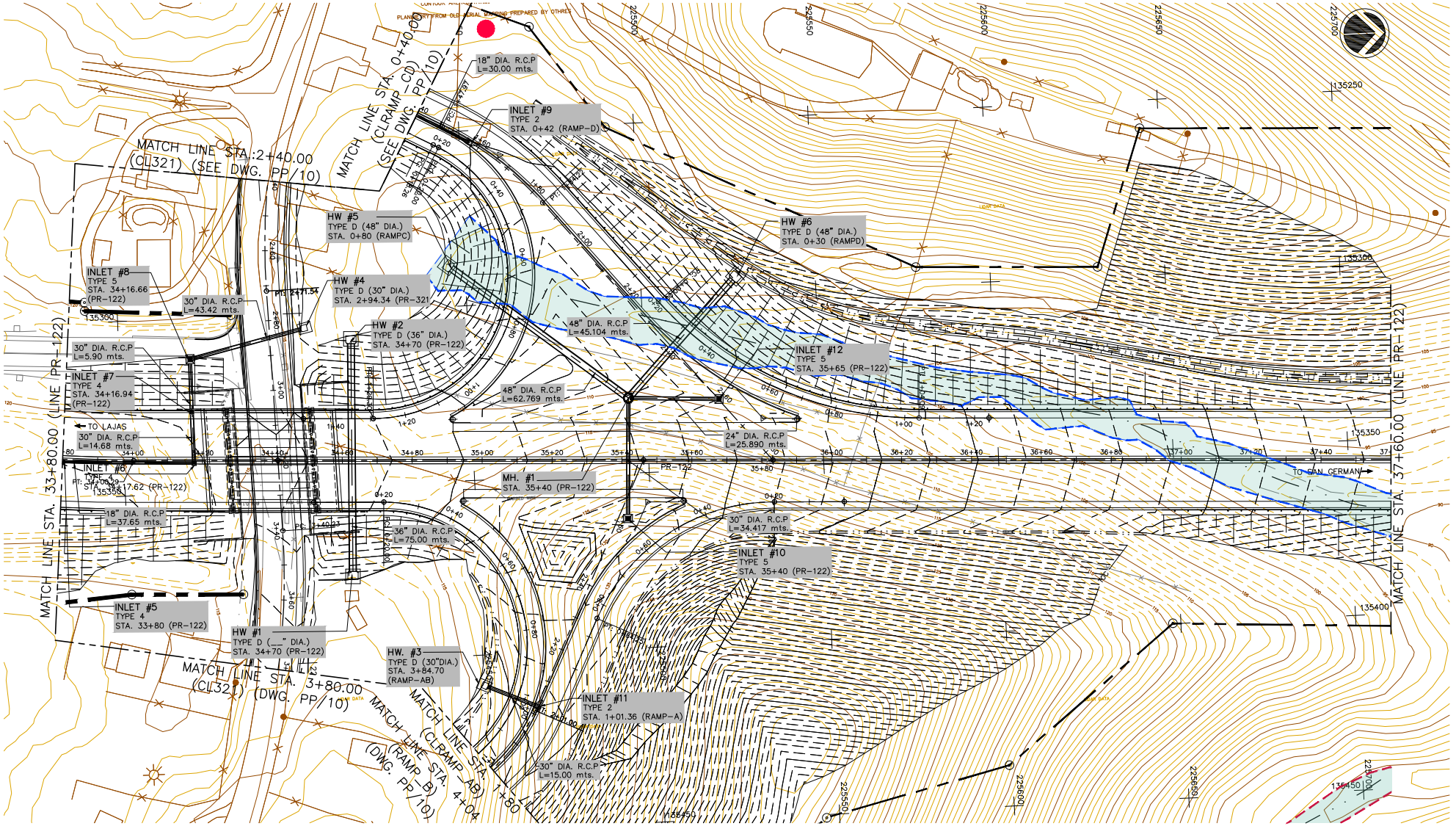
SCALE = 1 : 500
0 5 10 20 30 40

DRAINAGE PLANS
FROM STA. 30+52.94 TO STA. 33+80.00

DR
1

PLOT DATE: March 26, 2024
BYA FILE: \\BYASERVER1\Projects\22002-PR-122 Preliminary Plans\04-Preliminary Plans\06-DA\057-AC-012201-DR-01-PLAN.dwg
FILE NAME =

| FEDERAL CODE NO. | AC. PROJECT CODE NO. | HIGHWAY | MUNICIPALITY | ISLAND | FISCAL YEAR | SHEET NO. | TOTAL SHEETS |
|---|---|---|---|---|---|---|---|
| ------- | AC-012201<br>R0000102001 | PR-122 | SAN GERMAN | PR | 2022 | 58 | 349 |

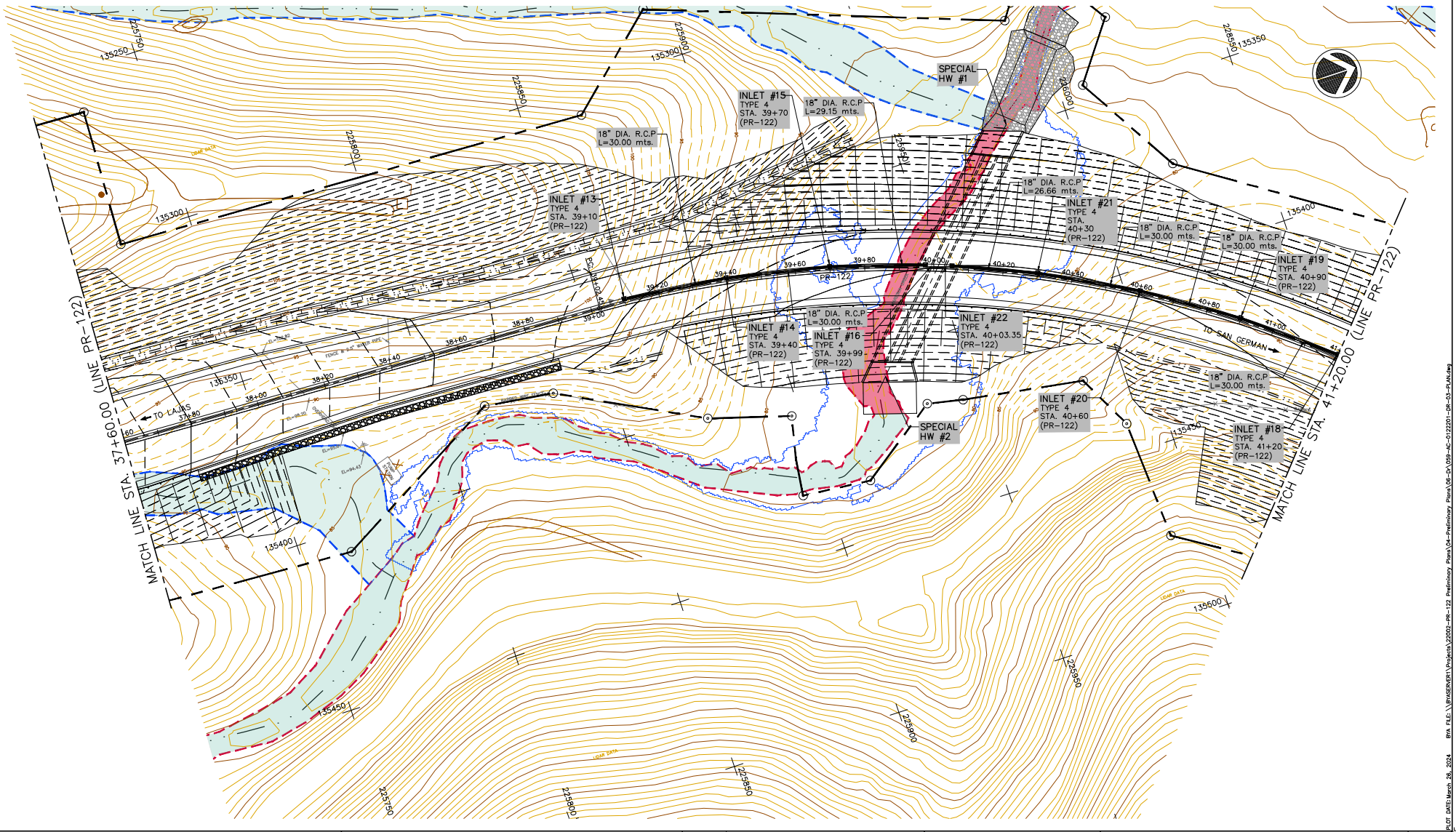



| PUERTO RICO HIGHWAY & TRANSPORTATION AUTHORITY<br>*BEHAR YBARRA & ASSOCIATES LLC*<br>*CONSULTING ENGINEERS AND ARCHITECTS* | EXTENSION HIGHWAY PR-122<br>FROM EXISTING PR-321 TO EXISTING PR-166 | DATE / REVISION | SCALE = 1 : 500<br>0 5 10 20 30 40 | DRAINAGE PLANS<br>FROM STA. 33+80.00 TO STA. 37+60.00 | DR 2 |
|---|---|---|---|---|---|

| WORK | DESIGN | DRAWN | TRACED | CHECKED | FINAL CHECK |
|---|---|---|---|---|---|
| BY | | | | | |
| DATE | | | | | |

PLOT DATE: March 26, 2024
FILE NAME = BYA FILE: \\BYASERVER1\Projects\22002--PR--122 Preliminary Plans\04-Preliminary Plans\05-DA\05-AC-012201-08-02-PLAN.dwg

| FEDERAL CODE NO. | AC. PROJECT CODE NO. | HIGHWAY | MUNICIPALITY | ISLAND | FISCAL YEAR | SHEET NO. | TOTAL SHEETS |
|---|---|---|---|---|---|---|---|
| -------- | AC-012201<br>R0000102001 | PR-122 | SAN GERMAN | PR | 2022 | 59 | 349 |




| DATE | BY | WORK |
|---|---|---|
| | | DESIGN |
| | | DRAWN |
| | | TRACED |
| | | CHECKED |
| | | FINAL CHECK |

PUERTO RICO HIGHWAY & TRANSPORTATION AUTHORITY
*BEHAR YBARRA & ASSOCIATES LLC*
*CONSULTING ENGINEERS AND ARCHITECTS*

EXTENSION HIGHWAY PR-122
FROM EXISTING PR-321 TO EXISTING PR-166

DATE | REVISION

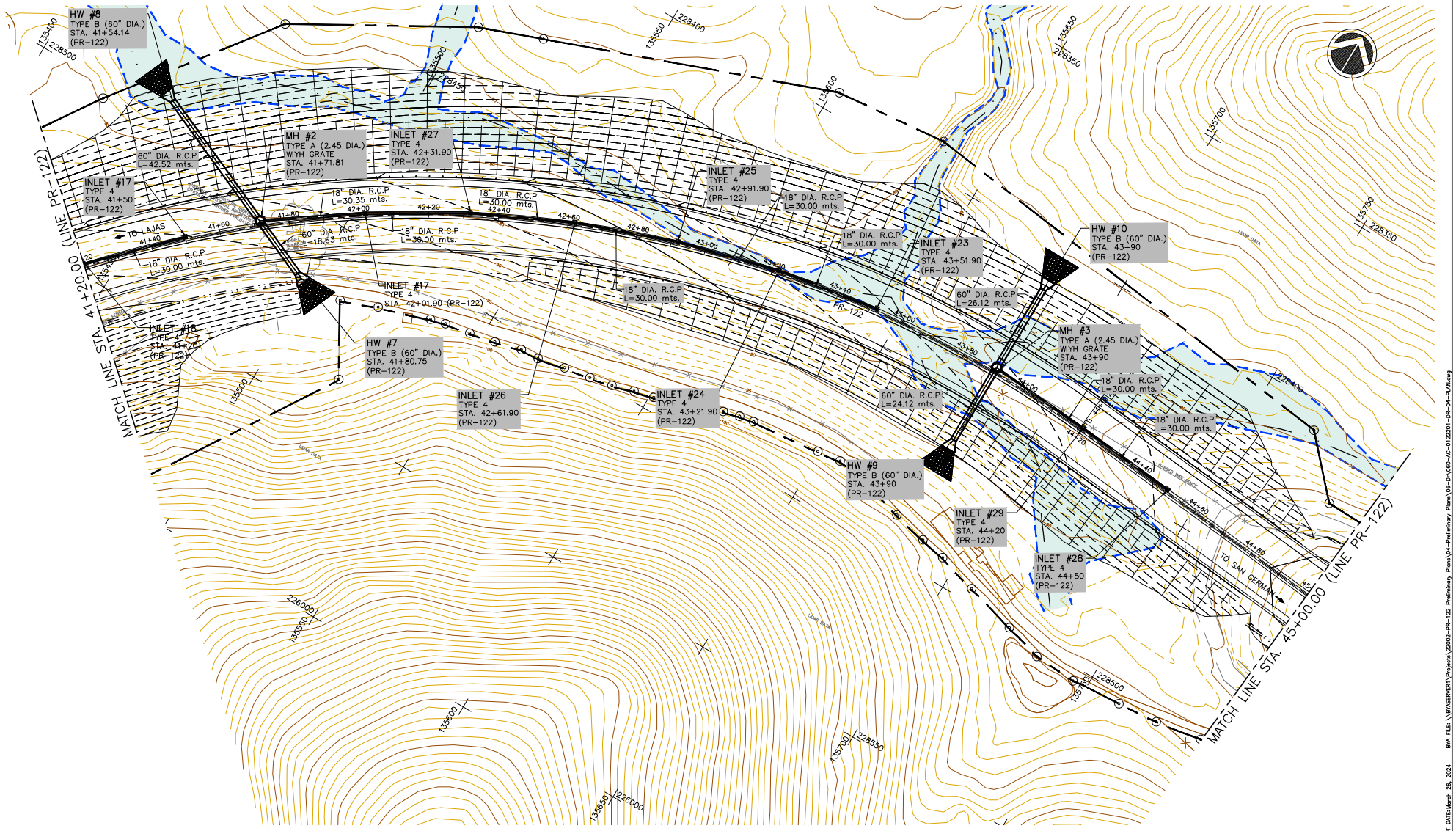
SCALE = 1 : 500
0 5 10 20 30 40

DRAINAGE PLANS
FROM STA. 37+60.00 TO STA. 41+20.00

DR
3

PLOT DATE: March 26, 2024
BYA FILE: \\BYASERVER1\Projects\22002-PR-122 Preliminary Plans\04-Preliminary Plans\06-DR\059-AC-012201-DR-03-PLAN.dwg
FILE NAME =

| FEDERAL CODE NO. | AC. PROJECT CODE NO. | HIGHWAY | MUNICIPALITY | ISLAND | FISCAL YEAR | SHEET NO. | TOTAL SHEETS |
|---|---|---|---|---|---|---|---|
| ------- | AC-012201<br>R0000102001 | PR-122 | SAN GERMAN | PR | 2022 | 60 | 349 |




| | | | | |
|---|---|---|---|---|
| WORK | BY | DATE | | |
| DESIGN | | | | |
| DRAWN | | | | |
| TRACED | | | | |
| CHECKED | | | | |
| FINAL CHECK | | | | |

PUERTO RICO HIGHWAY & TRANSPORTATION AUTHORITY
*BEHAR YBARRA & ASSOCIATES LLC*
*CONSULTING ENGINEERS AND ARCHITECTS*

EXTENSION HIGHWAY PR-122
FROM EXISTING PR-321 TO EXISTING PR-166

| DATE | REVISION |
|---|---|
| | |

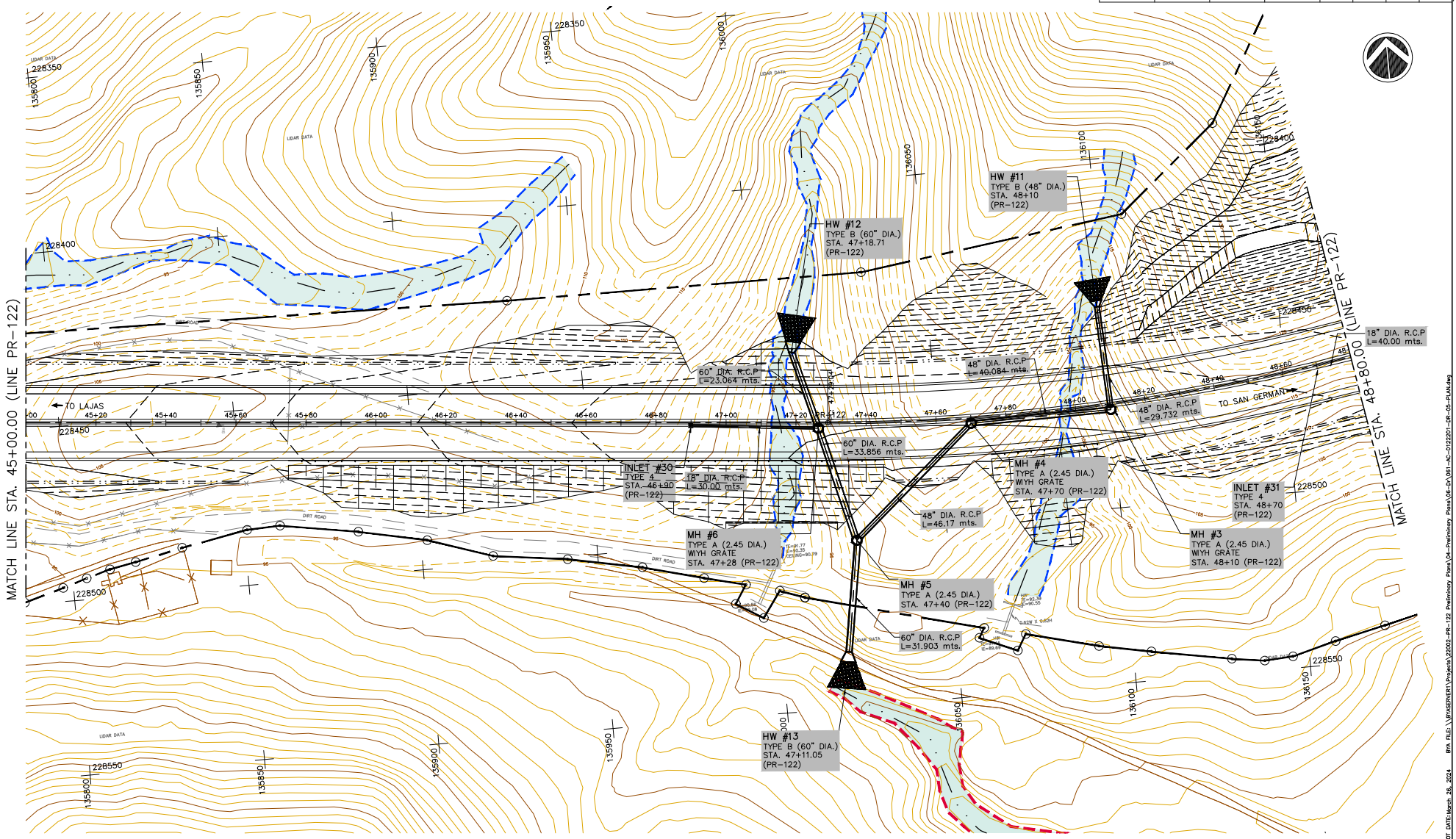
SCALE = 1 : 500
0 5 10 20 30 40

DRAINAGE PLANS
FROM STA. 41+20.00 TO STA. 45+00.00

DR
4

PLOT DATE: March 26, 2024
BYA FILE: \\BYASERVER1\Projects\22002-PR-122 Preliminary Plans\04-Preliminary Plans\06-DV\060-AC-012201-DR-04-PLAN.dwg
FILE NAME =

| FEDERAL CODE NO. | AC. PROJECT CODE NO. | HIGHWAY | MUNICIPALITY | ISLAND | FISCAL YEAR | SHEET NO. | TOTAL SHEETS |
|---|---|---|---|---|---|---|---|
| -------- | AC-012201<br>R0000102001 | PR-122 | SAN GERMAN | PR | 2022 | 61 | 349 |




| DATE | BY | WORK |
|---|---|---|
| | | DESIGN |
| | | DRAWING |
| | | TRACED |
| | | CHECKED |
| | | ENG. CHECK |

PUERTO RICO HIGHWAY & TRANSPORTATION AUTHORITY
*BEHAR YBARRA & ASSOCIATES LLC*
*CONSULTING ENGINEERS AND ARCHITECTS*

EXTENSION HIGHWAY PR-122
FROM EXISTING PR-321 TO EXISTING PR-166

| DATE | REVISION |
|---|---|
| | |

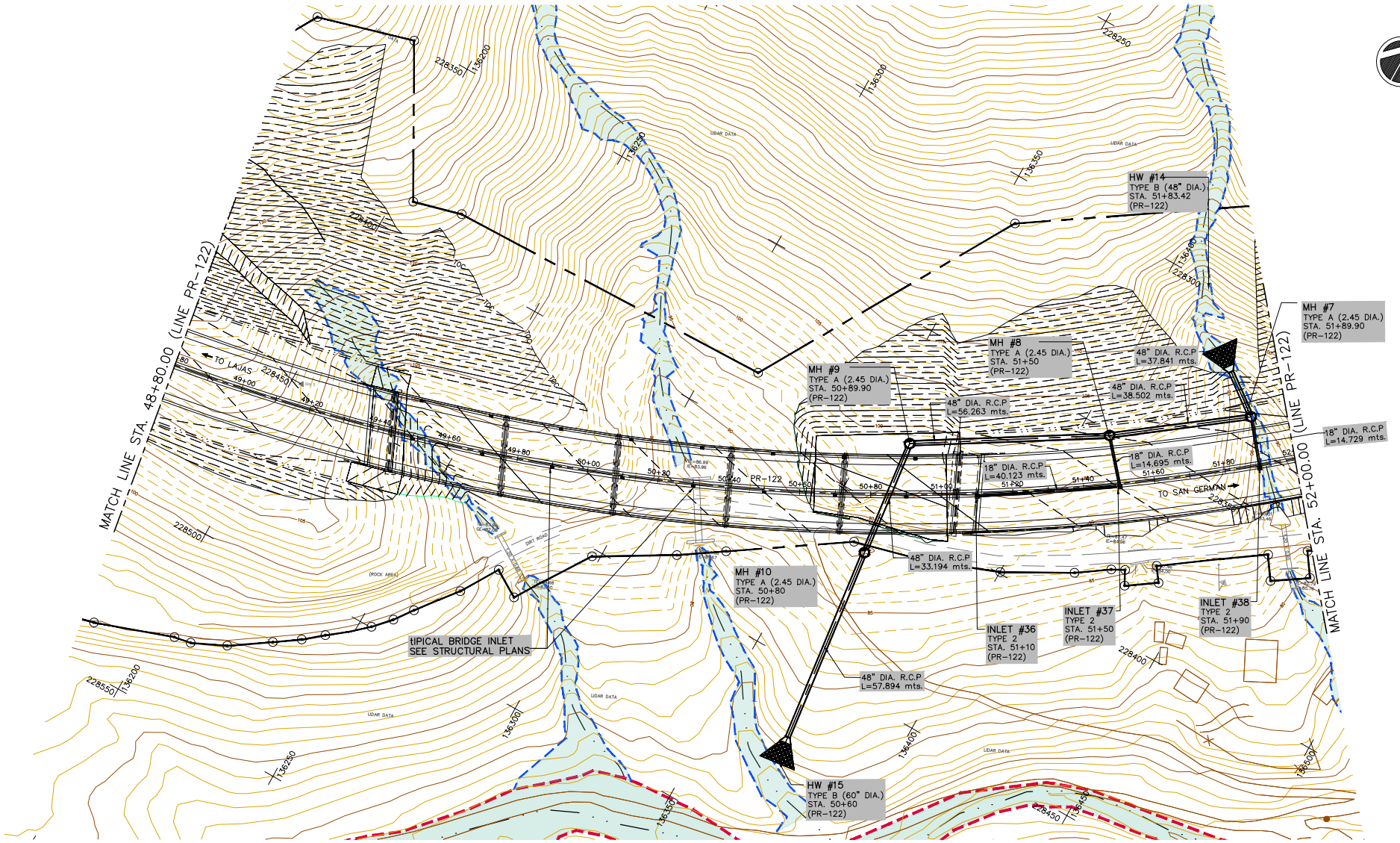
SCALE = 1 : 500
0 5 10 20 30 40

DRAINAGE PLANS
FROM STA. 45+00.00 TO STA. 48+80.00

DR
5

PLOT DATE: March 26, 2024
FILE NAME = BYA FILE: \\BYASERVER1\Projects\22002--PR-122 Preliminary Plans\04-Preliminary Plans\06-DV\061-AC-012201-DR-05-PLAN.dwg

| FEDERAL CODE NO. | AC. PROJECT CODE NO. | HIGHWAY | MUNICIPALITY | ISLAND | FISCAL YEAR | SHEET NO. | TOTAL SHEETS |
|---|---|---|---|---|---|---|---|
| ------- | AC-012201<br>R000102001 | PR-122 | SAN GERMAN | PR | 2022 | 62 | 349 |



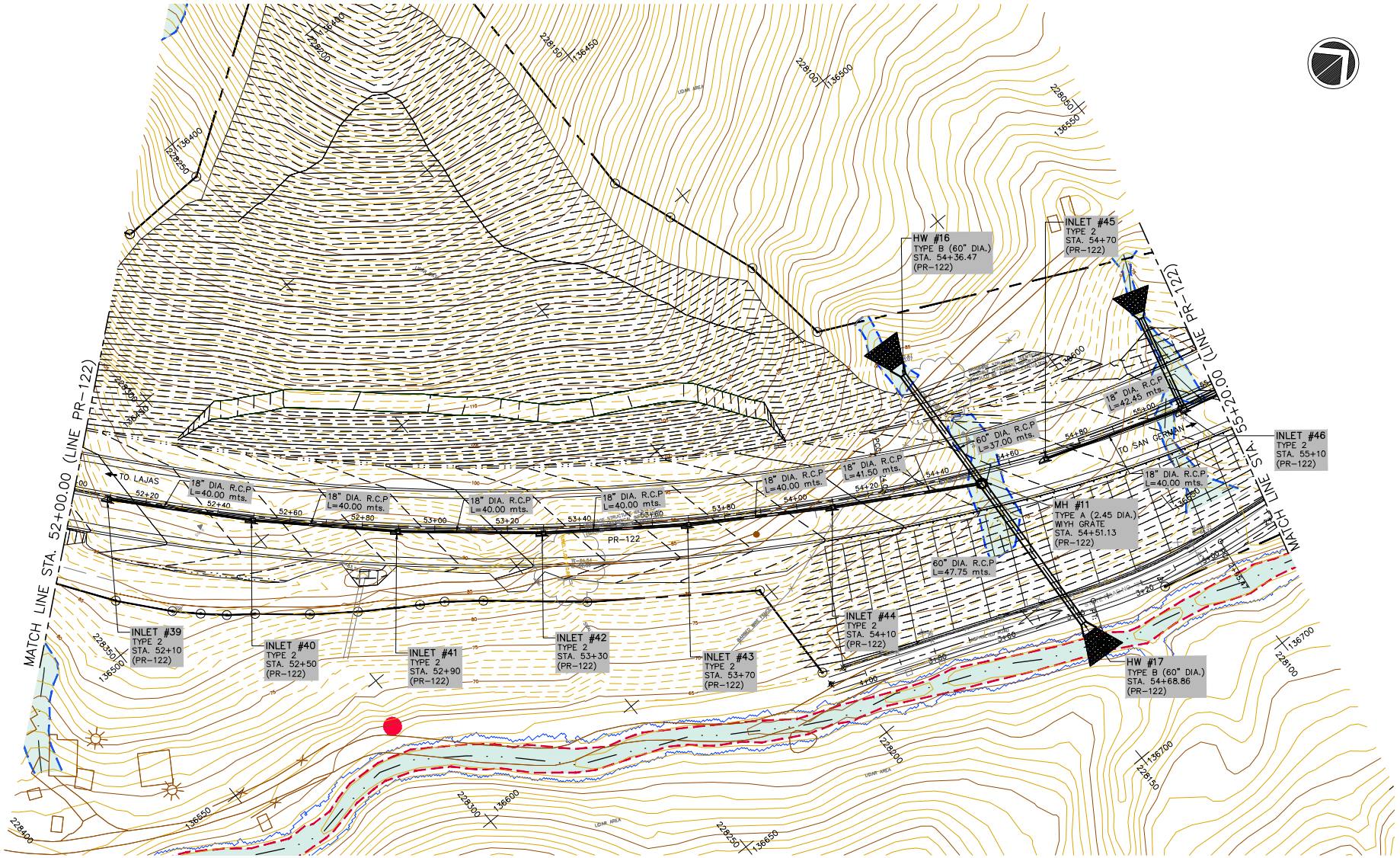

| | | |
|---|---|---|
| PUERTO RICO HIGHWAY & TRANSPORTATION AUTHORITY<br>*BEHAR YBARRA & ASSOCIATES LLC*<br>*CONSULTING ENGINEERS AND ARCHITECTS* | EXTENSION HIGHWAY PR-122<br>FROM EXISTING PR-321 TO EXISTING PR-166 | SCALE = 1 : 500<br>0 5 10 20 30 40 |
| DRAINAGE PLANS<br>FROM STA. 48+80.00 TO STA. 52+00.00 | DR<br>6 | |

| WORK | BY | DATE |
|---|---|---|
| DESIGN | | |
| DRAWN | | |
| TRACED | | |
| CHECKED | | |
| FINAL CHECK | | |

DATE | REVISION

PLOT DATE: March 26, 2024
BYA FILE: \\BYASERVER1\Projects\22002--PR--122 Preliminary Plans\04-Preliminary Plans\06-DV\062-AC-012201-DR-06-PLAN.dwg
FILE NAME =

| FEDERAL CODE NO. | AC. PROJECT CODE NO. | HIGHWAY | MUNICIPALITY | ISLAND | FISCAL YEAR | SHEET NO. | TOTAL SHEETS |
|---|---|---|---|---|---|---|---|
| ------- | AC-012201<br>R0000102001 | PR-122 | SAN GERMAN | PR | 2022 | 63 | 349 |




| WORK | BY | DATE |
|---|---|---|
| DESIGN | | |
| DRAWN | | |
| TRACED | | |
| CHECKED | | |
| FINAL CHECK | | |

PUERTO RICO HIGHWAY & TRANSPORTATION AUTHORITY
*BEHAR YBARRA & ASSOCIATES LLC*
*CONSULTING ENGINEERS AND ARCHITECTS*

EXTENSION HIGHWAY PR-122
FROM EXISTING PR-321 TO EXISTING PR-166

| DATE | REVISION |
|---|---|
| | |

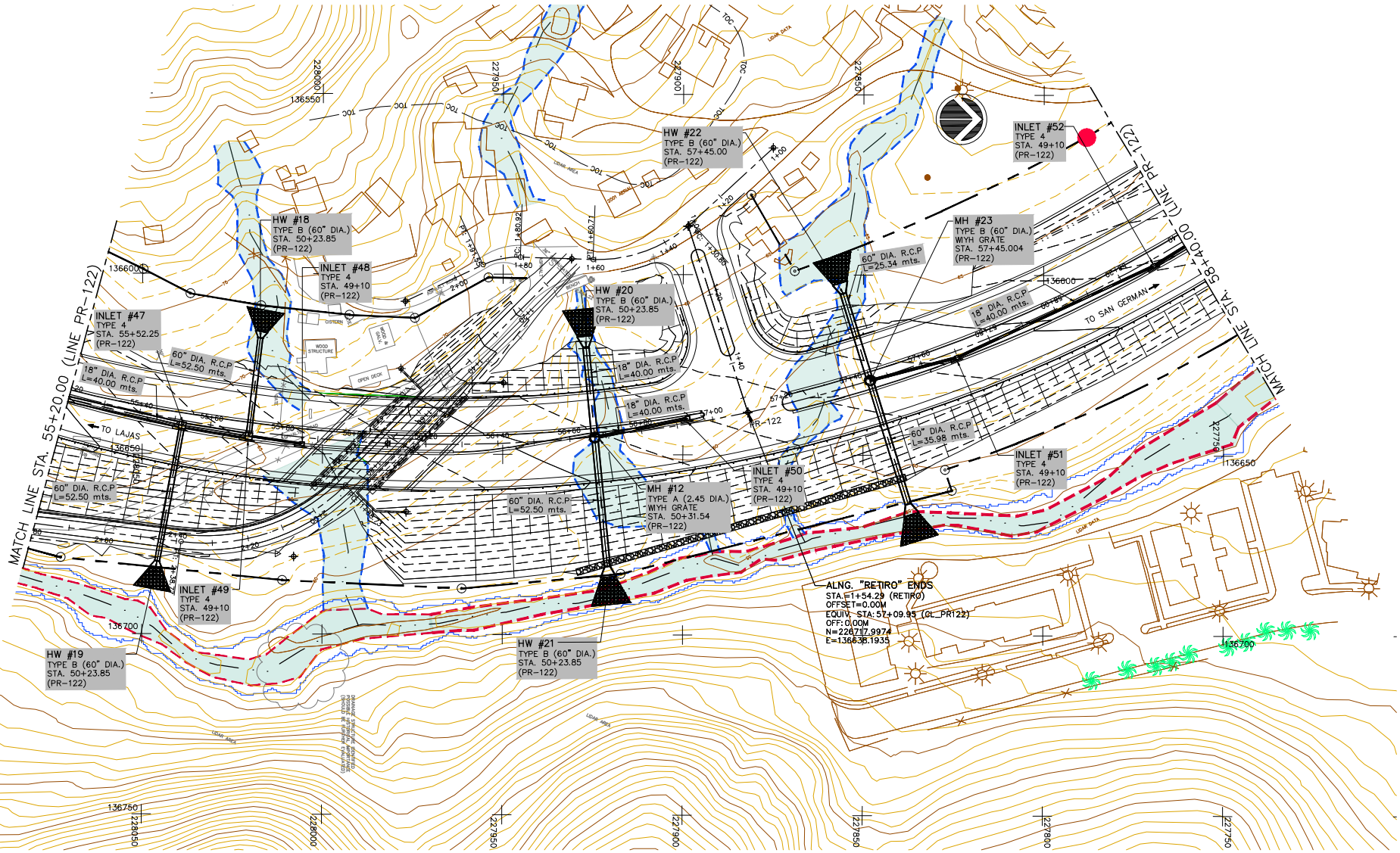
SCALE = 1 : 500
0 5 10 20 30 40

DRAINAGE PLANS
FROM STA. 52+00.00 TO STA. 55+20.00

DR
7

PLOT DATE: March 26, 2024
BYA FILE: \\BYASERVER1\Projects\22002-PR-122 Preliminary Plans\04-Preliminary Plans\06-DR\063-AC-012201-DR-07-PLAN.dwg
FILE NAME =

| FEDERAL CODE NO. | AC. PROJECT CODE NO. | HIGHWAY | MUNICIPALITY | ISLAND | FISCAL YEAR | SHEET NO. | TOTAL SHEETS |
|---|---|---|---|---|---|---|---|
| -------- | AC-012201<br>R0000102001 | PR-122 | SAN GERMAN | PR | 2022 | 64 | 349 |

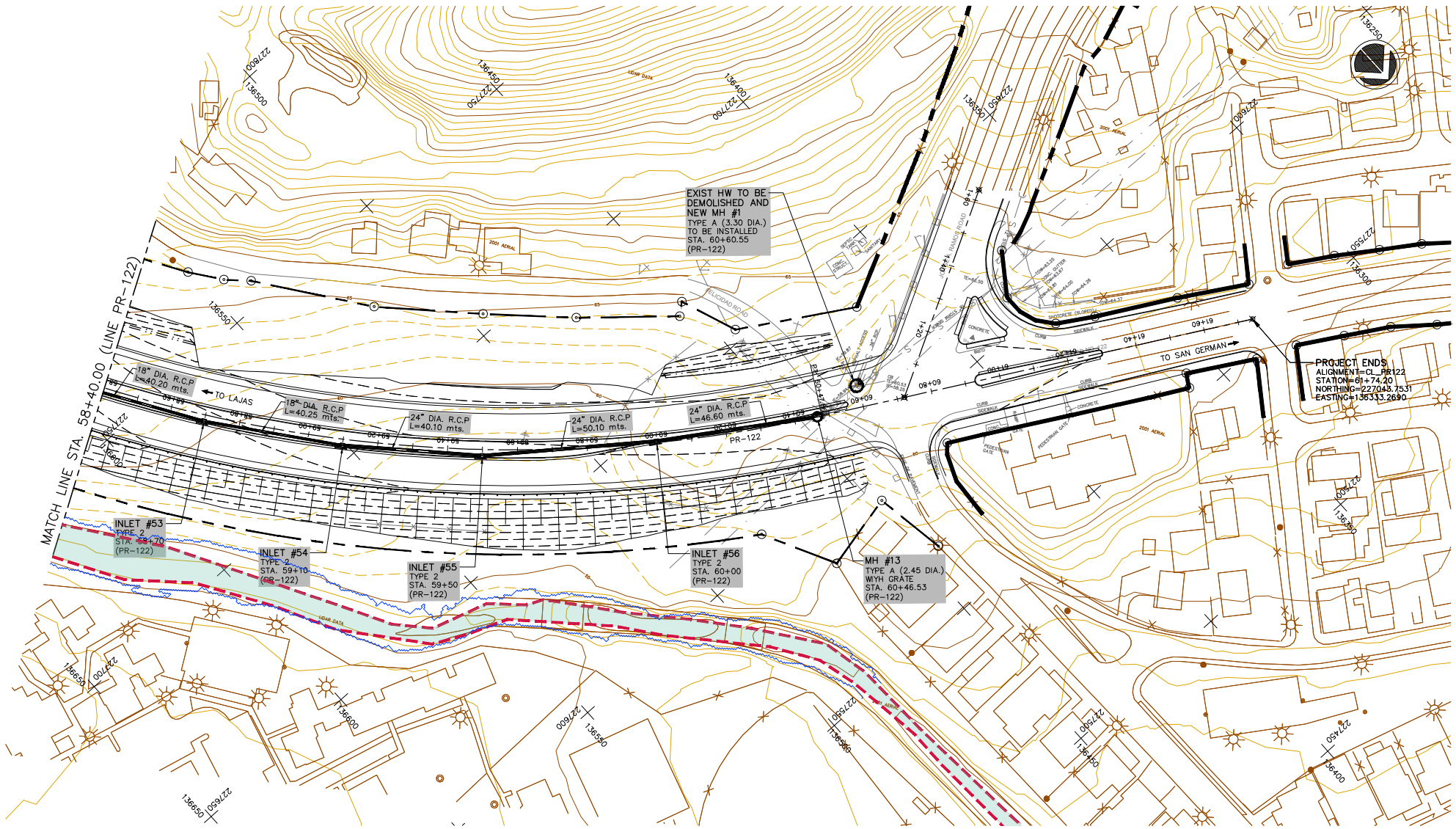



| PUERTO RICO HIGHWAY & TRANSPORTATION AUTHORITY<br>*BEHAR YBARRA & ASSOCIATES LLC*<br>*CONSULTING ENGINEERS AND ARCHITECTS* | EXTENSION HIGHWAY PR-122<br>FROM EXISTING PR-321 TO EXISTING PR-166 | DATE / REVISION | SCALE = 1 : 500<br>0 5 10 20 30 40 | DRAINAGE PLANS<br>FROM STA. 55+20.00 TO STA. 58+40.00 | DR<br>8 |
|---|---|---|---|---|---|

| WORK | BY | DATE |
|---|---|---|
| DESIGN | | |
| DRAWN | | |
| TRACED | | |
| CHECKED | | |
| FINAL CHECK | | |

PLOT DATE: March 26, 2024
BYA FILE: \\BYASERVER1\Projects\22002-PR-122 Preliminary Plans\04-Preliminary Plans\06-PV\064-AC-012201-DR-08-PLAN.dwg
FILE NAME =

| FEDERAL CODE NO. | AC. PROJECT CODE NO. | HIGHWAY | MUNICIPALITY | ISLAND | FISCAL YEAR | SHEET NO. | TOTAL SHEETS |
|---|---|---|---|---|---|---|---|
| -------- | AC-012201 | PR-122 | SAN GERMAN | PR | 2022 | 65 | 349 |
| | R0000102001 | | | | | | |




| WORK | BY | DATE |
|---|---|---|
| DESIGN | | |
| DRAWN | | |
| TRACED | | |
| CHECKED | | |
| FINAL CHECK | | |

PUERTO RICO HIGHWAY & TRANSPORTATION AUTHORITY
*BEHAR YBARRA & ASSOCIATES LLC*
*CONSULTING ENGINEERS AND ARCHITECTS*

EXTENSION HIGHWAY PR-122
FROM EXISTING PR-321 TO EXISTING PR-166

| DATE | REVISION |
|---|---|
| | |

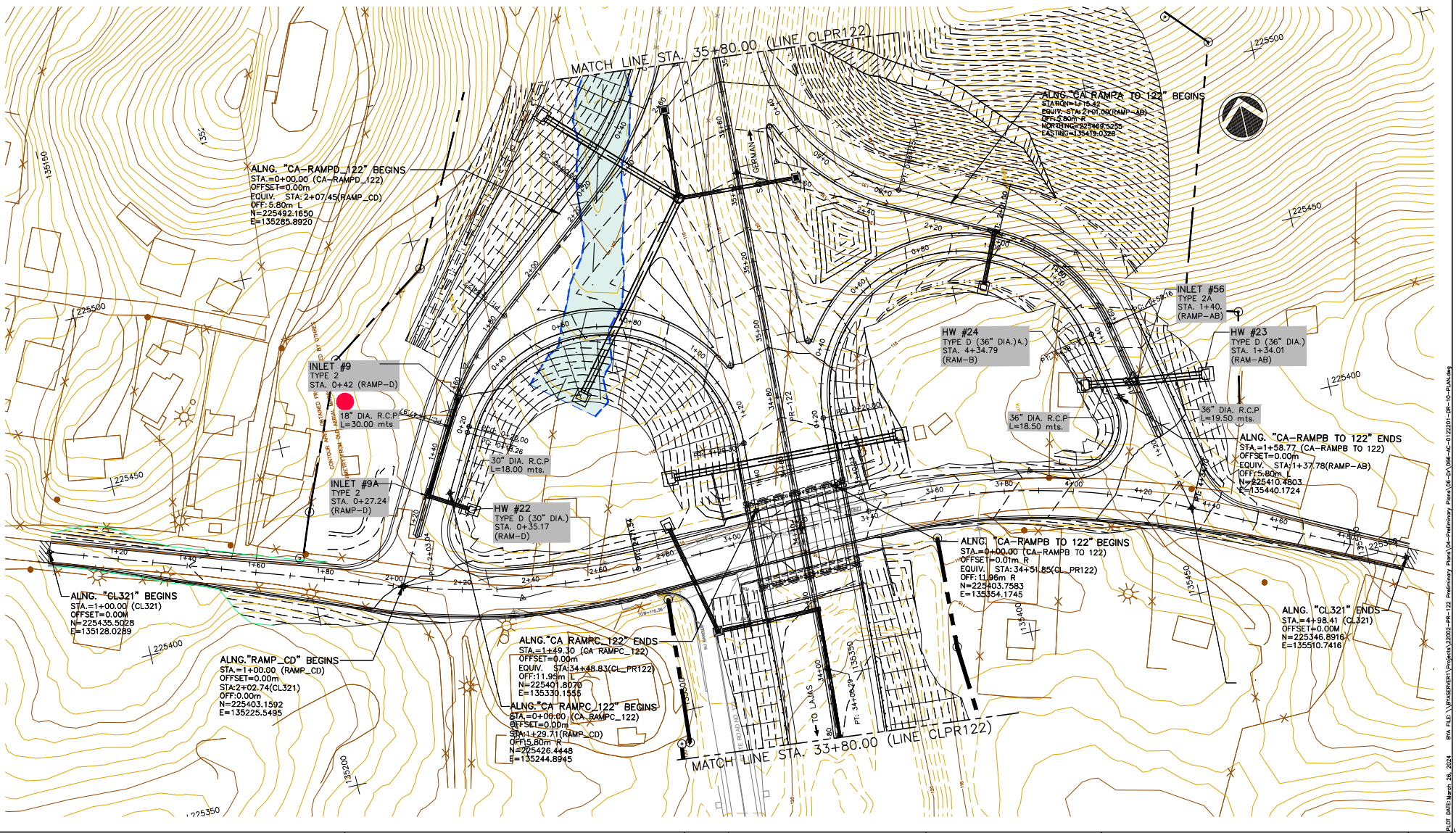
SCALE = 1 : 500
0 5 10 20 30 40

DRAINAGE PLANS
FROM STA. 58+40.00 TO STA. 61+74.20

DR 9

PLOT DATE: March 26, 2024
BYA FILE: \\BYASERVER1\Projects\220202-PR-122 Preliminary Plans\04-Preliminary Plans\05-DR\065-AC-012201-DR-09-PLAN.dwg
FILE NAME =

| FEDERAL CODE NO. | AC. PROJECT CODE NO. | HIGHWAY | MUNICIPALITY | ISLAND | FISCAL YEAR | SHEET NO. | TOTAL SHEETS |
|---|---|---|---|---|---|---|---|
| -------- | AC-012201<br>R0000102001 | PR-122 | SAN GERMAN | PR | 2022 | 66 | 349 |




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|---|---|---|
| PUERTO RICO HIGHWAY & TRANSPORTATION AUTHORITY<br>*BEHAR YBARRA & ASSOCIATES LLC*<br>*CONSULTING ENGINEERS AND ARCHITECTS* | EXTENSION HIGHWAY PR-122<br>FROM EXISTING PR-321 TO EXISTING PR-166 | SCALE = 1 : 500<br>0 5 10 20 30 40 |
| DATE REVISION | | DRAINAGE PLANS<br>FROM STA. 1+00.00 TO STA. 4+98.00 |

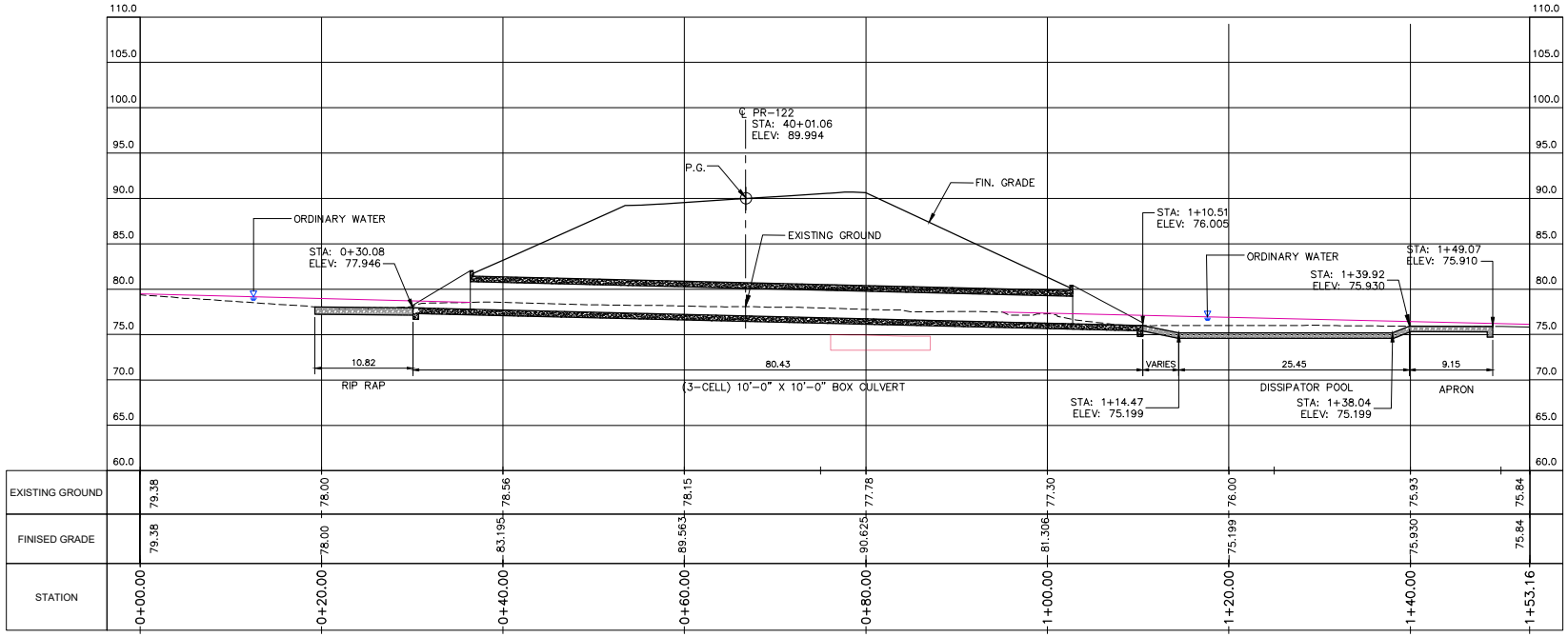
DR
10

WORK
DESIGN
DRAWN
TRACED
CHECKED
ENG. CHECK

DATE
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PLOT DATE: March 26, 2024
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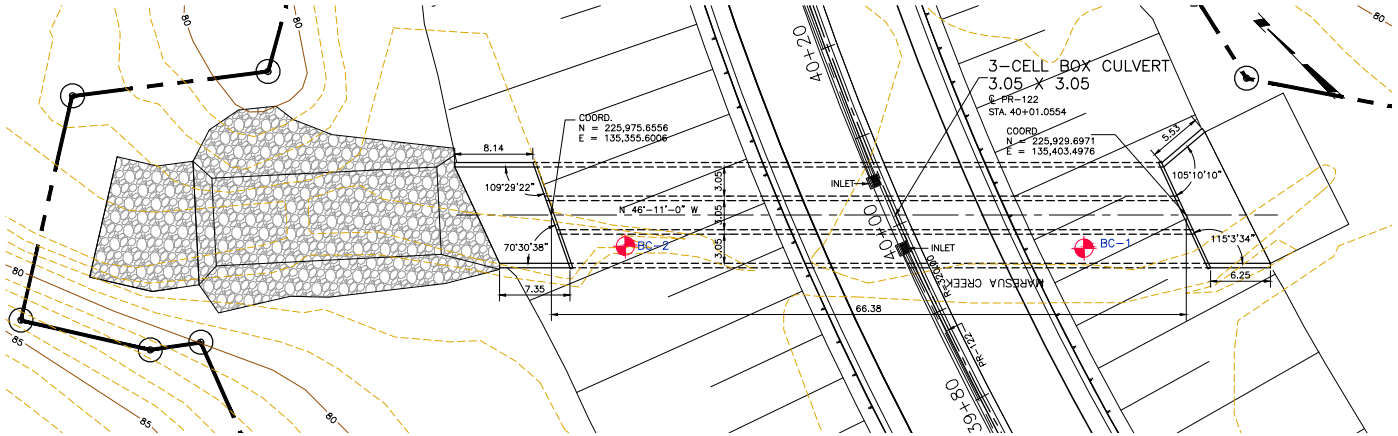

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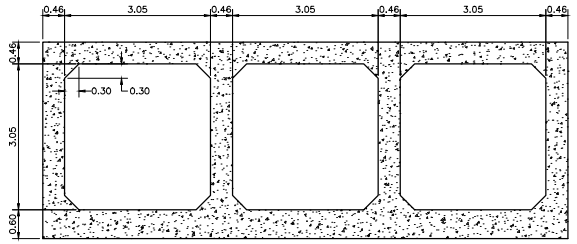
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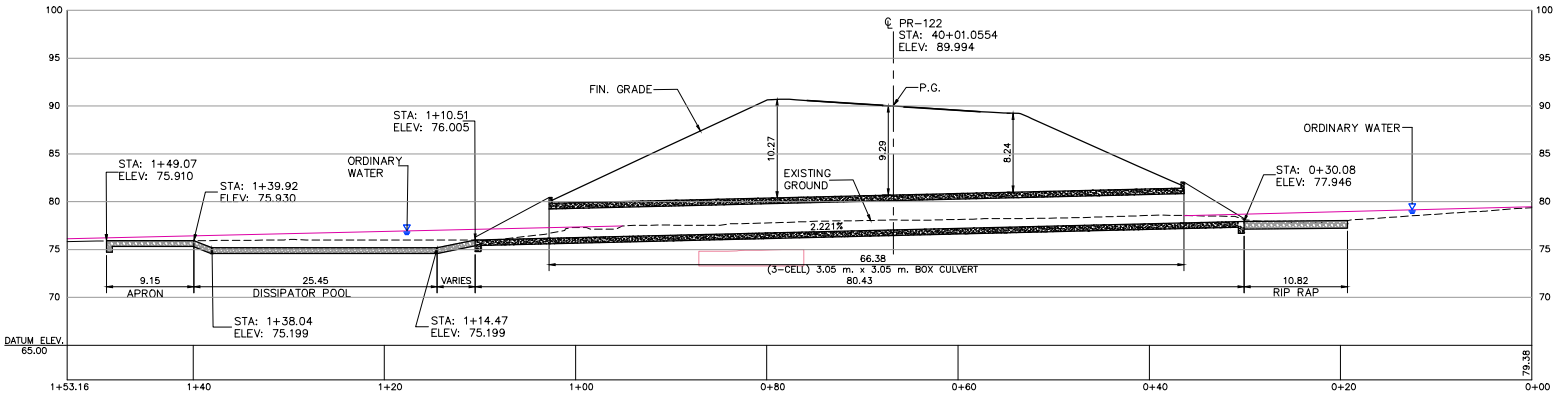
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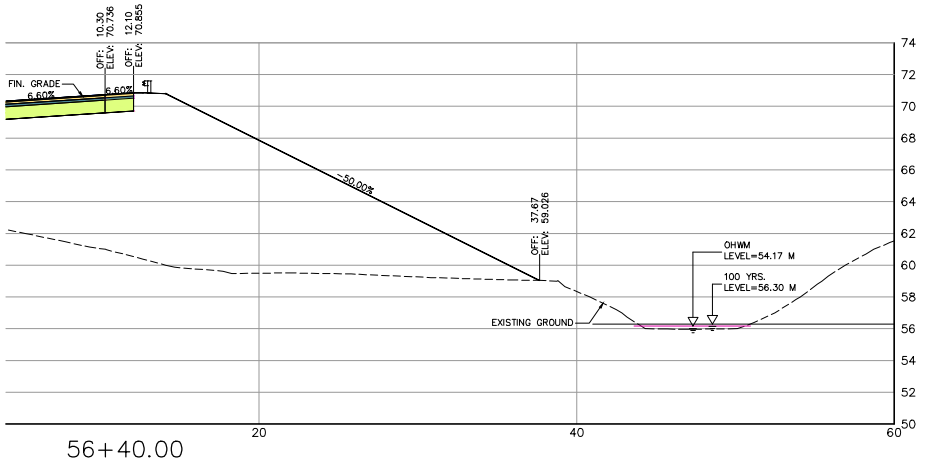

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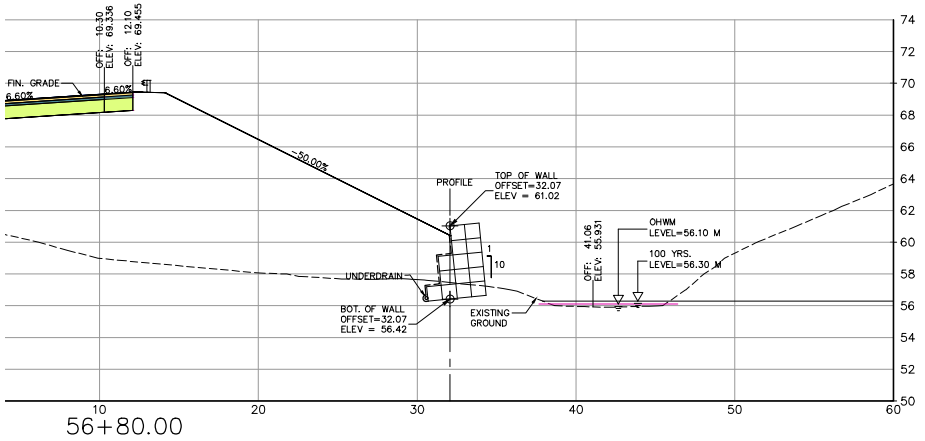
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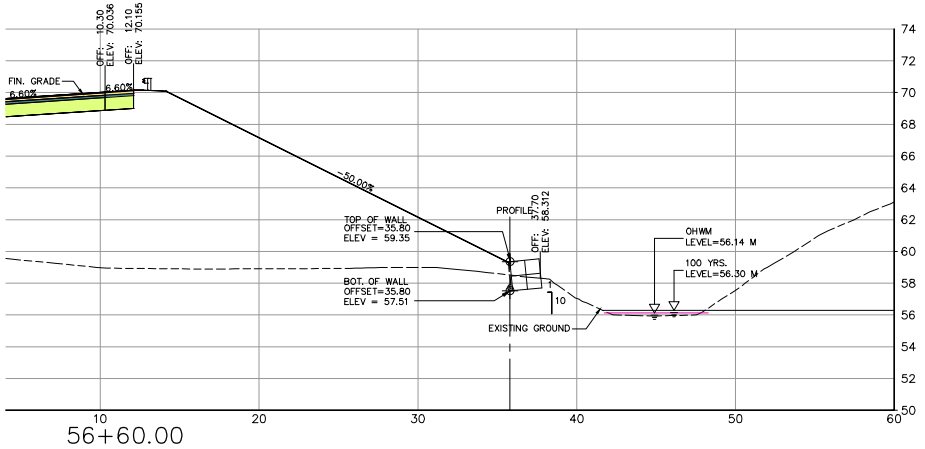
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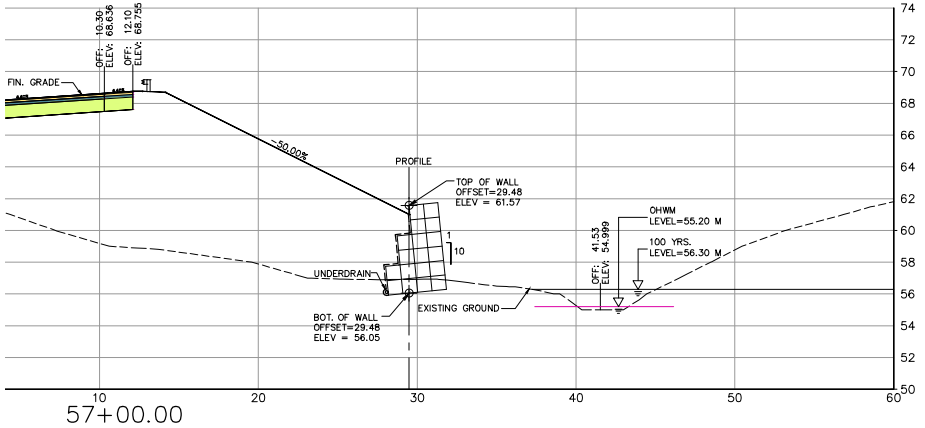

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EXTENSION HIGHWAY PR-122
FROM EXISTING PR-321 TO EXISTING PR-166

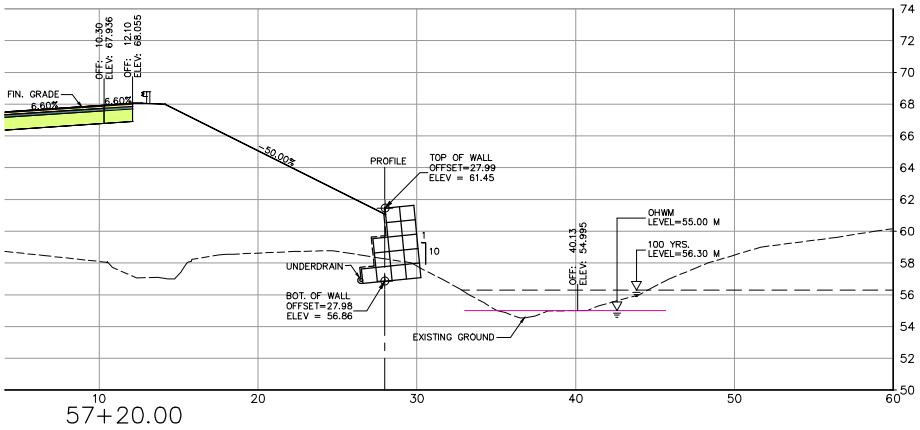
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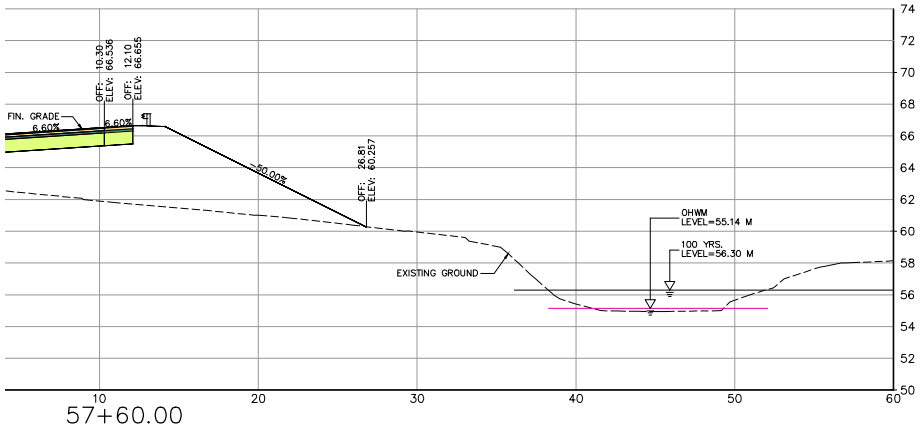
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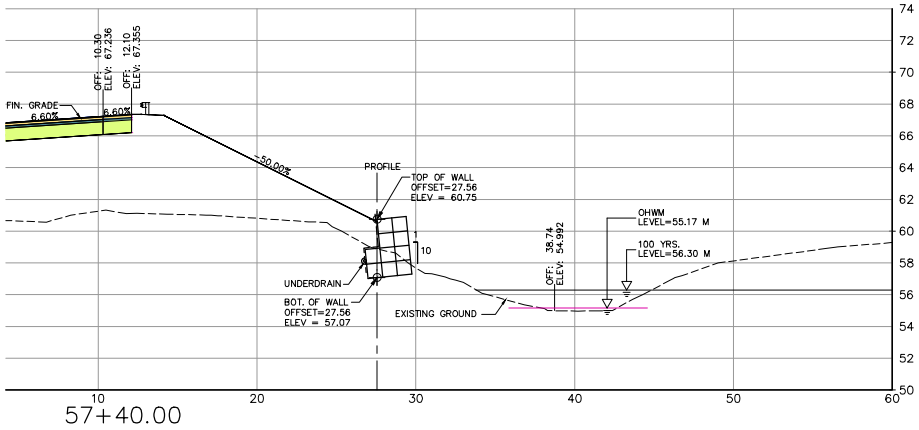
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EXTENSION HIGHWAY PR-122
FROM EXISTING PR-321 TO EXISTING PR-166

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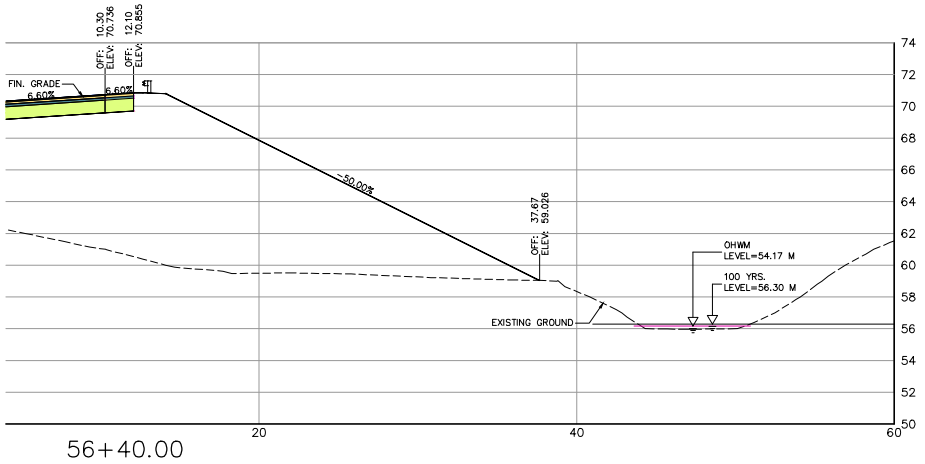
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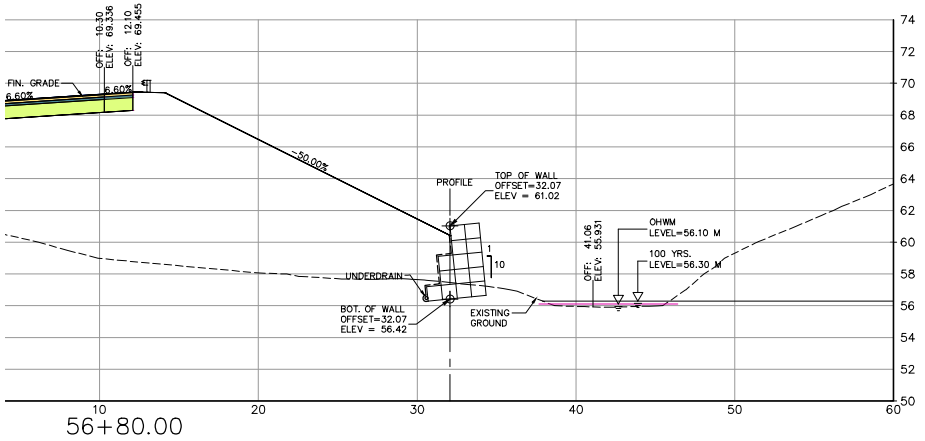
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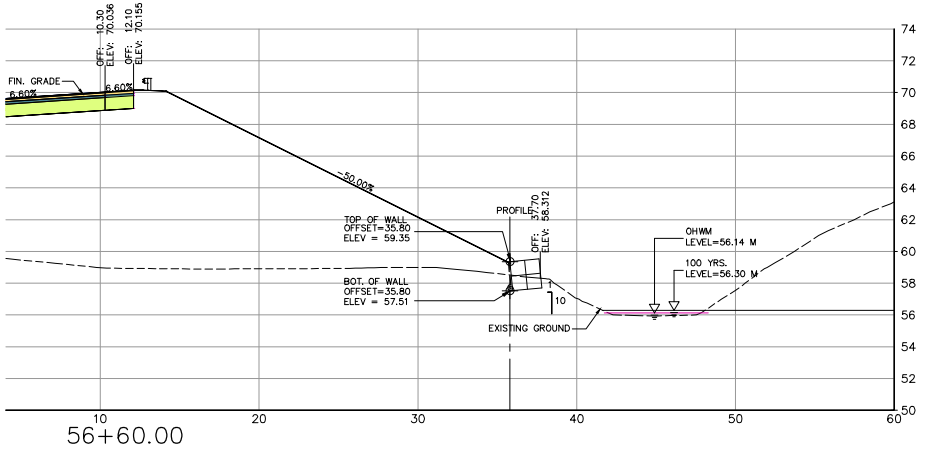
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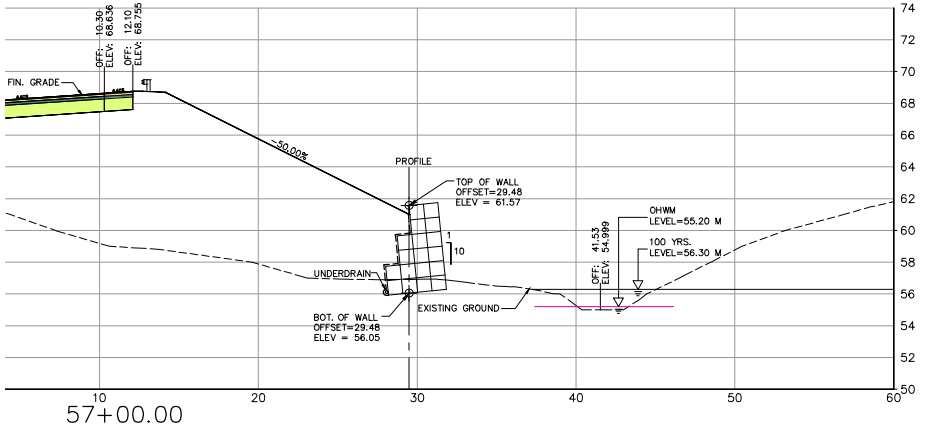

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EXTENSION HIGHWAY PR-122
FROM EXISTING PR-321 TO EXISTING PR-166

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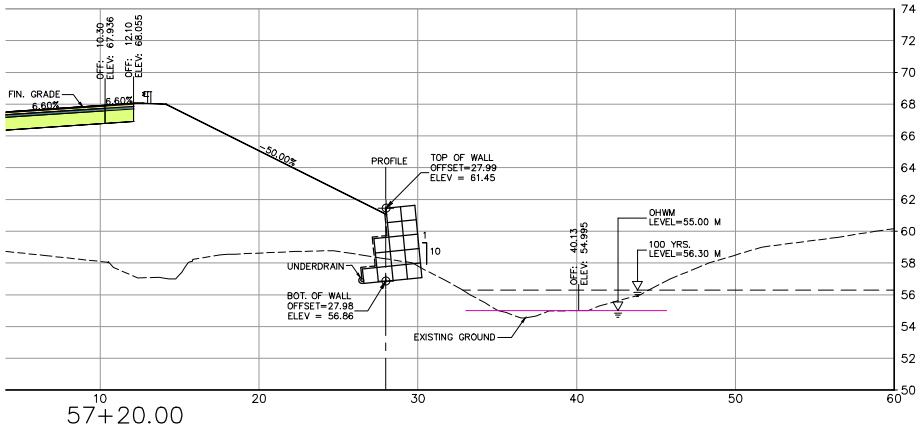
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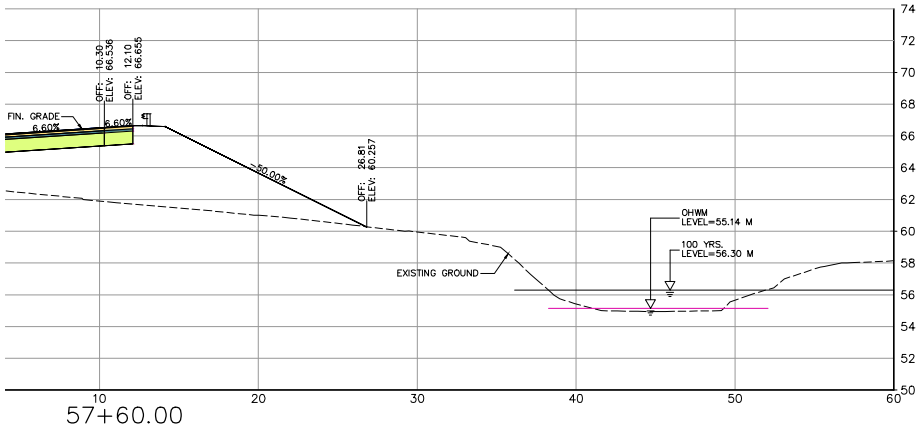
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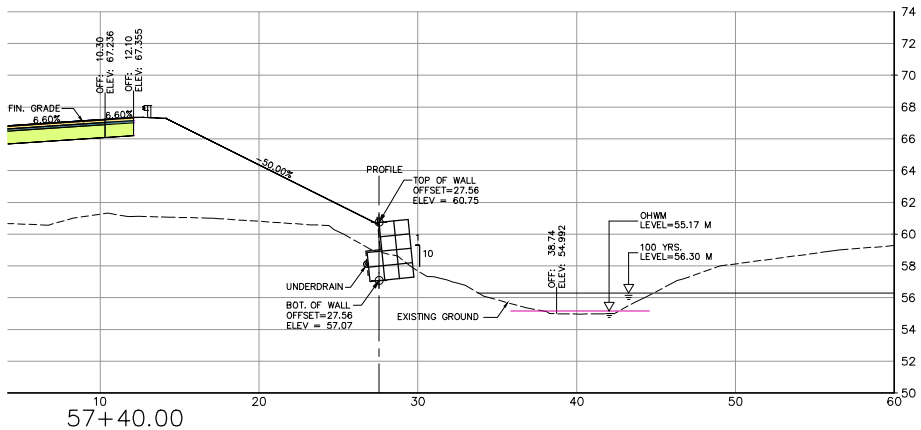
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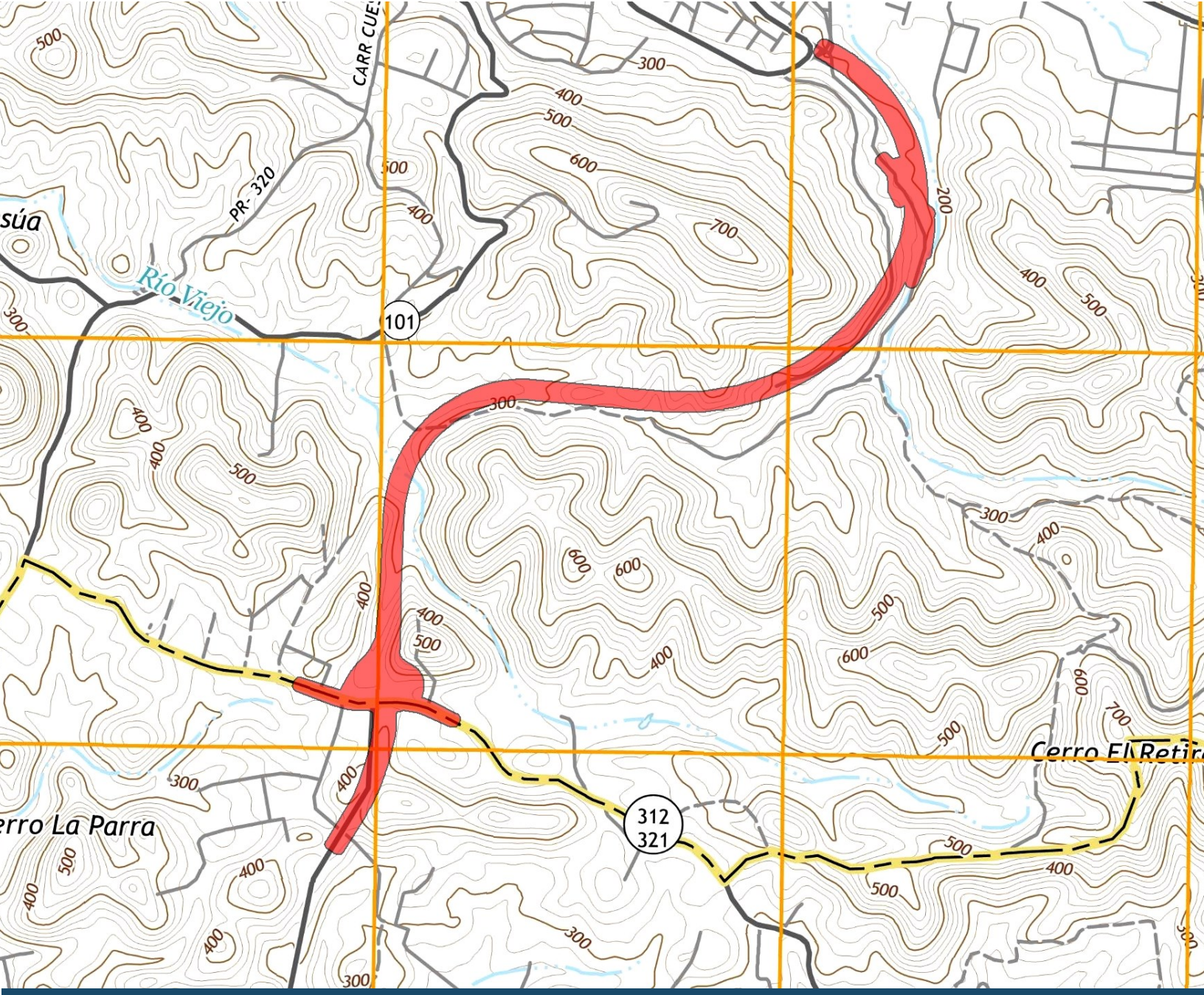
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# APPENDIX 13: Traffic Study




# TRAFFIC STUDY (DRAFT)
# PR-122 FROM PR-321 TO PR-166
# LAJAS – SAN GERMAN
# (AC-012201)

**Prepared by:**

BYA BEHAR-YBARRA & ASSOCIATES LLC
CONSULTING ENGINEERS, ARCHITECTS AND PLANNERS
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**May 1, 2023**

# TRAFFIC STUDY (DRAFT)

## PR-122 FROM PR-321 TO PR-166
## LAJAS – SAN GERMAN
## (AC-012201)

**Prepared By:**

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**May 1, 2023**

# NOMENCLATURE

## ABBREVIATIONS AND ACRONYMS

| | |
|---|---|
| ACS | American Community Survey |
| DLHRPR | Department of Labor and Human Resources |
| FNS | Food and Nutrition Service |
| GDB | Government Development Bank for Puerto Rico |
| IVU, Spanish | *Impuesto sobre Venta y Uso* |
| PMO | Permits Management Office |
| POT, Spanish | *Territorial Ordainment Plan* |
| PRIDCO | Puerto Rico Industrial Development Company |
| PRPB | Puerto Rico Planning Board |
| SNAP | Supplemental Nutrition Assistance Program |
| TANF | Temporary Assistance to Needy Families |
| USDA | U.S. Department of Agriculture |

## UNITS

| | |
|---|---|
| m | meters |
| $m^2$ | square meters |
| mmsl | meters above mean sea level |
| $ft^2$ | square feet |
| $mi^2$ | square miles |

## SIMBOLS

| | |
|---|---|
| $ | dollars |
| % | percent |

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Appendix B – Capacity Analysis Data and Results– Existing Condition (2022)

Appendix C – Signal Warrant Analysis Data and Results

Appendix D - Capacity Analysis Data and Results– Proposed Condition Opening Year (2028 Horizon)

Appendix E – Capacity Analysis Data and Results– Proposed Condition 10-Years from Opening (2038 Horizon)

Appendix F – Capacity Analysis Data and Results– Proposed Condition 20-Years from Opening (2048 Horizon)

Appendix G – Capacity Analysis Data and Results– No Action Scenario (2048 Horizon)

# CHAPTER 1 :INTRODUCTION

## 1.1 GENERAL DESCRIPTION

The Puerto Rico Highway and Transportation Authority (PRHTA) and the U.S. Department of Transportation (USDOT), through the Federal Highway Administration (FHWA) propose to extend the Angel Castro Pérez Avenue (PR-122), from road PR-321 to road PR-166 (San Germán South Bypass), within the boundaries of the municipalities of San Germán and Lajas in the Commonwealth of Puerto Rico. The project is approximately 2.7 kilometers long and the vicinity area is shown on **Figure 1**.

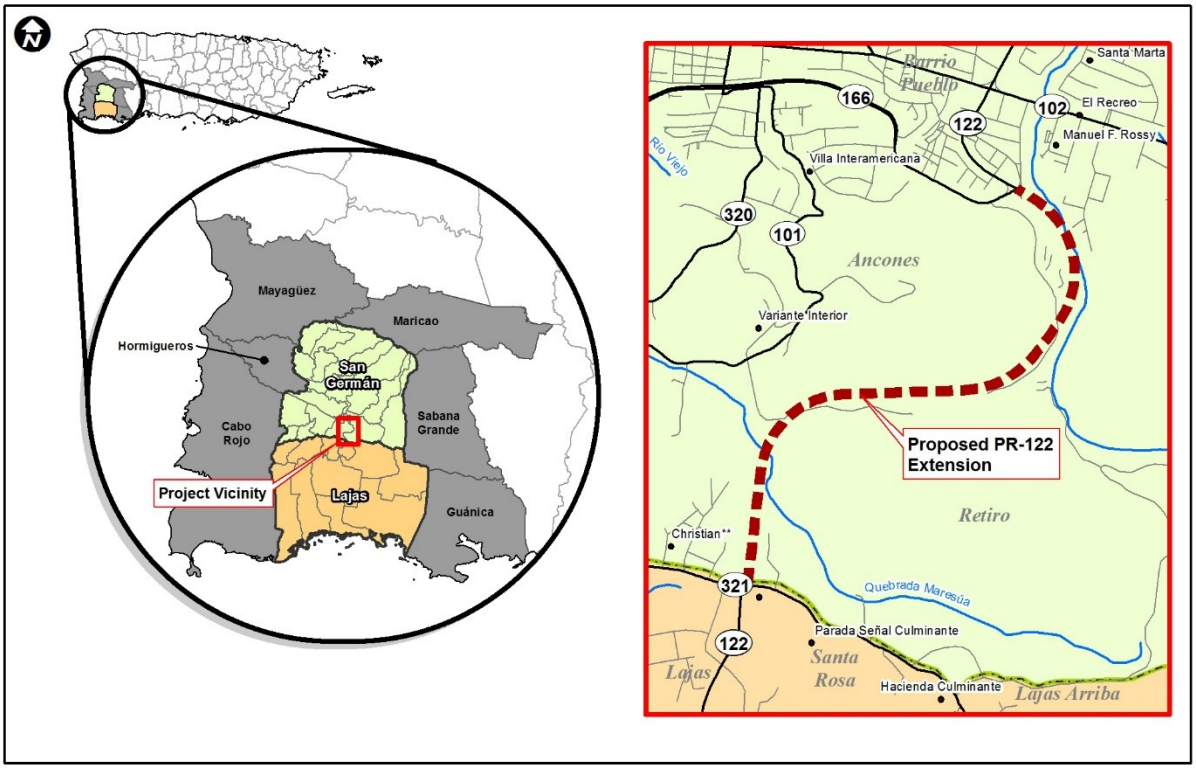



**Figure 1: Project Vicinity**

The purpose of the proposed PR-122 Extension project is to improve the mobility and connectivity in the project study area. The proposed project would provide a direct link between road PR-2 in the Municipality of San Germán and the Municipality of Lajas and its tourist area. It would provide an alternate route to PR-101, enhancing regional travel options and safety while protects the environment and promotes the economic development of the region.

## 1.2 PURPOSE OF STUDY

This report presents the data, procedures and results of the study of traffic analysis carried out for the PR-122 Extension (AC-012201), a new connector between the municipalities of San Germán and Lajas.

This study will present the existing traffic conditions (2022), traffic flow patterns, traffic counts, existing service levels at the studied intersections and travel time between San Germán and Lajas for the existing access routes. The report presents the results of the existing condition, non-action conditions for 2032 and 2042, and the evaluation of the proposed alternative, additional improvements, proposed road section and proposed intersection geometry for the project.

## 1.3 SCOPE OF WORK

The existing traffic conditions will be documented through the collected data of traffic volumes and travel times in key locations in the region. As part of the analysis, the existing levels of traffic and service congestion will be calculated.

Once the existing condition has been evaluated, the proposed project alternative will be introduced into the model and the re-allocation of the traffic in the network will be made to determine the change in the travel patterns expected to occur due to the construction of the project. The proposed changes will be calculated for the proposed project alternative including the no-action alternative. Based on the results obtained, the basic guidelines for the design will be proposed, in relation to the number of lanes, type of intersections, and other geometric characteristics.

An operational analysis will be performed at each key intersection, based on the procedures established in Highway Capacity Manual (HCM) 6$^{th}$ Edition (TRB, 2016), through a series of available software applications, mainly SIDRA Intersection 7 (Akcelik & Associates PTY LTD, 2017). The analysis will include existing conditions and service level (base year 2022) and future conditions for the proposed project (years 2032 and 2042) and for the non-action condition.

The final report will include the operational level of service for the alternatives being evaluated, directional distributions, rush hour traffic volumes and the distinction between heavy traffic and passenger traffic.

## 1.4 ANALYSIS PARAMETERS

### 1.4.1 STUDY AREA

The studied area includes 5 signalized intersections and 1 stop intersection located within the municipalities of Lajas and San German. **Table 1** lists the intersection included in the study area. **Figure 2** shows the location of the intersections. **Appendix A** and include the raw data sets of each intersection. The geometric description of each intersection is included later in this report.

**Table 1: Intersection Included in the Study Area**

| Municipality | Signal Intersection | Stop Intersection | Roads | Number of Approaches |
|---|---|---|---|---|
| **Lajas** | 101 | | PR-116 @ PR-315 | 4 |
| **Lajas** | 102 | | PR-116 @ PR-122 | 3 |
| **Lajas** | | 104 | PR-122 @ PR-321 | 3 |
| **San German** | 109 | | PR-101 @ PR-166 | 4 |
| **San German** | 110 | | PR-102 @ PR-122 | 4 |
| **San German** | 111 | | PR-102 @ PR-166 | 4 |

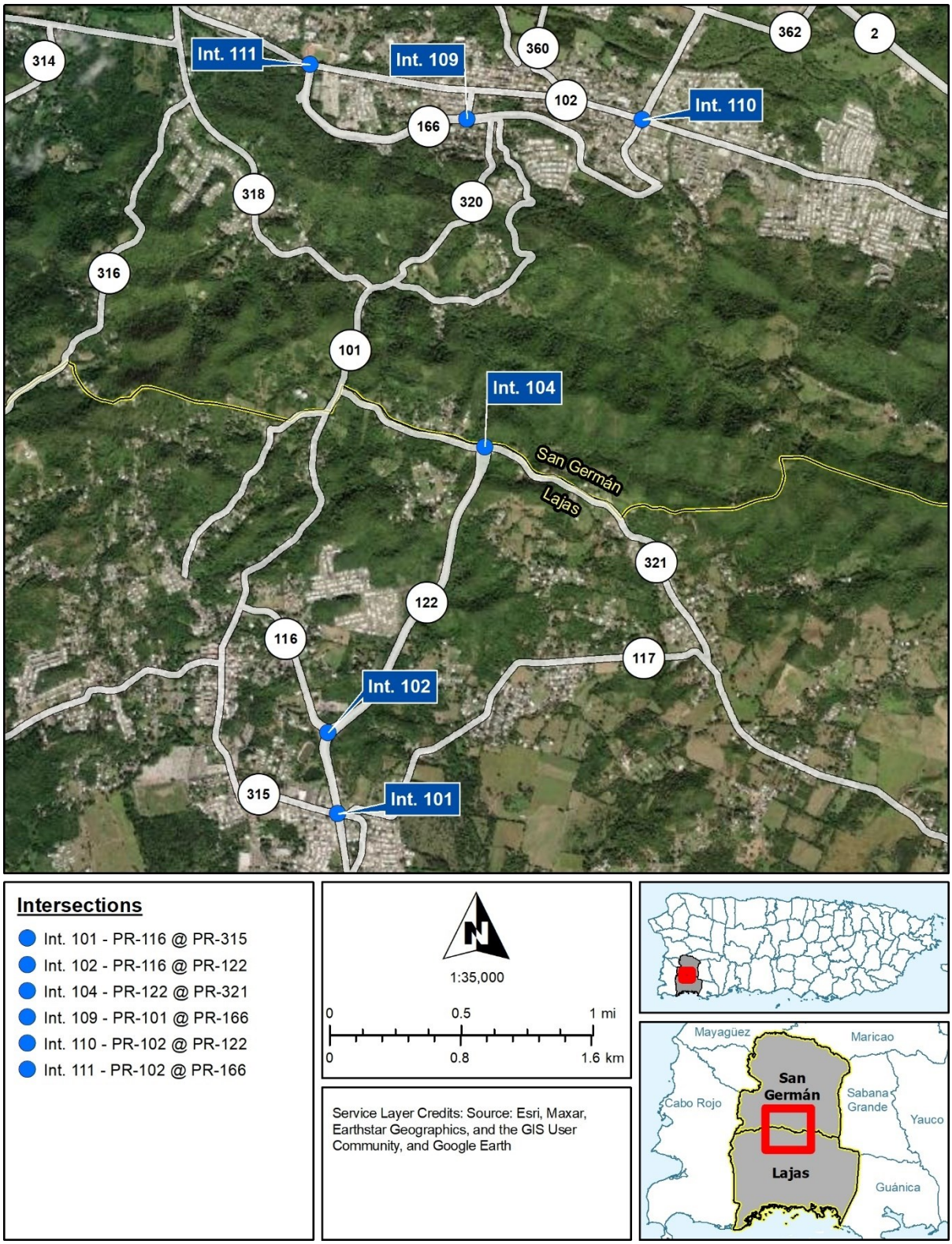



**Figure 2: Intersections Location**

### 1.4.2 ANALYZED SCENARIOS

The traffic study analyzes four (4) different scenarios:

- Existing conditions (2022).
- Proposed project opening Year (2028)
- 10-year projection from project opening year with project improvements (2038).
- 20- year projection from project opening year with project improvements (2048).
- 20- year projection from project opening year without improvements (2048).

**Appendix B** includes the SIDRA Intersection outputs for each scenario.

### 1.4.3 TYPICAL DAYS

Manual traffic counts were collected during 12-hour periods on a typical weekday. The traffic counts for intersections 101, 102 and 104 were performed on September 14, 2022. For intersections 109, 110 and 111 data were collected during February, 2017, and updated using the 2022 data of intersection 104, for which data from February 2017 was available.

### 1.4.4 PEAK HOURS

Two peak periods were identified and evaluated for the corridor, morning peak hour and afternoon peak hour. **Table 2** include the peak hour periods for each intersection obtained from the raw data set.

**Table 2. Intersections Peak Hours**

| Intersection | AM Peak Hour | | PM Peak Hour | |
|---|---|---|---|---|
| | From | To | From | To |
| 101 | 6:45 AM | 7:45 AM | 2:15 PM | 3:15 PM |
| 102 | 6:45 AM | 7:45 AM | 2:00 PM | 3:00 PM |
| 104 | 6:30 AM | 7:30 AM | 2:45 PM | 3:45 PM |
| 109 | 7:15 AM | 8:15 AM | 3:00 PM | 4:00 PM |
| 110 | 7:15 AM | 8:15 AM | 3:00 PM | 4:00 PM |
| 111 | 7:15 AM | 8:15 AM | 4:00 PM | 5:00 PM |

### 1.4.5 INPUT DATA

The input data for the existing condition's (2022) AM and PM peak hours is shown in **Appendix A**. The information included for each intersection is: Peak Hour Volumes (PHV) per movement, number of lanes per movement, and traffic control information. The input data was collected in the field, computed, or obtained from the aerial photos and digital elevation models.

## 1.5 STUDY MATRIX

The names of the SIDRA Intersection electronic files used for each analyzed scenario shown in **Table 3.**

**Table 3. Study Matrix**

| Scenario | Peak Hour | |
|---|---|---|
| | AM | PM |
| **Existing Conditions (2022)** | PR-122_EXISTING_AM.sip7 | PR-122_EXISTING_PM.sip7 |
| **Project opening year with improvements (2028)** | PR-122_PROPOSED_2028_AM.sip7 | PR-122_PROPOSED_2028_PM.sip7 |
| **10-year from project opening with improvements (2038)** | PR-122_PROPOSED_2038_AM.sip7 | PR-122_PROPOSED_2038_PM.sip7 |
| **20-year from project opening with improvements (2048)** | PR-122_PROPOSED_2048_AM.sip7 | PR-122_PROPOSED_2048_PM.sip7 |
| **20-year from project opening without improvements (2048)** | PR122_FUTURE_NO_ACTION_2048_AM.sip7 | PR122_FUTURE_NO_ACTION_2048_PM.sip7 |

# CHAPTER 2 :EXISTING CONDITION (2022) ANALYSIS

This chapter presents the existing condition data collected as part of this project and the analysis of this data. The existing condition data includes the geometric data, the traffic counts collected from the manual Traffic Count Stations (TCS) and the travel time data.

## 2.1 TRAFFIC VOLUMES AND GEOMETRIC CONDITIONS

Manual traffic counts were performed for an interrupted time period of 10 hours from 6:00 AM to 10:00 AM, from 11:00 AM to 2:00 PM and, from 3:00 PM to 6:00 PM at the following intersections; PR-122 with PR-321; PR-122 with PR-102; PR-166 with PR-101 and PR-166 with PR-102. See **Figure 2** for the locations of the six intersections evaluated in this report. **Figure 3** to **Figure 8** show the pictures of the evaluated intersections. For the complete set of traffic counts data see **Appendix A**.



Looking North



Looking South



Looking East



Looking West

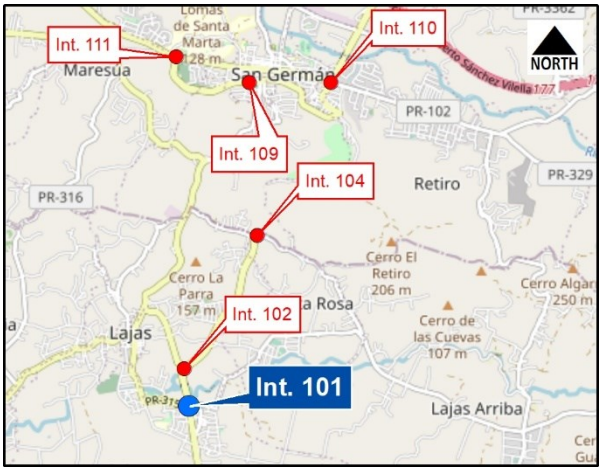






**Figure 3: Pictures of Intersection 101: PR-116 with PR-315**



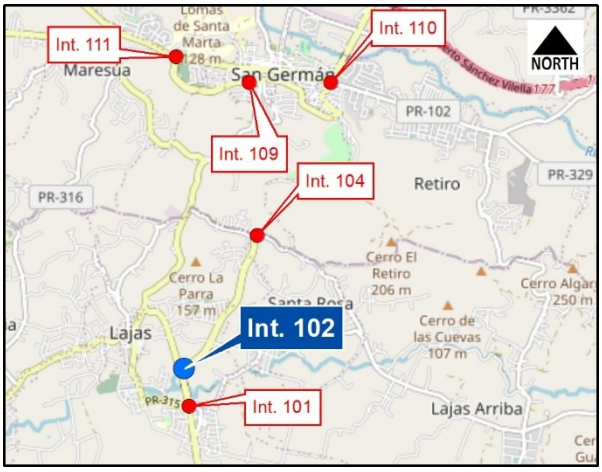
Looking South-East



Looking North-East



Looking South-West



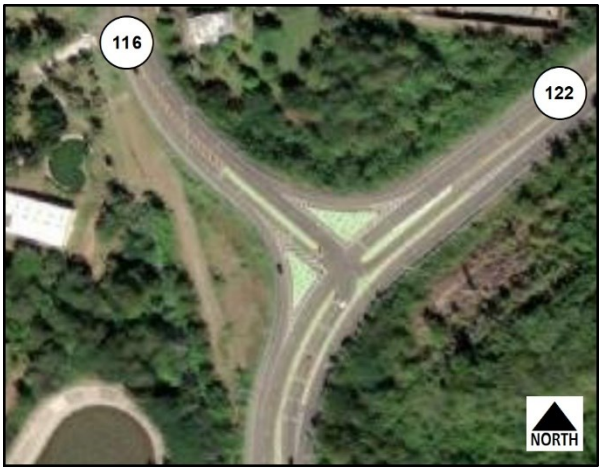




**Figure 4: Pictures of Intersection 102: PR-116 with PR-122**



Looking West



Looking East



Looking North







**Figure 5: Pictures of Intersection 104: PR-122 with PR-321**



Looking North



Looking East



Looking South



Looking West

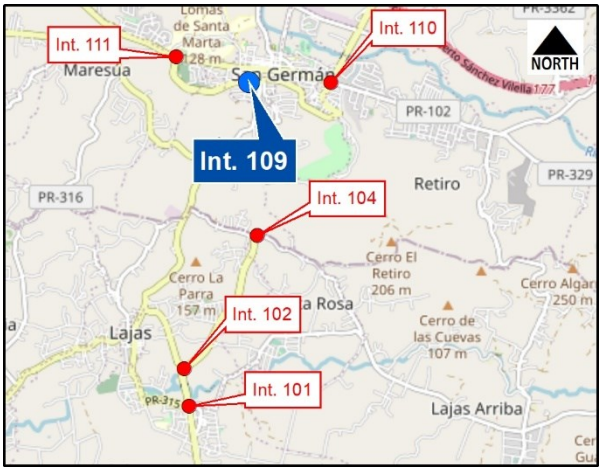






**Figure 6: Pictures of Intersection 109: PR-101 with PR-166**



Looking North



Looking East



Looking South



Looking West

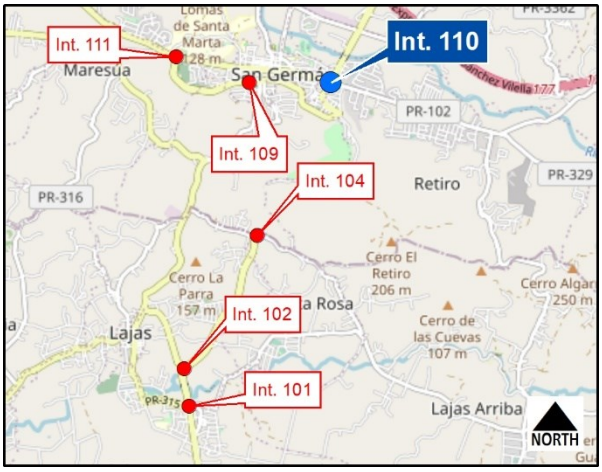






**Figure 7: Pictures of Intersection 110: PR-102 with PR-122**



Looking North



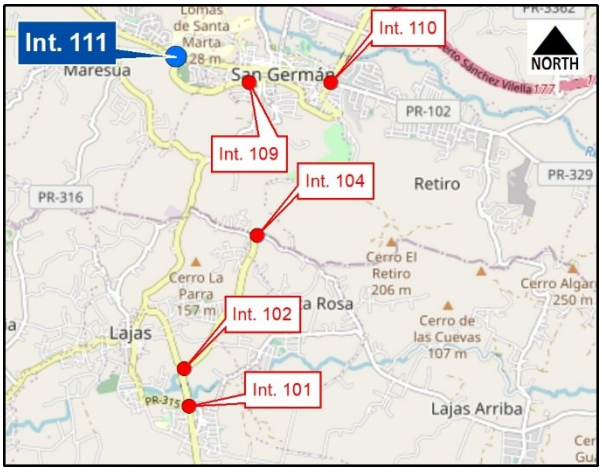
Looking East



Looking South



Looking West



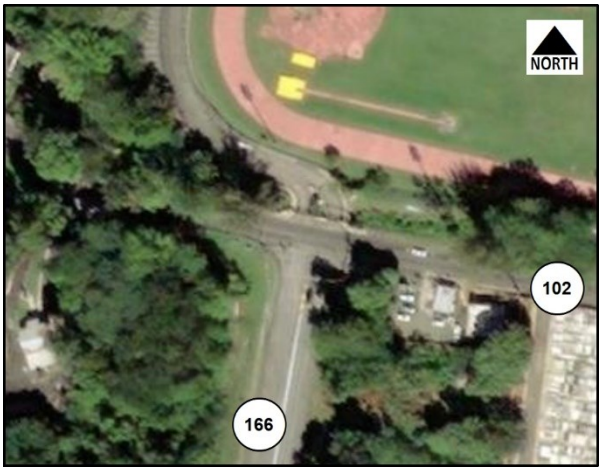




**Figure 8: Pictures of Intersection 111: PR-102 with PR-166**

Once the data was obtained for each intersection it was processed to obtain all the information necessary to perform the operational analysis, such as peak hours, peak hour volumes, vehicle classifications, peak hour factors among others. **Table 4** shows a summary of the peak hour and peak hour volumes for the studied intersections.

### Table 4: Intersections Flow per 15 Minutes

| Period | | Intersection Flow (veh/15 min) | | | | | |
|---|---|---|---|---|---|---|---|
| Start | End | 101 | 102 | 104 | 109 | 110 | 111 |
| 6:00 AM | 6:15 AM | 135 | 81 | 64 | 124 | 257 | 105 |
| 6:15 AM | 6:30 AM | 189 | 99 | 56 | 152 | 296 | 165 |
| 6:30 AM | 6:45 AM | 326 | 184 | 126 | 149 | 346 | 215 |
| 6:45 AM | 7:00 AM | 434 | 211 | 119 | 169 | 383 | 264 |
| 7:00 AM | 7:15 AM | 405 | 250 | 136 | 178 | 395 | 320 |
| 7:15 AM | 7:30 AM | 455 | 300 | 120 | 191 | 477 | 344 |
| 7:30 AM | 7:45 AM | 418 | 236 | 116 | 377 | 499 | 406 |
| 7:45 AM | 8:00 AM | 337 | 189 | 91 | 464 | 596 | 468 |
| 8:00 AM | 8:15 AM | 296 | 144 | 82 | 331 | 508 | 365 |
| 8:15 AM | 8:30 AM | 305 | 137 | 68 | 175 | 441 | 291 |
| 8:30 AM | 8:45 AM | 301 | 136 | 74 | 161 | 511 | 315 |
| 8:45 AM | 9:00 AM | 284 | 117 | 60 | 151 | 452 | 342 |
| 9:00 AM | 9:15 AM | 301 | 127 | 74 | 153 | 447 | 358 |
| 9:15 AM | 9:30 AM | 282 | 139 | 67 | 155 | 414 | 261 |
| 9:30 AM | 9:45 AM | 279 | 128 | 57 | 134 | 409 | 245 |
| 9:45 AM | 10:00 AM | 282 | 140 | 69 | 136 | 480 | 283 |
| 10:00 AM | 10:15 AM | 285 | 147 | 56 | | | |
| 10:15 AM | 10:30 AM | 299 | 155 | 72 | | | |
| 10:30 AM | 10:45 AM | 307 | 144 | 67 | | | |
| 10:45 AM | 11:00 AM | 314 | 150 | 62 | | | |
| 11:00 AM | 11:15 AM | 339 | 172 | 62 | 122 | 474 | 243 |
| 11:15 AM | 11:30 AM | 337 | 176 | 79 | 158 | 501 | 263 |
| 11:30 AM | 11:45 AM | 335 | 166 | 74 | 156 | 483 | 323 |
| 11:45 AM | 12:00 PM | 334 | 163 | 63 | 153 | 505 | 367 |
| 12:00 PM | 12:15 PM | 355 | 163 | 77 | 215 | 499 | 456 |
| 12:15 PM | 12:30 PM | 337 | 162 | 62 | 163 | 521 | 301 |

| Period | | Intersection Flow (veh/15 min) | | | | | |
|---|---|---|---|---|---|---|---|
| Start | End | 101 | 102 | 104 | 109 | 110 | 111 |
| 12:30 PM | 12:45 PM | 331 | 147 | 39 | 132 | 512 | 328 |
| 12:45 PM | 1:00 PM | 354 | 169 | 86 | 157 | 567 | 282 |
| 1:00 PM | 1:15 PM | 269 | 138 | 83 | 150 | 511 | 329 |
| 1:15 PM | 1:30 PM | 301 | 169 | 80 | 217 | 516 | 433 |
| 1:30 PM | 1:45 PM | 325 | 161 | 96 | 188 | 482 | 376 |
| 1:45 PM | 2:00 PM | 314 | 151 | 65 | 188 | 496 | 347 |
| 2:00 PM | 2:15 PM | 354 | 200 | 86 | | | |
| 2:15 PM | 2:30 PM | 391 | 203 | 92 | | | |
| 2:30 PM | 2:45 PM | 524 | 331 | 100 | | | |
| 2:45 PM | 3:00 PM | 463 | 272 | 117 | | | |
| 3:00 PM | 3:15 PM | 372 | 190 | 102 | 361 | 610 | 314 |
| 3:15 PM | 3:30 PM | 345 | 183 | 86 | 343 | 606 | 256 |
| 3:30 PM | 3:45 PM | 407 | 232 | 106 | 240 | 602 | 268 |
| 3:45 PM | 4:00 PM | 373 | 216 | 96 | 201 | 539 | 266 |
| 4:00 PM | 4:15 PM | 368 | 174 | 103 | 214 | 486 | 294 |
| 4:15 PM | 4:30 PM | 323 | 167 | 91 | 229 | 511 | 290 |
| 4:30 PM | 4:45 PM | 298 | 161 | 94 | 205 | 546 | 298 |
| 4:45 PM | 5:00 PM | 289 | 151 | 90 | 251 | 505 | 281 |
| 5:00 PM | 5:15 PM | 364 | 169 | 99 | 203 | 584 | 260 |
| 5:15 PM | 5:30 PM | 287 | 149 | 83 | 138 | 520 | 263 |
| 5:30 PM | 5:45 PM | 297 | 142 | 81 | 168 | 533 | 229 |
| 5:45 PM | 6:00 PM | 316 | 158 | 79 | 117 | 508 | 185 |

## Table 5: Intersections Flow per 60 Minutes

| Period | | Peak Hour Flow (veh/hr) | | | | | |
|---|---|---|---|---|---|---|---|
| Start | End | 101 | 102 | 104 | 109 | 110 | 111 |
| 6:00 AM | 7:00 AM | 1084 | 575 | 365 | 594 | 1282 | 749 |
| 6:15 AM | 7:15 AM | 1354 | 744 | 437 | 648 | 1420 | 964 |
| 6:30 AM | 7:30 AM | 1620 | 945 | 501 | 687 | 1601 | 1143 |
| 6:45 AM | 7:45 AM | 1712 | 997 | 491 | 915 | 1754 | 1334 |
| 7:00 AM | 8:00 AM | 1615 | 975 | 463 | 1210 | 1967 | 1538 |
| 7:15 AM | 8:15 AM | 1506 | 869 | 409 | 1363 | 2080 | 1583 |
| 7:30 AM | 8:30 AM | 1356 | 706 | 357 | 1347 | 2044 | 1530 |
| 7:45 AM | 8:45 AM | 1,239 | 606 | 315 | 1,131 | 2,056 | 1,439 |
| 8:00 AM | 9:00 AM | 1,186 | 534 | 284 | 818 | 1,912 | 1,313 |
| 8:15 AM | 9:15 AM | 1,191 | 517 | 276 | 640 | 1,851 | 1,306 |
| 8:30 AM | 9:30 AM | 1,168 | 519 | 275 | 620 | 1,824 | 1,276 |
| 8:45 AM | 9:45 AM | 1,146 | 511 | 258 | 593 | 1,722 | 1,206 |
| 9:00 AM | 10:00 AM | 1,144 | 534 | 267 | 578 | 1,750 | 1,147 |
| 9:15 AM | 10:15 AM | 1,128 | 554 | 249 | 425 | 1,303 | 789 |
| 9:30 AM | 10:30 AM | 1,145 | 570 | 254 | 270 | 889 | 528 |
| 9:45 AM | 10:45 AM | 1,173 | 586 | 264 | 136 | 480 | 283 |
| 10:00 AM | 11:00 AM | 1,205 | 596 | 257 | | | |
| 10:15 AM | 11:15 AM | 1,259 | 621 | 263 | 122 | 474 | 243 |
| 10:30 AM | 11:30 AM | 1,297 | 642 | 270 | 280 | 975 | 506 |
| 10:45 AM | 11:45 AM | 1,325 | 664 | 277 | 436 | 1,458 | 829 |
| 11:00 AM | 12:00 PM | 1,345 | 677 | 278 | 589 | 1,963 | 1,196 |
| 11:15 AM | 12:15 PM | 1,361 | 668 | 293 | 682 | 1,988 | 1,409 |
| 11:30 AM | 12:30 PM | 1,361 | 654 | 276 | 687 | 2,008 | 1,447 |
| 11:45 AM | 12:45 PM | 1,357 | 635 | 241 | 663 | 2,037 | 1,452 |
| 12:00 PM | 1:00 PM | 1,377 | 641 | 264 | 667 | 2,099 | 1,367 |
| 12:15 PM | 1:15 PM | 1,291 | 616 | 270 | 602 | 2,111 | 1,240 |
| 12:30 PM | 1:30 PM | 1,255 | 623 | 288 | 656 | 2,106 | 1,372 |
| 12:45 PM | 1:45 PM | 1,249 | 637 | 345 | 712 | 2,076 | 1,420 |
| 1:00 PM | 2:00 PM | 1,209 | 619 | 324 | 743 | 2,005 | 1,485 |
| 1:15 PM | 2:15 PM | 1,294 | 681 | 327 | 593 | 1,494 | 1,156 |
| 1:30 PM | 2:30 PM | 1,384 | 715 | 339 | 376 | 978 | 723 |

| Period | | Peak Hour Flow (veh/hr) | | | | | |
|---|---|---|---|---|---|---|---|
| Start | End | 101 | 102 | 104 | 109 | 110 | 111 |
| 1:45 PM | 2:45 PM | 1,583 | 885 | 343 | 188 | 496 | 347 |
| 2:00 PM | 3:00 PM | 1,732 | 1,006 | 395 | | | |
| 2:15 PM | 3:15 PM | 1,750 | 996 | 411 | 361 | 610 | 314 |
| 2:30 PM | 3:30 PM | 1,704 | 976 | 405 | 704 | 1,216 | 570 |
| 2:45 PM | 3:45 PM | 1,587 | 877 | 411 | 944 | 1,818 | 838 |
| 3:00 PM | 4:00 PM | 1,497 | 821 | 390 | 1,145 | 2,357 | 1,104 |
| 3:15 PM | 4:15 PM | 1,493 | 805 | 391 | 998 | 2,233 | 1,084 |
| 3:30 PM | 4:30 PM | 1,471 | 789 | 396 | 884 | 2,138 | 1,118 |
| 3:45 PM | 4:45 PM | 1,362 | 718 | 384 | 849 | 2,082 | 1,148 |
| 4:00 PM | 5:00 PM | 1,278 | 653 | 378 | 899 | 2,048 | 1,163 |
| 4:15 PM | 5:15 PM | 1,274 | 648 | 374 | 888 | 2,146 | 1,129 |
| 4:30 PM | 5:30 PM | 1,238 | 630 | 366 | 797 | 2,155 | 1,102 |
| 4:45 PM | 5:45 PM | 1,237 | 611 | 353 | 760 | 2,142 | 1,033 |
| 5:00 PM | 6:00 PM | 1,264 | 618 | 342 | 626 | 2,145 | 937 |

Since inputs to HCM procedures are typically expressed in terms of hourly demands, the HCM uses the peak hour factor (PHF) to convert an hourly volume into a peak 15-min flow rate. The PHF is the ratio of total hourly volume to peak flow rate within the hour. If 15-min periods are used, the PHF may be computed by:

$$\mathrm{PHF} = \frac{V}{4 \times V_{15}}$$

Where:

$\mathrm{PHF}$ = Peak hour factor,

$V$ = hourly volume (veh/hr), and

$V_{15}$ = volume during the peak 15 min of the analysis hour (veh/15 min).

The **Table 6** to **Table 11** show the PHF for each individual movement of every intersection included in this study. The calculations of the PHF are included in **Appendix A**.

### Table 6: Peak Hour Factors for Site 101

| Access | Movement | *V* (veh/h) | | $V_{15}$ (veh/15 min) | | PHF | |
|---|---|---|---|---|---|---|---|
| | | AM | PM | AM | PM | AM | PM |
| North | Left | 56 | 94 | 25 | 36 | 0.56 | 0.65 |
| | Through | 240 | 246 | 71 | 85 | 0.85 | 0.72 |
| | Right | 95 | 72 | 45 | 27 | 0.53 | 0.67 |
| East | Left | 130 | 115 | 38 | 46 | 0.86 | 0.63 |
| | Through | 248 | 170 | 83 | 48 | 0.75 | 0.89 |
| | Right | 156 | 116 | 49 | 36 | 0.80 | 0.81 |
| South | Left | 150 | 112 | 53 | 32 | 0.71 | 0.88 |
| | Through | 283 | 287 | 90 | 90 | 0.79 | 0.80 |
| | Right | 68 | 131 | 20 | 42 | 0.85 | 0.78 |
| West | Left | 65 | 100 | 27 | 40 | 0.60 | 0.63 |
| | Through | 107 | 177 | 41 | 52 | 0.65 | 0.85 |
| | Right | 114 | 126 | 33 | 41 | 0.86 | 0.77 |

### Table 7: Peak Hour Factors for Site 102

| Access | Movement | *V* (veh/h) | | $V_{15}$ (veh/15 min) | | PHF | |
|---|---|---|---|---|---|---|---|
| | | AM | PM | AM | PM | AM | PM |
| North | Left | | | | | | |
| | Through | 115 | 73 | 35 | 24 | 0.82 | 0.76 |
| | Right | 30 | 18 | 12 | 6 | 0.63 | 0.75 |
| East | Left | | | | | | |
| | Through | | | | | | |
| | Right | | | | | | |
| South | Left | 312 | 304 | 104 | 91 | 0.75 | 0.84 |
| | Through | 187 | 184 | 51 | 59 | 0.92 | 0.78 |
| | Right | | | | | | |
| West | Left | 73 | 98 | 23 | 51 | 0.79 | 0.48 |
| | Through | | | | | | |
| | Right | 279 | 320 | 88 | 126 | 0.79 | 0.63 |

### Table 8: Peak Hour Factors for Site 104

| Access | Movement | *V* (veh/h) | | $V_{15}$ (veh/15 min) | | PHF | |
|---|---|---|---|---|---|---|---|
| | | AM | PM | AM | PM | AM | PM |
| North | Left | | | | | | |
| | Through | | | | | | |
| | Right | | | | | | |
| East | Left | 25 | 11 | 9 | 3 | 0.69 | 0.92 |
| | Through | 86 | 35 | 27 | 11 | 0.80 | 0.80 |
| | Right | | | | | | |
| South | Left | 237 | 195 | 66 | 66 | 0.90 | 0.74 |
| | Through | | | | | | |
| | Right | 8 | 11 | 4 | 5 | 0.50 | 0.55 |
| West | Left | | | | | | |
| | Through | 28 | 65 | 11 | 24 | 0.64 | 0.68 |
| | Right | 117 | 94 | 36 | 31 | 0.81 | 0.76 |

### Table 9: Peak Hour Factors for Site 109

| Access | Movement | *V* (veh/h) | | $V_{15}$ (veh/15 min) | | PHF | |
|---|---|---|---|---|---|---|---|
| | | AM | PM | AM | PM | AM | PM |
| North | Left | 69 | 47 | 24 | 21 | 0.72 | 0.56 |
| | Through | 186 | 225 | 61 | 60 | 0.76 | 0.94 |
| | Right | 24 | 27 | 9 | 11 | 0.67 | 0.61 |
| East | Left | 42 | 50 | 21 | 21 | 0.50 | 0.60 |
| | Through | 197 | 140 | 69 | 48 | 0.71 | 0.73 |
| | Right | 69 | 78 | 21 | 26 | 0.82 | 0.75 |
| South | Left | 112 | 59 | 36 | 33 | 0.78 | 0.45 |
| | Through | 289 | 193 | 104 | 57 | 0.69 | 0.85 |
| | Right | 69 | 56 | 28 | 18 | 0.62 | 0.78 |
| West | Left | 74 | 51 | 28 | 28 | 0.66 | 0.46 |
| | Through | 152 | 150 | 54 | 60 | 0.70 | 0.63 |
| | Right | 73 | 69 | 35 | 24 | 0.52 | 0.72 |

### Table 10: Peak Hour Factors for Site 110

| Access | Movement | *V* (veh/h) | | $V_{15}$ (veh/15 min) | | PHF | |
|---|---|---|---|---|---|---|---|
| | | AM | PM | AM | PM | AM | PM |
| North | Left | 256 | 299 | 77 | 93 | 0.83 | 0.80 |
| | Through | 221 | 343 | 70 | 109 | 0.79 | 0.79 |
| | Right | 373 | 249 | 116 | 67 | 0.80 | 0.93 |
| East | Left | 20 | 16 | 6 | 6 | 0.83 | 0.67 |
| | Through | 340 | 267 | 105 | 70 | 0.81 | 0.95 |
| | Right | 207 | 249 | 61 | 67 | 0.85 | 0.93 |
| South | Left | 89 | 81 | 32 | 29 | 0.70 | 0.70 |
| | Through | 190 | 201 | 57 | 62 | 0.83 | 0.81 |
| | Right | 49 | 94 | 16 | 36 | 0.77 | 0.65 |
| West | Left | 119 | 252 | 35 | 69 | 0.85 | 0.91 |
| | Through | 186 | 267 | 59 | 80 | 0.79 | 0.83 |
| | Right | 30 | 39 | 16 | 11 | 0.47 | 0.89 |

### Table 11: Peak Hour Factors for Site 111

| Access | Movement | *V* (veh/h) | | $V_{15}$ (veh/15 min) | | PHF | |
|---|---|---|---|---|---|---|---|
| | | AM | PM | AM | PM | AM | PM |
| North | Left | 13 | 21 | 5 | 13 | 0.65 | 0.40 |
| | Through | 30 | 29 | 13 | 10 | 0.58 | 0.73 |
| | Right | 108 | 32 | 41 | 17 | 0.66 | 0.47 |
| East | Left | 19 | 25 | 7 | 10 | 0.68 | 0.63 |
| | Through | 288 | 463 | 86 | 132 | 0.84 | 0.88 |
| | Right | 27 | 31 | 10 | 12 | 0.68 | 0.65 |
| South | Left | 149 | 55 | 45 | 17 | 0.83 | 0.81 |
| | Through | 71 | 48 | 27 | 14 | 0.66 | 0.86 |
| | Right | 45 | 18 | 14 | 10 | 0.80 | 0.45 |
| West | Left | 179 | 100 | 50 | 28 | 0.90 | 0.89 |
| | Through | 519 | 275 | 136 | 84 | 0.95 | 0.82 |
| | Right | 135 | 66 | 41 | 21 | 0.82 | 0.79 |

A summary of the input data for each site which include the intersections geometry, volumes and movements by vehicle type, and signals phasing and times is presented in **Figure 9** to **Figure 20**. Signal phasing was field measured during the field visits.

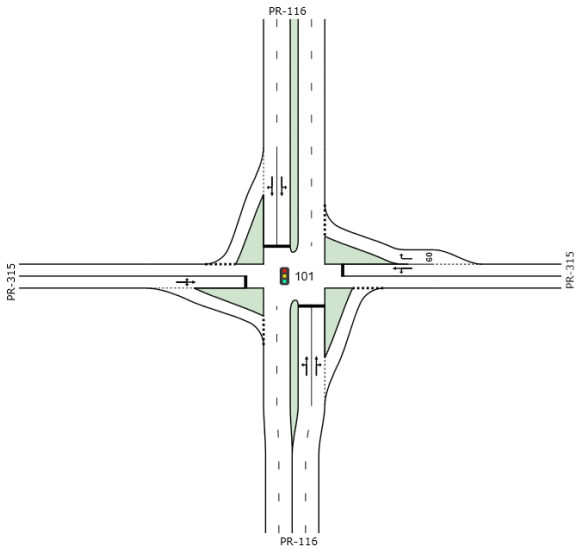
## INTERSECTION SITE INPUT DATA

Date : September 14, 2022 Reference No : 101

Intersection title : PR-116 and PR-315

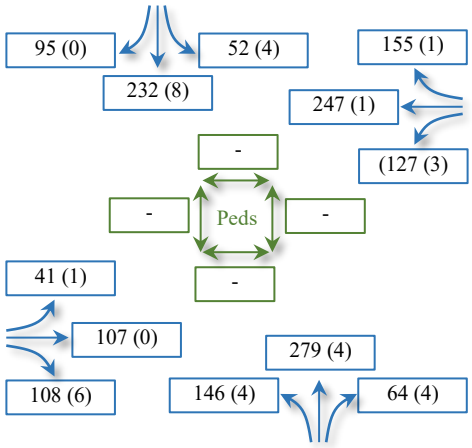
Description : Existing Condition (Peak: 6:45 AM – 7:45 AM)

**INTERSECTION LAYOUT**

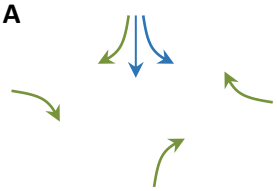
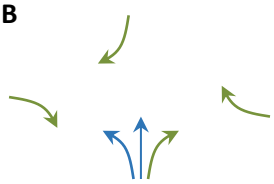
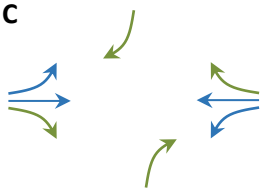



**VOLUMES** (per 60 minutes)

Volume Data Method: Separate, LV(HV)




**SIGNAL PHASING**

| A | B | C | |
|---|---|---|---|
|  Phase time = 24 sec |  Phase time = 24 sec |  Phase time = 39 sec | |
| | | | |

**OTHER FEATURES**

T = 60 min; $T_f$ = 15 min; Basic Sat. Flow = 1750 tcu/h.
Yellow time = 3 s and All-Red Time = 1 s for all phases.
**Approach speeds**: 40 km/h (all approaches).
**Number of lanes**: North and South legs = 1 lane per direction; East and West legs = 2 lanes per direction. See the diagram above.
**Lane width** = North: 3.35 m for approach and exit lanes; East: 3.0 m for approach and exit lanes; South: 3.35 m for approach and exit lanes; West: 3.0 m for approach and exit lanes.
**Grades**: level road (north and south legs); -4.0% (east approach); 4.0% (west approach).

**Figure 9: Site 101 Input Data Summary (AM Peak Hour)**

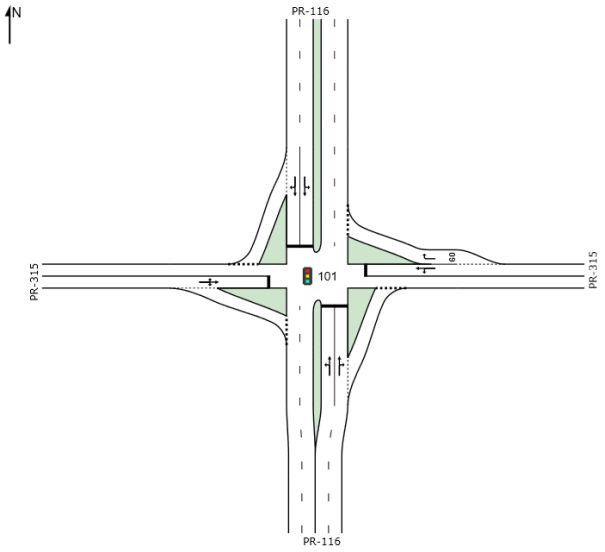
## INTERSECTION SITE INPUT DATA

Date : September 14, 2022 Reference No : 101

Intersection title : PR-116 and PR-315

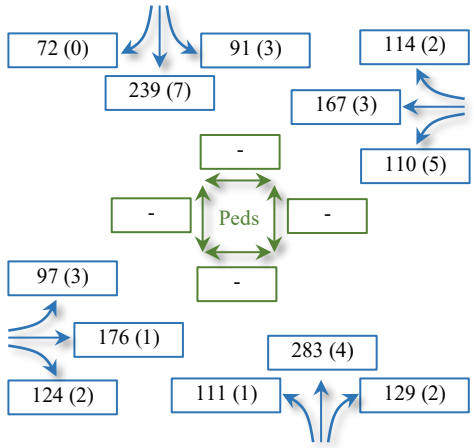
Description : Existing Condition (Peak: 2:15 PM – 3:15 PM)

**INTERSECTION LAYOUT**

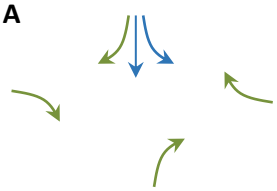
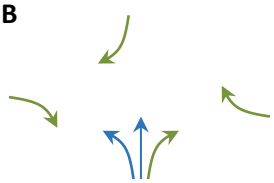
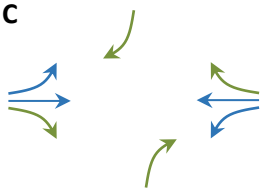



**VOLUMES** (per 60 minutes)

Volume Data Method: Separate, LV(HV)




**SIGNAL PHASING**

| A | B | C | |
|---|---|---|---|
|  Phase time = 24 sec |  Phase time = 24 sec |  Phase time = 39 sec | |
| | | | |

**OTHER FEATURES**

T = 60 min; $T_f$ = 15 min; Basic Sat. Flow = 1750 tcu/h.
Yellow time = 3 s and All-Red Time = 1 s for all phases.
**Approach speeds**: 40 km/h (all approaches).
**Number of lanes**: North and South legs = 2 lanes per direction; East and West legs = 1 lane per direction. See the diagram above.
**Lane width** = North: 3.35 m for approach and exit lanes; East: 3.0 m for approach and exit lanes; South: 3.35 m for approach and exit lanes; West: 3.0 m for approach and exit lanes.
**Grades**: level road (north and south legs); -4.0% (east approach); 4.0% (west approach).

Figure 10: Site 101 Input Data Summary (PM Peak Hour)

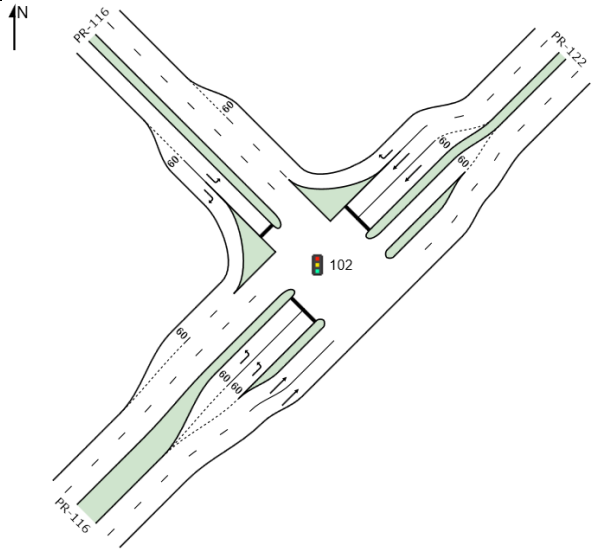
## INTERSECTION SITE INPUT DATA

Date : September 14, 2022 Reference No : 102

Intersection title : PR-116 and PR-122

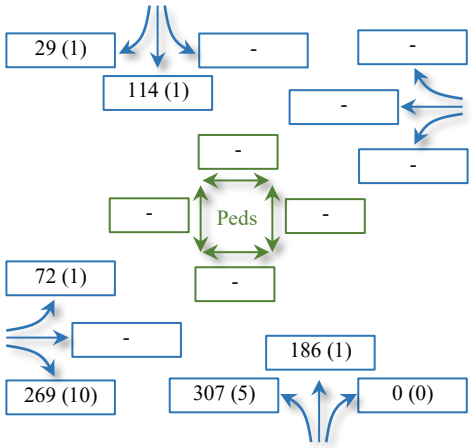
Description : Existing Condition (Peak: 6:45 AM – 7:45 AM)

**INTERSECTION LAYOUT**

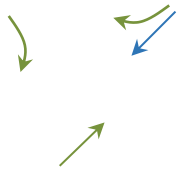
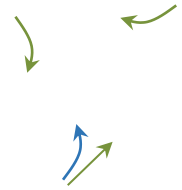
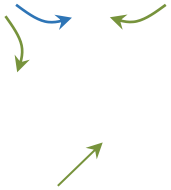



**VOLUMES** (per 60 minutes)

Volume Data Method: Separate, LV(HV)




**SIGNAL PHASING**

| A | B | C | |
|---|---|---|---|
|  Phase time = 24 sec |  Phase time = 34 sec |  Phase time = 24 sec | |
| | | | |

**OTHER FEATURES**

T = 60 min; $T_f$ = 15 min; Basic Sat. Flow = 1750 tcu/h.
Yellow time = 3 s and All-Red Time = 1 s for all phases.
**Approach speeds**: 65 km/h (north and south leg); 40 km/h (west leg).
**Number of lanes**: North and South legs = 2 lanes per direction (by-pass lanes in the south to north approach); West legs = 1 approach lane, 2 exit lanes. See the diagram above.
**Lane width** = North: 3.60 m for approach and exit lanes; South: 3.65 m for approach and exit lanes; West: 3.60 m for approach and exit lanes.
**Grades**: -1.0% (north approach); 2.0% (south approach); -2.0% (west approach).

Figure 11: Site 102 Input Data Summary (AM Peak Hour)

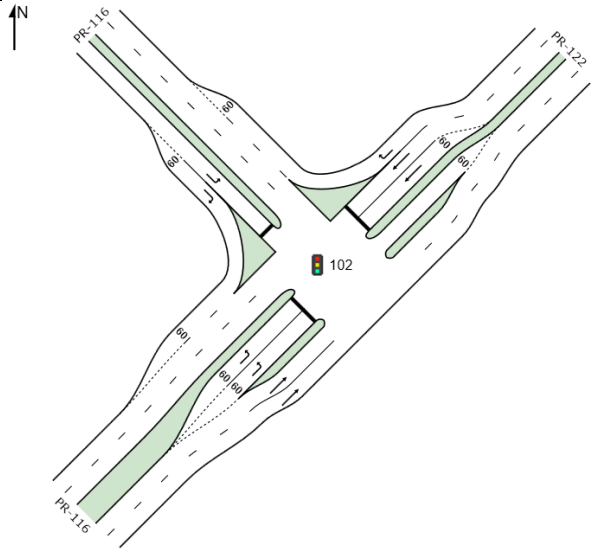
## INTERSECTION SITE INPUT DATA

Date : September 14, 2022 Reference No : 102

Intersection title : PR-116 and PR-122

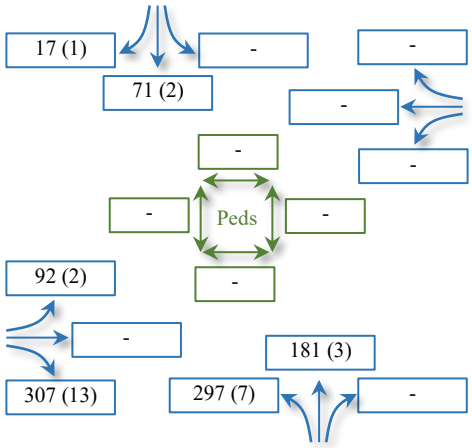
Description : Existing Condition (Peak: 2:00 PM – 3:00 PM)

**INTERSECTION LAYOUT**

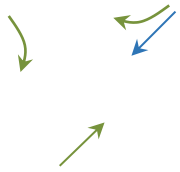
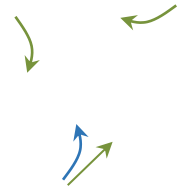
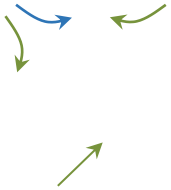



**VOLUMES** (per 60 minutes)

Volume Data Method: Separate, LV(HV)




**SIGNAL PHASING**

| A | B | C | |
|---|---|---|---|
|  Phase time = 24 sec |  Phase time = 34 sec |  Phase time = 24 sec | |
| | | | |

**OTHER FEATURES**

T = 60 min; $T_f$ = 15 min; Basic Sat. Flow = 1750 tcu/h.
Yellow time = 3 s and All-Red Time = 1 s for all phases.
**Approach speeds**: 65 km/h (north and south leg); 40 km/h (west leg).
**Number of lanes**: North and South legs = 2 lanes per direction (by-pass lanes in the south to north approach); West legs = 1 approach lane, 2 exit lanes. See the diagram above.
**Lane width** = North: 3.60 m for approach and exit lanes; South: 3.65 m for approach and exit lanes; West: 3.60 m for approach and exit lanes.
**Grades**: -1.0% (north approach); 2.0% (south approach); -2.0% (west approach).

Figure 12: Site 102 Input Data Summary (PM Peak Hour)

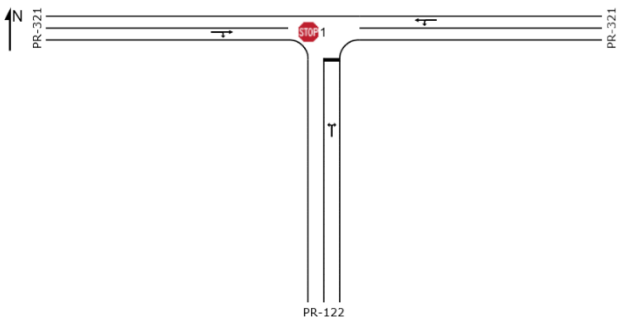
## INTERSECTION SITE INPUT DATA

Date : September 14, 2022 Reference No : 104

Intersection title : PR-122 and PR-321

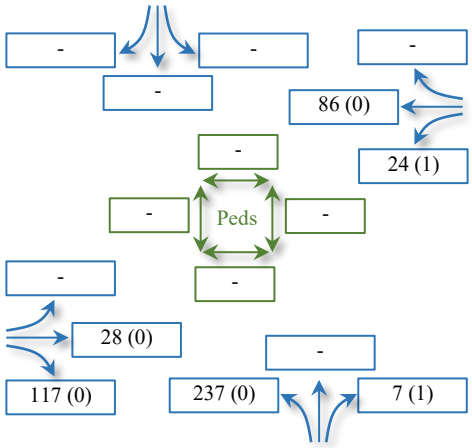
Description : Existing Condition (Peak: 6:30 AM – 7:30 AM)

**INTERSECTION LAYOUT**




**VOLUMES** (per 60 minutes)

Volume Data Method: Separate, LV(HV)




**SIGNAL PHASING**

| | | | |
|---|---|---|---|
| | | | |
| | | | |

**OTHER FEATURES**

T = 60 min; $T_f$ = 15 min.
**Approach speeds**: 65 km/h for all approaches.
**Number of lanes**: 1 lane per direction in all legs. See the diagram above.
**Lane width** = 2.70 m for east and west approach and exit lanes; 3.60 m for south approach and exit lanes.
**Grades**: 2% (east approach); -3.6% (south approach); -2% (west approach).

Figure 13: Site 104 Input Data Summary (AM Peak Hour)

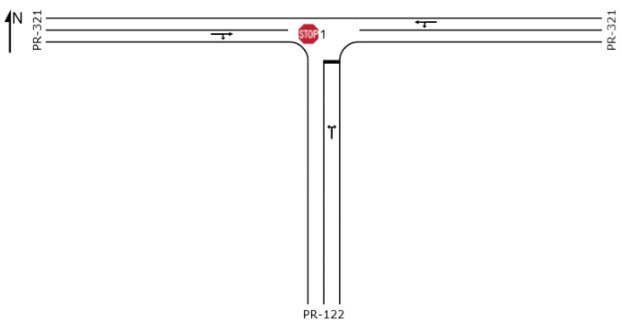
## INTERSECTION SITE INPUT DATA

Date : September 14, 2022 Reference No : 104

Intersection title : PR-122 and PR-321

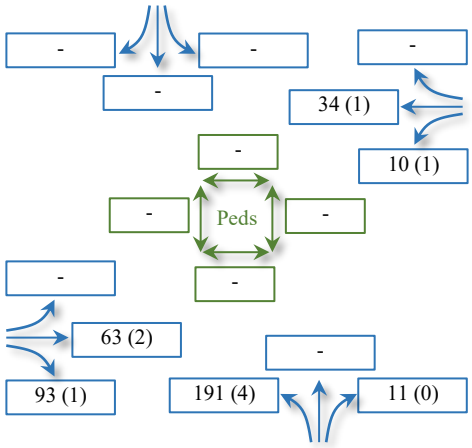
Description : Existing Condition (Peak: 2:45 PM –3:45 PM)

**INTERSECTION LAYOUT**




**VOLUMES** (per 60 minutes)

Volume Data Method: Separate, LV(HV)




**SIGNAL PHASING**

| | | | |
|---|---|---|---|
| | | | |
| | | | |

**OTHER FEATURES**

T = 60 min; $T_f$ = 15 min.

**Approach speeds**: 65 km/h for all approaches.

**Number of lanes**: 1 lane per direction in all legs. See the diagram above.

**Lane width** = 2.70 m for east and west approach and exit lanes; 3.60 m for south approach and exit lanes.

**Grades**: 2% (east approach); -3.6% (south approach); -2% (west approach).

Figure 14: Site 104 Input Data Summary (PM Peak Hour)

## INTERSECTION SITE INPUT DATA

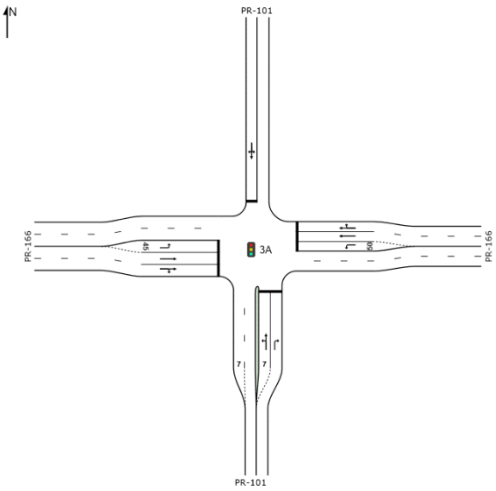
Date : February 14, 2017 (updated September 14, 2022)

Reference No : 109

Intersection title : PR-101 and PR-166

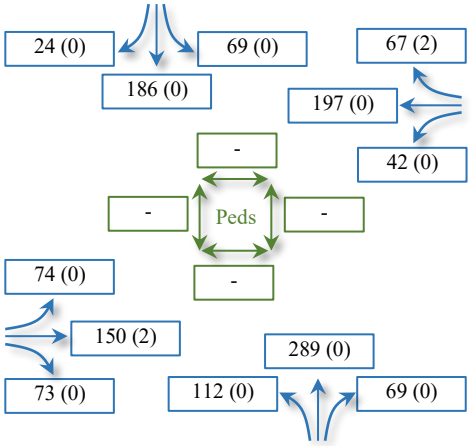
Description : Existing Condition (Peak:7:15 AM – 8:15 AM)

**INTERSECTION LAYOUT**

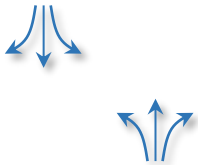
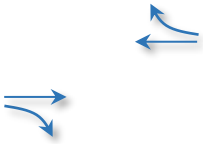



**VOLUMES** (per 60 minutes)

Volume Data Method: Separate, LV(HV)




**SIGNAL PHASING**

| A | B | C | |
|---|---|---|---|
|  Phase time = 29 sec |  Phase time = 19 sec |  Phase time = 39 sec | |
| | | | |

**OTHER FEATURES**

T = 60 min; $T_f$ = 15 min; Basic Sat. Flow = 1750 tcu/h.
Yellow time = 3 s and All-Red Time = 1 s for all phases.
**Approach speeds**: 40 km/h (north and south legs); 65 km/h (east and west legs).
**Number of lanes**: North and south legs = 1 lane per direction; East and West legs = 2 lanes per direction. See the diagram above.
**Lane width:** North: 3.35 m for approach and exit lanes; East: 3.35 m for approach and exit lanes; South: 3.50 m for approach and 3.35 m for exit lanes; West: 3.65 m for approach and exit lanes.
**Grades**: level road (east and west legs); -6.5% (north approach); -15% (south approach).

Figure 15: Site 109 Site Input Data Summary (AM Peak Hour)

## INTERSECTION SITE INPUT DATA

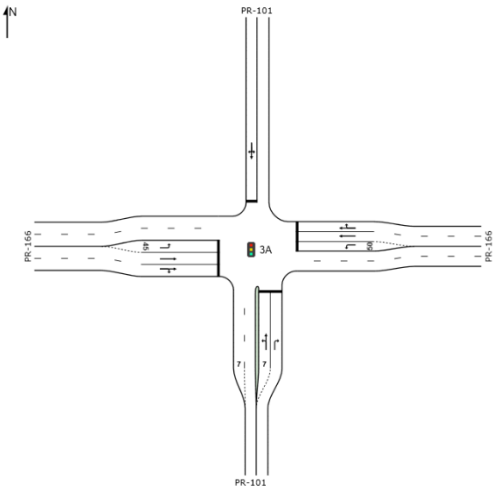
Date : February 14, 2017 (updated September 14, 2022)

Reference No : 109

Intersection title : PR-101 and PR-166

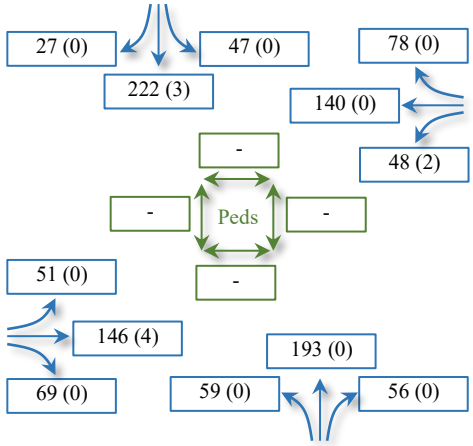
Description : Existing Condition (Peak:3:00 PM – 4:00 PM)

**INTERSECTION LAYOUT**

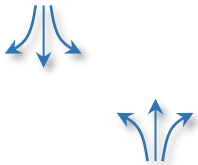
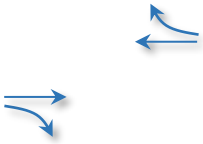



**VOLUMES** (per 60 minutes)

Volume Data Method: Separate, LV(HV)




**SIGNAL PHASING**

| A | B | C | |
|---|---|---|---|
|  |  |  | |
| Phase time = 29 sec | Phase time = 19 sec | Phase time = 39 sec | |
| | | | |

**OTHER FEATURES**

T = 60 min; $T_f$ = 15 min; Basic Sat. Flow = 1750 tcu/h.
Yellow time = 3 s and All-Red Time = 1 s for all phases.
**Approach speeds**: 40 km/h (north and south legs); 65 km/h (east and west legs).
**Number of lanes**: North and south legs = 1 lane per direction; East and West legs = 2 lanes per direction. See the diagram above.
**Lane width:** North: 3.35 m for approach and exit lanes; East: 3.35 m for approach and exit lanes; South: 3.50 m for approach and 3.35 m for exit lanes; West: 3.65 m for approach and exit lanes.
**Grades**: level road (east and west legs); -6.5% (north approach); -15% (south approach).

Figure 16: Site 109 Input Data Summary (PM Peak Hour)

## INTERSECTION SITE INPUT DATA

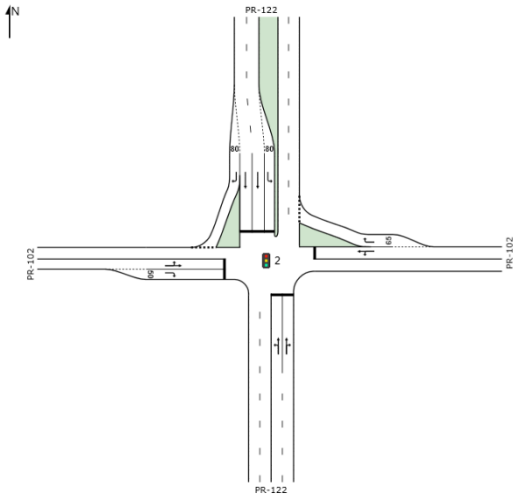
Date : February 15, 2017 (updated September 14, 2022)

Reference No : 110

Intersection title : PR-122 and PR-102

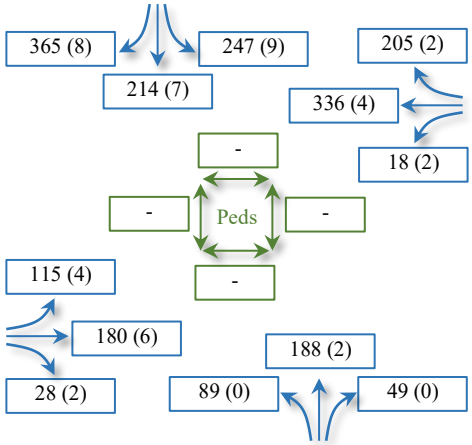
Description : Existing Condition (Peak:7:15 AM – 8:15 AM)

**INTERSECTION LAYOUT**

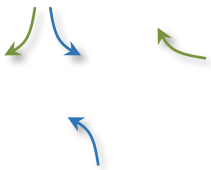
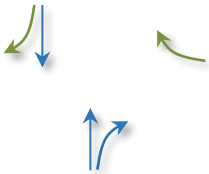
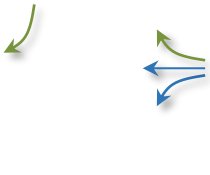
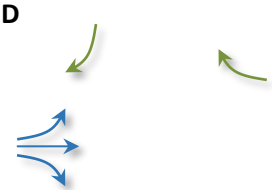



**VOLUMES** (per 60 minutes)

Volume Data Method: Separate, LV(HV)




**SIGNAL PHASING**

| A | B | C | D |
|---|---|---|---|
|  |  |  |  |
| Phase time = 24 sec | Phase time = 29 sec | Phase time = 34 sec | Phase time = 34 sec |

**OTHER FEATURES**

T = 60 min; $T_f$ = 15 min; Basic Sat. Flow = 1750 tcu/h.
Yellow time = 3 s and All-Red Time = 1 s for all phases.
**Approach speeds**: 40 km/h for all approaches.
**Number of lanes**: North and south legs = 2 lanes per direction; East and West legs = 1 lane per direction. See the diagram above.
**Lane width:** North: 3.65 m for approach and 3.35 for exit lanes; East: 3.65 m for approach and exit lanes; **South**: 3.35 m for approach and exit lanes; West: 3.05 m for approach and 3.35 for exit lanes.
**Grades**: level road (north, east and west legs); -2.5% (south approach).

Figure 17: Site 110 Input Data Summary (AM Peak Hour)

## INTERSECTION SITE INPUT DATA

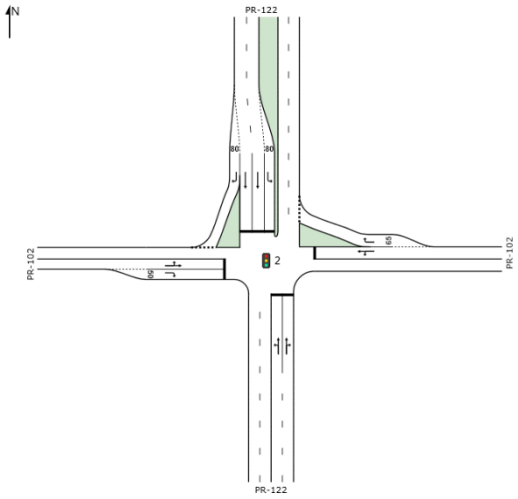
Date : February 15, 2017 (updated September 14, 2022)

Reference No : 110

Intersection title : PR-122 and PR-102

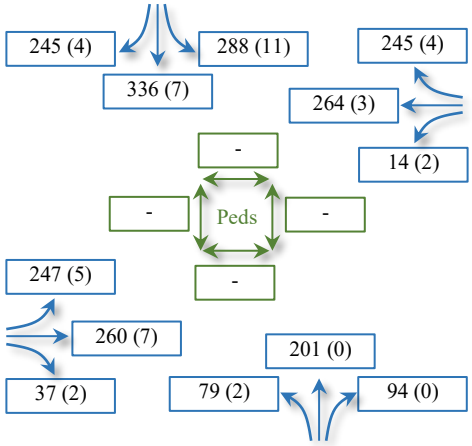
Description : Existing Condition (Peak:3:00 PM – 4:00 PM)

**INTERSECTION LAYOUT**

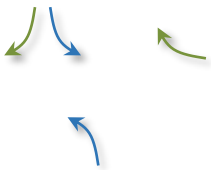
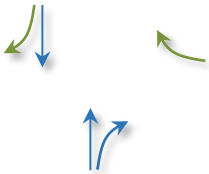
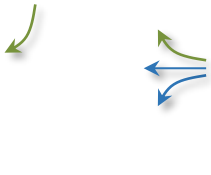
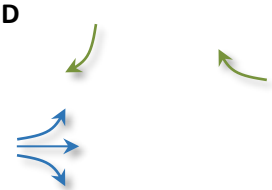



**VOLUMES** (per 60 minutes)

Volume Data Method: Separate, LV(HV)




**SIGNAL PHASING**

| A | B | C | D |
|---|---|---|---|
|  |  |  |  |
| Phase time = 24 sec | Phase time = 29 sec | Phase time = 34 sec | Phase time = 34 sec |

**OTHER FEATURES**

T = 60 min; $T_f$ = 15 min; Basic Sat. Flow = 1750 tcu/h.
Yellow time = 3 s and All-Red Time = 1 s for all phases.
**Approach speeds**: 40 km/h for all approaches.
**Number of lanes**: North and south legs = 2 lanes per direction; East and West legs = 1 lane per direction. See the diagram above.
**Lane width:** North: 3.65 m for approach and 3.35 for exit lanes; East: 3.65 m for approach and exit lanes; **South**: 3.35 m for approach and exit lanes; West: 3.05 m for approach and 3.35 for exit lanes.
**Grades**: level road (north, east and west legs); -2.5% (south approach).

Figure 18: Site 110 Input Data Summary (PM Peak Hour)

## INTERSECTION SITE INPUT DATA

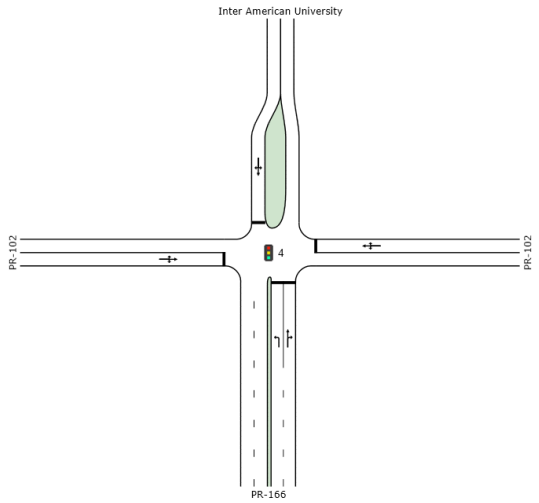
Date : February 16, 2017 (updated September 14, 2022)

Reference No : 111

Intersection title : PR-102 and PR-166

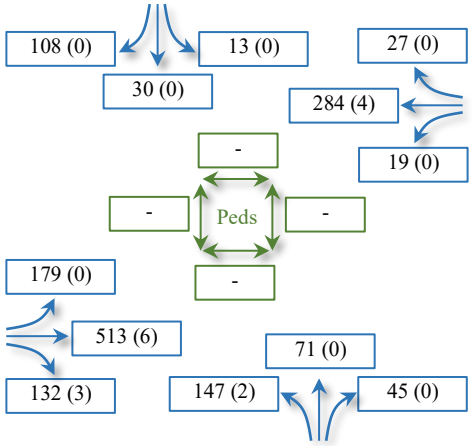
Description : Existing Condition (Peak:7:15 AM – 8:15 AM)

**INTERSECTION LAYOUT**




**VOLUMES** (per 60 minutes)

Volume Data Method: Separate, LV(HV)




**SIGNAL PHASING**

| A | B | C | |
|---|---|---|---|
|  |  |  | |
| Phase time = 19 seg | Phase time = 19 seg | Phase time = 74 seg | |
| | | | |

**OTHER FEATURES**

T = 60 min; $T_f$ = 15 min; Basic Sat. Flow = 1750 tcu/h.
Yellow time = 3 s and All-Red Time = 1 s for all phases.
**Approach speeds**: 25 km/h (north leg); 55 km/h (east and west legs); 65 km/h (south leg).
**Number of lanes**: North, East and West legs = 1 lane per direction; South leg = 2 lanes per direction. See the diagram above.
**Lane width**: North: 3.65 m for approach and exit lanes; East: 3.65 m for approach and exit lanes; South: 3.35 m for approach and 3.65 m for exit lanes; West: 3.65 m for approach and exit lanes.
**Grades**: level road (north and south legs); -4.0% (east approach); 4.0% (west approach).

Figure 19: Site 111 Input Data Summary (AM Peak Hour)

## INTERSECTION SITE INPUT DATA

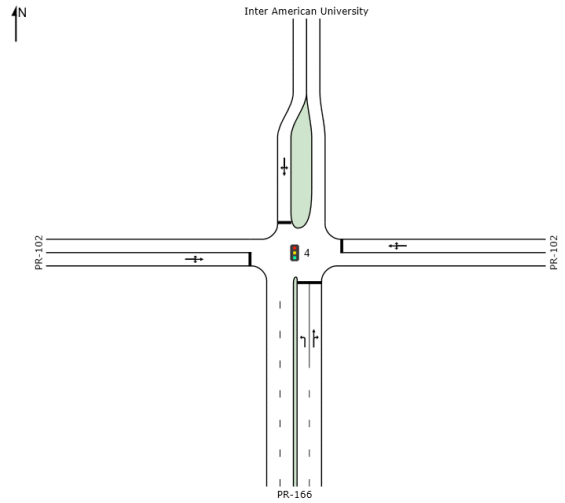
Date : February 16, 2017 (updated September 14, 2022)

Reference No : 111

Intersection title : PR-102 and PR-166

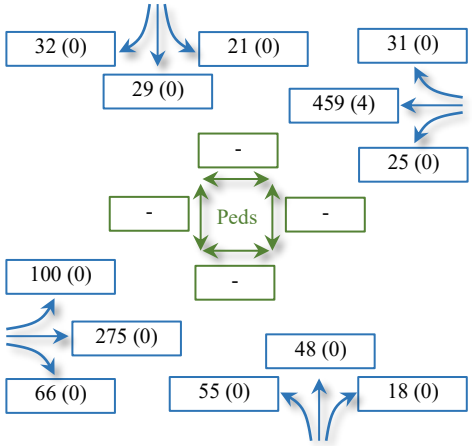
Description : Existing Condition (Peak: 4:00 PM – 5:00 PM)

**INTERSECTION LAYOUT**




**VOLUMES** (per 60 minutes)

Volume Data Method: Separate, LV(HV)




**SIGNAL PHASING**

| A | B | C | |
|---|---|---|---|
|  |  |  | |
| Phase time = 19 seg | Phase time = 19 seg | Phase time = 74 seg | |
| | | | |

**OTHER FEATURES**

T = 60 min; $T_f$ = 15 min; Basic Sat. Flow = 1750 tcu/h.
Yellow time = 3 s and All-Red Time = 1 s for all phases.
**Approach speeds**: 25 km/h (north leg); 55 km/h (east and west legs); 65 km/h (south leg).
**Number of lanes**: North, East and West legs = 1 lane per direction; South leg = 2 lanes per direction. See the diagram above.
**Lane width**: North: 3.65 m for approach and exit lanes; East: 3.65 m for approach and exit lanes; South: 3.35 m for approach and 3.65 m for exit lanes; West: 3.65 m for approach and exit lanes.
**Grades**: level road (north and south legs); -4.0% (east approach); 4.0% (west approach).

Figure 20: Site 111 Input Data Summary (PM Peak Hour)

Once the data has been reduced and evaluated for each manual counting location, it will be the basis for the operational assessment of the studied intersections. The capacity analysis was performed according to the Criteria of the Highway Capacity Manual (HCM) 6th Edition (TRB, 2016). The modeling to analyze the intersection within the study area was carried out with the SIDRA Intersection 7 (Akcelik & Associates PTY LTD, 2017) computer software.

The Level of Services (LOS) was used as the base criteria for the analysis of the operation conditions of the road network. The LOS are based on the average delays experienced by the vehicles as they pass through the intersections, both signalized and non-signalized. The criteria for this evaluation include different types of roads and their components, such as intersections, ramps, etc. The LOS are divided in 6 categories (A, B, C, D, E and F). The LOS A represents an excellent and ideal traffic condition. The LOS F represents the worse traffic conditions and vehicular congestion on the road network. The categories of LOS are described as follows:

- **LOS A – Excellent**

  This condition represents the traffic with free flow, accompanied with lower traffic volumes and higher vehicle speeds. The driver has little or no restriction to perform maneuvers, and maintains the desired speed without delays.

- **LOS B – Very Good**

  In this condition the traffic operation speeds and conditions begin to be slightly restrictive. The drivers still have considerable liberty to select desired speed and lane.

- **LOS C – Good**

  The speed and maneuvers are more restrictive due to the higher traffic volume. This condition presents more restriction to the driver to select their desired speed, lane and vehicle overtake.

- **LOS D – Acceptable**

  This level of service approaches an unstable traffic flow with tolerable operational speeds, although considerable affected by the changes in operational conditions. The drivers have little liberty to maneuver, and the convenience and comfort are low.

- **LOS E – Capacity**

The traffic flow becomes unstable and could present momentary stops. The vehicular congestion and the delays increase considerably.

- **LOS F – Bad**

  In this condition the operational speed could drop to cero and have the effect of traffic build up.

**Table 12** shows the relationship between the LOS and the average delays of each vehicle at the intersection controlled by traffic lights, STOP or Yield lights. The two (2) components of these delays are the delays while traveling through the intersection and the delay while being stop during a red light.

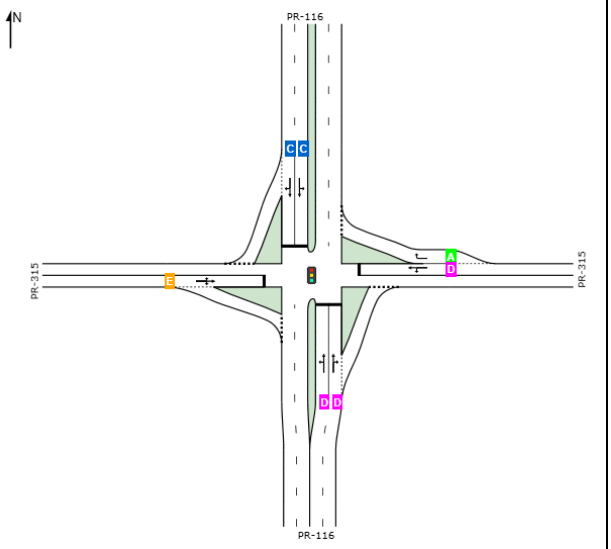
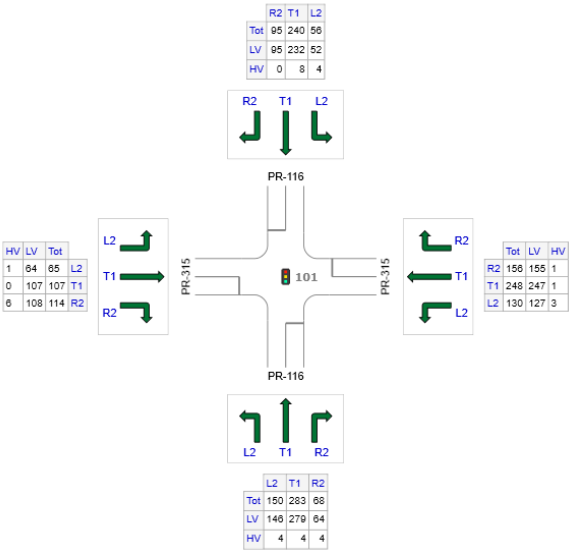
**Table 12. Intersection LOS Criteria for Traffic Delays**

| Level of Service (LOS) | Traffic Light and Roundabout (Seconds/veh) | STOP and Yield (Seconds/veh) |
|---|---|---|
| **A** | delay < 10 | delay < 10 |
| **B** | 10 < delay < 20 | 10 < delay <15 |
| **C** | 20 < delay <35 | 15 < delay <25 |
| **D** | 35 < delay <55 | 25 < delay <35 |
| **E** | 55 < delay <80 | 35 < delay <50 |
| **F** | 80 < delay | 50 < delay |

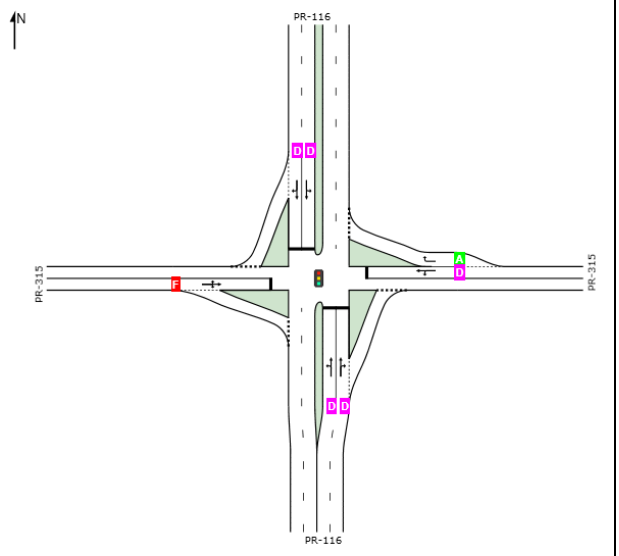
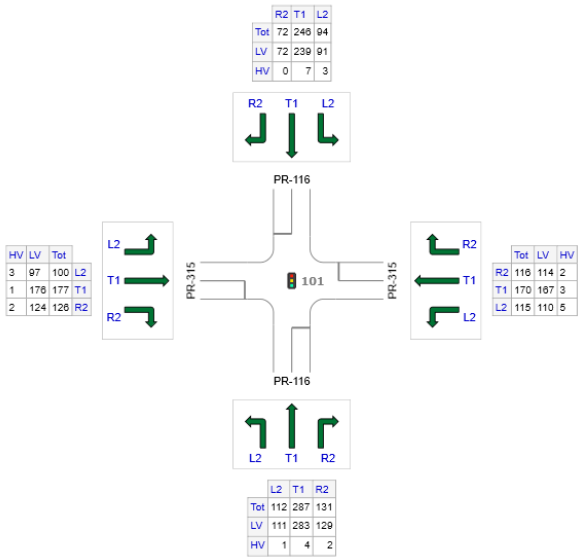
## 2.2 CAPACITY ANALYSIS

**Table 13** to **Table 24** show the summary of results for the existing conditions during typical peak hours (AM and PM). Each table presents the schematic geometry, peak hour volume (PHV), v/C ratio of each movement, approach control delay and LOS, and intersection control delay and LOS.

## Table 13. Summary of Results Intersection 101 AM– Existing Condition

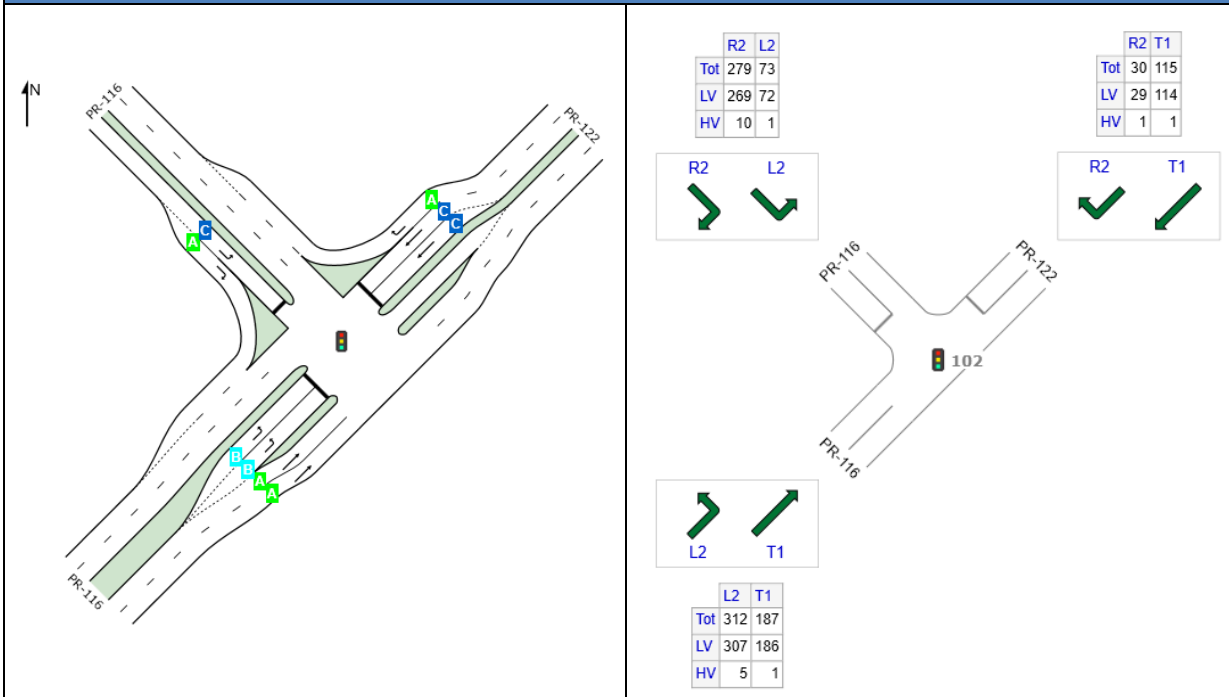
| Intersection 101 | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
|  | | | | | | | | | |  | | | | | | | | |
| Peak Hour | AM | | | | | | | | | | | |
| Approach | S | | | E | | | N | | | W | | |
| Movement | L | T | R | L | T | R | L | T | R | L | T | R |
| Degree of Saturation (v/C Ratio) | 0.78 | 0.78 | 0.78 | 0.92 | 0.92 | 0.17 | 0.65 | 0.65 | 0.65 | 0.86 | 0.86 | 0.86 |
| Approach Control Delay (sec/veh) | 46.8 | | | 33.6 | | | 33.9 | | | 56.0 | | |
| Approach LOS | D | | | C | | | C | | | E | | |
| Intersection Control Delay (sec/veh) | 41.3 | | | | | | | | | | | |
| Intersection LOS | D | | | | | | | | | | | |

## Table 14. Summary of Results Intersection 101 PM– Existing Condition

| Intersection 101 | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
|  | | | | | | |  | | | | | | | |
| Peak Hour | PM | | | | | | | | | | | |
| Approach | S | | | E | | | N | | | W | | |
| Movement | L | T | R | L | T | R | L | T | R | L | T | R |
| Degree of Saturation (v/C Ratio) | 0.76 | 0.76 | 0.76 | 0.83 | 0.83 | 0.13 | 0.71 | 0.71 | 0.71 | 1.02 | 1.02 | 1.02 |
| Approach Control Delay (sec/veh) | 42.6 | | | 29.0 | | | 40.2 | | | 81.6 | | |
| Approach LOS | D | | | C | | | D | | | F | | |
| Intersection Control Delay (sec/veh) | 47.9 | | | | | | | | | | | |
| Intersection LOS | D | | | | | | | | | | | |

## Table 15. Summary of Results Intersection 102 AM– Existing Condition

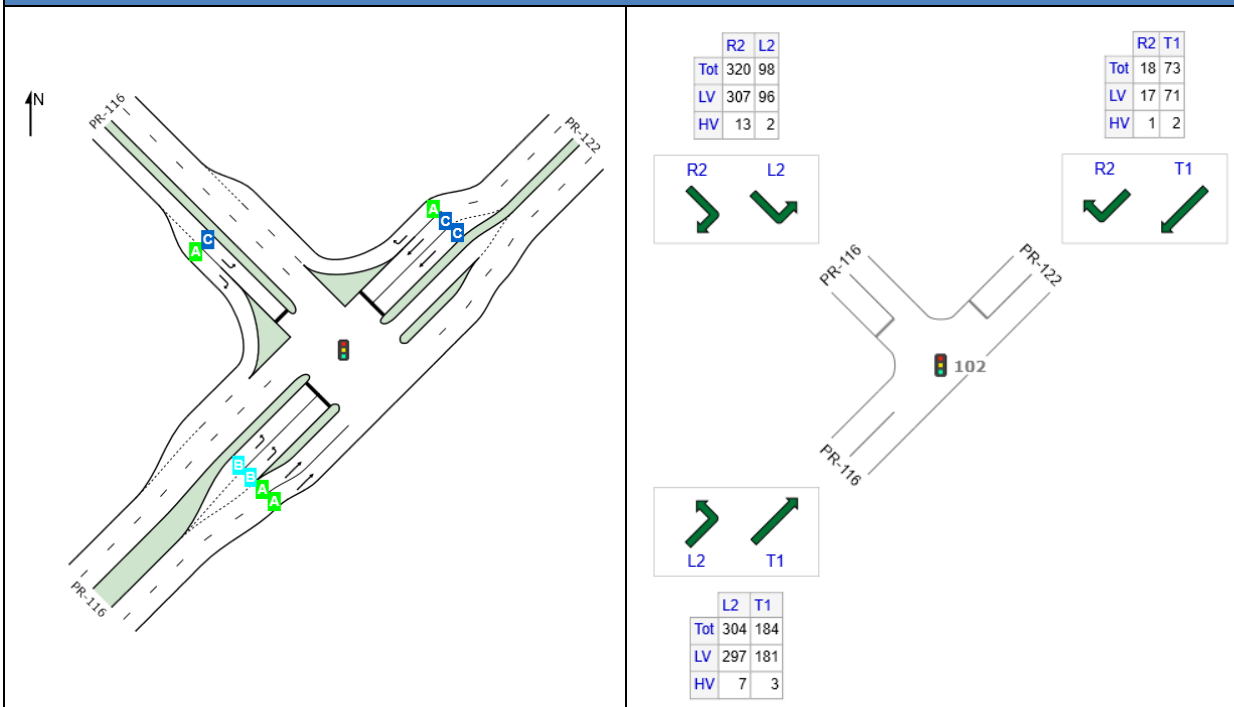
**Intersection 102**




| Peak Hour | AM | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Approach | NE | | | NW | | | SW | | | SE | | |
| Movement | L | T | R | L | T | R | L | T | R | L | T | R |
| Degree of Saturation (v/C Ratio) | - | 0.15 | 0.03 | 0.21 | - | 0.23 | 0.32 | 0.05 | - | - | - | - |
| Approach Control Delay (sec/veh) | 18.3 | | | 5.2 | | | 12.7 | | | - | | |
| Approach LOS | B | | | A | | | B | | | - | | |
| Intersection Control Delay (sec/veh) | 10.9 | | | | | | | | | | | |
| Intersection LOS | B | | | | | | | | | | | |

## Table 16. Summary of Results Intersection 102 PM– Existing Condition

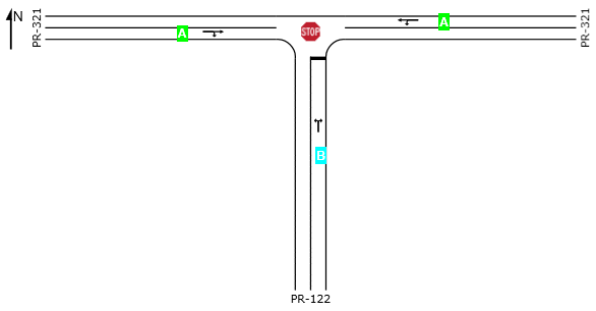
**Intersection 102**

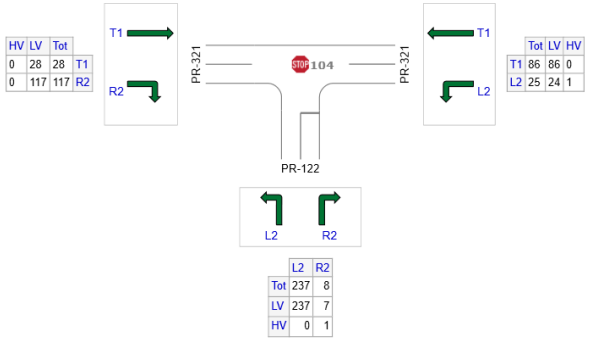



| Peak Hour | PM | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Approach | NE | | | NW | | | SW | | | SE | | |
| Movement | L | T | R | L | T | R | L | T | R | L | T | R |
| Degree of Saturation (v/C Ratio) | - | 0.11 | 0.02 | 0.47 | - | 0.33 | 0.28 | 0.06 | - | - | - | - |
| Approach Control Delay (sec/veh) | 19.3 | | | 7.8 | | | 11.2 | | | - | | |
| Approach LOS | B | | | A | | | B | | | - | | |
| Intersection Control Delay (sec/veh) | 10.2 | | | | | | | | | | | |
| Intersection LOS | B | | | | | | | | | | | |

## Table 17. Summary of Results Intersection 104 AM– Existing Condition

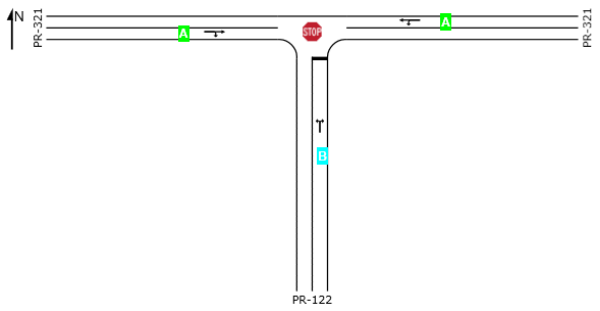
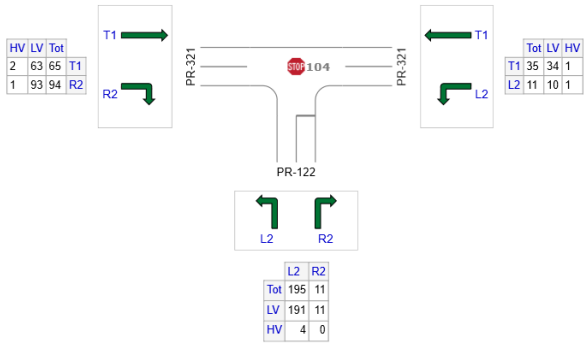
**Intersection 104**



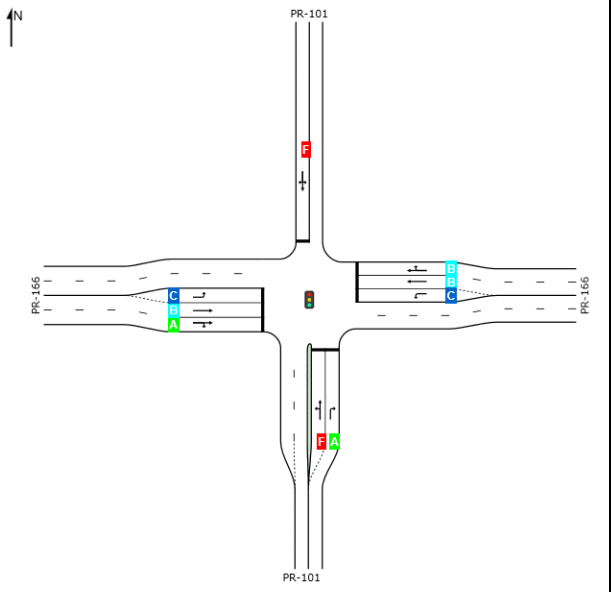
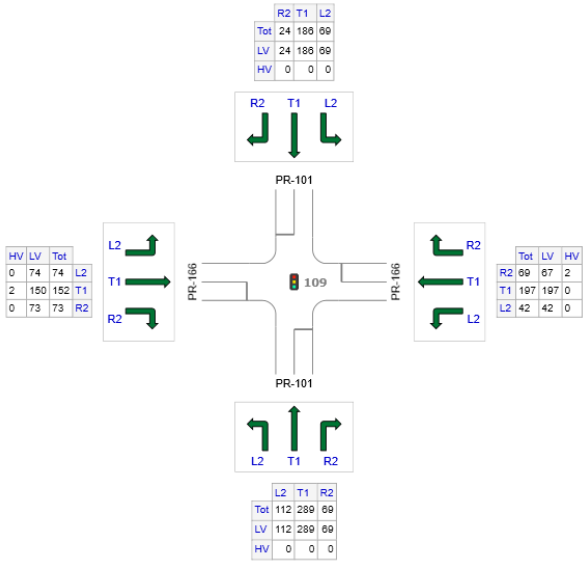

| Peak Hour | AM | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Approach | S | | | E | | | N | | | W | | |
| Movement | L | T | R | L | T | R | L | T | R | L | T | R |
| Degree of Saturation (v/C Ratio) | 0.35 | - | 0.35 | 0.09 | 0.09 | - | - | - | - | - | 0.21 | 0.21 |
| Approach Control Delay (sec/veh) | 11.9 | | | 0.0 | | | - | | | 6.1 | | |
| Approach LOS | B | | | A | | | - | | | A | | |
| Intersection Control Delay (sec/veh) | 7.3 | | | | | | | | | | | |
| Intersection LOS | A | | | | | | | | | | | |

## Table 18. Summary of Results Intersection 104 PM– Existing Condition

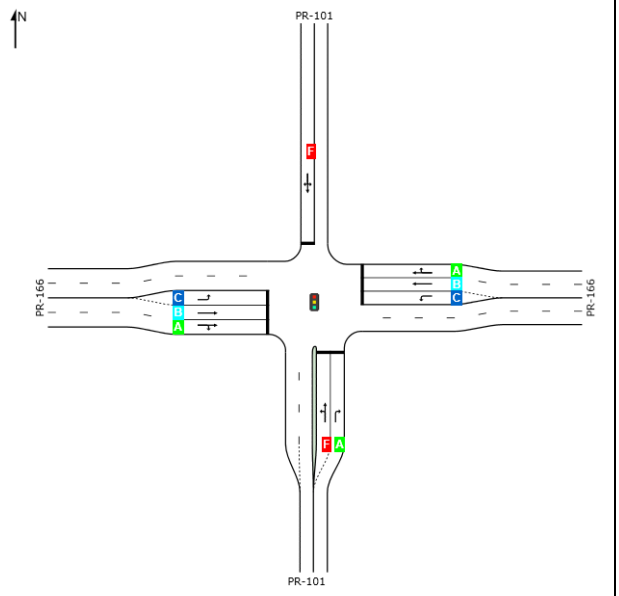
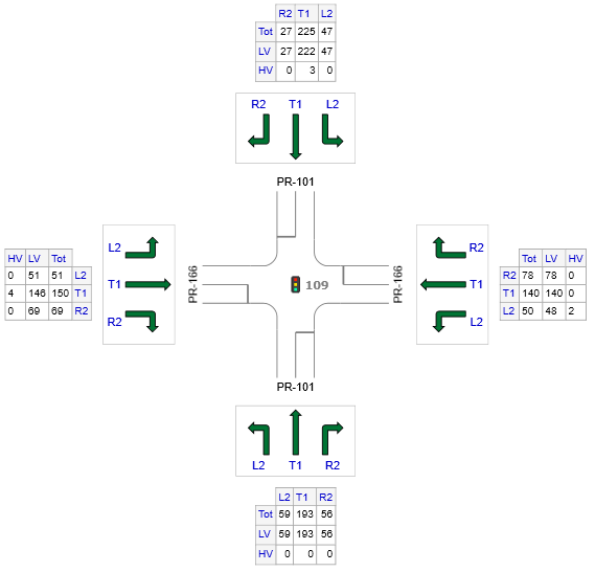
| Intersection 104 | |
|---|---|
|  |  |

| Peak Hour | PM | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Approach | S | | | E | | | N | | | W | | |
| Movement | L | T | R | L | T | R | L | T | R | L | T | R |
| Degree of Saturation (v/C Ratio) | 0.34 | - | 0.34 | 0.4 | 0.4 | - | - | - | - | - | 0.27 | 0.27 |
| Approach Control Delay (sec/veh) | 11.6 | | | 0.0 | | | - | | | 7.3 | | |
| Approach LOS | B | | | A | | | - | | | A | | |
| Intersection Control Delay (sec/veh) | 8.8 | | | | | | | | | | | |
| Intersection LOS | A | | | | | | | | | | | |

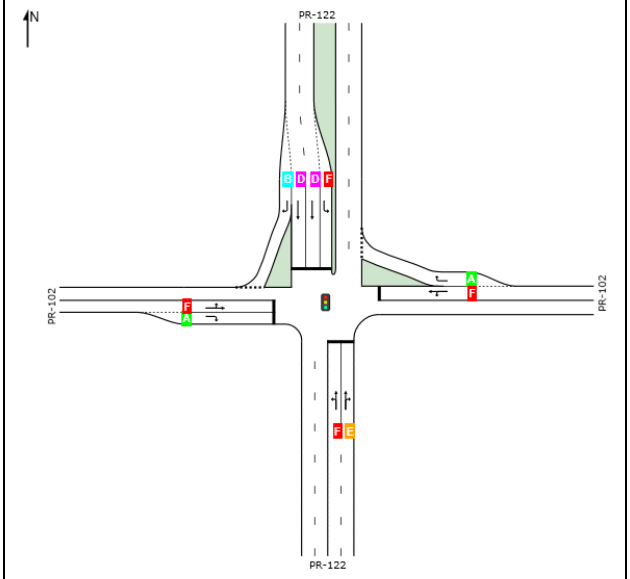
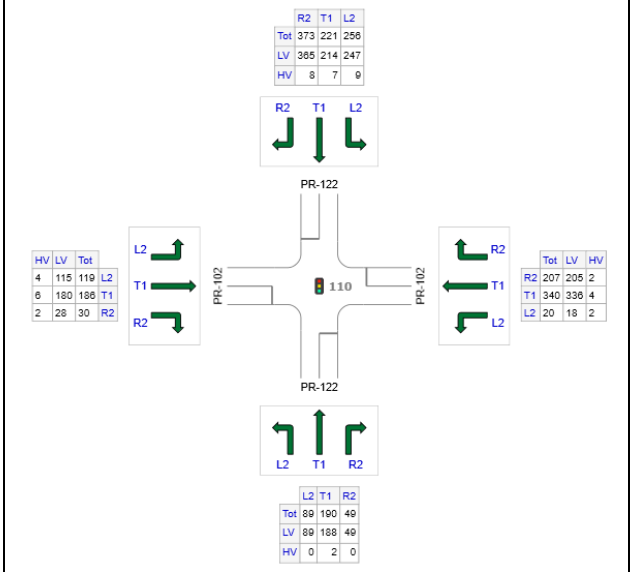
## Table 19. Summary of Results Intersection 109 AM– Existing Condition

| Intersection 109 | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
|  | | | | | | |  | | | | | | | | |
| Peak Hour | AM | | | | | | | | | | | |
| Approach | S | | | E | | | N | | | W | | |
| Movement | L | T | R | L | T | R | L | T | R | L | T | R |
| Degree of Saturation (v/C Ratio) | 1.53 | 1.53 | 0.10 | 0.29 | 0.26 | 0.26 | 1.68 | 1.68 | 1.68 | 0.39 | 0.25 | 0.25 |
| Approach Control Delay (sec/veh) | 228.9 | | | 17.6 | | | >300 | | | 16.6 | | |
| Approach LOS | F | | | B | | | F | | | B | | |
| Intersection Control Delay (sec/veh) | 152.6 | | | | | | | | | | | |
| Intersection LOS | F | | | | | | | | | | | |

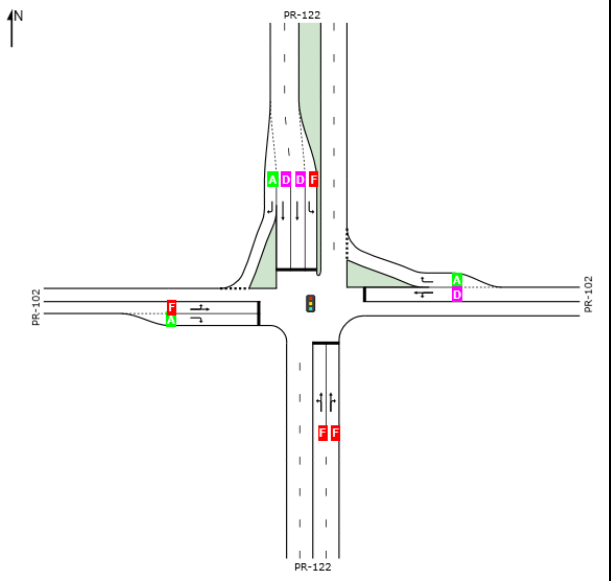
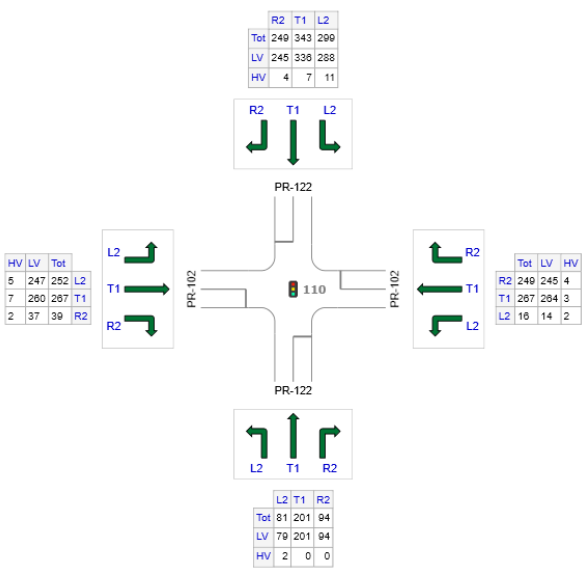
## Table 20. Summary of Results Intersection 109 PM– Existing Condition

| Intersection 109 | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
|  | | | | | | |  | | | | | | | | |
| Peak Hour | PM | | | | | | | | | | | |
| Approach | S | | | E | | | N | | | W | | |
| Movement | L | T | R | L | T | R | L | T | R | L | T | R |
| Degree of Saturation (v/C Ratio) | 1.15 | 1.15 | 0.07 | 0.30 | 0.21 | 0.21 | 1.37 | 1.37 | 1.37 | 0.39 | 0.24 | 0.24 |
| Approach Control Delay (sec/veh) | 105.4 | | | 16.2 | | | 209.8 | | | 17.6 | | |
| Approach LOS | F | | | B | | | F | | | B | | |
| Intersection Control Delay (sec/veh) | 84.1 | | | | | | | | | | | |
| Intersection LOS | F | | | | | | | | | | | |

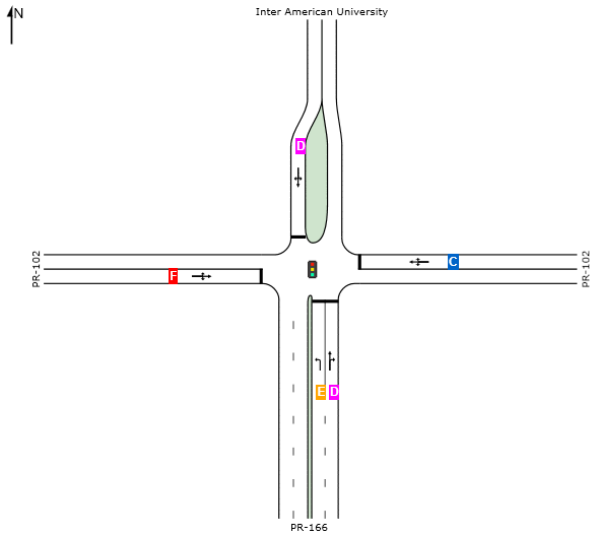
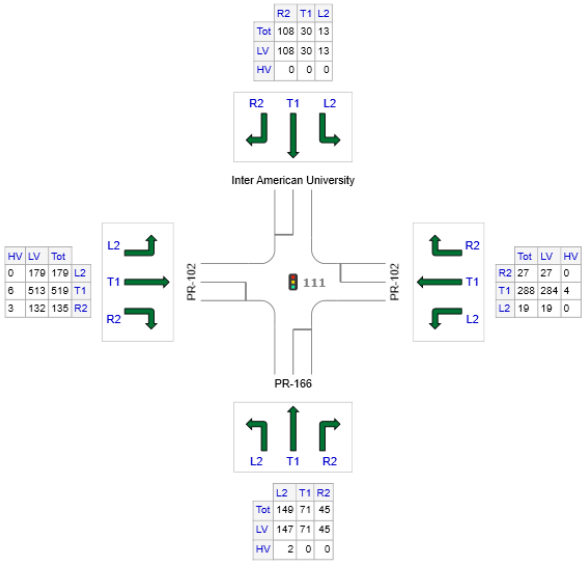
## Table 21. Summary of Results Intersection 110 AM– Existing Condition

| Intersection 110 | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
|  | | | | | | |  | | | | | | | | |
| Peak Hour | AM | | | | | | | | | | | |
| Approach | S | | | E | | | N | | | W | | |
| Movement | L | T | R | L | T | R | L | T | R | L | T | R |
| Degree of Saturation (v/C Ratio) | 1.63 | 0.82 | 0.82 | 1.24 | 1.24 | 0.22 | 1.16 | 0.40 | 0.47 | 1.02 | 1.02 | 0.06 |
| Approach Control Delay (sec/veh) | 150.7 | | | 109.2 | | | 59.6 | | | 83.0 | | |
| Approach LOS | F | | | F | | | E | | | F | | |
| Intersection Control Delay (sec/veh) | 91.4 | | | | | | | | | | | |
| Intersection LOS | F | | | | | | | | | | | |

## Table 22. Summary of Results Intersection 110 PM– Existing Condition

| Intersection 110 | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
|  | | | | | | |  | | | | | | | | |
| Peak Hour | PM | | | | | | | | | | | |
| Approach | S | | | E | | | N | | | W | | |
| Movement | L | T | R | L | T | R | L | T | R | L | T | R |
| Degree of Saturation (v/C Ratio) | 1.39 | 1.07 | 1.07 | 0.82 | 0.82 | 0.24 | 1.41 | 0.61 | 0.24 | 1.53 | 1.53 | 0.04 |
| Approach Control Delay (sec/veh) | 186.4 | | | 30.6 | | | 103.1 | | | 262.9 | | |
| Approach LOS | F | | | C | | | F | | | F | | |
| Intersection Control Delay (sec/veh) | 140.2 | | | | | | | | | | | |
| Intersection LOS | F | | | | | | | | | | | |

## Table 23. Summary of Results Intersection 111 AM– Existing Condition

| Intersection 111 | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
|  | | | | | | |  | | | | | |
| Peak Hour | AM | | | | | | | | | | | |
| Approach | S | | | E | | | N | | | W | | |
| Movement | L | T | R | L | T | R | L | T | R | L | T | R |
| Degree of Saturation (v/C Ratio) | 0.82 | 0.69 | 0.69 | 0.58 | 0.58 | 0.58 | 0.84 | 0.84 | 0.84 | 1.12 | 1.12 | 1.12 |
| Approach Control Delay (sec/veh) | 57.6 | | | 25.3 | | | 45.3 | | | 89.4 | | |
| Approach LOS | E | | | C | | | D | | | F | | |
| Intersection Control Delay (sec/veh) | 64.3 | | | | | | | | | | | |
| Intersection LOS | E | | | | | | | | | | | |

### Table 24. Summary of Results Intersection 111 PM– Existing Condition

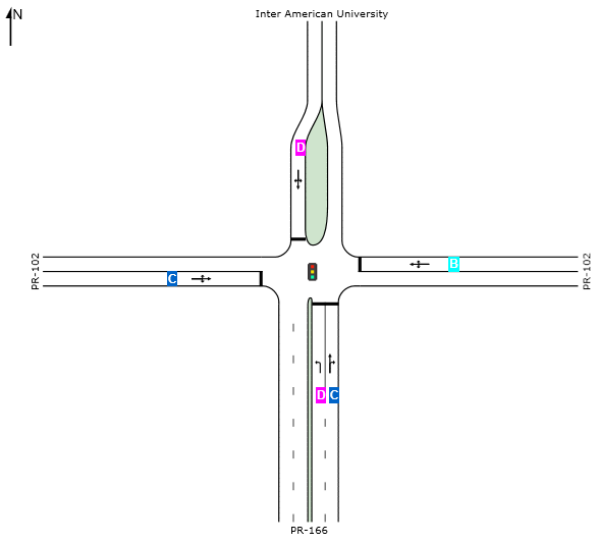
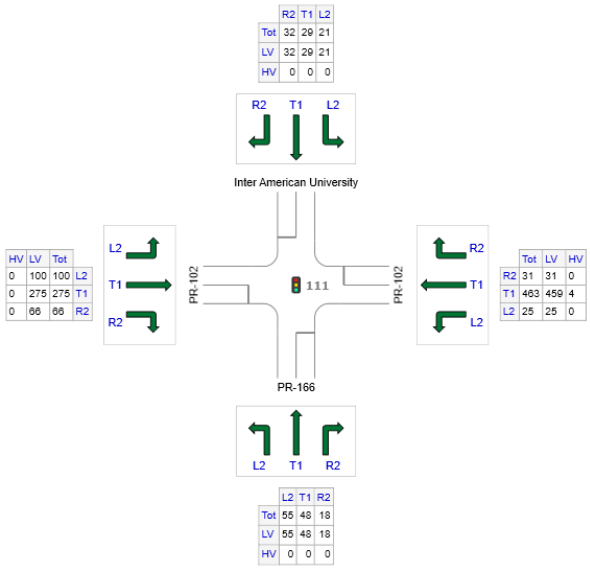
| Intersection 111 | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
|  | | | | | | |  | | | | | | | | |
| Peak Hour | PM | | | | | | | | | | | |
| Approach | S | | | E | | | N | | | W | | |
| Movement | L | T | R | L | T | R | L | T | R | L | T | R |
| Degree of Saturation (v/C Ratio) | 0.30 | 0.40 | 0.40 | 0.65 | 0.65 | 0.65 | 0.67 | 0.67 | 0.67 | 0.76 | 0.76 | 0.76 |
| Approach Control Delay (sec/veh) | 34.5 | | | 18.5 | | | 42.4 | | | 28.7 | | |
| Approach LOS | C | | | B | | | D | | | C | | |
| Intersection Control Delay (sec/veh) | 26.6 | | | | | | | | | | | |
| Intersection LOS | C | | | | | | | | | | | |

**Table 25** presents the summary of results for the operations of the 6 intersections evaluated in this study.

**Table 25. Summary of Results - Existing Conditions**

| Intersection | AM Peak Hour | | PM Peak Hour | |
|---|---|---|---|---|
| | Delay (sec/veh) | LOS | Delay (sec/veh) | LOS |
| **101** | 41.3 | D | 47.9 | D |
| **102** | 10.9 | B | 10.2 | B |
| **104** | 7.3 | A | 8.8 | A |
| **109** | **152.6** | **F** | **84.1** | **F** |
| **110** | **91.4** | **F** | **140.2** | **E** |
| **111** | **64.3** | **E** | 26.6 | C |

The results of the existing condition show that for the morning and afternoon peak hours the intersections 101, 102 and 104 are operating at an acceptable condition. An improvement to the operation condition is expected at intersection 110, after the completion of the PR-122 extension, since part of the traffic at this intersection will be flowing through the proposed project. Intersections 109 and 111 are operating below the acceptable condition and requires additional improvements which are outside the scope of the project.

# CHAPTER 3 :FUTURE CONDITION – PROPOSED PR-122 EXTENSION

## 3.1 PROPOSED PROJECT DESCRIPTION

The proposed action consists of extending the existing Highway PR-122 from its current intersection with highway PR-321 in Lajas until its intersection with the east end of highway PR-166 (South detour of San Germán), known as Castro Pérez Avenue. **Figure 21** shows the proposed PR-122 extension alignment. Continuing with the planning process conceptualized in 2003, this project intends to provide a road with greater capacity and better alignment to provide a fast and safe route to the current and future traffic volume. Completing this section of PR-122 to Lajas would have the effect of facilitating and improving the transport of goods, people and services between the town of Lajas and the PR-2 highway, thus fulfilling one of the main objectives of the project.

The proposed project is located within the Western Region of Puerto Rico; specifically, between the towns of San Germán and Lajas. The alignment runs mostly parallel to Highway PR-101 and approximately one (1) kilometer (km) east of it, with a total length of 2.2 km and a minimum easement width of 33.5 meters (m.). The alignment passes through El Retiro Community and an unnamed stream in San Germán and continues towards Lajas, crossing over Highway PR-321 at km 1.0.

For the purpose of this study, the existing intersection 104 (PR-122 with PR-321) will be divided in two proposed intersections, the west intersection (104-A) and east intersection (104-B). The proposed intersection 104-A is formed by the southbound ramp of the proposed PR-122 alignment; similarly, the proposed intersection 104-B is formed by the northbound ramp of the proposed PR-122 alignment. In addition, the intersection of the proposed PR-122 alignment with the existing PR-122 and PR-166 intersection will be addressed as intersection 107, see **Figure 21. Table 26** includes the geometric description of the proposed intersections.

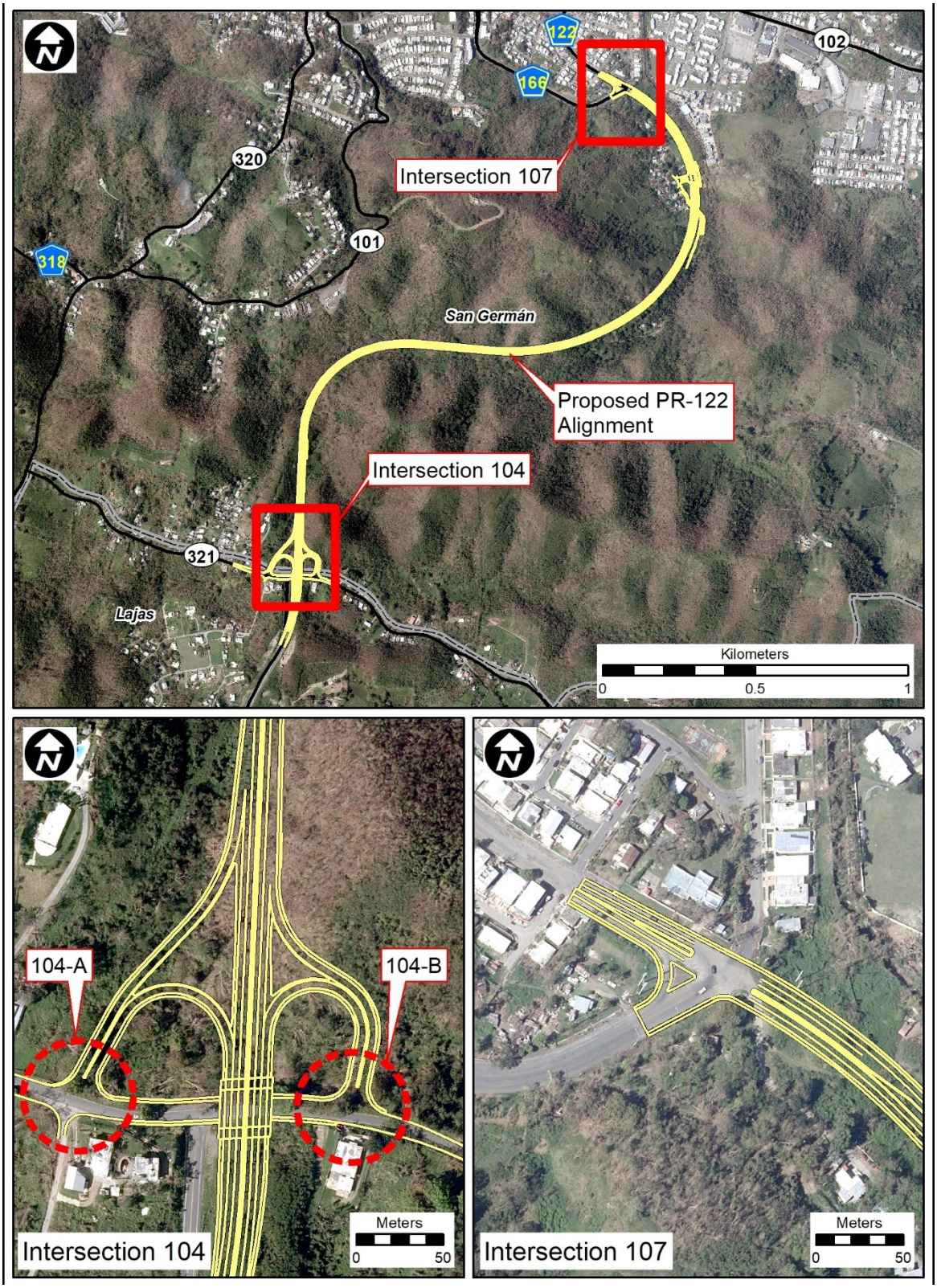
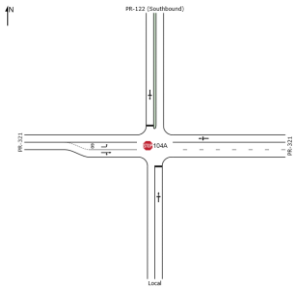
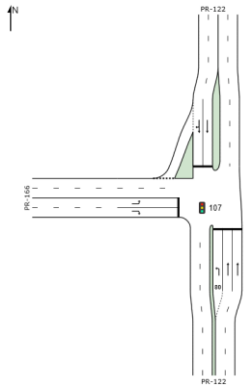



**Figure 21: Proposed PR-122 Extension Alignment**

### Table 26: Geometric Description of Proposed Intersections

| Intersection | Leg | Lanes | Lane Width (m) | Approach Grade | Schematic |
|---|---|---|---|---|---|
| 104-A | North | 1 lane per direction | 3.65 | -5.0% |  |
| | East | 1 approach lane; 2 exit lanes | 3.65 | 2.0% | |
| | South | 1 lane per direction | 3.60 | 2.0% | |
| | West | 1 full-length approach lane;1 short lane approach 60 m long; 1 exit lane | 3.65 | -2.0% | |
| 104-B | North | 1 lane per direction | 3.65 | -5.0% |  |
| | East | 1 lane per direction | 3.65 | 2.0% | |
| | West | 2 approach lanes; 1 exit lane | 3.65 | -2.0% | |
| 107 | North | 2 lanes per direction, bypass at the western exit lane | 3.65 | 1.0% |  |
| | South | 2 full-length approach lanes;1 short lane approach 80 m long; 2 exit lanes | 3.65 | 1.0% | |
| | West | 2 lanes per direction | 3.65 | 1.0% | |

The extension of Highway PR-122 from San Germán to Lajas will be designed to meet the requirements of an R-5 road according to the Design Manual of the PRHTA. It will have a typical section similar to the one used in the extension of Castro Pérez Avenue in San Germán, that is, four (4) lanes of 3.65 m wide each, and will be divided by a concrete barrier or by a central island, depending on the corresponding section, as illustrated in **Figure 22**. In both cases, a safety strip will be left on each side of the central protection to comply with the minimum design standards established in the applicable local and federal standards. The slopes of the cut and fill slopes will

comply with the recommendations of the geotechnical report based on the results of soil investigations. It will also comply with other standards and other design requirements related to drainage and erosion control.

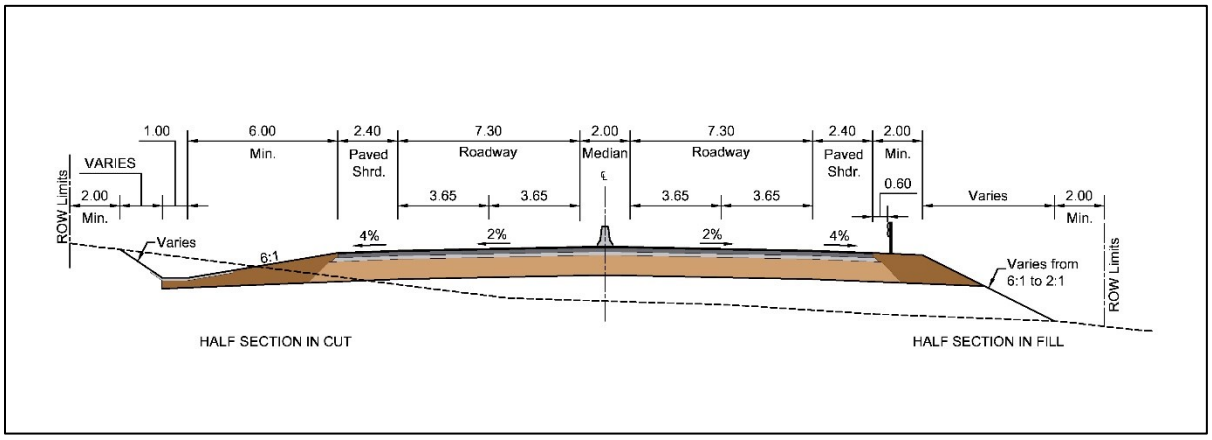



**Figure 22: Proposed PR-122 Extension Typical Section**

## 3.2 PROJECTION FACTORS

The projection factors used in this study were provided by the Puerto Rico Highway and Transportation Authority. The projection factors were developed using the ACT methodology based on the annual average daily historical traffic of the permanent stations that are found across the island and the projection of population and vehicles registered. These projection factors are calculated for each road classification, such as Interstate, minor arteries and major arteries. **Table** 27 presents the projection factors as calculated for each road segment to be evaluated.

**Table 27: Projection Factors, 10 and 20 Years**

| Intersection | Road | Area | Functional Classification | Projection Factor | |
|---|---|---|---|---|---|
| | | | | 10 Year | 20 Year |
| 101 | PR-116 | Rural | Principal Arterial | 1.2 | 1.4 |
| | PR-315 | Rural | Collector | 1.1 | 1.21 |
| 102 | PR-116 | Rural | Principal Arterial | 1.2 | 1.4 |
| | PR-122 | Rural | Principal Arterial | 1.2 | 1.4 |
| 104 | PR-122 | Rural | Principal Arterial | 1.2 | 1.4 |
| | PR-321 | Rural | Collector | 1.1 | 1.21 |
| 109 | PR-122 | Rural | Principal Arterial | 1.2 | 1.4 |
| | PR-102 | Rural | Minor Arterial | 1.14 | 1.27 |
| 110 | PR-166 | Rural | Minor Arterial | 1.14 | 1.27 |
| | PR-101 | Rural | Collector | 1.1 | 1.21 |
| 111 | PR-166 | Rural | Minor Arterial | 1.14 | 1.27 |
| | PR-102 | Rural | Minor Arterial | 1.14 | 1.27 |

## 3.3 FUTURE VOLUMES

Based on the aforementioned projection factors, the peak hour flows obtained from the counting stations used for this study were be projected for the two future year conditions. The traffic count data were used to determine the future vehicular traffic for a period of 20 years. The projected vehicular annual growth rate was estimated with the formula provided by the Traffic Collection and Analysis Office from the PRHTA.

$$F = P\,(1 + i)^n$$

Where:

F = Projected Traffic

P = Present Traffic

*i* = Annual growth rate

*n* = number of years

## 3.4 TRAFFIC ANALYSIS FOR PROPOSED CONDITIONS

The peak hour projected traffic was redistributed to incorporate the proposed PR-122 extension. The distribution was based on an origin-destination analysis performed from the traffic counts, movements volumes at each intersection approach, and projection factors. **Figure 23** shows the zones, nodes and links used to develop the projected origin-destination matrixes. The proposed condition 12-hour projected traffic for each zone are included in **Table 28** to **Table 30**.

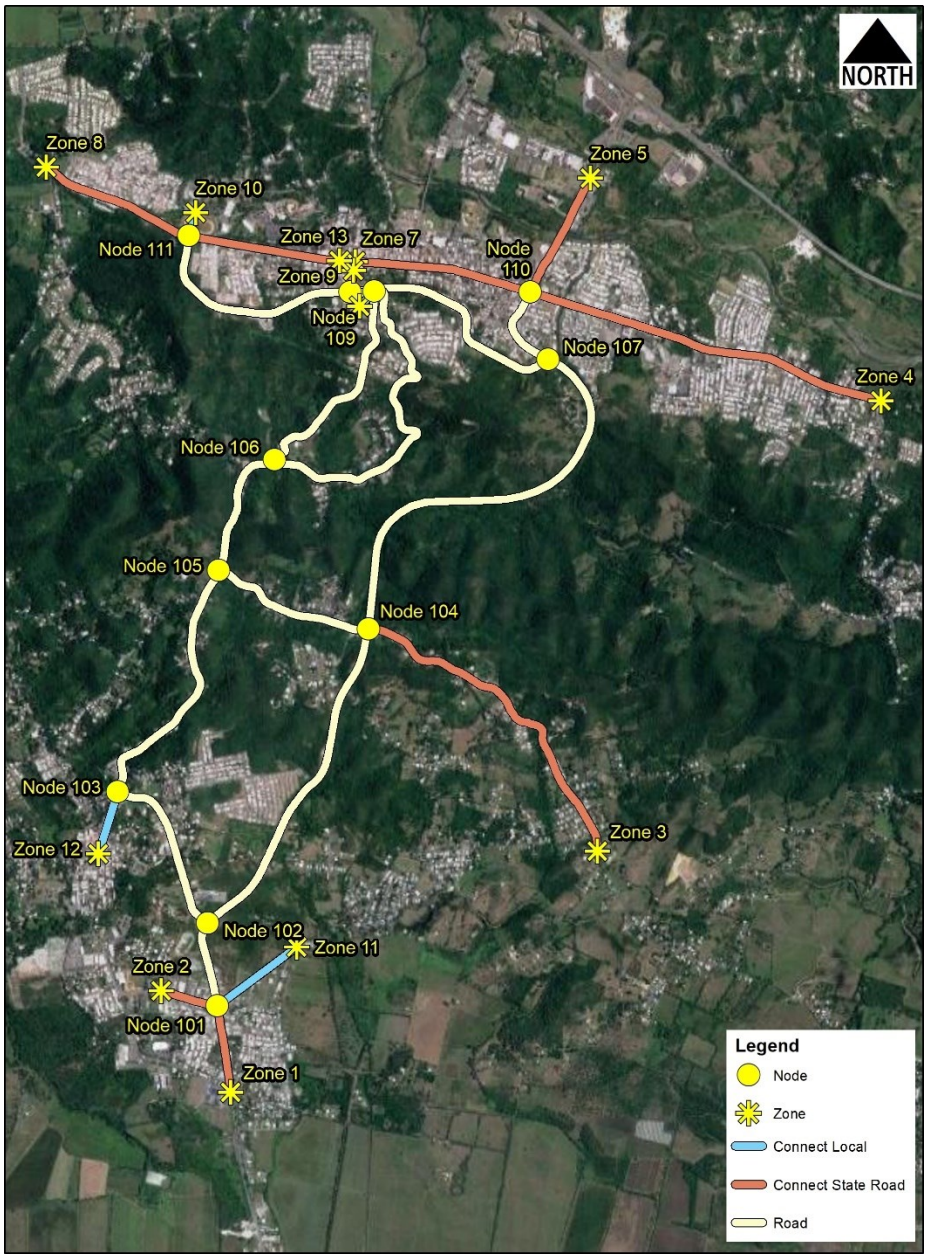



**Figure 23: Proposed Condition Origin-Destination Map**

## Table 28: Projected Traffic Origin - Destination Matrix for Opening Year (2028)

| 12-Hour Projected Traffic (veh) | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Zone** | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** | **13** |
| **1** | | 1431 | 61 | 31 | 82 | 17 | 32 | 91 | 612 | 46 | 1106 | 1398 | 33 |
| **2** | 1558 | | 19 | 10 | 26 | 5 | 10 | 29 | 193 | 14 | 1867 | 440 | 10 |
| **3** | 76 | 26 | | 18 | 47 | 10 | 18 | 52 | 349 | 26 | 27 | 30 | 19 |
| **4** | 16 | 5 | 15 | | 2662 | 2 | 2946 | 57 | 50 | 29 | 6 | 3 | 0 |
| **5** | 204 | 69 | 196 | 2111 | | 27 | 2840 | 750 | 660 | 375 | 73 | 37 | 0 |
| **6** | 173 | 59 | 166 | 16 | 43 | | 17 | 48 | 321 | 24 | 62 | 69 | 17 |
| **7** | 27 | 9 | 26 | 2331 | 1869 | 3 | | 100 | 0 | 0 | 0 | 5 | 0 |
| **8** | 60 | 20 | 57 | 91 | 241 | 9 | 0 | | 152 | 889 | 21 | 24 | 4168 |
| **9** | 438 | 149 | 422 | 54 | 143 | 63 | 0 | 127 | | 64 | 157 | 175 | 0 |
| **10** | 13 | 5 | 13 | 21 | 55 | 3 | 0 | 668 | 34 | | 5 | 24 | 304 |
| **11** | 1081 | 2112 | 28 | 14 | 38 | 8 | 15 | 43 | 286 | 21 | | 653 | 15 |
| **12** | 1580 | 538 | 45 | 23 | 60 | 13 | 23 | 67 | 450 | 33 | 567 | | 24 |
| **13** | 12 | 4 | 12 | 0 | 0 | 2 | 0 | 3882 | 0 | 292 | 4 | 5 | |

## Table 29: Projected Traffic Origin - Destination Matrix for 10 Years from Opening Year (2038) Horizon

| 12-Hour Projected Traffic (veh) | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Zone** | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** | **13** |
| **1** | | 1612 | 68 | 35 | 92 | 19 | 36 | 103 | 690 | 51 | 1246 | 1575 | 37 |
| **2** | 1738 | | 21 | 11 | 29 | 6 | 11 | 32 | 215 | 16 | 2083 | 491 | 12 |
| **3** | 85 | 29 | | 20 | 52 | 11 | 20 | 58 | 389 | 29 | 30 | 34 | 21 |
| **4** | 17 | 6 | 17 | | 2982 | 2 | 3300 | 64 | 56 | 32 | 6 | 3 | 0 |
| **5** | 230 | 78 | 221 | 2378 | | 30 | 3200 | 845 | 744 | 422 | 82 | 42 | 0 |
| **6** | 194 | 66 | 187 | 17 | 46 | | 18 | 52 | 347 | 26 | 70 | 77 | 19 |
| **7** | 30 | 10 | 29 | 2611 | 2093 | 3 | | 112 | 0 | 0 | 0 | 6 | 0 |
| **8** | 67 | 23 | 64 | 102 | 270 | 10 | 0 | | 170 | 996 | 24 | 27 | 4668 |
| **9** | 489 | 166 | 470 | 60 | 160 | 69 | 0 | 142 | | 71 | 175 | 195 | 0 |
| **10** | 15 | 5 | 15 | 23 | 61 | 3 | 0 | 748 | 39 | | 5 | 27 | 340 |
| **11** | 1206 | 2356 | 32 | 16 | 43 | 9 | 17 | 48 | 319 | 24 | | 729 | 17 |
| **12** | 1780 | 606 | 50 | 25 | 68 | 14 | 26 | 76 | 507 | 38 | 639 | | 27 |
| **13** | 14 | 5 | 13 | 0 | 0 | 2 | 0 | 4348 | 0 | 327 | 5 | 5 | |

### Table 30: Projected Traffic Origin - Destination Matrix for the 20 Years from Opening Year (2048) Horizon

| 12-Hour Projected Traffic (veh) | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Zone** | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** | **13** |
| **1** | | 1890 | 80 | 41 | 108 | 22 | 42 | 121 | 809 | 60 | 1461 | 1847 | 43 |
| **2** | 1982 | | 24 | 12 | 33 | 7 | 13 | 37 | 245 | 18 | 2375 | 560 | 13 |
| **3** | 97 | 33 | | 22 | 59 | 12 | 23 | 66 | 444 | 33 | 35 | 39 | 24 |
| **4** | 20 | 7 | 19 | | 3426 | 3 | 3792 | 74 | 65 | 37 | 7 | 4 | 0 |
| **5** | 269 | 92 | 259 | 2788 | | 36 | 3750 | 990 | 872 | 494 | 97 | 49 | 0 |
| **6** | 223 | 76 | 215 | 18 | 48 | | 19 | 54 | 360 | 27 | 80 | 89 | 19 |
| **7** | 35 | 12 | 34 | 3000 | 2406 | 4 | | 128 | 0 | 0 | 0 | 6 | 0 |
| **8** | 77 | 26 | 74 | 117 | 310 | 11 | 0 | | 196 | 1144 | 27 | 31 | 5365 |
| **9** | 557 | 190 | 537 | 69 | 183 | 79 | 0 | 162 | | 81 | 200 | 222 | 0 |
| **10** | 17 | 6 | 17 | 26 | 70 | 4 | 0 | 860 | 44 | | 6 | 31 | 391 |
| **11** | 1375 | 2686 | 36 | 18 | 49 | 10 | 19 | 54 | 364 | 27 | | 831 | 20 |
| **12** | 2087 | 711 | 59 | 30 | 79 | 16 | 31 | 89 | 594 | 44 | 748 | | 32 |
| **13** | 16 | 5 | 15 | 0 | 0 | 2 | 0 | 4997 | 0 | 376 | 6 | 6 | |

The projected traffic horizons for the opening year (2028), 10 years from opening (2038) and 10 years from opening (2048) are included in **Table 31** to **Table 33**. These tables include the peak hour projected traffic for each approach and movement for the proposed intersections.

## Table 31: Proposed Condition: Peak Hour Projected Traffic for Opening Year (2028)

| Intersection | Approach | Movement | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | AM Peak Hour | | | | | | PM Peak Hour | | | | | |
| | | Left | | Through | | Right | | Left | | Through | | Right | |
| | | LV | HV | LV | HV | LV | HV | LV | HV | LV | HV | LV | HV |
| 104-A | N | 56 | 1 | 4 | 0 | 48 | 1 | 132 | 3 | 4 | 0 | 35 | 0 |
| | E | 4 | 0 | 18 | 0 | 20 | 0 | 4 | 0 | 16 | 0 | 6 | 0 |
| | S | 4 | 0 | 4 | 0 | 4 | 0 | 4 | 0 | 4 | 0 | 4 | 0 |
| | W | 85 | 1 | 47 | 0 | 4 | 0 | 83 | 1 | 91 | 0 | 4 | 0 |
| 104-B | N | 8 | 0 | | | 8 | 0 | 14 | 0 | | | 11 | 0 |
| | E | | | 30 | 0 | 86 | 2 | | | 11 | 0 | 35 | 0 |
| | W | 13 | 0 | 90 | 1 | | | 21 | 0 | 202 | 3 | | |
| 107 | N | | | 29 | 0 | 220 | 4 | | | 51 | 0 | 335 | 6 |
| | S | 263 | 6 | 60 | 0 | | | 196 | 4 | 69 | 0 | | |
| | W | 130 | 3 | | | 257 | 5 | | | 140 | 3 | 288 | 6 |

## Table 32: Proposed Condition: Peak Hour Projected Traffic for the 10 Years from Opening Year (2038) Horizon

| Intersection | Approach | Movement | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | AM Peak Hour | | | | | | PM Peak Hour | | | | | |
| | | Left | | Through | | Right | | Left | | Through | | Right | |
| | | LV | HV | LV | HV | LV | HV | LV | HV | LV | HV | LV | HV |
| 104-A | N | 63 | 1 | 4 | 0 | 56 | 1 | 151 | 3 | 4 | 0 | 41 | 0 |
| | E | 4 | 0 | 21 | 0 | 24 | 0 | 4 | 0 | 18 | 0 | 6 | 0 |
| | S | 4 | 0 | 4 | 0 | 4 | 0 | 4 | 0 | 4 | 0 | 4 | 0 |
| | W | 96 | 2 | 60 | 0 | 4 | 0 | 92 | 1 | 102 | 1 | 4 | 0 |
| 104-B | N | 9 | 0 | | | 9 | 0 | 18 | 0 | | | 13 | 0 |
| | E | | | 36 | 0 | 99 | 2 | | | 11 | 0 | 39 | 0 |
| | W | 10 | 0 | 100 | 1 | | | 24 | 0 | 229 | 4 | | |
| 107 | N | | | 34 | 0 | 230 | 4 | | | 54 | 0 | 353 | 8 |
| | S | 280 | 6 | 58 | 0 | | | 209 | 4 | 72 | 1 | | |
| | W | 143 | 3 | | | 277 | 6 | | | 152 | 4 | 300 | 7 |

**Table 33: Proposed Condition: Peak Hour Projected Traffic for the 20 Years from Opening Year (2048) Horizon**

| Intersection | Approach | Movement | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | AM Peak Hour | | | | | | PM Peak Hour | | | | | |
| | | Left | | Through | | Right | | Left | | Through | | Right | |
| | | LV | HV | LV | HV | LV | HV | LV | HV | LV | HV | LV | HV |
| 104-A | N | 72 | 1 | 4 | 0 | 65 | 1 | 173 | 3 | 4 | 0 | 44 | 0 |
| | E | 4 | 0 | 23 | 0 | 26 | 0 | 4 | 0 | 21 | 0 | 13 | 0 |
| | S | 4 | 0 | 4 | 0 | 4 | 0 | 4 | 0 | 4 | 0 | 4 | 0 |
| | W | 108 | 2 | 59 | 1 | 4 | 0 | 103 | 3 | 116 | 1 | 4 | 0 |
| 104-B | N | 10 | 0 | | | 9 | 0 | 22 | 0 | | | 15 | 0 |
| | E | | | 40 | 0 | 115 | 3 | | | 19 | 0 | 50 | 0 |
| | W | 16 | 0 | 113 | 2 | | | 27 | 0 | 262 | 4 | | |
| 107 | N | | | 42 | 0 | 271 | 5 | | | 63 | 0 | 411 | 9 |
| | S | 318 | 7 | 70 | 1 | | | 245 | 4 | 85 | 1 | | |
| | W | 165 | 3 | | | 316 | 6 | | | 174 | 4 | 341 | 7 |

## 3.5 SIGNAL WARRANT ANALYSIS

In order to perform the operational analysis of the proposed intersections, it was necessary to perform a traffic signal warrant analysis. This analysis was performed according to the Manual of Uniform Traffic Control Devices (MUTCD). A traffic signal is warranted if one or more of the following nine warrants are satisfied:

- **Warrant 1: Eight-Hour Vehicular Volume**
  - **Condition A**: Applied at locations where a large volume of intersecting traffic is the principal reason to consider installing a traffic control signal.
  - **Condition B:** Applied at locations where condition A is not satisfied and the minor road traffic experiences high delays and conflict in entering or crossing the major road.

  For each of any eight hours of an average day the total volume in vehicles per hour (vph) of the major road and the higher volume (vph) of the two approaches of the minor road should exceed the minimum threshold traffic volumes defined in the MUTCD. The thresholds are shown in **Appendix C**. Where the posted speed limit exceeds 40 mph, or the intersection lies

in a community of a population of less than 10,000 people, the traffic volumes thresholds are decreased to address such areas.

- **Warrant 2: Four-Hour Vehicular Volume**

  This warrant is applied where the volume of intersecting traffic is the main reason to consider installing a traffic control signal. The volume of at least four hours should exceed the minimum threshold outlined in the MUTCD to justify this warrant. The thresholds are also decreased to address where the posted speed limit exceeds 40 mph, or the intersection lies in a community of a population of less than 10,000 people.

- **Warrant 3: Peak Hour**

  This warrant is applied where traffic conditions are such that for at least one hour the minor road traffic suffers undue delay. The point representing the vehicles per hour on the major street (total of both approaches) and the corresponding vehicles per hour on the higher-volume minor-street approach (one direction only) for one hour (any four consecutive 15-minute periods) of an average day falls above the applicable MUTCD defined thresholds.

- **Warrant 4: Pedestrian Volume**

  The Pedestrian Volume signal warrant is intended for application where the traffic volume on a major street is so heavy that pedestrians experience excessive delay in crossing the major street. Bicyclists using pedestrian crossings may be counted as pedestrians.

  The need for a traffic control signal at an intersection or midblock crossing would be considered if:

  - For each of any 4 hours of an average day, the plotted points representing the vehicles per hour on the major street (total of both approaches) and the corresponding pedestrians per hour crossing the major street (total of all crossings) all fall above the applicable MUTCD defined curve, or
  - For 1 hour (any four consecutive 15-minute periods) of an average day, the plotted point representing the vehicles per hour on the major street (total of both approaches) and the corresponding pedestrians per hour crossing the major street (total of all crossings) falls above the curve the applicable MUTCD defined curve.

- **Warrant 5: School Crossing**

The School Crossing signal warrant is intended for application where the principal reason to consider installing a traffic control signal is schoolchildren cross the major street.

The need for a traffic control signal would be considered if the number of adequate gaps in the vehicular traffic stream during the period when children are using an established school crossing is less than the number of minutes in the same period and there are a minimum of 20 students during the highest crossing hour.

- **Warrant 6: Coordinated Signal System**

  A signal is warranted to maintain proper platooning through a coordinated signal system. A traffic control signal would be considered if the adjacent traffic control signals do not provide the necessary degree of platooning and the proposed and adjacent signal will collectively provide a progressive operation.

  This warrant should not be applied where the resultant spacing of traffic control signals would be less than 1,000 feet.

- **Warrant 7: Crash Experience**

  The Crash Experience signal warrant conditions are intended for application where the severity and frequency of crashes are the principal reasons to consider installing a traffic control signal.

  A signal is warranted if following three criteria are met:

  **A.** Adequate trial of alternatives with satisfactory observance and enforcement has failed to reduce the crash frequency; and

  **B.** Five or more reported crashes, of types susceptible to correction by a traffic control signal, have occurred within a 12-month period; and

  **C.** For each of any eight hours of an average day, the traffic volume (vph) given in both of the 80 percent columns of warrant 1 Condition A or Condition B must be met as defined in the MUTCD.

- **Warrant 8: Roadway Network**

  A traffic control signal might be justified to encourage concentration and organization of traffic flow on a roadway network.

A traffic control signal would be considered if the common intersection of two or more major routes has an existing entering traffic volume and 5-year projected traffic volumes that would exceed the minimum threshold volumes defined by the MUTCD.

- **Warrant 9: Intersection Near a Grade Crossing**

  The Intersection Near a Grade Crossing signal warrant is intended for use at a location where none of the conditions described in the other eight traffic signal warrants are met, but the proximity to the intersection of a grade crossing on an intersection approach controlled by a STOP or YIELD sign is the principal reason to consider installing a traffic control signal.

For this signal warrant analysis only the intersections that are physically affected by the proposed project were evaluated, i.e. intersection 104 (104-A and 104-B) and intersection 107.

The analyses of Warrants 1, 2 and 3 are based on the 2042 projected traffic. Error! Reference source not found. shows the projected traffic volumes used for the signal warrant analysis.

For intersection 104 warrants 4 and 5 are not applicable since the intersection is not close to a school or any pedestrian traffic generator. The distance to the nearest traffic controlled intersection on both sides of the intersections were taken into consideration for warrants 6 and 8. The analysis of warrant 7 was not possible since no crash data was available at the time of this study.

For intersection 107, it was not possible to properly evaluate warrant 4 because pedestrian volumes are unknown. Warrant 5 is not applicable since the intersection is not close to a school. The distance to the nearest traffic-controlled intersection on both sides of the intersections were taken into consideration for warrants 6 and 8. The analysis of warrant 7 was not possible since no crash data was available at the time of this study.

Warrant 9 is not applicable since none of the evaluated intersections is near a railroad grade crossing.

The traffic signal warrant analysis was performed using the Highway Capacity Software (HCS2010) Warrants Version 6.60 module developed by McTrans Center, University of Florida. The input data and results from HCS2010 are included in **Appendix C**. **Table 34** shows a summary of the warrants that were satisfied of each of the evaluated intersections.

**Table 34: Summary of Signal Warrants Satisfied**

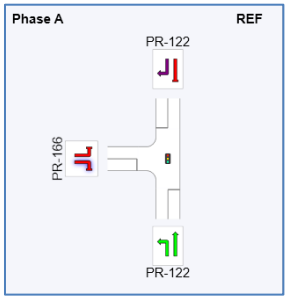
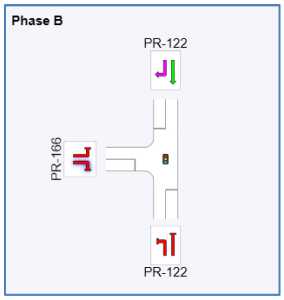
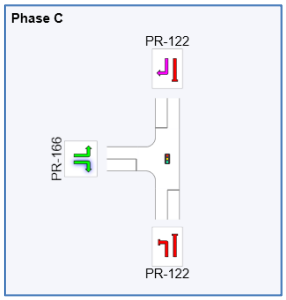
| Warrant | Warrants Satisfied? | | |
|---|---|---|---|
| | 104-A | 104-B | 107 |
| 1 | No | No | No |
| 2 | No | No | Yes |
| 3 | No | No | No |
| 4 | No | No | No |
| 5 | No | No | No |
| 6 | No | No | No |
| 7 | No | No | Yes |
| 8 | No | No | No |
| 9 | No | No | No |

Based on signal warrants analysis performed, the intersections 104-A and 104-B do not warrant a traffic signal. For intersections 104-A and 104-B none of the nine signal warrants were satisfied by the projected traffic data. However, for intersection 107, the warrants 2 and 7 were satisfied. Therefore intersection 107 warrants a traffic signal.

## 3.6 PHASE TIME

The optimum cycle time for the studied signalized intersections was evaluated for the proposed future condition. The summary for the 2048 proposed cycle time is shown in **Table 35.** For all phases, the Yellow Time = 3 s and All-Red Time = 1 s.

### Table 35: Cycle Time for the Proposed Intersection 107

| Phase | Phase Change Time (sec) | Green Time (sec) | Phase Time (sec) | Diagram |
|---|---|---|---|---|
| Phase A | 0 | 22 | 26 |  |
| Phase B | 26 | 10 | 40 |  |
| Phase C | 40 | 20 | 64 |  |

## 3.7 TRAVEL TIME

Travel time studies and delays were carried out on two routes that work as access routes from Lajas to San Germán and one route that works as access route from Lajas to San Germán. Map for the studied routes is illustrated in **Figure 24**. Further discussion of the findings is included later in this report.

- **Route A (Lajas to San Germán)** - starts at the intersection of PR-122 with PR-321; takes PR-321 (westward) to its intersection with PR-320; takes PR-320 (northward) to its intersection with Del Angel Street; takes Del Angel Street (eastward) to its intersection with PR-101; takes PR-101 (northward) to its intersection with PR-166; takes PR-166 (eastward)

to its intersection with PR-122. All the route till the intersection with PR-166 is one lane per direction, then is two lanes per direction.

- **Route B (Lajas to San Germán) -** starts at the intersection of PR-122 with PR-166; takes PR-166 (westward) to its intersection with PR-101; takes PR-101 (eastward) to its intersection with PR-320; takes PR-320 (southward) to its intersection with PR-321; takes PR-321 (eastward) to its intersection with PR-122. All the route till the intersection with PR-166 is one lane per direction, then is two lanes per direction.
- **Route C (San Germán to Lajas) –** starts at the intersection of PR-122 with PR-166; takes PR-166 (westward) to its intersection with PR-101; takes PR-101 (southward) to its intersection with PR-320; takes PR-320 (southward) to its intersection with PR-321; then takes PR-321 (eastward) to its intersection with PR-122. The route along the PR-166 is two lanes per direction, then after the intersection with PR-101 is one lane per direction.
- **Proposed Route (Lajas to San Germán) -** starts at the intersection of PR-122 with PR-321; takes proposed PR-122 (northward) to the intersection with PR-166. The route is a two lanes per direction.
- **Proposed Route (San Germán to Lajas) -** starts at the intersection of PR-122 with PR-166; takes proposed PR-122 (southward) to the intersection with PR-321. The route is a two lanes per direction.

A summary of the round-trip travel times measured in field along the existing access routes and the proposed route between Lajas and San Germán are shown in **Table 36** and **Table 37,** respectively.

**Table 36: Round Trip Travel Time for Existing Routes**

| Route | Description | Total Length | | Travel Time | | Average Velocity | |
|---|---|---|---|---|---|---|---|
| | | km | Miles | Min | Sec | KMH | MPH |
| A | Lajas to San Germán | 4.700 | 2.921 | 7 | 22 | 38.281 | 23.792 |
| C | San Germán to Lajas | 5.225 | 3.247 | 8 | 51 | 35.424 | 22.016 |
| | **Total** | **9.925** | **6.168** | **16** | **13** | **36.718** | **22.819** |
| | | | | | | | |
| B | Lajas to San Germán | 5.215 | 3.241 | 8 | 16 | 37.841 | 23.524 |
| C | San Germán to Lajas | 5.225 | 3.247 | 8 | 51 | 35.424 | 22.016 |
| | **Total** | **10.440** | **6.488** | **17** | **7** | **36.597** | **22.743** |

The results for the existing condition show that the round-trip travel time from Lajas to San Germán is 16.22 min for route A-C and 17.12 min for route B-C. This represents an average travel time of 16.67 min for the round trip between Lajas and San Germán.

**Table 37: Round Trip Travel Time for Proposed the Route**

| Description | Total Length | | Average Velocity | | Travel Time | |
|---|---|---|---|---|---|---|
| | km | Miles | KMH | MPH | Min | Sec |
| **Lajas to San Germán** | 2.964 | 1.84 | 78 | 48.4 | 2 | 17 |
| **San Germán to Lajas** | 2.964 | 1.84 | 78 | 48.4 | 2 | 17 |
| **Total** | **5.928** | **3.68** | **78** | **48.4** | **4** | **34** |

For the proposed condition it is expected that the round-trip travel time will be reduced to 4.56 min, that is a reduction of 73%. The distance difference is -3.997 km compared with route A-C and -4.512 km compared with B-C.

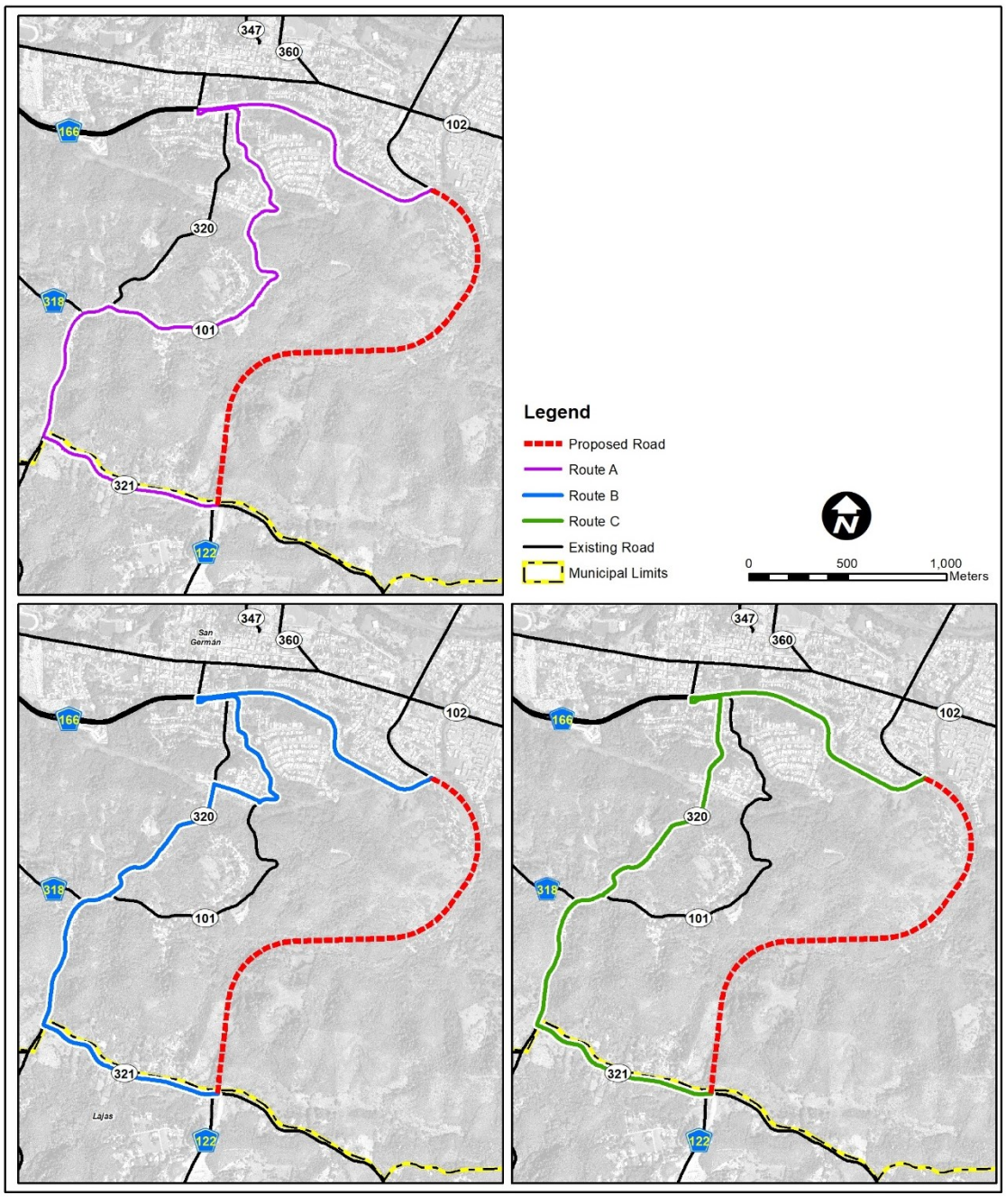


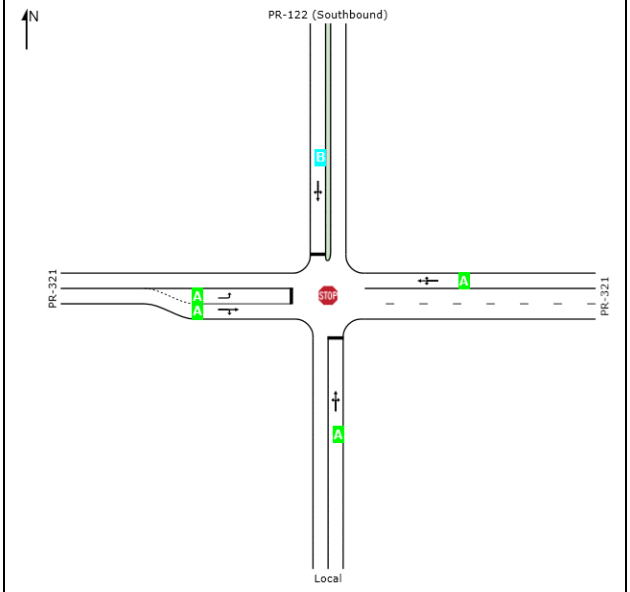

**Figure 24: Travel Time Studied Routes**

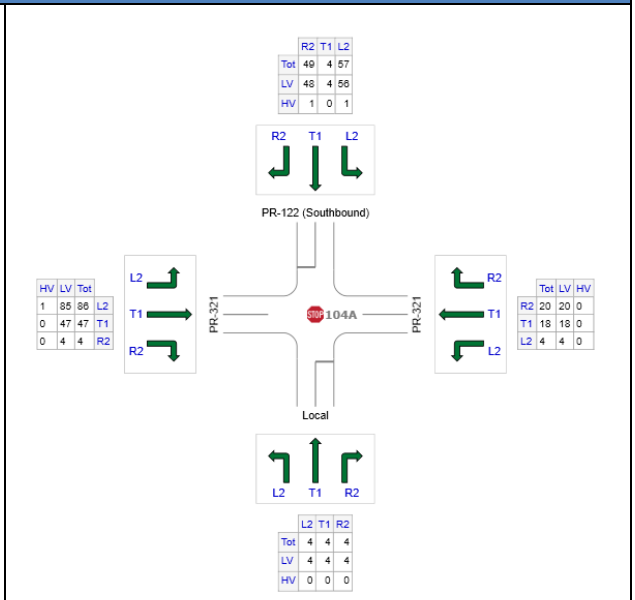
## 3.8 CAPACITY ANALYSIS–OPENING YEAR (2028)

**Table 38** to **Table 49** show the summary of results for the 2028 horizon during typical peak hours (AM and PM) for intersections 104-A, 104-B and 107. Each table presents the geometry, peak hour volume, v/C ratio of each movement, approach control delay and LOS, intersection control delay and LOS.

## Table 38. Summary of Results Intersection 104-A AM– 2028 Horizon

**Intersection 104-A**

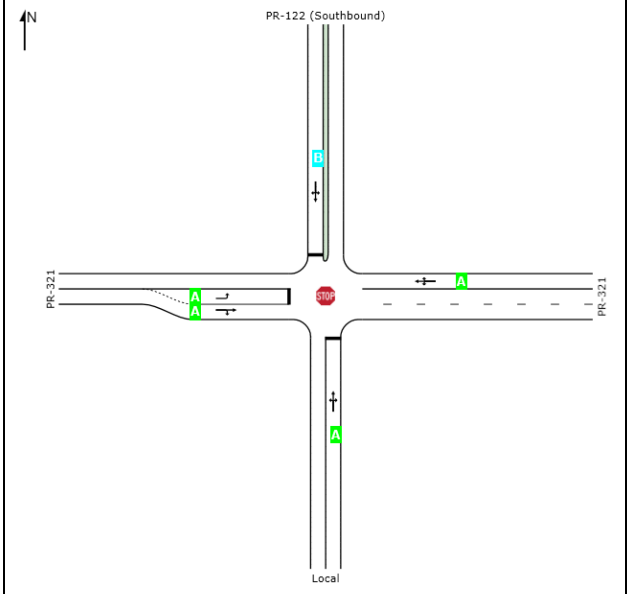


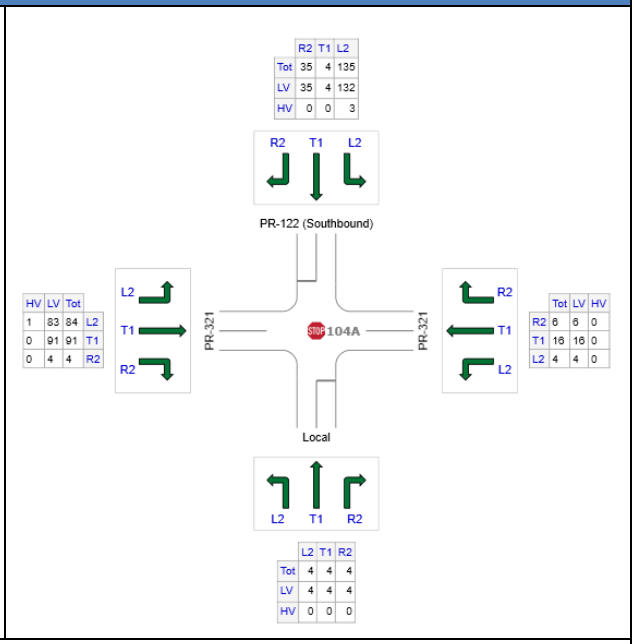




| Peak Hour | AM | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Approach | S | | | E | | | N | | | W | | |
| Movement | L | T | R | L | T | R | L | T | R | L | T | R |
| Degree of Saturation (v/C Ratio) | 0.02 | 0.02 | 0.02 | 0.04 | 0.04 | 0.04 | 0.25 | 0.25 | 0.25 | 0.15 | 0.05 | 0.05 |
| Approach Control Delay (sec/veh) | 9.3 | | | 0.7 | | | 10.6 | | | 5.5 | | |
| Approach LOS | A | | | A | | | B | | | A | | |
| Intersection Control Delay (sec/veh) | 7.0 | | | | | | | | | | | |
| Intersection LOS | A | | | | | | | | | | | |

## Table 39. Summary of Results Intersection 104-A PM– 2028 Horizon

**Intersection 104-A**

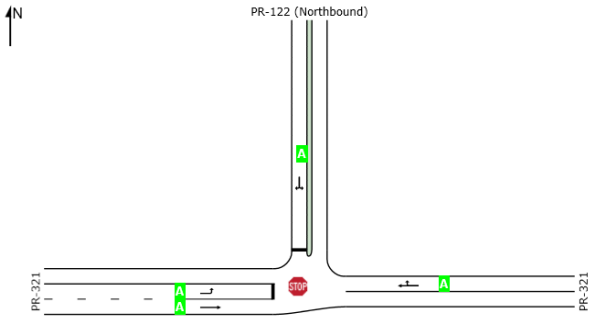


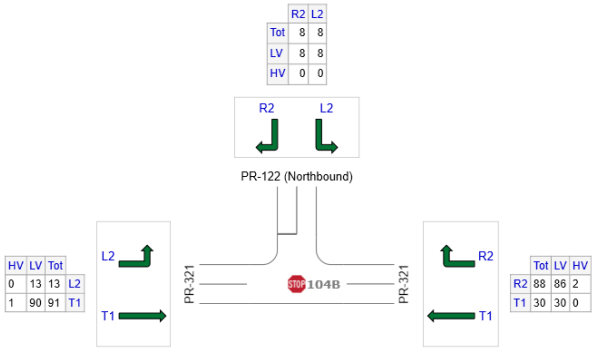




| Peak Hour | PM | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Approach | S | | | E | | | N | | | W | | |
| Movement | L | T | R | L | T | R | L | T | R | L | T | R |
| Degree of Saturation (v/C Ratio) | 0.01 | 0.01 | 0.01 | 0.02 | 0.02 | 0.02 | 0.28 | 0.28 | 0.28 | 0.13 | 0.06 | 0.06 |
| Approach Control Delay (sec/veh) | 9.2 | | | 1.0 | | | 11.0 | | | 4.6 | | |
| Approach LOS | A | | | A | | | B | | | A | | |
| Intersection Control Delay (sec/veh) | 7.4 | | | | | | | | | | | |
| Intersection LOS | A | | | | | | | | | | | |

## Table 40. Summary of Results Intersection 104-B AM– 2028 Horizon

**Intersection 104-B**

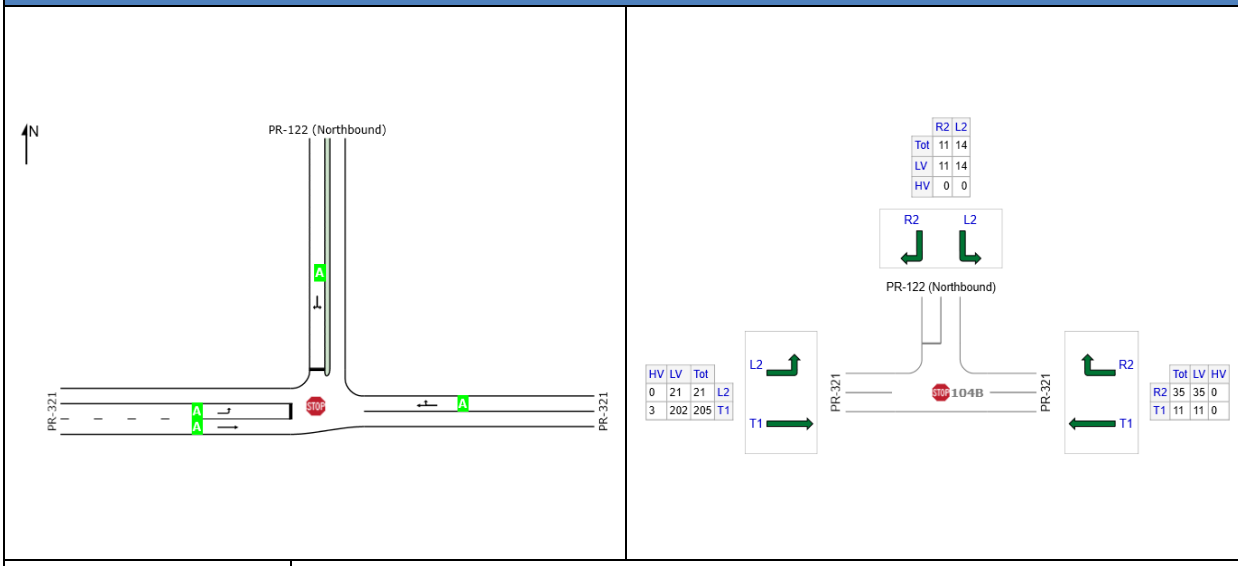



| Peak Hour | AM | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Approach | S | | | E | | | N | | | W | | |
| Movement | L | T | R | L | T | R | L | T | R | L | T | R |
| Degree of Saturation (v/C Ratio) | - | - | - | - | 0.09 | 0.09 | 0.05 | - | 0.05 | 0.02 | 0.10 | - |
| Approach Control Delay (sec/veh) | - | | | 0.0 | | | 9.3 | | | 0.8 | | |
| Approach LOS | - | | | A | | | A | | | A | | |
| Intersection Control Delay (sec/veh) | 1.3 | | | | | | | | | | | |
| Intersection LOS | A | | | | | | | | | | | |

## Table 41. Summary of Results Intersection 104-B PM– 2028 Horizon

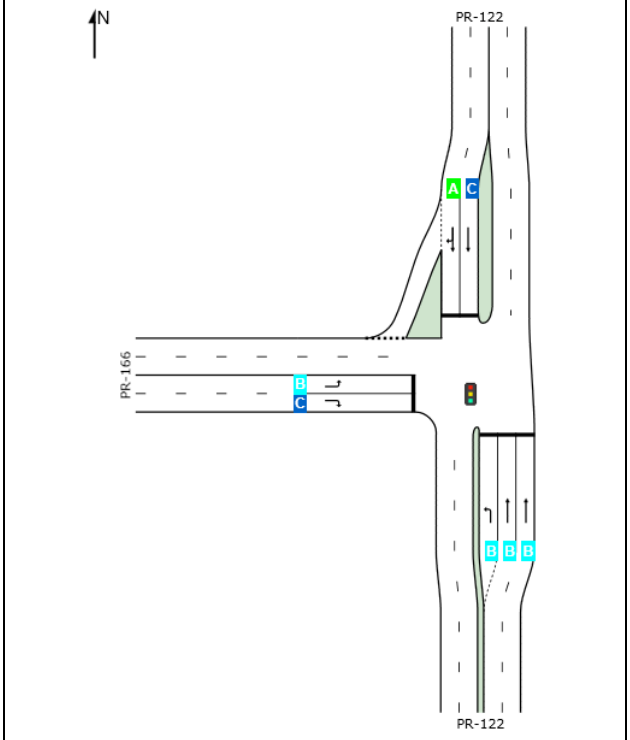
**Intersection 104-B**

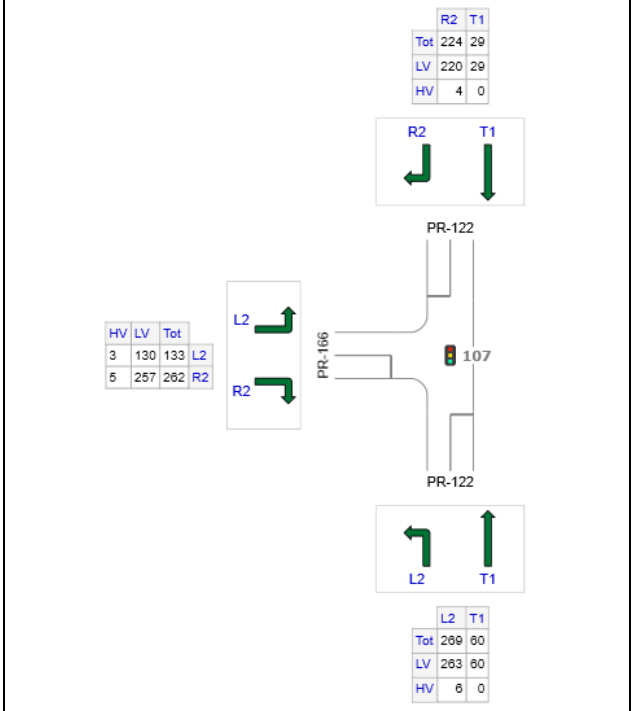



| Peak Hour | PM | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Approach | S | | | E | | | N | | | W | | |
| Movement | L | T | R | L | T | R | L | T | R | L | T | R |
| Degree of Saturation (v/C Ratio) | - | - | - | - | 0.03 | 0.03 | 0.05 | - | 0.05 | 0.04 | 0.14 | - |
| Approach Control Delay (sec/veh) | - | | | 0.0 | | | 9.6 | | | 1.1 | | |
| Approach LOS | - | | | A | | | A | | | A | | |
| Intersection Control Delay (sec/veh) | 1.9 | | | | | | | | | | | |
| Intersection LOS | A | | | | | | | | | | | |

## Table 42. Summary of Results Intersection 107 AM– 2028 Horizon

**Intersection 107**

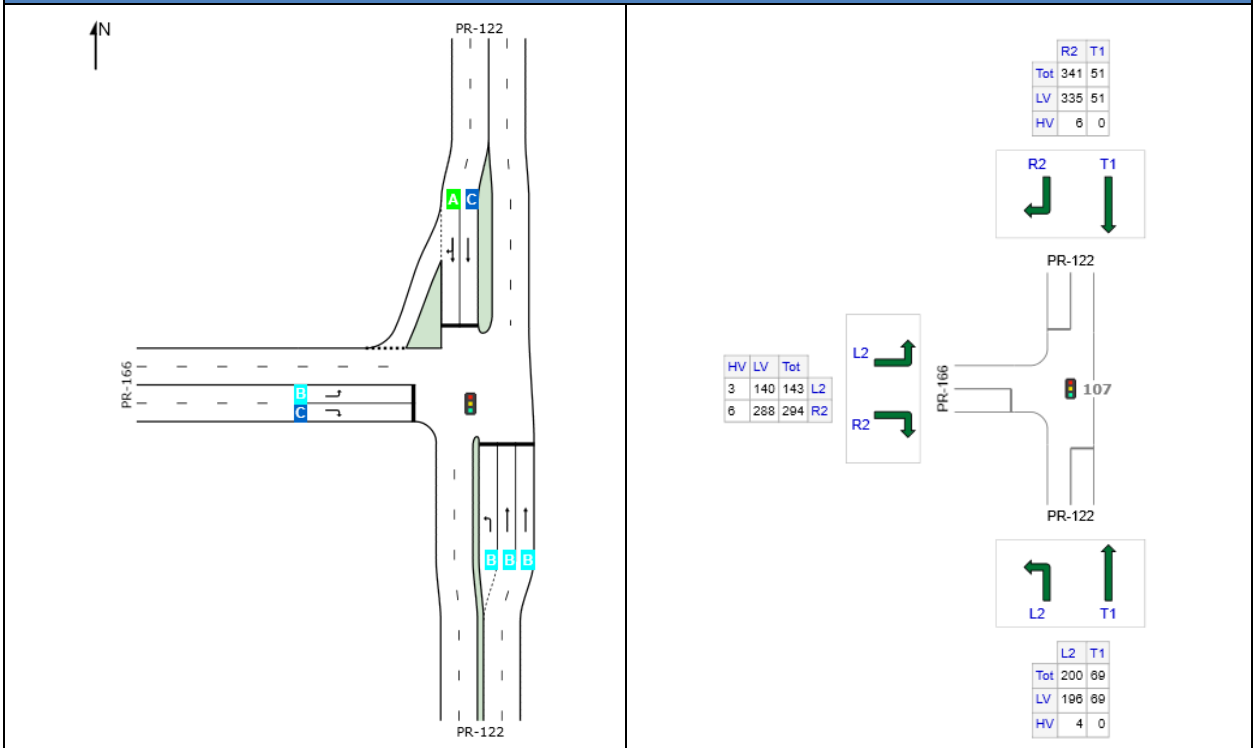



| Peak Hour | AM | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Approach | S | | | E | | | N | | | W | | |
| Movement | L | T | R | L | T | R | L | T | R | L | T | R |
| Degree of Saturation (v/C Ratio) | 0.51 | 0.07 | - | - | - | - | - | 0.16 | 0.22 | 0.36 | - | 0.70 |
| Approach Control Delay (sec/veh) | 16.6 | | | - | | | 5.9 | | | 21.2 | | |
| Approach LOS | B | | | - | | | A | | | C | | |
| Intersection Control Delay (sec/veh) | 16.0 | | | | | | | | | | | |
| Intersection LOS | B | | | | | | | | | | | |

## Table 43. Summary of Results Intersection 107 PM– 2028 Horizon

**Intersection 107**



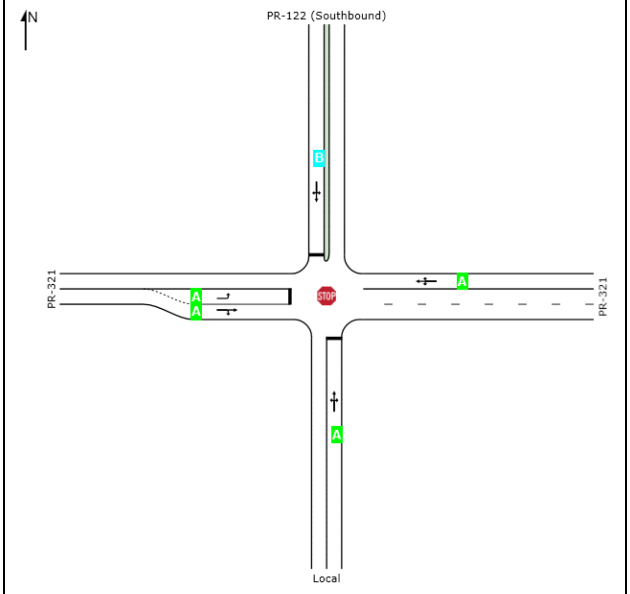

| Peak Hour | PM | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Approach | S | | | E | | | N | | | W | | |
| Movement | L | T | R | L | T | R | L | T | R | L | T | R |
| Degree of Saturation (v/C Ratio) | 0.35 | 0.06 | - | - | - | - | - | 0.26 | 0.37 | 0.50 | - | 0.75 |
| Approach Control Delay (sec/veh) | 15.4 | | | - | | | 5.8 | | | 22.8 | | |
| Approach LOS | B | | | - | | | A | | | C | | |
| Intersection Control Delay (sec/veh) | 15.1 | | | | | | | | | | | |
| Intersection LOS | B | | | | | | | | | | | |

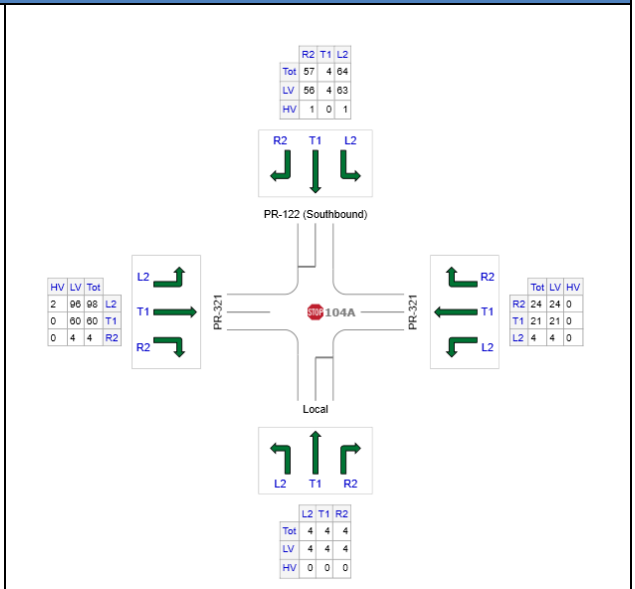
## 3.9 CAPACITY ANALYSIS – 10 YEARS FROM OPENING YEAR (2038 HORIZON)

**Table 44** to **Table 49** show the summary of results for the 2032 horizon during typical peak hours (AM and PM) for intersections 104-A, 104-B and 107. Each table presents the geometry, peak hour volume, v/C ratio of each movement, approach control delay and LOS, intersection control delay and LOS.

## Table 44. Summary of Results Intersection 104-A AM– 2038 Horizon

**Intersection 104-A**

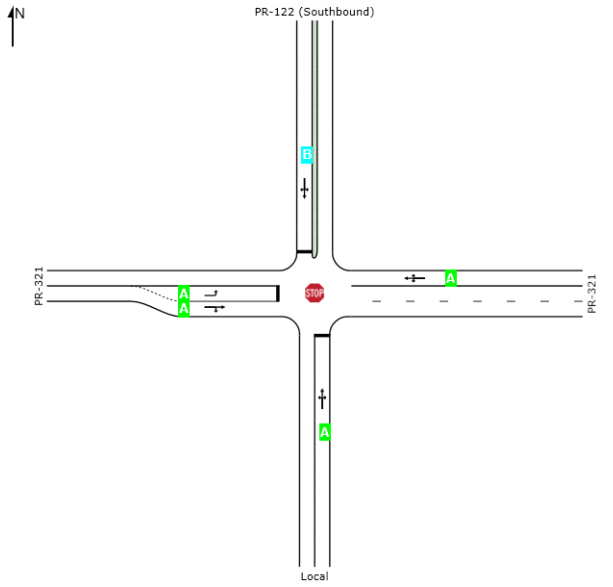


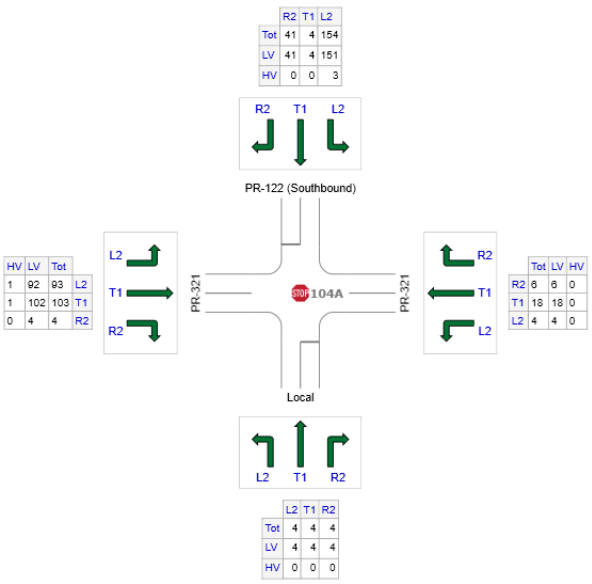




| Peak Hour | AM | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Approach | S | | | E | | | N | | | W | | |
| Movement | L | T | R | L | T | R | L | T | R | L | T | R |
| Degree of Saturation (v/C Ratio) | 0.02 | 0.02 | 0.02 | 0.05 | 0.05 | 0.05 | 0.31 | 0.31 | 0.31 | 0.17 | 0.08 | 0.08 |
| Approach Control Delay (sec/veh) | 9.7 | | | 0.7 | | | 11.4 | | | 5.0 | | |
| Approach LOS | B | | | A | | | B | | | A | | |
| Intersection Control Delay (sec/veh) | 7.0 | | | | | | | | | | | |
| Intersection LOS | A | | | | | | | | | | | |

## Table 45. Summary of Results Intersection 104-A PM– 2038 Horizon

**Intersection 104-A**

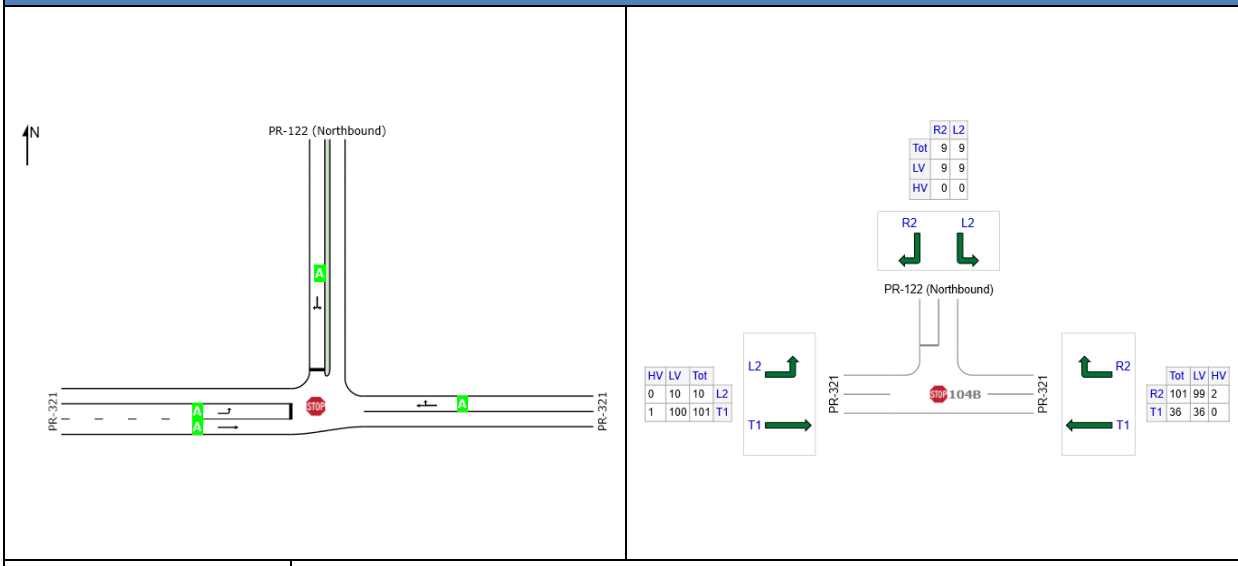



| Peak Hour | PM | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Approach | S | | | E | | | N | | | W | | |
| Movement | L | T | R | L | T | R | L | T | R | L | T | R |
| Degree of Saturation (v/C Ratio) | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.33 | 0.33 | 0.33 | 0.14 | 0.07 | 0.07 |
| Approach Control Delay (sec/veh) | 9.4 | | | 1.0 | | | 11.6 | | | 4.6 | | |
| Approach LOS | A | | | A | | | B | | | A | | |
| Intersection Control Delay (sec/veh) | 7.6 | | | | | | | | | | | |
| Intersection LOS | A | | | | | | | | | | | |

## Table 46. Summary of Results Intersection 104-B AM– 2038 Horizon

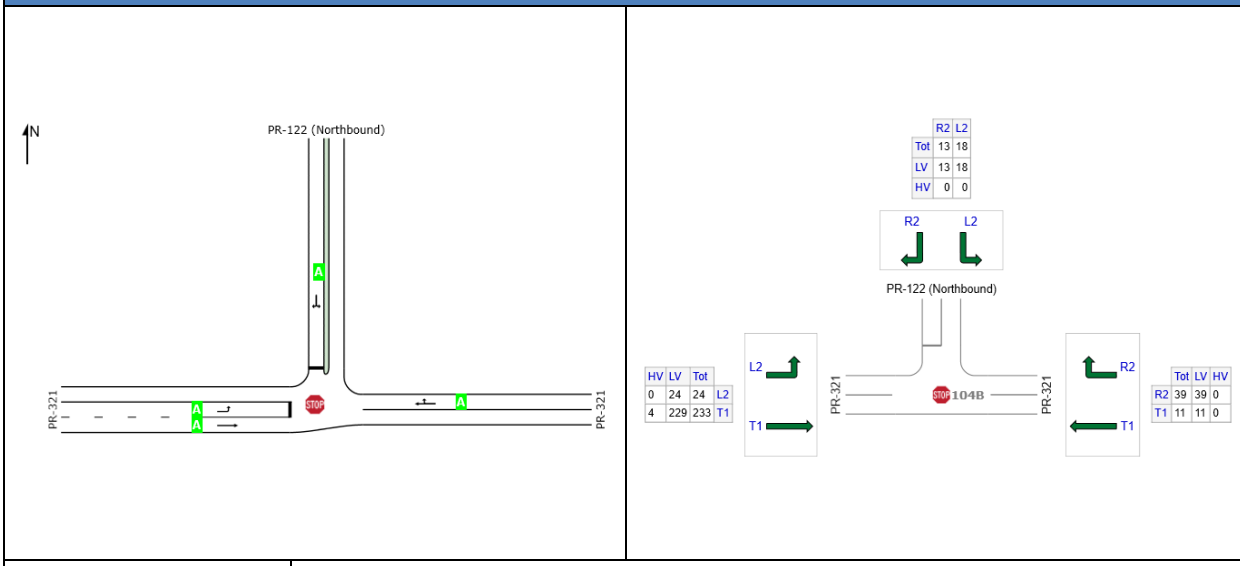
**Intersection 104-B**




| Peak Hour | AM | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Approach | S | | | E | | | N | | | W | | |
| Movement | L | T | R | L | T | R | L | T | R | L | T | R |
| Degree of Saturation (v/C Ratio) | - | - | - | - | 0.11 | 0.11 | 0.05 | - | 0.05 | 0.02 | 0.12 | - |
| Approach Control Delay (sec/veh) | - | | | 0.0 | | | 9.6 | | | 0.7 | | |
| Approach LOS | - | | | A | | | A | | | A | | |
| Intersection Control Delay (sec/veh) | 1.3 | | | | | | | | | | | |
| Intersection LOS | A | | | | | | | | | | | |

## Table 47. Summary of Results Intersection 104-B PM– 2038 Horizon

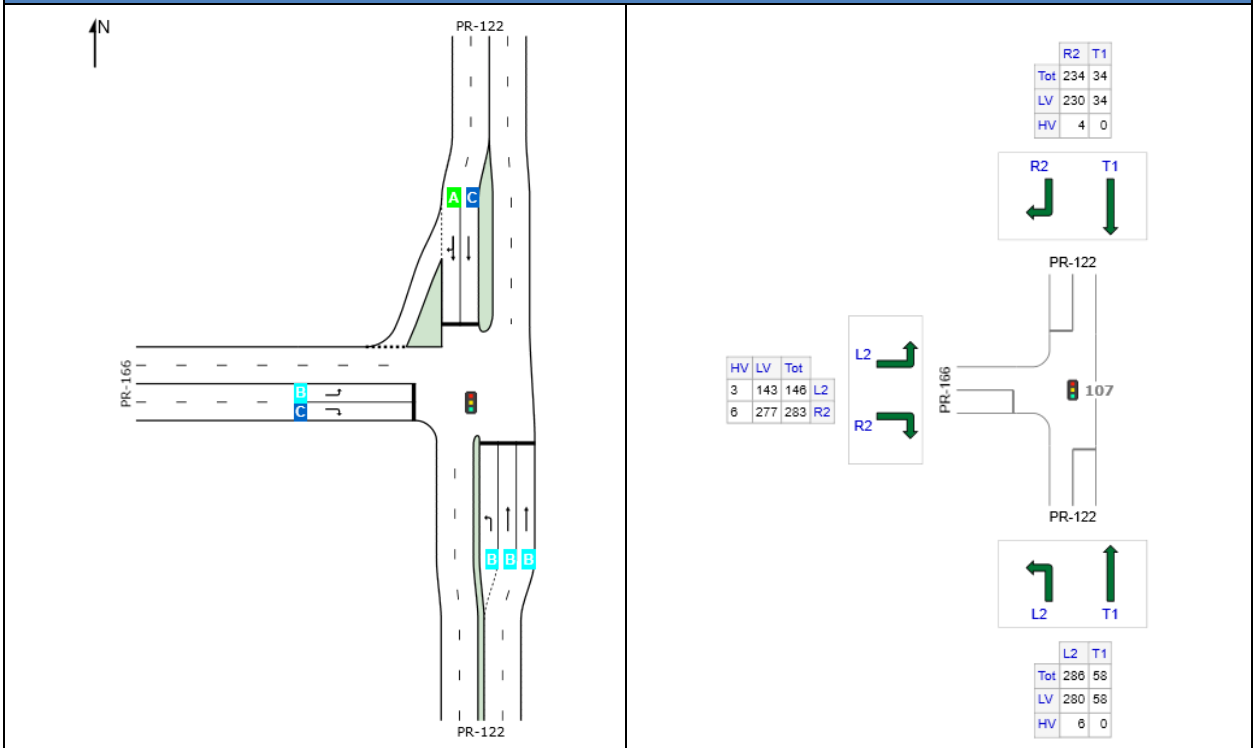
**Intersection 104-B**




| Peak Hour | PM | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Approach | S | | | E | | | N | | | W | | |
| Movement | L | T | R | L | T | R | L | T | R | L | T | R |
| Degree of Saturation (v/C Ratio) | - | - | - | - | 0.04 | 0.04 | 0.06 | - | 0.06 | 0.04 | 0.16 | - |
| Approach Control Delay (sec/veh) | - | | | 0.0 | | | 9.8 | | | 1.1 | | |
| Approach LOS | - | | | A | | | A | | | A | | |
| Intersection Control Delay (sec/veh) | 1.8 | | | | | | | | | | | |
| Intersection LOS | A | | | | | | | | | | | |

## Table 48. Summary of Results Intersection 107 AM– 2038 Horizon

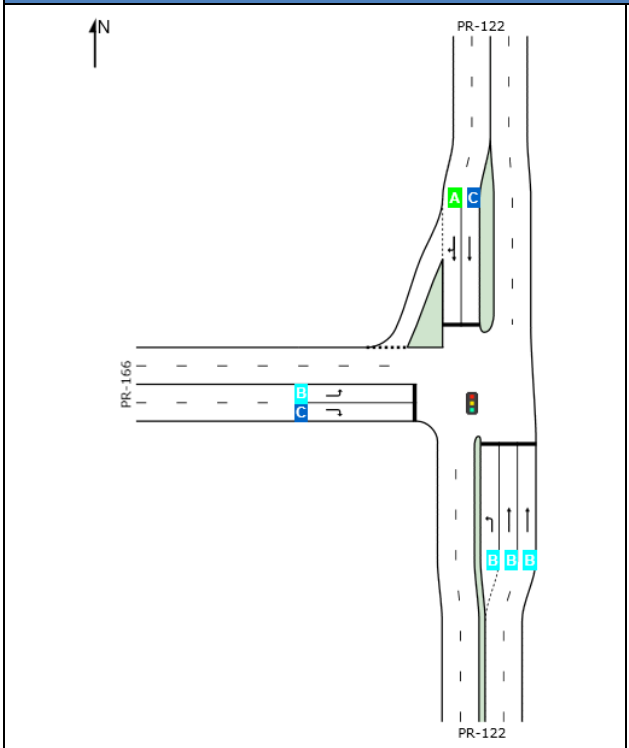
**Intersection 107**

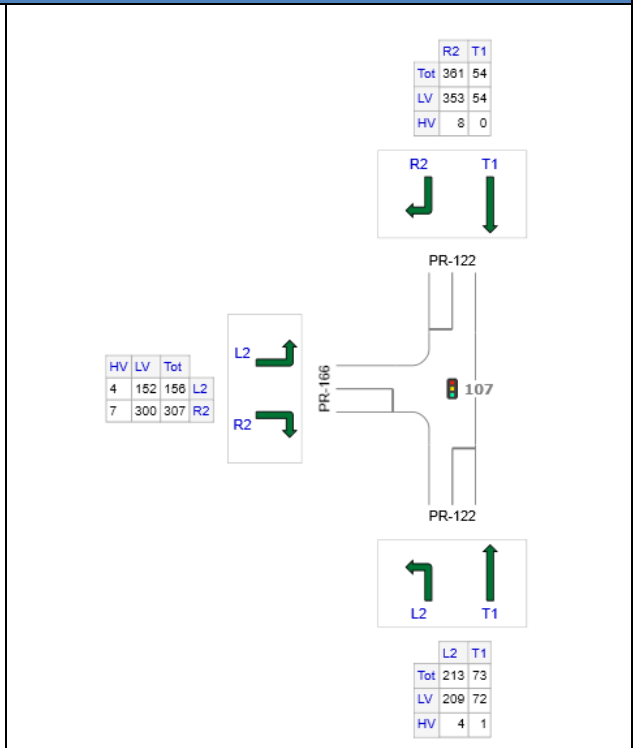



| Peak Hour | AM | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Approach | S | | | E | | | N | | | W | | |
| Movement | L | T | R | L | T | R | L | T | R | L | T | R |
| Degree of Saturation (v/C Ratio) | 0.57 | 0.06 | - | - | - | - | - | 0.23 | 0.24 | 0.40 | - | 0.80 |
| Approach Control Delay (sec/veh) | 17.5 | | | - | | | 7.1 | | | 24.8 | | |
| Approach LOS | B | | | - | | | A | | | C | | |
| Intersection Control Delay (sec/veh) | 18.2 | | | | | | | | | | | |
| Intersection LOS | B | | | | | | | | | | | |

## Table 49. Summary of Results Intersection 107 PM– 2038 Horizon

**Intersection 107**



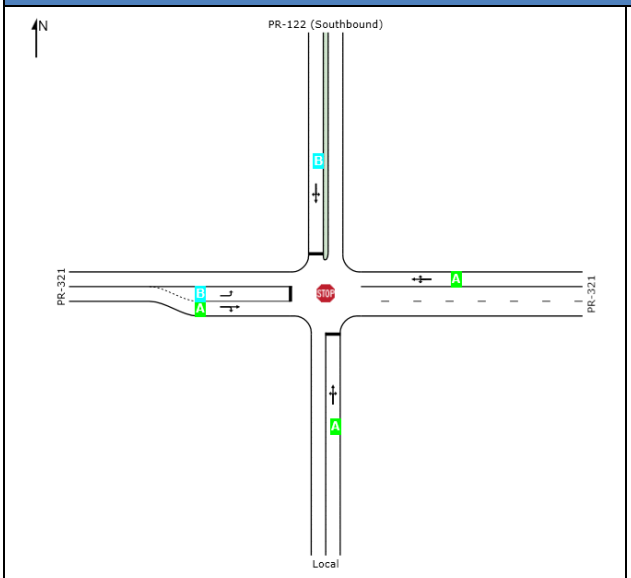

| Peak Hour | PM | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Approach | S | | | E | | | N | | | W | | |
| Movement | L | T | R | L | T | R | L | T | R | L | T | R |
| Degree of Saturation (v/C Ratio) | 0.41 | 0.08 | - | - | - | - | - | 0.30 | 0.44 | 0.57 | - | 0.69 |
| Approach Control Delay (sec/veh) | 15.7 | | | - | | | 6.6 | | | 21.4 | | |
| Approach LOS | B | | | - | | | A | | | C | | |
| Intersection Control Delay (sec/veh) | 14.6 | | | | | | | | | | | |
| Intersection LOS | B | | | | | | | | | | | |

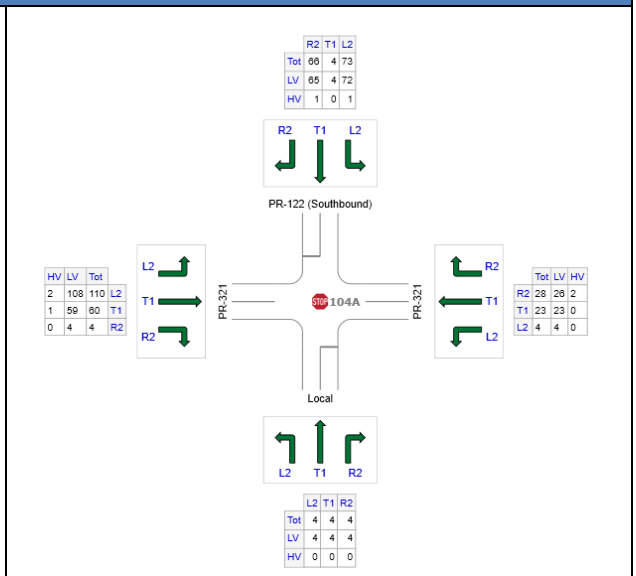
## 3.10 CAPACITY ANALYSIS – 20 YEARS FROM OPENING YEAR (2048 HORIZON)

**Table 50** to **Table 55** show the summary of results for the 2042 horizon during typical peak hours (AM and PM) for intersections 104-A, 104-B and 107. Each table presents the geometry, peak hour volume, v/C ratio of each movement, approach control delay and LOS, intersection control delay and LOS.

## Table 50. Summary of Results Intersection 104-A AM– 2048 Horizon

**Intersection 104-A**

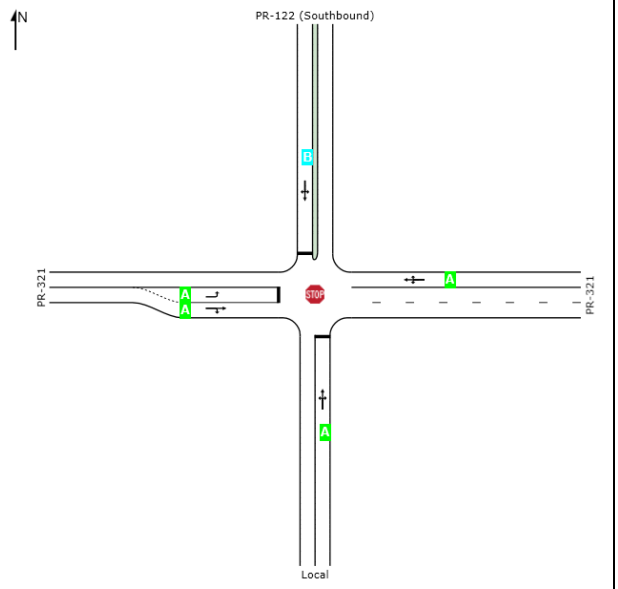


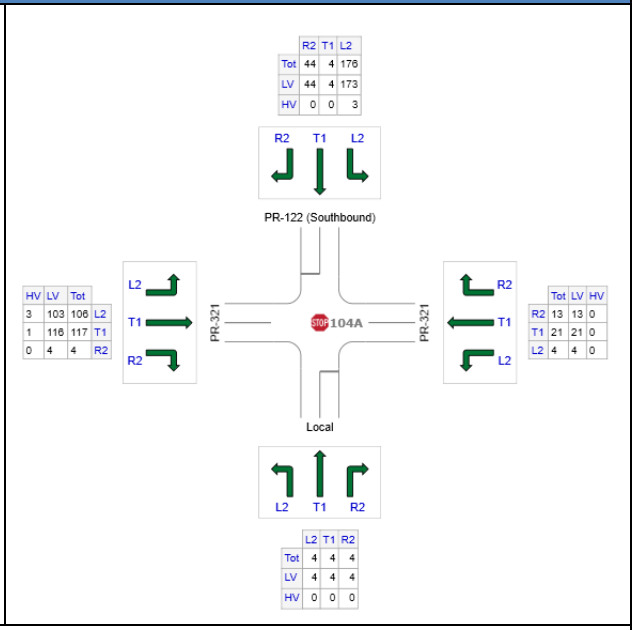




| Peak Hour | AM | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Approach | S | | | E | | | N | | | W | | |
| Movement | L | T | R | L | T | R | L | T | R | L | T | R |
| Degree of Saturation (v/C Ratio) | 0.02 | 0.02 | 0.02 | 0.05 | 0.05 | 0.05 | 0.35 | 0.35 | 0.35 | 0.20 | 0.07 | 0.07 |
| Approach Control Delay (sec/veh) | 9.6 | | | 0.7 | | | 11.8 | | | 5.6 | | |
| Approach LOS | A | | | A | | | B | | | A | | |
| Intersection Control Delay (sec/veh) | 7.6 | | | | | | | | | | | |
| Intersection LOS | A | | | | | | | | | | | |

## Table 51. Summary of Results Intersection 104-A PM– 2048 Horizon

**Intersection 104-A**

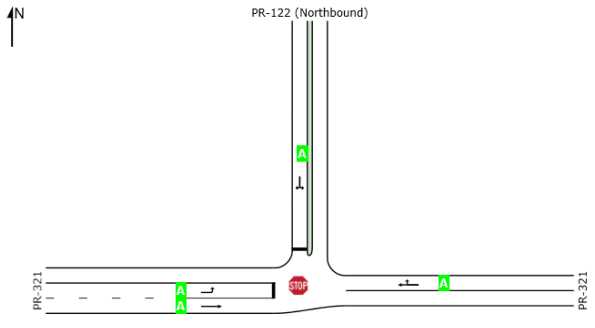


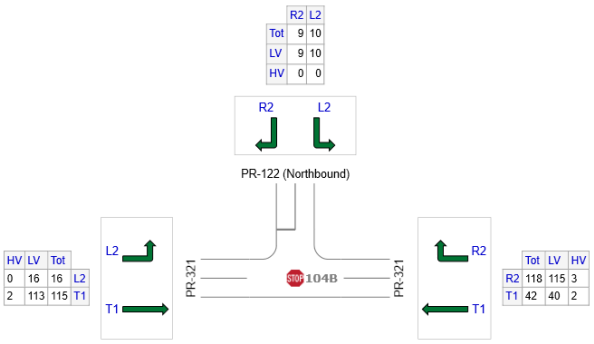




| Peak Hour | PM | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Approach | S | | | E | | | N | | | W | | |
| Movement | L | T | R | L | T | R | L | T | R | L | T | R |
| Degree of Saturation (v/C Ratio) | 0.02 | 0.02 | 0.02 | 0.03 | 0.03 | 0.03 | 0.39 | 0.39 | 0.39 | 0.16 | 0.08 | 0.08 |
| Approach Control Delay (sec/veh) | 9.5 | | | 0.8 | | | 12.6 | | | 4.8 | | |
| Approach LOS | A | | | A | | | B | | | A | | |
| Intersection Control Delay (sec/veh) | 8.1 | | | | | | | | | | | |
| Intersection LOS | A | | | | | | | | | | | |

## Table 52. Summary of Results Intersection 104-B AM– 2048 Horizon

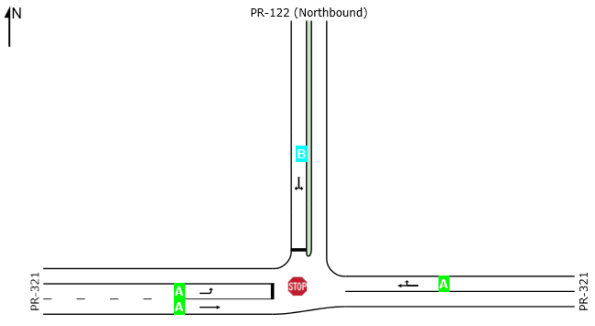
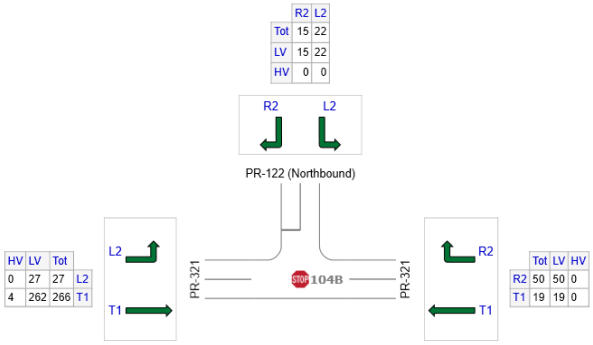
**Intersection 104-B**




| Peak Hour | AM | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Approach | S | | | E | | | N | | | W | | |
| Movement | L | T | R | L | T | R | L | T | R | L | T | R |
| Degree of Saturation (v/C Ratio) | - | - | - | - | 0.13 | 0.13 | 0.06 | - | 0.06 | 0.03 | 0.14 | - |
| Approach Control Delay (sec/veh) | - | | | 0.0 | | | 9.9 | | | 0.9 | | |
| Approach LOS | - | | | A | | | A | | | A | | |
| Intersection Control Delay (sec/veh) | 1.3 | | | | | | | | | | | |
| Intersection LOS | A | | | | | | | | | | | |

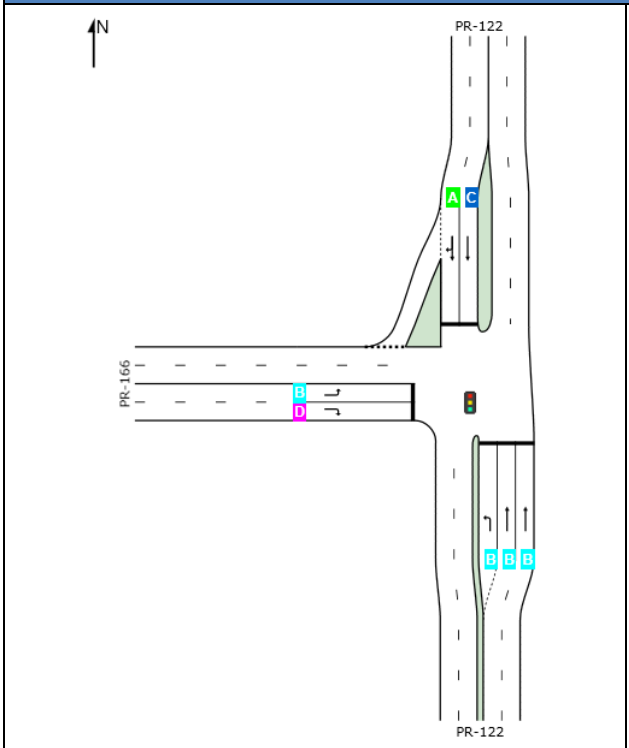
## Table 53. Summary of Results Intersection 104-B PM– 2048 Horizon

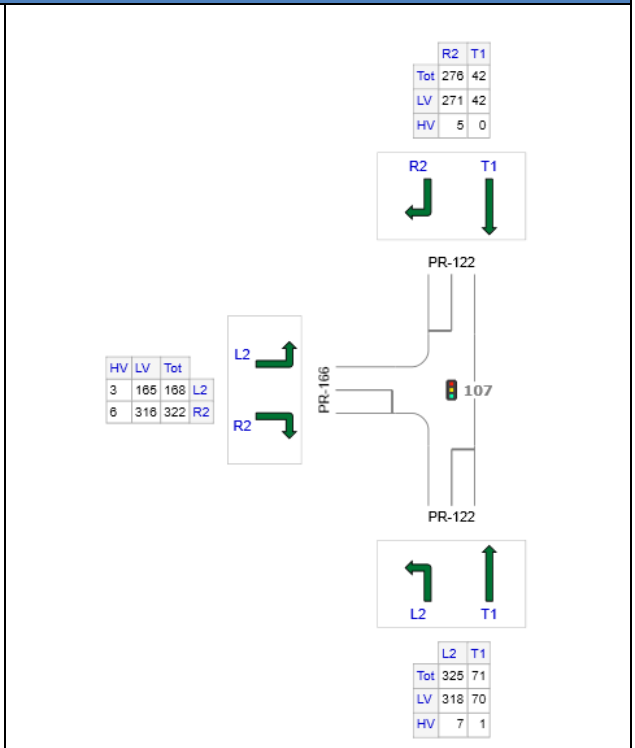
| Intersection 104-B | |
|---|---|
|  |  |

| Peak Hour | PM | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Approach | S | | | E | | | N | | | W | | |
| Movement | L | T | R | L | T | R | L | T | R | L | T | R |
| Degree of Saturation (v/C Ratio) | ' | ' | ' | ' | 0.06 | 0.06 | 0.08 | ' | 0.08 | 0.05 | 0.18 | ' |
| Approach Control Delay (sec/veh) | - | | | 0.0 | | | 10.4 | | | 1.2 | | |
| Approach LOS | - | | | A | | | B | | | A | | |
| Intersection Control Delay (sec/veh) | 2.0 | | | | | | | | | | | |
| Intersection LOS | A | | | | | | | | | | | |

## Table 54. Summary of Results Intersection 107 AM– 2048 Horizon

**Intersection 107**

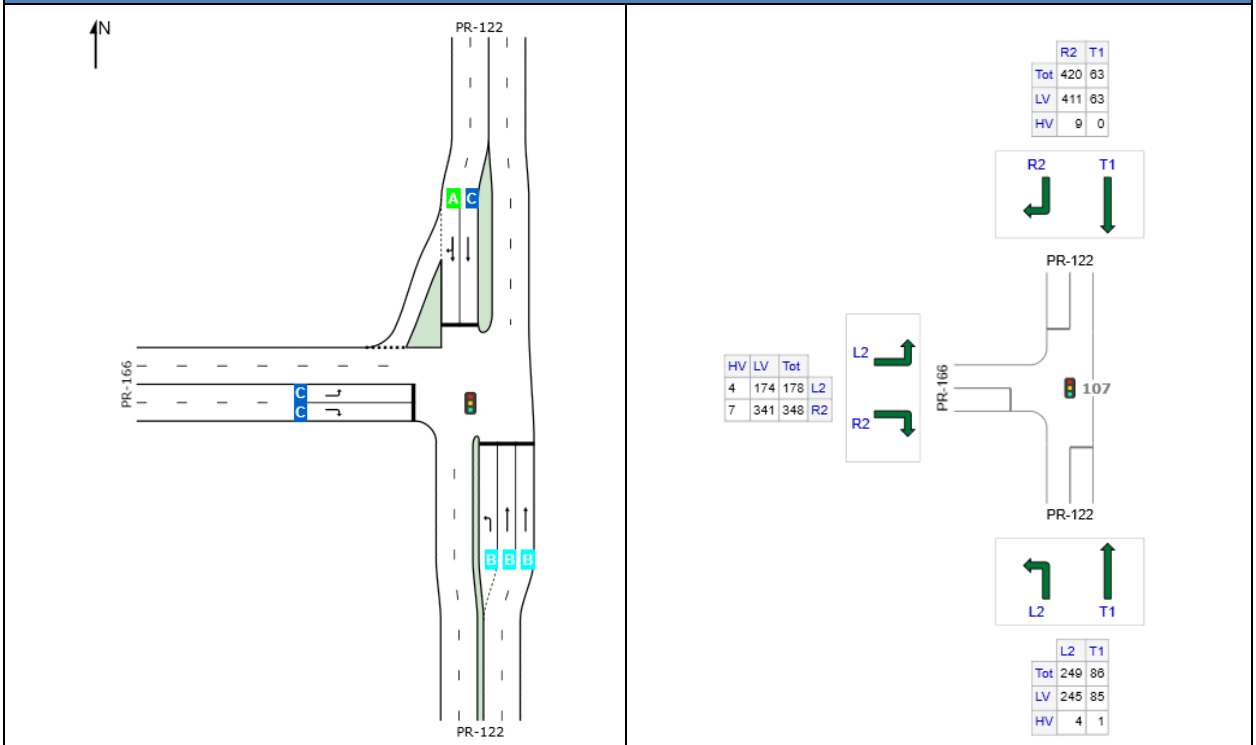



| Peak Hour | AM | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Approach | S | | | E | | | N | | | W | | |
| Movement | L | T | R | L | T | R | L | T | R | L | T | R |
| Degree of Saturation (v/C Ratio) | 0.63 | 0.08 | - | - | - | - | - | 0.24 | 0.29 | 0.47 | - | 0.91 |
| Approach Control Delay (sec/veh) | 18.3 | | | - | | | 7.4 | | | 32.6 | | |
| Approach LOS | B | | | - | | | A | | | C | | |
| Intersection Control Delay (sec/veh) | 21.9 | | | | | | | | | | | |
| Intersection LOS | C | | | | | | | | | | | |

## Table 55. Summary of Results Intersection 107 PM– 2048 Horizon

**Intersection 107**




| Peak Hour | PM | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Approach | S | | | E | | | N | | | W | | |
| Movement | L | T | R | L | T | R | L | T | R | L | T | R |
| Degree of Saturation (v/C Ratio) | 0.46 | 0.09 | - | - | - | - | - | 0.31 | 0.51 | 0.63 | - | 0.77 |
| Approach Control Delay (sec/veh) | 16.0 | | | - | | | 7.4 | | | 24.0 | | |
| Approach LOS | B | | | - | | | A | | | C | | |
| Intersection Control Delay (sec/veh) | 15.9 | | | | | | | | | | | |
| Intersection LOS | B | | | | | | | | | | | |

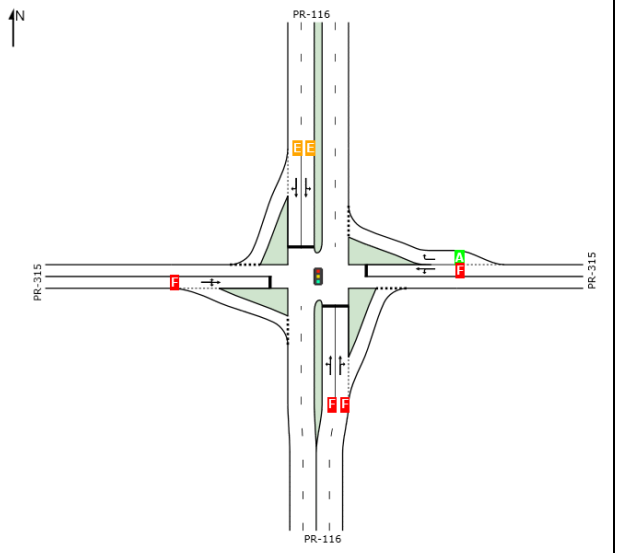
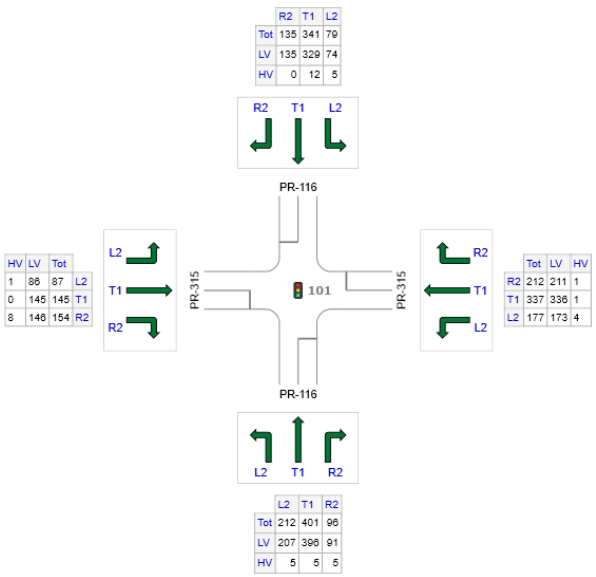
# CHAPTER 4 :FUTURE CONDITION – NO ACTION SCENARIO

The existing intersections were analyzed for the existing conditions traffic volumes (2022) and the 2048 future conditions traffic volumes in a non-action alternative.

## 4.1 CAPACITY ANALYSIS – 2048 HORIZON (NO ACTION SCENARIO)

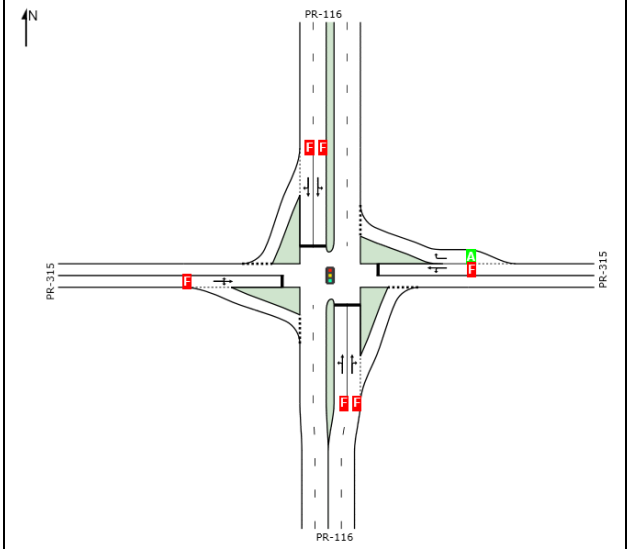
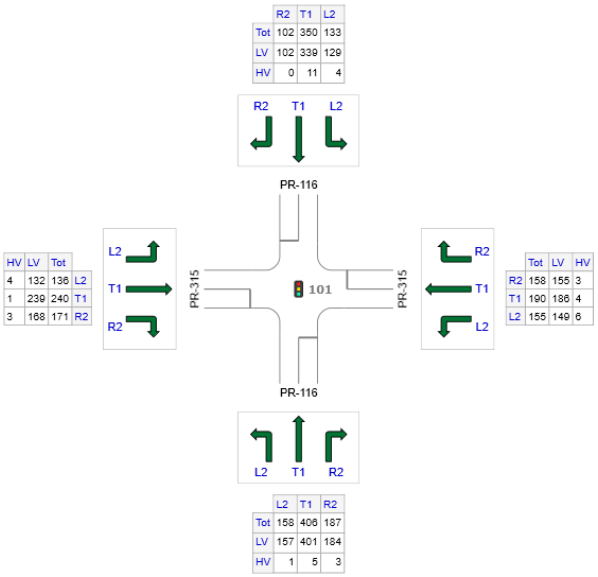
**Table 56** to **Table 67** show the summary of results for the 2048 projection no action scenario during typical peak hours (AM and PM). Each table presents the geometry, peak hour volume, v/C ratio of each movement, approach control delay and LOS, intersection control delay and LOS.

## Table 56. Summary of Results Intersection 101 AM– 2048 Horizon (No Action Scenario)

| Intersection 101 | |
|---|---|
|  |  |

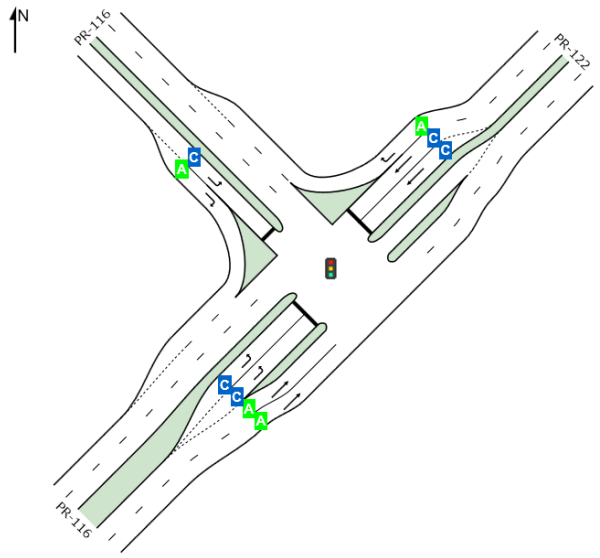
| Peak Hour | AM | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Approach | S | | | E | | | N | | | W | | |
| Movement | L | T | R | L | T | R | L | T | R | L | T | R |
| Degree of Saturation (v/C Ratio) | 1.10 | 1.10 | 1.10 | 1.24 | 1.24 | 0.24 | 0.92 | 0.92 | 0.92 | 1.33 | 1.33 | 1.33 |
| Approach Control Delay (sec/veh) | 107.0 | | | 105.2 | | | 64.5 | | | 194.1 | | |
| Approach LOS | F | | | F | | | E | | | F | | |
| Intersection Control Delay (sec/veh) | 110.8 | | | | | | | | | | | |
| Intersection LOS | F | | | | | | | | | | | |

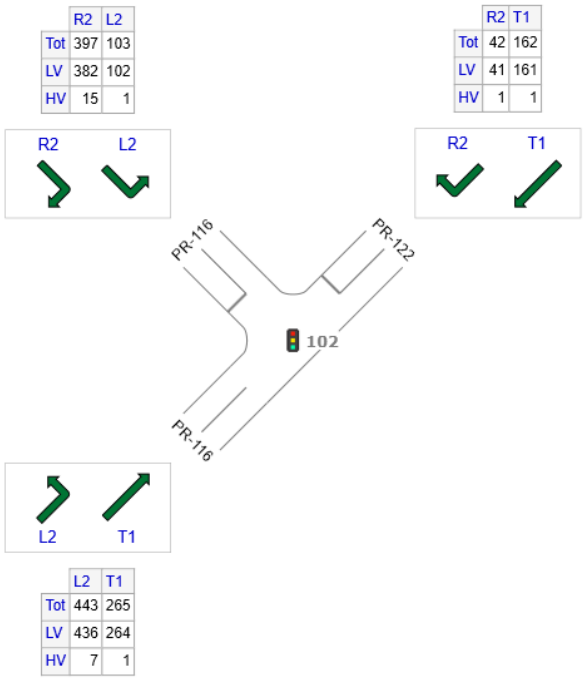
## Table 57. Summary of Results Intersection 101 PM– 2048 Horizon (No Action Scenario)

| Intersection 101 | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
|  | | | | | | | | |  | | | | | | | |
| Peak Hour | PM | | | | | | | | | | | |
| Approach | S | | | E | | | N | | | W | | |
| Movement | L | T | R | L | T | R | L | T | R | L | T | R |
| Degree of Saturation (v/C Ratio) | 1.08 | 1.08 | 1.08 | 1.00 | 1.00 | 0.18 | 1.00 | 1.00 | 1.00 | 1.62 | 1.62 | 1.62 |
| Approach Control Delay (sec/veh) | 98.5 | | | 51.5 | | | 81.0 | | | >300 | | |
| Approach LOS | F | | | D | | | F | | | F | | |
| Intersection Control Delay (sec/veh) | 132.6 | | | | | | | | | | | |
| Intersection LOS | F | | | | | | | | | | | |

## Table 58. Summary of Results Intersection 102 AM– 2048 Horizon (No Action Scenario)

**Intersection 102**

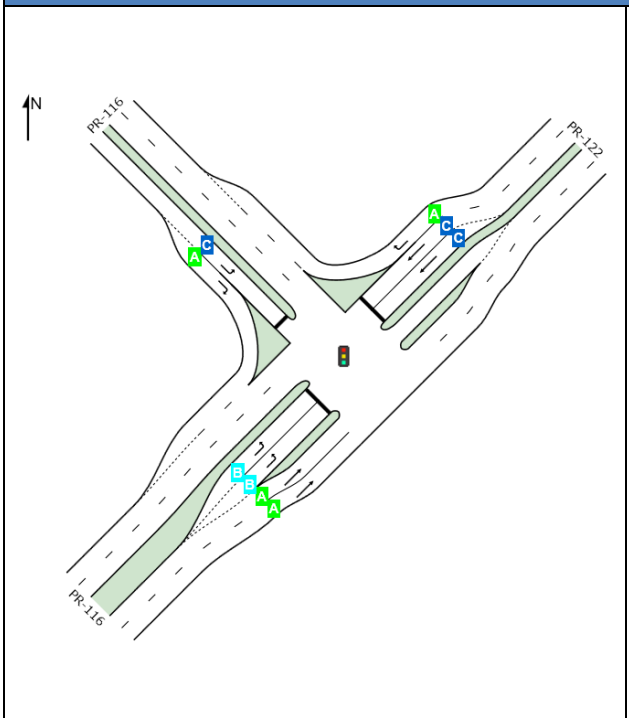


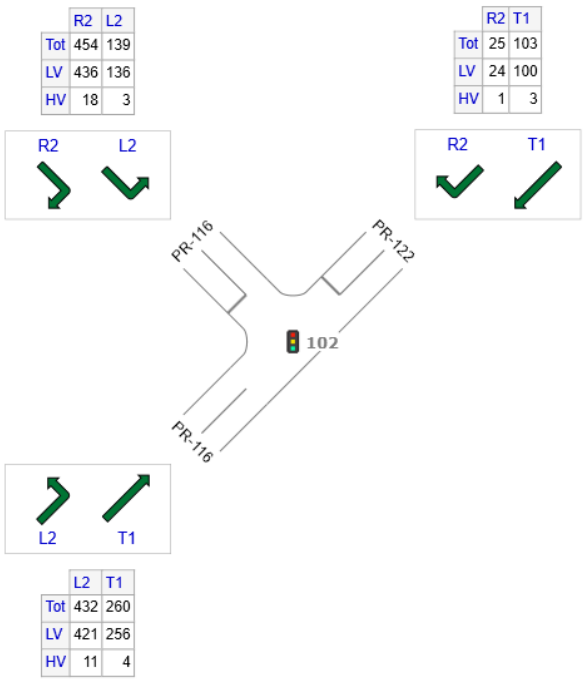




| Peak Hour | AM | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Approach | NE | | | NW | | | SW | | | SE | | |
| Movement | L | T | R | L | T | R | L | T | R | L | T | R |
| Degree of Saturation (v/C Ratio) | - | 0.21 | 0.04 | 0.30 | - | 0.32 | 0.45 | 0.08 | - | - | - | - |
| Approach Control Delay (sec/veh) | 18.6 | | | 5.3 | | | 13.5 | | | - | | |
| Approach LOS | B | | | A | | | B | | | - | | |
| Intersection Control Delay (sec/veh) | 11.4 | | | | | | | | | | | |
| Intersection LOS | B | | | | | | | | | | | |

## Table 59. Summary of Results Intersection 102 PM– 2048 Horizon (No Action Scenario)

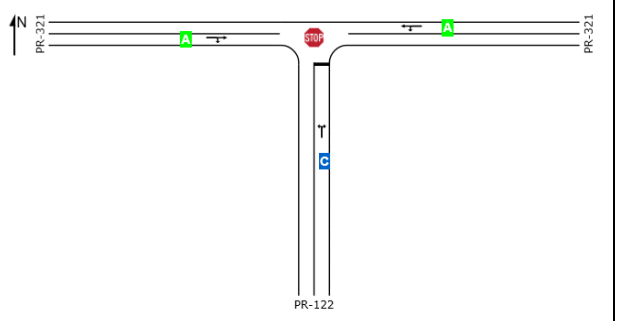
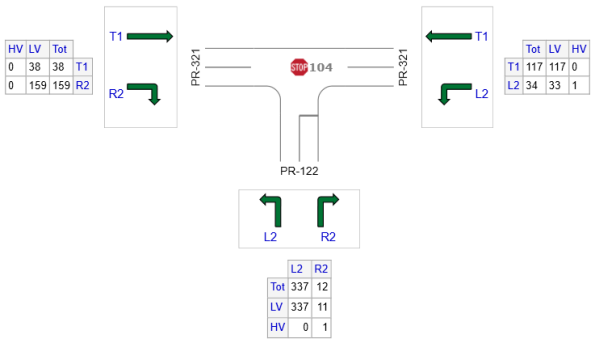
**Intersection 102**



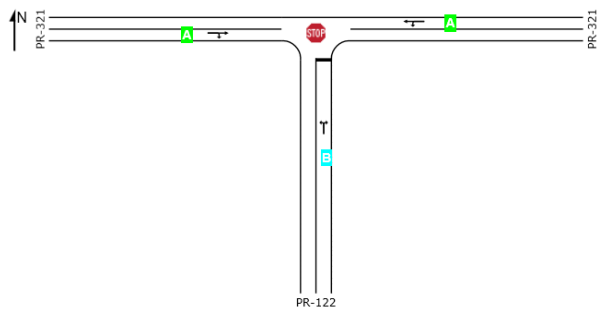
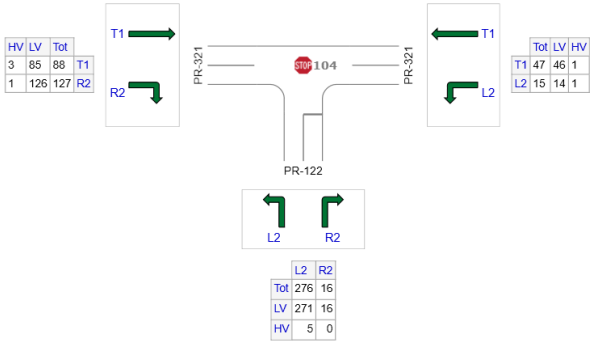

| Peak Hour | PM | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Approach | NE | | | NW | | | SW | | | SE | | |
| Movement | L | T | R | L | T | R | L | T | R | L | T | R |
| Degree of Saturation (v/C Ratio) | - | 0.15 | 0.02 | 0.67 | - | 0.47 | 0.40 | 0.09 | - | - | - | - |
| Approach Control Delay (sec/veh) | 19.6 | | | 9.2 | | | 11.9 | | | - | | |
| Approach LOS | B | | | A | | | B | | | - | | |
| Intersection Control Delay (sec/veh) | 11.2 | | | | | | | | | | | |
| Intersection LOS | B | | | | | | | | | | | |

## Table 60. Summary of Results Intersection 104 AM– 2048 Horizon (No Action Scenario)

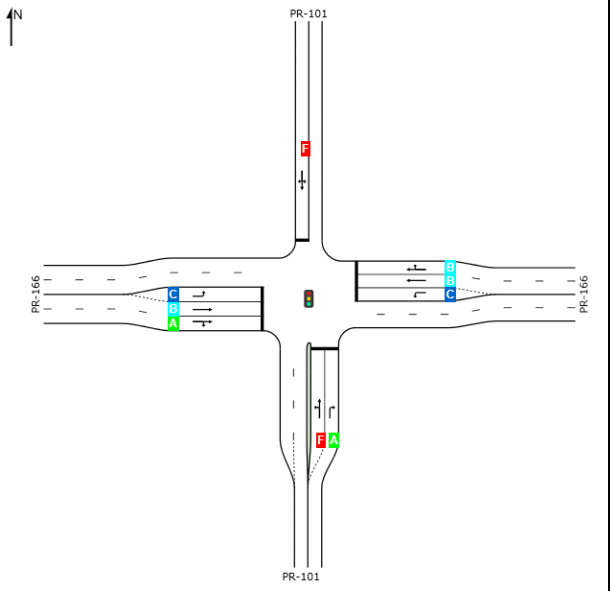
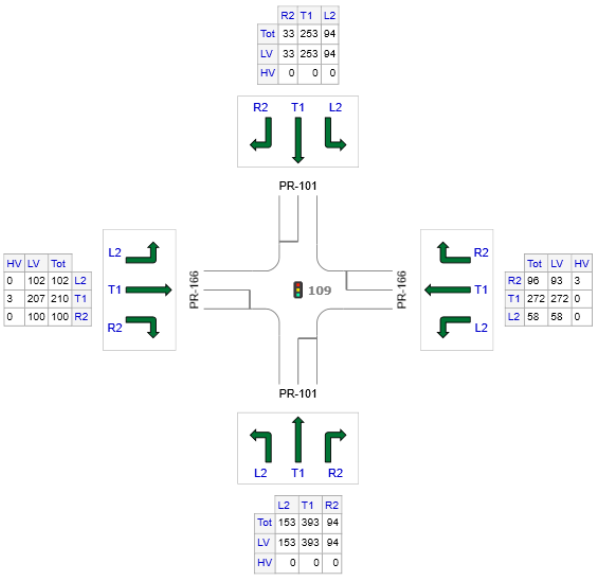
| Intersection 104 | |
|---|---|
|  |  |

| Peak Hour | AM | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Approach | S | | | E | | | N | | | W | | |
| Movement | L | T | R | L | T | R | L | T | R | L | T | R |
| Degree of Saturation (v/C Ratio) | 0.54 | - | 0.54 | 0.12 | 0.12 | - | - | - | - | - | 0.30 | 0.30 |
| Approach Control Delay (sec/veh) | 15.6 | | | 0.0 | | | - | | | 7.5 | | |
| Approach LOS | C | | | A | | | - | | | NA* | | |
| Intersection Control Delay (sec/veh) | 9.6 | | | | | | | | | | | |
| Intersection LOS | A | | | | | | | | | | | |

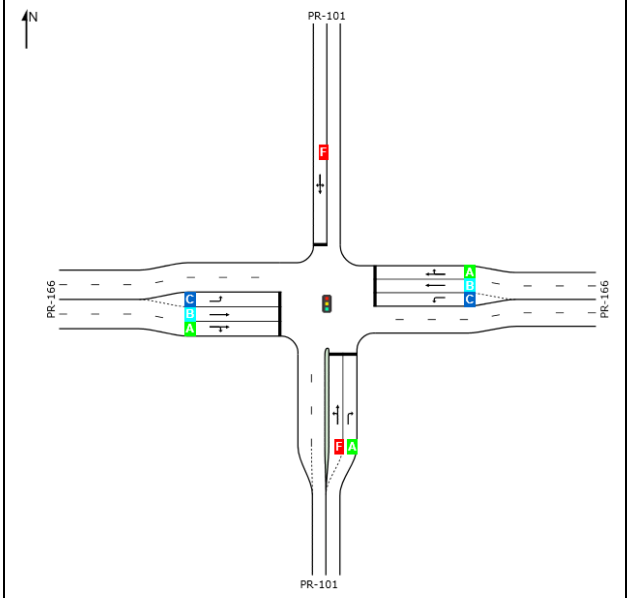
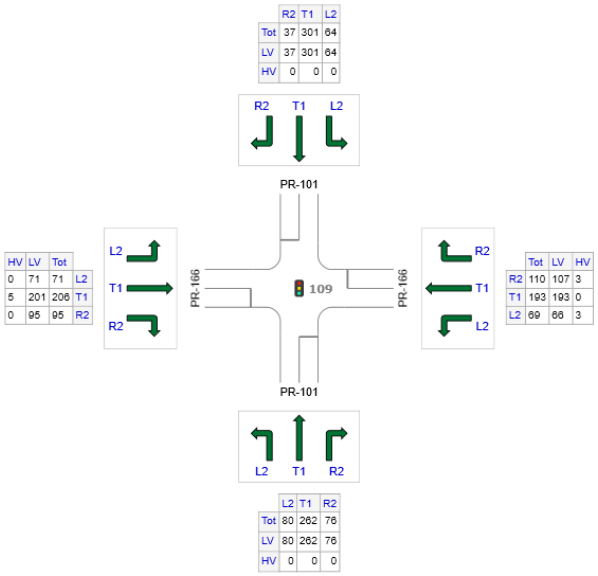
## Table 61. Summary of Results Intersection 104 PM– 2048 Horizon (No Action Scenario)

| Intersection 104 | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
|  | | | | | | | | |  | | | | | |
| Peak Hour | PM | | | | | | | | | | | |
| Approach | S | | | E | | | N | | | W | | |
| Movement | L | T | R | L | T | R | L | T | R | L | T | R |
| Degree of Saturation (v/C Ratio) | 0.52 | - | 0.52 | 0.05 | 0.05 | - | - | - | - | - | 0.39 | 0.39 |
| Approach Control Delay (sec/veh) | 14.7 | | | 0.0 | | | - | | | 9.7 | | |
| Approach LOS | B | | | A | | | - | | | NA* | | |
| Intersection Control Delay (sec/veh) | 11.4 | | | | | | | | | | | |
| Intersection LOS | B | | | | | | | | | | | |

## Table 62. Summary of Results Intersection 109 AM– 2048 Horizon (No Action Scenario)

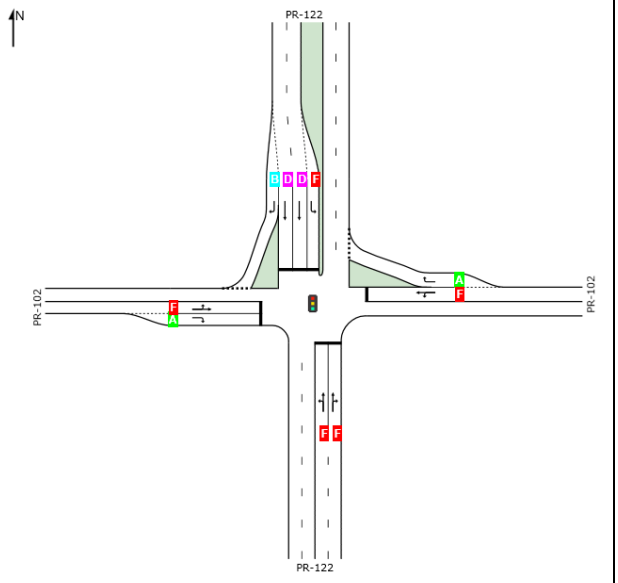
| Intersection 109 | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
|  | | | | | | |  | | | | | | | | |
| Peak Hour | AM | | | | | | | | | | | |
| Approach | S | | | E | | | N | | | W | | |
| Movement | L | T | R | L | T | R | L | T | R | L | T | R |
| Degree of Saturation (v/C Ratio) | 2.10 | 2.10 | 0.15 | 0.40 | 0.36 | 0.36 | 2.21 | 2.21 | 2.21 | 0.54 | 0.34 | 0.34 |
| Approach Control Delay (sec/veh) | >300 | | | 19.2 | | | >300 | | | 17.5 | | |
| Approach LOS | F | | | B | | | F | | | B | | |
| Intersection Control Delay (sec/veh) | 265.7 | | | | | | | | | | | |
| Intersection LOS | F | | | | | | | | | | | |

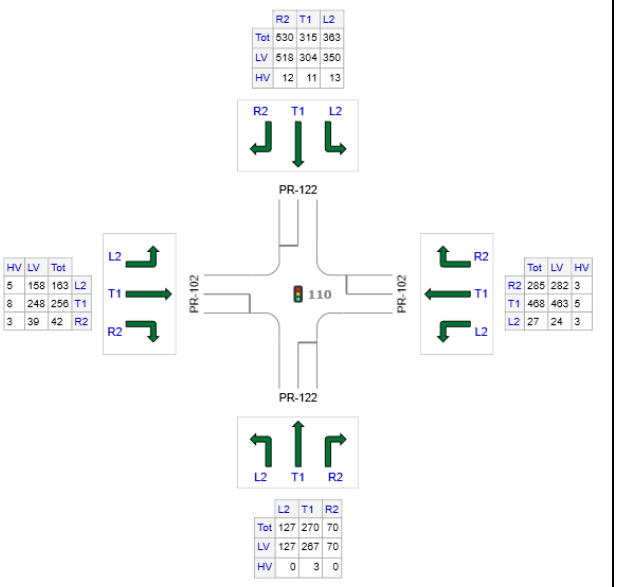
## Table 63. Summary of Results Intersection 109 PM– 2048 Horizon (No Action Scenario)

| Intersection 109 | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
|  | | | | | | |  | | | | | |
| Peak Hour | PM | | | | | | | | | | | |
| Approach | S | | | E | | | N | | | W | | |
| Movement | L | T | R | L | T | R | L | T | R | L | T | R |
| Degree of Saturation (v/C Ratio) | 1.56 | 1.56 | 0.10 | 0.42 | 0.29 | 0.29 | 1.85 | 1.85 | 1.85 | 0.54 | 0.33 | 0.33 |
| Approach Control Delay (sec/veh) | 240.7 | | | 16.8 | | | >300 | | | 18.8 | | |
| Approach LOS | F | | | B | | | F | | | B | | |
| Intersection Control Delay (sec/veh) | 165.1 | | | | | | | | | | | |
| Intersection LOS | F | | | | | | | | | | | |

## Table 64. Summary of Results Intersection 110 AM– 2048 Horizon (No Action Scenario)

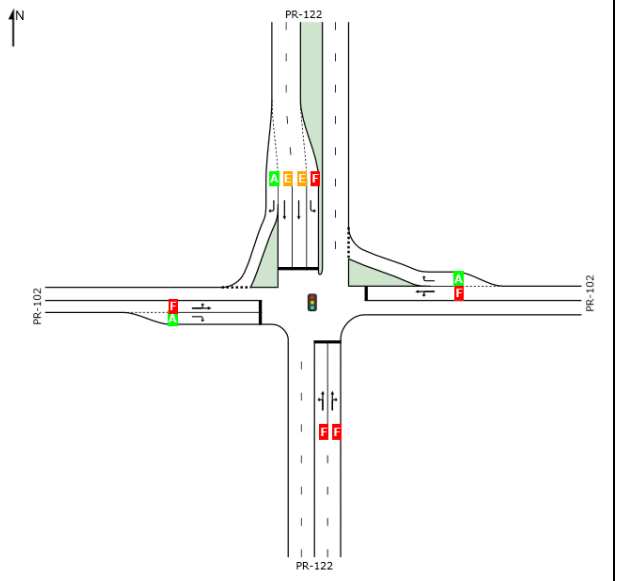
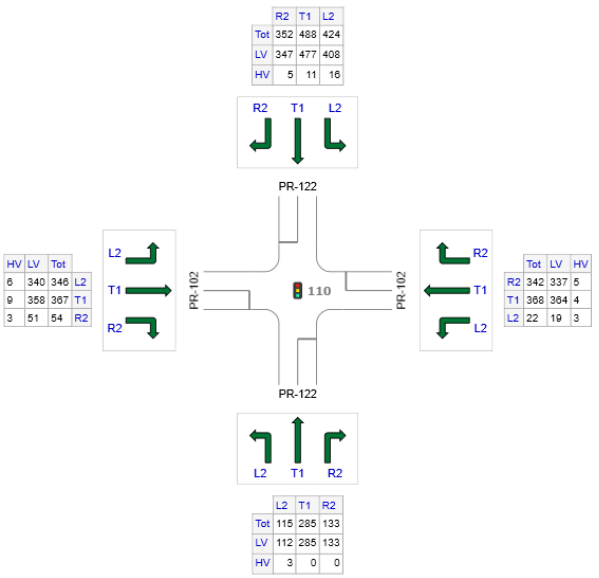
**Intersection 110**



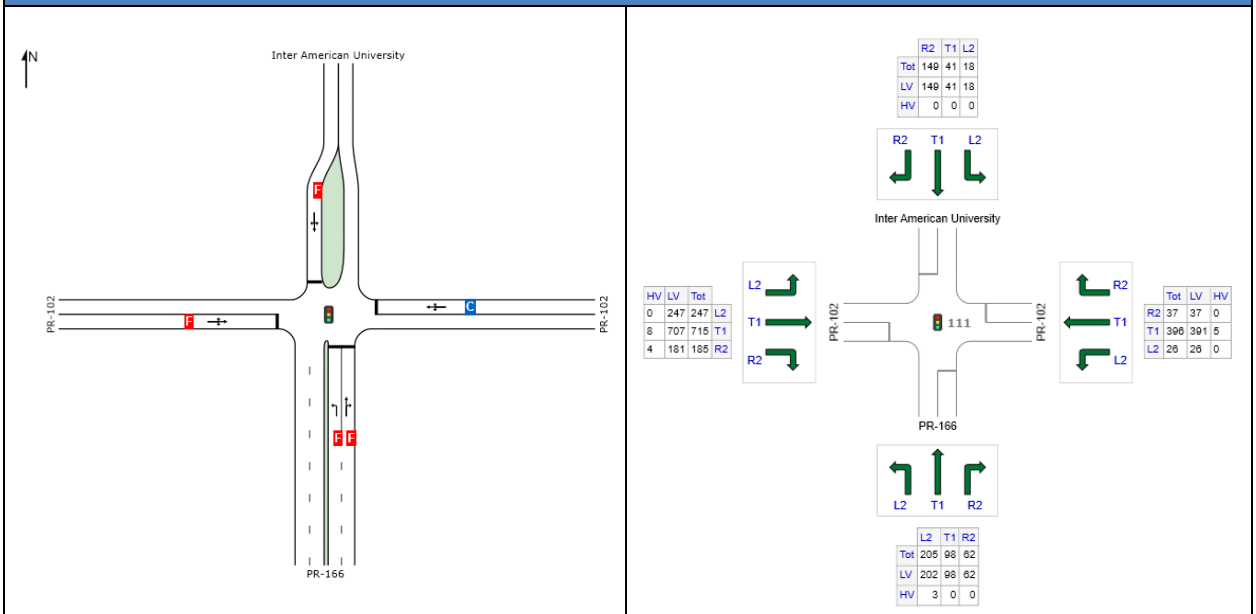

| Peak Hour | AM | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Approach | S | | | E | | | N | | | W | | |
| Movement | L | T | R | L | T | R | L | T | R | L | T | R |
| Degree of Saturation (v/C Ratio) | 2.31 | 1.16 | 1.16 | 1.71 | 1.71 | 0.32 | 1.64 | 0.57 | 0.73 | 1.40 | 1.40 | 0.09 |
| Approach Control Delay (sec/veh) | 283.0 | | | 232.4 | | | 119.1 | | | 196.3 | | |
| Approach LOS | F | | | F | | | F | | | F | | |
| Intersection Control Delay (sec/veh) | 188.1 | | | | | | | | | | | |
| Intersection LOS | F | | | | | | | | | | | |

## Table 65. Summary of Results Intersection 110 PM– 2048 Horizon (No Action Scenario)

| Intersection 110 | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
|  | | | | | | |  | | | | | | | | |
| Peak Hour | AM | | | | | | | | | | | |
| Approach | S | | | E | | | N | | | W | | |
| Movement | L | T | R | L | T | R | L | T | R | L | T | R |
| Degree of Saturation (v/C Ratio) | 2.74 | 1.52 | 1.52 | 1.25 | 1.25 | 0.35 | 2.00 | 0.87 | 0.36 | 2.09 | 2.09 | 0.06 |
| Approach Control Delay (sec/veh) | >300 | | | 94.2 | | | 198.2 | | | >300 | | |
| Approach LOS | F | | | F | | | F | | | F | | |
| Intersection Control Delay (sec/veh) | 278.6 | | | | | | | | | | | |
| Intersection LOS | F | | | | | | | | | | | |

## Table 66. Summary of Results Intersection 111 AM– 2048 Horizon (No Action Scenario)

**Intersection 111**




| Peak Hour | AM | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Approach | S | | | E | | | N | | | W | | |
| Movement | L | T | R | L | T | R | L | T | R | L | T | R |
| Degree of Saturation (v/C Ratio) | 1.12 | 0.95 | 0.95 | 0.71 | 0.71 | 0.71 | 1.16 | 1.16 | 1.16 | 1.79 | 1.79 | 1.79 |
| Approach Control Delay (sec/veh) | 115.3 | | | 26.3 | | | 121.5 | | | >300 | | |
| Approach LOS | F | | | C | | | F | | | F | | |
| Intersection Control Delay (sec/veh) | 221.1 | | | | | | | | | | | |
| Intersection LOS | F | | | | | | | | | | | |

**Table 67. Summary of Results Intersection 111 PM– 2048 Horizon (No Action Scenario)**

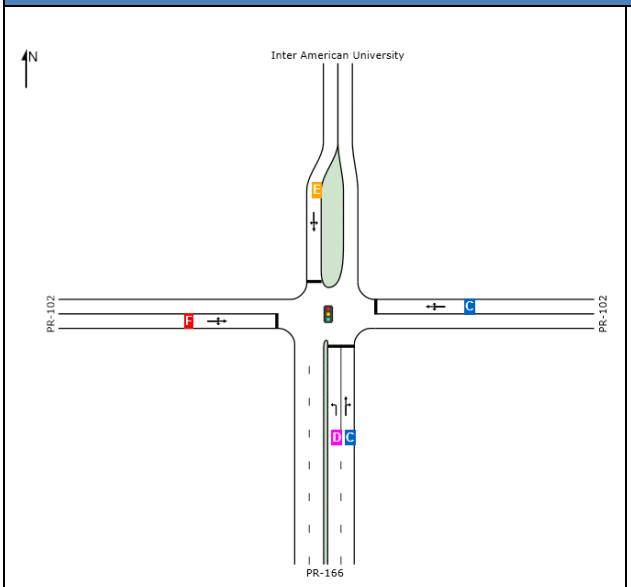
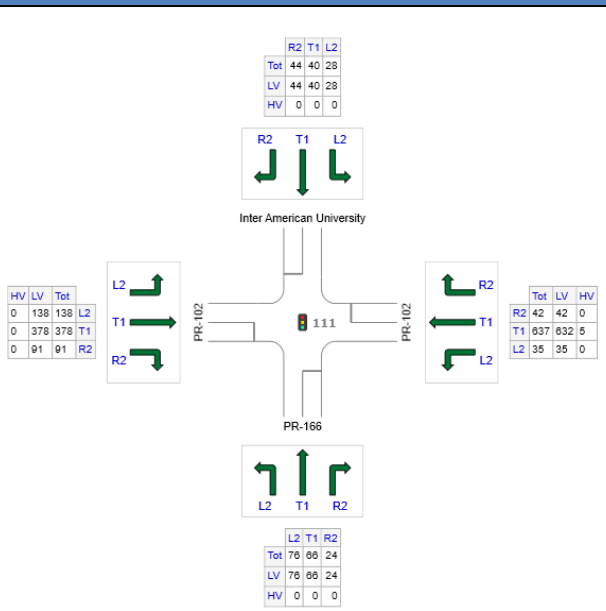
| Intersection 111 | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
|  | | | | | | |  | | | | | |
| Peak Hour | PM | | | | | | | | | | | |
| Approach | S | | | E | | | N | | | W | | |
| Movement | L | T | R | L | T | R | L | T | R | L | T | R |
| Degree of Saturation (v/C Ratio) | 0.42 | 0.54 | 0.54 | 0.89 | 0.89 | 0.89 | 0.92 | 0.92 | 0.92 | 1.59 | 1.59 | 1.59 |
| Approach Control Delay (sec/veh) | 39.2 | | | 32.9 | | | 78.2 | | | 299.4 | | |
| Approach LOS | D | | | C | | | E | | | F | | |
| Intersection Control Delay (sec/veh) | 135.1 | | | | | | | | | | | |
| Intersection LOS | F | | | | | | | | | | | |

**Table 25** presents the summary of results for the operations of the intersections evaluated in this study for the 2048 Horizon (No Action Scenario).

**Table 68. Summary of Results - 2048 Horizon (No Action Scenario)**

| Intersection | AM Peak Hour | | PM Peak Hour | |
|---|---|---|---|---|
| | Delay (sec/veh) | LOS | Delay (sec/veh) | LOS |
| **101** | **110.8** | **F** | **132.6** | **F** |
| **102** | 11.4 | B | 11.2 | B |
| **104** | 9.6 | A | 11.4 | B |
| **109** | **265.7** | **F** | **165.1** | **F** |
| **110** | **188.1** | **F** | **278.6** | **F** |
| **111** | **221.1** | **F** | **135.1** | **F** |

The results for the 2048 Horizon (No Action Scenario) show that the operation condition for intersections 101, 109, 110 and 111 will be worsen than its existing condition since these intersections will be operating below an acceptable condition. Thus, these intersections requires additional improvements, however evaluation of these improvements are outside the scope of the project.

# CHAPTER 5 :CONCLUSIONS

Based on the previous sections the following conclusions are provided:

1. As a result of the traffic study performed for the proposed PR-122 extension, it has been determined that the proposed extension is necessary to improve the operation of the studied intersections and reduce the travel time of the users.
2. The results for the existing condition (2022) show that intersections 109, 110 and 111 are operating below the acceptable condition.
3. The results for the 2048 Horizon (No Action Scenario) show that the operation condition for intersections 101, 109, 110 and 111 will be worse than its existing condition since these intersections will be operating below an acceptable condition.
4. Intersections 101, 109, 110 and 111 requires additional improvements, however evaluation of these improvements are outside the scope of this project. It is recommended that the PRHTA evaluate possible alternative to improve the operation of these intersections under a different project.
5. It is expected that the proposed intersections 104 and 107 will be operating at LOS A and B for the 2048 horizon.
6. According with the criteria established in the MUTCD, for the south intersection of the proposed extension (PR-122 @ PR-321) the installation of traffic signal system is not warranted, while for the north intersection (PR-122 @ PR-166) the installation of traffic signal system is warranted.

# CHAPTER 6 :CERTIFICATION

I certify that the information presented herein is true, accurate, and complete and that it was obtained and analyzed using the criteria of the best practice used and accepted by traffic engineering in the Puerto Rico Highway and Transportation Authority.

Certified today February 20, 2023

Miguel A Pérez Correa, PE

Lic. No. 19609

# CHAPTER 7 :REFERENCES

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Federal Highway Administration. (2009), Manual on Uniform Traffic Control Devices

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Transportation Research Board. (2016), Highway Capacity Manual 6th Edition, Washington, D.C.

# APPENDICES

# Appendix A:

## Traffic Count Data

**Fecha:** Septiembre 14, 2022 **Dia de la Semana:** Miercoles **Cond. del Tiempo :** Soleado

**Periodo :** 6:00 AM @ 6:00 PM **Municipio :** Lajas

**Interseccion** PR-315 **con** PR-116

**Contaje desde el Acceso** A **Carretera** PR-116

**Descripcion del acceso :** Acceso Norte - Tres Carriles

| Periodo de Estudio | | Afluencia de vehiculos | | | | | | | | Peatones | | Totales | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Izquierda | | Recto | | Derecha | | Viraje en U | | Desde | Desde | Periodo | Hora |
| Comienzo | Final | Liviano | Pesado | Liviano | Pesado | Liviano | Pesado | Liviano | Pesado | lado Izq. | lado Der. | 15 Min. | Pico |
| 6:00 AM | 6:15 AM | 2 | 0 | 18 | 0 | 12 | 0 | 0 | 0 | | | 32 | 32 |
| 6:15 AM | 6:30 AM | 1 | 0 | 12 | 0 | 17 | 0 | 1 | 0 | | | 31 | 63 |
| 6:30 AM | 6:45 AM | 5 | 1 | 37 | 1 | 41 | 1 | 0 | 0 | | | 86 | 149 |
| 6:45 AM | 7:00 AM | 7 | 0 | 36 | 1 | 45 | 0 | 0 | 0 | | | 89 | 238 |
| Sub-Total | | 15 | 1 | 103 | 2 | 115 | 1 | 1 | 0 | 0 | 0 | | |
| 7:00 AM | 7:15 AM | 11 | 2 | 59 | 7 | 13 | 0 | 0 | 0 | | | 92 | 298 |
| 7:15 AM | 7:30 AM | 11 | 0 | 71 | 0 | 23 | 0 | 0 | 0 | | | 105 | 372 |
| 7:30 AM | 7:45 AM | 23 | 2 | 66 | 0 | 14 | 0 | 0 | 0 | | | 105 | 391 |
| 7:45 AM | 8:00 AM | 12 | 0 | 47 | 0 | 12 | 0 | 0 | 0 | | | 71 | 373 |
| Sub-Total | | 57 | 4 | 243 | 7 | 62 | 0 | 0 | 0 | 0 | 0 | | |
| 8:00 AM | 8:15 AM | 10 | 0 | 35 | 0 | 10 | 0 | 0 | 0 | | | 55 | 336 |
| 8:15 AM | 8:30 AM | 8 | 0 | 42 | 1 | 10 | 0 | 0 | 0 | | | 61 | 292 |
| 8:30 AM | 8:45 AM | 15 | 0 | 33 | 2 | 9 | 0 | 0 | 0 | | | 59 | 246 |
| 8:45 AM | 9:00 AM | 11 | 1 | 20 | 1 | 9 | 0 | 0 | 0 | | | 42 | 217 |
| Sub-Total | | 44 | 1 | 130 | 4 | 38 | 0 | 0 | 0 | 0 | 0 | | |
| 9:00 AM | 9:15 AM | 12 | 1 | 24 | 3 | 7 | 0 | 0 | 0 | | | 47 | 209 |
| 9:15 AM | 9:30 AM | 13 | 0 | 30 | 3 | 10 | 0 | 0 | 0 | | | 56 | 204 |
| 9:30 AM | 9:45 AM | 11 | 0 | 29 | 0 | 13 | 1 | 0 | 0 | | | 54 | 199 |
| 9:45 AM | 10:00 AM | 14 | 1 | 24 | 1 | 6 | 1 | 0 | 0 | | | 47 | 204 |
| Sub-Total | | 50 | 2 | 107 | 7 | 36 | 2 | 0 | 0 | 0 | 0 | | |
| 10:00 AM | 10:15 AM | 12 | 0 | 41 | 0 | 15 | 2 | 0 | 0 | | | 70 | 227 |
| 10:15 AM | 10:30 AM | 17 | 1 | 40 | 2 | 12 | 0 | 0 | 0 | | | 72 | 243 |
| 10:30 AM | 10:45 AM | 10 | 0 | 39 | 1 | 12 | 1 | 0 | 0 | | | 63 | 252 |
| 10:45 AM | 11:00 AM | 8 | 0 | 34 | 2 | 8 | 1 | 0 | 0 | | | 53 | 258 |
| Sub-Total | | 47 | 1 | 154 | 5 | 47 | 4 | 0 | 0 | 0 | 0 | | |
| 11:00 AM | 11:15 AM | 17 | 0 | 38 | 1 | 11 | 0 | 0 | 0 | | | 67 | 255 |
| 11:15 AM | 11:30 AM | 22 | 0 | 33 | 1 | 14 | 0 | 0 | 0 | | | 70 | 253 |
| 11:30 AM | 11:45 AM | 14 | 0 | 40 | 1 | 18 | 0 | 0 | 0 | | | 73 | 263 |
| 11:45 AM | 12:00 PM | 19 | 0 | 43 | 1 | 18 | 1 | 0 | 0 | | | 82 | 292 |
| Sub-Total | | 72 | 0 | 154 | 4 | 61 | 1 | 0 | 0 | 0 | 0 | | |
| 12:00 PM | 12:15 PM | 15 | 1 | 36 | 3 | 11 | 0 | 0 | 0 | | | 66 | 291 |
| 12:15 PM | 12:30 PM | 16 | 0 | 39 | 1 | 14 | 1 | 0 | 0 | | | 71 | 292 |
| 12:30 PM | 12:45 PM | 12 | 0 | 33 | 2 | 15 | 0 | 0 | 0 | | | 62 | 281 |
| 12:45 PM | 1:00 PM | 13 | 0 | 31 | 2 | 16 | 0 | 0 | 0 | | | 62 | 261 |
| Sub-Total | | 56 | 1 | 139 | 8 | 56 | 1 | 0 | 0 | 0 | 0 | | |
| 1:00 PM | 1:15 PM | 13 | 0 | 25 | 0 | 6 | 0 | 0 | 0 | | | 44 | 239 |
| 1:15 PM | 1:30 PM | 16 | 0 | 45 | 2 | 8 | 0 | 0 | 0 | | | 71 | 239 |
| 1:30 PM | 1:45 PM | 14 | 1 | 41 | 1 | 9 | 0 | 0 | 0 | | | 66 | 243 |
| 1:45 PM | 2:00 PM | 15 | 1 | 35 | 0 | 10 | 0 | 0 | 0 | | | 61 | 242 |
| Sub-Total | | 58 | 2 | 146 | 3 | 33 | 0 | 0 | 0 | 0 | 0 | | |
| 2:00 PM | 2:15 PM | 18 | 0 | 50 | 2 | 18 | 2 | 0 | 0 | | | 90 | 288 |
| 2:15 PM | 2:30 PM | 8 | 0 | 49 | 3 | 13 | 0 | 0 | 0 | | | 73 | 290 |
| 2:30 PM | 2:45 PM | 30 | 0 | 84 | 1 | 27 | 0 | 0 | 0 | | | 142 | 366 |
| 2:45 PM | 3:00 PM | 33 | 3 | 57 | 3 | 15 | 0 | 0 | 0 | | | 111 | 416 |
| Sub-Total | | 89 | 3 | 240 | 9 | 73 | 2 | 0 | 0 | 0 | 0 | | |
| 3:00 PM | 3:15 PM | 20 | 0 | 49 | 0 | 17 | 0 | 0 | 0 | | | 86 | 412 |
| 3:15 PM | 3:30 PM | 15 | 1 | 40 | 2 | 15 | 0 | 0 | 0 | | | 73 | 412 |
| 3:30 PM | 3:45 PM | 17 | 0 | 41 | 2 | 5 | 0 | 1 | 0 | | | 66 | 336 |
| 3:45 PM | 4:00 PM | 15 | 0 | 46 | 3 | 12 | 0 | 0 | 0 | | | 76 | 301 |
| Sub-Total | | 67 | 1 | 176 | 7 | 49 | 0 | 1 | 0 | 0 | 0 | | |
| 4:00 PM | 4:15 PM | 21 | 0 | 45 | 1 | 18 | 0 | 0 | 0 | | | 85 | 300 |
| 4:15 PM | 4:30 PM | 19 | 1 | 50 | 1 | 9 | 0 | 1 | 0 | | | 81 | 308 |
| 4:30 PM | 4:45 PM | 19 | 1 | 43 | 1 | 12 | 0 | 0 | 0 | | | 76 | 318 |
| 4:45 PM | 5:00 PM | 19 | 0 | 41 | 1 | 13 | 0 | 0 | 0 | | | 74 | 316 |
| Sub-Total | | 78 | 2 | 179 | 4 | 52 | 0 | 1 | 0 | 0 | 0 | | |
| 5:00 PM | 5:15 PM | 20 | 0 | 44 | 2 | 16 | 0 | 0 | 0 | | | 82 | 313 |
| 5:15 PM | 5:30 PM | 14 | 0 | 43 | 1 | 10 | 0 | 0 | 0 | | | 68 | 300 |
| 5:30 PM | 5:45 PM | 15 | 0 | 37 | 0 | 15 | 0 | 0 | 0 | | | 67 | 291 |
| 5:45 PM | 6:00 PM | 19 | 0 | 45 | 0 | 8 | 0 | 0 | 0 | | | 72 | 289 |
| Sub-Total | | 68 | 0 | 169 | 3 | 49 | 0 | 0 | 0 | 0 | 0 | | |
| Sub-Total | | 701 | 18 | 1,940 | 63 | 671 | 11 | 3 | 0 | 0 | 0 | 3,407 | |

**Tecnico**

**Obesrvaciones**

**Fecha:** Septiembre 14, 2022 **Dia de la Semana:** Miercoles **Cond. del Tiempo :** Soleado

**Periodo :** 6:00 AM @ 6:00 PM **Municipio :** Lajas

**Interseccion** PR-315 **con** PR-116

**Contaje desde el Acceso** B **Carretera.** PR-315

**Descripcion del acceso :** Acceso Este - Un Carril

| Periodo de Estudio | | Afluencia de vehiculos | | | | | | | | Peatones | | Totales | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Izquierda | | Recto | | Derecha | | Viraje en U | | Desde | Desde | Periodo | Hora |
| Comienzo | Final | Liviano | Pesado | Liviano | Pesado | Liviano | Pesado | Liviano | Pesado | lado Izq. | lado Der. | 15 Min. | Pico |
| 6:00 AM | 6:15 AM | 14 | 1 | 18 | 0 | 10 | 0 | 0 | 0 | | | 43 | 43 |
| 6:15 AM | 6:30 AM | 17 | 1 | 29 | 2 | 15 | 1 | 0 | 0 | | | 65 | 108 |
| 6:30 AM | 6:45 AM | 17 | 1 | 61 | 0 | 21 | 0 | 0 | 0 | | | 100 | 208 |
| 6:45 AM | 7:00 AM | 31 | 1 | 82 | 1 | 34 | 0 | 0 | 0 | | | 149 | 357 |
| Sub-Total | | 79 | 4 | 190 | 3 | 80 | 1 | 0 | 0 | 0 | 0 | | |
| 7:00 AM | 7:15 AM | 37 | 1 | 59 | 0 | 49 | 0 | 0 | 0 | | | 146 | 460 |
| 7:15 AM | 7:30 AM | 37 | 0 | 47 | 0 | 44 | 1 | 0 | 0 | | | 129 | 524 |
| 7:30 AM | 7:45 AM | 22 | 1 | 59 | 0 | 28 | 0 | 0 | 0 | | | 110 | 534 |
| 7:45 AM | 8:00 AM | 22 | 0 | 42 | 0 | 24 | 1 | 0 | 0 | | | 89 | 474 |
| Sub-Total | | 118 | 2 | 207 | 0 | 145 | 2 | 0 | 0 | 0 | 0 | | |
| 8:00 AM | 8:15 AM | 13 | 0 | 53 | 0 | 19 | 1 | 0 | 0 | | | 86 | 414 |
| 8:15 AM | 8:30 AM | 12 | 0 | 48 | 0 | 25 | 1 | 0 | 0 | | | 86 | 371 |
| 8:30 AM | 8:45 AM | 11 | 0 | 48 | 0 | 18 | 0 | 0 | 0 | | | 77 | 338 |
| 8:45 AM | 9:00 AM | 9 | 0 | 44 | 1 | 17 | 0 | 0 | 0 | | | 71 | 320 |
| Sub-Total | | 45 | 0 | 193 | 1 | 79 | 2 | 0 | 0 | 0 | 0 | | |
| 9:00 AM | 9:15 AM | 19 | 2 | 42 | 2 | 12 | 1 | 0 | 0 | | | 78 | 312 |
| 9:15 AM | 9:30 AM | 16 | 2 | 34 | 1 | 21 | 0 | 0 | 0 | | | 74 | 300 |
| 9:30 AM | 9:45 AM | 17 | 1 | 30 | 0 | 19 | 1 | 0 | 0 | | | 68 | 291 |
| 9:45 AM | 10:00 AM | 15 | 3 | 42 | 0 | 22 | 1 | 0 | 0 | | | 83 | 303 |
| Sub-Total | | 67 | 8 | 148 | 3 | 74 | 3 | 0 | 0 | 0 | 0 | | |
| 10:00 AM | 10:15 AM | 22 | 1 | 31 | 0 | 10 | 1 | 0 | 0 | | | 65 | 290 |
| 10:15 AM | 10:30 AM | 18 | 2 | 42 | 0 | 15 | 1 | 0 | 0 | | | 78 | 294 |
| 10:30 AM | 10:45 AM | 21 | 1 | 31 | 0 | 6 | 0 | 0 | 0 | | | 59 | 285 |
| 10:45 AM | 11:00 AM | 20 | 0 | 43 | 0 | 26 | 1 | 0 | 0 | | | 90 | 292 |
| Sub-Total | | 81 | 4 | 147 | 0 | 57 | 3 | 0 | 0 | 0 | 0 | | |
| 11:00 AM | 11:15 AM | 19 | 2 | 34 | 1 | 32 | 0 | 0 | 0 | | | 88 | 315 |
| 11:15 AM | 11:30 AM | 24 | 0 | 52 | 1 | 23 | 1 | 0 | 0 | | | 101 | 338 |
| 11:30 AM | 11:45 AM | 21 | 0 | 39 | 1 | 20 | 4 | 0 | 0 | | | 85 | 364 |
| 11:45 AM | 12:00 PM | 16 | 0 | 41 | 1 | 16 | 0 | 0 | 0 | | | 74 | 348 |
| Sub-Total | | 80 | 2 | 166 | 4 | 91 | 5 | 0 | 0 | 0 | 0 | | |
| 12:00 PM | 12:15 PM | 18 | 0 | 51 | 0 | 18 | 0 | 0 | 0 | | | 87 | 347 |
| 12:15 PM | 12:30 PM | 17 | 3 | 37 | 0 | 27 | 1 | 0 | 0 | | | 85 | 331 |
| 12:30 PM | 12:45 PM | 24 | 0 | 43 | 0 | 21 | 1 | 0 | 0 | | | 89 | 335 |
| 12:45 PM | 1:00 PM | 21 | 0 | 45 | 0 | 23 | 0 | 0 | 0 | | | 89 | 350 |
| Sub-Total | | 80 | 3 | 176 | 0 | 89 | 2 | 0 | 0 | 0 | 0 | | |
| 1:00 PM | 1:15 PM | 20 | 2 | 22 | 1 | 17 | 0 | 0 | 0 | | | 62 | 325 |
| 1:15 PM | 1:30 PM | 12 | 1 | 30 | 1 | 14 | 0 | 0 | 0 | | | 58 | 298 |
| 1:30 PM | 1:45 PM | 19 | 0 | 31 | 0 | 15 | 0 | 0 | 0 | | | 65 | 274 |
| 1:45 PM | 2:00 PM | 27 | 1 | 46 | 1 | 23 | 1 | 0 | 0 | | | 99 | 284 |
| Sub-Total | | 78 | 4 | 129 | 3 | 69 | 1 | 0 | 0 | 0 | 0 | | |
| 2:00 PM | 2:15 PM | 25 | 0 | 35 | 2 | 24 | 1 | 0 | 0 | | | 87 | 309 |
| 2:15 PM | 2:30 PM | 43 | 3 | 45 | 3 | 33 | 0 | 0 | 0 | | | 127 | 378 |
| 2:30 PM | 2:45 PM | 18 | 1 | 45 | 0 | 25 | 0 | 0 | 0 | | | 89 | 402 |
| 2:45 PM | 3:00 PM | 24 | 0 | 37 | 0 | 34 | 2 | 0 | 0 | | | 97 | 400 |
| Sub-Total | | 110 | 4 | 162 | 5 | 116 | 3 | 0 | 0 | 0 | 0 | | |
| 3:00 PM | 3:15 PM | 25 | 1 | 40 | 0 | 22 | 0 | 0 | 0 | | | 88 | 401 |
| 3:15 PM | 3:30 PM | 26 | 0 | 47 | 1 | 28 | 0 | 0 | 0 | | | 102 | 376 |
| 3:30 PM | 3:45 PM | 26 | 0 | 27 | 0 | 24 | 0 | 0 | 0 | | | 77 | 364 |
| 3:45 PM | 4:00 PM | 23 | 1 | 33 | 1 | 20 | 1 | 0 | 0 | | | 79 | 346 |
| Sub-Total | | 100 | 2 | 147 | 2 | 94 | 1 | 0 | 0 | 0 | 0 | | |
| 4:00 PM | 4:15 PM | 18 | 1 | 41 | 0 | 19 | 1 | 0 | 0 | | | 80 | 338 |
| 4:15 PM | 4:30 PM | 14 | 2 | 36 | 0 | 22 | 0 | 0 | 0 | | | 74 | 310 |
| 4:30 PM | 4:45 PM | 15 | 1 | 29 | 0 | 14 | 0 | 0 | 0 | | | 59 | 292 |
| 4:45 PM | 5:00 PM | 20 | 1 | 35 | 3 | 20 | 1 | 0 | 0 | | | 80 | 293 |
| Sub-Total | | 67 | 5 | 141 | 3 | 75 | 2 | 0 | 0 | 0 | 0 | | |
| 5:00 PM | 5:15 PM | 17 | 1 | 37 | 1 | 19 | 0 | 0 | 0 | | | 75 | 288 |
| 5:15 PM | 5:30 PM | 13 | 0 | 34 | 1 | 8 | 0 | 0 | 0 | | | 56 | 270 |
| 5:30 PM | 5:45 PM | 13 | 0 | 33 | 0 | 8 | 0 | 0 | 0 | | | 54 | 265 |
| 5:45 PM | 6:00 PM | 25 | 0 | 42 | 0 | 14 | 0 | 0 | 0 | | | 81 | 266 |
| Sub-Total | | 68 | 1 | 146 | 2 | 49 | 0 | 0 | 0 | 0 | 0 | | |
| Sub-Total | | 973 | 39 | 1,952 | 26 | 1,018 | 25 | 0 | 0 | 0 | 0 | 4,033 | |

**Tecnico**

**Obesrvaciones**

**Fecha:** Septiembre 14, 2022 **Dia de la Semana:** Miercoles **Cond. del Tiempo :**

**Periodo :** 6:00 AM @ 6:00 PM **Municipio :** Lajas

**Interseccion** PR-315 **con** PR-116

**Contaje desde el Acceso** C **Carretera** PR-116

**Descripcion del acceso :** Acceso Sur - Dos Carriles

| Periodo de Estudio | | Afluencia de vehiculos | | | | | | | | Peatones | | Totales | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Izquierda | | Recto | | Derecha | | Viraje en U | | Desde | Desde | Periodo | Hora |
| Comienzo | Final | Liviano | Pesado | Liviano | Pesado | Liviano | Pesado | Liviano | Pesado | lado Izq. | lado Der. | 15 Min. | Pico |
| 6:00 AM | 6:15 AM | 10 | 0 | 28 | 0 | 5 | 0 | 0 | 0 | | | 43 | 43 |
| 6:15 AM | 6:30 AM | 29 | 0 | 32 | 0 | 10 | 1 | 0 | 0 | | | 72 | 115 |
| 6:30 AM | 6:45 AM | 29 | 1 | 52 | 0 | 10 | 0 | 0 | 0 | | | 92 | 207 |
| 6:45 AM | 7:00 AM | 52 | 1 | 63 | 0 | 20 | 0 | 0 | 0 | | | 136 | 343 |
| Sub-Total | | 120 | 2 | 175 | 0 | 45 | 1 | 0 | 0 | 0 | 0 | | |
| 7:00 AM | 7:15 AM | 28 | 0 | 66 | 2 | 12 | 1 | 0 | 0 | | | 109 | 409 |
| 7:15 AM | 7:30 AM | 28 | 2 | 89 | 1 | 15 | 1 | 0 | 0 | | | 136 | 473 |
| 7:30 AM | 7:45 AM | 38 | 1 | 61 | 1 | 17 | 2 | 0 | 0 | | | 120 | 501 |
| 7:45 AM | 8:00 AM | 36 | 0 | 62 | 2 | 13 | 1 | 0 | 0 | | | 114 | 479 |
| Sub-Total | | 130 | 3 | 278 | 6 | 57 | 5 | 0 | 0 | 0 | 0 | | |
| 8:00 AM | 8:15 AM | 35 | 0 | 43 | 1 | 13 | 0 | 0 | 0 | | | 92 | 462 |
| 8:15 AM | 8:30 AM | 34 | 0 | 37 | 0 | 13 | 0 | 0 | 0 | | | 84 | 410 |
| 8:30 AM | 8:45 AM | 30 | 1 | 36 | 1 | 12 | 1 | 0 | 0 | | | 81 | 371 |
| 8:45 AM | 9:00 AM | 38 | 0 | 42 | 1 | 17 | 1 | 0 | 0 | | | 99 | 356 |
| Sub-Total | | 137 | 1 | 158 | 3 | 55 | 2 | 0 | 0 | 0 | 0 | | |
| 9:00 AM | 9:15 AM | 35 | 0 | 34 | 0 | 22 | 0 | 0 | 0 | | | 91 | 355 |
| 9:15 AM | 9:30 AM | 30 | 0 | 38 | 2 | 13 | 0 | 0 | 0 | | | 83 | 354 |
| 9:30 AM | 9:45 AM | 24 | 1 | 35 | 3 | 19 | 0 | 0 | 0 | | | 82 | 355 |
| 9:45 AM | 10:00 AM | 25 | 2 | 28 | 2 | 9 | 0 | 0 | 0 | | | 66 | 322 |
| Sub-Total | | 114 | 3 | 135 | 7 | 63 | 0 | 0 | 0 | 0 | 0 | | |
| 10:00 AM | 10:15 AM | 22 | 0 | 26 | 4 | 13 | 1 | 0 | 0 | | | 66 | 297 |
| 10:15 AM | 10:30 AM | 33 | 0 | 37 | 1 | 16 | 1 | 0 | 0 | | | 88 | 302 |
| 10:30 AM | 10:45 AM | 21 | 1 | 44 | 2 | 22 | 2 | 0 | 0 | | | 92 | 312 |
| 10:45 AM | 11:00 AM | 23 | 2 | 37 | 3 | 18 | 1 | 0 | 0 | | | 84 | 330 |
| Sub-Total | | 99 | 3 | 144 | 10 | 69 | 5 | 0 | 0 | 0 | 0 | | |
| 11:00 AM | 11:15 AM | 32 | 1 | 34 | 0 | 24 | 0 | 0 | 0 | | | 91 | 355 |
| 11:15 AM | 11:30 AM | 29 | 0 | 46 | 2 | 20 | 0 | 0 | 0 | | | 97 | 364 |
| 11:30 AM | 11:45 AM | 20 | 0 | 33 | 3 | 20 | 0 | 0 | 0 | | | 76 | 348 |
| 11:45 AM | 12:00 PM | 30 | 0 | 41 | 1 | 23 | 2 | 0 | 0 | | | 97 | 361 |
| Sub-Total | | 111 | 1 | 154 | 6 | 87 | 2 | 0 | 0 | 0 | 0 | | |
| 12:00 PM | 12:15 PM | 23 | 0 | 40 | 2 | 20 | 2 | 0 | 0 | | | 87 | 357 |
| 12:15 PM | 12:30 PM | 32 | 1 | 34 | 3 | 20 | 2 | 0 | 0 | | | 92 | 352 |
| 12:30 PM | 12:45 PM | 34 | 0 | 34 | 1 | 24 | 2 | 0 | 0 | | | 95 | 371 |
| 12:45 PM | 1:00 PM | 32 | 0 | 51 | 1 | 22 | 1 | 0 | 0 | | | 107 | 381 |
| Sub-Total | | 121 | 1 | 159 | 7 | 86 | 7 | 0 | 0 | 0 | 0 | | |
| 1:00 PM | 1:15 PM | 21 | 2 | 40 | 1 | 28 | 1 | 0 | 0 | | | 93 | 387 |
| 1:15 PM | 1:30 PM | 22 | 0 | 53 | 5 | 15 | 2 | 0 | 0 | | | 97 | 392 |
| 1:30 PM | 1:45 PM | 33 | 0 | 51 | 0 | 27 | 1 | 0 | 0 | | | 112 | 409 |
| 1:45 PM | 2:00 PM | 25 | 0 | 36 | 4 | 23 | 0 | 0 | 0 | | | 88 | 390 |
| Sub-Total | | 101 | 2 | 180 | 10 | 93 | 4 | 0 | 0 | 0 | 0 | | |
| 2:00 PM | 2:15 PM | 23 | 1 | 54 | 3 | 20 | 1 | 0 | 0 | | | 102 | 399 |
| 2:15 PM | 2:30 PM | 28 | 0 | 65 | 1 | 23 | 0 | 2 | 0 | | | 119 | 421 |
| 2:30 PM | 2:45 PM | 31 | 1 | 89 | 1 | 42 | 0 | 0 | 0 | | | 164 | 473 |
| 2:45 PM | 3:00 PM | 23 | 0 | 78 | 1 | 36 | 1 | 1 | 0 | | | 140 | 525 |
| Sub-Total | | 105 | 2 | 286 | 6 | 121 | 2 | 3 | 0 | 0 | 0 | | |
| 3:00 PM | 3:15 PM | 29 | 0 | 51 | 1 | 28 | 1 | 1 | 0 | | | 111 | 534 |
| 3:15 PM | 3:30 PM | 27 | 1 | 37 | 1 | 24 | 0 | 0 | 0 | | | 90 | 505 |
| 3:30 PM | 3:45 PM | 16 | 0 | 41 | 3 | 51 | 0 | 0 | 0 | | | 111 | 452 |
| 3:45 PM | 4:00 PM | 17 | 0 | 45 | 0 | 32 | 0 | 0 | 0 | | | 94 | 406 |
| Sub-Total | | 89 | 1 | 174 | 5 | 135 | 1 | 1 | 0 | 0 | 0 | | |
| 4:00 PM | 4:15 PM | 26 | 0 | 43 | 1 | 28 | 1 | 0 | 0 | | | 99 | 394 |
| 4:15 PM | 4:30 PM | 23 | 0 | 34 | 0 | 25 | 0 | 0 | 0 | | | 82 | 386 |
| 4:30 PM | 4:45 PM | 18 | 0 | 37 | 0 | 19 | 0 | 0 | 0 | | | 74 | 349 |
| 4:45 PM | 5:00 PM | 18 | 1 | 33 | 0 | 18 | 0 | 0 | 0 | | | 70 | 325 |
| Sub-Total | | 85 | 1 | 147 | 1 | 90 | 1 | 0 | 0 | 0 | 0 | | |
| 5:00 PM | 5:15 PM | 24 | 1 | 45 | 1 | 26 | 1 | 0 | 0 | | | 98 | 324 |
| 5:15 PM | 5:30 PM | 19 | 1 | 39 | 1 | 23 | 2 | 0 | 0 | | | 85 | 327 |
| 5:30 PM | 5:45 PM | 28 | 0 | 46 | 1 | 18 | 2 | 0 | 0 | | | 95 | 348 |
| 5:45 PM | 6:00 PM | 27 | 0 | 36 | 0 | 25 | 2 | 0 | 0 | | | 90 | 368 |
| Sub-Total | | 98 | 2 | 166 | 3 | 92 | 7 | 0 | 0 | 0 | 0 | | |
| Sub-Total | | 1,310 | 22 | 2,156 | 64 | 993 | 37 | 4 | 0 | 0 | 0 | 4,586 | |

**Tecnico**

**Obesrvaciones**

**Fecha:** Septiembre 14, 2022 **Dia de la Semana:** Miercoles **Cond. del Tiempo :** Soleado

**Periodo :** 6:00 AM @ 6:00 PM **Municipio :** Lajas

**Interseccion** PR-315 **con** PR-116

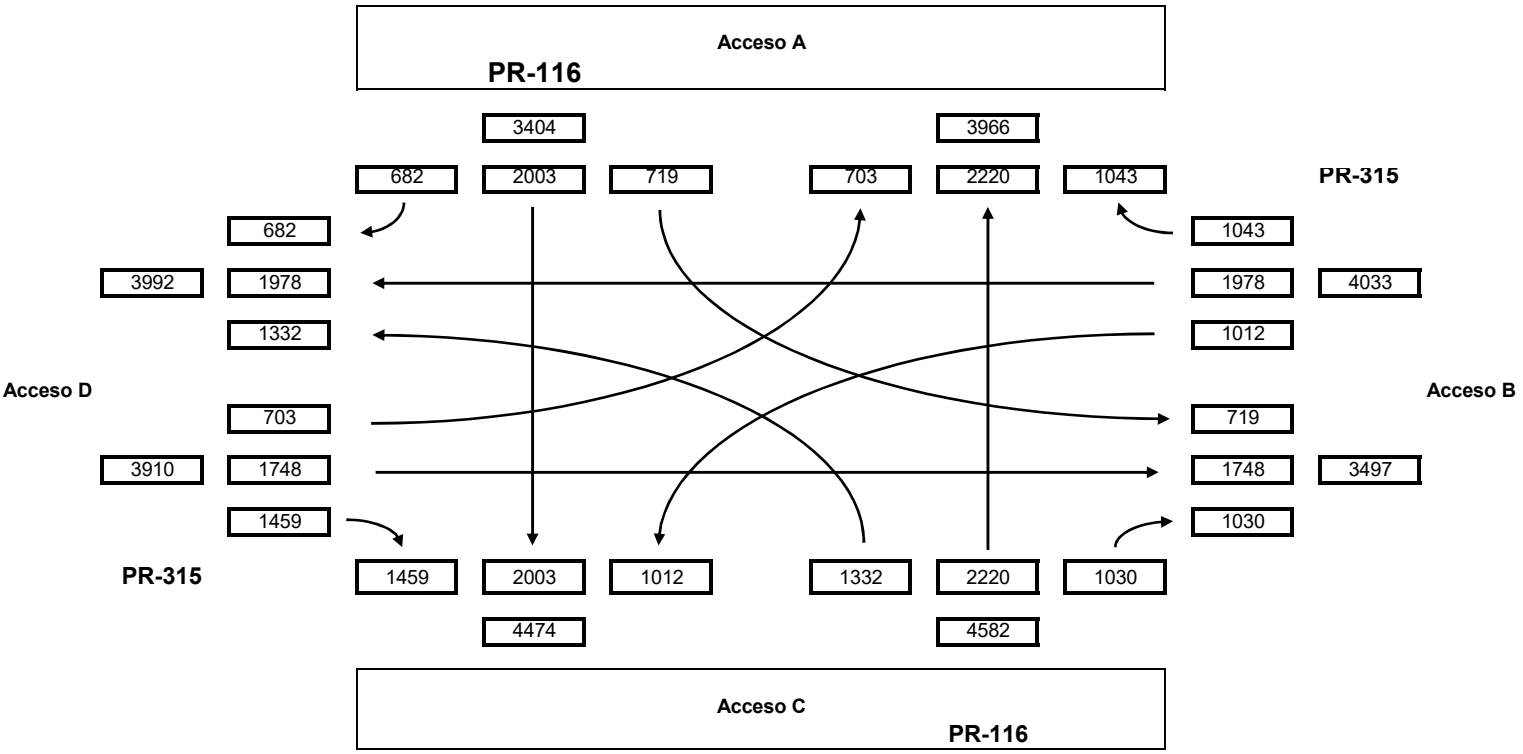
**Contaje desde el Acceso** D **Carretera** PR-315

**Descripcion del acceso :** Acceso Oeste - Dos Carriles

| Periodo de Estudio | | Afluencia de vehiculos | | | | | | | | Peatones | | Totales | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Izquierda | | Recto | | Derecha | | Viraje en U | | Desde | Desde | Periodo | Hora |
| Comienzo | Final | Liviano | Pesado | Liviano | Pesado | Liviano | Pesado | Liviano | Pesado | lado Izq. | lado Der. | 15 Min. | Pico |
| 6:00 AM | 6:15 AM | 4 | 0 | 4 | 0 | 9 | 0 | 0 | 0 | | | 17 | 17 |
| 6:15 AM | 6:30 AM | 2 | 0 | 11 | 0 | 8 | 0 | 0 | 0 | | | 21 | 38 |
| 6:30 AM | 6:45 AM | 14 | 0 | 19 | 0 | 15 | 0 | 0 | 0 | | | 48 | 86 |
| 6:45 AM | 7:00 AM | 10 | 0 | 18 | 0 | 31 | 1 | 0 | 0 | | | 60 | 146 |
| Sub-Total | | 30 | 0 | 52 | 0 | 63 | 1 | 0 | 0 | 0 | 0 | | |
| 7:00 AM | 7:15 AM | 14 | 1 | 23 | 0 | 20 | 0 | 0 | 0 | | | 58 | 187 |
| 7:15 AM | 7:30 AM | 27 | 0 | 25 | 0 | 28 | 5 | 0 | 0 | | | 85 | 251 |
| 7:30 AM | 7:45 AM | 13 | 0 | 41 | 0 | 29 | 0 | 0 | 0 | | | 83 | 286 |
| 7:45 AM | 8:00 AM | 16 | 0 | 26 | 1 | 19 | 1 | 0 | 0 | | | 63 | 289 |
| Sub-Total | | 70 | 1 | 115 | 1 | 96 | 6 | 0 | 0 | 0 | 0 | | |
| 8:00 AM | 8:15 AM | 12 | 0 | 24 | 0 | 27 | 0 | 0 | 0 | | | 63 | 294 |
| 8:15 AM | 8:30 AM | 9 | 0 | 36 | 2 | 27 | 0 | 0 | 0 | | | 74 | 283 |
| 8:30 AM | 8:45 AM | 12 | 1 | 44 | 1 | 26 | 0 | 0 | 0 | | | 84 | 284 |
| 8:45 AM | 9:00 AM | 10 | 0 | 31 | 2 | 29 | 0 | 0 | 0 | | | 72 | 293 |
| Sub-Total | | 43 | 1 | 135 | 5 | 109 | 0 | 0 | 0 | 0 | 0 | | |
| 9:00 AM | 9:15 AM | 16 | 0 | 36 | 0 | 33 | 0 | 0 | 0 | | | 85 | 315 |
| 9:15 AM | 9:30 AM | 10 | 0 | 36 | 0 | 23 | 0 | 0 | 0 | | | 69 | 310 |
| 9:30 AM | 9:45 AM | 11 | 0 | 33 | 1 | 28 | 2 | 0 | 0 | | | 75 | 301 |
| 9:45 AM | 10:00 AM | 18 | 1 | 35 | 0 | 32 | 0 | 0 | 0 | | | 86 | 315 |
| Sub-Total | | 55 | 1 | 140 | 1 | 116 | 2 | 0 | 0 | 0 | 0 | | |
| 10:00 AM | 10:15 AM | 15 | 0 | 38 | 0 | 29 | 2 | 0 | 0 | | | 84 | 314 |
| 10:15 AM | 10:30 AM | 8 | 1 | 32 | 0 | 20 | 0 | 0 | 0 | | | 61 | 306 |
| 10:30 AM | 10:45 AM | 16 | 0 | 38 | 0 | 36 | 3 | 0 | 0 | | | 93 | 324 |
| 10:45 AM | 11:00 AM | 11 | 0 | 45 | 1 | 29 | 1 | 0 | 0 | | | 87 | 325 |
| Sub-Total | | 50 | 1 | 153 | 1 | 114 | 6 | 0 | 0 | 0 | 0 | | |
| 11:00 AM | 11:15 AM | 18 | 1 | 37 | 2 | 34 | 1 | 0 | 0 | | | 93 | 334 |
| 11:15 AM | 11:30 AM | 9 | 0 | 37 | 1 | 21 | 1 | 0 | 0 | | | 69 | 342 |
| 11:30 AM | 11:45 AM | 18 | 0 | 44 | 0 | 38 | 1 | 0 | 0 | | | 101 | 350 |
| 11:45 AM | 12:00 PM | 13 | 0 | 35 | 0 | 32 | 1 | 0 | 0 | | | 81 | 344 |
| Sub-Total | | 58 | 1 | 153 | 3 | 125 | 4 | 0 | 0 | 0 | 0 | | |
| 12:00 PM | 12:15 PM | 16 | 0 | 60 | 1 | 36 | 2 | 0 | 0 | | | 115 | 366 |
| 12:15 PM | 12:30 PM | 12 | 0 | 41 | 0 | 34 | 2 | 0 | 0 | | | 89 | 386 |
| 12:30 PM | 12:45 PM | 12 | 0 | 39 | 0 | 34 | 0 | 0 | 0 | | | 85 | 370 |
| 12:45 PM | 1:00 PM | 20 | 0 | 39 | 0 | 36 | 1 | 0 | 0 | | | 96 | 385 |
| Sub-Total | | 60 | 0 | 179 | 1 | 140 | 5 | 0 | 0 | 0 | 0 | | |
| 1:00 PM | 1:15 PM | 9 | 0 | 28 | 0 | 33 | 0 | 0 | 0 | | | 70 | 340 |
| 1:15 PM | 1:30 PM | 12 | 2 | 30 | 0 | 30 | 1 | 0 | 0 | | | 75 | 326 |
| 1:30 PM | 1:45 PM | 12 | 0 | 38 | 0 | 31 | 1 | 0 | 0 | | | 82 | 323 |
| 1:45 PM | 2:00 PM | 10 | 0 | 25 | 0 | 31 | 0 | 0 | 0 | | | 66 | 293 |
| Sub-Total | | 43 | 2 | 121 | 0 | 125 | 2 | 0 | 0 | 0 | 0 | | |
| 2:00 PM | 2:15 PM | 10 | 0 | 33 | 0 | 32 | 0 | 0 | 0 | | | 75 | 298 |
| 2:15 PM | 2:30 PM | 14 | 2 | 32 | 1 | 23 | 0 | 0 | 0 | | | 72 | 295 |
| 2:30 PM | 2:45 PM | 40 | 0 | 52 | 0 | 36 | 1 | 0 | 0 | | | 129 | 342 |
| 2:45 PM | 3:00 PM | 26 | 0 | 48 | 0 | 41 | 0 | 0 | 0 | | | 115 | 391 |
| Sub-Total | | 90 | 2 | 165 | 1 | 132 | 1 | 0 | 0 | 0 | 0 | | |
| 3:00 PM | 3:15 PM | 17 | 1 | 44 | 0 | 24 | 1 | 0 | 0 | | | 87 | 403 |
| 3:15 PM | 3:30 PM | 16 | 0 | 32 | 0 | 32 | 0 | 0 | 0 | | | 80 | 411 |
| 3:30 PM | 3:45 PM | 53 | 0 | 61 | 0 | 39 | 0 | 0 | 0 | | | 153 | 435 |
| 3:45 PM | 4:00 PM | 28 | 1 | 55 | 1 | 39 | 0 | 0 | 0 | | | 124 | 444 |
| Sub-Total | | 114 | 2 | 192 | 1 | 134 | 1 | 0 | 0 | 0 | 0 | | |
| 4:00 PM | 4:15 PM | 12 | 0 | 44 | 1 | 47 | 0 | 0 | 0 | | | 104 | 461 |
| 4:15 PM | 4:30 PM | 12 | 0 | 36 | 0 | 37 | 1 | 0 | 0 | | | 86 | 467 |
| 4:30 PM | 4:45 PM | 12 | 0 | 42 | 0 | 34 | 1 | 0 | 0 | | | 89 | 403 |
| 4:45 PM | 5:00 PM | 2 | 0 | 43 | 0 | 20 | 0 | 0 | 0 | | | 65 | 344 |
| Sub-Total | | 38 | 0 | 165 | 1 | 138 | 2 | 0 | 0 | 0 | 0 | | |
| 5:00 PM | 5:15 PM | 10 | 0 | 50 | 1 | 47 | 1 | 0 | 0 | | | 109 | 349 |
| 5:15 PM | 5:30 PM | 10 | 0 | 39 | 0 | 28 | 1 | 0 | 0 | | | 78 | 341 |
| 5:30 PM | 5:45 PM | 9 | 0 | 39 | 1 | 32 | 0 | 0 | 0 | | | 81 | 333 |
| 5:45 PM | 6:00 PM | 12 | 0 | 33 | 0 | 28 | 0 | 0 | 0 | | | 73 | 341 |
| Sub-Total | | 41 | 0 | 161 | 2 | 135 | 2 | 0 | 0 | 0 | 0 | | |
| Sub-Total | | 692 | 11 | 1,731 | 17 | 1,427 | 32 | 0 | 0 | 0 | 0 | 3,910 | |

**Tecnico**

**Obesrvaciones**


Acceso A
PR-116
3404
3966
682
2003
719
703
2220
1043
PR-315
682
1043
3992
1978
1978
4033
1332
1012
Acceso D
Acceso B
703
719
3910
1748
1748
3497
1459
1030
PR-315
1459
2003
1012
1332
2220
1030
4474
4582
Acceso C
PR-116

## Intersection : PR-315 with PR-116

### MORNING PEAK HOUR FACTOR

| Time Period | | North Access (Southbound) | | | | | | East Access (Westbound) | | | | | | South Access (Northbound) | | | | | | West Access (Eastbound) | | | | | | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Left | | Thru | | Right | | Left | | Thru | | Right | | Left | | Thru | | Right | | Left | | Thru | | Right | | |
| | | Light | Heavy | Light | Heavy | Light | Heavy | Light | Heavy | Light | Heavy | Light | Heavy | Light | Heavy | Light | Heavy | Light | Heavy | Light | Heavy | Light | Heavy | Light | Heavy | |
| 6:45 AM | 7:00 AM | 7 | 0 | 36 | 1 | 45 | 0 | 31 | 1 | 82 | 1 | 34 | 0 | 52 | 1 | 63 | 0 | 20 | 0 | 10 | 0 | 18 | 0 | 31 | 1 | 434 |
| 7:00 AM | 7:15 AM | 11 | 2 | 59 | 7 | 13 | 0 | 37 | 1 | 59 | 0 | 49 | 0 | 28 | 0 | 66 | 2 | 12 | 1 | 14 | 1 | 23 | 0 | 20 | 0 | 405 |
| 7:15 AM | 7:30 AM | 11 | 0 | 71 | 0 | 23 | 0 | 37 | 0 | 47 | 0 | 44 | 1 | 28 | 2 | 89 | 1 | 15 | 1 | 27 | 0 | 25 | 0 | 28 | 5 | 455 |
| 7:30 AM | 7:45 AM | 23 | 2 | 66 | 0 | 14 | 0 | 22 | 1 | 59 | 0 | 28 | 0 | 38 | 1 | 61 | 1 | 17 | 2 | 13 | 0 | 41 | 0 | 29 | 0 | 418 |
| | Total | 52 | 4 | 232 | 8 | 95 | 0 | 127 | 3 | 247 | 1 | 155 | 1 | 146 | 4 | 279 | 4 | 64 | 4 | 64 | 1 | 107 | 0 | 108 | 6 | 1712 |

| | North Access | | | East Access | | | South Access | | | West Access | | | Intersection | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right | | |
| Total Flow Period, T (minutes) | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | |
| Peak Flow Period, $T_p$ (minutes) | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | |
| Volume Count during the Total Flow Period, $v_a$ (veh) | 56 | 240 | 95 | 130 | 248 | 156 | 150 | 283 | 68 | 65 | 107 | 114 | 1712 | |
| Volume Count during the Peak Flow Period, $v_p$ (veh) | 25 | 71 | 45 | 38 | 83 | 49 | 53 | 90 | 20 | 27 | 41 | 33 | 455 | |
| Average Flow Rate during the Total Flow Period, $q_a$ (veh/hr) | 56 | 240 | 95 | 130 | 248 | 156 | 150 | 283 | 68 | 65 | 107 | 114 | 1712 | |
| Average Flow Rate during the Peak Flow Period, $q_p$ (veh/hr) | 100 | 284 | 180 | 152 | 332 | 196 | 212 | 360 | 80 | 108 | 164 | 132 | 1820 | |
| Peak Time Factor, PTF | 25% | 25% | 25% | 25% | 25% | 25% | 25% | 25% | 25% | 25% | 25% | 25% | 25% | |
| Peak Flow Factor, PFF | 56% | 85% | 53% | 86% | 75% | 80% | 71% | 79% | 85% | 60% | 65% | 86% | 94% | |
| Unit Time for Volumes, $T_v$ (minutes) | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | |
| Minimum Total Flow Period, $T_m$ (minutes) | 26.78571 | 17.75 | 28.42105 | 17.53846 | 20.08065 | 18.84615 | 21.2 | 19.08127 | 17.64706 | 24.92308 | 22.99065 | 17.36842 | 15.94626 | ≤ Tv, OK |
| Duration of Non-Peak Flow Period, $T_n$ (minutes) | 45 | 45 | 45 | 45 | 45 | 45 | 45 | 45 | 45 | 45 | 45 | 45 | 45 | |
| Average Flow Rate during the Non-Peak Flow Period, $q_n$ (veh/hr) | 41 | 225 | 67 | 123 | 220 | 143 | 129 | 257 | 64 | 51 | 88 | 108 | 1676 | |
| Volume Count during the Non-Peak Flow Period, $v_n$ (veh) | 31 | 169 | 50 | 92 | 165 | 107 | 97 | 193 | 48 | 38 | 66 | 81 | 1257 | |

### AFTERNOON PEAK HOUR FACTOR

| Time Period | | North Access (Southbound) | | | | | | East Access (Westbound) | | | | | | South Access (Northbound) | | | | | | West Access (Eastbound) | | | | | | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Left | | Thru | | Right | | Left | | Thru | | Right | | Left | | Thru | | Right | | Left | | Thru | | Right | | |
| | | Light | Heavy | Light | Heavy | Light | Heavy | Light | Heavy | Light | Heavy | Light | Heavy | Light | Heavy | Light | Heavy | Light | Heavy | Light | Heavy | Light | Heavy | Light | Heavy | |
| 2:15 PM | 2:30 PM | 8 | 0 | 49 | 3 | 13 | 0 | 43 | 3 | 45 | 3 | 33 | 0 | 28 | 0 | 65 | 1 | 23 | 0 | 14 | 2 | 32 | 1 | 23 | 0 | 389 |
| 2:30 PM | 2:45 PM | 30 | 0 | 84 | 1 | 27 | 0 | 18 | 1 | 45 | 0 | 25 | 0 | 31 | 1 | 89 | 1 | 42 | 0 | 40 | 0 | 52 | 0 | 36 | 1 | 524 |
| 2:45 PM | 3:00 PM | 33 | 3 | 57 | 3 | 15 | 0 | 24 | 0 | 37 | 0 | 34 | 2 | 23 | 0 | 78 | 1 | 36 | 1 | 26 | 0 | 48 | 0 | 41 | 0 | 462 |
| 3:00 PM | 3:15 PM | 20 | 0 | 49 | 0 | 17 | 0 | 25 | 1 | 40 | 0 | 22 | 0 | 29 | 0 | 51 | 1 | 28 | 1 | 17 | 1 | 44 | 0 | 24 | 1 | 371 |
| | Total | 91 | 3 | 239 | 7 | 72 | 0 | 110 | 5 | 167 | 3 | 114 | 2 | 111 | 1 | 283 | 4 | 129 | 2 | 97 | 3 | 176 | 1 | 124 | 2 | 1746 |

| | North Access | | | East Access | | | South Access | | | West Access | | | Intersection | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right | | |
| Total Flow Period, T (minutes) | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | |
| Peak Flow Period, $T_p$ (minutes) | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | |
| Volume Count during the Total Flow Period, $v_a$ (veh) | 94 | 246 | 72 | 115 | 170 | 116 | 112 | 287 | 131 | 100 | 177 | 126 | 1746 | |
| Volume Count during the Peak Flow Period, $v_p$ (veh) | 36 | 85 | 27 | 46 | 48 | 36 | 32 | 90 | 42 | 40 | 52 | 41 | 524 | |
| Average Flow Rate during the Total Flow Period, $q_a$ (veh/hr) | 94 | 246 | 72 | 115 | 170 | 116 | 112 | 287 | 131 | 100 | 177 | 126 | 1746 | |
| Average Flow Rate during the Peak Flow Period, $q_p$ (veh/hr) | 144 | 340 | 108 | 184 | 192 | 144 | 128 | 360 | 168 | 160 | 208 | 164 | 2096 | |
| Peak Time Factor, PTF | 25% | 25% | 25% | 25% | 25% | 25% | 25% | 25% | 25% | 25% | 25% | 25% | 25% | |
| Peak Flow Factor, PFF | 65% | 72% | 67% | 63% | 89% | 81% | 88% | 80% | 78% | 63% | 85% | 77% | 83% | |
| Unit Time for Volumes, $T_v$ (minutes) | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | |
| Minimum Total Flow Period, $T_m$ (minutes) | 22.97872 | 20.73171 | 22.5 | 24 | 16.94118 | 18.62069 | 17.14286 | 18.81533 | 19.23664 | 24 | 17.62712 | 19.52381 | 18.00687 | ≤ Tv, OK |
| Duration of Non-Peak Flow Period, $T_n$ (minutes) | 45 | 45 | 45 | 45 | 45 | 45 | 45 | 45 | 45 | 45 | 45 | 45 | 45 | |
| Average Flow Rate during the Non-Peak Flow Period, $q_n$ (veh/hr) | 77 | 215 | 60 | 92 | 163 | 107 | 107 | 263 | 119 | 80 | 167 | 113 | 1629 | |
| Volume Count during the Non-Peak Flow Period, $v_n$ (veh) | 58 | 161 | 45 | 69 | 122 | 80 | 80 | 197 | 89 | 60 | 125 | 85 | 1222 | |

**Fecha:** Septiembre 14, 2022 **Dia de la Semana:** Miercoles **Cond. del Tiempo :** Soleado

**Periodo :** 6:00 AM @ 6:00 PM **Municipio :** Lajas

**Interseccion** PR-122 **con** PR-116

**Contaje desde el Acceso** A **Carretera** PR-122

**Descripcion del acceso :** Acceso Norte - Tres Carriles

| Periodo de Estudio | | Afluencia de vehiculos | | | | | | | | Peatones | | Totales | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Izquierda | | Recto | | Derecha | | Viraje en U | | Desde | Desde | Periodo | Hora |
| Comienzo | Final | Liviano | Pesado | Liviano | Pesado | Liviano | Pesado | Liviano | Pesado | lado Izq. | lado Der. | 15 Min. | Pico |
| 6:00 AM | 6:15 AM | | | 10 | 0 | 2 | 0 | 1 | 0 | | | 13 | 13 |
| 6:15 AM | 6:30 AM | | | 6 | 0 | 4 | 0 | 0 | 0 | | | 10 | 23 |
| 6:30 AM | 6:45 AM | | | 28 | 0 | 5 | 0 | 0 | 0 | | | 33 | 56 |
| 6:45 AM | 7:00 AM | | | 35 | 0 | 6 | 0 | 0 | 0 | | | 41 | 97 |
| **Sub-Total** | | 0 | 0 | 79 | 0 | 17 | 0 | 1 | 0 | 0 | 0 | | |
| 7:00 AM | 7:15 AM | | | 28 | 0 | 8 | 1 | 0 | 0 | | | 37 | 121 |
| 7:15 AM | 7:30 AM | | | 21 | 0 | 12 | 0 | 1 | 0 | | | 34 | 145 |
| 7:30 AM | 7:45 AM | | | 30 | 1 | 3 | 0 | 0 | 0 | | | 34 | 146 |
| 7:45 AM | 8:00 AM | | | 17 | 0 | 6 | 0 | 1 | 0 | | | 24 | 129 |
| **Sub-Total** | | 0 | 0 | 96 | 1 | 29 | 1 | 2 | 0 | 0 | 0 | | |
| 8:00 AM | 8:15 AM | | | 14 | 0 | 2 | 0 | 0 | 0 | | | 16 | 108 |
| 8:15 AM | 8:30 AM | | | 14 | 0 | 2 | 0 | 0 | 0 | | | 16 | 90 |
| 8:30 AM | 8:45 AM | | | 19 | 1 | 1 | 0 | 0 | 0 | | | 21 | 77 |
| 8:45 AM | 9:00 AM | | | 9 | 0 | 2 | 0 | 0 | 0 | | | 11 | 64 |
| **Sub-Total** | | 0 | 0 | 56 | 1 | 7 | 0 | 0 | 0 | 0 | 0 | | |
| 9:00 AM | 9:15 AM | | | 15 | 1 | 4 | 0 | 1 | 0 | | | 21 | 69 |
| 9:15 AM | 9:30 AM | | | 17 | 0 | 1 | 0 | 0 | 0 | | | 18 | 71 |
| 9:30 AM | 9:45 AM | | | 9 | 0 | 8 | 1 | 0 | 0 | | | 18 | 68 |
| 9:45 AM | 10:00 AM | | | 10 | 0 | 5 | 2 | 0 | 0 | | | 17 | 74 |
| **Sub-Total** | | 0 | 0 | 51 | 1 | 18 | 3 | 1 | 0 | 0 | 0 | | |
| 10:00 AM | 10:15 AM | | | 12 | 0 | 8 | 0 | 2 | 0 | | | 22 | 75 |
| 10:15 AM | 10:30 AM | | | 20 | 1 | 6 | 0 | 1 | 0 | | | 28 | 85 |
| 10:30 AM | 10:45 AM | | | 12 | 1 | 2 | 0 | 2 | 0 | | | 17 | 84 |
| 10:45 AM | 11:00 AM | | | 13 | 0 | 4 | 0 | 1 | 0 | | | 18 | 85 |
| **Sub-Total** | | 0 | 0 | 57 | 2 | 20 | 0 | 6 | 0 | 0 | 0 | | |
| 11:00 AM | 11:15 AM | | | 6 | 1 | 8 | 0 | 0 | 0 | | | 15 | 78 |
| 11:15 AM | 11:30 AM | | | 20 | 0 | 7 | 0 | 2 | 0 | | | 29 | 79 |
| 11:30 AM | 11:45 AM | | | 25 | 0 | 2 | 0 | 0 | 0 | | | 27 | 89 |
| 11:45 AM | 12:00 PM | | | 15 | 0 | 6 | 0 | 0 | 0 | | | 21 | 92 |
| **Sub-Total** | | 0 | 0 | 66 | 1 | 23 | 0 | 2 | 0 | 0 | 0 | | |
| 12:00 PM | 12:15 PM | | | 15 | 0 | 4 | 0 | 2 | 0 | | | 21 | 98 |
| 12:15 PM | 12:30 PM | | | 22 | 0 | 1 | 0 | 1 | 0 | | | 24 | 93 |
| 12:30 PM | 12:45 PM | | | 13 | 1 | 4 | 0 | 0 | 0 | | | 18 | 84 |
| 12:45 PM | 1:00 PM | | | 12 | 0 | 4 | 0 | 1 | 0 | | | 17 | 80 |
| **Sub-Total** | | 0 | 0 | 62 | 1 | 13 | 0 | 4 | 0 | 0 | 0 | | |
| 1:00 PM | 1:15 PM | | | 13 | 0 | 4 | 0 | 0 | 0 | | | 17 | 76 |
| 1:15 PM | 1:30 PM | | | 16 | 1 | 6 | 0 | 1 | 0 | | | 24 | 76 |
| 1:30 PM | 1:45 PM | | | 18 | 0 | 2 | 1 | 1 | 0 | | | 22 | 80 |
| 1:45 PM | 2:00 PM | | | 14 | 1 | 3 | 1 | 1 | 0 | | | 20 | 83 |
| **Sub-Total** | | 0 | 0 | 61 | 2 | 15 | 2 | 3 | 0 | 0 | 0 | | |
| 2:00 PM | 2:15 PM | | | 24 | 0 | 4 | 0 | 2 | 0 | | | 30 | 96 |
| 2:15 PM | 2:30 PM | | | 15 | 0 | 5 | 1 | 4 | 0 | | | 25 | 97 |
| 2:30 PM | 2:45 PM | | | 10 | 1 | 5 | 0 | 2 | 0 | | | 18 | 93 |
| 2:45 PM | 3:00 PM | | | 22 | 1 | 3 | 0 | 1 | 0 | | | 27 | 100 |
| **Sub-Total** | | 0 | 0 | 71 | 2 | 17 | 1 | 9 | 0 | 0 | 0 | | |
| 3:00 PM | 3:15 PM | | | 21 | 1 | 3 | 0 | 1 | 0 | | | 26 | 96 |
| 3:15 PM | 3:30 PM | | | 29 | 0 | 5 | 0 | 1 | 0 | | | 35 | 106 |
| 3:30 PM | 3:45 PM | | | 22 | 0 | 2 | 0 | 2 | 0 | | | 26 | 114 |
| 3:45 PM | 4:00 PM | | | 26 | 1 | 6 | 0 | 2 | 0 | | | 35 | 122 |
| **Sub-Total** | | 0 | 0 | 98 | 2 | 16 | 0 | 6 | 0 | 0 | 0 | | |
| 4:00 PM | 4:15 PM | | | 22 | 1 | 3 | 0 | 1 | 0 | | | 27 | 123 |
| 4:15 PM | 4:30 PM | | | 30 | 0 | 5 | 0 | 1 | 0 | | | 36 | 124 |
| 4:30 PM | 4:45 PM | | | 23 | 0 | 2 | 0 | 2 | 0 | | | 27 | 125 |
| 4:45 PM | 5:00 PM | | | 27 | 1 | 6 | 0 | 1 | 0 | | | 35 | 125 |
| **Sub-Total** | | 0 | 0 | 102 | 2 | 16 | 0 | 5 | 0 | 0 | 0 | | |
| 5:00 PM | 5:15 PM | | | 25 | 0 | 1 | 0 | 4 | 0 | | | 30 | 128 |
| 5:15 PM | 5:30 PM | | | 22 | 0 | 7 | 0 | 4 | 0 | | | 33 | 125 |
| 5:30 PM | 5:45 PM | | | 22 | 0 | 2 | 0 | 0 | 0 | | | 24 | 122 |
| 5:45 PM | 6:00 PM | | | 18 | 0 | 3 | 0 | 1 | 0 | | | 22 | 109 |
| **Sub-Total** | | 0 | 0 | 87 | 0 | 13 | 0 | 9 | 0 | 0 | 0 | | |
| **Sub-Total** | | 0 | 0 | 886 | 15 | 204 | 7 | 48 | 0 | 0 | 0 | 1,160 | |

**Tecnico**

**Obesrvaciones**

**Fecha:** Septiembre 14, 2022 **Dia de la Semana:** Miercoles **Cond. del Tiempo :** Soleado

**Periodo :** 6:00 AM @ 6:00 PM **Municipio :** Lajas

**Interseccion** PR-122 **con** PR-116

**Contaje desde el Acceso** B **Carretera.** N/A

**Descripcion del acceso :** Acceso Este - Un Carril

| Periodo de Estudio | | Afluencia de vehiculos | | | | | | | | Peatones | | Totales | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Izquierda | | Recto | | Derecha | | Viraje en U | | Desde | Desde | Periodo | Hora |
| Comienzo | Final | Liviano | Pesado | Liviano | Pesado | Liviano | Pesado | Liviano | Pesado | lado Izq. | lado Der. | 15 Min. | Pico |
| 6:00 AM | 6:15 AM | | | | | | | | | | | 0 | 0 |
| 6:15 AM | 6:30 AM | | | | | | | | | | | 0 | 0 |
| 6:30 AM | 6:45 AM | | | | | | | | | | | 0 | 0 |
| 6:45 AM | 7:00 AM | | | | | | | | | | | 0 | 0 |
| Sub-Total | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | |
| 7:00 AM | 7:15 AM | | | | | | | | | | | 0 | 0 |
| 7:15 AM | 7:30 AM | | | | | | | | | | | 0 | 0 |
| 7:30 AM | 7:45 AM | | | | | | | | | | | 0 | 0 |
| 7:45 AM | 8:00 AM | | | | | | | | | | | 0 | 0 |
| Sub-Total | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | |
| 8:00 AM | 8:15 AM | | | | | | | | | | | 0 | 0 |
| 8:15 AM | 8:30 AM | | | | | | | | | | | 0 | 0 |
| 8:30 AM | 8:45 AM | | | | | | | | | | | 0 | 0 |
| 8:45 AM | 9:00 AM | | | | | | | | | | | 0 | 0 |
| Sub-Total | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | |
| 9:00 AM | 9:15 AM | | | | | | | | | | | 0 | 0 |
| 9:15 AM | 9:30 AM | | | | | | | | | | | 0 | 0 |
| 9:30 AM | 9:45 AM | | | | | | | | | | | 0 | 0 |
| 9:45 AM | 10:00 AM | | | | | | | | | | | 0 | 0 |
| Sub-Total | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | |
| 10:00 AM | 10:15 AM | | | | | | | | | | | 0 | 0 |
| 10:15 AM | 10:30 AM | | | | | | | | | | | 0 | 0 |
| 10:30 AM | 10:45 AM | | | | | | | | | | | 0 | 0 |
| 10:45 AM | 11:00 AM | | | | | | | | | | | 0 | 0 |
| Sub-Total | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | |
| 11:00 AM | 11:15 AM | | | | | | | | | | | 0 | 0 |
| 11:15 AM | 11:30 AM | | | | | | | | | | | 0 | 0 |
| 11:30 AM | 11:45 AM | | | | | | | | | | | 0 | 0 |
| 11:45 AM | 12:00 PM | | | | | | | | | | | 0 | 0 |
| Sub-Total | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | |
| 12:00 PM | 12:15 PM | | | | | | | | | | | 0 | 0 |
| 12:15 PM | 12:30 PM | | | | | | | | | | | 0 | 0 |
| 12:30 PM | 12:45 PM | | | | | | | | | | | 0 | 0 |
| 12:45 PM | 1:00 PM | | | | | | | | | | | 0 | 0 |
| Sub-Total | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | |
| 1:00 PM | 1:15 PM | | | | | | | | | | | 0 | 0 |
| 1:15 PM | 1:30 PM | | | | | | | | | | | 0 | 0 |
| 1:30 PM | 1:45 PM | | | | | | | | | | | 0 | 0 |
| 1:45 PM | 2:00 PM | | | | | | | | | | | 0 | 0 |
| Sub-Total | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | |
| 2:00 PM | 2:15 PM | | | | | | | | | | | 0 | 0 |
| 2:15 PM | 2:30 PM | | | | | | | | | | | 0 | 0 |
| 2:30 PM | 2:45 PM | | | | | | | | | | | 0 | 0 |
| 2:45 PM | 3:00 PM | | | | | | | | | | | 0 | 0 |
| Sub-Total | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | |
| 3:00 PM | 3:15 PM | | | | | | | | | | | 0 | 0 |
| 3:15 PM | 3:30 PM | | | | | | | | | | | 0 | 0 |
| 3:30 PM | 3:45 PM | | | | | | | | | | | 0 | 0 |
| 3:45 PM | 4:00 PM | | | | | | | | | | | 0 | 0 |
| Sub-Total | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | |
| 4:00 PM | 4:15 PM | | | | | | | | | | | 0 | 0 |
| 4:15 PM | 4:30 PM | | | | | | | | | | | 0 | 0 |
| 4:30 PM | 4:45 PM | | | | | | | | | | | 0 | 0 |
| 4:45 PM | 5:00 PM | | | | | | | | | | | 0 | 0 |
| Sub-Total | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | |
| 5:00 PM | 5:15 PM | | | | | | | | | | | 0 | 0 |
| 5:15 PM | 5:30 PM | | | | | | | | | | | 0 | 0 |
| 5:30 PM | 5:45 PM | | | | | | | | | | | 0 | 0 |
| 5:45 PM | 6:00 PM | | | | | | | | | | | 0 | 0 |
| Sub-Total | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | |
| Sub-Total | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |

**Tecnico**

**Obesrvaciones**

**Fecha:** Septiembre 14, 2022 **Dia de la Semana:** Miercoles **Cond. del Tiempo :**

**Periodo :** 6:00 AM @ 6:00 PM **Municipio :** Lajas

**Interseccion** PR-122 **con** PR-116

**Contaje desde el Acceso** C **Carretera** PR-116

**Descripcion del acceso :** Acceso Sur - Dos Carriles

| Periodo de Estudio | | Afluencia de vehiculos | | | | | | | | Peatones | | Totales | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Izquierda | | Recto | | Derecha | | Viraje en U | | Desde | Desde | Periodo | Hora |
| Comienzo | Final | Liviano | Pesado | Liviano | Pesado | Liviano | Pesado | Liviano | Pesado | lado Izq. | lado Der. | 15 Min. | Pico |
| 6:00 AM | 6:15 AM | 13 | 0 | 31 | 0 | | | 0 | 0 | | | 44 | 44 |
| 6:15 AM | 6:30 AM | 25 | 1 | 26 | 0 | | | 0 | 0 | | | 52 | 96 |
| 6:30 AM | 6:45 AM | 34 | 0 | 47 | 0 | | | 0 | 0 | | | 81 | 177 |
| 6:45 AM | 7:00 AM | 66 | 0 | 45 | 0 | | | 0 | 0 | | | 111 | 288 |
| Sub-Total | | 138 | 1 | 149 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | |
| 7:00 AM | 7:15 AM | 76 | 2 | 47 | 1 | | | 0 | 0 | | | 126 | 370 |
| 7:15 AM | 7:30 AM | 102 | 2 | 51 | 0 | | | 0 | 0 | | | 155 | 473 |
| 7:30 AM | 7:45 AM | 63 | 1 | 43 | 0 | | | 0 | 0 | | | 107 | 499 |
| 7:45 AM | 8:00 AM | 56 | 3 | 45 | 0 | | | 0 | 0 | | | 104 | 492 |
| Sub-Total | | 297 | 8 | 186 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | | |
| 8:00 AM | 8:15 AM | 37 | 1 | 33 | 0 | | | 0 | 0 | | | 71 | 437 |
| 8:15 AM | 8:30 AM | 33 | 2 | 36 | 1 | | | 0 | 0 | | | 72 | 354 |
| 8:30 AM | 8:45 AM | 30 | 1 | 33 | 1 | | | 1 | 0 | | | 66 | 313 |
| 8:45 AM | 9:00 AM | 44 | 0 | 20 | 1 | | | 0 | 0 | | | 65 | 274 |
| Sub-Total | | 144 | 4 | 122 | 3 | 0 | 0 | 1 | 0 | 0 | 0 | | |
| 9:00 AM | 9:15 AM | 35 | 0 | 32 | 1 | | | 0 | 0 | | | 68 | 271 |
| 9:15 AM | 9:30 AM | 40 | 2 | 28 | 0 | | | 1 | 0 | | | 71 | 270 |
| 9:30 AM | 9:45 AM | 35 | 1 | 23 | 3 | | | 1 | 0 | | | 63 | 267 |
| 9:45 AM | 10:00 AM | 47 | 4 | 22 | 0 | | | 0 | 0 | | | 73 | 275 |
| Sub-Total | | 157 | 7 | 105 | 4 | 0 | 0 | 2 | 0 | 0 | 0 | | |
| 10:00 AM | 10:15 AM | 30 | 3 | 17 | 1 | | | 0 | 0 | | | 51 | 258 |
| 10:15 AM | 10:30 AM | 36 | 4 | 25 | 0 | | | 0 | 0 | | | 65 | 252 |
| 10:30 AM | 10:45 AM | 31 | 1 | 35 | 0 | | | 1 | 0 | | | 68 | 257 |
| 10:45 AM | 11:00 AM | 54 | 3 | 22 | 1 | | | 0 | 0 | | | 80 | 264 |
| Sub-Total | | 151 | 11 | 99 | 2 | 0 | 0 | 1 | 0 | 0 | 0 | | |
| 11:00 AM | 11:15 AM | 50 | 0 | 35 | 1 | | | 1 | 0 | | | 87 | 300 |
| 11:15 AM | 11:30 AM | 50 | 3 | 28 | 0 | | | 0 | 0 | | | 81 | 316 |
| 11:30 AM | 11:45 AM | 40 | 4 | 29 | 0 | | | 0 | 0 | | | 73 | 321 |
| 11:45 AM | 12:00 PM | 45 | 1 | 25 | 0 | | | 2 | 0 | | | 73 | 314 |
| Sub-Total | | 185 | 8 | 117 | 1 | 0 | 0 | 3 | 0 | 0 | 0 | | |
| 12:00 PM | 12:15 PM | 37 | 2 | 34 | 0 | | | 0 | 0 | | | 73 | 300 |
| 12:15 PM | 12:30 PM | 46 | 2 | 26 | 1 | | | 1 | 1 | | | 77 | 296 |
| 12:30 PM | 12:45 PM | 49 | 1 | 18 | 0 | | | 0 | 0 | | | 68 | 291 |
| 12:45 PM | 1:00 PM | 47 | 0 | 48 | 1 | | | 0 | 0 | | | 96 | 314 |
| Sub-Total | | 179 | 5 | 126 | 2 | 0 | 0 | 1 | 1 | 0 | 0 | | |
| 1:00 PM | 1:15 PM | 37 | 1 | 29 | 0 | | | 1 | 0 | | | 68 | 309 |
| 1:15 PM | 1:30 PM | 39 | 2 | 44 | 2 | | | 0 | 0 | | | 87 | 319 |
| 1:30 PM | 1:45 PM | 44 | 1 | 36 | 0 | | | 0 | 0 | | | 81 | 332 |
| 1:45 PM | 2:00 PM | 39 | 4 | 27 | 0 | | | 0 | 0 | | | 70 | 306 |
| Sub-Total | | 159 | 8 | 136 | 2 | 0 | 0 | 1 | 0 | 0 | 0 | | |
| 2:00 PM | 2:15 PM | 54 | 2 | 39 | 1 | | | 0 | 0 | | | 96 | 334 |
| 2:15 PM | 2:30 PM | 73 | 3 | 30 | 0 | | | 0 | 0 | | | 106 | 353 |
| 2:30 PM | 2:45 PM | 81 | 0 | 54 | 1 | | | 0 | 0 | | | 136 | 408 |
| 2:45 PM | 3:00 PM | 89 | 2 | 58 | 1 | | | 0 | 0 | | | 150 | 488 |
| Sub-Total | | 297 | 7 | 181 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | | |
| 3:00 PM | 3:15 PM | 53 | 2 | 31 | 1 | | | 0 | 0 | | | 87 | 479 |
| 3:15 PM | 3:30 PM | 46 | 2 | 34 | 0 | | | 0 | 0 | | | 82 | 455 |
| 3:30 PM | 3:45 PM | 61 | 2 | 57 | 1 | | | 0 | 0 | | | 121 | 440 |
| 3:45 PM | 4:00 PM | 54 | 1 | 43 | 1 | | | 0 | 0 | | | 99 | 389 |
| Sub-Total | | 214 | 7 | 165 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | | |
| 4:00 PM | 4:15 PM | 39 | 1 | 32 | 0 | | | 0 | 0 | | | 72 | 374 |
| 4:15 PM | 4:30 PM | 43 | 0 | 28 | 0 | | | 0 | 0 | | | 71 | 363 |
| 4:30 PM | 4:45 PM | 34 | 0 | 28 | 0 | | | 0 | 0 | | | 62 | 304 |
| 4:45 PM | 5:00 PM | 31 | 0 | 23 | 0 | | | 1 | 0 | | | 55 | 260 |
| Sub-Total | | 147 | 1 | 111 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | | |
| 5:00 PM | 5:15 PM | 50 | 0 | 24 | 1 | | | 0 | 0 | | | 75 | 263 |
| 5:15 PM | 5:30 PM | 30 | 1 | 22 | 0 | | | 0 | 0 | | | 53 | 245 |
| 5:30 PM | 5:45 PM | 39 | 1 | 23 | 0 | | | 0 | 0 | | | 63 | 246 |
| 5:45 PM | 6:00 PM | 32 | 0 | 27 | 0 | | | 0 | 0 | | | 59 | 250 |
| Sub-Total | | 151 | 2 | 96 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | | |
| Sub-Total | | 2,219 | 69 | 1,593 | 22 | 0 | 0 | 10 | 1 | 0 | 0 | 3,913 | |

**Tecnico**

**Obesrvaciones**

**Fecha:** Septiembre 14, 2022 **Dia de la Semana:** Miercoles **Cond. del Tiempo :** Soleado

**Periodo :** 6:00 AM @ 6:00 PM **Municipio :** Lajas

**Interseccion** PR-122 **con** PR-116

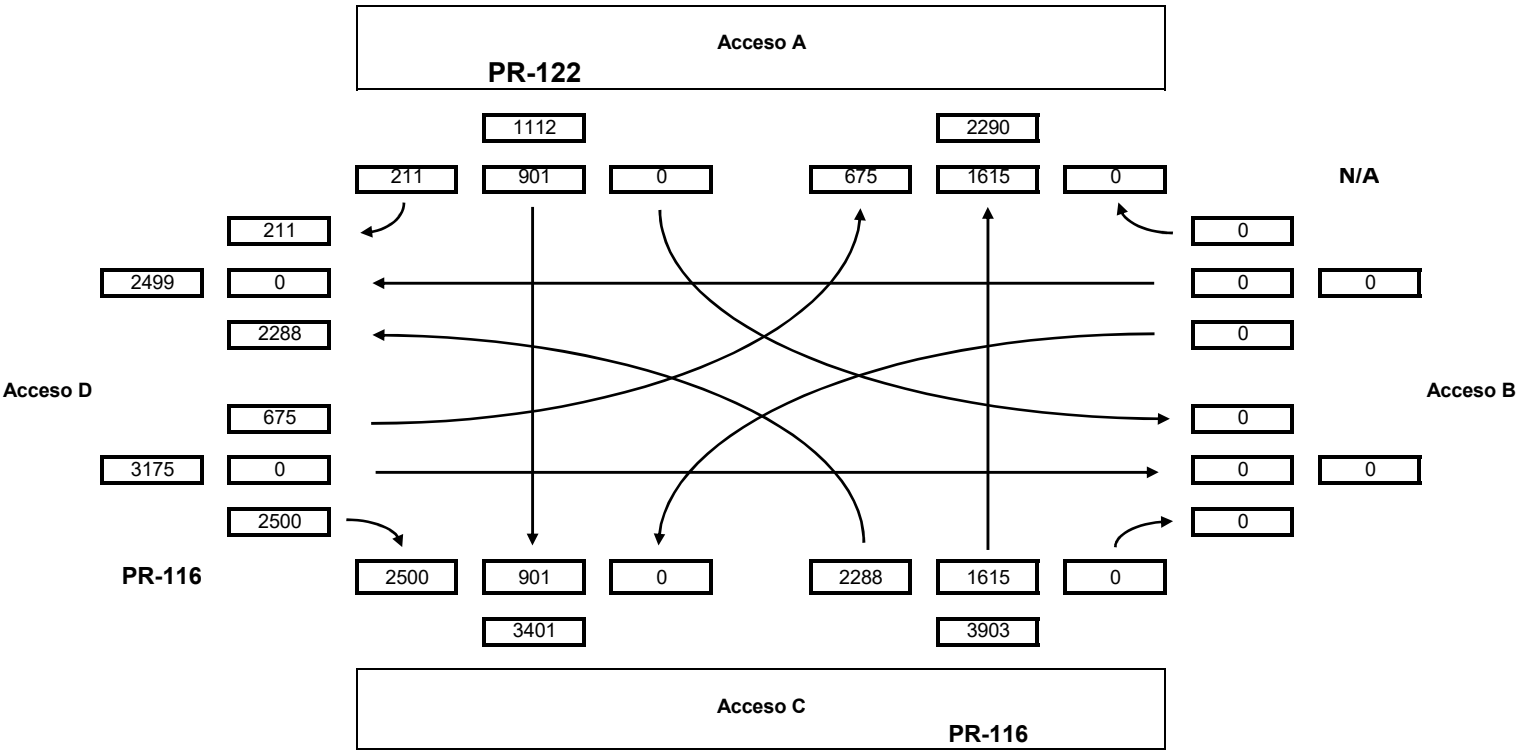
**Contaje desde el Acceso** D **Carretera** PR-116

**Descripcion del acceso :** Acceso Oeste - Dos Carriles

| Periodo de Estudio | | Afluencia de vehiculos | | | | | | | | Peatones | | Totales | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Izquierda | | Recto | | Derecha | | Viraje en U | | Desde | Desde | Periodo | Hora |
| Comienzo | Final | Liviano | Pesado | Liviano | Pesado | Liviano | Pesado | Liviano | Pesado | lado Izq. | lado Der. | 15 Min. | Pico |
| 6:00 AM | 6:15 AM | 4 | 0 | | | 20 | 0 | 0 | 0 | | | 24 | 24 |
| 6:15 AM | 6:30 AM | 10 | 0 | | | 26 | 1 | 0 | 0 | | | 37 | 61 |
| 6:30 AM | 6:45 AM | 6 | 0 | | | 62 | 2 | 0 | 0 | | | 70 | 131 |
| 6:45 AM | 7:00 AM | 13 | 0 | | | 45 | 1 | 0 | 0 | | | 59 | 190 |
| Sub-Total | | 33 | 0 | 0 | 0 | 153 | 4 | 0 | 0 | 0 | 0 | | |
| 7:00 AM | 7:15 AM | 17 | 0 | | | 63 | 7 | 0 | 0 | | | 87 | 253 |
| 7:15 AM | 7:30 AM | 23 | 0 | | | 87 | 1 | 0 | 0 | | | 111 | 327 |
| 7:30 AM | 7:45 AM | 19 | 1 | | | 74 | 1 | 0 | 0 | | | 95 | 352 |
| 7:45 AM | 8:00 AM | 12 | 0 | | | 49 | 0 | 0 | 0 | | | 61 | 354 |
| Sub-Total | | 71 | 1 | 0 | 0 | 273 | 9 | 0 | 0 | 0 | 0 | | |
| 8:00 AM | 8:15 AM | 10 | 0 | | | 46 | 1 | 0 | 0 | | | 57 | 324 |
| 8:15 AM | 8:30 AM | 8 | 0 | | | 41 | 0 | 0 | 0 | | | 49 | 262 |
| 8:30 AM | 8:45 AM | 10 | 0 | | | 38 | 1 | 0 | 0 | | | 49 | 216 |
| 8:45 AM | 9:00 AM | 10 | 0 | | | 28 | 3 | 0 | 0 | | | 41 | 196 |
| Sub-Total | | 38 | 0 | 0 | 0 | 153 | 5 | 0 | 0 | 0 | 0 | | |
| 9:00 AM | 9:15 AM | 9 | 0 | | | 28 | 1 | 0 | 0 | | | 38 | 177 |
| 9:15 AM | 9:30 AM | 9 | 0 | | | 40 | 1 | 0 | 0 | | | 50 | 178 |
| 9:30 AM | 9:45 AM | 7 | 0 | | | 39 | 1 | 0 | 0 | | | 47 | 176 |
| 9:45 AM | 10:00 AM | 14 | 0 | | | 35 | 1 | 0 | 0 | | | 50 | 185 |
| Sub-Total | | 39 | 0 | 0 | 0 | 142 | 4 | 0 | 0 | 0 | 0 | | |
| 10:00 AM | 10:15 AM | 8 | 0 | | | 63 | 3 | 0 | 0 | | | 74 | 221 |
| 10:15 AM | 10:30 AM | 11 | 0 | | | 49 | 2 | 0 | 0 | | | 62 | 233 |
| 10:30 AM | 10:45 AM | 10 | 0 | | | 47 | 2 | 0 | 0 | | | 59 | 245 |
| 10:45 AM | 11:00 AM | 7 | 1 | | | 40 | 4 | 0 | 0 | | | 52 | 247 |
| Sub-Total | | 36 | 1 | 0 | 0 | 199 | 11 | 0 | 0 | 0 | 0 | | |
| 11:00 AM | 11:15 AM | 13 | 0 | | | 56 | 1 | 0 | 0 | | | 70 | 243 |
| 11:15 AM | 11:30 AM | 17 | 0 | | | 49 | 0 | 0 | 0 | | | 66 | 247 |
| 11:30 AM | 11:45 AM | 6 | 0 | | | 58 | 2 | 0 | 0 | | | 66 | 254 |
| 11:45 AM | 12:00 PM | 13 | 0 | | | 55 | 1 | 0 | 0 | | | 69 | 271 |
| Sub-Total | | 49 | 0 | 0 | 0 | 218 | 4 | 0 | 0 | 0 | 0 | | |
| 12:00 PM | 12:15 PM | 16 | 2 | | | 47 | 4 | 0 | 0 | | | 69 | 270 |
| 12:15 PM | 12:30 PM | 11 | 3 | | | 46 | 1 | 0 | 0 | | | 61 | 265 |
| 12:30 PM | 12:45 PM | 12 | 0 | | | 47 | 2 | 0 | 0 | | | 61 | 260 |
| 12:45 PM | 1:00 PM | 8 | 0 | | | 48 | 0 | 0 | 0 | | | 56 | 247 |
| Sub-Total | | 47 | 5 | 0 | 0 | 188 | 7 | 0 | 0 | 0 | 0 | | |
| 1:00 PM | 1:15 PM | 17 | 0 | | | 35 | 1 | 0 | 0 | | | 53 | 231 |
| 1:15 PM | 1:30 PM | 10 | 0 | | | 46 | 2 | 0 | 0 | | | 58 | 228 |
| 1:30 PM | 1:45 PM | 10 | 0 | | | 45 | 3 | 0 | 0 | | | 58 | 225 |
| 1:45 PM | 2:00 PM | 13 | 1 | | | 46 | 1 | 0 | 0 | | | 61 | 230 |
| Sub-Total | | 50 | 1 | 0 | 0 | 172 | 7 | 0 | 0 | 0 | 0 | | |
| 2:00 PM | 2:15 PM | 12 | 0 | | | 59 | 3 | 0 | 0 | | | 74 | 251 |
| 2:15 PM | 2:30 PM | 13 | 1 | | | 55 | 3 | 0 | 0 | | | 72 | 265 |
| 2:30 PM | 2:45 PM | 51 | 0 | | | 124 | 2 | 0 | 0 | | | 177 | 384 |
| 2:45 PM | 3:00 PM | 20 | 1 | | | 69 | 5 | 0 | 0 | | | 95 | 418 |
| Sub-Total | | 96 | 2 | 0 | 0 | 307 | 13 | 0 | 0 | 0 | 0 | | |
| 3:00 PM | 3:15 PM | 16 | 0 | | | 61 | 0 | 0 | 0 | | | 77 | 421 |
| 3:15 PM | 3:30 PM | 15 | 0 | | | 51 | 0 | 0 | 0 | | | 66 | 415 |
| 3:30 PM | 3:45 PM | 31 | 0 | | | 53 | 1 | 0 | 0 | | | 85 | 323 |
| 3:45 PM | 4:00 PM | 20 | 0 | | | 60 | 2 | 0 | 0 | | | 82 | 310 |
| Sub-Total | | 82 | 0 | 0 | 0 | 225 | 3 | 0 | 0 | 0 | 0 | | |
| 4:00 PM | 4:15 PM | 19 | 0 | | | 56 | 0 | 0 | 0 | | | 75 | 308 |
| 4:15 PM | 4:30 PM | 13 | 0 | | | 46 | 1 | 0 | 0 | | | 60 | 302 |
| 4:30 PM | 4:45 PM | 16 | 0 | | | 54 | 2 | 0 | 0 | | | 72 | 289 |
| 4:45 PM | 5:00 PM | 14 | 0 | | | 47 | 0 | 0 | 0 | | | 61 | 268 |
| Sub-Total | | 62 | 0 | 0 | 0 | 203 | 3 | 0 | 0 | 0 | 0 | | |
| 5:00 PM | 5:15 PM | 14 | 0 | | | 48 | 2 | 0 | 0 | | | 64 | 257 |
| 5:15 PM | 5:30 PM | 10 | 0 | | | 52 | 1 | 0 | 0 | | | 63 | 260 |
| 5:30 PM | 5:45 PM | 16 | 0 | | | 39 | 0 | 0 | 0 | | | 55 | 243 |
| 5:45 PM | 6:00 PM | 22 | 0 | | | 54 | 1 | 0 | 0 | | | 77 | 259 |
| Sub-Total | | 62 | 0 | 0 | 0 | 193 | 4 | 0 | 0 | 0 | 0 | | |
| Sub-Total | | 665 | 10 | 0 | 0 | 2,426 | 74 | 0 | 0 | 0 | 0 | 3,175 | |

**Tecnico**

**Obesrvaciones**


Acceso A
PR-122
1112
2290
211
901
0
675
1615
0
N/A
211
2499
0
2288
Acceso D
675
3175
0
2500
PR-116
0
0
0
0
0
0
0
0
0
Acceso B
2500
901
0
2288
1615
0
3401
3903
Acceso C
PR-116

## Intersection 1: PR-122 with PR-116

### MORNING PEAK HOUR FACTOR

| Time Period | | North Access (Southbound) | | | | | | East Access (Westbound) | | | | | | South Access (Northbound) | | | | | | West Access (Eastbound) | | | | | | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Left | | Thru | | Right | | Left | | Thru | | Right | | Left | | Thru | | Right | | Left | | Thru | | Right | | |
| | | Light | Heavy | Light | Heavy | Light | Heavy | Light | Heavy | Light | Heavy | Light | Heavy | Light | Heavy | Light | Heavy | Light | Heavy | Light | Heavy | Light | Heavy | Light | Heavy | |
| 6:45 AM | 7:00 AM | | | 35 | 0 | 6 | 0 | | | | | | | 66 | 0 | 45 | 0 | | | 13 | 0 | | | 45 | 1 | 211 |
| 7:00 AM | 7:15 AM | | | 28 | 0 | 8 | 1 | | | | | | | 76 | 2 | 47 | 1 | | | 17 | 0 | | | 63 | 7 | 250 |
| 7:15 AM | 7:30 AM | | | 21 | 0 | 12 | 0 | | | | | | | 102 | 2 | 51 | 0 | | | 23 | 0 | | | 87 | 1 | 299 |
| 7:30 AM | 7:45 AM | | | 30 | 1 | 3 | 0 | | | | | | | 63 | 1 | 43 | 0 | | | 19 | 1 | | | 74 | 1 | 236 |
| | Total | 0 | 0 | 114 | 1 | 29 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 307 | 5 | 186 | 1 | 0 | 0 | 72 | 1 | 0 | 0 | 269 | 10 | 996 |

| | North Access | | | East Access | | | South Access | | | West Access | | | Intersection | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right | | |
| Total Flow Period, T (minutes) | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | |
| Peak Flow Period, $T_p$ (minutes) | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | |
| Volume Count during the Total Flow Period, $v_a$ (veh) | 0 | 115 | 30 | 0 | 0 | 0 | 312 | 187 | 0 | 73 | 0 | 279 | 996 | |
| Volume Count during the Peak Flow Period, $v_p$ (veh) | 0 | 35 | 12 | 0 | 0 | 0 | 104 | 51 | 0 | 23 | 0 | 88 | 299 | |
| Average Flow Rate during the Total Flow Period, $q_a$ (veh/hr) | 0 | 115 | 30 | 0 | 0 | 0 | 312 | 187 | 0 | 73 | 0 | 279 | 996 | |
| Average Flow Rate during the Peak Flow Period, $q_p$ (veh/hr) | 0 | 140 | 48 | 0 | 0 | 0 | 416 | 204 | 0 | 92 | 0 | 352 | 1196 | |
| Peak Time Factor, PTF | 25% | 25% | 25% | 25% | 25% | 25% | 25% | 25% | 25% | 25% | 25% | 25% | 25% | |
| Peak Flow Factor, PFF | #DIV/0! | 82% | 63% | #DIV/0! | #DIV/0! | #DIV/0! | 75% | 92% | #DIV/0! | 79% | #DIV/0! | 79% | 83% | |
| Unit Time for Volumes, $T_v$ (minutes) | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | |
| Minimum Total Flow Period, $T_m$ (minutes) | #DIV/0! | 18.26087 | 24 | #DIV/0! | #DIV/0! | #DIV/0! | 20 | 16.36364 | #DIV/0! | 18.90411 | #DIV/0! | 18.92473 | 18.01205 | ≤ Tv, OK |
| Duration of Non-Peak Flow Period, $T_n$ (minutes) | 45 | 45 | 45 | 45 | 45 | 45 | 45 | 45 | 45 | 45 | 45 | 45 | 45 | |
| Average Flow Rate during the Non-Peak Flow Period, $q_n$ (veh/hr) | #DIV/0! | 107 | 24 | #DIV/0! | #DIV/0! | #DIV/0! | 277 | 181 | #DIV/0! | 67 | #DIV/0! | 255 | 929 | |
| Volume Count during the Non-Peak Flow Period, $v_n$ (veh) | #DIV/0! | 80 | 18 | #DIV/0! | #DIV/0! | #DIV/0! | 208 | 136 | #DIV/0! | 50 | #DIV/0! | 191 | 697 | |

### AFTERNOON PEAK HOUR FACTOR

| Time Period | | North Access (Southbound) | | | | | | East Access (Westbound) | | | | | | South Access (Northbound) | | | | | | West Access (Eastbound) | | | | | | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Left | | Thru | | Right | | Left | | Thru | | Right | | Left | | Thru | | Right | | Left | | Thru | | Right | | |
| | | Light | Heavy | Light | Heavy | Light | Heavy | Light | Heavy | Light | Heavy | Light | Heavy | Light | Heavy | Light | Heavy | Light | Heavy | Light | Heavy | Light | Heavy | Light | Heavy | |
| 2:00 PM | 2:15 PM | | | 24 | 0 | 4 | 0 | | | | | | | 54 | 2 | 39 | 1 | | | 12 | 0 | | | 59 | 3 | 198 |
| 2:15 PM | 2:30 PM | | | 15 | 0 | 5 | 1 | | | | | | | 73 | 3 | 30 | 0 | | | 13 | 1 | | | 55 | 3 | 199 |
| 2:30 PM | 2:45 PM | | | 10 | 1 | 5 | 0 | | | | | | | 81 | 0 | 54 | 1 | | | 51 | 0 | | | 124 | 2 | 329 |
| 2:45 PM | 3:00 PM | | | 22 | 1 | 3 | 0 | | | | | | | 89 | 2 | 58 | 1 | | | 20 | 1 | | | 69 | 5 | 271 |
| | Total | 0 | 0 | 71 | 2 | 17 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 297 | 7 | 181 | 3 | 0 | 0 | 96 | 2 | 0 | 0 | 307 | 13 | 997 |

| | North Access | | | East Access | | | South Access | | | West Access | | | Intersection | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right | | |
| Total Flow Period, T (minutes) | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | |
| Peak Flow Period, $T_p$ (minutes) | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | |
| Volume Count during the Total Flow Period, $v_a$ (veh) | 0 | 73 | 18 | 0 | 0 | 0 | 304 | 184 | 0 | 98 | 0 | 320 | 997 | |
| Volume Count during the Peak Flow Period, $v_p$ (veh) | 0 | 24 | 6 | 0 | 0 | 0 | 91 | 59 | 0 | 51 | 0 | 126 | 329 | |
| Average Flow Rate during the Total Flow Period, $q_a$ (veh/hr) | 0 | 73 | 18 | 0 | 0 | 0 | 304 | 184 | 0 | 98 | 0 | 320 | 997 | |
| Average Flow Rate during the Peak Flow Period, $q_p$ (veh/hr) | 0 | 96 | 24 | 0 | 0 | 0 | 364 | 236 | 0 | 204 | 0 | 504 | 1316 | |
| Peak Time Factor, PTF | 25% | 25% | 25% | 25% | 25% | 25% | 25% | 25% | 25% | 25% | 25% | 25% | 25% | |
| Peak Flow Factor, PFF | #DIV/0! | 76% | 75% | #DIV/0! | #DIV/0! | #DIV/0! | 84% | 78% | #DIV/0! | 48% | #DIV/0! | 63% | 76% | |
| Unit Time for Volumes, $T_v$ (minutes) | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | |
| Minimum Total Flow Period, $T_m$ (minutes) | #DIV/0! | 19.72603 | 20 | #DIV/0! | #DIV/0! | #DIV/0! | 17.96053 | 19.23913 | #DIV/0! | 31.22449 | #DIV/0! | 23.625 | 19.7994 | ≤ Tv, OK |
| Duration of Non-Peak Flow Period, $T_n$ (minutes) | 45 | 45 | 45 | 45 | 45 | 45 | 45 | 45 | 45 | 45 | 45 | 45 | 45 | |
| Average Flow Rate during the Non-Peak Flow Period, $q_n$ (veh/hr) | #DIV/0! | 65 | 16 | #DIV/0! | #DIV/0! | #DIV/0! | 284 | 167 | #DIV/0! | 63 | #DIV/0! | 259 | 891 | |
| Volume Count during the Non-Peak Flow Period, $v_n$ (veh) | #DIV/0! | 49 | 12 | #DIV/0! | #DIV/0! | #DIV/0! | 213 | 125 | #DIV/0! | 47 | #DIV/0! | 194 | 668 | |

**Fecha:** Septiembre 14, 2022 **Dia de la Semana:** Miercoles **Cond. del Tiempo :** Soleado

**Periodo :** 6:00 AM @ 6:00 PM **Municipio :** San German

**Interseccion** PR-122 **con** PR-321

**Contaje desde el Acceso** A **Carretera** N/A

**Descripcion del acceso :** Acceso Norte - Tres Carriles

| Periodo de Estudio | | Afluencia de vehiculos | | | | | | | | Peatones | | Totales | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Izquierda | | Recto | | Derecha | | Viraje en U | | Desde | Desde | Periodo | Hora |
| Comienzo | Final | Liviano | Pesado | Liviano | Pesado | Liviano | Pesado | Liviano | Pesado | lado Izq. | lado Der. | 15 Min. | Pico |
| 6:00 AM | 6:15 AM | | | | | | | | | | | 0 | 0 |
| 6:15 AM | 6:30 AM | | | | | | | | | | | 0 | 0 |
| 6:30 AM | 6:45 AM | | | | | | | | | | | 0 | 0 |
| 6:45 AM | 7:00 AM | | | | | | | | | | | 0 | 0 |
| **Sub-Total** | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | |
| 7:00 AM | 7:15 AM | | | | | | | | | | | 0 | 0 |
| 7:15 AM | 7:30 AM | | | | | | | | | | | 0 | 0 |
| 7:30 AM | 7:45 AM | | | | | | | | | | | 0 | 0 |
| 7:45 AM | 8:00 AM | | | | | | | | | | | 0 | 0 |
| **Sub-Total** | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | |
| 8:00 AM | 8:15 AM | | | | | | | | | | | 0 | 0 |
| 8:15 AM | 8:30 AM | | | | | | | | | | | 0 | 0 |
| 8:30 AM | 8:45 AM | | | | | | | | | | | 0 | 0 |
| 8:45 AM | 9:00 AM | | | | | | | | | | | 0 | 0 |
| **Sub-Total** | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | |
| 9:00 AM | 9:15 AM | | | | | | | | | | | 0 | 0 |
| 9:15 AM | 9:30 AM | | | | | | | | | | | 0 | 0 |
| 9:30 AM | 9:45 AM | | | | | | | | | | | 0 | 0 |
| 9:45 AM | 10:00 AM | | | | | | | | | | | 0 | 0 |
| **Sub-Total** | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | |
| 10:00 AM | 10:15 AM | | | | | | | | | | | 0 | 0 |
| 10:15 AM | 10:30 AM | | | | | | | | | | | 0 | 0 |
| 10:30 AM | 10:45 AM | | | | | | | | | | | 0 | 0 |
| 10:45 AM | 11:00 AM | | | | | | | | | | | 0 | 0 |
| **Sub-Total** | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | |
| 11:00 AM | 11:15 AM | | | | | | | | | | | 0 | 0 |
| 11:15 AM | 11:30 AM | | | | | | | | | | | 0 | 0 |
| 11:30 AM | 11:45 AM | | | | | | | | | | | 0 | 0 |
| 11:45 AM | 12:00 PM | | | | | | | | | | | 0 | 0 |
| **Sub-Total** | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | |
| 12:00 PM | 12:15 PM | | | | | | | | | | | 0 | 0 |
| 12:15 PM | 12:30 PM | | | | | | | | | | | 0 | 0 |
| 12:30 PM | 12:45 PM | | | | | | | | | | | 0 | 0 |
| 12:45 PM | 1:00 PM | | | | | | | | | | | 0 | 0 |
| **Sub-Total** | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | |
| 1:00 PM | 1:15 PM | | | | | | | | | | | 0 | 0 |
| 1:15 PM | 1:30 PM | | | | | | | | | | | 0 | 0 |
| 1:30 PM | 1:45 PM | | | | | | | | | | | 0 | 0 |
| 1:45 PM | 2:00 PM | | | | | | | | | | | 0 | 0 |
| **Sub-Total** | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | |
| 2:00 PM | 2:15 PM | | | | | | | | | | | 0 | 0 |
| 2:15 PM | 2:30 PM | | | | | | | | | | | 0 | 0 |
| 2:30 PM | 2:45 PM | | | | | | | | | | | 0 | 0 |
| 2:45 PM | 3:00 PM | | | | | | | | | | | 0 | 0 |
| **Sub-Total** | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | |
| 3:00 PM | 3:15 PM | | | | | | | | | | | 0 | 0 |
| 3:15 PM | 3:30 PM | | | | | | | | | | | 0 | 0 |
| 3:30 PM | 3:45 PM | | | | | | | | | | | 0 | 0 |
| 3:45 PM | 4:00 PM | | | | | | | | | | | 0 | 0 |
| **Sub-Total** | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | |
| 4:00 PM | 4:15 PM | | | | | | | | | | | 0 | 0 |
| 4:15 PM | 4:30 PM | | | | | | | | | | | 0 | 0 |
| 4:30 PM | 4:45 PM | | | | | | | | | | | 0 | 0 |
| 4:45 PM | 5:00 PM | | | | | | | | | | | 0 | 0 |
| **Sub-Total** | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | |
| 5:00 PM | 5:15 PM | | | | | | | | | | | 0 | 0 |
| 5:15 PM | 5:30 PM | | | | | | | | | | | 0 | 0 |
| 5:30 PM | 5:45 PM | | | | | | | | | | | 0 | 0 |
| 5:45 PM | 6:00 PM | | | | | | | | | | | 0 | 0 |
| **Sub-Total** | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | |
| **Sub-Total** | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |

**Tecnico**

**Obesrvaciones**

**Fecha:** Septiembre 14, 2022 **Dia de la Semana:** Miercoles **Cond. del Tiempo :** Soleado

**Periodo :** 6:00 AM @ 6:00 PM **Municipio :** San German

**Interseccion** PR-122 **con** PR-321

**Contaje desde el Acceso** B **Carretera.** PR-321

**Descripcion del acceso :** Acceso Este - Un Carril

| Periodo de Estudio | | Afluencia de vehiculos | | | | | | | | Peatones | | Totales | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Izquierda | | Recto | | Derecha | | Viraje en U | | Desde | Desde | Periodo | Hora |
| Comienzo | Final | Liviano | Pesado | Liviano | Pesado | Liviano | Pesado | Liviano | Pesado | lado Izq. | lado Der. | 15 Min. | Pico |
| 6:00 AM | 6:15 AM | 1 | 0 | 12 | 2 | | | 0 | 0 | | | 15 | 15 |
| 6:15 AM | 6:30 AM | 2 | 0 | 8 | 0 | | | 0 | 0 | | | 10 | 25 |
| 6:30 AM | 6:45 AM | 3 | 0 | 27 | 0 | | | 0 | 0 | | | 30 | 55 |
| 6:45 AM | 7:00 AM | 6 | 0 | 26 | 0 | | | 0 | 0 | | | 32 | 87 |
| Sub-Total | | 12 | 0 | 73 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | | |
| 7:00 AM | 7:15 AM | 8 | 1 | 18 | 0 | | | 0 | 0 | | | 27 | 99 |
| 7:15 AM | 7:30 AM | 7 | 0 | 15 | 0 | | | 0 | 0 | | | 22 | 111 |
| 7:30 AM | 7:45 AM | 5 | 0 | 23 | 0 | | | 0 | 0 | | | 28 | 109 |
| 7:45 AM | 8:00 AM | 2 | 0 | 9 | 0 | | | 0 | 0 | | | 11 | 88 |
| Sub-Total | | 22 | 1 | 65 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | |
| 8:00 AM | 8:15 AM | 3 | 0 | 8 | 0 | | | 0 | 0 | | | 11 | 72 |
| 8:15 AM | 8:30 AM | 0 | 0 | 9 | 0 | | | 0 | 0 | | | 9 | 59 |
| 8:30 AM | 8:45 AM | 1 | 0 | 10 | 0 | | | 0 | 0 | | | 11 | 42 |
| 8:45 AM | 9:00 AM | 5 | 0 | 10 | 0 | | | 0 | 0 | | | 15 | 46 |
| Sub-Total | | 9 | 0 | 37 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | |
| 9:00 AM | 9:15 AM | 0 | 0 | 8 | 0 | | | 0 | 0 | | | 8 | 43 |
| 9:15 AM | 9:30 AM | 4 | 0 | 12 | 1 | | | 0 | 0 | | | 17 | 51 |
| 9:30 AM | 9:45 AM | 4 | 0 | 4 | 1 | | | 0 | 0 | | | 9 | 49 |
| 9:45 AM | 10:00 AM | 4 | 0 | 12 | 1 | | | 0 | 0 | | | 17 | 51 |
| Sub-Total | | 12 | 0 | 36 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | | |
| 10:00 AM | 10:15 AM | 0 | 0 | 7 | 0 | | | 0 | 0 | | | 7 | 50 |
| 10:15 AM | 10:30 AM | 3 | 0 | 5 | 0 | | | 0 | 0 | | | 8 | 41 |
| 10:30 AM | 10:45 AM | 4 | 0 | 8 | 0 | | | 0 | 0 | | | 12 | 44 |
| 10:45 AM | 11:00 AM | 3 | 0 | 10 | 0 | | | 0 | 0 | | | 13 | 40 |
| Sub-Total | | 10 | 0 | 30 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | |
| 11:00 AM | 11:15 AM | 2 | 0 | 11 | 0 | | | 0 | 0 | | | 13 | 46 |
| 11:15 AM | 11:30 AM | 6 | 0 | 4 | 0 | | | 0 | 0 | | | 10 | 48 |
| 11:30 AM | 11:45 AM | 5 | 0 | 6 | 0 | | | 0 | 0 | | | 11 | 47 |
| 11:45 AM | 12:00 PM | 4 | 0 | 5 | 0 | | | 1 | 0 | | | 10 | 44 |
| Sub-Total | | 17 | 0 | 26 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | | |
| 12:00 PM | 12:15 PM | 3 | 0 | 8 | 0 | | | 0 | 0 | | | 11 | 42 |
| 12:15 PM | 12:30 PM | 2 | 0 | 3 | 0 | | | 0 | 0 | | | 5 | 37 |
| 12:30 PM | 12:45 PM | 2 | 0 | 8 | 0 | | | 0 | 0 | | | 10 | 36 |
| 12:45 PM | 1:00 PM | 0 | 0 | 12 | 0 | | | 0 | 0 | | | 12 | 38 |
| Sub-Total | | 7 | 0 | 31 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | |
| 1:00 PM | 1:15 PM | 2 | 0 | 9 | 0 | | | 0 | 0 | | | 11 | 38 |
| 1:15 PM | 1:30 PM | 4 | 0 | 8 | 0 | | | 0 | 0 | | | 12 | 45 |
| 1:30 PM | 1:45 PM | 4 | 0 | 11 | 0 | | | 0 | 0 | | | 15 | 50 |
| 1:45 PM | 2:00 PM | 1 | 0 | 5 | 0 | | | 0 | 0 | | | 6 | 44 |
| Sub-Total | | 11 | 0 | 33 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | |
| 2:00 PM | 2:15 PM | 1 | 0 | 9 | 1 | | | 0 | 0 | | | 11 | 44 |
| 2:15 PM | 2:30 PM | 2 | 0 | 9 | 0 | | | 0 | 0 | | | 11 | 43 |
| 2:30 PM | 2:45 PM | 2 | 1 | 16 | 0 | | | 0 | 0 | | | 19 | 47 |
| 2:45 PM | 3:00 PM | 3 | 0 | 6 | 0 | | | 0 | 0 | | | 9 | 50 |
| Sub-Total | | 8 | 1 | 40 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | | |
| 3:00 PM | 3:15 PM | 3 | 0 | 11 | 0 | | | 0 | 0 | | | 14 | 53 |
| 3:15 PM | 3:30 PM | 2 | 1 | 7 | 1 | | | 0 | 0 | | | 11 | 53 |
| 3:30 PM | 3:45 PM | 2 | 0 | 10 | 0 | | | 0 | 0 | | | 12 | 46 |
| 3:45 PM | 4:00 PM | 2 | 0 | 12 | 0 | | | 0 | 0 | | | 14 | 51 |
| Sub-Total | | 9 | 1 | 40 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | | |
| 4:00 PM | 4:15 PM | 3 | 0 | 8 | 0 | | | 0 | 0 | | | 11 | 48 |
| 4:15 PM | 4:30 PM | 1 | 0 | 8 | 0 | | | 0 | 0 | | | 9 | 46 |
| 4:30 PM | 4:45 PM | 5 | 0 | 14 | 0 | | | 0 | 0 | | | 19 | 53 |
| 4:45 PM | 5:00 PM | 6 | 0 | 11 | 0 | | | 0 | 0 | | | 17 | 56 |
| Sub-Total | | 15 | 0 | 41 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | |
| 5:00 PM | 5:15 PM | 2 | 0 | 6 | 0 | | | 0 | 0 | | | 8 | 53 |
| 5:15 PM | 5:30 PM | 2 | 0 | 13 | 0 | | | 0 | 0 | | | 15 | 59 |
| 5:30 PM | 5:45 PM | 9 | 0 | 7 | 0 | | | 0 | 0 | | | 16 | 56 |
| 5:45 PM | 6:00 PM | 2 | 0 | 9 | 0 | | | 0 | 0 | | | 11 | 50 |
| Sub-Total | | 15 | 0 | 35 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | |
| Sub-Total | | 147 | 3 | 487 | 7 | 0 | 0 | 1 | 0 | 0 | 0 | 645 | |

**Tecnico**

**Obesrvaciones**

**Fecha:** Septiembre 14, 2022 **Dia de la Semana:** Miercoles **Cond. del Tiempo :**

**Periodo :** 6:00 AM @ 6:00 PM **Municipio :** San German

**Interseccion** PR-122 **con** PR-321

**Contaje desde el Acceso** C **Carretera** PR-122

**Descripcion del acceso :** Acceso Sur - Dos Carriles

| Periodo de Estudio | | Afluencia de vehiculos | | | | | | | | Peatones | | Totales | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Izquierda | | Recto | | Derecha | | Viraje en U | | Desde | Desde | Periodo | Hora |
| Comienzo | Final | Liviano | Pesado | Liviano | Pesado | Liviano | Pesado | Liviano | Pesado | lado Izq. | lado Der. | 15 Min. | Pico |
| 6:00 AM | 6:15 AM | 35 | 0 | | | 1 | 0 | 0 | 0 | | | 36 | 36 |
| 6:15 AM | 6:30 AM | 28 | 0 | | | 5 | 0 | 0 | 0 | | | 33 | 69 |
| 6:30 AM | 6:45 AM | 63 | 0 | | | 1 | 0 | 0 | 0 | | | 64 | 133 |
| 6:45 AM | 7:00 AM | 46 | 0 | | | 1 | 0 | 0 | 0 | | | 47 | 180 |
| Sub-Total | | 172 | 0 | 0 | 0 | 8 | 0 | 0 | 0 | 0 | 0 | | |
| 7:00 AM | 7:15 AM | 66 | 0 | | | 3 | 1 | 0 | 0 | | | 70 | 214 |
| 7:15 AM | 7:30 AM | 62 | 0 | | | 2 | 0 | 0 | 0 | | | 64 | 245 |
| 7:30 AM | 7:45 AM | 52 | 1 | | | 2 | 0 | 0 | 0 | | | 55 | 236 |
| 7:45 AM | 8:00 AM | 57 | 0 | | | 4 | 0 | 0 | 0 | | | 61 | 250 |
| Sub-Total | | 237 | 1 | 0 | 0 | 11 | 1 | 0 | 0 | 0 | 0 | | |
| 8:00 AM | 8:15 AM | 44 | 0 | | | 1 | 0 | 0 | 0 | | | 45 | 225 |
| 8:15 AM | 8:30 AM | 39 | 0 | | | 4 | 0 | 0 | 0 | | | 43 | 204 |
| 8:30 AM | 8:45 AM | 38 | 1 | | | 2 | 0 | 0 | 0 | | | 41 | 190 |
| 8:45 AM | 9:00 AM | 29 | 1 | | | 2 | 0 | 0 | 0 | | | 32 | 161 |
| Sub-Total | | 150 | 2 | 0 | 0 | 9 | 0 | 0 | 0 | 0 | 0 | | |
| 9:00 AM | 9:15 AM | 34 | 0 | | | 4 | 0 | 0 | 0 | | | 38 | 154 |
| 9:15 AM | 9:30 AM | 31 | 0 | | | 0 | 0 | 0 | 0 | | | 31 | 142 |
| 9:30 AM | 9:45 AM | 27 | 2 | | | 1 | 0 | 0 | 0 | | | 30 | 131 |
| 9:45 AM | 10:00 AM | 27 | 2 | | | 1 | 0 | 0 | 0 | | | 30 | 129 |
| Sub-Total | | 119 | 4 | 0 | 0 | 6 | 0 | 0 | 0 | 0 | 0 | | |
| 10:00 AM | 10:15 AM | 16 | 1 | | | 1 | 0 | 0 | 0 | | | 18 | 109 |
| 10:15 AM | 10:30 AM | 30 | 1 | | | 3 | 0 | 1 | 0 | | | 35 | 113 |
| 10:30 AM | 10:45 AM | 29 | 0 | | | 2 | 0 | 0 | 0 | | | 31 | 114 |
| 10:45 AM | 11:00 AM | 29 | 3 | | | 1 | 0 | 0 | 0 | | | 33 | 117 |
| Sub-Total | | 104 | 5 | 0 | 0 | 7 | 0 | 1 | 0 | 0 | 0 | | |
| 11:00 AM | 11:15 AM | 38 | 1 | | | 2 | 0 | 0 | 0 | | | 41 | 140 |
| 11:15 AM | 11:30 AM | 38 | 0 | | | 2 | 0 | 0 | 0 | | | 40 | 145 |
| 11:30 AM | 11:45 AM | 29 | 2 | | | 0 | 0 | 0 | 0 | | | 31 | 145 |
| 11:45 AM | 12:00 PM | 29 | 2 | | | 0 | 0 | 0 | 0 | | | 31 | 143 |
| Sub-Total | | 134 | 5 | 0 | 0 | 4 | 0 | 0 | 0 | 0 | 0 | | |
| 12:00 PM | 12:15 PM | 38 | 0 | | | 3 | 0 | 0 | 0 | | | 41 | 143 |
| 12:15 PM | 12:30 PM | 28 | 0 | | | 2 | 0 | 0 | 0 | | | 30 | 133 |
| 12:30 PM | 12:45 PM | 11 | 1 | | | 1 | 0 | 0 | 0 | | | 13 | 115 |
| 12:45 PM | 1:00 PM | 44 | 1 | | | 6 | 0 | 0 | 0 | | | 51 | 135 |
| Sub-Total | | 121 | 2 | 0 | 0 | 12 | 0 | 0 | 0 | 0 | 0 | | |
| 1:00 PM | 1:15 PM | 41 | 0 | | | 4 | 0 | 0 | 0 | | | 45 | 139 |
| 1:15 PM | 1:30 PM | 40 | 2 | | | 2 | 0 | 0 | 0 | | | 44 | 153 |
| 1:30 PM | 1:45 PM | 48 | 0 | | | 2 | 0 | 0 | 0 | | | 50 | 190 |
| 1:45 PM | 2:00 PM | 27 | 1 | | | 4 | 0 | 0 | 0 | | | 32 | 171 |
| Sub-Total | | 156 | 3 | 0 | 0 | 12 | 0 | 0 | 0 | 0 | 0 | | |
| 2:00 PM | 2:15 PM | 36 | 2 | | | 1 | 0 | 0 | 0 | | | 39 | 165 |
| 2:15 PM | 2:30 PM | 38 | 0 | | | 2 | 0 | 0 | 0 | | | 40 | 161 |
| 2:30 PM | 2:45 PM | 46 | 0 | | | 4 | 0 | 0 | 0 | | | 50 | 161 |
| 2:45 PM | 3:00 PM | 64 | 2 | | | 5 | 0 | 0 | 0 | | | 71 | 200 |
| Sub-Total | | 184 | 4 | 0 | 0 | 12 | 0 | 0 | 0 | 0 | 0 | | |
| 3:00 PM | 3:15 PM | 38 | 1 | | | 0 | 0 | 0 | 0 | | | 39 | 200 |
| 3:15 PM | 3:30 PM | 28 | 0 | | | 2 | 0 | 0 | 0 | | | 30 | 190 |
| 3:30 PM | 3:45 PM | 61 | 1 | | | 4 | 0 | 0 | 0 | | | 66 | 206 |
| 3:45 PM | 4:00 PM | 44 | 1 | | | 5 | 0 | 0 | 0 | | | 50 | 185 |
| Sub-Total | | 171 | 3 | 0 | 0 | 11 | 0 | 0 | 0 | 0 | 0 | | |
| 4:00 PM | 4:15 PM | 45 | 0 | | | 5 | 0 | 0 | 0 | | | 50 | 196 |
| 4:15 PM | 4:30 PM | 32 | 0 | | | 3 | 0 | 0 | 0 | | | 35 | 201 |
| 4:30 PM | 4:45 PM | 32 | 0 | | | 1 | 0 | 0 | 0 | | | 33 | 168 |
| 4:45 PM | 5:00 PM | 27 | 0 | | | 3 | 1 | 0 | 0 | | | 31 | 149 |
| Sub-Total | | 136 | 0 | 0 | 0 | 12 | 1 | 0 | 0 | 0 | 0 | | |
| 5:00 PM | 5:15 PM | 34 | 2 | | | 2 | 0 | 0 | 0 | | | 38 | 137 |
| 5:15 PM | 5:30 PM | 20 | 0 | | | 3 | 0 | 0 | 0 | | | 23 | 125 |
| 5:30 PM | 5:45 PM | 23 | 0 | | | 3 | 0 | 0 | 0 | | | 26 | 118 |
| 5:45 PM | 6:00 PM | 26 | 0 | | | 5 | 0 | 0 | 0 | | | 31 | 118 |
| Sub-Total | | 103 | 2 | 0 | 0 | 13 | 0 | 0 | 0 | 0 | 0 | | |
| Sub-Total | | 1,787 | 31 | 0 | 0 | 117 | 2 | 1 | 0 | 0 | 0 | 1,938 | |

**Tecnico**

**Obesrvaciones**

**Fecha:** Septiembre 14, 2022 **Dia de la Semana:** Miercoles **Cond. del Tiempo :** Soleado

**Periodo :** 6:00 AM @ 6:00 PM **Municipio :** San German

**Interseccion** PR-122 **con** PR-321

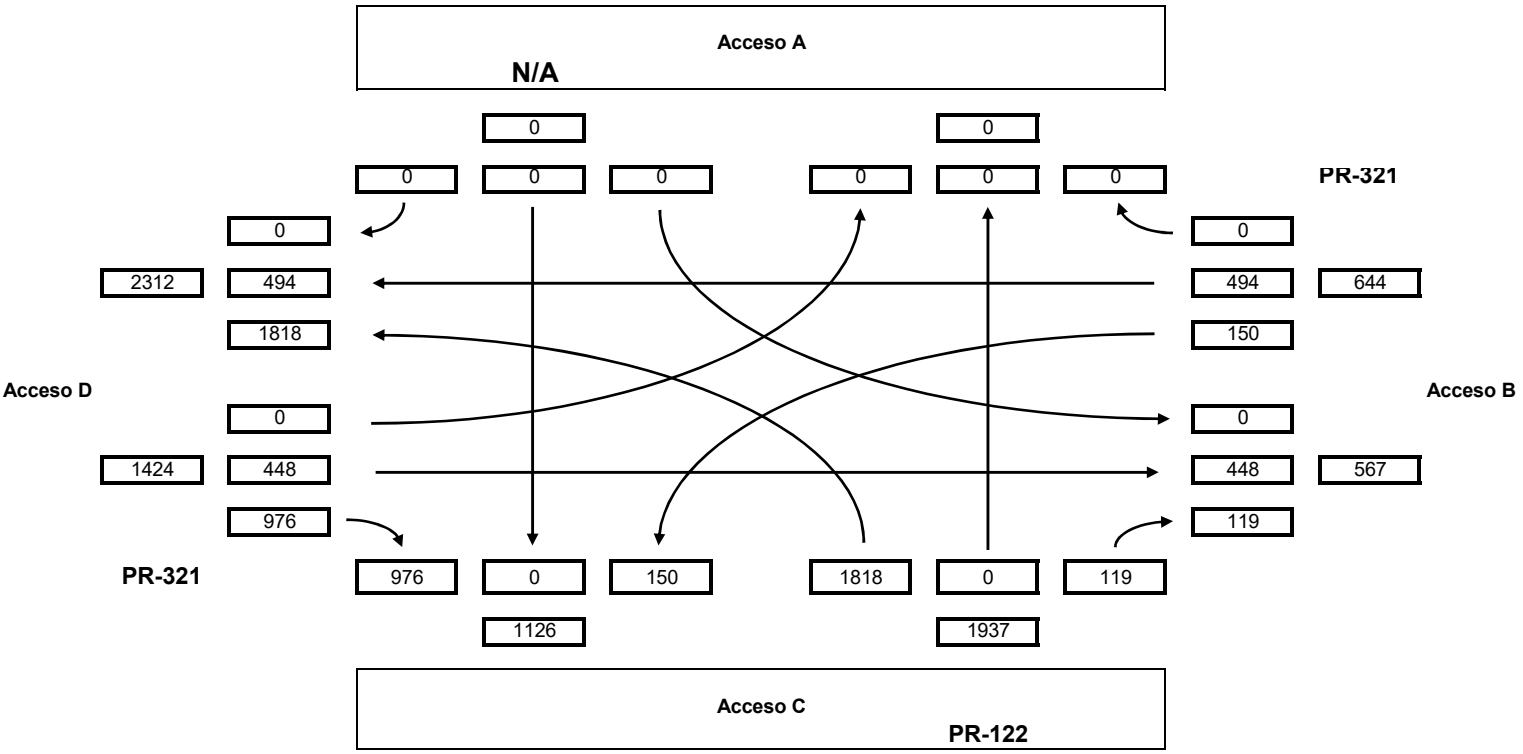
**Contaje desde el Acceso** D **Carretera** PR-321

**Descripcion del acceso :** Acceso Oeste - Dos Carriles

| Periodo de Estudio | | Afluencia de vehiculos | | | | | | | | Peatones | | Totales | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Izquierda | | Recto | | Derecha | | Viraje en U | | Desde | Desde | Periodo | Hora |
| Comienzo | Final | Liviano | Pesado | Liviano | Pesado | Liviano | Pesado | Liviano | Pesado | lado Izq. | lado Der. | 15 Min. | Pico |
| 6:00 AM | 6:15 AM | | | 2 | 0 | 11 | 0 | 0 | 0 | | | 13 | 13 |
| 6:15 AM | 6:30 AM | | | 3 | 0 | 10 | 0 | 0 | 0 | | | 13 | 26 |
| 6:30 AM | 6:45 AM | | | 3 | 0 | 29 | 0 | 0 | 0 | | | 32 | 58 |
| 6:45 AM | 7:00 AM | | | 4 | 0 | 36 | 0 | 0 | 0 | | | 40 | 98 |
| Sub-Total | | 0 | 0 | 12 | 0 | 86 | 0 | 0 | 0 | 0 | 0 | | |
| 7:00 AM | 7:15 AM | | | 11 | 0 | 28 | 0 | 0 | 0 | | | 39 | 124 |
| 7:15 AM | 7:30 AM | | | 10 | 0 | 24 | 0 | 0 | 0 | | | 34 | 145 |
| 7:30 AM | 7:45 AM | | | 2 | 0 | 30 | 1 | 0 | 0 | | | 33 | 146 |
| 7:45 AM | 8:00 AM | | | 5 | 0 | 14 | 0 | 0 | 0 | | | 19 | 125 |
| Sub-Total | | 0 | 0 | 28 | 0 | 96 | 1 | 0 | 0 | 0 | 0 | | |
| 8:00 AM | 8:15 AM | | | 10 | 0 | 16 | 0 | 0 | 0 | | | 26 | 112 |
| 8:15 AM | 8:30 AM | | | 3 | 0 | 12 | 1 | 0 | 0 | | | 16 | 94 |
| 8:30 AM | 8:45 AM | | | 4 | 0 | 17 | 1 | 0 | 0 | | | 22 | 83 |
| 8:45 AM | 9:00 AM | | | 4 | 0 | 9 | 0 | 0 | 0 | | | 13 | 77 |
| Sub-Total | | 0 | 0 | 21 | 0 | 54 | 2 | 0 | 0 | 0 | 0 | | |
| 9:00 AM | 9:15 AM | | | 6 | 1 | 19 | 2 | 0 | 0 | | | 28 | 79 |
| 9:15 AM | 9:30 AM | | | 6 | 0 | 12 | 1 | 0 | 0 | | | 19 | 82 |
| 9:30 AM | 9:45 AM | | | 6 | 0 | 11 | 1 | 0 | 0 | | | 18 | 78 |
| 9:45 AM | 10:00 AM | | | 9 | 0 | 11 | 2 | 0 | 0 | | | 22 | 87 |
| Sub-Total | | 0 | 0 | 27 | 1 | 53 | 6 | 0 | 0 | 0 | 0 | | |
| 10:00 AM | 10:15 AM | | | 9 | 0 | 22 | 0 | 0 | 0 | | | 31 | 90 |
| 10:15 AM | 10:30 AM | | | 9 | 0 | 19 | 1 | 0 | 0 | | | 29 | 100 |
| 10:30 AM | 10:45 AM | | | 6 | 0 | 18 | 0 | 0 | 0 | | | 24 | 106 |
| 10:45 AM | 11:00 AM | | | 4 | 0 | 12 | 0 | 0 | 0 | | | 16 | 100 |
| Sub-Total | | 0 | 0 | 28 | 0 | 71 | 1 | 0 | 0 | 0 | 0 | | |
| 11:00 AM | 11:15 AM | | | 1 | 0 | 6 | 1 | 0 | 0 | | | 8 | 77 |
| 11:15 AM | 11:30 AM | | | 6 | 0 | 23 | 0 | 0 | 0 | | | 29 | 77 |
| 11:30 AM | 11:45 AM | | | 10 | 0 | 22 | 0 | 0 | 0 | | | 32 | 85 |
| 11:45 AM | 12:00 PM | | | 8 | 0 | 14 | 0 | 0 | 0 | | | 22 | 91 |
| Sub-Total | | 0 | 0 | 25 | 0 | 65 | 1 | 0 | 0 | 0 | 0 | | |
| 12:00 PM | 12:15 PM | | | 8 | 0 | 17 | 0 | 0 | 0 | | | 25 | 108 |
| 12:15 PM | 12:30 PM | | | 2 | 0 | 25 | 0 | 0 | 0 | | | 27 | 106 |
| 12:30 PM | 12:45 PM | | | 5 | 0 | 10 | 1 | 0 | 0 | | | 16 | 90 |
| 12:45 PM | 1:00 PM | | | 7 | 0 | 16 | 0 | 0 | 0 | | | 23 | 91 |
| Sub-Total | | 0 | 0 | 22 | 0 | 68 | 1 | 0 | 0 | 0 | 0 | | |
| 1:00 PM | 1:15 PM | | | 10 | 0 | 17 | 0 | 0 | 0 | | | 27 | 93 |
| 1:15 PM | 1:30 PM | | | 4 | 0 | 20 | 0 | 0 | 0 | | | 24 | 90 |
| 1:30 PM | 1:45 PM | | | 11 | 0 | 19 | 1 | 0 | 0 | | | 31 | 105 |
| 1:45 PM | 2:00 PM | | | 6 | 1 | 18 | 2 | 0 | 0 | | | 27 | 109 |
| Sub-Total | | 0 | 0 | 31 | 1 | 74 | 3 | 0 | 0 | 0 | 0 | | |
| 2:00 PM | 2:15 PM | | | 10 | 0 | 26 | 0 | 0 | 0 | | | 36 | 118 |
| 2:15 PM | 2:30 PM | | | 15 | 0 | 26 | 0 | 0 | 0 | | | 41 | 135 |
| 2:30 PM | 2:45 PM | | | 9 | 0 | 22 | 0 | 0 | 0 | | | 31 | 135 |
| 2:45 PM | 3:00 PM | | | 9 | 0 | 28 | 0 | 0 | 0 | | | 37 | 145 |
| Sub-Total | | 0 | 0 | 43 | 0 | 102 | 0 | 0 | 0 | 0 | 0 | | |
| 3:00 PM | 3:15 PM | | | 18 | 0 | 31 | 0 | 0 | 0 | | | 49 | 158 |
| 3:15 PM | 3:30 PM | | | 22 | 2 | 21 | 0 | 0 | 0 | | | 45 | 162 |
| 3:30 PM | 3:45 PM | | | 14 | 0 | 13 | 1 | 0 | 0 | | | 28 | 159 |
| 3:45 PM | 4:00 PM | | | 11 | 1 | 19 | 1 | 0 | 0 | | | 32 | 154 |
| Sub-Total | | 0 | 0 | 65 | 3 | 84 | 2 | 0 | 0 | 0 | 0 | | |
| 4:00 PM | 4:15 PM | | | 16 | 1 | 24 | 1 | 0 | 0 | | | 42 | 147 |
| 4:15 PM | 4:30 PM | | | 14 | 0 | 33 | 0 | 0 | 0 | | | 47 | 149 |
| 4:30 PM | 4:45 PM | | | 17 | 0 | 25 | 0 | 0 | 0 | | | 42 | 163 |
| 4:45 PM | 5:00 PM | | | 15 | 0 | 26 | 1 | 0 | 0 | | | 42 | 173 |
| Sub-Total | | 0 | 0 | 62 | 1 | 108 | 2 | 0 | 0 | 0 | 0 | | |
| 5:00 PM | 5:15 PM | | | 20 | 1 | 32 | 0 | 0 | 0 | | | 53 | 184 |
| 5:15 PM | 5:30 PM | | | 20 | 0 | 25 | 0 | 0 | 0 | | | 45 | 182 |
| 5:30 PM | 5:45 PM | | | 20 | 1 | 18 | 0 | 0 | 0 | | | 39 | 179 |
| 5:45 PM | 6:00 PM | | | 15 | 1 | 21 | 0 | 0 | 0 | | | 37 | 174 |
| Sub-Total | | 0 | 0 | 75 | 3 | 96 | 0 | 0 | 0 | 0 | 0 | | |
| Sub-Total | | 0 | 0 | 439 | 9 | 957 | 19 | 0 | 0 | 0 | 0 | 1,424 | |

**Tecnico**

**Obesrvaciones**


Acceso A
N/A
0
0
0
0
0
0
0
0
PR-321
0
2312
494
494
644
1818
150
Acceso D
Acceso B
0
0
1424
448
448
567
976
119
PR-321
976
0
150
1818
0
119
1126
1937
Acceso C
PR-122

## Intersection : PR-122 with PR-321

### MORNING PEAK HOUR FACTOR

| Time Period | | North Access (Southbound) | | | | | | East Access (Westbound) | | | | | | South Access (Northbound) | | | | | | West Access (Eastbound) | | | | | | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Left | | Thru | | Right | | Left | | Thru | | Right | | Left | | Thru | | Right | | Left | | Thru | | Right | | |
| | | Light | Heavy | Light | Heavy | Light | Heavy | Light | Heavy | Light | Heavy | Light | Heavy | Light | Heavy | Light | Heavy | Light | Heavy | Light | Heavy | Light | Heavy | Light | Heavy | |
| 6:30 AM | 6:45 AM | | | | | | | 3 | 0 | 27 | 0 | | | 63 | 0 | | | 1 | 0 | | | 3 | 0 | 29 | 0 | 126 |
| 6:45 AM | 7:00 AM | | | | | | | 6 | 0 | 26 | 0 | | | 46 | 0 | | | 1 | 0 | | | 4 | 0 | 36 | 0 | 119 |
| 7:00 AM | 7:15 AM | | | | | | | 8 | 1 | 18 | 0 | | | 66 | 0 | | | 3 | 1 | | | 11 | 0 | 28 | 0 | 136 |
| 7:15 AM | 7:30 AM | | | | | | | 7 | 0 | 15 | 0 | | | 62 | 0 | | | 2 | 0 | | | 10 | 0 | 24 | 0 | 120 |
| | Total | 0 | 0 | 0 | 0 | 0 | 0 | 24 | 1 | 86 | 0 | 0 | 0 | 237 | 0 | 0 | 0 | 7 | 1 | 0 | 0 | 28 | 0 | 117 | 0 | 501 |

| | North Access | | | East Access | | | South Access | | | West Access | | | Intersection | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right | | |
| Total Flow Period, T (minutes) | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | |
| Peak Flow Period, $T_p$ (minutes) | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | |
| Volume Count during the Total Flow Period, $v_a$ (veh) | 0 | 0 | 0 | 25 | 86 | 0 | 237 | 0 | 8 | 0 | 28 | 117 | 501 | |
| Volume Count during the Peak Flow Period, $v_p$ (veh) | 0 | 0 | 0 | 9 | 27 | 0 | 66 | 0 | 4 | 0 | 11 | 36 | 136 | |
| Average Flow Rate during the Total Flow Period, $q_a$ (veh/hr) | 0 | 0 | 0 | 25 | 86 | 0 | 237 | 0 | 8 | 0 | 28 | 117 | 501 | |
| Average Flow Rate during the Peak Flow Period, $q_p$ (veh/hr) | 0 | 0 | 0 | 36 | 108 | 0 | 264 | 0 | 16 | 0 | 44 | 144 | 544 | |
| Peak Time Factor, PTF | 25% | 25% | 25% | 25% | 25% | 25% | 25% | 25% | 25% | 25% | 25% | 25% | 25% | |
| Peak Flow Factor, PFF | #DIV/0! | #DIV/0! | #DIV/0! | 69% | 80% | #DIV/0! | 90% | #DIV/0! | 50% | #DIV/0! | 64% | 81% | 92% | |
| Unit Time for Volumes, $T_v$ (minutes) | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | |
| Minimum Total Flow Period, $T_m$ (minutes) | #DIV/0! | #DIV/0! | #DIV/0! | 21.6 | 18.83721 | #DIV/0! | 16.70886 | #DIV/0! | 30 | #DIV/0! | 23.57143 | 18.46154 | 16.28743 | ≤ Tv, OK |
| Duration of Non-Peak Flow Period, $T_n$ (minutes) | 45 | 45 | 45 | 45 | 45 | 45 | 45 | 45 | 45 | 45 | 45 | 45 | 45 | |
| Average Flow Rate during the Non-Peak Flow Period, $q_n$ (veh/hr) | #DIV/0! | #DIV/0! | #DIV/0! | 21 | 79 | #DIV/0! | 228 | #DIV/0! | 5 | #DIV/0! | 23 | 108 | 487 | |
| Volume Count during the Non-Peak Flow Period, $v_n$ (veh) | #DIV/0! | #DIV/0! | #DIV/0! | 16 | 59 | #DIV/0! | 171 | #DIV/0! | 4 | #DIV/0! | 17 | 81 | 365 | |

### AFTERNOON PEAK HOUR FACTOR

| Time Period | | North Access (Southbound) | | | | | | East Access (Westbound) | | | | | | South Access (Northbound) | | | | | | West Access (Eastbound) | | | | | | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Left | | Thru | | Right | | Left | | Thru | | Right | | Left | | Thru | | Right | | Left | | Thru | | Right | | |
| | | Light | Heavy | Light | Heavy | Light | Heavy | Light | Heavy | Light | Heavy | Light | Heavy | Light | Heavy | Light | Heavy | Light | Heavy | Light | Heavy | Light | Heavy | Light | Heavy | |
| 2:45 PM | 3:00 PM | | | | | | | 3 | 0 | 6 | 0 | | | 64 | 2 | | | 5 | 0 | | | 9 | 0 | 28 | 0 | 117 |
| 3:00 PM | 3:15 PM | | | | | | | 3 | 0 | 11 | 0 | | | 38 | 1 | | | 0 | 0 | | | 18 | 0 | 31 | 0 | 102 |
| 3:15 PM | 3:30 PM | | | | | | | 2 | 1 | 7 | 1 | | | 28 | 0 | | | 2 | 0 | | | 22 | 2 | 21 | 0 | 86 |
| 3:30 PM | 3:45 PM | | | | | | | 2 | 0 | 10 | 0 | | | 61 | 1 | | | 4 | 0 | | | 14 | 0 | 13 | 1 | 106 |
| | Total | 0 | 0 | 0 | 0 | 0 | 0 | 10 | 1 | 34 | 1 | 0 | 0 | 191 | 4 | 0 | 0 | 11 | 0 | 0 | 0 | 63 | 2 | 93 | 1 | 411 |

| | North Access | | | East Access | | | South Access | | | West Access | | | Intersection | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right | | |
| Total Flow Period, T (minutes) | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | |
| Peak Flow Period, $T_p$ (minutes) | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | |
| Volume Count during the Total Flow Period, $v_a$ (veh) | 0 | 0 | 0 | 11 | 35 | 0 | 195 | 0 | 11 | 0 | 65 | 94 | 411 | |
| Volume Count during the Peak Flow Period, $v_p$ (veh) | 0 | 0 | 0 | 3 | 11 | 0 | 66 | 0 | 5 | 0 | 24 | 31 | 117 | |
| Average Flow Rate during the Total Flow Period, $q_a$ (veh/hr) | 0 | 0 | 0 | 11 | 35 | 0 | 195 | 0 | 11 | 0 | 65 | 94 | 411 | |
| Average Flow Rate during the Peak Flow Period, $q_p$ (veh/hr) | 0 | 0 | 0 | 12 | 44 | 0 | 264 | 0 | 20 | 0 | 96 | 124 | 468 | |
| Peak Time Factor, PTF | 25% | 25% | 25% | 25% | 25% | 25% | 25% | 25% | 25% | 25% | 25% | 25% | 25% | |
| Peak Flow Factor, PFF | #DIV/0! | #DIV/0! | #DIV/0! | 92% | 80% | #DIV/0! | 74% | #DIV/0! | 55% | #DIV/0! | 68% | 76% | 88% | |
| Unit Time for Volumes, $T_v$ (minutes) | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | |
| Minimum Total Flow Period, $T_m$ (minutes) | #DIV/0! | #DIV/0! | #DIV/0! | 16.36364 | 18.85714 | #DIV/0! | 20.30769 | #DIV/0! | 27.27273 | #DIV/0! | 22.15385 | 19.78723 | 17.08029 | ≤ Tv, OK |
| Duration of Non-Peak Flow Period, $T_n$ (minutes) | 45 | 45 | 45 | 45 | 45 | 45 | 45 | 45 | 45 | 45 | 45 | 45 | 45 | |
| Average Flow Rate during the Non-Peak Flow Period, $q_n$ (veh/hr) | #DIV/0! | #DIV/0! | #DIV/0! | 11 | 32 | #DIV/0! | 172 | #DIV/0! | 8 | #DIV/0! | 55 | 84 | 392 | |
| Volume Count during the Non-Peak Flow Period, $v_n$ (veh) | #DIV/0! | #DIV/0! | #DIV/0! | 8 | 24 | #DIV/0! | 129 | #DIV/0! | 6 | #DIV/0! | 41 | 63 | 294 | |

**Fecha:** Febrero 14, 2017 (Projected) **Dia de la Semana:** Martes **Cond. del Tiempo :** Soleado

**Periodo :** 6:00 AM @ 6:00 PM **Municipio :** San Germán

**Interseccion** PR-166 **con** PR-101

**Contaje desde el Acceso** A **Carretera** Lorencita Ramirez St.

**Descripcion del acceso :** Acceso Norte - Un carril por dirreccion

| Periodo de Estudio | | Afluencia de vehiculos | | | | | | | | Peatones | | Totales | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Izquierda | | Recto | | Derecha | | Viraje en U | | Desde | Desde | Periodo | Hora |
| Comienzo | Final | Liviano | Pesado | Liviano | Pesado | Liviano | Pesado | Liviano | Pesado | lado Izq. | lado Der. | 15 Min. | Pico |
| 6:00 AM | 6:15 AM | 2 | 0 | 9 | 0 | 2 | 0 | | | | | 13 | 13 |
| 6:15 AM | 6:30 AM | 3 | 0 | 11 | 0 | 4 | 0 | | | | | 18 | 31 |
| 6:30 AM | 6:45 AM | 3 | 0 | 10 | 0 | 2 | 0 | | | | | 15 | 46 |
| 6:45 AM | 7:00 AM | 4 | 0 | 13 | 0 | 3 | 0 | | | | | 20 | 66 |
| **Sub-Total** | | 12 | 0 | 43 | 0 | 11 | 0 | 0 | 0 | 0 | 0 | | |
| 7:00 AM | 7:15 AM | 7 | 0 | 18 | 0 | 4 | 0 | | | | | 29 | 82 |
| 7:15 AM | 7:30 AM | 9 | 0 | 32 | 0 | 2 | 0 | | | | | 43 | 107 |
| 7:30 AM | 7:45 AM | 20 | 0 | 54 | 0 | 9 | 0 | | | | | 83 | 175 |
| 7:45 AM | 8:00 AM | 24 | 0 | 61 | 0 | 5 | 0 | | | | | 90 | 245 |
| **Sub-Total** | | 60 | 0 | 165 | 0 | 20 | 0 | 0 | 0 | 0 | 0 | | |
| 8:00 AM | 8:15 AM | 17 | 0 | 40 | 0 | 9 | 0 | | | | | 66 | 282 |
| 8:15 AM | 8:30 AM | 5 | 0 | 26 | 0 | 0 | 0 | | | | | 31 | 270 |
| 8:30 AM | 8:45 AM | 3 | 0 | 27 | 0 | 4 | 0 | | | | | 34 | 221 |
| 8:45 AM | 9:00 AM | 6 | 0 | 23 | 0 | 3 | 0 | | | | | 32 | 163 |
| **Sub-Total** | | 31 | 0 | 116 | 0 | 16 | 0 | 0 | 0 | 0 | 0 | | |
| 9:00 AM | 9:15 AM | 0 | 0 | 27 | 4 | 2 | 0 | | | | | 33 | 130 |
| 9:15 AM | 9:30 AM | 4 | 0 | 27 | 0 | 2 | 0 | | | | | 33 | 132 |
| 9:30 AM | 9:45 AM | 3 | 0 | 35 | 0 | 6 | 0 | | | | | 44 | 142 |
| 9:45 AM | 10:00 AM | 4 | 0 | 31 | 0 | 4 | 0 | | | | | 39 | 149 |
| **Sub-Total** | | 11 | 0 | 120 | 4 | 14 | 0 | 0 | 0 | 0 | 0 | | |
| 10:00 AM | 10:15 AM | 0 | 0 | 0 | 0 | 0 | 0 | | | | | 0 | 116 |
| 10:15 AM | 10:30 AM | 0 | 0 | 0 | 0 | 0 | 0 | | | | | 0 | 83 |
| 10:30 AM | 10:45 AM | 0 | 0 | 0 | 0 | 0 | 0 | | | | | 0 | 39 |
| 10:45 AM | 11:00 AM | 0 | 0 | 0 | 0 | 0 | 0 | | | | | 0 | 0 |
| **Sub-Total** | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | |
| 11:00 AM | 11:15 AM | 4 | 0 | 26 | 0 | 5 | 0 | | | | | 35 | 35 |
| 11:15 AM | 11:30 AM | 3 | 0 | 34 | 2 | 11 | 0 | | | | | 50 | 85 |
| 11:30 AM | 11:45 AM | 2 | 0 | 32 | 0 | 4 | 0 | | | | | 38 | 123 |
| 11:45 AM | 12:00 PM | 5 | 0 | 25 | 0 | 7 | 0 | | | | | 37 | 160 |
| **Sub-Total** | | 14 | 0 | 117 | 2 | 27 | 0 | 0 | 0 | 0 | 0 | | |
| 12:00 PM | 12:15 PM | 3 | 0 | 43 | 0 | 16 | 0 | | | | | 62 | 187 |
| 12:15 PM | 12:30 PM | 3 | 0 | 27 | 0 | 6 | 0 | | | | | 36 | 173 |
| 12:30 PM | 12:45 PM | 2 | 2 | 28 | 0 | 0 | 0 | | | | | 32 | 167 |
| 12:45 PM | 1:00 PM | 2 | 0 | 38 | 0 | 11 | 0 | | | | | 51 | 181 |
| **Sub-Total** | | 10 | 2 | 136 | 0 | 33 | 0 | 0 | 0 | 0 | 0 | | |
| 1:00 PM | 1:15 PM | 3 | 0 | 45 | 0 | 4 | 0 | | | | | 52 | 171 |
| 1:15 PM | 1:30 PM | 6 | 0 | 36 | 0 | 16 | 0 | | | | | 58 | 193 |
| 1:30 PM | 1:45 PM | 4 | 0 | 42 | 2 | 13 | 0 | | | | | 61 | 222 |
| 1:45 PM | 2:00 PM | 2 | 0 | 47 | 0 | 4 | 0 | | | | | 53 | 224 |
| **Sub-Total** | | 15 | 0 | 170 | 2 | 37 | 0 | 0 | 0 | 0 | 0 | | |
| 2:00 PM | 2:15 PM | 0 | 0 | 0 | 0 | 0 | 0 | | | | | 0 | 172 |
| 2:15 PM | 2:30 PM | 0 | 0 | 0 | 0 | 0 | 0 | | | | | 0 | 114 |
| 2:30 PM | 2:45 PM | 0 | 0 | 0 | 0 | 0 | 0 | | | | | 0 | 53 |
| 2:45 PM | 3:00 PM | 0 | 0 | 0 | 0 | 0 | 0 | | | | | 0 | 0 |
| **Sub-Total** | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | |
| 3:00 PM | 3:15 PM | 17 | 0 | 50 | 0 | 11 | 0 | | | | | 78 | 78 |
| 3:15 PM | 3:30 PM | 21 | 0 | 60 | 0 | 10 | 0 | | | | | 91 | 169 |
| 3:30 PM | 3:45 PM | 5 | 0 | 57 | 0 | 4 | 0 | | | | | 66 | 235 |
| 3:45 PM | 4:00 PM | 4 | 0 | 55 | 3 | 2 | 0 | | | | | 64 | 299 |
| **Sub-Total** | | 47 | 0 | 222 | 3 | 27 | 0 | 0 | 0 | 0 | 0 | | |
| 4:00 PM | 4:15 PM | 3 | 0 | 52 | 0 | 3 | 0 | | | | | 58 | 279 |
| 4:15 PM | 4:30 PM | 3 | 0 | 26 | 0 | 4 | 0 | | | | | 33 | 221 |
| 4:30 PM | 4:45 PM | 5 | 0 | 17 | 0 | 0 | 0 | | | | | 22 | 177 |
| 4:45 PM | 5:00 PM | 4 | 0 | 13 | 0 | 5 | 0 | | | | | 22 | 135 |
| **Sub-Total** | | 15 | 0 | 108 | 0 | 12 | 0 | 0 | 0 | 0 | 0 | | |
| 5:00 PM | 5:15 PM | 7 | 0 | 19 | 0 | 10 | 0 | | | | | 36 | 113 |
| 5:15 PM | 5:30 PM | 5 | 0 | 13 | 0 | 6 | 0 | | | | | 24 | 104 |
| 5:30 PM | 5:45 PM | 5 | 0 | 9 | 0 | 6 | 0 | | | | | 20 | 102 |
| 5:45 PM | 6:00 PM | 3 | 0 | 7 | 0 | 3 | 0 | | | | | 13 | 93 |
| **Sub-Total** | | 20 | 0 | 48 | 0 | 25 | 0 | 0 | 0 | 0 | 0 | | |

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Sub-Total** | | 235 | 2 | 1,245 | 11 | 222 | 0 | 0 | 0 | 0 | 0 | 1,715 | |

**Tecnico**

**Obesrvaciones**

**Fecha:** Febrero 14, 2017 (Projected) **Dia de la Semana:** Martes **Cond. del Tiempo :** Soleado

**Periodo :** 6:00 AM @ 6:00 PM **Municipio :** San Germán

**Interseccion** PR-166 **con** PR-101

**Contaje desde el Acceso** B **Carretera.** PR-166

**Descripcion del acceso :** Acceso Este - Dos carriles en direccion este

| Periodo de Estudio | | Afluencia de vehiculos | | | | | | | | Peatones | | Totales | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Izquierda | | Recto | | Derecha | | Viraje en U | | Desde | Desde | Periodo | Hora |
| Comienzo | Final | Liviano | Pesado | Liviano | Pesado | Liviano | Pesado | Liviano | Pesado | lado Izq. | lado Der. | 15 Min. | Pico |
| 6:00 AM | 6:15 AM | 3 | 0 | 14 | 0 | 3 | 0 | | | | | 20 | 20 |
| 6:15 AM | 6:30 AM | 7 | 0 | 23 | 0 | 5 | 0 | | | | | 35 | 55 |
| 6:30 AM | 6:45 AM | 4 | 0 | 13 | 0 | 10 | 0 | | | | | 27 | 82 |
| 6:45 AM | 7:00 AM | 5 | 0 | 19 | 0 | 9 | 0 | | | | | 33 | 115 |
| Sub-Total | | 19 | 0 | 69 | 0 | 27 | 0 | 0 | 0 | 0 | 0 | | |
| 7:00 AM | 7:15 AM | 5 | 3 | 20 | 0 | 5 | 0 | | | | | 33 | 128 |
| 7:15 AM | 7:30 AM | 4 | 0 | 32 | 0 | 20 | 0 | | | | | 56 | 149 |
| 7:30 AM | 7:45 AM | 7 | 0 | 54 | 0 | 18 | 2 | | | | | 81 | 203 |
| 7:45 AM | 8:00 AM | 21 | 0 | 69 | 0 | 21 | 0 | | | | | 111 | 281 |
| Sub-Total | | 37 | 3 | 175 | 0 | 64 | 2 | 0 | 0 | 0 | 0 | | |
| 8:00 AM | 8:15 AM | 11 | 0 | 42 | 0 | 9 | 0 | | | | | 62 | 310 |
| 8:15 AM | 8:30 AM | 5 | 2 | 18 | 2 | 6 | 0 | | | | | 33 | 287 |
| 8:30 AM | 8:45 AM | 6 | 0 | 11 | 0 | 3 | 0 | | | | | 20 | 226 |
| 8:45 AM | 9:00 AM | 4 | 0 | 13 | 0 | 7 | 0 | | | | | 24 | 139 |
| Sub-Total | | 26 | 2 | 84 | 2 | 25 | 0 | 0 | 0 | 0 | 0 | | |
| 9:00 AM | 9:15 AM | 5 | 0 | 19 | 0 | 10 | 0 | | | | | 34 | 111 |
| 9:15 AM | 9:30 AM | 3 | 0 | 28 | 0 | 7 | 0 | | | | | 38 | 116 |
| 9:30 AM | 9:45 AM | 9 | 0 | 12 | 0 | 4 | 0 | | | | | 25 | 121 |
| 9:45 AM | 10:00 AM | 10 | 0 | 14 | 0 | 7 | 0 | | | | | 31 | 128 |
| Sub-Total | | 27 | 0 | 73 | 0 | 28 | 0 | 0 | 0 | 0 | 0 | | |
| 10:00 AM | 10:15 AM | 0 | 0 | 0 | 0 | 0 | 0 | | | | | 0 | 94 |
| 10:15 AM | 10:30 AM | 0 | 0 | 0 | 0 | 0 | 0 | | | | | 0 | 56 |
| 10:30 AM | 10:45 AM | 0 | 0 | 0 | 0 | 0 | 0 | | | | | 0 | 31 |
| 10:45 AM | 11:00 AM | 0 | 0 | 0 | 0 | 0 | 0 | | | | | 0 | 0 |
| Sub-Total | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | |
| 11:00 AM | 11:15 AM | 4 | 0 | 10 | 0 | 7 | 0 | | | | | 21 | 21 |
| 11:15 AM | 11:30 AM | 2 | 2 | 19 | 0 | 10 | 0 | | | | | 33 | 54 |
| 11:30 AM | 11:45 AM | 3 | 0 | 20 | 0 | 13 | 2 | | | | | 38 | 92 |
| 11:45 AM | 12:00 PM | 10 | 3 | 25 | 0 | 11 | 0 | | | | | 49 | 141 |
| Sub-Total | | 19 | 5 | 74 | 0 | 41 | 2 | 0 | 0 | 0 | 0 | | |
| 12:00 PM | 12:15 PM | 7 | 4 | 32 | 0 | 13 | 0 | | | | | 56 | 176 |
| 12:15 PM | 12:30 PM | 11 | 0 | 25 | 0 | 4 | 0 | | | | | 40 | 183 |
| 12:30 PM | 12:45 PM | 4 | 2 | 19 | 0 | 6 | 0 | | | | | 31 | 176 |
| 12:45 PM | 1:00 PM | 6 | 3 | 13 | 0 | 12 | 0 | | | | | 34 | 161 |
| Sub-Total | | 28 | 9 | 89 | 0 | 35 | 0 | 0 | 0 | 0 | 0 | | |
| 1:00 PM | 1:15 PM | 4 | 0 | 17 | 0 | 17 | 0 | | | | | 38 | 143 |
| 1:15 PM | 1:30 PM | 16 | 2 | 28 | 0 | 11 | 0 | | | | | 57 | 160 |
| 1:30 PM | 1:45 PM | 24 | 0 | 10 | 0 | 17 | 0 | | | | | 51 | 180 |
| 1:45 PM | 2:00 PM | 10 | 0 | 16 | 0 | 7 | 0 | | | | | 33 | 179 |
| Sub-Total | | 54 | 2 | 71 | 0 | 52 | 0 | 0 | 0 | 0 | 0 | | |
| 2:00 PM | 2:15 PM | 0 | 0 | 0 | 0 | 0 | 0 | | | | | 0 | 141 |
| 2:15 PM | 2:30 PM | 0 | 0 | 0 | 0 | 0 | 0 | | | | | 0 | 84 |
| 2:30 PM | 2:45 PM | 0 | 0 | 0 | 0 | 0 | 0 | | | | | 0 | 33 |
| 2:45 PM | 3:00 PM | 0 | 0 | 0 | 0 | 0 | 0 | | | | | 0 | 0 |
| Sub-Total | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | |
| 3:00 PM | 3:15 PM | 13 | 0 | 41 | 0 | 23 | 0 | | | | | 77 | 77 |
| 3:15 PM | 3:30 PM | 19 | 2 | 48 | 0 | 26 | 0 | | | | | 95 | 172 |
| 3:30 PM | 3:45 PM | 10 | 0 | 26 | 0 | 18 | 0 | | | | | 54 | 226 |
| 3:45 PM | 4:00 PM | 6 | 0 | 25 | 0 | 11 | 0 | | | | | 42 | 268 |
| Sub-Total | | 48 | 2 | 140 | 0 | 78 | 0 | 0 | 0 | 0 | 0 | | |
| 4:00 PM | 4:15 PM | 11 | 0 | 11 | 0 | 14 | 0 | | | | | 36 | 227 |
| 4:15 PM | 4:30 PM | 17 | 0 | 26 | 0 | 10 | 0 | | | | | 53 | 185 |
| 4:30 PM | 4:45 PM | 13 | 0 | 12 | 0 | 9 | 0 | | | | | 34 | 165 |
| 4:45 PM | 5:00 PM | 23 | 0 | 28 | 0 | 4 | 0 | | | | | 55 | 178 |
| Sub-Total | | 64 | 0 | 77 | 0 | 37 | 0 | 0 | 0 | 0 | 0 | | |
| 5:00 PM | 5:15 PM | 19 | 0 | 11 | 0 | 17 | 0 | | | | | 47 | 189 |
| 5:15 PM | 5:30 PM | 12 | 0 | 12 | 0 | 3 | 0 | | | | | 27 | 163 |
| 5:30 PM | 5:45 PM | 17 | 0 | 17 | 0 | 11 | 0 | | | | | 45 | 174 |
| 5:45 PM | 6:00 PM | 12 | 0 | 12 | 0 | 7 | 0 | | | | | 31 | 150 |
| Sub-Total | | 60 | 0 | 52 | 0 | 38 | 0 | 0 | 0 | 0 | 0 | | |
| Sub-Total | | 382 | 23 | 904 | 2 | 425 | 4 | 0 | 0 | 0 | 0 | 1,740 | |

**Tecnico**

**Obesrvaciones**

**Fecha:** Febrero 14, 2017 (Projected) **Dia de la Semana:** Martes **Cond. del Tiempo :** Soleado

**Periodo :** 6:00 AM @ 6:00 PM **Municipio :** San Germán

**Interseccion** PR-166 **con** PR-101

**Contaje desde el Acceso** C **Carretera** PR-101

**Descripcion del acceso :** Acceso Sur - Un carril por direccion

| Periodo de Estudio | | Afluencia de vehiculos | | | | | | | | Peatones | | Totales | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Izquierda | | Recto | | Derecha | | Viraje en U | | Desde | Desde | Periodo | Hora |
| Comienzo | Final | Liviano | Pesado | Liviano | Pesado | Liviano | Pesado | Liviano | Pesado | lado Izq. | lado Der. | 15 Min. | Pico |
| 6:00 AM | 6:15 AM | 12 | 0 | 46 | 0 | 4 | 0 | | | | | 62 | 62 |
| 6:15 AM | 6:30 AM | 10 | 0 | 47 | 0 | 7 | 0 | | | | | 64 | 126 |
| 6:30 AM | 6:45 AM | 19 | 0 | 54 | 0 | 10 | 0 | | | | | 83 | 209 |
| 6:45 AM | 7:00 AM | 14 | 0 | 68 | 0 | 5 | 0 | | | | | 87 | 296 |
| **Sub-Total** | | 55 | 0 | 215 | 0 | 26 | 0 | 0 | 0 | 0 | 0 | | |
| 7:00 AM | 7:15 AM | 11 | 0 | 70 | 0 | 7 | 0 | | | | | 88 | 322 |
| 7:15 AM | 7:30 AM | 33 | 0 | 12 | 0 | 11 | 0 | | | | | 56 | 314 |
| 7:30 AM | 7:45 AM | 29 | 0 | 99 | 0 | 13 | 0 | | | | | 141 | 372 |
| 7:45 AM | 8:00 AM | 36 | 0 | 104 | 0 | 17 | 0 | | | | | 157 | 442 |
| **Sub-Total** | | 109 | 0 | 285 | 0 | 48 | 0 | 0 | 0 | 0 | 0 | | |
| 8:00 AM | 8:15 AM | 14 | 0 | 75 | 0 | 28 | 0 | | | | | 117 | 471 |
| 8:15 AM | 8:30 AM | 7 | 0 | 55 | 0 | 13 | 0 | | | | | 75 | 490 |
| 8:30 AM | 8:45 AM | 17 | 2 | 54 | 0 | 9 | 0 | | | | | 82 | 431 |
| 8:45 AM | 9:00 AM | 10 | 0 | 49 | 0 | 11 | 0 | | | | | 70 | 344 |
| **Sub-Total** | | 48 | 2 | 233 | 0 | 61 | 0 | 0 | 0 | 0 | 0 | | |
| 9:00 AM | 9:15 AM | 5 | 0 | 47 | 0 | 5 | 0 | | | | | 57 | 284 |
| 9:15 AM | 9:30 AM | 6 | 0 | 46 | 0 | 9 | 0 | | | | | 61 | 270 |
| 9:30 AM | 9:45 AM | 7 | 0 | 32 | 0 | 6 | 0 | | | | | 45 | 233 |
| 9:45 AM | 10:00 AM | 4 | 0 | 36 | 0 | 7 | 0 | | | | | 47 | 210 |
| **Sub-Total** | | 22 | 0 | 161 | 0 | 27 | 0 | 0 | 0 | 0 | 0 | | |
| 10:00 AM | 10:15 AM | 0 | 0 | 0 | 0 | 0 | 0 | | | | | 0 | 153 |
| 10:15 AM | 10:30 AM | 0 | 0 | 0 | 0 | 0 | 0 | | | | | 0 | 92 |
| 10:30 AM | 10:45 AM | 0 | 0 | 0 | 0 | 0 | 0 | | | | | 0 | 47 |
| 10:45 AM | 11:00 AM | 0 | 0 | 0 | 0 | 0 | 0 | | | | | 0 | 0 |
| **Sub-Total** | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | |
| 11:00 AM | 11:15 AM | 3 | 0 | 31 | 0 | 10 | 0 | | | | | 44 | 44 |
| 11:15 AM | 11:30 AM | 6 | 0 | 27 | 0 | 12 | 3 | | | | | 48 | 92 |
| 11:30 AM | 11:45 AM | 6 | 0 | 34 | 0 | 7 | 0 | | | | | 47 | 139 |
| 11:45 AM | 12:00 PM | 9 | 0 | 29 | 0 | 5 | 0 | | | | | 43 | 182 |
| **Sub-Total** | | 24 | 0 | 121 | 0 | 34 | 3 | 0 | 0 | 0 | 0 | | |
| 12:00 PM | 12:15 PM | 5 | 0 | 45 | 0 | 14 | 2 | | | | | 66 | 204 |
| 12:15 PM | 12:30 PM | 9 | 0 | 29 | 0 | 6 | 3 | | | | | 47 | 203 |
| 12:30 PM | 12:45 PM | 4 | 0 | 33 | 0 | 6 | 0 | | | | | 43 | 199 |
| 12:45 PM | 1:00 PM | 9 | 0 | 42 | 0 | 3 | 0 | | | | | 54 | 210 |
| **Sub-Total** | | 27 | 0 | 149 | 0 | 29 | 5 | 0 | 0 | 0 | 0 | | |
| 1:00 PM | 1:15 PM | 6 | 0 | 27 | 0 | 10 | 0 | | | | | 43 | 187 |
| 1:15 PM | 1:30 PM | 12 | 2 | 42 | 0 | 12 | 3 | | | | | 71 | 211 |
| 1:30 PM | 1:45 PM | 6 | 0 | 31 | 0 | 5 | 0 | | | | | 42 | 210 |
| 1:45 PM | 2:00 PM | 6 | 0 | 38 | 0 | 5 | 2 | | | | | 51 | 207 |
| **Sub-Total** | | 30 | 2 | 138 | 0 | 32 | 5 | 0 | 0 | 0 | 0 | | |
| 2:00 PM | 2:15 PM | 0 | 0 | 0 | 0 | 0 | 0 | | | | | 0 | 164 |
| 2:15 PM | 2:30 PM | 0 | 0 | 0 | 0 | 0 | 0 | | | | | 0 | 93 |
| 2:30 PM | 2:45 PM | 0 | 0 | 0 | 0 | 0 | 0 | | | | | 0 | 51 |
| 2:45 PM | 3:00 PM | 0 | 0 | 0 | 0 | 0 | 0 | | | | | 0 | 0 |
| **Sub-Total** | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | |
| 3:00 PM | 3:15 PM | 33 | 0 | 43 | 0 | 18 | 0 | | | | | 94 | 94 |
| 3:15 PM | 3:30 PM | 7 | 0 | 57 | 0 | 18 | 0 | | | | | 82 | 176 |
| 3:30 PM | 3:45 PM | 14 | 0 | 48 | 0 | 6 | 0 | | | | | 68 | 244 |
| 3:45 PM | 4:00 PM | 5 | 0 | 45 | 0 | 14 | 0 | | | | | 64 | 308 |
| **Sub-Total** | | 59 | 0 | 193 | 0 | 56 | 0 | 0 | 0 | 0 | 0 | | |
| 4:00 PM | 4:15 PM | 19 | 0 | 57 | 0 | 11 | 0 | | | | | 87 | 301 |
| 4:15 PM | 4:30 PM | 26 | 0 | 68 | 0 | 20 | 0 | | | | | 114 | 333 |
| 4:30 PM | 4:45 PM | 17 | 0 | 70 | 0 | 26 | 0 | | | | | 113 | 378 |
| 4:45 PM | 5:00 PM | 33 | 0 | 84 | 0 | 21 | 0 | | | | | 138 | 452 |
| **Sub-Total** | | 95 | 0 | 279 | 0 | 78 | 0 | 0 | 0 | 0 | 0 | | |
| 5:00 PM | 5:15 PM | 20 | 0 | 65 | 0 | 10 | 0 | | | | | 95 | 460 |
| 5:15 PM | 5:30 PM | 12 | 0 | 40 | 0 | 14 | 0 | | | | | 66 | 412 |
| 5:30 PM | 5:45 PM | 19 | 0 | 33 | 0 | 17 | 0 | | | | | 69 | 368 |
| 5:45 PM | 6:00 PM | 13 | 0 | 25 | 0 | 11 | 0 | | | | | 49 | 279 |
| **Sub-Total** | | 64 | 0 | 163 | 0 | 52 | 0 | 0 | 0 | 0 | 0 | | |
| **Sub-Total** | | 533 | 4 | 1,937 | 0 | 443 | 13 | 0 | 0 | 0 | 0 | 2,930 | |

**Tecnico**

**Obesrvaciones**

**Fecha:** Febrero 14, 2017 (Projected) **Dia de la Semana:** Martes **Cond. del Tiempo :** Soleado

**Periodo :** 6:00 AM @ 6:00 PM **Municipio :** San Germán

**Interseccion** PR-166 **con** PR-101

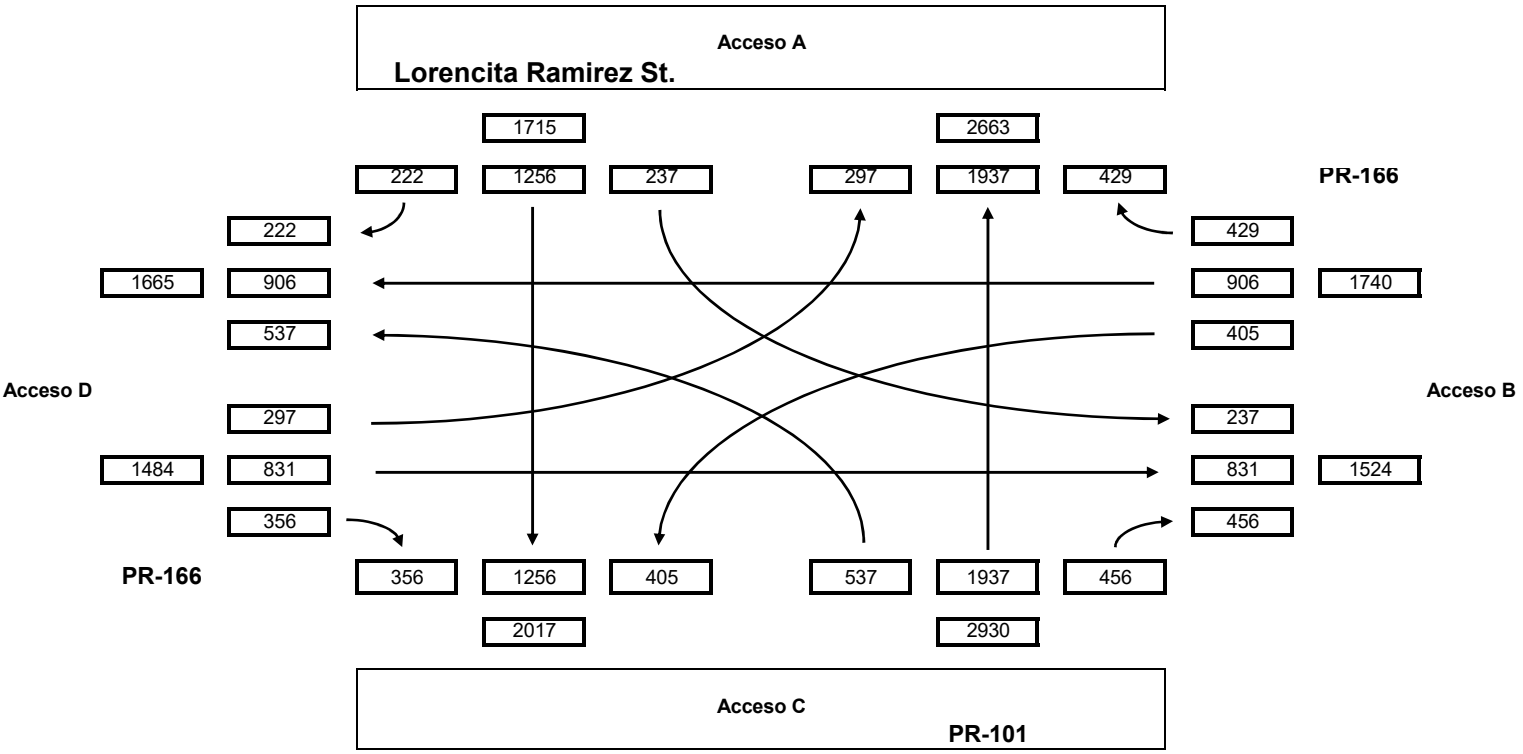
**Contaje desde el Acceso** D **Carretera** PR-166

**Descripcion del acceso :** Acceso Oeste - Dos carreiles en direccion oeste

| Periodo de Estudio | | Afluencia de vehiculos | | | | | | | | Peatones | | Totales | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Izquierda | | Recto | | Derecha | | Viraje en U | | Desde | Desde | Periodo | Hora |
| Comienzo | Final | Liviano | Pesado | Liviano | Pesado | Liviano | Pesado | Liviano | Pesado | lado Izq. | lado Der. | 15 Min. | Pico |
| 6:00 AM | 6:15 AM | 10 | 0 | 13 | 0 | 6 | 0 | | | | | 29 | 29 |
| 6:15 AM | 6:30 AM | 12 | 0 | 19 | 0 | 4 | 0 | | | | | 35 | 64 |
| 6:30 AM | 6:45 AM | 11 | 0 | 10 | 0 | 3 | 0 | | | | | 24 | 88 |
| 6:45 AM | 7:00 AM | 5 | 0 | 19 | 0 | 5 | 0 | | | | | 29 | 117 |
| **Sub-Total** | | 38 | 0 | 61 | 0 | 18 | 0 | 0 | 0 | 0 | 0 | | |
| 7:00 AM | 7:15 AM | 3 | 0 | 18 | 0 | 7 | 0 | | | | | 28 | 116 |
| 7:15 AM | 7:30 AM | 7 | 0 | 17 | 0 | 12 | 0 | | | | | 36 | 117 |
| 7:30 AM | 7:45 AM | 28 | 0 | 29 | 2 | 13 | 0 | | | | | 72 | 165 |
| 7:45 AM | 8:00 AM | 17 | 0 | 54 | 0 | 35 | 0 | | | | | 106 | 242 |
| **Sub-Total** | | 55 | 0 | 118 | 2 | 67 | 0 | 0 | 0 | 0 | 0 | | |
| 8:00 AM | 8:15 AM | 23 | 0 | 50 | 0 | 13 | 0 | | | | | 86 | 300 |
| 8:15 AM | 8:30 AM | 3 | 0 | 29 | 0 | 4 | 0 | | | | | 36 | 300 |
| 8:30 AM | 8:45 AM | 4 | 0 | 14 | 0 | 7 | 0 | | | | | 25 | 253 |
| 8:45 AM | 9:00 AM | 3 | 0 | 17 | 0 | 5 | 0 | | | | | 25 | 172 |
| **Sub-Total** | | 33 | 0 | 110 | 0 | 29 | 0 | 0 | 0 | 0 | 0 | | |
| 9:00 AM | 9:15 AM | 2 | 0 | 18 | 0 | 9 | 0 | | | | | 29 | 115 |
| 9:15 AM | 9:30 AM | 4 | 0 | 13 | 2 | 4 | 0 | | | | | 23 | 102 |
| 9:30 AM | 9:45 AM | 3 | 0 | 11 | 0 | 6 | 0 | | | | | 20 | 97 |
| 9:45 AM | 10:00 AM | 3 | 0 | 12 | 0 | 4 | 0 | | | | | 19 | 91 |
| **Sub-Total** | | 12 | 0 | 54 | 2 | 23 | 0 | 0 | 0 | 0 | 0 | | |
| 10:00 AM | 10:15 AM | 0 | 0 | 0 | 0 | 0 | 0 | | | | | 0 | 62 |
| 10:15 AM | 10:30 AM | 0 | 0 | 0 | 0 | 0 | 0 | | | | | 0 | 39 |
| 10:30 AM | 10:45 AM | 0 | 0 | 0 | 0 | 0 | 0 | | | | | 0 | 19 |
| 10:45 AM | 11:00 AM | 0 | 0 | 0 | 0 | 0 | 0 | | | | | 0 | 0 |
| **Sub-Total** | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | |
| 11:00 AM | 11:15 AM | 2 | 0 | 17 | 0 | 3 | 0 | | | | | 22 | 22 |
| 11:15 AM | 11:30 AM | 3 | 0 | 20 | 2 | 2 | 0 | | | | | 27 | 49 |
| 11:30 AM | 11:45 AM | 5 | 0 | 19 | 0 | 9 | 0 | | | | | 33 | 82 |
| 11:45 AM | 12:00 PM | 3 | 0 | 19 | 0 | 2 | 0 | | | | | 24 | 106 |
| **Sub-Total** | | 13 | 0 | 75 | 2 | 16 | 0 | 0 | 0 | 0 | 0 | | |
| 12:00 PM | 12:15 PM | 2 | 0 | 19 | 0 | 10 | 0 | | | | | 31 | 115 |
| 12:15 PM | 12:30 PM | 3 | 2 | 24 | 0 | 9 | 2 | | | | | 40 | 128 |
| 12:30 PM | 12:45 PM | 3 | 0 | 19 | 2 | 2 | 0 | | | | | 26 | 121 |
| 12:45 PM | 1:00 PM | 2 | 0 | 7 | 0 | 9 | 0 | | | | | 18 | 115 |
| **Sub-Total** | | 10 | 2 | 69 | 2 | 30 | 2 | 0 | 0 | 0 | 0 | | |
| 1:00 PM | 1:15 PM | 0 | 0 | 12 | 0 | 3 | 2 | | | | | 17 | 101 |
| 1:15 PM | 1:30 PM | 3 | 0 | 18 | 0 | 10 | 0 | | | | | 31 | 92 |
| 1:30 PM | 1:45 PM | 3 | 0 | 21 | 0 | 10 | 0 | | | | | 34 | 100 |
| 1:45 PM | 2:00 PM | 5 | 2 | 28 | 0 | 16 | 0 | | | | | 51 | 133 |
| **Sub-Total** | | 11 | 2 | 79 | 0 | 39 | 2 | 0 | 0 | 0 | 0 | | |
| 2:00 PM | 2:15 PM | 0 | 0 | 0 | 0 | 0 | 0 | | | | | 0 | 116 |
| 2:15 PM | 2:30 PM | 0 | 0 | 0 | 0 | 0 | 0 | | | | | 0 | 85 |
| 2:30 PM | 2:45 PM | 0 | 0 | 0 | 0 | 0 | 0 | | | | | 0 | 51 |
| 2:45 PM | 3:00 PM | 0 | 0 | 0 | 0 | 0 | 0 | | | | | 0 | 0 |
| **Sub-Total** | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | |
| 3:00 PM | 3:15 PM | 28 | 0 | 56 | 4 | 24 | 0 | | | | | 112 | 112 |
| 3:15 PM | 3:30 PM | 18 | 0 | 43 | 0 | 14 | 0 | | | | | 75 | 187 |
| 3:30 PM | 3:45 PM | 3 | 0 | 31 | 0 | 18 | 0 | | | | | 52 | 239 |
| 3:45 PM | 4:00 PM | 2 | 0 | 16 | 0 | 13 | 0 | | | | | 31 | 270 |
| **Sub-Total** | | 51 | 0 | 146 | 4 | 69 | 0 | 0 | 0 | 0 | 0 | | |
| 4:00 PM | 4:15 PM | 3 | 0 | 19 | 0 | 11 | 0 | | | | | 33 | 191 |
| 4:15 PM | 4:30 PM | 0 | 0 | 16 | 0 | 13 | 0 | | | | | 29 | 145 |
| 4:30 PM | 4:45 PM | 12 | 0 | 21 | 0 | 3 | 0 | | | | | 36 | 129 |
| 4:45 PM | 5:00 PM | 17 | 0 | 13 | 0 | 6 | 0 | | | | | 36 | 134 |
| **Sub-Total** | | 32 | 0 | 69 | 0 | 33 | 0 | 0 | 0 | 0 | 0 | | |
| 5:00 PM | 5:15 PM | 7 | 0 | 7 | 0 | 11 | 0 | | | | | 25 | 126 |
| 5:15 PM | 5:30 PM | 11 | 0 | 5 | 0 | 5 | 0 | | | | | 21 | 118 |
| 5:30 PM | 5:45 PM | 13 | 0 | 14 | 0 | 7 | 0 | | | | | 34 | 116 |
| 5:45 PM | 6:00 PM | 7 | 0 | 12 | 0 | 5 | 0 | | | | | 24 | 104 |
| **Sub-Total** | | 38 | 0 | 38 | 0 | 28 | 0 | 0 | 0 | 0 | 0 | | |
| **Sub-Total** | | 293 | 4 | 819 | 12 | 352 | 4 | 0 | 0 | 0 | 0 | 1,484 | |

**Tecnico**

**Obesrvaciones**


Acceso A
Lorencita Ramirez St.
1715
2663
222
1256
237
297
1937
429
PR-166
222
429
1665
906
906
1740
537
405
Acceso D
Acceso B
297
237
1484
831
831
1524
356
456
PR-166
356
1256
405
537
1937
456
2017
2930
Acceso C
PR-101

## Intersection: PR-166 with PR-101

### MORNING PEAK HOUR FACTOR

| Time Period | | North Access (Southbound) | | | | | | East Access (Westbound) | | | | | | South Access (Northbound) | | | | | | West Access (Eastbound) | | | | | | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Left | | Thru | | Right | | Left | | Thru | | Right | | Left | | Thru | | Right | | Left | | Thru | | Right | | |
| | | Light | Heavy | Light | Heavy | Light | Heavy | Light | Heavy | Light | Heavy | Light | Heavy | Light | Heavy | Light | Heavy | Light | Heavy | Light | Heavy | Light | Heavy | Light | Heavy | |
| 7:15 AM | 7:30 AM | 9 | 0 | 32 | 0 | 2 | 0 | 4 | 0 | 32 | 0 | 20 | 0 | 33 | 0 | 12 | 0 | 11 | 0 | 7 | 0 | 17 | 0 | 12 | 0 | 191 |
| 7:30 AM | 7:45 AM | 20 | 0 | 54 | 0 | 9 | 0 | 7 | 0 | 54 | 0 | 18 | 2 | 29 | 0 | 99 | 0 | 13 | 0 | 28 | 0 | 29 | 2 | 13 | 0 | 377 |
| 7:45 AM | 8:00 AM | 24 | 0 | 61 | 0 | 5 | 0 | 21 | 0 | 69 | 0 | 21 | 0 | 36 | 0 | 104 | 0 | 17 | 0 | 17 | 0 | 54 | 0 | 35 | 0 | 464 |
| 8:00 AM | 8:15 AM | 16 | 0 | 39 | 0 | 8 | 0 | 10 | 0 | 42 | 0 | 8 | 0 | 14 | 0 | 74 | 0 | 28 | 0 | 22 | 0 | 50 | 0 | 13 | 0 | 324 |
| | Total | 69 | 0 | 186 | 0 | 24 | 0 | 42 | 0 | 197 | 0 | 67 | 2 | 112 | 0 | 289 | 0 | 69 | 0 | 74 | 0 | 150 | 2 | 73 | 0 | 1356 |

| | North Access | | | East Access | | | South Access | | | West Access | | | Intersection | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right | | |
| Total Flow Period, T (minutes) | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | |
| Peak Flow Period, $T_p$ (minutes) | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | |
| Volume Count during the Total Flow Period, $v_a$ (veh) | 69 | 186 | 24 | 42 | 197 | 69 | 112 | 289 | 69 | 74 | 152 | 73 | 1356 | |
| Volume Count during the Peak Flow Period, $v_p$ (veh) | 24 | 61 | 9 | 21 | 69 | 21 | 36 | 104 | 28 | 28 | 54 | 35 | 464 | |
| Average Flow Rate during the Total Flow Period, $q_a$ (veh/hr) | 69 | 186 | 24 | 42 | 197 | 69 | 112 | 289 | 69 | 74 | 152 | 73 | 1356 | |
| Average Flow Rate during the Peak Flow Period, $q_p$ (veh/hr) | 96 | 244 | 36 | 84 | 276 | 84 | 144 | 416 | 112 | 112 | 216 | 140 | 1856 | |
| Peak Time Factor, PTF | 25% | 25% | 25% | 25% | 25% | 25% | 25% | 25% | 25% | 25% | 25% | 25% | 25% | |
| Peak Flow Factor, PFF | 72% | 76% | 67% | 50% | 71% | 82% | 78% | 69% | 62% | 66% | 70% | 52% | 73% | |
| Unit Time for Volumes, $T_v$ (minutes) | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | |
| Minimum Total Flow Period, $T_m$ (minutes) | 20.86957 | 19.67742 | 22.5 | 30 | 21.01523 | 18.26087 | 19.28571 | 21.5917 | 24.34783 | 22.7027 | 21.31579 | 28.76712 | 20.53097 | ≤ Tv, OK |
| Duration of Non-Peak Flow Period, $T_n$ (minutes) | 45 | 45 | 45 | 45 | 45 | 45 | 45 | 45 | 45 | 45 | 45 | 45 | 45 | |
| Average Flow Rate during the Non-Peak Flow Period, $q_n$ (veh/hr) | 60 | 167 | 20 | 28 | 171 | 64 | 101 | 247 | 55 | 61 | 131 | 51 | 1189 | |
| Volume Count during the Non-Peak Flow Period, $v_n$ (veh) | 45 | 125 | 15 | 21 | 128 | 48 | 76 | 185 | 41 | 46 | 98 | 38 | 892 | |

### AFTERNOON PEAK HOUR FACTOR

| Time Period | | North Access (Southbound) | | | | | | East Access (Westbound) | | | | | | South Access (Northbound) | | | | | | West Access (Eastbound) | | | | | | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Left | | Thru | | Right | | Left | | Thru | | Right | | Left | | Thru | | Right | | Left | | Thru | | Right | | |
| | | Light | Heavy | Light | Heavy | Light | Heavy | Light | Heavy | Light | Heavy | Light | Heavy | Light | Heavy | Light | Heavy | Light | Heavy | Light | Heavy | Light | Heavy | Light | Heavy | |
| 3:00 PM | 3:15 PM | 17 | 0 | 50 | 0 | 11 | 0 | 13 | 0 | 41 | 0 | 23 | 0 | 33 | 0 | 43 | 0 | 18 | 0 | 28 | 0 | 56 | 4 | 24 | 0 | 361 |
| 3:15 PM | 3:30 PM | 21 | 0 | 60 | 0 | 10 | 0 | 19 | 2 | 48 | 0 | 26 | 0 | 7 | 0 | 57 | 0 | 18 | 0 | 18 | 0 | 43 | 0 | 14 | 0 | 343 |
| 3:30 PM | 3:45 PM | 5 | 0 | 57 | 0 | 4 | 0 | 10 | 0 | 26 | 0 | 18 | 0 | 14 | 0 | 48 | 0 | 6 | 0 | 3 | 0 | 31 | 0 | 18 | 0 | 240 |
| 3:45 PM | 4:00 PM | 4 | 0 | 55 | 3 | 2 | 0 | 6 | 0 | 25 | 0 | 11 | 0 | 5 | 0 | 45 | 0 | 14 | 0 | 2 | 0 | 16 | 0 | 13 | 0 | 201 |
| | Total | 47 | 0 | 222 | 3 | 27 | 0 | 48 | 2 | 140 | 0 | 78 | 0 | 59 | 0 | 193 | 0 | 56 | 0 | 51 | 0 | 146 | 4 | 69 | 0 | 1145 |

| | North Access | | | East Access | | | South Access | | | West Access | | | Intersection | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right | | |
| Total Flow Period, T (minutes) | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | |
| Peak Flow Period, $T_p$ (minutes) | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | |
| Volume Count during the Total Flow Period, $v_a$ (veh) | 47 | 225 | 27 | 50 | 140 | 78 | 59 | 193 | 56 | 51 | 150 | 69 | 1145 | |
| Volume Count during the Peak Flow Period, $v_p$ (veh) | 21 | 60 | 11 | 21 | 48 | 26 | 33 | 57 | 18 | 28 | 60 | 24 | 361 | |
| Average Flow Rate during the Total Flow Period, $q_a$ (veh/hr) | 47 | 225 | 27 | 50 | 140 | 78 | 59 | 193 | 56 | 51 | 150 | 69 | 1145 | |
| Average Flow Rate during the Peak Flow Period, $q_p$ (veh/hr) | 84 | 240 | 44 | 84 | 192 | 104 | 132 | 228 | 72 | 112 | 240 | 96 | 1444 | |
| Peak Time Factor, PTF | 25% | 25% | 25% | 25% | 25% | 25% | 25% | 25% | 25% | 25% | 25% | 25% | 25% | |
| Peak Flow Factor, PFF | 56% | 94% | 61% | 60% | 73% | 75% | 45% | 85% | 78% | 46% | 63% | 72% | 79% | |
| Unit Time for Volumes, $T_v$ (minutes) | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | |
| Minimum Total Flow Period, $T_m$ (minutes) | 26.80851 | 16 | 24.44444 | 25.2 | 20.57143 | 20 | 33.55932 | 17.72021 | 19.28571 | 32.94118 | 24 | 20.86957 | 18.91703 | ≤ Tv, OK |
| Duration of Non-Peak Flow Period, $T_n$ (minutes) | 45 | 45 | 45 | 45 | 45 | 45 | 45 | 45 | 45 | 45 | 45 | 45 | 45 | |
| Average Flow Rate during the Non-Peak Flow Period, $q_n$ (veh/hr) | 35 | 220 | 21 | 39 | 123 | 69 | 35 | 181 | 51 | 31 | 120 | 60 | 1045 | |
| Volume Count during the Non-Peak Flow Period, $v_n$ (veh) | 26 | 165 | 16 | 29 | 92 | 52 | 26 | 136 | 38 | 23 | 90 | 45 | 784 | |

**Fecha:** Febrero 14, 2017 (Projected) **Dia de la Semana:** Martes **Cond. del Tiempo :** Soleado

**Periodo :** 6:00 AM @ 6:00 PM **Municipio :** San Germán

**Interseccion** PR-122 **con** PR-102

**Contaje desde el Acceso** A **Carretera** PR-122

**Descripcion del acceso :** Acceso Norte - Tres Carriles

| Periodo de Estudio | | Afluencia de vehiculos | | | | | | | | Peatones | | Totales | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Izquierda | | Recto | | Derecha | | Viraje en U | | Desde | Desde | Periodo | Hora |
| Comienzo | Final | Liviano | Pesado | Liviano | Pesado | Liviano | Pesado | Liviano | Pesado | lado Izq. | lado Der. | 15 Min. | Pico |
| 6:00 AM | 6:15 AM | 12 | 3 | 14 | 0 | 40 | 0 | | | | | 69 | 69 |
| 6:15 AM | 6:30 AM | 17 | 0 | 25 | 0 | 45 | 0 | | | | | 87 | 156 |
| 6:30 AM | 6:45 AM | 16 | 0 | 33 | 2 | 49 | 0 | | | | | 100 | 256 |
| 6:45 AM | 7:00 AM | 18 | 3 | 32 | 0 | 52 | 0 | | | | | 105 | 361 |
| **Sub-Total** | | 63 | 6 | 104 | 2 | 186 | 0 | 0 | 0 | 0 | 0 | | |
| 7:00 AM | 7:15 AM | 25 | 3 | 26 | 3 | 58 | 4 | | | | | 119 | 411 |
| 7:15 AM | 7:30 AM | 46 | 0 | 48 | 0 | 89 | 2 | | | | | 185 | 509 |
| 7:30 AM | 7:45 AM | 53 | 4 | 43 | 4 | 91 | 3 | | | | | 198 | 607 |
| 7:45 AM | 8:00 AM | 76 | 0 | 70 | 0 | 116 | 0 | | | | | 262 | 764 |
| **Sub-Total** | | 200 | 7 | 187 | 7 | 354 | 9 | 0 | 0 | 0 | 0 | | |
| 8:00 AM | 8:15 AM | 72 | 5 | 53 | 3 | 69 | 3 | | | | | 205 | 850 |
| 8:15 AM | 8:30 AM | 39 | 5 | 50 | 0 | 78 | 2 | | | | | 174 | 839 |
| 8:30 AM | 8:45 AM | 40 | 4 | 60 | 0 | 109 | 2 | | | | | 215 | 856 |
| 8:45 AM | 9:00 AM | 33 | 0 | 25 | 2 | 72 | 2 | | | | | 134 | 728 |
| **Sub-Total** | | 184 | 14 | 188 | 5 | 328 | 9 | 0 | 0 | 0 | 0 | | |
| 9:00 AM | 9:15 AM | 38 | 2 | 41 | 0 | 78 | 0 | | | | | 159 | 682 |
| 9:15 AM | 9:30 AM | 34 | 4 | 61 | 0 | 54 | 5 | | | | | 158 | 666 |
| 9:30 AM | 9:45 AM | 38 | 6 | 45 | 0 | 42 | 2 | | | | | 133 | 584 |
| 9:45 AM | 10:00 AM | 53 | 7 | 46 | 2 | 53 | 0 | | | | | 161 | 611 |
| **Sub-Total** | | 163 | 19 | 193 | 2 | 227 | 7 | 0 | 0 | 0 | 0 | | |
| 10:00 AM | 10:15 AM | 0 | 0 | 0 | 0 | 0 | 0 | | | | | 0 | 452 |
| 10:15 AM | 10:30 AM | 0 | 0 | 0 | 0 | 0 | 0 | | | | | 0 | 294 |
| 10:30 AM | 10:45 AM | 0 | 0 | 0 | 0 | 0 | 0 | | | | | 0 | 161 |
| 10:45 AM | 11:00 AM | 0 | 0 | 0 | 0 | 0 | 0 | | | | | 0 | 0 |
| **Sub-Total** | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | |
| 11:00 AM | 11:15 AM | 46 | 2 | 52 | 2 | 69 | 2 | | | | | 173 | 173 |
| 11:15 AM | 11:30 AM | 53 | 2 | 43 | 0 | 53 | 2 | | | | | 153 | 326 |
| 11:30 AM | 11:45 AM | 43 | 2 | 67 | 0 | 48 | 2 | | | | | 162 | 488 |
| 11:45 AM | 12:00 PM | 49 | 4 | 72 | 0 | 61 | 3 | | | | | 189 | 677 |
| **Sub-Total** | | 191 | 10 | 234 | 2 | 231 | 9 | 0 | 0 | 0 | 0 | | |
| 12:00 PM | 12:15 PM | 55 | 0 | 63 | 0 | 56 | 0 | | | | | 174 | 678 |
| 12:15 PM | 12:30 PM | 49 | 2 | 77 | 3 | 49 | 0 | | | | | 180 | 705 |
| 12:30 PM | 12:45 PM | 62 | 3 | 67 | 0 | 63 | 4 | | | | | 199 | 742 |
| 12:45 PM | 1:00 PM | 56 | 5 | 74 | 3 | 82 | 2 | | | | | 222 | 775 |
| **Sub-Total** | | 222 | 10 | 281 | 6 | 250 | 6 | 0 | 0 | 0 | 0 | | |
| 1:00 PM | 1:15 PM | 50 | 3 | 77 | 2 | 62 | 2 | | | | | 196 | 797 |
| 1:15 PM | 1:30 PM | 47 | 0 | 78 | 2 | 65 | 0 | | | | | 192 | 809 |
| 1:30 PM | 1:45 PM | 38 | 2 | 67 | 0 | 70 | 0 | | | | | 177 | 787 |
| 1:45 PM | 2:00 PM | 53 | 2 | 71 | 0 | 63 | 3 | | | | | 192 | 757 |
| **Sub-Total** | | 188 | 7 | 293 | 4 | 260 | 5 | 0 | 0 | 0 | 0 | | |
| 2:00 PM | 2:15 PM | 0 | 0 | 0 | 0 | 0 | 0 | | | | | 0 | 561 |
| 2:15 PM | 2:30 PM | 0 | 0 | 0 | 0 | 0 | 0 | | | | | 0 | 369 |
| 2:30 PM | 2:45 PM | 0 | 0 | 0 | 0 | 0 | 0 | | | | | 0 | 192 |
| 2:45 PM | 3:00 PM | 0 | 0 | 0 | 0 | 0 | 0 | | | | | 0 | 0 |
| **Sub-Total** | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | |
| 3:00 PM | 3:15 PM | 90 | 3 | 87 | 3 | 60 | 0 | | | | | 243 | 243 |
| 3:15 PM | 3:30 PM | 85 | 3 | 75 | 0 | 62 | 0 | | | | | 225 | 468 |
| 3:30 PM | 3:45 PM | 60 | 3 | 105 | 4 | 65 | 2 | | | | | 239 | 707 |
| 3:45 PM | 4:00 PM | 53 | 2 | 69 | 0 | 58 | 2 | | | | | 184 | 891 |
| **Sub-Total** | | 288 | 11 | 336 | 7 | 245 | 4 | 0 | 0 | 0 | 0 | | |
| 4:00 PM | 4:15 PM | 48 | 0 | 65 | 0 | 47 | 0 | | | | | 160 | 808 |
| 4:15 PM | 4:30 PM | 43 | 0 | 80 | 2 | 49 | 0 | | | | | 174 | 757 |
| 4:30 PM | 4:45 PM | 48 | 0 | 80 | 0 | 65 | 0 | | | | | 193 | 711 |
| 4:45 PM | 5:00 PM | 46 | 2 | 85 | 0 | 55 | 2 | | | | | 190 | 717 |
| **Sub-Total** | | 185 | 2 | 310 | 2 | 216 | 2 | 0 | 0 | 0 | 0 | | |
| 5:00 PM | 5:15 PM | 61 | 0 | 84 | 0 | 84 | 0 | | | | | 229 | 786 |
| 5:15 PM | 5:30 PM | 47 | 0 | 82 | 2 | 64 | 0 | | | | | 195 | 807 |
| 5:30 PM | 5:45 PM | 41 | 0 | 83 | 0 | 78 | 0 | | | | | 202 | 816 |
| 5:45 PM | 6:00 PM | 46 | 0 | 80 | 0 | 70 | 0 | | | | | 196 | 822 |
| **Sub-Total** | | 195 | 0 | 329 | 2 | 296 | 0 | 0 | 0 | 0 | 0 | | |
| **Sub-Total** | | 1,879 | 86 | 2,455 | 39 | 2,593 | 51 | 0 | 0 | 0 | 0 | 7,103 | |

**Tecnico**

**Obesrvaciones**

**Fecha:** Febrero 14, 2017 (Projected) **Dia de la Semana:** Martes **Cond. del Tiempo :** Soleado

**Periodo :** 6:00 AM @ 6:00 PM **Municipio :** San Germán

**Interseccion** PR-122 **con** PR-102

**Contaje desde el Acceso** B **Carretera.** PR-102

**Descripcion del acceso :** Acceso Este - Un Carril

| Periodo de Estudio | | Afluencia de vehiculos | | | | | | | | Peatones | | Totales | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Izquierda | | Recto | | Derecha | | Viraje en U | | Desde | Desde | Periodo | Hora |
| Comienzo | Final | Liviano | Pesado | Liviano | Pesado | Liviano | Pesado | Liviano | Pesado | lado Izq. | lado Der. | 15 Min. | Pico |
| 6:00 AM | 6:15 AM | 3 | 0 | 54 | 0 | 56 | 0 | | | | | 113 | 113 |
| 6:15 AM | 6:30 AM | 2 | 0 | 61 | 0 | 63 | 2 | | | | | 128 | 241 |
| 6:30 AM | 6:45 AM | 2 | 0 | 64 | 0 | 74 | 0 | | | | | 140 | 381 |
| 6:45 AM | 7:00 AM | 3 | 0 | 74 | 0 | 55 | 0 | | | | | 132 | 513 |
| **Sub-Total** | | 10 | 0 | 253 | 0 | 248 | 2 | 0 | 0 | 0 | 0 | | |
| 7:00 AM | 7:15 AM | 0 | 0 | 96 | 0 | 60 | 3 | | | | | 159 | 559 |
| 7:15 AM | 7:30 AM | 2 | 0 | 101 | 4 | 61 | 0 | | | | | 168 | 599 |
| 7:30 AM | 7:45 AM | 6 | 0 | 89 | 0 | 50 | 2 | | | | | 147 | 606 |
| 7:45 AM | 8:00 AM | 4 | 2 | 82 | 0 | 58 | 0 | | | | | 146 | 620 |
| **Sub-Total** | | 12 | 2 | 368 | 4 | 229 | 5 | 0 | 0 | 0 | 0 | | |
| 8:00 AM | 8:15 AM | 6 | 0 | 64 | 0 | 36 | 0 | | | | | 106 | 567 |
| 8:15 AM | 8:30 AM | 2 | 2 | 69 | 0 | 46 | 3 | | | | | 122 | 521 |
| 8:30 AM | 8:45 AM | 10 | 0 | 56 | 2 | 52 | 3 | | | | | 123 | 497 |
| 8:45 AM | 9:00 AM | 3 | 0 | 63 | 0 | 89 | 0 | | | | | 155 | 506 |
| **Sub-Total** | | 21 | 2 | 252 | 2 | 223 | 6 | 0 | 0 | 0 | 0 | | |
| 9:00 AM | 9:15 AM | 2 | 0 | 52 | 0 | 72 | 2 | | | | | 128 | 528 |
| 9:15 AM | 9:30 AM | 2 | 0 | 39 | 0 | 57 | 2 | | | | | 100 | 506 |
| 9:30 AM | 9:45 AM | 2 | 2 | 53 | 0 | 57 | 5 | | | | | 119 | 502 |
| 9:45 AM | 10:00 AM | 4 | 0 | 57 | 0 | 67 | 2 | | | | | 130 | 477 |
| **Sub-Total** | | 10 | 2 | 201 | 0 | 253 | 11 | 0 | 0 | 0 | 0 | | |
| 10:00 AM | 10:15 AM | 0 | 0 | 0 | 0 | 0 | 0 | | | | | 0 | 349 |
| 10:15 AM | 10:30 AM | 0 | 0 | 0 | 0 | 0 | 0 | | | | | 0 | 249 |
| 10:30 AM | 10:45 AM | 0 | 0 | 0 | 0 | 0 | 0 | | | | | 0 | 130 |
| 10:45 AM | 11:00 AM | 0 | 0 | 0 | 0 | 0 | 0 | | | | | 0 | 0 |
| **Sub-Total** | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | |
| 11:00 AM | 11:15 AM | 4 | 0 | 65 | 0 | 47 | 2 | | | | | 118 | 118 |
| 11:15 AM | 11:30 AM | 7 | 0 | 67 | 4 | 72 | 3 | | | | | 153 | 271 |
| 11:30 AM | 11:45 AM | 5 | 0 | 69 | 2 | 55 | 2 | | | | | 133 | 404 |
| 11:45 AM | 12:00 PM | 6 | 2 | 55 | 2 | 74 | 2 | | | | | 141 | 545 |
| **Sub-Total** | | 22 | 2 | 256 | 8 | 248 | 9 | 0 | 0 | 0 | 0 | | |
| 12:00 PM | 12:15 PM | 7 | 0 | 91 | 0 | 70 | 0 | | | | | 168 | 595 |
| 12:15 PM | 12:30 PM | 6 | 3 | 97 | 0 | 64 | 0 | | | | | 170 | 612 |
| 12:30 PM | 12:45 PM | 9 | 0 | 65 | 2 | 49 | 2 | | | | | 127 | 606 |
| 12:45 PM | 1:00 PM | 9 | 0 | 63 | 0 | 70 | 2 | | | | | 144 | 609 |
| **Sub-Total** | | 31 | 3 | 316 | 2 | 253 | 4 | 0 | 0 | 0 | 0 | | |
| 1:00 PM | 1:15 PM | 3 | 0 | 65 | 2 | 58 | 3 | | | | | 131 | 572 |
| 1:15 PM | 1:30 PM | 6 | 0 | 68 | 2 | 69 | 2 | | | | | 147 | 549 |
| 1:30 PM | 1:45 PM | 9 | 0 | 57 | 0 | 57 | 3 | | | | | 126 | 548 |
| 1:45 PM | 2:00 PM | 2 | 0 | 61 | 0 | 39 | 2 | | | | | 104 | 508 |
| **Sub-Total** | | 20 | 0 | 251 | 4 | 223 | 10 | 0 | 0 | 0 | 0 | | |
| 2:00 PM | 2:15 PM | 0 | 0 | 0 | 0 | 0 | 0 | | | | | 0 | 377 |
| 2:15 PM | 2:30 PM | 0 | 0 | 0 | 0 | 0 | 0 | | | | | 0 | 230 |
| 2:30 PM | 2:45 PM | 0 | 0 | 0 | 0 | 0 | 0 | | | | | 0 | 104 |
| 2:45 PM | 3:00 PM | 0 | 0 | 0 | 0 | 0 | 0 | | | | | 0 | 0 |
| **Sub-Total** | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | |
| 3:00 PM | 3:15 PM | 4 | 0 | 64 | 3 | 60 | 0 | | | | | 131 | 131 |
| 3:15 PM | 3:30 PM | 4 | 2 | 65 | 0 | 62 | 0 | | | | | 133 | 264 |
| 3:30 PM | 3:45 PM | 3 | 0 | 70 | 0 | 65 | 2 | | | | | 140 | 404 |
| 3:45 PM | 4:00 PM | 3 | 0 | 65 | 0 | 58 | 2 | | | | | 128 | 532 |
| **Sub-Total** | | 14 | 2 | 264 | 3 | 245 | 4 | 0 | 0 | 0 | 0 | | |
| 4:00 PM | 4:15 PM | 4 | 0 | 68 | 0 | 47 | 0 | | | | | 119 | 520 |
| 4:15 PM | 4:30 PM | 4 | 0 | 63 | 0 | 49 | 0 | | | | | 116 | 503 |
| 4:30 PM | 4:45 PM | 5 | 0 | 92 | 2 | 65 | 0 | | | | | 164 | 527 |
| 4:45 PM | 5:00 PM | 4 | 0 | 62 | 0 | 55 | 2 | | | | | 123 | 522 |
| **Sub-Total** | | 17 | 0 | 285 | 2 | 216 | 2 | 0 | 0 | 0 | 0 | | |
| 5:00 PM | 5:15 PM | 6 | 0 | 75 | 0 | 84 | 0 | | | | | 165 | 568 |
| 5:15 PM | 5:30 PM | 5 | 0 | 69 | 2 | 64 | 0 | | | | | 140 | 592 |
| 5:30 PM | 5:45 PM | 6 | 0 | 68 | 0 | 78 | 0 | | | | | 152 | 580 |
| 5:45 PM | 6:00 PM | 4 | 0 | 67 | 0 | 70 | 0 | | | | | 141 | 598 |
| **Sub-Total** | | 21 | 0 | 279 | 2 | 296 | 0 | 0 | 0 | 0 | 0 | | |
| **Sub-Total** | | 178 | 13 | 2,725 | 27 | 2,434 | 53 | 0 | 0 | 0 | 0 | 5,430 | |

**Tecnico**

**Obesrvaciones**

**Fecha:** Febrero 14, 2017 (Projected) **Dia de la Semana:** Martes **Cond. del Tiempo :**

**Periodo :** 6:00 AM @ 6:00 PM **Municipio :** San Germán

**Interseccion** PR-122 **con** PR-102

**Contaje desde el Acceso** C **Carretera** PR-122

**Descripcion del acceso :** Acceso Sur - Dos Carriles

| Periodo de Estudio | | Afluencia de vehiculos | | | | | | | | Peatones | | Totales | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Izquierda | | Recto | | Derecha | | Viraje en U | | Desde | Desde | Periodo | Hora |
| Comienzo | Final | Liviano | Pesado | Liviano | Pesado | Liviano | Pesado | Liviano | Pesado | lado Izq. | lado Der. | 15 Min. | Pico |
| 6:00 AM | 6:15 AM | 7 | 0 | 14 | 0 | 6 | 0 | | | | | 27 | 27 |
| 6:15 AM | 6:30 AM | 5 | 0 | 24 | 0 | 5 | 0 | | | | | 34 | 61 |
| 6:30 AM | 6:45 AM | 10 | 0 | 20 | 0 | 6 | 2 | | | | | 38 | 99 |
| 6:45 AM | 7:00 AM | 11 | 0 | 41 | 2 | 14 | 0 | | | | | 68 | 167 |
| **Sub-Total** | | 33 | 0 | 99 | 2 | 31 | 2 | 0 | 0 | 0 | 0 | | |
| 7:00 AM | 7:15 AM | 12 | 0 | 41 | 0 | 6 | 0 | | | | | 59 | 199 |
| 7:15 AM | 7:30 AM | 14 | 0 | 46 | 2 | 6 | 0 | | | | | 68 | 233 |
| 7:30 AM | 7:45 AM | 32 | 0 | 29 | 0 | 11 | 0 | | | | | 72 | 267 |
| 7:45 AM | 8:00 AM | 18 | 0 | 56 | 0 | 16 | 0 | | | | | 90 | 289 |
| **Sub-Total** | | 76 | 0 | 172 | 2 | 39 | 0 | 0 | 0 | 0 | 0 | | |
| 8:00 AM | 8:15 AM | 25 | 0 | 57 | 0 | 16 | 0 | | | | | 98 | 328 |
| 8:15 AM | 8:30 AM | 14 | 0 | 40 | 0 | 11 | 2 | | | | | 67 | 327 |
| 8:30 AM | 8:45 AM | 11 | 0 | 40 | 0 | 12 | 0 | | | | | 63 | 318 |
| 8:45 AM | 9:00 AM | 13 | 0 | 47 | 0 | 11 | 0 | | | | | 71 | 299 |
| **Sub-Total** | | 63 | 0 | 184 | 0 | 50 | 2 | 0 | 0 | 0 | 0 | | |
| 9:00 AM | 9:15 AM | 10 | 0 | 45 | 0 | 12 | 0 | | | | | 67 | 268 |
| 9:15 AM | 9:30 AM | 13 | 0 | 34 | 0 | 10 | 0 | | | | | 57 | 258 |
| 9:30 AM | 9:45 AM | 12 | 0 | 40 | 0 | 11 | 0 | | | | | 63 | 258 |
| 9:45 AM | 10:00 AM | 19 | 0 | 31 | 3 | 18 | 0 | | | | | 71 | 258 |
| **Sub-Total** | | 54 | 0 | 150 | 3 | 51 | 0 | 0 | 0 | 0 | 0 | | |
| 10:00 AM | 10:15 AM | 0 | 0 | 0 | 0 | 0 | 0 | | | | | 0 | 191 |
| 10:15 AM | 10:30 AM | 0 | 0 | 0 | 0 | 0 | 0 | | | | | 0 | 134 |
| 10:30 AM | 10:45 AM | 0 | 0 | 0 | 0 | 0 | 0 | | | | | 0 | 71 |
| 10:45 AM | 11:00 AM | 0 | 0 | 0 | 0 | 0 | 0 | | | | | 0 | 0 |
| **Sub-Total** | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | |
| 11:00 AM | 11:15 AM | 16 | 0 | 25 | 2 | 12 | 0 | | | | | 55 | 55 |
| 11:15 AM | 11:30 AM | 23 | 0 | 31 | 2 | 18 | 0 | | | | | 74 | 129 |
| 11:30 AM | 11:45 AM | 12 | 0 | 36 | 4 | 14 | 0 | | | | | 66 | 195 |
| 11:45 AM | 12:00 PM | 13 | 0 | 33 | 0 | 20 | 0 | | | | | 66 | 261 |
| **Sub-Total** | | 64 | 0 | 125 | 8 | 64 | 0 | 0 | 0 | 0 | 0 | | |
| 12:00 PM | 12:15 PM | 16 | 0 | 32 | 0 | 23 | 0 | | | | | 71 | 277 |
| 12:15 PM | 12:30 PM | 14 | 0 | 34 | 3 | 14 | 0 | | | | | 65 | 268 |
| 12:30 PM | 12:45 PM | 12 | 2 | 28 | 2 | 18 | 2 | | | | | 64 | 266 |
| 12:45 PM | 1:00 PM | 17 | 0 | 43 | 2 | 18 | 0 | | | | | 80 | 280 |
| **Sub-Total** | | 59 | 2 | 137 | 7 | 73 | 2 | 0 | 0 | 0 | 0 | | |
| 1:00 PM | 1:15 PM | 16 | 0 | 23 | 0 | 11 | 0 | | | | | 50 | 259 |
| 1:15 PM | 1:30 PM | 11 | 0 | 36 | 0 | 17 | 2 | | | | | 66 | 260 |
| 1:30 PM | 1:45 PM | 25 | 2 | 39 | 2 | 17 | 0 | | | | | 85 | 281 |
| 1:45 PM | 2:00 PM | 20 | 0 | 39 | 3 | 16 | 2 | | | | | 80 | 281 |
| **Sub-Total** | | 72 | 2 | 137 | 5 | 61 | 4 | 0 | 0 | 0 | 0 | | |
| 2:00 PM | 2:15 PM | 0 | 0 | 0 | 0 | 0 | 0 | | | | | 0 | 231 |
| 2:15 PM | 2:30 PM | 0 | 0 | 0 | 0 | 0 | 0 | | | | | 0 | 165 |
| 2:30 PM | 2:45 PM | 0 | 0 | 0 | 0 | 0 | 0 | | | | | 0 | 80 |
| 2:45 PM | 3:00 PM | 0 | 0 | 0 | 0 | 0 | 0 | | | | | 0 | 0 |
| **Sub-Total** | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | |
| 3:00 PM | 3:15 PM | 29 | 0 | 62 | 0 | 24 | 0 | | | | | 115 | 115 |
| 3:15 PM | 3:30 PM | 19 | 0 | 61 | 0 | 36 | 0 | | | | | 116 | 231 |
| 3:30 PM | 3:45 PM | 12 | 0 | 38 | 0 | 20 | 0 | | | | | 70 | 301 |
| 3:45 PM | 4:00 PM | 19 | 2 | 40 | 0 | 14 | 0 | | | | | 75 | 376 |
| **Sub-Total** | | 79 | 2 | 201 | 0 | 94 | 0 | 0 | 0 | 0 | 0 | | |
| 4:00 PM | 4:15 PM | 18 | 0 | 34 | 0 | 10 | 0 | | | | | 62 | 323 |
| 4:15 PM | 4:30 PM | 9 | 0 | 41 | 0 | 10 | 0 | | | | | 60 | 267 |
| 4:30 PM | 4:45 PM | 11 | 0 | 39 | 2 | 12 | 0 | | | | | 64 | 261 |
| 4:45 PM | 5:00 PM | 17 | 0 | 41 | 0 | 16 | 0 | | | | | 74 | 260 |
| **Sub-Total** | | 55 | 0 | 155 | 2 | 48 | 0 | 0 | 0 | 0 | 0 | | |
| 5:00 PM | 5:15 PM | 5 | 0 | 43 | 0 | 14 | 0 | | | | | 62 | 260 |
| 5:15 PM | 5:30 PM | 13 | 0 | 36 | 0 | 20 | 0 | | | | | 69 | 269 |
| 5:30 PM | 5:45 PM | 10 | 2 | 43 | 0 | 12 | 0 | | | | | 67 | 272 |
| 5:45 PM | 6:00 PM | 11 | 0 | 41 | 0 | 17 | 0 | | | | | 69 | 267 |
| **Sub-Total** | | 39 | 2 | 163 | 0 | 63 | 0 | 0 | 0 | 0 | 0 | | |
| **Sub-Total** | | 594 | 8 | 1,523 | 29 | 574 | 10 | 0 | 0 | 0 | 0 | 2,738 | |

**Tecnico**

**Obesrvaciones**

**Fecha:** Febrero 14, 2017 (Projected) **Dia de la Semana:** Martes **Cond. del Tiempo :** Soleado

**Periodo :** 6:00 AM @ 6:00 PM **Municipio :** San Germán

**Interseccion** PR-122 **con** PR-102

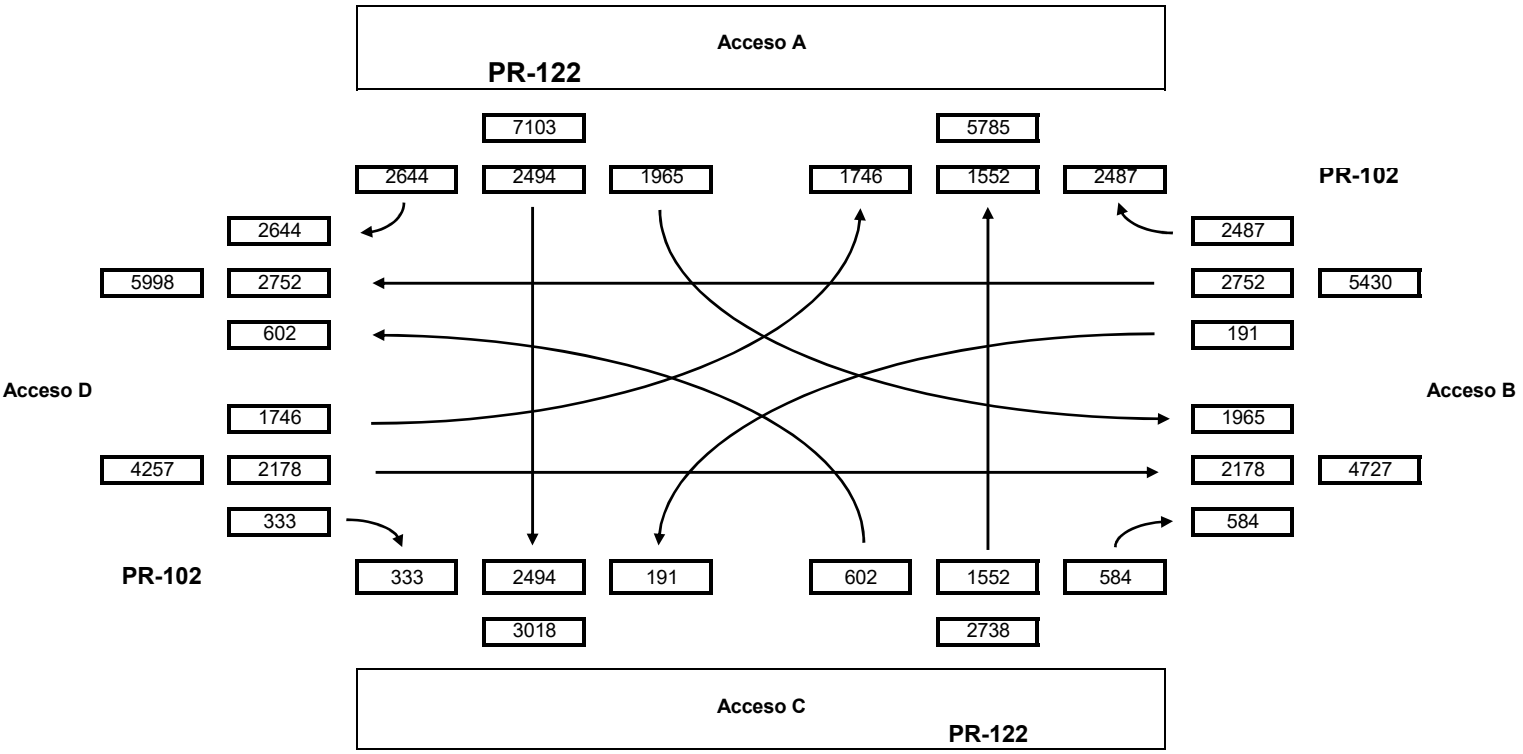
**Contaje desde el Acceso** D **Carretera** PR-102

**Descripcion del acceso :** Acceso Oeste - Dos Carriles

| Periodo de Estudio | | Afluencia de vehiculos | | | | | | | | Peatones | | Totales | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Izquierda | | Recto | | Derecha | | Viraje en U | | Desde | Desde | Periodo | Hora |
| Comienzo | Final | Liviano | Pesado | Liviano | Pesado | Liviano | Pesado | Liviano | Pesado | lado Izq. | lado Der. | 15 Min. | Pico |
| 6:00 AM | 6:15 AM | 20 | 0 | 25 | 0 | 3 | 0 | | | | | 48 | 48 |
| 6:15 AM | 6:30 AM | 24 | 0 | 21 | 0 | 2 | 0 | | | | | 47 | 95 |
| 6:30 AM | 6:45 AM | 32 | 0 | 27 | 3 | 4 | 2 | | | | | 68 | 163 |
| 6:45 AM | 7:00 AM | 29 | 2 | 41 | 0 | 4 | 2 | | | | | 78 | 241 |
| **Sub-Total** | | 105 | 2 | 114 | 3 | 13 | 4 | 0 | 0 | 0 | 0 | | |
| 7:00 AM | 7:15 AM | 19 | 0 | 32 | 0 | 5 | 2 | | | | | 58 | 251 |
| 7:15 AM | 7:30 AM | 23 | 0 | 29 | 0 | 4 | 0 | | | | | 56 | 260 |
| 7:30 AM | 7:45 AM | 28 | 2 | 48 | 2 | 2 | 0 | | | | | 82 | 274 |
| 7:45 AM | 8:00 AM | 29 | 2 | 57 | 2 | 6 | 2 | | | | | 98 | 294 |
| **Sub-Total** | | 99 | 4 | 166 | 4 | 17 | 4 | 0 | 0 | 0 | 0 | | |
| 8:00 AM | 8:15 AM | 35 | 0 | 46 | 2 | 16 | 0 | | | | | 99 | 335 |
| 8:15 AM | 8:30 AM | 24 | 0 | 48 | 0 | 6 | 0 | | | | | 78 | 357 |
| 8:30 AM | 8:45 AM | 31 | 3 | 56 | 4 | 14 | 2 | | | | | 110 | 385 |
| 8:45 AM | 9:00 AM | 36 | 3 | 43 | 2 | 6 | 2 | | | | | 92 | 379 |
| **Sub-Total** | | 126 | 6 | 193 | 8 | 42 | 4 | 0 | 0 | 0 | 0 | | |
| 9:00 AM | 9:15 AM | 39 | 0 | 47 | 0 | 7 | 0 | | | | | 93 | 373 |
| 9:15 AM | 9:30 AM | 46 | 0 | 48 | 0 | 5 | 0 | | | | | 99 | 394 |
| 9:30 AM | 9:45 AM | 38 | 0 | 46 | 0 | 10 | 0 | | | | | 94 | 378 |
| 9:45 AM | 10:00 AM | 47 | 0 | 58 | 2 | 11 | 0 | | | | | 118 | 404 |
| **Sub-Total** | | 170 | 0 | 199 | 2 | 33 | 0 | 0 | 0 | 0 | 0 | | |
| 10:00 AM | 10:15 AM | 0 | 0 | 0 | 0 | 0 | 0 | | | | | 0 | 311 |
| 10:15 AM | 10:30 AM | 0 | 0 | 0 | 0 | 0 | 0 | | | | | 0 | 212 |
| 10:30 AM | 10:45 AM | 0 | 0 | 0 | 0 | 0 | 0 | | | | | 0 | 118 |
| 10:45 AM | 11:00 AM | 0 | 0 | 0 | 0 | 0 | 0 | | | | | 0 | 0 |
| **Sub-Total** | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | |
| 11:00 AM | 11:15 AM | 43 | 2 | 69 | 2 | 12 | 0 | | | | | 128 | 128 |
| 11:15 AM | 11:30 AM | 50 | 3 | 52 | 3 | 13 | 0 | | | | | 121 | 249 |
| 11:30 AM | 11:45 AM | 48 | 0 | 65 | 0 | 9 | 0 | | | | | 122 | 371 |
| 11:45 AM | 12:00 PM | 38 | 0 | 64 | 0 | 7 | 0 | | | | | 109 | 480 |
| **Sub-Total** | | 179 | 5 | 250 | 5 | 41 | 0 | 0 | 0 | 0 | 0 | | |
| 12:00 PM | 12:15 PM | 45 | 0 | 36 | 0 | 5 | 0 | | | | | 86 | 438 |
| 12:15 PM | 12:30 PM | 52 | 3 | 45 | 3 | 3 | 0 | | | | | 106 | 423 |
| 12:30 PM | 12:45 PM | 54 | 0 | 53 | 3 | 12 | 0 | | | | | 122 | 423 |
| 12:45 PM | 1:00 PM | 52 | 0 | 56 | 2 | 11 | 0 | | | | | 121 | 435 |
| **Sub-Total** | | 203 | 3 | 190 | 8 | 31 | 0 | 0 | 0 | 0 | 0 | | |
| 1:00 PM | 1:15 PM | 57 | 0 | 61 | 3 | 13 | 0 | | | | | 134 | 483 |
| 1:15 PM | 1:30 PM | 46 | 2 | 56 | 2 | 5 | 0 | | | | | 111 | 488 |
| 1:30 PM | 1:45 PM | 38 | 0 | 49 | 0 | 5 | 2 | | | | | 94 | 460 |
| 1:45 PM | 2:00 PM | 56 | 2 | 50 | 2 | 10 | 0 | | | | | 120 | 459 |
| **Sub-Total** | | 197 | 4 | 216 | 7 | 33 | 2 | 0 | 0 | 0 | 0 | | |
| 2:00 PM | 2:15 PM | 0 | 0 | 0 | 0 | 0 | 0 | | | | | 0 | 325 |
| 2:15 PM | 2:30 PM | 0 | 0 | 0 | 0 | 0 | 0 | | | | | 0 | 214 |
| 2:30 PM | 2:45 PM | 0 | 0 | 0 | 0 | 0 | 0 | | | | | 0 | 120 |
| 2:45 PM | 3:00 PM | 0 | 0 | 0 | 0 | 0 | 0 | | | | | 0 | 0 |
| **Sub-Total** | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | |
| 3:00 PM | 3:15 PM | 55 | 0 | 55 | 2 | 9 | 0 | | | | | 121 | 121 |
| 3:15 PM | 3:30 PM | 69 | 0 | 49 | 3 | 11 | 0 | | | | | 132 | 253 |
| 3:30 PM | 3:45 PM | 61 | 3 | 76 | 2 | 11 | 0 | | | | | 153 | 406 |
| 3:45 PM | 4:00 PM | 62 | 2 | 80 | 0 | 6 | 2 | | | | | 152 | 558 |
| **Sub-Total** | | 247 | 5 | 260 | 7 | 37 | 2 | 0 | 0 | 0 | 0 | | |
| 4:00 PM | 4:15 PM | 61 | 0 | 71 | 0 | 13 | 0 | | | | | 145 | 582 |
| 4:15 PM | 4:30 PM | 64 | 2 | 75 | 2 | 18 | 0 | | | | | 161 | 611 |
| 4:30 PM | 4:45 PM | 49 | 0 | 63 | 4 | 9 | 0 | | | | | 125 | 583 |
| 4:45 PM | 5:00 PM | 48 | 0 | 61 | 2 | 7 | 0 | | | | | 118 | 549 |
| **Sub-Total** | | 222 | 2 | 270 | 8 | 47 | 0 | 0 | 0 | 0 | 0 | | |
| 5:00 PM | 5:15 PM | 47 | 0 | 70 | 4 | 5 | 2 | | | | | 128 | 532 |
| 5:15 PM | 5:30 PM | 40 | 0 | 71 | 0 | 5 | 0 | | | | | 116 | 487 |
| 5:30 PM | 5:45 PM | 42 | 0 | 63 | 0 | 5 | 2 | | | | | 112 | 474 |
| 5:45 PM | 6:00 PM | 38 | 0 | 60 | 0 | 4 | 0 | | | | | 102 | 458 |
| **Sub-Total** | | 167 | 0 | 264 | 4 | 19 | 4 | 0 | 0 | 0 | 0 | | |
| **Sub-Total** | | 1,715 | 31 | 2,122 | 56 | 313 | 20 | 0 | 0 | 0 | 0 | 4,257 | |

**Tecnico**

**Obesrvaciones**


Acceso A
PR-122
7103
5785
2644
2494
1965
1746
1552
2487
PR-102
2644
2487
5998
2752
2752
5430
602
191
Acceso D
Acceso B
1746
1965
4257
2178
2178
4727
333
584
PR-102
333
2494
191
602
1552
584
3018
2738
Acceso C
PR-122

## Intersection: PR-122 with PR-102

### MORNING PEAK HOUR FACTOR

| Time Period | | North Access (Southbound) | | | | | | East Access (Westbound) | | | | | | South Access (Northbound) | | | | | | West Access (Eastbound) | | | | | | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Left | | Thru | | Right | | Left | | Thru | | Right | | Left | | Thru | | Right | | Left | | Thru | | Right | | |
| | | Light | Heavy | Light | Heavy | Light | Heavy | Light | Heavy | Light | Heavy | Light | Heavy | Light | Heavy | Light | Heavy | Light | Heavy | Light | Heavy | Light | Heavy | Light | Heavy | |
| 7:15 AM | 7:30 AM | 46 | 0 | 48 | 0 | 89 | 2 | 2 | 0 | 101 | 4 | 61 | 0 | 14 | 0 | 46 | 2 | 6 | 0 | 23 | 0 | 29 | 0 | 4 | 0 | 477 |
| 7:30 AM | 7:45 AM | 53 | 4 | 43 | 4 | 91 | 3 | 6 | 0 | 89 | 0 | 50 | 2 | 32 | 0 | 29 | 0 | 11 | 0 | 28 | 2 | 48 | 2 | 2 | 0 | 499 |
| 7:45 AM | 8:00 AM | 76 | 0 | 70 | 0 | 116 | 0 | 4 | 2 | 82 | 0 | 58 | 0 | 18 | 0 | 56 | 0 | 16 | 0 | 29 | 2 | 57 | 2 | 6 | 2 | 596 |
| 8:00 AM | 8:15 AM | 72 | 5 | 53 | 3 | 69 | 3 | 6 | 0 | 64 | 0 | 36 | 0 | 25 | 0 | 57 | 0 | 16 | 0 | 35 | 0 | 46 | 2 | 16 | 0 | 508 |
| | Total | 247 | 9 | 214 | 7 | 365 | 8 | 18 | 2 | 336 | 4 | 205 | 2 | 89 | 0 | 188 | 2 | 49 | 0 | 115 | 4 | 180 | 6 | 28 | 2 | 2080 |

| | North Access | | | East Access | | | South Access | | | West Access | | | Intersection | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right | | |
| Total Flow Period, T (minutes) | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | |
| Peak Flow Period, $T_p$ (minutes) | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | |
| Volume Count during the Total Flow Period, $v_a$ (veh) | 256 | 221 | 373 | 20 | 340 | 207 | 89 | 190 | 49 | 119 | 186 | 30 | 2080 | |
| Volume Count during the Peak Flow Period, $v_p$ (veh) | 77 | 70 | 116 | 6 | 105 | 61 | 32 | 57 | 16 | 35 | 59 | 16 | 596 | |
| Average Flow Rate during the Total Flow Period, $q_a$ (veh/hr) | 256 | 221 | 373 | 20 | 340 | 207 | 89 | 190 | 49 | 119 | 186 | 30 | 2080 | |
| Average Flow Rate during the Peak Flow Period, $q_p$ (veh/hr) | 308 | 280 | 464 | 24 | 420 | 244 | 128 | 228 | 64 | 140 | 236 | 64 | 2384 | |
| Peak Time Factor, PTF | 25% | 25% | 25% | 25% | 25% | 25% | 25% | 25% | 25% | 25% | 25% | 25% | 25% | |
| Peak Flow Factor, PFF | 83% | 79% | 80% | 83% | 81% | 85% | 70% | 83% | 77% | 85% | 79% | 47% | 87% | |
| Unit Time for Volumes, $T_v$ (minutes) | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | |
| Minimum Total Flow Period, $T_m$ (minutes) | 18.04688 | 19.00452 | 18.65952 | 18 | 18.52941 | 17.68116 | 21.57303 | 18 | 19.59184 | 17.64706 | 19.03226 | 32 | 17.19231 | ≤ Tv, OK |
| Duration of Non-Peak Flow Period, $T_n$ (minutes) | 45 | 45 | 45 | 45 | 45 | 45 | 45 | 45 | 45 | 45 | 45 | 45 | 45 | |
| Average Flow Rate during the Non-Peak Flow Period, $q_n$ (veh/hr) | 239 | 201 | 343 | 19 | 313 | 195 | 76 | 177 | 44 | 112 | 169 | 19 | 1979 | |
| Volume Count during the Non-Peak Flow Period, $v_n$ (veh) | 179 | 151 | 257 | 14 | 235 | 146 | 57 | 133 | 33 | 84 | 127 | 14 | 1484 | |

### AFTERNOON PEAK HOUR FACTOR

| Time Period | | North Access (Southbound) | | | | | | East Access (Westbound) | | | | | | South Access (Northbound) | | | | | | West Access (Eastbound) | | | | | | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Left | | Thru | | Right | | Left | | Thru | | Right | | Left | | Thru | | Right | | Left | | Thru | | Right | | |
| | | Light | Heavy | Light | Heavy | Light | Heavy | Light | Heavy | Light | Heavy | Light | Heavy | Light | Heavy | Light | Heavy | Light | Heavy | Light | Heavy | Light | Heavy | Light | Heavy | |
| 3:00 PM | 3:15 PM | 90 | 3 | 87 | 3 | 60 | 0 | 4 | 0 | 64 | 3 | 60 | 0 | 29 | 0 | 62 | 0 | 24 | 0 | 55 | 0 | 55 | 2 | 9 | 0 | 610 |
| 3:15 PM | 3:30 PM | 85 | 3 | 75 | 0 | 62 | 0 | 4 | 2 | 65 | 0 | 62 | 0 | 19 | 0 | 61 | 0 | 36 | 0 | 69 | 0 | 49 | 3 | 11 | 0 | 606 |
| 3:30 PM | 3:45 PM | 60 | 3 | 105 | 4 | 65 | 2 | 3 | 0 | 70 | 0 | 65 | 2 | 12 | 0 | 38 | 0 | 20 | 0 | 61 | 3 | 76 | 2 | 11 | 0 | 602 |
| 3:45 PM | 4:00 PM | 53 | 2 | 69 | 0 | 58 | 2 | 3 | 0 | 65 | 0 | 58 | 2 | 19 | 2 | 40 | 0 | 14 | 0 | 62 | 2 | 80 | 0 | 6 | 2 | 539 |
| | Total | 288 | 11 | 336 | 7 | 245 | 4 | 14 | 2 | 264 | 3 | 245 | 4 | 79 | 2 | 201 | 0 | 94 | 0 | 247 | 5 | 260 | 7 | 37 | 2 | 2357 |

| | North Access | | | East Access | | | South Access | | | West Access | | | Intersection | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right | | |
| Total Flow Period, T (minutes) | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | |
| Peak Flow Period, $T_p$ (minutes) | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | |
| Volume Count during the Total Flow Period, $v_a$ (veh) | 299 | 343 | 249 | 16 | 267 | 249 | 81 | 201 | 94 | 252 | 267 | 39 | 2357 | |
| Volume Count during the Peak Flow Period, $v_p$ (veh) | 93 | 109 | 67 | 6 | 70 | 67 | 29 | 62 | 36 | 69 | 80 | 11 | 610 | |
| Average Flow Rate during the Total Flow Period, $q_a$ (veh/hr) | 299 | 343 | 249 | 16 | 267 | 249 | 81 | 201 | 94 | 252 | 267 | 39 | 2357 | |
| Average Flow Rate during the Peak Flow Period, $q_p$ (veh/hr) | 372 | 436 | 268 | 24 | 280 | 268 | 116 | 248 | 144 | 276 | 320 | 44 | 2440 | |
| Peak Time Factor, PTF | 25% | 25% | 25% | 25% | 25% | 25% | 25% | 25% | 25% | 25% | 25% | 25% | 25% | |
| Peak Flow Factor, PFF | 80% | 79% | 93% | 67% | 95% | 93% | 70% | 81% | 65% | 91% | 83% | 89% | 97% | |
| Unit Time for Volumes, $T_v$ (minutes) | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | |
| Minimum Total Flow Period, $T_m$ (minutes) | 18.66221 | 19.06706 | 16.14458 | 22.5 | 15.73034 | 16.14458 | 21.48148 | 18.50746 | 22.97872 | 16.42857 | 17.97753 | 16.92308 | 15.52821 | ≤ Tv, OK |
| Duration of Non-Peak Flow Period, $T_n$ (minutes) | 45 | 45 | 45 | 45 | 45 | 45 | 45 | 45 | 45 | 45 | 45 | 45 | 45 | |
| Average Flow Rate during the Non-Peak Flow Period, $q_n$ (veh/hr) | 275 | 312 | 243 | 13 | 263 | 243 | 69 | 185 | 77 | 244 | 249 | 37 | 2329 | |
| Volume Count during the Non-Peak Flow Period, $v_n$ (veh) | 206 | 234 | 182 | 10 | 197 | 182 | 52 | 139 | 58 | 183 | 187 | 28 | 1747 | |

**Fecha:** Febrero 14, 2017 (Projected) **Dia de la Semana:** Martes **Cond. del Tiempo :** Soleado

**Periodo :** 6:00 AM @ 6:00 PM **Municipio :** San Germán

**Interseccion** PR-166 **con** PR-102

**Contaje desde el Acceso** A **Carretera** Universidad Interamericana

**Descripcion del acceso :** Acceso Norte - Un Carril

| Periodo de Estudio | | Afluencia de vehiculos | | | | | | | | Peatones | | Totales | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Izquierda | | Recto | | Derecha | | Viraje en U | | Desde | Desde | Periodo | Hora |
| Comienzo | Final | Liviano | Pesado | Liviano | Pesado | Liviano | Pesado | Liviano | Pesado | lado Izq. | lado Der. | 15 Min. | Pico |
| 6:00 AM | 6:15 AM | 0 | 0 | 0 | 0 | 0 | 0 | | | | | 0 | 0 |
| 6:15 AM | 6:30 AM | 0 | 0 | 0 | 0 | 0 | 0 | | | | | 0 | 0 |
| 6:30 AM | 6:45 AM | 0 | 0 | 0 | 0 | 0 | 0 | | | | | 0 | 0 |
| 6:45 AM | 7:00 AM | 2 | 0 | 2 | 0 | 3 | 0 | | | | | 7 | 7 |
| **Sub-Total** | | 2 | 0 | 2 | 0 | 3 | 0 | 0 | 0 | 0 | 0 | | |
| 7:00 AM | 7:15 AM | 6 | 0 | 2 | 0 | 31 | 0 | | | | | 39 | 46 |
| 7:15 AM | 7:30 AM | 5 | 0 | 0 | 0 | 18 | 0 | | | | | 23 | 69 |
| 7:30 AM | 7:45 AM | 2 | 0 | 10 | 0 | 32 | 0 | | | | | 44 | 113 |
| 7:45 AM | 8:00 AM | 3 | 0 | 13 | 0 | 41 | 0 | | | | | 57 | 163 |
| **Sub-Total** | | 16 | 0 | 25 | 0 | 122 | 0 | 0 | 0 | 0 | 0 | | |
| 8:00 AM | 8:15 AM | 3 | 0 | 7 | 0 | 17 | 0 | | | | | 27 | 151 |
| 8:15 AM | 8:30 AM | 2 | 0 | 2 | 0 | 7 | 0 | | | | | 11 | 139 |
| 8:30 AM | 8:45 AM | 3 | 0 | 2 | 0 | 12 | 0 | | | | | 17 | 112 |
| 8:45 AM | 9:00 AM | 10 | 0 | 5 | 0 | 16 | 0 | | | | | 31 | 86 |
| **Sub-Total** | | 18 | 0 | 16 | 0 | 52 | 0 | 0 | 0 | 0 | 0 | | |
| 9:00 AM | 9:15 AM | 11 | 0 | 3 | 0 | 12 | 0 | | | | | 26 | 85 |
| 9:15 AM | 9:30 AM | 2 | 0 | 2 | 0 | 5 | 0 | | | | | 9 | 83 |
| 9:30 AM | 9:45 AM | 3 | 0 | 2 | 0 | 6 | 0 | | | | | 11 | 77 |
| 9:45 AM | 10:00 AM | 5 | 0 | 2 | 2 | 9 | 0 | | | | | 18 | 64 |
| **Sub-Total** | | 21 | 0 | 9 | 2 | 32 | 0 | 0 | 0 | 0 | 0 | | |
| 10:00 AM | 10:15 AM | 0 | 0 | 0 | 0 | 0 | 0 | | | | | 0 | 38 |
| 10:15 AM | 10:30 AM | 0 | 0 | 0 | 0 | 0 | 0 | | | | | 0 | 29 |
| 10:30 AM | 10:45 AM | 0 | 0 | 0 | 0 | 0 | 0 | | | | | 0 | 18 |
| 10:45 AM | 11:00 AM | 0 | 0 | 0 | 0 | 0 | 0 | | | | | 0 | 0 |
| **Sub-Total** | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | |
| 11:00 AM | 11:15 AM | 4 | 0 | 3 | 0 | 4 | 0 | | | | | 11 | 11 |
| 11:15 AM | 11:30 AM | 9 | 0 | 2 | 0 | 9 | 0 | | | | | 20 | 31 |
| 11:30 AM | 11:45 AM | 9 | 0 | 2 | 0 | 17 | 0 | | | | | 28 | 59 |
| 11:45 AM | 12:00 PM | 17 | 0 | 5 | 0 | 13 | 0 | | | | | 35 | 94 |
| **Sub-Total** | | 39 | 0 | 12 | 0 | 43 | 0 | 0 | 0 | 0 | 0 | | |
| 12:00 PM | 12:15 PM | 19 | 0 | 11 | 0 | 36 | 0 | | | | | 66 | 149 |
| 12:15 PM | 12:30 PM | 6 | 0 | 4 | 0 | 9 | 0 | | | | | 19 | 148 |
| 12:30 PM | 12:45 PM | 4 | 0 | 3 | 0 | 19 | 0 | | | | | 26 | 146 |
| 12:45 PM | 1:00 PM | 4 | 0 | 3 | 0 | 16 | 0 | | | | | 23 | 134 |
| **Sub-Total** | | 33 | 0 | 21 | 0 | 80 | 0 | 0 | 0 | 0 | 0 | | |
| 1:00 PM | 1:15 PM | 3 | 0 | 2 | 0 | 13 | 0 | | | | | 18 | 86 |
| 1:15 PM | 1:30 PM | 12 | 0 | 11 | 0 | 26 | 0 | | | | | 49 | 116 |
| 1:30 PM | 1:45 PM | 12 | 0 | 6 | 0 | 42 | 0 | | | | | 60 | 150 |
| 1:45 PM | 2:00 PM | 16 | 0 | 3 | 0 | 35 | 0 | | | | | 54 | 181 |
| **Sub-Total** | | 43 | 0 | 22 | 0 | 116 | 0 | 0 | 0 | 0 | 0 | | |
| 2:00 PM | 2:15 PM | 0 | 0 | 0 | 0 | 0 | 0 | | | | | 0 | 163 |
| 2:15 PM | 2:30 PM | 0 | 0 | 0 | 0 | 0 | 0 | | | | | 0 | 114 |
| 2:30 PM | 2:45 PM | 0 | 0 | 0 | 0 | 0 | 0 | | | | | 0 | 54 |
| 2:45 PM | 3:00 PM | 0 | 0 | 0 | 0 | 0 | 0 | | | | | 0 | 0 |
| **Sub-Total** | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | |
| 3:00 PM | 3:15 PM | 17 | 0 | 5 | 0 | 38 | 0 | | | | | 60 | 60 |
| 3:15 PM | 3:30 PM | 10 | 0 | 3 | 0 | 20 | 0 | | | | | 33 | 93 |
| 3:30 PM | 3:45 PM | 14 | 0 | 2 | 0 | 33 | 0 | | | | | 49 | 142 |
| 3:45 PM | 4:00 PM | 10 | 0 | 2 | 0 | 23 | 0 | | | | | 35 | 177 |
| **Sub-Total** | | 51 | 0 | 12 | 0 | 114 | 0 | 0 | 0 | 0 | 0 | | |
| 4:00 PM | 4:15 PM | 0 | 0 | 3 | 0 | 17 | 0 | | | | | 20 | 137 |
| 4:15 PM | 4:30 PM | 13 | 0 | 7 | 0 | 7 | 0 | | | | | 27 | 131 |
| 4:30 PM | 4:45 PM | 3 | 0 | 10 | 0 | 5 | 0 | | | | | 18 | 100 |
| 4:45 PM | 5:00 PM | 5 | 0 | 9 | 0 | 3 | 0 | | | | | 17 | 82 |
| **Sub-Total** | | 21 | 0 | 29 | 0 | 32 | 0 | 0 | 0 | 0 | 0 | | |
| 5:00 PM | 5:15 PM | 10 | 0 | 2 | 0 | 11 | 0 | | | | | 23 | 85 |
| 5:15 PM | 5:30 PM | 12 | 0 | 3 | 0 | 3 | 0 | | | | | 18 | 76 |
| 5:30 PM | 5:45 PM | 11 | 0 | 4 | 0 | 9 | 0 | | | | | 24 | 82 |
| 5:45 PM | 6:00 PM | 7 | 0 | 2 | 0 | 7 | 0 | | | | | 16 | 81 |
| **Sub-Total** | | 40 | 0 | 11 | 0 | 30 | 0 | 0 | 0 | 0 | 0 | | |
| **Sub-Total** | | 284 | 0 | 159 | 2 | 624 | 0 | 0 | 0 | 0 | 0 | 1,069 | |

**Tecnico**

**Obesrvaciones**

**Fecha:** Febrero 14, 2017 (Projected) **Dia de la Semana:** Martes **Cond. del Tiempo :** Soleado

**Periodo :** 6:00 AM @ 6:00 PM **Municipio :** San Germán

**Interseccion** PR-166 **con** PR-102

**Contaje desde el Acceso** B **Carretera.** PR-102

**Descripcion del acceso :** Acceso Este - Un Carril

| Periodo de Estudio | | Afluencia de vehiculos | | | | | | | | Peatones | | Totales | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Izquierda | | Recto | | Derecha | | Viraje en U | | Desde | Desde | Periodo | Hora |
| Comienzo | Final | Liviano | Pesado | Liviano | Pesado | Liviano | Pesado | Liviano | Pesado | lado Izq. | lado Der. | 15 Min. | Pico |
| 6:00 AM | 6:15 AM | 0 | 0 | 27 | 0 | 0 | 0 | | | | | 27 | 27 |
| 6:15 AM | 6:30 AM | 0 | 0 | 28 | 2 | 0 | 0 | | | | | 30 | 57 |
| 6:30 AM | 6:45 AM | 5 | 0 | 45 | 0 | 0 | 0 | | | | | 50 | 107 |
| 6:45 AM | 7:00 AM | 3 | 0 | 60 | 2 | 0 | 0 | | | | | 65 | 172 |
| **Sub-Total** | | 8 | 0 | 160 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | | |
| 7:00 AM | 7:15 AM | 3 | 0 | 71 | 2 | 0 | 0 | | | | | 76 | 221 |
| 7:15 AM | 7:30 AM | 7 | 0 | 53 | 2 | 3 | 0 | | | | | 65 | 256 |
| 7:30 AM | 7:45 AM | 5 | 0 | 74 | 2 | 9 | 0 | | | | | 90 | 296 |
| 7:45 AM | 8:00 AM | 4 | 0 | 86 | 0 | 10 | 0 | | | | | 100 | 331 |
| **Sub-Total** | | 19 | 0 | 284 | 6 | 22 | 0 | 0 | 0 | 0 | 0 | | |
| 8:00 AM | 8:15 AM | 3 | 0 | 71 | 0 | 5 | 0 | | | | | 79 | 334 |
| 8:15 AM | 8:30 AM | 2 | 0 | 71 | 2 | 3 | 0 | | | | | 78 | 347 |
| 8:30 AM | 8:45 AM | 2 | 0 | 78 | 0 | 4 | 0 | | | | | 84 | 341 |
| 8:45 AM | 9:00 AM | 2 | 0 | 68 | 0 | 11 | 0 | | | | | 81 | 322 |
| **Sub-Total** | | 9 | 0 | 288 | 2 | 23 | 0 | 0 | 0 | 0 | 0 | | |
| 9:00 AM | 9:15 AM | 4 | 0 | 65 | 3 | 10 | 0 | | | | | 82 | 325 |
| 9:15 AM | 9:30 AM | 3 | 0 | 71 | 2 | 5 | 0 | | | | | 81 | 328 |
| 9:30 AM | 9:45 AM | 4 | 0 | 82 | 2 | 6 | 0 | | | | | 94 | 338 |
| 9:45 AM | 10:00 AM | 9 | 0 | 91 | 0 | 3 | 0 | | | | | 103 | 360 |
| **Sub-Total** | | 20 | 0 | 309 | 7 | 24 | 0 | 0 | 0 | 0 | 0 | | |
| 10:00 AM | 10:15 AM | 0 | 0 | 0 | 0 | 0 | 0 | | | | | 0 | 278 |
| 10:15 AM | 10:30 AM | 0 | 0 | 0 | 0 | 0 | 0 | | | | | 0 | 197 |
| 10:30 AM | 10:45 AM | 0 | 0 | 0 | 0 | 0 | 0 | | | | | 0 | 103 |
| 10:45 AM | 11:00 AM | 0 | 0 | 0 | 0 | 0 | 0 | | | | | 0 | 0 |
| **Sub-Total** | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | |
| 11:00 AM | 11:15 AM | 0 | 0 | 93 | 0 | 6 | 0 | | | | | 99 | 99 |
| 11:15 AM | 11:30 AM | 2 | 0 | 105 | 2 | 6 | 0 | | | | | 115 | 214 |
| 11:30 AM | 11:45 AM | 0 | 0 | 108 | 2 | 5 | 0 | | | | | 115 | 329 |
| 11:45 AM | 12:00 PM | 0 | 0 | 108 | 2 | 14 | 0 | | | | | 124 | 453 |
| **Sub-Total** | | 2 | 0 | 414 | 6 | 31 | 0 | 0 | 0 | 0 | 0 | | |
| 12:00 PM | 12:15 PM | 3 | 0 | 176 | 5 | 11 | 0 | | | | | 195 | 549 |
| 12:15 PM | 12:30 PM | 5 | 0 | 107 | 5 | 9 | 0 | | | | | 126 | 560 |
| 12:30 PM | 12:45 PM | 6 | 0 | 105 | 2 | 12 | 0 | | | | | 125 | 570 |
| 12:45 PM | 1:00 PM | 3 | 0 | 65 | 0 | 14 | 0 | | | | | 82 | 528 |
| **Sub-Total** | | 17 | 0 | 453 | 12 | 46 | 0 | 0 | 0 | 0 | 0 | | |
| 1:00 PM | 1:15 PM | 4 | 0 | 101 | 0 | 10 | 0 | | | | | 115 | 448 |
| 1:15 PM | 1:30 PM | 2 | 0 | 150 | 0 | 5 | 0 | | | | | 157 | 479 |
| 1:30 PM | 1:45 PM | 4 | 0 | 126 | 3 | 4 | 0 | | | | | 137 | 491 |
| 1:45 PM | 2:00 PM | 2 | 0 | 111 | 2 | 5 | 0 | | | | | 120 | 529 |
| **Sub-Total** | | 12 | 0 | 488 | 5 | 24 | 0 | 0 | 0 | 0 | 0 | | |
| 2:00 PM | 2:15 PM | 0 | 0 | 0 | 0 | 0 | 0 | | | | | 0 | 414 |
| 2:15 PM | 2:30 PM | 0 | 0 | 0 | 0 | 0 | 0 | | | | | 0 | 257 |
| 2:30 PM | 2:45 PM | 0 | 0 | 0 | 0 | 0 | 0 | | | | | 0 | 120 |
| 2:45 PM | 3:00 PM | 0 | 0 | 0 | 0 | 0 | 0 | | | | | 0 | 0 |
| **Sub-Total** | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | |
| 3:00 PM | 3:15 PM | 5 | 0 | 104 | 0 | 10 | 0 | | | | | 119 | 119 |
| 3:15 PM | 3:30 PM | 3 | 0 | 80 | 0 | 14 | 0 | | | | | 97 | 216 |
| 3:30 PM | 3:45 PM | 3 | 0 | 98 | 0 | 11 | 0 | | | | | 112 | 328 |
| 3:45 PM | 4:00 PM | 7 | 0 | 92 | 2 | 7 | 0 | | | | | 108 | 436 |
| **Sub-Total** | | 18 | 0 | 374 | 2 | 42 | 0 | 0 | 0 | 0 | 0 | | |
| 4:00 PM | 4:15 PM | 6 | 0 | 101 | 0 | 5 | 0 | | | | | 112 | 429 |
| 4:15 PM | 4:30 PM | 10 | 0 | 114 | 0 | 4 | 0 | | | | | 128 | 460 |
| 4:30 PM | 4:45 PM | 4 | 0 | 128 | 4 | 10 | 0 | | | | | 146 | 494 |
| 4:45 PM | 5:00 PM | 5 | 0 | 116 | 0 | 12 | 0 | | | | | 133 | 519 |
| **Sub-Total** | | 25 | 0 | 459 | 4 | 31 | 0 | 0 | 0 | 0 | 0 | | |
| 5:00 PM | 5:15 PM | 3 | 0 | 101 | 0 | 11 | 0 | | | | | 115 | 522 |
| 5:15 PM | 5:30 PM | 5 | 0 | 90 | 0 | 7 | 0 | | | | | 102 | 496 |
| 5:30 PM | 5:45 PM | 5 | 0 | 86 | 3 | 5 | 0 | | | | | 99 | 449 |
| 5:45 PM | 6:00 PM | 3 | 0 | 70 | 0 | 7 | 0 | | | | | 80 | 396 |
| **Sub-Total** | | 16 | 0 | 347 | 3 | 30 | 0 | 0 | 0 | 0 | 0 | | |
| **Sub-Total** | | 146 | 0 | 3,576 | 51 | 273 | 0 | 0 | 0 | 0 | 0 | 4,046 | |

**Tecnico**

**Obesrvaciones**

**Fecha:** Febrero 14, 2017 (Projected) **Dia de la Semana:** Martes **Cond. del Tiempo :**

**Periodo :** 6:00 AM @ 6:00 PM **Municipio :** San Germán

**Interseccion** PR-166 **con** PR-102

**Contaje desde el Acceso** C **Carretera** PR-166

**Descripcion del acceso :** Acceso Sur - Dos Carriles

| Periodo de Estudio | | Afluencia de vehiculos | | | | | | | | Peatones | | Totales | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Izquierda | | Recto | | Derecha | | Viraje en U | | Desde | Desde | Periodo | Hora |
| Comienzo | Final | Liviano | Pesado | Liviano | Pesado | Liviano | Pesado | Liviano | Pesado | lado Izq. | lado Der. | 15 Min. | Pico |
| 6:00 AM | 6:15 AM | 2 | 0 | 10 | 0 | 3 | 0 | | | | | 15 | 15 |
| 6:15 AM | 6:30 AM | 3 | 0 | 14 | 0 | 2 | 0 | | | | | 19 | 34 |
| 6:30 AM | 6:45 AM | 3 | 2 | 17 | 0 | 2 | 0 | | | | | 24 | 58 |
| 6:45 AM | 7:00 AM | 21 | 2 | 24 | 0 | 2 | 0 | | | | | 49 | 107 |
| Sub-Total | | 29 | 4 | 65 | 0 | 9 | 0 | 0 | 0 | 0 | 0 | | |
| 7:00 AM | 7:15 AM | 10 | 0 | 20 | 0 | 6 | 0 | | | | | 36 | 128 |
| 7:15 AM | 7:30 AM | 24 | 0 | 21 | 0 | 6 | 0 | | | | | 51 | 160 |
| 7:30 AM | 7:45 AM | 38 | 2 | 17 | 0 | 14 | 0 | | | | | 71 | 207 |
| 7:45 AM | 8:00 AM | 45 | 0 | 27 | 0 | 13 | 0 | | | | | 85 | 243 |
| Sub-Total | | 117 | 2 | 85 | 0 | 39 | 0 | 0 | 0 | 0 | 0 | | |
| 8:00 AM | 8:15 AM | 40 | 0 | 6 | 0 | 12 | 0 | | | | | 58 | 265 |
| 8:15 AM | 8:30 AM | 18 | 0 | 9 | 0 | 9 | 0 | | | | | 36 | 250 |
| 8:30 AM | 8:45 AM | 25 | 0 | 7 | 0 | 7 | 0 | | | | | 39 | 218 |
| 8:45 AM | 9:00 AM | 7 | 0 | 12 | 0 | 6 | 0 | | | | | 25 | 158 |
| Sub-Total | | 90 | 0 | 34 | 0 | 34 | 0 | 0 | 0 | 0 | 0 | | |
| 9:00 AM | 9:15 AM | 17 | 0 | 10 | 0 | 5 | 0 | | | | | 32 | 132 |
| 9:15 AM | 9:30 AM | 18 | 0 | 2 | 0 | 6 | 2 | | | | | 28 | 124 |
| 9:30 AM | 9:45 AM | 21 | 0 | 2 | 0 | 4 | 0 | | | | | 27 | 112 |
| 9:45 AM | 10:00 AM | 14 | 0 | 4 | 0 | 12 | 0 | | | | | 30 | 117 |
| Sub-Total | | 70 | 0 | 18 | 0 | 27 | 2 | 0 | 0 | 0 | 0 | | |
| 10:00 AM | 10:15 AM | 0 | 0 | 0 | 0 | 0 | 0 | | | | | 0 | 85 |
| 10:15 AM | 10:30 AM | 0 | 0 | 0 | 0 | 0 | 0 | | | | | 0 | 57 |
| 10:30 AM | 10:45 AM | 0 | 0 | 0 | 0 | 0 | 0 | | | | | 0 | 30 |
| 10:45 AM | 11:00 AM | 0 | 0 | 0 | 0 | 0 | 0 | | | | | 0 | 0 |
| Sub-Total | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | |
| 11:00 AM | 11:15 AM | 17 | 0 | 3 | 0 | 5 | 0 | | | | | 25 | 25 |
| 11:15 AM | 11:30 AM | 14 | 0 | 3 | 0 | 6 | 0 | | | | | 23 | 48 |
| 11:30 AM | 11:45 AM | 21 | 0 | 2 | 0 | 11 | 0 | | | | | 34 | 82 |
| 11:45 AM | 12:00 PM | 25 | 0 | 2 | 0 | 6 | 0 | | | | | 33 | 115 |
| Sub-Total | | 77 | 0 | 10 | 0 | 28 | 0 | 0 | 0 | 0 | 0 | | |
| 12:00 PM | 12:15 PM | 29 | 0 | 4 | 2 | 7 | 0 | | | | | 42 | 132 |
| 12:15 PM | 12:30 PM | 19 | 2 | 2 | 0 | 5 | 2 | | | | | 30 | 139 |
| 12:30 PM | 12:45 PM | 12 | 0 | 2 | 0 | 5 | 0 | | | | | 19 | 124 |
| 12:45 PM | 1:00 PM | 28 | 0 | 7 | 0 | 4 | 0 | | | | | 39 | 130 |
| Sub-Total | | 88 | 2 | 15 | 2 | 21 | 2 | 0 | 0 | 0 | 0 | | |
| 1:00 PM | 1:15 PM | 23 | 0 | 2 | 0 | 12 | 0 | | | | | 37 | 125 |
| 1:15 PM | 1:30 PM | 25 | 0 | 7 | 0 | 10 | 0 | | | | | 42 | 137 |
| 1:30 PM | 1:45 PM | 26 | 0 | 10 | 0 | 9 | 0 | | | | | 45 | 163 |
| 1:45 PM | 2:00 PM | 20 | 0 | 6 | 0 | 11 | 0 | | | | | 37 | 161 |
| Sub-Total | | 94 | 0 | 25 | 0 | 42 | 0 | 0 | 0 | 0 | 0 | | |
| 2:00 PM | 2:15 PM | 0 | 0 | 0 | 0 | 0 | 0 | | | | | 0 | 124 |
| 2:15 PM | 2:30 PM | 0 | 0 | 0 | 0 | 0 | 0 | | | | | 0 | 82 |
| 2:30 PM | 2:45 PM | 0 | 0 | 0 | 0 | 0 | 0 | | | | | 0 | 37 |
| 2:45 PM | 3:00 PM | 0 | 0 | 0 | 0 | 0 | 0 | | | | | 0 | 0 |
| Sub-Total | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | |
| 3:00 PM | 3:15 PM | 19 | 0 | 5 | 0 | 14 | 0 | | | | | 38 | 38 |
| 3:15 PM | 3:30 PM | 13 | 0 | 6 | 0 | 5 | 0 | | | | | 24 | 62 |
| 3:30 PM | 3:45 PM | 11 | 0 | 7 | 0 | 7 | 0 | | | | | 25 | 87 |
| 3:45 PM | 4:00 PM | 25 | 0 | 10 | 0 | 4 | 0 | | | | | 39 | 126 |
| Sub-Total | | 68 | 0 | 28 | 0 | 30 | 0 | 0 | 0 | 0 | 0 | | |
| 4:00 PM | 4:15 PM | 13 | 0 | 10 | 0 | 10 | 0 | | | | | 33 | 121 |
| 4:15 PM | 4:30 PM | 11 | 0 | 13 | 0 | 2 | 0 | | | | | 26 | 123 |
| 4:30 PM | 4:45 PM | 17 | 0 | 11 | 0 | 2 | 0 | | | | | 30 | 128 |
| 4:45 PM | 5:00 PM | 14 | 0 | 14 | 0 | 4 | 0 | | | | | 32 | 121 |
| Sub-Total | | 55 | 0 | 48 | 0 | 18 | 0 | 0 | 0 | 0 | 0 | | |
| 5:00 PM | 5:15 PM | 13 | 0 | 9 | 0 | 3 | 0 | | | | | 25 | 113 |
| 5:15 PM | 5:30 PM | 20 | 0 | 20 | 0 | 6 | 0 | | | | | 46 | 133 |
| 5:30 PM | 5:45 PM | 13 | 0 | 7 | 0 | 7 | 0 | | | | | 27 | 130 |
| 5:45 PM | 6:00 PM | 10 | 0 | 10 | 0 | 3 | 0 | | | | | 23 | 121 |
| Sub-Total | | 56 | 0 | 46 | 0 | 19 | 0 | 0 | 0 | 0 | 0 | | |
| Sub-Total | | 744 | 8 | 374 | 2 | 267 | 4 | 0 | 0 | 0 | 0 | 1,399 | |

**Tecnico**

**Obesrvaciones**

**Fecha:** Febrero 14, 2017 (Projected) **Dia de la Semana:** Martes **Cond. del Tiempo :** Soleado

**Periodo :** 6:00 AM @ 6:00 PM **Municipio :** San Germán

**Interseccion** PR-166 **con** PR-102

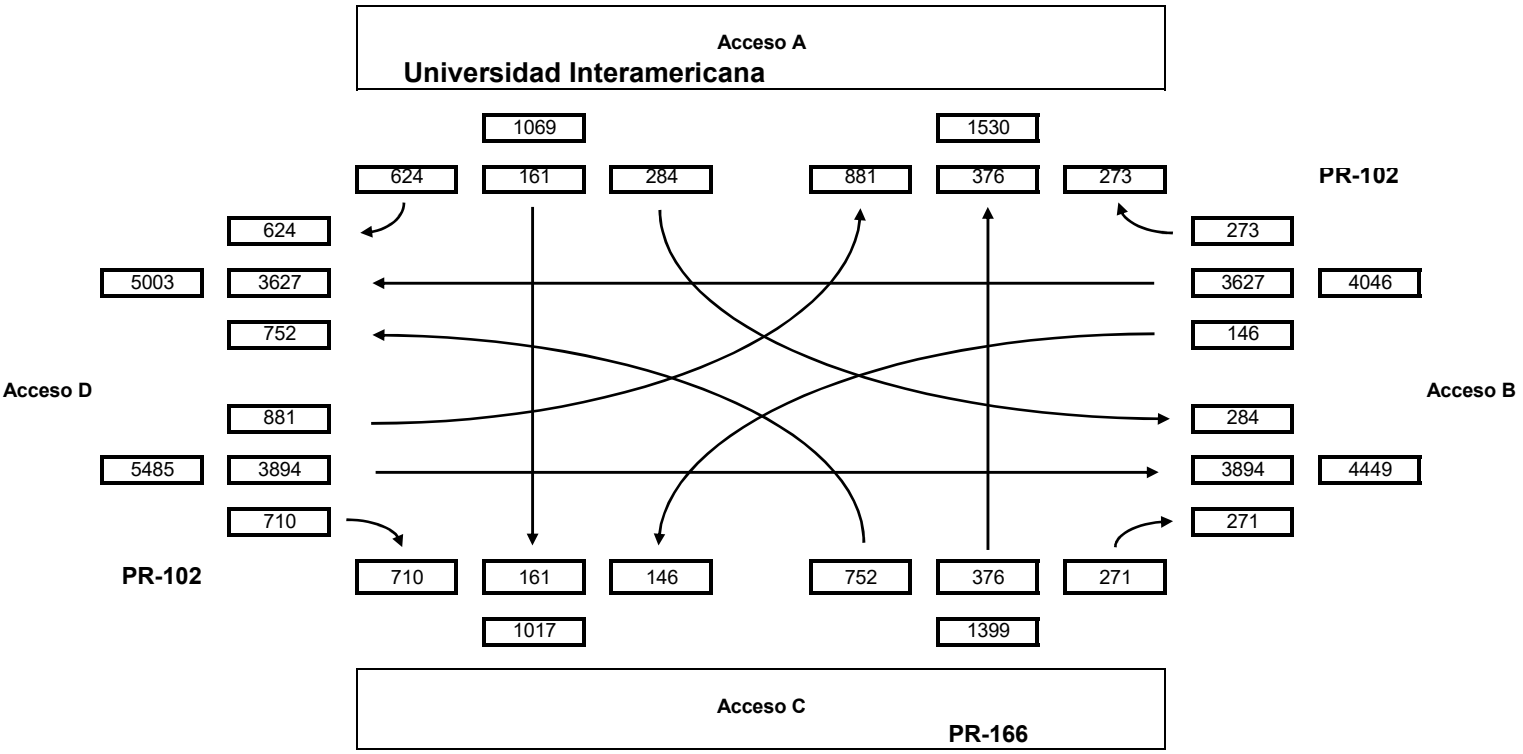
**Contaje desde el Acceso** D **Carretera** PR-102

**Descripcion del acceso :** Acceso Oeste - Un Carril

| Periodo de Estudio | | Afluencia de vehiculos | | | | | | | | Peatones | | Totales | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Izquierda | | Recto | | Derecha | | Viraje en U | | Desde | Desde | Periodo | Hora |
| Comienzo | Final | Liviano | Pesado | Liviano | Pesado | Liviano | Pesado | Liviano | Pesado | lado Izq. | lado Der. | 15 Min. | Pico |
| 6:00 AM | 6:15 AM | 0 | 0 | 56 | 2 | 5 | 0 | | | | | 63 | 63 |
| 6:15 AM | 6:30 AM | 0 | 0 | 107 | 3 | 6 | 0 | | | | | 116 | 179 |
| 6:30 AM | 6:45 AM | 0 | 0 | 126 | 4 | 11 | 0 | | | | | 141 | 320 |
| 6:45 AM | 7:00 AM | 0 | 0 | 127 | 0 | 16 | 0 | | | | | 143 | 463 |
| **Sub-Total** | | 0 | 0 | 416 | 9 | 38 | 0 | 0 | 0 | 0 | 0 | | |
| 7:00 AM | 7:15 AM | 9 | 0 | 127 | 0 | 33 | 0 | | | | | 169 | 569 |
| 7:15 AM | 7:30 AM | 50 | 0 | 123 | 0 | 32 | 0 | | | | | 205 | 658 |
| 7:30 AM | 7:45 AM | 49 | 0 | 122 | 2 | 25 | 3 | | | | | 201 | 718 |
| 7:45 AM | 8:00 AM | 49 | 0 | 134 | 2 | 41 | 0 | | | | | 226 | 801 |
| **Sub-Total** | | 157 | 0 | 506 | 4 | 131 | 3 | 0 | 0 | 0 | 0 | | |
| 8:00 AM | 8:15 AM | 31 | 0 | 134 | 2 | 34 | 0 | | | | | 201 | 833 |
| 8:15 AM | 8:30 AM | 21 | 0 | 112 | 2 | 29 | 2 | | | | | 166 | 794 |
| 8:30 AM | 8:45 AM | 42 | 0 | 116 | 0 | 17 | 0 | | | | | 175 | 768 |
| 8:45 AM | 9:00 AM | 71 | 0 | 118 | 0 | 14 | 2 | | | | | 205 | 747 |
| **Sub-Total** | | 165 | 0 | 480 | 4 | 94 | 4 | 0 | 0 | 0 | 0 | | |
| 9:00 AM | 9:15 AM | 62 | 0 | 140 | 2 | 14 | 0 | | | | | 218 | 764 |
| 9:15 AM | 9:30 AM | 14 | 0 | 116 | 2 | 9 | 2 | | | | | 143 | 741 |
| 9:30 AM | 9:45 AM | 13 | 0 | 93 | 0 | 7 | 0 | | | | | 113 | 679 |
| 9:45 AM | 10:00 AM | 21 | 0 | 96 | 4 | 11 | 0 | | | | | 132 | 606 |
| **Sub-Total** | | 110 | 0 | 445 | 8 | 41 | 2 | 0 | 0 | 0 | 0 | | |
| 10:00 AM | 10:15 AM | 0 | 0 | 0 | 0 | 0 | 0 | | | | | 0 | 388 |
| 10:15 AM | 10:30 AM | 0 | 0 | 0 | 0 | 0 | 0 | | | | | 0 | 245 |
| 10:30 AM | 10:45 AM | 0 | 0 | 0 | 0 | 0 | 0 | | | | | 0 | 132 |
| 10:45 AM | 11:00 AM | 0 | 0 | 0 | 0 | 0 | 0 | | | | | 0 | 0 |
| **Sub-Total** | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | |
| 11:00 AM | 11:15 AM | 10 | 0 | 85 | 0 | 13 | 0 | | | | | 108 | 108 |
| 11:15 AM | 11:30 AM | 5 | 0 | 85 | 0 | 13 | 2 | | | | | 105 | 213 |
| 11:30 AM | 11:45 AM | 13 | 0 | 114 | 0 | 19 | 0 | | | | | 146 | 359 |
| 11:45 AM | 12:00 PM | 33 | 0 | 125 | 0 | 17 | 0 | | | | | 175 | 534 |
| **Sub-Total** | | 61 | 0 | 409 | 0 | 62 | 2 | 0 | 0 | 0 | 0 | | |
| 12:00 PM | 12:15 PM | 16 | 0 | 119 | 2 | 16 | 0 | | | | | 153 | 579 |
| 12:15 PM | 12:30 PM | 12 | 0 | 96 | 3 | 13 | 2 | | | | | 126 | 600 |
| 12:30 PM | 12:45 PM | 12 | 0 | 125 | 3 | 18 | 0 | | | | | 158 | 612 |
| 12:45 PM | 1:00 PM | 14 | 0 | 100 | 0 | 24 | 0 | | | | | 138 | 575 |
| **Sub-Total** | | 54 | 0 | 440 | 8 | 71 | 2 | 0 | 0 | 0 | 0 | | |
| 1:00 PM | 1:15 PM | 29 | 0 | 107 | 0 | 23 | 0 | | | | | 159 | 581 |
| 1:15 PM | 1:30 PM | 45 | 0 | 115 | 0 | 25 | 0 | | | | | 185 | 640 |
| 1:30 PM | 1:45 PM | 16 | 0 | 99 | 2 | 17 | 0 | | | | | 134 | 616 |
| 1:45 PM | 2:00 PM | 13 | 0 | 100 | 4 | 19 | 0 | | | | | 136 | 614 |
| **Sub-Total** | | 103 | 0 | 421 | 6 | 84 | 0 | 0 | 0 | 0 | 0 | | |
| 2:00 PM | 2:15 PM | 0 | 0 | 0 | 0 | 0 | 0 | | | | | 0 | 455 |
| 2:15 PM | 2:30 PM | 0 | 0 | 0 | 0 | 0 | 0 | | | | | 0 | 270 |
| 2:30 PM | 2:45 PM | 0 | 0 | 0 | 0 | 0 | 0 | | | | | 0 | 136 |
| 2:45 PM | 3:00 PM | 0 | 0 | 0 | 0 | 0 | 0 | | | | | 0 | 0 |
| **Sub-Total** | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | |
| 3:00 PM | 3:15 PM | 19 | 0 | 65 | 0 | 13 | 0 | | | | | 97 | 97 |
| 3:15 PM | 3:30 PM | 19 | 0 | 72 | 0 | 11 | 0 | | | | | 102 | 199 |
| 3:30 PM | 3:45 PM | 14 | 0 | 42 | 0 | 26 | 0 | | | | | 82 | 281 |
| 3:45 PM | 4:00 PM | 16 | 0 | 54 | 0 | 14 | 0 | | | | | 84 | 365 |
| **Sub-Total** | | 68 | 0 | 233 | 0 | 64 | 0 | 0 | 0 | 0 | 0 | | |
| 4:00 PM | 4:15 PM | 28 | 0 | 84 | 0 | 17 | 0 | | | | | 129 | 397 |
| 4:15 PM | 4:30 PM | 25 | 0 | 67 | 0 | 17 | 0 | | | | | 109 | 404 |
| 4:30 PM | 4:45 PM | 26 | 0 | 57 | 0 | 21 | 0 | | | | | 104 | 426 |
| 4:45 PM | 5:00 PM | 21 | 0 | 67 | 0 | 11 | 0 | | | | | 99 | 441 |
| **Sub-Total** | | 100 | 0 | 275 | 0 | 66 | 0 | 0 | 0 | 0 | 0 | | |
| 5:00 PM | 5:15 PM | 17 | 0 | 70 | 0 | 10 | 0 | | | | | 97 | 409 |
| 5:15 PM | 5:30 PM | 23 | 0 | 61 | 0 | 13 | 0 | | | | | 97 | 397 |
| 5:30 PM | 5:45 PM | 12 | 0 | 56 | 0 | 11 | 0 | | | | | 79 | 372 |
| 5:45 PM | 6:00 PM | 11 | 0 | 43 | 0 | 12 | 0 | | | | | 66 | 339 |
| **Sub-Total** | | 63 | 0 | 230 | 0 | 46 | 0 | 0 | 0 | 0 | 0 | | |
| **Sub-Total** | | 881 | 0 | 3,855 | 39 | 697 | 13 | 0 | 0 | 0 | 0 | 5,485 | |

**Tecnico**

**Obesrvaciones**


Acceso A
Universidad Interamericana
1069
1530
624
161
284
881
376
273
PR-102
624
273
5003
3627
3627
4046
752
146
Acceso D
Acceso B
881
284
5485
3894
3894
4449
710
271
PR-102
710
161
146
752
376
271
1017
1399
Acceso C
PR-166

## Intersection: PR-166 with PR-101

### MORNING PEAK HOUR FACTOR

| Time Period | | North Access (Southbound) | | | | | | East Access (Westbound) | | | | | | South Access (Northbound) | | | | | | West Access (Eastbound) | | | | | | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Left | | Thru | | Right | | Left | | Thru | | Right | | Left | | Thru | | Right | | Left | | Thru | | Right | | |
| | | Light | Heavy | Light | Heavy | Light | Heavy | Light | Heavy | Light | Heavy | Light | Heavy | Light | Heavy | Light | Heavy | Light | Heavy | Light | Heavy | Light | Heavy | Light | Heavy | |
| 7:15 AM | 7:30 AM | 5 | 0 | 0 | 0 | 18 | 0 | 7 | 0 | 53 | 2 | 3 | 0 | 24 | 0 | 21 | 0 | 6 | 0 | 50 | 0 | 123 | 0 | 32 | 0 | 344 |
| 7:30 AM | 7:45 AM | 2 | 0 | 10 | 0 | 32 | 0 | 5 | 0 | 74 | 2 | 9 | 0 | 38 | 2 | 17 | 0 | 14 | 0 | 49 | 0 | 122 | 2 | 25 | 3 | 406 |
| 7:45 AM | 8:00 AM | 3 | 0 | 13 | 0 | 41 | 0 | 4 | 0 | 86 | 0 | 10 | 0 | 45 | 0 | 27 | 0 | 13 | 0 | 49 | 0 | 134 | 2 | 41 | 0 | 468 |
| 8:00 AM | 8:15 AM | 3 | 0 | 7 | 0 | 17 | 0 | 3 | 0 | 71 | 0 | 5 | 0 | 40 | 0 | 6 | 0 | 12 | 0 | 31 | 0 | 134 | 2 | 34 | 0 | 365 |
| | Total | 13 | 0 | 30 | 0 | 108 | 0 | 19 | 0 | 284 | 4 | 27 | 0 | 147 | 2 | 71 | 0 | 45 | 0 | 179 | 0 | 513 | 6 | 132 | 3 | 1583 |

| | North Access | | | East Access | | | South Access | | | West Access | | | Intersection | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right | | |
| Total Flow Period, T (minutes) | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | |
| Peak Flow Period, $T_p$ (minutes) | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | |
| Volume Count during the Total Flow Period, $v_a$ (veh) | 13 | 30 | 108 | 19 | 288 | 27 | 149 | 71 | 45 | 179 | 519 | 135 | 1583 | |
| Volume Count during the Peak Flow Period, $v_p$ (veh) | 5 | 13 | 41 | 7 | 86 | 10 | 45 | 27 | 14 | 50 | 136 | 41 | 468 | |
| Average Flow Rate during the Total Flow Period, $q_a$ (veh/hr) | 13 | 30 | 108 | 19 | 288 | 27 | 149 | 71 | 45 | 179 | 519 | 135 | 1583 | |
| Average Flow Rate during the Peak Flow Period, $q_p$ (veh/hr) | 20 | 52 | 164 | 28 | 344 | 40 | 180 | 108 | 56 | 200 | 544 | 164 | 1872 | |
| Peak Time Factor, PTF | 25% | 25% | 25% | 25% | 25% | 25% | 25% | 25% | 25% | 25% | 25% | 25% | 25% | |
| Peak Flow Factor, PFF | 65% | 58% | 66% | 68% | 84% | 68% | 83% | 66% | 80% | 90% | 95% | 82% | 85% | |
| Unit Time for Volumes, $T_v$ (minutes) | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | |
| Minimum Total Flow Period, $T_m$ (minutes) | 23.07692 | 26 | 22.77778 | 22.10526 | 17.91667 | 22.22222 | 18.12081 | 22.8169 | 18.66667 | 16.75978 | 15.72254 | 18.22222 | 17.73847 | ≤ Tv, OK |
| Duration of Non-Peak Flow Period, $T_n$ (minutes) | 45 | 45 | 45 | 45 | 45 | 45 | 45 | 45 | 45 | 45 | 45 | 45 | 45 | |
| Average Flow Rate during the Non-Peak Flow Period, $q_n$ (veh/hr) | 11 | 23 | 89 | 16 | 269 | 23 | 139 | 59 | 41 | 172 | 511 | 125 | 1487 | |
| Volume Count during the Non-Peak Flow Period, $v_n$ (veh) | 8 | 17 | 67 | 12 | 202 | 17 | 104 | 44 | 31 | 129 | 383 | 94 | 1115 | |

### AFTERNOON PEAK HOUR FACTOR

| Time Period | | North Access (Southbound) | | | | | | East Access (Westbound) | | | | | | South Access (Northbound) | | | | | | West Access (Eastbound) | | | | | | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Left | | Thru | | Right | | Left | | Thru | | Right | | Left | | Thru | | Right | | Left | | Thru | | Right | | |
| | | Light | Heavy | Light | Heavy | Light | Heavy | Light | Heavy | Light | Heavy | Light | Heavy | Light | Heavy | Light | Heavy | Light | Heavy | Light | Heavy | Light | Heavy | Light | Heavy | |
| 4:00 PM | 4:15 PM | 0 | 0 | 3 | 0 | 17 | 0 | 6 | 0 | 101 | 0 | 5 | 0 | 13 | 0 | 10 | 0 | 10 | 0 | 28 | 0 | 84 | 0 | 17 | 0 | 294 |
| 4:15 PM | 4:30 PM | 13 | 0 | 7 | 0 | 7 | 0 | 10 | 0 | 114 | 0 | 4 | 0 | 11 | 0 | 13 | 0 | 2 | 0 | 25 | 0 | 67 | 0 | 17 | 0 | 290 |
| 4:30 PM | 4:45 PM | 3 | 0 | 10 | 0 | 5 | 0 | 4 | 0 | 128 | 4 | 10 | 0 | 17 | 0 | 11 | 0 | 2 | 0 | 26 | 0 | 57 | 0 | 21 | 0 | 298 |
| 4:45 PM | 5:00 PM | 5 | 0 | 9 | 0 | 3 | 0 | 5 | 0 | 116 | 0 | 12 | 0 | 14 | 0 | 14 | 0 | 4 | 0 | 21 | 0 | 67 | 0 | 11 | 0 | 281 |
| | Total | 21 | 0 | 29 | 0 | 32 | 0 | 25 | 0 | 459 | 4 | 31 | 0 | 55 | 0 | 48 | 0 | 18 | 0 | 100 | 0 | 275 | 0 | 66 | 0 | 1163 |

| | North Access | | | East Access | | | South Access | | | West Access | | | Intersection | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right | Left | Thru | Right | | |
| Total Flow Period, T (minutes) | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | |
| Peak Flow Period, $T_p$ (minutes) | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | |
| Volume Count during the Total Flow Period, $v_a$ (veh) | 21 | 29 | 32 | 25 | 463 | 31 | 55 | 48 | 18 | 100 | 275 | 66 | 1163 | |
| Volume Count during the Peak Flow Period, $v_p$ (veh) | 13 | 10 | 17 | 10 | 132 | 12 | 17 | 14 | 10 | 28 | 84 | 21 | 298 | |
| Average Flow Rate during the Total Flow Period, $q_a$ (veh/hr) | 21 | 29 | 32 | 25 | 463 | 31 | 55 | 48 | 18 | 100 | 275 | 66 | 1163 | |
| Average Flow Rate during the Peak Flow Period, $q_p$ (veh/hr) | 52 | 40 | 68 | 40 | 528 | 48 | 68 | 56 | 40 | 112 | 336 | 84 | 1192 | |
| Peak Time Factor, PTF | 25% | 25% | 25% | 25% | 25% | 25% | 25% | 25% | 25% | 25% | 25% | 25% | 25% | |
| Peak Flow Factor, PFF | 40% | 73% | 47% | 63% | 88% | 65% | 81% | 86% | 45% | 89% | 82% | 79% | 98% | |
| Unit Time for Volumes, $T_v$ (minutes) | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | |
| Minimum Total Flow Period, $T_m$ (minutes) | 37.14286 | 20.68966 | 31.875 | 24 | 17.10583 | 23.22581 | 18.54545 | 17.5 | 33.33333 | 16.8 | 18.32727 | 19.09091 | 15.37403 | ≤ Tv, OK |
| Duration of Non-Peak Flow Period, $T_n$ (minutes) | 45 | 45 | 45 | 45 | 45 | 45 | 45 | 45 | 45 | 45 | 45 | 45 | 45 | |
| Average Flow Rate during the Non-Peak Flow Period, $q_n$ (veh/hr) | 11 | 25 | 20 | 20 | 441 | 25 | 51 | 45 | 11 | 96 | 255 | 60 | 1153 | |
| Volume Count during the Non-Peak Flow Period, $v_n$ (veh) | 8 | 19 | 15 | 15 | 331 | 19 | 38 | 34 | 8 | 72 | 191 | 45 | 865 | |

# Appendix B:

## Capacity Analysis Data and Results– Existing Condition (2022)

# INTERSECTION SUMMARY

## Site: 101 [101-PR-116 @ PR-315 (AM)]

New Site
Signals - Fixed Time Isolated Cycle Time = 85 seconds (Optimum Cycle Time - Minimum Delay)

| Intersection Performance - Hourly Values | | | | |
|---|---|---|---|---|
| **Performance Measure** | **Vehicles** | | **Persons** | |
| Travel Speed (Average) | 20.1 | km/h | 20.1 | km/h |
| Travel Distance (Total) | 2331.8 | veh-km/h | 2798.1 | pers-km/h |
| Travel Time (Total) | 116.0 | veh-h/h | 139.2 | pers-h/h |
| Demand Flows (Total) | 2293 | veh/h | 2752 | pers/h |
| Percent Heavy Vehicles (Demand) | 2.0 | % | | |
| Degree of Saturation | 1.109 | | | |
| Practical Spare Capacity | -18.8 | % | | |
| Effective Intersection Capacity | 2068 | veh/h | | |
| Control Delay (Total) | 54.53 | veh-h/h | 65.43 | pers-h/h |
| Control Delay (Average) | 85.6 | sec | 85.6 | sec |
| Control Delay (Worst Lane) | 104.2 | sec | | |
| Control Delay (Worst Movement) | 104.2 | sec | 104.2 | sec |
| Geometric Delay (Average) | 0.0 | sec | | |
| Stop-Line Delay (Average) | 85.6 | sec | | |
| Idling Time (Average) | 82.4 | sec | | |
| Intersection Level of Service (LOS) | LOS F | | | |
| 95% Back of Queue - Vehicles (Worst Lane) | 34.4 | veh | | |
| 95% Back of Queue - Distance (Worst Lane) | 263.8 | m | | |
| Queue Storage Ratio (Worst Lane) | 0.32 | | | |
| Total Effective Stops | 2840 | veh/h | 3408 | pers/h |
| Effective Stop Rate | 1.24 | per veh | 1.24 | per pers |
| Proportion Queued | 0.94 | | 0.94 | |
| Performance Index | 398.2 | | 398.2 | |
| Cost (Total) | 1433.36 | $/h | 1433.36 | $/h |
| Fuel Consumption (Total) | 263.0 | L/h | | |
| Carbon Dioxide (Total) | 621.2 | kg/h | | |
| Hydrocarbons (Total) | 0.055 | kg/h | | |
| Carbon Monoxide (Total) | 0.363 | kg/h | | |
| NOx (Total) | 0.525 | kg/h | | |

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Intersection LOS value for Vehicles is based on average delay for all vehicle movements.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.

| Intersection Performance - Annual Values | | | | |
|---|---|---|---|---|
| **Performance Measure** | **Vehicles** | | **Persons** | |
| Demand Flows (Total) | 1,100,847 | veh/y | 1,321,016 | pers/y |
| Delay | 26,172 | veh-h/y | 31,407 | pers-h/y |
| Effective Stops | 1,363,338 | veh/y | 1,636,005 | pers/y |
| Travel Distance | 1,119,249 | veh-km/y | 1,343,098 | pers-km/y |
| Travel Time | 55,683 | veh-h/y | 66,820 | pers-h/y |
| Cost | 688,012 | $/y | 688,012 | $/y |
| Fuel Consumption | 126,223 | L/y | | |
| Carbon Dioxide | 298,156 | kg/y | | |
| Hydrocarbons | 27 | kg/y | | |
| Carbon Monoxide | 174 | kg/y | | |
| NOx | 252 | kg/y | | |

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# MOVEMENT SUMMARY

## Site: 101 [101-PR-116 @ PR-315 (AM)]

New Site
Signals - Fixed Time Isolated Cycle Time = 85 seconds (Optimum Cycle Time - Minimum Delay)

| Movement Performance - Vehicles | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Mov ID | OD Mov | Demand Flows Total veh/h | HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
| South: PR-116 | | | | | | | | | | | |
| 3 | L2 | 211 | 2.7 | 1.009 | 87.4 | LOS F | 19.9 | 153.7 | 1.00 | 1.25 | 20.1 |
| 8 | T1 | 358 | 1.4 | 1.009 | 95.2 | LOS F | 19.9 | 153.7 | 1.00 | 1.27 | 18.9 |
| 18 | R2 | 80 | 5.9 | 1.009 | 98.6 | LOS F | 18.0 | 139.7 | 1.00 | 1.27 | 18.5 |
| Approach | | 649 | 2.4 | 1.009 | 93.1 | LOS F | 19.9 | 153.7 | 1.00 | 1.26 | 19.2 |
| East: PR-315 | | | | | | | | | | | |
| 1 | L2 | 151 | 2.3 | 1.109 | 104.2 | LOS F | 34.4 | 263.8 | 1.00 | 1.53 | 18.3 |
| 6 | T1 | 331 | 0.4 | 1.109 | 104.2 | LOS F | 34.4 | 263.8 | 1.00 | 1.53 | 18.3 |
| 16 | R2 | 195 | 0.6 | 0.168 | 3.2 | LOS A | 2.3 | 17.7 | 0.33 | 0.27 | 37.9 |
| Approach | | 677 | 0.9 | 1.109 | 75.1 | LOS E | 34.4 | 263.8 | 0.81 | 1.17 | 21.5 |
| North: PR-116 | | | | | | | | | | | |
| 7 | L2 | 100 | 7.1 | 0.945 | 78.0 | LOS E | 13.5 | 107.1 | 1.00 | 1.19 | 21.4 |
| 4 | T1 | 282 | 3.3 | 0.945 | 82.1 | LOS F | 16.2 | 124.6 | 1.00 | 1.26 | 20.9 |
| 14 | R2 | 179 | 0.0 | 0.945 | 85.9 | LOS F | 16.2 | 124.6 | 1.00 | 1.33 | 20.6 |
| Approach | | 562 | 2.9 | 0.945 | 82.6 | LOS F | 16.2 | 124.6 | 1.00 | 1.27 | 20.9 |
| West: PR-315 | | | | | | | | | | | |
| 5 | L2 | 108 | 1.5 | 1.034 | 95.3 | LOS F | 22.4 | 172.9 | 1.00 | 1.27 | 18.4 |
| 2 | T1 | 165 | 0.0 | 1.034 | 95.3 | LOS F | 22.4 | 172.9 | 1.00 | 1.27 | 18.4 |
| 12 | R2 | 133 | 5.3 | 1.034 | 95.3 | LOS F | 22.4 | 172.9 | 1.00 | 1.27 | 18.5 |
| Approach | | 406 | 2.1 | 1.034 | 95.3 | LOS F | 22.4 | 172.9 | 1.00 | 1.27 | 18.5 |
| All Vehicles | | 2293 | 2.0 | 1.109 | 85.6 | LOS F | 34.4 | 263.8 | 0.94 | 1.24 | 20.1 |

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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# LANE SUMMARY

## Site: 101 [101-PR-116 @ PR-315 (AM)]

New Site
Signals - Fixed Time Isolated Cycle Time = 85 seconds (Optimum Cycle Time - Minimum Delay)

**Lane Use and Performance**

| | Demand Flows Total veh/h | HV % | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Average Delay sec | Level of Service | 95% Back of Queue Veh | Dist m | Lane Config | Lane Length m | Cap. Adj. % | Prob. Block. % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| South: PR-116 | | | | | | | | | | | | | |
| Lane 1 | 320 | 2.2 | 317 | 1.009 | 100 | 87.4 | LOS F | 19.9 | 153.7 | Full | 500 | 0.0 | 0.0 |
| Lane 2 | 329 | 2.5 | 327 | 1.009 | 100 | 98.6 | LOS F | 18.0 | 139.7 | Full | 500 | 0.0 | 0.0 |
| Approach | 649 | 2.4 | | 1.009 | | 93.1 | LOS F | 19.9 | 153.7 | | | | |
| East: PR-315 | | | | | | | | | | | | | |
| Lane 1 | 482 | 1.0 | 434[1] | 1.109 | 100 | 104.2 | LOS F | 34.4 | 263.8 | Full | 500 | 0.0 | 0.0 |
| Lane 2 | 195 | 0.6 | 1162 | 0.168 | 100 | 3.2 | LOS A | 2.3 | 17.7 | Short | 60 | 0.0 | NA |
| Approach | 677 | 0.9 | | 1.109 | | 75.1 | LOS E | 34.4 | 263.8 | | | | |
| North: PR-116 | | | | | | | | | | | | | |
| Lane 1 | 236 | 4.9 | 250 | 0.945 | 100 | 78.0 | LOS E | 13.5 | 107.1 | Full | 500 | 0.0 | 0.0 |
| Lane 2 | 325 | 1.5 | 344 | 0.945 | 100 | 85.9 | LOS F | 16.2 | 124.6 | Full | 500 | 0.0 | 0.0 |
| Approach | 562 | 2.9 | | 0.945 | | 82.6 | LOS F | 16.2 | 124.6 | | | | |
| West: PR-315 | | | | | | | | | | | | | |
| Lane 1 | 406 | 2.1 | 392 | 1.034 | 100 | 95.3 | LOS F | 22.4 | 172.9 | Full | 500 | 0.0 | 0.0 |
| Approach | 406 | 2.1 | | 1.034 | | 95.3 | LOS F | 22.4 | 172.9 | | | | |
| Intersection | 2293 | 2.0 | | 1.109 | | 85.6 | LOS F | 34.4 | 263.8 | | | | |

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.
LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 6).
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

1 Reduced capacity due to a short lane effect. Short lane queues may extend into the full-length lanes. Some upstream delays at entry to short lanes are not included.

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# LANE FLOWS

## Site: 101 [101-PR-116 @ PR-315 (AM)]

New Site
Signals - Fixed Time Isolated Cycle Time = 85 seconds (Optimum Cycle Time - Minimum Delay)

**Approach Lane Flows (veh/h)**

South: PR-116

| Mov. From S To Exit: | L2 W | T1 N | R2 E | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 211 | 109 | - | 320 | 2.2 | 317 | 1.009 | 100 | NA | NA |
| Lane 2 | - | 249 | 80 | 329 | 2.5 | 327 | 1.009 | 100 | NA | NA |
| Approach | 211 | 358 | 80 | 649 | 2.4 | | 1.009 | | | |

East: PR-315

| Mov. From E To Exit: | L2 S | T1 W | R2 N | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 151 | 331 | - | 482 | 1.0 | 434[1] | 1.109 | 100 | NA | NA |
| Lane 2 | - | - | 195 | 195 | 0.6 | 1162 | 0.168 | 100 | 0.0 | 1 |
| Approach | 151 | 331 | 195 | 677 | 0.9 | | 1.109 | | | |

North: PR-116

| Mov. From N To Exit: | L2 E | T1 S | R2 W | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 100 | 136 | - | 236 | 4.9 | 250 | 0.945 | 100 | NA | NA |
| Lane 2 | - | 146 | 179 | 325 | 1.5 | 344 | 0.945 | 100 | NA | NA |
| Approach | 100 | 282 | 179 | 562 | 2.9 | | 0.945 | | | |

West: PR-315

| Mov. From W To Exit: | L2 N | T1 E | R2 S | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 108 | 165 | 133 | 406 | 2.1 | 392 | 1.034 | 100 | NA | NA |
| Approach | 108 | 165 | 133 | 406 | 2.1 | | 1.034 | | | |

| | Total | %HV | Deg.Satn (v/c) |
|---|---|---|---|
| Intersection | 2293 | 2.0 | 1.109 |

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

1 Reduced capacity due to a short lane effect. Short lane queues may extend into the full-length lanes. Some upstream delays at entry to short lanes are not included.

# INTERSECTION SUMMARY

## Site: 102 [102-PR-122 @ PR-116 (AM)]

New Site
Signals - Fixed Time Isolated Cycle Time = 35 seconds (Optimum Cycle Time - Minimum Delay)

| Intersection Performance - Hourly Values | | | | |
|---|---|---|---|---|
| **Performance Measure** | **Vehicles** | | **Persons** | |
| Travel Speed (Average) | 45.0 | km/h | 45.0 | km/h |
| Travel Distance (Total) | 1283.1 | veh-km/h | 1539.7 | pers-km/h |
| Travel Time (Total) | 28.5 | veh-h/h | 34.2 | pers-h/h |
| Demand Flows (Total) | 1253 | veh/h | 1503 | pers/h |
| Percent Heavy Vehicles (Demand) | 2.0 | % | | |
| Degree of Saturation | 0.372 | | | |
| Practical Spare Capacity | 142.2 | % | | |
| Effective Intersection Capacity | 3371 | veh/h | | |
| Control Delay (Total) | 1.95 | veh-h/h | 2.34 | pers-h/h |
| Control Delay (Average) | 5.6 | sec | 5.6 | sec |
| Control Delay (Worst Lane) | 13.1 | sec | | |
| Control Delay (Worst Movement) | 13.1 | sec | 13.1 | sec |
| Geometric Delay (Average) | 0.0 | sec | | |
| Stop-Line Delay (Average) | 5.6 | sec | | |
| Idling Time (Average) | 3.6 | sec | | |
| Intersection Level of Service (LOS) | LOS A | | | |
| 95% Back of Queue - Vehicles (Worst Lane) | 2.9 | veh | | |
| 95% Back of Queue - Distance (Worst Lane) | 22.6 | m | | |
| Queue Storage Ratio (Worst Lane) | 0.01 | | | |
| Total Effective Stops | 438 | veh/h | 526 | pers/h |
| Effective Stop Rate | 0.35 | per veh | 0.35 | per pers |
| Proportion Queued | 0.44 | | 0.44 | |
| Performance Index | 35.2 | | 35.2 | |
| Cost (Total) | 312.96 | $/h | 312.96 | $/h |
| Fuel Consumption (Total) | 101.6 | L/h | | |
| Carbon Dioxide (Total) | 240.1 | kg/h | | |
| Hydrocarbons (Total) | 0.019 | kg/h | | |
| Carbon Monoxide (Total) | 0.226 | kg/h | | |
| NOx (Total) | 0.230 | kg/h | | |

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Intersection LOS value for Vehicles is based on average delay for all vehicle movements.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.

| Intersection Performance - Annual Values | | | | |
|---|---|---|---|---|
| **Performance Measure** | **Vehicles** | | **Persons** | |
| Demand Flows (Total) | 601,293 | veh/y | 721,551 | pers/y |
| Delay | 934 | veh-h/y | 1,121 | pers-h/y |
| Effective Stops | 210,439 | veh/y | 252,527 | pers/y |
| Travel Distance | 615,894 | veh-km/y | 739,072 | pers-km/y |
| Travel Time | 13,692 | veh-h/y | 16,431 | pers-h/y |
| Cost | 150,222 | $/y | 150,222 | $/y |
| Fuel Consumption | 48,752 | L/y | | |
| Carbon Dioxide | 115,250 | kg/y | | |
| Hydrocarbons | 9 | kg/y | | |
| Carbon Monoxide | 109 | kg/y | | |
| NOx | 110 | kg/y | | |

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# MOVEMENT SUMMARY

## Site: 102 [102-PR-122 @ PR-116 (AM)]

New Site
Signals - Fixed Time Isolated Cycle Time = 35 seconds (Optimum Cycle Time - Minimum Delay)

| Movement Performance - Vehicles | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Mov ID | OD Mov | Demand Flows Total veh/h | HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
| NorthEast: PR-122 | | | | | | | | | | | |
| 6 | T1 | 140 | 0.9 | 0.217 | 12.7 | LOS B | 1.1 | 8.3 | 0.90 | 0.68 | 53.1 |
| 16 | R2 | 48 | 3.3 | 0.031 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.00 | 57.9 |
| Approach | | 188 | 1.5 | 0.217 | 9.5 | LOS A | 1.1 | 8.3 | 0.67 | 0.51 | 54.2 |
| NorthWest: PR-116 | | | | | | | | | | | |
| 7 | L2 | 92 | 1.4 | 0.302 | 13.1 | LOS B | 1.5 | 11.2 | 0.91 | 0.70 | 39.8 |
| 14 | R2 | 353 | 3.6 | 0.227 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.00 | 39.7 |
| Approach | | 446 | 3.1 | 0.302 | 2.7 | LOS A | 1.5 | 11.2 | 0.19 | 0.15 | 39.7 |
| SouthWest: PR-116 | | | | | | | | | | | |
| 5 | L2 | 416 | 1.6 | 0.372 | 9.6 | LOS A | 2.9 | 22.6 | 0.82 | 0.67 | 41.5 |
| 2 | T1 | 203 | 0.5 | 0.054 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.00 | 65.0 |
| Approach | | 619 | 1.3 | 0.372 | 6.5 | LOS A | 2.9 | 22.6 | 0.55 | 0.45 | 47.1 |
| All Vehicles | | 1253 | 2.0 | 0.372 | 5.6 | LOS A | 2.9 | 22.6 | 0.44 | 0.35 | 45.0 |

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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# LANE SUMMARY

## Site: 102 [102-PR-122 @ PR-116 (AM)]

New Site
Signals - Fixed Time Isolated Cycle Time = 35 seconds (Optimum Cycle Time - Minimum Delay)

**Lane Use and Performance**

| | Demand Flows Total veh/h | HV % | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Average Delay sec | Level of Service | 95% Back of Queue Veh | Dist m | Lane Config | Lane Length m | Cap. Adj. % | Prob. Block. % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| NorthEast: PR-122 | | | | | | | | | | | | | |
| Lane 1 | 70 | 0.9 | 323 | 0.217 | 100 | 12.7 | LOS B | 1.1 | 8.3 | Short | 60 | 0.0 | NA |
| Lane 2 | 70 | 0.9 | 323 | 0.217 | 100 | 12.7 | LOS B | 1.1 | 8.3 | Full | 500 | 0.0 | 0.0 |
| Lane 3 | 48 | 3.3 | 1558 | 0.031 | 100 | 0.0 | LOS A | 0.0 | 0.0 | Full | 500 | 0.0 | 0.0 |
| Approach | 188 | 1.5 | | 0.217 | | 9.5 | LOS A | 1.1 | 8.3 | | | | |
| NorthWest: PR-116 | | | | | | | | | | | | | |
| Lane 1 | 92 | 1.4 | 306 | 0.302 | 100 | 13.1 | LOS B | 1.5 | 11.2 | Full | 500 | 0.0 | 0.0 |
| Lane 2 | 353 | 3.6 | 1554 | 0.227 | 100 | 0.0 | LOS A | 0.0 | 0.0 | Short | 60 | 0.0 | NA |
| Approach | 446 | 3.1 | | 0.302 | | 2.7 | LOS A | 1.5 | 11.2 | | | | |
| SouthWest: PR-116 | | | | | | | | | | | | | |
| Lane 1 | 208 | 1.6 | 560 | 0.372 | 100 | 9.6 | LOS A | 2.9 | 22.6 | Short | 60 | 0.0 | NA |
| Lane 2 | 208 | 1.6 | 560 | 0.372 | 100 | 9.6 | LOS A | 2.9 | 22.6 | Short | 60 | 0.0 | NA |
| Lane 3 | 102 | 0.5 | 1890 | 0.054 | 100 | 0.0 | LOS A | 0.0 | 0.0 | Full | 500 | 0.0 | 0.0 |
| Lane 4 | 102 | 0.5 | 1890 | 0.054 | 100 | 0.0 | LOS A | 0.0 | 0.0 | Full | 500 | 0.0 | 0.0 |
| Approach | 619 | 1.3 | | 0.372 | | 6.5 | LOS A | 2.9 | 22.6 | | | | |
| Intersection | 1253 | 2.0 | | 0.372 | | 5.6 | LOS A | 2.9 | 22.6 | | | | |

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.
LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 6).
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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# LANE FLOWS

## Site: 102 [102-PR-122 @ PR-116 (AM)]

New Site
Signals - Fixed Time Isolated Cycle Time = 35 seconds (Optimum Cycle Time - Minimum Delay)

**Approach Lane Flows (veh/h)**

NorthEast: PR-122

| Mov. From NE To Exit: | T1 SW | R2 NW | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 70 | - | 70 | 0.9 | 323 | 0.217 | 100 | 0.0 | 2 |
| Lane 2 | 70 | - | 70 | 0.9 | 323 | 0.217 | 100 | NA | NA |
| Lane 3 | - | 48 | 48 | 3.3 | 1558 | 0.031 | 100 | NA | NA |
| Approach | 140 | 48 | 188 | 1.5 | | 0.217 | | | |

NorthWest: PR-116

| Mov. From NW To Exit: | L2 NE | R2 SW | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 92 | - | 92 | 1.4 | 306 | 0.302 | 100 | NA | NA |
| Lane 2 | - | 353 | 353 | 3.6 | 1554 | 0.227 | 100 | 0.0 | 1 |
| Approach | 92 | 353 | 446 | 3.1 | | 0.302 | | | |

SouthWest: PR-116

| Mov. From SW To Exit: | L2 NW | T1 NE | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 208 | - | 208 | 1.6 | 560 | 0.372 | 100 | 0.0 | 2 |
| Lane 2 | 208 | - | 208 | 1.6 | 560 | 0.372 | 100 | 0.0 | 3 |
| Lane 3 | - | 102 | 102 | 0.5 | 1890 | 0.054 | 100 | NA | NA |
| Lane 4 | - | 102 | 102 | 0.5 | 1890 | 0.054 | 100 | NA | NA |
| Approach | 416 | 203 | 619 | 1.3 | | 0.372 | | | |

| | Total | %HV | Deg.Satn (v/c) |
|---|---|---|---|
| Intersection | 1253 | 2.0 | 0.372 |

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

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# INTERSECTION SUMMARY

## Site: 104 [104-PR-122 @ PR-321 (AM)]

Three-way intersection with 2-lane major road (Stop control)
Stop (Two-Way)

| Intersection Performance - Hourly Values | | | | |
|---|---|---|---|---|
| **Performance Measure** | **Vehicles** | | **Persons** | |
| Travel Speed (Average) | 51.8 | km/h | 51.8 | km/h |
| Travel Distance (Total) | 618.5 | veh-km/h | 742.2 | pers-km/h |
| Travel Time (Total) | 11.9 | veh-h/h | 14.3 | pers-h/h |
| | | | | |
| Demand Flows (Total) | 611 | veh/h | 734 | pers/h |
| Percent Heavy Vehicles (Demand) | 0.6 | % | | |
| Degree of Saturation | 0.350 | | | |
| Practical Spare Capacity | 128.5 | % | | |
| Effective Intersection Capacity | 1746 | veh/h | | |
| | | | | |
| Control Delay (Total) | 1.24 | veh-h/h | 1.49 | pers-h/h |
| Control Delay (Average) | 7.3 | sec | 7.3 | sec |
| Control Delay (Worst Lane) | 11.9 | sec | | |
| Control Delay (Worst Movement) | 12.0 | sec | 12.0 | sec |
| Geometric Delay (Average) | 0.0 | sec | | |
| Stop-Line Delay (Average) | 7.3 | sec | | |
| Idling Time (Average) | 6.7 | sec | | |
| Intersection Level of Service (LOS) | NA | | | |
| | | | | |
| 95% Back of Queue - Vehicles (Worst Lane) | 1.9 | veh | | |
| 95% Back of Queue - Distance (Worst Lane) | 14.8 | m | | |
| Queue Storage Ratio (Worst Lane) | 0.01 | | | |
| Total Effective Stops | 108 | veh/h | 130 | pers/h |
| Effective Stop Rate | 0.18 | per veh | 0.18 | per pers |
| Proportion Queued | 0.24 | | 0.24 | |
| Performance Index | 14.6 | | 14.6 | |
| | | | | |
| Cost (Total) | 152.62 | $/h | 152.62 | $/h |
| Fuel Consumption (Total) | 61.9 | L/h | | |
| Carbon Dioxide (Total) | 145.7 | kg/h | | |
| Hydrocarbons (Total) | 0.015 | kg/h | | |
| Carbon Monoxide (Total) | 0.193 | kg/h | | |
| NOx (Total) | 0.106 | kg/h | | |

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
NA: Intersection LOS for Vehicles is Not Applicable for two-way sign control since the average intersection delay is not a good LOS measure due to zero delays associated with major road movements.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.

| Intersection Performance - Annual Values | | | | |
|---|---|---|---|---|
| **Performance Measure** | **Vehicles** | | **Persons** | |
| Demand Flows (Total) | 293,405 | veh/y | 352,086 | pers/y |
| Delay | 596 | veh-h/y | 715 | pers-h/y |
| Effective Stops | 52,012 | veh/y | 62,415 | pers/y |
| Travel Distance | 296,861 | veh-km/y | 356,233 | pers-km/y |
| Travel Time | 5,727 | veh-h/y | 6,873 | pers-h/y |
| | | | | |
| Cost | 73,255 | $/y | 73,255 | $/y |
| Fuel Consumption | 29,713 | L/y | | |
| Carbon Dioxide | 69,947 | kg/y | | |
| Hydrocarbons | 7 | kg/y | | |
| Carbon Monoxide | 93 | kg/y | | |
| NOx | 51 | kg/y | | |

# MOVEMENT SUMMARY

## Site: 104 [104-PR-122 @ PR-321 (AM)]

Three-way intersection with 2-lane major road (Stop control)
Stop (Two-Way)

| Movement Performance - Vehicles | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mov ID | OD Mov | Demand Flows Total veh/h | HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
| South: PR-122 | | | | | | | | | | | |
| 3 | L2 | 263 | 0.0 | 0.350 | 12.0 | LOS B | 1.9 | 14.8 | 0.41 | 0.34 | 46.8 |
| 18 | R2 | 16 | 12.5 | 0.350 | 11.1 | LOS B | 1.9 | 14.8 | 0.41 | 0.34 | 46.9 |
| Approach | | 279 | 0.7 | 0.350 | 11.9 | LOS B | 1.9 | 14.8 | 0.41 | 0.34 | 46.8 |
| East: PR-321 | | | | | | | | | | | |
| 1 | L2 | 36 | 4.0 | 0.088 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.00 | 60.0 |
| 6 | T1 | 108 | 0.0 | 0.088 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.00 | 63.4 |
| Approach | | 144 | 1.0 | 0.088 | 0.0 | NA | 0.0 | 0.0 | 0.00 | 0.00 | 62.5 |
| West: PR-321 | | | | | | | | | | | |
| 2 | T1 | 44 | 0.0 | 0.208 | 7.7 | LOS A | 1.1 | 8.1 | 0.16 | 0.07 | 54.6 |
| 12 | R2 | 144 | 0.0 | 0.208 | 5.5 | LOS A | 1.1 | 8.1 | 0.16 | 0.07 | 52.9 |
| Approach | | 188 | 0.0 | 0.208 | 6.1 | NA | 1.1 | 8.1 | 0.16 | 0.07 | 53.3 |
| All Vehicles | | 611 | 0.6 | 0.350 | 7.3 | NA | 1.9 | 14.8 | 0.24 | 0.18 | 51.8 |

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Minor Road Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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# LANE SUMMARY

## Site: 104 [104-PR-122 @ PR-321 (AM)]

Three-way intersection with 2-lane major road (Stop control)
Stop (Two-Way)

| Lane Use and Performance | Demand Flows Total veh/h | HV % | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Average Delay sec | Level of Service | 95% Back of Queue Veh | Dist m | Lane Config | Lane Length m | Cap. Adj. % | Prob. Block. % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| South: PR-122 | | | | | | | | | | | | | |
| Lane 1 | 279 | 0.7 | 798 | 0.350 | 100 | 11.9 | LOS B | 1.9 | 14.8 | Full | 500 | 0.0 | 0.0 |
| Approach | 279 | 0.7 | | 0.350 | | 11.9 | LOS B | 1.9 | 14.8 | | | | |
| East: PR-321 | | | | | | | | | | | | | |
| Lane 1 | 144 | 1.0 | 1626 | 0.088 | 100 | 0.0 | LOS A | 0.0 | 0.0 | Full | 500 | 0.0 | 0.0 |
| Approach | 144 | 1.0 | | 0.088 | | 0.0 | NA | 0.0 | 0.0 | | | | |
| West: PR-321 | | | | | | | | | | | | | |
| Lane 1 | 188 | 0.0 | 906 | 0.208 | 100 | 6.1 | LOS A | 1.1 | 8.1 | Full | 500 | 0.0 | 0.0 |
| Approach | 188 | 0.0 | | 0.208 | | 6.1 | NA | 1.1 | 8.1 | | | | |
| Intersection | 611 | 0.6 | | 0.350 | | 7.3 | NA | 1.9 | 14.8 | | | | |

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.
LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection).
Minor Road Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 6).
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road lanes.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

# LANE FLOWS

## Site: 104 [104-PR-122 @ PR-321 (AM)]

Three-way intersection with 2-lane major road (Stop control)
Stop (Two-Way)

**Approach Lane Flows (veh/h)**

South: PR-122

| Mov. From S To Exit: | L2 W | R2 E | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 263 | 16 | 279 | 0.7 | 798 | 0.350 | 100 | NA | NA |
| Approach | 263 | 16 | 279 | 0.7 | | 0.350 | | | |

East: PR-321

| Mov. From E To Exit: | L2 S | T1 W | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 36 | 108 | 144 | 1.0 | 1626 | 0.088 | 100 | NA | NA |
| Approach | 36 | 108 | 144 | 1.0 | | 0.088 | | | |

West: PR-321

| Mov. From W To Exit: | T1 E | R2 S | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 44 | 144 | 188 | 0.0 | 906 | 0.208 | 100 | NA | NA |
| Approach | 44 | 144 | 188 | 0.0 | | 0.208 | | | |

| | Total | %HV | Deg.Satn (v/c) |
|---|---|---|---|
| Intersection | 611 | 0.6 | 0.350 |

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

# INTERSECTION SUMMARY

## Site: 109 [109-PR-101 @ PR-166 (AM) SINGLE]

Four-way intersection with 2-lane approaches (Signals)

Signals - Fixed Time Isolated Cycle Time = 71 seconds (User-Given Phase Times)

| Intersection Performance - Hourly Values | | | | |
|---|---|---|---|---|
| **Performance Measure** | **Vehicles** | | **Persons** | |
| Travel Speed (Average) | 17.0 | km/h | 17.0 | km/h |
| Travel Distance (Total) | 1595.1 | veh-km/h | 1914.1 | pers-km/h |
| Travel Time (Total) | 93.9 | veh-h/h | 112.6 | pers-h/h |
| Demand Flows (Total) | 1965 | veh/h | 2358 | pers/h |
| Percent Heavy Vehicles (Demand) | 0.3 | % | | |
| Degree of Saturation | 1.406 | | | |
| Practical Spare Capacity | -36.0 | % | | |
| Effective Intersection Capacity | 1397 | veh/h | | |
| Control Delay (Total) | 59.17 | veh-h/h | 71.00 | pers-h/h |
| Control Delay (Average) | 108.4 | sec | 108.4 | sec |
| Control Delay (Worst Lane) | 220.9 | sec | | |
| Control Delay (Worst Movement) | 220.9 | sec | 220.9 | sec |
| Geometric Delay (Average) | 0.0 | sec | | |
| Stop-Line Delay (Average) | 108.4 | sec | | |
| Idling Time (Average) | 103.4 | sec | | |
| Intersection Level of Service (LOS) | LOS F | | | |
| 95% Back of Queue - Vehicles (Worst Lane) | 52.4 | veh | | |
| 95% Back of Queue - Distance (Worst Lane) | 398.2 | m | | |
| Queue Storage Ratio (Worst Lane) | 1.79 | | | |
| Total Effective Stops | 2753 | veh/h | 3304 | pers/h |
| Effective Stop Rate | 1.40 | per veh | 1.40 | per pers |
| Proportion Queued | 0.87 | | 0.87 | |
| Performance Index | 252.2 | | 252.2 | |
| Cost (Total) | 1278.88 | $/h | 1278.88 | $/h |
| Fuel Consumption (Total) | 251.2 | L/h | | |
| Carbon Dioxide (Total) | 590.4 | kg/h | | |
| Hydrocarbons (Total) | 0.063 | kg/h | | |
| Carbon Monoxide (Total) | 0.582 | kg/h | | |
| NOx (Total) | 0.234 | kg/h | | |

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Intersection LOS value for Vehicles is based on average delay for all vehicle movements.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.

| Intersection Performance - Annual Values | | | | |
|---|---|---|---|---|
| **Performance Measure** | **Vehicles** | | **Persons** | |
| Demand Flows (Total) | 943,378 | veh/y | 1,132,054 | pers/y |
| Delay | 28,402 | veh-h/y | 34,082 | pers-h/y |
| Effective Stops | 1,321,549 | veh/y | 1,585,859 | pers/y |
| Travel Distance | 765,657 | veh-km/y | 918,788 | pers-km/y |
| Travel Time | 45,053 | veh-h/y | 54,064 | pers-h/y |
| Cost | 613,863 | $/y | 613,863 | $/y |
| Fuel Consumption | 120,555 | L/y | | |
| Carbon Dioxide | 283,402 | kg/y | | |
| Hydrocarbons | 30 | kg/y | | |
| Carbon Monoxide | 279 | kg/y | | |
| NOx | 112 | kg/y | | |

# MOVEMENT SUMMARY

## Site: 109 [109-PR-101 @ PR-166 (AM) SINGLE]

Four-way intersection with 2-lane approaches (Signals)

Signals - Fixed Time Isolated Cycle Time = 71 seconds (User-Given Phase Times)

**Movement Performance - Vehicles**

| Mov ID | OD Mov | Demand Flows Total veh/h | HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| South: PR-101 | | | | | | | | | | | |
| 3 | L2 | 144 | 0.0 | 1.378 | 203.7 | LOS F | 52.4 | 398.2 | 1.00 | 2.37 | 12.8 |
| 8 | T1 | 419 | 0.0 | 1.378 | 203.7 | LOS F | 52.4 | 398.2 | 1.00 | 2.37 | 8.3 |
| 18 | R2 | 111 | 0.0 | 0.104 | 0.8 | LOS A | 0.7 | 5.3 | 0.21 | 0.17 | 45.4 |
| Approach | | 674 | 0.0 | 1.378 | 170.2 | LOS F | 52.4 | 398.2 | 0.87 | 2.01 | 11.5 |
| East: PR-166 | | | | | | | | | | | |
| 1 | L2 | 84 | 0.0 | 0.239 | 23.5 | LOS C | 2.5 | 18.9 | 0.87 | 0.68 | 35.6 |
| 6 | T1 | 277 | 0.0 | 0.350 | 17.2 | LOS B | 5.1 | 38.9 | 0.82 | 0.68 | 49.1 |
| 16 | R2 | 84 | 2.9 | 0.350 | 12.1 | LOS B | 3.5 | 27.2 | 0.80 | 0.68 | 42.6 |
| Approach | | 446 | 0.5 | 0.350 | 17.4 | LOS B | 5.1 | 38.9 | 0.83 | 0.68 | 44.8 |
| North: PR-101 | | | | | | | | | | | |
| 7 | L2 | 96 | 0.0 | 1.406 | 220.9 | LOS F | 34.6 | 262.9 | 1.00 | 2.11 | 8.0 |
| 4 | T1 | 245 | 0.0 | 1.406 | 220.9 | LOS F | 34.6 | 262.9 | 1.00 | 2.11 | 7.6 |
| 14 | R2 | 36 | 0.0 | 1.406 | 220.9 | LOS F | 34.6 | 262.9 | 1.00 | 2.11 | 8.0 |
| Approach | | 376 | 0.0 | 1.406 | 220.9 | LOS F | 34.6 | 262.9 | 1.00 | 2.11 | 7.7 |
| West: PR-166 | | | | | | | | | | | |
| 5 | L2 | 112 | 0.0 | 0.318 | 24.1 | LOS C | 3.4 | 25.9 | 0.89 | 0.71 | 32.7 |
| 2 | T1 | 217 | 1.3 | 0.325 | 16.9 | LOS B | 4.6 | 35.6 | 0.80 | 0.65 | 49.3 |
| 12 | R2 | 140 | 0.0 | 0.325 | 7.5 | LOS A | 3.0 | 22.9 | 0.72 | 0.59 | 43.0 |
| Approach | | 470 | 0.6 | 0.325 | 15.8 | LOS B | 4.6 | 35.6 | 0.79 | 0.65 | 43.7 |
| All Vehicles | | 1965 | 0.3 | 1.406 | 108.4 | LOS F | 52.4 | 398.2 | 0.87 | 1.40 | 17.0 |

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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# LANE SUMMARY

## Site: 109 [109-PR-101 @ PR-166 (AM) SINGLE]

Four-way intersection with 2-lane approaches (Signals)

Signals - Fixed Time Isolated Cycle Time = 71 seconds (User-Given Phase Times)

**Lane Use and Performance**

| | Demand Flows Total veh/h | HV % | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Average Delay sec | Level of Service | 95% Back of Queue Veh | Dist m | Lane Config | Lane Length m | Cap. Adj. % | Prob. Block. % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| South: PR-101 | | | | | | | | | | | | | |
| Lane 1 | 562 | 0.0 | 408[1] | 1.378 | 100 | 203.7 | LOS F | 52.4 | 398.2 | Short | 7 | 0.0 | NA |
| Lane 2 | 111 | 0.0 | 1071 | 0.104 | 100 | 0.8 | LOS A | 0.7 | 5.3 | Full | 500 | 0.0 | 0.0 |
| Approach | 674 | 0.0 | | 1.378 | | 170.2 | LOS F | 52.4 | 398.2 | | | | |
| East: PR-166 | | | | | | | | | | | | | |
| Lane 1 | 84 | 0.0 | 352 | 0.239 | 100 | 23.5 | LOS C | 2.5 | 18.9 | Short | 50 | 0.0 | NA |
| Lane 2 | 181 | 0.0 | 518 | 0.350 | 100 | 19.9 | LOS B | 5.1 | 38.9 | Full | 500 | 0.0 | 0.0 |
| Lane 3 | 180 | 1.4 | 515 | 0.350 | 100 | 12.1 | LOS B | 3.5 | 27.2 | Full | 500 | 0.0 | 0.0 |
| Approach | 446 | 0.5 | | 0.350 | | 17.4 | LOS B | 5.1 | 38.9 | | | | |
| North: PR-101 | | | | | | | | | | | | | |
| Lane 1 | 376 | 0.0 | 268 | 1.406 | 100 | 220.9 | LOS F | 34.6 | 262.9 | Full | 90 | 0.0 | 100.0 |
| Approach | 376 | 0.0 | | 1.406 | | 220.9 | LOS F | 34.6 | 262.9 | | | | |
| West: PR-166 | | | | | | | | | | | | | |
| Lane 1 | 112 | 0.0 | 352 | 0.318 | 100 | 24.1 | LOS C | 3.4 | 25.9 | Short | 45 | 0.0 | NA |
| Lane 2 | 166 | 1.3 | 511 | 0.325 | 100 | 19.8 | LOS B | 4.6 | 35.6 | Full | 500 | 0.0 | 0.0 |
| Lane 3 | 191 | 0.4 | 589 | 0.325 | 100 | 7.5 | LOS A | 3.0 | 22.9 | Full | 500 | 0.0 | 0.0 |
| Approach | 470 | 0.6 | | 0.325 | | 15.8 | LOS B | 4.6 | 35.6 | | | | |
| Intersection | 1965 | 0.3 | | 1.406 | | 108.4 | LOS F | 52.4 | 398.2 | | | | |

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.
LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 6).
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

1 Reduced capacity due to a short lane effect. Short lane queues may extend into the full-length lanes. Some upstream delays at entry to short lanes are not included.

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# LANE FLOWS

## Site: 109 [109-PR-101 @ PR-166 (AM) SINGLE]

Four-way intersection with 2-lane approaches (Signals)

Signals - Fixed Time Isolated Cycle Time = 71 seconds (User-Given Phase Times)

**Approach Lane Flows (veh/h)**

South: PR-101

| Mov. From S To Exit: | L2 W | T1 N | R2 E | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 144 | 419 | - | 562 | 0.0 | 408[1] | 1.378 | 100 | 100.0 | 2 |
| Lane 2 | - | - | 111 | 111 | 0.0 | 1071 | 0.104 | 100 | NA | NA |
| Approach | 144 | 419 | 111 | 674 | 0.0 | | 1.378 | | | |

East: PR-166

| Mov. From E To Exit: | L2 S | T1 W | R2 N | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 84 | - | - | 84 | 0.0 | 352 | 0.239 | 100 | 0.0 | 2 |
| Lane 2 | - | 181 | - | 181 | 0.0 | 518 | 0.350 | 100 | NA | NA |
| Lane 3 | - | 96 | 84 | 180 | 1.4 | 515 | 0.350 | 100 | NA | NA |
| Approach | 84 | 277 | 84 | 446 | 0.5 | | 0.350 | | | |

North: PR-101

| Mov. From N To Exit: | L2 E | T1 S | R2 W | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 96 | 245 | 36 | 376 | 0.0 | 268 | 1.406 | 100 | NA | NA |
| Approach | 96 | 245 | 36 | 376 | 0.0 | | 1.406 | | | |

West: PR-166

| Mov. From W To Exit: | L2 N | T1 E | R2 S | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 112 | - | - | 112 | 0.0 | 352 | 0.318 | 100 | 0.0 | 2 |
| Lane 2 | - | 166 | - | 166 | 1.3 | 511 | 0.325 | 100 | NA | NA |
| Lane 3 | - | 51 | 140 | 191 | 0.4 | 589 | 0.325 | 100 | NA | NA |
| Approach | 112 | 217 | 140 | 470 | 0.6 | | 0.325 | | | |

| | Total | %HV | Deg.Satn (v/c) |
|---|---|---|---|
| Intersection | 1965 | 0.3 | 1.406 |

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

1 Reduced capacity due to a short lane effect. Short lane queues may extend into the full-length lanes. Some upstream delays at entry to short lanes are not included.

# INTERSECTION SUMMARY

## Site: 110 [110-PR-122 @ PR-102 (AM)]

New Site
Signals - Fixed Time Isolated Cycle Time = 81 seconds (User-Given Phase Times)

| Intersection Performance - Hourly Values | | | | |
|---|---|---|---|---|
| **Performance Measure** | **Vehicles** | | **Persons** | |
| Travel Speed (Average) | 16.2 | km/h | 16.2 | km/h |
| Travel Distance (Total) | 2152.6 | veh-km/h | 2583.1 | pers-km/h |
| Travel Time (Total) | 132.5 | veh-h/h | 159.0 | pers-h/h |
| Demand Flows (Total) | 2601 | veh/h | 3121 | pers/h |
| Percent Heavy Vehicles (Demand) | 2.2 | % | | |
| Degree of Saturation | 1.552 | | | |
| Practical Spare Capacity | -42.0 | % | | |
| Effective Intersection Capacity | 1676 | veh/h | | |
| Control Delay (Total) | 74.87 | veh-h/h | 89.85 | pers-h/h |
| Control Delay (Average) | 103.6 | sec | 103.6 | sec |
| Control Delay (Worst Lane) | 294.4 | sec | | |
| Control Delay (Worst Movement) | 294.4 | sec | 294.4 | sec |
| Geometric Delay (Average) | 0.0 | sec | | |
| Stop-Line Delay (Average) | 103.6 | sec | | |
| Idling Time (Average) | 99.6 | sec | | |
| Intersection Level of Service (LOS) | LOS F | | | |
| 95% Back of Queue - Vehicles (Worst Lane) | 44.5 | veh | | |
| 95% Back of Queue - Distance (Worst Lane) | 342.8 | m | | |
| Queue Storage Ratio (Worst Lane) | 0.42 | | | |
| Total Effective Stops | 3138 | veh/h | 3766 | pers/h |
| Effective Stop Rate | 1.21 | per veh | 1.21 | per pers |
| Proportion Queued | 0.78 | | 0.78 | |
| Performance Index | 415.1 | | 415.1 | |
| Cost (Total) | 1666.75 | $/h | 1666.75 | $/h |
| Fuel Consumption (Total) | 287.3 | L/h | | |
| Carbon Dioxide (Total) | 679.5 | kg/h | | |
| Hydrocarbons (Total) | 0.066 | kg/h | | |
| Carbon Monoxide (Total) | 0.441 | kg/h | | |
| NOx (Total) | 0.673 | kg/h | | |

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Intersection LOS value for Vehicles is based on average delay for all vehicle movements.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.

| Intersection Performance - Annual Values | | | | |
|---|---|---|---|---|
| **Performance Measure** | **Vehicles** | | **Persons** | |
| Demand Flows (Total) | 1,248,373 | veh/y | 1,498,048 | pers/y |
| Delay | 35,940 | veh-h/y | 43,128 | pers-h/y |
| Effective Stops | 1,506,238 | veh/y | 1,807,485 | pers/y |
| Travel Distance | 1,033,233 | veh-km/y | 1,239,880 | pers-km/y |
| Travel Time | 63,617 | veh-h/y | 76,341 | pers-h/y |
| Cost | 800,041 | $/y | 800,041 | $/y |
| Fuel Consumption | 137,895 | L/y | | |
| Carbon Dioxide | 326,160 | kg/y | | |
| Hydrocarbons | 32 | kg/y | | |
| Carbon Monoxide | 212 | kg/y | | |
| NOx | 323 | kg/y | | |

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# MOVEMENT SUMMARY

## Site: 110 [110-PR-122 @ PR-102 (AM)]

New Site
Signals - Fixed Time Isolated Cycle Time = 81 seconds (User-Given Phase Times)

**Movement Performance - Vehicles**

| Mov ID | OD Mov | Demand Flows Total veh/h | HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | 95% Back of Queue Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| South: PR-122 | | | | | | | | | | | |
| 3 | L2 | 127 | 0.0 | 0.610 | 38.2 | LOS D | 5.3 | 40.2 | 0.99 | 0.82 | 27.5 |
| 8 | T1 | 229 | 1.1 | 0.547 | 22.5 | LOS C | 9.7 | 74.6 | 0.88 | 0.79 | 29.4 |
| 18 | R2 | 64 | 0.0 | 0.547 | 22.5 | LOS C | 9.7 | 74.6 | 0.88 | 0.79 | 32.0 |
| Approach | | 420 | 0.6 | 0.610 | 27.3 | LOS C | 9.7 | 74.6 | 0.91 | 0.80 | 29.1 |
| East: PR-102 | | | | | | | | | | | |
| 1 | L2 | 24 | 10.0 | 1.396 | 220.1 | LOS F | 44.5 | 342.8 | 1.00 | 2.26 | 11.4 |
| 6 | T1 | 420 | 1.2 | 1.396 | 220.1 | LOS F | 44.5 | 342.8 | 1.00 | 2.26 | 11.4 |
| 16 | R2 | 244 | 1.0 | 0.208 | 1.4 | LOS A | 1.6 | 12.1 | 0.19 | 0.16 | 38.1 |
| Approach | | 687 | 1.4 | 1.396 | 142.6 | LOS F | 44.5 | 342.8 | 0.71 | 1.52 | 14.2 |
| North: PR-122 | | | | | | | | | | | |
| 7 | L2 | 308 | 3.5 | 1.552 | 294.4 | LOS F | 35.2 | 275.2 | 1.00 | 2.12 | 6.9 |
| 4 | T1 | 280 | 3.2 | 0.267 | 21.3 | LOS C | 4.3 | 33.3 | 0.79 | 0.65 | 30.0 |
| 14 | R2 | 466 | 2.1 | 0.459 | 7.7 | LOS A | 8.4 | 64.7 | 0.51 | 0.45 | 34.9 |
| Approach | | 1054 | 2.8 | 1.552 | 95.2 | LOS F | 35.2 | 275.2 | 0.73 | 0.99 | 15.7 |
| West: PR-102 | | | | | | | | | | | |
| 5 | L2 | 140 | 3.4 | 1.238 | 158.9 | LOS F | 31.7 | 247.8 | 1.00 | 1.88 | 11.3 |
| 2 | T1 | 235 | 3.2 | 1.238 | 158.9 | LOS F | 31.7 | 247.8 | 1.00 | 1.88 | 14.2 |
| 12 | R2 | 64 | 6.7 | 0.066 | 0.7 | LOS A | 0.4 | 3.2 | 0.18 | 0.14 | 38.4 |
| Approach | | 439 | 3.8 | 1.238 | 135.9 | LOS F | 31.7 | 247.8 | 0.88 | 1.63 | 14.8 |
| All Vehicles | | 2601 | 2.2 | 1.552 | 103.6 | LOS F | 44.5 | 342.8 | 0.78 | 1.21 | 16.2 |

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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# LANE SUMMARY

## Site: 110 [110-PR-122 @ PR-102 (AM)]

New Site
Signals - Fixed Time Isolated Cycle Time = 81 seconds (User-Given Phase Times)

**Lane Use and Performance**

| | Demand Flows Total veh/h | HV % | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Average Delay sec | Level of Service | 95% Back of Queue Veh | Dist m | Lane Config | Lane Length m | Cap. Adj. % | Prob. Block. % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| South: PR-122 | | | | | | | | | | | | | |
| Lane 1 | 127 | 0.0 | 208 | 0.610 | 100 | 38.2 | LOS D | 5.3 | 40.2 | Full | 500 | 0.0 | 0.0 |
| Lane 2 | 293 | 0.8 | 534 | 0.547 | 90[5] | 22.5 | LOS C | 9.7 | 74.6 | Full | 500 | 0.0 | 0.0 |
| Approach | 420 | 0.6 | | 0.610 | | 27.3 | LOS C | 9.7 | 74.6 | | | | |
| East: PR-102 | | | | | | | | | | | | | |
| Lane 1 | 444 | 1.7 | 318 | 1.396 | 100 | 220.1 | LOS F | 44.5 | 342.8 | Full | 500 | 0.0 | 0.0 |
| Lane 2 | 244 | 1.0 | 1169 | 0.208 | 100 | 1.4 | LOS A | 1.6 | 12.1 | Short | 65 | 0.0 | NA |
| Approach | 687 | 1.4 | | 1.396 | | 142.6 | LOS F | 44.5 | 342.8 | | | | |
| North: PR-122 | | | | | | | | | | | | | |
| Lane 1 | 308 | 3.5 | 199 | 1.552 | 100 | 294.4 | LOS F | 35.2 | 275.2 | Short | 80 | 0.0 | NA |
| Lane 2 | 140 | 3.2 | 524 | 0.267 | 100 | 21.3 | LOS C | 4.3 | 33.3 | Full | 200 | 0.0 | 34.1[8] |
| Lane 3 | 140 | 3.2 | 524 | 0.267 | 100 | 21.3 | LOS C | 4.3 | 33.3 | Full | 200 | 0.0 | 0.0 |
| Lane 4 | 466 | 2.1 | 1015 | 0.459 | 100 | 7.7 | LOS A | 8.4 | 64.7 | Short | 80 | 0.0 | NA |
| Approach | 1054 | 2.8 | | 1.552 | | 95.2 | LOS F | 35.2 | 275.2 | | | | |
| West: PR-102 | | | | | | | | | | | | | |
| Lane 1 | 375 | 3.3 | 303[1] | 1.238 | 100 | 158.9 | LOS F | 31.7 | 247.8 | Full | 500 | 0.0 | 0.0 |
| Lane 2 | 64 | 6.7 | 973 | 0.066 | 100 | 0.7 | LOS A | 0.4 | 3.2 | Short | 50 | 0.0 | NA |
| Approach | 439 | 3.8 | | 1.238 | | 135.9 | LOS F | 31.7 | 247.8 | | | | |
| Intersection | 2601 | 2.2 | | 1.552 | | 103.6 | LOS F | 44.5 | 342.8 | | | | |

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.
LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 6).
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

1 Reduced capacity due to a short lane effect. Short lane queues may extend into the full-length lanes. Some upstream delays at entry to short lanes are not included.
5 Lane under-utilisation found by the program
8 Probability of Blockage has been set on the basis of a queue that overflows from a short lane.

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# LANE FLOWS

## Site: 110 [110-PR-122 @ PR-102 (AM)]

New Site
Signals - Fixed Time Isolated Cycle Time = 81 seconds (User-Given Phase Times)

**Approach Lane Flows (veh/h)**

South: PR-122

| Mov. From S To Exit: | L2 W | T1 N | R2 E | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 127 | - | - | 127 | 0.0 | 208 | 0.610 | 100 | NA | NA |
| Lane 2 | - | 229 | 64 | 293 | 0.8 | 534 | 0.547 | 90[5] | NA | NA |
| Approach | 127 | 229 | 64 | 420 | 0.6 | | 0.610 | | | |

East: PR-102

| Mov. From E To Exit: | L2 S | T1 W | R2 N | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 24 | 420 | - | 444 | 1.7 | 318 | 1.396 | 100 | NA | NA |
| Lane 2 | - | - | 244 | 244 | 1.0 | 1169 | 0.208 | 100 | 0.0 | 1 |
| Approach | 24 | 420 | 244 | 687 | 1.4 | | 1.396 | | | |

North: PR-122

| Mov. From N To Exit: | L2 E | T1 S | R2 W | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 308 | - | - | 308 | 3.5 | 199 | 1.552 | 100 | 100.0 | 2 |
| Lane 2 | - | 140 | - | 140 | 3.2 | 524 | 0.267 | 100 | NA | NA |
| Lane 3 | - | 140 | - | 140 | 3.2 | 524 | 0.267 | 100 | NA | NA |
| Lane 4 | - | - | 466 | 466 | 2.1 | 1015 | 0.459 | 100 | 0.0 | 3 |
| Approach | 308 | 280 | 466 | 1054 | 2.8 | | 1.552 | | | |

West: PR-102

| Mov. From W To Exit: | L2 N | T1 E | R2 S | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 140 | 235 | - | 375 | 3.3 | 303[1] | 1.238 | 100 | NA | NA |
| Lane 2 | - | - | 64 | 64 | 6.7 | 973 | 0.066 | 100 | 0.0 | 1 |
| Approach | 140 | 235 | 64 | 439 | 3.8 | | 1.238 | | | |

| | Total | %HV | Deg.Satn (v/c) |
|---|---|---|---|
| Intersection | 2601 | 2.2 | 1.552 |

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

1 Reduced capacity due to a short lane effect. Short lane queues may extend into the full-length lanes. Some upstream delays at entry to short lanes are not included.
5 Lane under-utilisation found by the program

Project: C:\Users\BYA 44\Desktop\New Folder (2)\0_COVID\20-PR-122\TRAFICO\SIDRA\EXISTING\PR-122_EXISTING_AM.sip7

# INTERSECTION SUMMARY

## Site: 111 [111-PR-102 @ PR-166 (AM)]

Four-way intersection with 2-lane approaches (Signals)

Signals - Fixed Time Isolated Cycle Time = 112 seconds (User-Given Phase Times)

| Intersection Performance - Hourly Values | | | | |
|---|---|---|---|---|
| **Performance Measure** | **Vehicles** | | **Persons** | |
| Travel Speed (Average) | 24.8 | km/h | 24.8 | km/h |
| Travel Distance (Total) | 1928.6 | veh-km/h | 2314.3 | pers-km/h |
| Travel Time (Total) | 77.7 | veh-h/h | 93.3 | pers-h/h |
| | | | | |
| Demand Flows (Total) | 1899 | veh/h | 2279 | pers/h |
| Percent Heavy Vehicles (Demand) | 0.9 | % | | |
| Degree of Saturation | 1.120 | | | |
| Practical Spare Capacity | -19.6 | % | | |
| Effective Intersection Capacity | 1696 | veh/h | | |
| | | | | |
| Control Delay (Total) | 33.93 | veh-h/h | 40.72 | pers-h/h |
| Control Delay (Average) | 64.3 | sec | 64.3 | sec |
| Control Delay (Worst Lane) | 89.4 | sec | | |
| Control Delay (Worst Movement) | 89.4 | sec | 89.4 | sec |
| Geometric Delay (Average) | 0.0 | sec | | |
| Stop-Line Delay (Average) | 64.3 | sec | | |
| Idling Time (Average) | 63.2 | sec | | |
| Intersection Level of Service (LOS) | LOS E | | | |
| | | | | |
| 95% Back of Queue - Vehicles (Worst Lane) | 73.1 | veh | | |
| 95% Back of Queue - Distance (Worst Lane) | 561.0 | m | | |
| Queue Storage Ratio (Worst Lane) | 0.69 | | | |
| Total Effective Stops | 2066 | veh/h | 2479 | pers/h |
| Effective Stop Rate | 1.09 | per veh | 1.09 | per pers |
| Proportion Queued | 0.96 | | 0.96 | |
| Performance Index | 398.1 | | 398.1 | |
| | | | | |
| Cost (Total) | 1034.27 | $/h | 1034.27 | $/h |
| Fuel Consumption (Total) | 233.8 | L/h | | |
| Carbon Dioxide (Total) | 550.8 | kg/h | | |
| Hydrocarbons (Total) | 0.055 | kg/h | | |
| Carbon Monoxide (Total) | 0.490 | kg/h | | |
| NOx (Total) | 0.421 | kg/h | | |

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Intersection LOS value for Vehicles is based on average delay for all vehicle movements.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.

| Intersection Performance - Annual Values | | | | |
|---|---|---|---|---|
| **Performance Measure** | **Vehicles** | | **Persons** | |
| Demand Flows (Total) | 911,543 | veh/y | 1,093,851 | pers/y |
| Delay | 16,286 | veh-h/y | 19,543 | pers-h/y |
| Effective Stops | 991,779 | veh/y | 1,190,135 | pers/y |
| Travel Distance | 925,734 | veh-km/y | 1,110,881 | pers-km/y |
| Travel Time | 37,315 | veh-h/y | 44,778 | pers-h/y |
| | | | | |
| Cost | 496,450 | $/y | 496,450 | $/y |
| Fuel Consumption | 112,240 | L/y | | |
| Carbon Dioxide | 264,382 | kg/y | | |
| Hydrocarbons | 26 | kg/y | | |
| Carbon Monoxide | 235 | kg/y | | |
| NOx | 202 | kg/y | | |

# MOVEMENT SUMMARY

## Site: 111 [111-PR-102 @ PR-166 (AM)]

Four-way intersection with 2-lane approaches (Signals)

Signals - Fixed Time Isolated Cycle Time = 112 seconds (User-Given Phase Times)

**Movement Performance - Vehicles**

| Mov ID | OD Mov | Demand Flows Total veh/h | HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| South: PR-166 | | | | | | | | | | | |
| 3 | L2 | 180 | 1.3 | 0.815 | 67.2 | LOS E | 11.4 | 87.6 | 1.00 | 0.90 | 26.9 |
| 8 | T1 | 108 | 0.0 | 0.690 | 47.1 | LOS D | 8.6 | 65.7 | 1.00 | 0.88 | 23.9 |
| 18 | R2 | 56 | 0.0 | 0.690 | 47.1 | LOS D | 8.6 | 65.7 | 1.00 | 0.88 | 31.8 |
| Approach | | 343 | 0.7 | 0.815 | 57.6 | LOS E | 11.4 | 87.6 | 1.00 | 0.89 | 26.5 |
| East: PR-102 | | | | | | | | | | | |
| 1 | L2 | 28 | 0.0 | 0.576 | 25.3 | LOS C | 18.0 | 138.1 | 0.82 | 0.73 | 40.7 |
| 6 | T1 | 343 | 1.4 | 0.576 | 25.3 | LOS C | 18.0 | 138.1 | 0.82 | 0.73 | 39.5 |
| 16 | R2 | 40 | 0.0 | 0.576 | 25.3 | LOS C | 18.0 | 138.1 | 0.82 | 0.73 | 28.2 |
| Approach | | 411 | 1.2 | 0.576 | 25.3 | LOS C | 18.0 | 138.1 | 0.82 | 0.73 | 38.1 |
| North: Inter American University | | | | | | | | | | | |
| 7 | L2 | 20 | 0.0 | 0.838 | 45.3 | LOS D | 11.2 | 85.2 | 1.00 | 1.04 | 23.6 |
| 4 | T1 | 52 | 0.0 | 0.838 | 45.3 | LOS D | 11.2 | 85.2 | 1.00 | 1.04 | 24.4 |
| 14 | R2 | 164 | 0.0 | 0.838 | 45.3 | LOS D | 11.2 | 85.2 | 1.00 | 1.04 | 23.7 |
| Approach | | 235 | 0.0 | 0.838 | 45.3 | LOS D | 11.2 | 85.2 | 1.00 | 1.04 | 23.8 |
| West: PR-102 | | | | | | | | | | | |
| 5 | L2 | 199 | 0.0 | 1.120 | 89.4 | LOS F | 73.1 | 561.0 | 1.00 | 1.34 | 18.0 |
| 2 | T1 | 546 | 1.2 | 1.120 | 89.4 | LOS F | 73.1 | 561.0 | 1.00 | 1.34 | 22.2 |
| 12 | R2 | 165 | 2.2 | 1.120 | 89.4 | LOS F | 73.1 | 561.0 | 1.00 | 1.34 | 22.5 |
| Approach | | 910 | 1.1 | 1.120 | 89.4 | LOS F | 73.1 | 561.0 | 1.00 | 1.34 | 21.2 |
| All Vehicles | | 1899 | 0.9 | 1.120 | 64.3 | LOS E | 73.1 | 561.0 | 0.96 | 1.09 | 24.8 |

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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# LANE SUMMARY

## Site: 111 [111-PR-102 @ PR-166 (AM)]

Four-way intersection with 2-lane approaches (Signals)

Signals - Fixed Time Isolated Cycle Time = 112 seconds (User-Given Phase Times)

**Lane Use and Performance**

| | Demand Flows Total veh/h | HV % | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Average Delay sec | Level of Service | 95% Back of Queue Veh | Dist m | Lane Config | Lane Length m | Cap. Adj. % | Prob. Block. % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| South: PR-166 | | | | | | | | | | | | | |
| Lane 1 | 180 | 1.3 | 220 | 0.815 | 100 | 67.2 | LOS E | 11.4 | 87.6 | Full | 500 | 0.0 | 0.0 |
| Lane 2 | 164 | 0.0 | 238 | 0.690 | 100 | 47.1 | LOS D | 8.6 | 65.7 | Full | 500 | 0.0 | 0.0 |
| Approach | 343 | 0.7 | | 0.815 | | 57.6 | LOS E | 11.4 | 87.6 | | | | |
| East: PR-102 | | | | | | | | | | | | | |
| Lane 1 | 411 | 1.2 | 712 | 0.576 | 100 | 25.3 | LOS C | 18.0 | 138.1 | Full | 500 | 0.0 | 0.0 |
| Approach | 411 | 1.2 | | 0.576 | | 25.3 | LOS C | 18.0 | 138.1 | | | | |
| North: Inter American University | | | | | | | | | | | | | |
| Lane 1 | 235 | 0.0 | 281 | 0.838 | 100 | 45.3 | LOS D | 11.2 | 85.2 | Full | 500 | 0.0 | 0.0 |
| Approach | 235 | 0.0 | | 0.838 | | 45.3 | LOS D | 11.2 | 85.2 | | | | |
| West: PR-102 | | | | | | | | | | | | | |
| Lane 1 | 910 | 1.1 | 813 | 1.120 | 100 | 89.4 | LOS F | 73.1 | 561.0 | Full | 500 | 0.0 | 15.4 |
| Approach | 910 | 1.1 | | 1.120 | | 89.4 | LOS F | 73.1 | 561.0 | | | | |
| Intersection | 1899 | 0.9 | | 1.120 | | 64.3 | LOS E | 73.1 | 561.0 | | | | |

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.
LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 6).
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

# LANE FLOWS

## Site: 111 [111-PR-102 @ PR-166 (AM)]

Four-way intersection with 2-lane approaches (Signals)

Signals - Fixed Time Isolated Cycle Time = 112 seconds (User-Given Phase Times)

**Approach Lane Flows (veh/h)**

South: PR-166

| Mov. From S To Exit: | L2 W | T1 N | R2 E | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 180 | - | - | 180 | 1.3 | 220 | 0.815 | 100 | NA | NA |
| Lane 2 | - | 108 | 56 | 164 | 0.0 | 238 | 0.690 | 100 | NA | NA |
| Approach | 180 | 108 | 56 | 343 | 0.7 | | 0.815 | | | |

East: PR-102

| Mov. From E To Exit: | L2 S | T1 W | R2 N | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 28 | 343 | 40 | 411 | 1.2 | 712 | 0.576 | 100 | NA | NA |
| Approach | 28 | 343 | 40 | 411 | 1.2 | | 0.576 | | | |

North: Inter American University

| Mov. From N To Exit: | L2 E | T1 S | R2 W | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 20 | 52 | 164 | 235 | 0.0 | 281 | 0.838 | 100 | NA | NA |
| Approach | 20 | 52 | 164 | 235 | 0.0 | | 0.838 | | | |

West: PR-102

| Mov. From W To Exit: | L2 N | T1 E | R2 S | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 199 | 546 | 165 | 910 | 1.1 | 813 | 1.120 | 100 | NA | NA |
| Approach | 199 | 546 | 165 | 910 | 1.1 | | 1.120 | | | |

| | Total | %HV | Deg.Satn (v/c) |
|---|---|---|---|
| Intersection | 1899 | 0.9 | 1.120 |

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

# INTERSECTION SUMMARY

## Site: 101 [101-PR-116 @ PR-315 (PM)]

New Site
Signals - Fixed Time Isolated Cycle Time = 85 seconds (Optimum Cycle Time - Minimum Delay)

| Intersection Performance - Hourly Values | | | | |
|---|---|---|---|---|
| **Performance Measure** | **Vehicles** | | **Persons** | |
| Travel Speed (Average) | 19.2 | km/h | 19.2 | km/h |
| Travel Distance (Total) | 2333.2 | veh-km/h | 2799.8 | pers-km/h |
| Travel Time (Total) | 121.2 | veh-h/h | 145.5 | pers-h/h |
| Demand Flows (Total) | 2295 | veh/h | 2754 | pers/h |
| Percent Heavy Vehicles (Demand) | 2.0 | % | | |
| Degree of Saturation | 1.100 | | | |
| Practical Spare Capacity | -18.2 | % | | |
| Effective Intersection Capacity | 2086 | veh/h | | |
| Control Delay (Total) | 56.37 | veh-h/h | 67.65 | pers-h/h |
| Control Delay (Average) | 88.4 | sec | 88.4 | sec |
| Control Delay (Worst Lane) | 109.4 | sec | | |
| Control Delay (Worst Movement) | 109.4 | sec | 109.4 | sec |
| Geometric Delay (Average) | 0.0 | sec | | |
| Stop-Line Delay (Average) | 88.4 | sec | | |
| Idling Time (Average) | 90.3 | sec | | |
| Intersection Level of Service (LOS) | LOS F | | | |
| 95% Back of Queue - Vehicles (Worst Lane) | 26.6 | veh | | |
| 95% Back of Queue - Distance (Worst Lane) | 207.2 | m | | |
| Queue Storage Ratio (Worst Lane) | 0.25 | | | |
| Total Effective Stops | 2838 | veh/h | 3405 | pers/h |
| Effective Stop Rate | 1.24 | per veh | 1.24 | per pers |
| Proportion Queued | 0.95 | | 0.95 | |
| Performance Index | 416.3 | | 416.3 | |
| Cost (Total) | 1504.42 | $/h | 1504.42 | $/h |
| Fuel Consumption (Total) | 268.6 | L/h | | |
| Carbon Dioxide (Total) | 634.4 | kg/h | | |
| Hydrocarbons (Total) | 0.057 | kg/h | | |
| Carbon Monoxide (Total) | 0.371 | kg/h | | |
| NOx (Total) | 0.519 | kg/h | | |

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Intersection LOS value for Vehicles is based on average delay for all vehicle movements.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.

| Intersection Performance - Annual Values | | | | |
|---|---|---|---|---|
| **Performance Measure** | **Vehicles** | | **Persons** | |
| Demand Flows (Total) | 1,101,638 | veh/y | 1,321,966 | pers/y |
| Delay | 27,059 | veh-h/y | 32,471 | pers-h/y |
| Effective Stops | 1,362,099 | veh/y | 1,634,518 | pers/y |
| Travel Distance | 1,119,933 | veh-km/y | 1,343,920 | pers-km/y |
| Travel Time | 58,183 | veh-h/y | 69,819 | pers-h/y |
| Cost | 722,121 | $/y | 722,121 | $/y |
| Fuel Consumption | 128,949 | L/y | | |
| Carbon Dioxide | 304,528 | kg/y | | |
| Hydrocarbons | 27 | kg/y | | |
| Carbon Monoxide | 178 | kg/y | | |
| NOx | 249 | kg/y | | |

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# MOVEMENT SUMMARY

## Site: 101 [101-PR-116 @ PR-315 (PM)]

New Site
Signals - Fixed Time Isolated Cycle Time = 85 seconds (Optimum Cycle Time - Minimum Delay)

| Movement Performance - Vehicles | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mov ID | OD Mov | Demand Flows Total veh/h | HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
| South: PR-116 | | | | | | | | | | | |
| 3 | L2 | 127 | 0.9 | 1.041 | 96.9 | LOS F | 20.6 | 158.3 | 1.00 | 1.37 | 19.1 |
| 8 | T1 | 359 | 1.4 | 1.041 | 100.1 | LOS F | 20.6 | 158.3 | 1.00 | 1.34 | 18.3 |
| 18 | R2 | 168 | 1.5 | 1.041 | 103.6 | LOS F | 18.7 | 143.5 | 1.00 | 1.31 | 17.6 |
| Approach | | 654 | 1.3 | 1.041 | 100.4 | LOS F | 20.6 | 158.3 | 1.00 | 1.34 | 18.3 |
| East: PR-315 | | | | | | | | | | | |
| 1 | L2 | 183 | 4.3 | 1.100 | 109.4 | LOS F | 26.6 | 207.2 | 1.00 | 1.48 | 17.8 |
| 6 | T1 | 191 | 1.8 | 1.100 | 109.4 | LOS F | 26.6 | 207.2 | 1.00 | 1.48 | 17.8 |
| 16 | R2 | 143 | 1.7 | 0.124 | 2.2 | LOS A | 1.4 | 11.0 | 0.28 | 0.23 | 38.3 |
| Approach | | 517 | 2.7 | 1.100 | 79.7 | LOS E | 26.6 | 207.2 | 0.80 | 1.13 | 20.9 |
| North: PR-116 | | | | | | | | | | | |
| 7 | L2 | 145 | 3.2 | 1.010 | 92.6 | LOS F | 17.4 | 135.7 | 1.00 | 1.30 | 19.7 |
| 4 | T1 | 342 | 2.8 | 1.010 | 89.1 | LOS F | 17.4 | 135.7 | 1.00 | 1.21 | 18.7 |
| 14 | R2 | 107 | 0.0 | 1.010 | 86.9 | LOS F | 14.2 | 109.8 | 1.00 | 1.16 | 18.3 |
| Approach | | 594 | 2.4 | 1.010 | 89.6 | LOS F | 17.4 | 135.7 | 1.00 | 1.22 | 18.9 |
| West: PR-315 | | | | | | | | | | | |
| 5 | L2 | 159 | 3.0 | 1.036 | 80.9 | LOS F | 26.5 | 204.5 | 1.00 | 1.23 | 19.4 |
| 2 | T1 | 208 | 0.6 | 1.036 | 80.9 | LOS F | 26.5 | 204.5 | 1.00 | 1.23 | 19.4 |
| 12 | R2 | 164 | 1.6 | 1.036 | 80.9 | LOS F | 26.5 | 204.5 | 1.00 | 1.23 | 19.6 |
| Approach | | 531 | 1.6 | 1.036 | 80.9 | LOS F | 26.5 | 204.5 | 1.00 | 1.23 | 19.5 |
| All Vehicles | | 2295 | 2.0 | 1.100 | 88.4 | LOS F | 26.6 | 207.2 | 0.95 | 1.24 | 19.2 |

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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# LANE SUMMARY

## Site: 101 [101-PR-116 @ PR-315 (PM)]

New Site
Signals - Fixed Time Isolated Cycle Time = 85 seconds (Optimum Cycle Time - Minimum Delay)

**Lane Use and Performance**

| | Demand Flows Total veh/h | HV % | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Average Delay sec | Level of Service | 95% Back of Queue Veh | Dist m | Lane Config | Lane Length m | Cap. Adj. % | Prob. Block. % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| South: PR-116 | | | | | | | | | | | | | |
| Lane 1 | 316 | 1.2 | 303 | 1.041 | 100 | 96.9 | LOS F | 20.6 | 158.3 | Full | 500 | 0.0 | 0.0 |
| Lane 2 | 338 | 1.5 | 325 | 1.041 | 100 | 103.6 | LOS F | 18.7 | 143.5 | Full | 500 | 0.0 | 0.0 |
| Approach | 654 | 1.3 | | 1.041 | | 100.4 | LOS F | 20.6 | 158.3 | | | | |
| East: PR-315 | | | | | | | | | | | | | |
| Lane 1 | 374 | 3.0 | 340[1] | 1.100 | 100 | 109.4 | LOS F | 26.6 | 207.2 | Full | 500 | 0.0 | 0.0 |
| Lane 2 | 143 | 1.7 | 1156 | 0.124 | 100 | 2.2 | LOS A | 1.4 | 11.0 | Short | 60 | 0.0 | NA |
| Approach | 517 | 2.7 | | 1.100 | | 79.7 | LOS E | 26.6 | 207.2 | | | | |
| North: PR-116 | | | | | | | | | | | | | |
| Lane 1 | 278 | 3.0 | 275 | 1.010 | 100 | 92.6 | LOS F | 17.4 | 135.7 | Full | 500 | 0.0 | 0.0 |
| Lane 2 | 316 | 1.9 | 313 | 1.010 | 100 | 86.9 | LOS F | 14.2 | 109.8 | Full | 500 | 0.0 | 0.0 |
| Approach | 594 | 2.4 | | 1.010 | | 89.6 | LOS F | 17.4 | 135.7 | | | | |
| West: PR-315 | | | | | | | | | | | | | |
| Lane 1 | 531 | 1.6 | 512 | 1.036 | 100 | 80.9 | LOS F | 26.5 | 204.5 | Full | 500 | 0.0 | 0.0 |
| Approach | 531 | 1.6 | | 1.036 | | 80.9 | LOS F | 26.5 | 204.5 | | | | |
| Intersection | 2295 | 2.0 | | 1.100 | | 88.4 | LOS F | 26.6 | 207.2 | | | | |

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.
LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 6).
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

1 Reduced capacity due to a short lane effect. Short lane queues may extend into the full-length lanes. Some upstream delays at entry to short lanes are not included.

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# LANE FLOWS

## Site: 101 [101-PR-116 @ PR-315 (PM)]

New Site
Signals - Fixed Time Isolated Cycle Time = 85 seconds (Optimum Cycle Time - Minimum Delay)

**Approach Lane Flows (veh/h)**

South: PR-116

| Mov. From S To Exit: | L2 W | T1 N | R2 E | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 127 | 188 | - | 316 | 1.2 | 303 | 1.041 | 100 | NA | NA |
| Lane 2 | - | 170 | 168 | 338 | 1.5 | 325 | 1.041 | 100 | NA | NA |
| Approach | 127 | 359 | 168 | 654 | 1.3 | | 1.041 | | | |

East: PR-315

| Mov. From E To Exit: | L2 S | T1 W | R2 N | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 183 | 191 | - | 374 | 3.0 | 340[1] | 1.100 | 100 | NA | NA |
| Lane 2 | - | - | 143 | 143 | 1.7 | 1156 | 0.124 | 100 | 0.0 | 1 |
| Approach | 183 | 191 | 143 | 517 | 2.7 | | 1.100 | | | |

North: PR-116

| Mov. From N To Exit: | L2 E | T1 S | R2 W | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 145 | 133 | - | 278 | 3.0 | 275 | 1.010 | 100 | NA | NA |
| Lane 2 | - | 209 | 107 | 316 | 1.9 | 313 | 1.010 | 100 | NA | NA |
| Approach | 145 | 342 | 107 | 594 | 2.4 | | 1.010 | | | |

West: PR-315

| Mov. From W To Exit: | L2 N | T1 E | R2 S | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 159 | 208 | 164 | 531 | 1.6 | 512 | 1.036 | 100 | NA | NA |
| Approach | 159 | 208 | 164 | 531 | 1.6 | | 1.036 | | | |

| | Total | %HV | Deg.Satn (v/c) |
|---|---|---|---|
| Intersection | 2295 | 2.0 | 1.100 |

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

1 Reduced capacity due to a short lane effect. Short lane queues may extend into the full-length lanes. Some upstream delays at entry to short lanes are not included.

# INTERSECTION SUMMARY

## Site: 102 [102-PR-122 @ PR-116 (PM)]

New Site
Signals - Fixed Time Isolated Cycle Time = 30 seconds (Optimum Cycle Time - Minimum Delay)

| Intersection Performance - Hourly Values | | | | |
|---|---|---|---|---|
| **Performance Measure** | **Vehicles** | | **Persons** | |
| Travel Speed (Average) | 43.8 | km/h | 43.8 | km/h |
| Travel Distance (Total) | 1465.7 | veh-km/h | 1758.8 | pers-km/h |
| Travel Time (Total) | 33.5 | veh-h/h | 40.1 | pers-h/h |
| Demand Flows (Total) | 1430 | veh/h | 1716 | pers/h |
| Percent Heavy Vehicles (Demand) | 2.9 | % | | |
| Degree of Saturation | 0.576 | | | |
| Practical Spare Capacity | 56.3 | % | | |
| Effective Intersection Capacity | 2484 | veh/h | | |
| Control Delay (Total) | 2.17 | veh-h/h | 2.61 | pers-h/h |
| Control Delay (Average) | 5.5 | sec | 5.5 | sec |
| Control Delay (Worst Lane) | 12.8 | sec | | |
| Control Delay (Worst Movement) | 12.8 | sec | 12.8 | sec |
| Geometric Delay (Average) | 0.0 | sec | | |
| Stop-Line Delay (Average) | 5.5 | sec | | |
| Idling Time (Average) | 3.4 | sec | | |
| Intersection Level of Service (LOS) | LOS A | | | |
| 95% Back of Queue - Vehicles (Worst Lane) | 3.1 | veh | | |
| 95% Back of Queue - Distance (Worst Lane) | 23.7 | m | | |
| Queue Storage Ratio (Worst Lane) | 0.03 | | | |
| Total Effective Stops | 499 | veh/h | 599 | pers/h |
| Effective Stop Rate | 0.35 | per veh | 0.35 | per pers |
| Proportion Queued | 0.43 | | 0.43 | |
| Performance Index | 42.3 | | 42.3 | |
| Cost (Total) | 373.91 | $/h | 373.91 | $/h |
| Fuel Consumption (Total) | 121.4 | L/h | | |
| Carbon Dioxide (Total) | 287.7 | kg/h | | |
| Hydrocarbons (Total) | 0.023 | kg/h | | |
| Carbon Monoxide (Total) | 0.256 | kg/h | | |
| NOx (Total) | 0.360 | kg/h | | |

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Intersection LOS value for Vehicles is based on average delay for all vehicle movements.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.

| Intersection Performance - Annual Values | | | | |
|---|---|---|---|---|
| **Performance Measure** | **Vehicles** | | **Persons** | |
| Demand Flows (Total) | 686,380 | veh/y | 823,656 | pers/y |
| Delay | 1,042 | veh-h/y | 1,251 | pers-h/y |
| Effective Stops | 239,649 | veh/y | 287,579 | pers/y |
| Travel Distance | 703,533 | veh-km/y | 844,239 | pers-km/y |
| Travel Time | 16,057 | veh-h/y | 19,269 | pers-h/y |
| Cost | 179,478 | $/y | 179,478 | $/y |
| Fuel Consumption | 58,270 | L/y | | |
| Carbon Dioxide | 138,079 | kg/y | | |
| Hydrocarbons | 11 | kg/y | | |
| Carbon Monoxide | 123 | kg/y | | |
| NOx | 173 | kg/y | | |

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# MOVEMENT SUMMARY

## Site: 102 [102-PR-122 @ PR-116 (PM)]

New Site
Signals - Fixed Time Isolated Cycle Time = 30 seconds (Optimum Cycle Time - Minimum Delay)

**Movement Performance - Vehicles**

| Mov ID | OD Mov | Demand Flows Total veh/h | HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | 95% Back of Queue Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| NorthEast: PR-122 | | | | | | | | | | | |
| 6 | T1 | 96 | 2.7 | 0.130 | 10.0 | LOS A | 0.6 | 4.7 | 0.85 | 0.63 | 55.3 |
| 16 | R2 | 24 | 5.6 | 0.016 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.00 | 57.8 |
| Approach | | 120 | 3.3 | 0.130 | 8.0 | LOS A | 0.6 | 4.7 | 0.68 | 0.50 | 55.8 |
| NorthWest: PR-116 | | | | | | | | | | | |
| 7 | L2 | 204 | 2.0 | 0.576 | 12.8 | LOS B | 3.1 | 23.7 | 0.95 | 0.81 | 39.9 |
| 14 | R2 | 508 | 4.1 | 0.328 | 0.1 | LOS A | 0.0 | 0.0 | 0.00 | 0.00 | 39.7 |
| Approach | | 712 | 3.5 | 0.576 | 3.7 | LOS A | 3.1 | 23.7 | 0.27 | 0.23 | 39.8 |
| SouthWest: PR-116 | | | | | | | | | | | |
| 5 | L2 | 362 | 2.3 | 0.512 | 11.6 | LOS B | 2.6 | 20.3 | 0.94 | 0.76 | 40.5 |
| 2 | T1 | 236 | 1.6 | 0.063 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.00 | 65.0 |
| Approach | | 598 | 2.0 | 0.512 | 7.1 | LOS A | 2.6 | 20.3 | 0.57 | 0.46 | 47.6 |
| All Vehicles | | 1430 | 2.9 | 0.576 | 5.5 | LOS A | 3.1 | 23.7 | 0.43 | 0.35 | 43.8 |

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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# LANE SUMMARY

## Site: 102 [102-PR-122 @ PR-116 (PM)]

New Site
Signals - Fixed Time Isolated Cycle Time = 30 seconds (Optimum Cycle Time - Minimum Delay)

**Lane Use and Performance**

| | Demand Flows Total veh/h | HV % | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Average Delay sec | Level of Service | 95% Back of Queue Veh | Dist m | Lane Config | Lane Length m | Cap. Adj. % | Prob. Block. % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| NorthEast: PR-122 | | | | | | | | | | | | | |
| Lane 1 | 48 | 2.7 | 370 | 0.130 | 100 | 10.0 | LOS A | 0.6 | 4.7 | Short | 60 | 0.0 | NA |
| Lane 2 | 48 | 2.7 | 370 | 0.130 | 100 | 10.0 | LOS A | 0.6 | 4.7 | Full | 500 | 0.0 | 0.0 |
| Lane 3 | 24 | 5.6 | 1525 | 0.016 | 100 | 0.0 | LOS A | 0.0 | 0.0 | Full | 500 | 0.0 | 0.0 |
| Approach | 120 | 3.3 | | 0.130 | | 8.0 | LOS A | 0.6 | 4.7 | | | | |
| NorthWest: PR-116 | | | | | | | | | | | | | |
| Lane 1 | 204 | 2.0 | 355 | 0.576 | 100 | 12.8 | LOS B | 3.1 | 23.7 | Full | 500 | 0.0 | 0.0 |
| Lane 2 | 508 | 4.1 | 1547 | 0.328 | 100 | 0.1 | LOS A | 0.0 | 0.0 | Short | 60 | 0.0 | NA |
| Approach | 712 | 3.5 | | 0.576 | | 3.7 | LOS A | 3.1 | 23.7 | | | | |
| SouthWest: PR-116 | | | | | | | | | | | | | |
| Lane 1 | 181 | 2.3 | 354 | 0.512 | 100 | 11.6 | LOS B | 2.6 | 20.3 | Short | 60 | 0.0 | NA |
| Lane 2 | 181 | 2.3 | 354 | 0.512 | 100 | 11.6 | LOS B | 2.6 | 20.3 | Short | 60 | 0.0 | NA |
| Lane 3 | 118 | 1.6 | 1870 | 0.063 | 100 | 0.0 | LOS A | 0.0 | 0.0 | Full | 500 | 0.0 | 0.0 |
| Lane 4 | 118 | 1.6 | 1870 | 0.063 | 100 | 0.0 | LOS A | 0.0 | 0.0 | Full | 500 | 0.0 | 0.0 |
| Approach | 598 | 2.0 | | 0.512 | | 7.1 | LOS A | 2.6 | 20.3 | | | | |
| Intersection | 1430 | 2.9 | | 0.576 | | 5.5 | LOS A | 3.1 | 23.7 | | | | |

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.
LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 6).
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

# LANE FLOWS

## Site: 102 [102-PR-122 @ PR-116 (PM)]

New Site
Signals - Fixed Time Isolated Cycle Time = 30 seconds (Optimum Cycle Time - Minimum Delay)

**Approach Lane Flows (veh/h)**

NorthEast: PR-122

| Mov. From NE To Exit: | T1 SW | R2 NW | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 48 | - | 48 | 2.7 | 370 | 0.130 | 100 | 0.0 | 2 |
| Lane 2 | 48 | - | 48 | 2.7 | 370 | 0.130 | 100 | NA | NA |
| Lane 3 | - | 24 | 24 | 5.6 | 1525 | 0.016 | 100 | NA | NA |
| Approach | 96 | 24 | 120 | 3.3 | | 0.130 | | | |

NorthWest: PR-116

| Mov. From NW To Exit: | L2 NE | R2 SW | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 204 | - | 204 | 2.0 | 355 | 0.576 | 100 | NA | NA |
| Lane 2 | - | 508 | 508 | 4.1 | 1547 | 0.328 | 100 | 0.0 | 1 |
| Approach | 204 | 508 | 712 | 3.5 | | 0.576 | | | |

SouthWest: PR-116

| Mov. From SW To Exit: | L2 NW | T1 NE | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 181 | - | 181 | 2.3 | 354 | 0.512 | 100 | 0.0 | 2 |
| Lane 2 | 181 | - | 181 | 2.3 | 354 | 0.512 | 100 | 0.0 | 3 |
| Lane 3 | - | 118 | 118 | 1.6 | 1870 | 0.063 | 100 | NA | NA |
| Lane 4 | - | 118 | 118 | 1.6 | 1870 | 0.063 | 100 | NA | NA |
| Approach | 362 | 236 | 598 | 2.0 | | 0.512 | | | |

| | Total | %HV | Deg.Satn (v/c) |
|---|---|---|---|
| Intersection | 1430 | 2.9 | 0.576 |

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

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# INTERSECTION SUMMARY

## Site: 104 [104-PR-122 @ PR-321 (PM)]

Three-way intersection with 2-lane major road (Stop control)
Stop (Two-Way)

| Intersection Performance - Hourly Values | | | | |
|---|---|---|---|---|
| **Performance Measure** | **Vehicles** | | **Persons** | |
| Travel Speed (Average) | 50.7 | km/h | 50.7 | km/h |
| Travel Distance (Total) | 565.1 | veh-km/h | 678.1 | pers-km/h |
| Travel Time (Total) | 11.2 | veh-h/h | 13.4 | pers-h/h |
| | | | | |
| Demand Flows (Total) | 558 | veh/h | 670 | pers/h |
| Percent Heavy Vehicles (Demand) | 2.1 | % | | |
| Degree of Saturation | 0.344 | | | |
| Practical Spare Capacity | 132.7 | % | | |
| Effective Intersection Capacity | 1624 | veh/h | | |
| | | | | |
| Control Delay (Total) | 1.36 | veh-h/h | 1.63 | pers-h/h |
| Control Delay (Average) | 8.8 | sec | 8.8 | sec |
| Control Delay (Worst Lane) | 11.6 | sec | | |
| Control Delay (Worst Movement) | 11.7 | sec | 11.7 | sec |
| Geometric Delay (Average) | 0.0 | sec | | |
| Stop-Line Delay (Average) | 8.8 | sec | | |
| Idling Time (Average) | 8.3 | sec | | |
| Intersection Level of Service (LOS) | NA | | | |
| | | | | |
| 95% Back of Queue - Vehicles (Worst Lane) | 1.7 | veh | | |
| 95% Back of Queue - Distance (Worst Lane) | 12.7 | m | | |
| Queue Storage Ratio (Worst Lane) | 0.01 | | | |
| Total Effective Stops | 96 | veh/h | 115 | pers/h |
| Effective Stop Rate | 0.17 | per veh | 0.17 | per pers |
| Proportion Queued | 0.24 | | 0.24 | |
| Performance Index | 14.7 | | 14.7 | |
| | | | | |
| Cost (Total) | 143.76 | $/h | 143.76 | $/h |
| Fuel Consumption (Total) | 57.0 | L/h | | |
| Carbon Dioxide (Total) | 135.0 | kg/h | | |
| Hydrocarbons (Total) | 0.013 | kg/h | | |
| Carbon Monoxide (Total) | 0.169 | kg/h | | |
| NOx (Total) | 0.200 | kg/h | | |

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
NA: Intersection LOS for Vehicles is Not Applicable for two-way sign control since the average intersection delay is not a good LOS measure due to zero delays associated with major road movements.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.

| Intersection Performance - Annual Values | | | | |
|---|---|---|---|---|
| **Performance Measure** | **Vehicles** | | **Persons** | |
| Demand Flows (Total) | 268,076 | veh/y | 321,692 | pers/y |
| Delay | 653 | veh-h/y | 784 | pers-h/y |
| Effective Stops | 46,066 | veh/y | 55,279 | pers/y |
| Travel Distance | 271,235 | veh-km/y | 325,482 | pers-km/y |
| Travel Time | 5,352 | veh-h/y | 6,423 | pers-h/y |
| | | | | |
| Cost | 69,005 | $/y | 69,005 | $/y |
| Fuel Consumption | 27,369 | L/y | | |
| Carbon Dioxide | 64,792 | kg/y | | |
| Hydrocarbons | 6 | kg/y | | |
| Carbon Monoxide | 81 | kg/y | | |
| NOx | 96 | kg/y | | |

# MOVEMENT SUMMARY

## Site: 104 [104-PR-122 @ PR-321 (PM)]

Three-way intersection with 2-lane major road (Stop control)
Stop (Two-Way)

| Movement Performance - Vehicles | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mov ID | OD Mov | Demand Flows Total veh/h | HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
| South: PR-122 | | | | | | | | | | | |
| 3 | L2 | 264 | 2.1 | 0.344 | 11.7 | LOS B | 1.7 | 12.7 | 0.42 | 0.31 | 46.9 |
| 18 | R2 | 20 | 0.0 | 0.344 | 10.9 | LOS B | 1.7 | 12.7 | 0.42 | 0.31 | 47.4 |
| Approach | | 284 | 1.9 | 0.344 | 11.6 | LOS B | 1.7 | 12.7 | 0.42 | 0.31 | 46.9 |
| East: PR-321 | | | | | | | | | | | |
| 1 | L2 | 12 | 9.1 | 0.035 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.00 | 59.7 |
| 6 | T1 | 44 | 2.9 | 0.035 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.00 | 63.7 |
| Approach | | 56 | 4.2 | 0.035 | 0.0 | NA | 0.0 | 0.0 | 0.00 | 0.00 | 62.8 |
| West: PR-321 | | | | | | | | | | | |
| 2 | T1 | 96 | 3.1 | 0.266 | 8.6 | LOS A | 1.3 | 10.2 | 0.07 | 0.04 | 54.6 |
| 12 | R2 | 124 | 1.1 | 0.266 | 6.3 | LOS A | 1.3 | 10.2 | 0.07 | 0.04 | 52.8 |
| Approach | | 219 | 1.9 | 0.266 | 7.3 | NA | 1.3 | 10.2 | 0.07 | 0.04 | 53.6 |
| All Vehicles | | 558 | 2.1 | 0.344 | 8.8 | NA | 1.7 | 12.7 | 0.24 | 0.17 | 50.7 |

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Minor Road Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

# LANE SUMMARY

## Site: 104 [104-PR-122 @ PR-321 (PM)]

Three-way intersection with 2-lane major road (Stop control)
Stop (Two-Way)

**Lane Use and Performance**

| | Demand Flows Total veh/h | HV % | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Average Delay sec | Level of Service | 95% Back of Queue Veh | Dist m | Lane Config | Lane Length m | Cap. Adj. % | Prob. Block. % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| South: PR-122 | | | | | | | | | | | | | |
| Lane 1 | 284 | 1.9 | 825 | 0.344 | 100 | 11.6 | LOS B | 1.7 | 12.7 | Full | 500 | 0.0 | 0.0 |
| Approach | 284 | 1.9 | | 0.344 | | 11.6 | LOS B | 1.7 | 12.7 | | | | |
| East: PR-321 | | | | | | | | | | | | | |
| Lane 1 | 56 | 4.2 | 1579 | 0.035 | 100 | 0.0 | LOS A | 0.0 | 0.0 | Full | 500 | 0.0 | 0.0 |
| Approach | 56 | 4.2 | | 0.035 | | 0.0 | NA | 0.0 | 0.0 | | | | |
| West: PR-321 | | | | | | | | | | | | | |
| Lane 1 | 219 | 1.9 | 823 | 0.266 | 100 | 7.3 | LOS A | 1.3 | 10.2 | Full | 500 | 0.0 | 0.0 |
| Approach | 219 | 1.9 | | 0.266 | | 7.3 | NA | 1.3 | 10.2 | | | | |
| Intersection | 558 | 2.1 | | 0.344 | | 8.8 | NA | 1.7 | 12.7 | | | | |

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.
LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection).
Minor Road Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 6).
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road lanes.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

# LANE FLOWS

## Site: 104 [104-PR-122 @ PR-321 (PM)]

Three-way intersection with 2-lane major road (Stop control)
Stop (Two-Way)

**Approach Lane Flows (veh/h)**

South: PR-122

| Mov. From S To Exit: | L2 W | R2 E | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 264 | 20 | 284 | 1.9 | 825 | 0.344 | 100 | NA | NA |
| Approach | 264 | 20 | 284 | 1.9 | | 0.344 | | | |

East: PR-321

| Mov. From E To Exit: | L2 S | T1 W | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 12 | 44 | 56 | 4.2 | 1579 | 0.035 | 100 | NA | NA |
| Approach | 12 | 44 | 56 | 4.2 | | 0.035 | | | |

West: PR-321

| Mov. From W To Exit: | T1 E | R2 S | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 96 | 124 | 219 | 1.9 | 823 | 0.266 | 100 | NA | NA |
| Approach | 96 | 124 | 219 | 1.9 | | 0.266 | | | |

| | Total | %HV | Deg.Satn (v/c) |
|---|---|---|---|
| Intersection | 558 | 2.1 | 0.344 |

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

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# INTERSECTION SUMMARY

## Site: 109 [109-PR-101 @ PR-166 (PM) SINGLE]

Four-way intersection with 2-lane approaches (Signals)

Signals - Fixed Time Isolated Cycle Time = 71 seconds (User-Given Phase Times)

| Intersection Performance - Hourly Values | | | | |
|---|---|---|---|---|
| **Performance Measure** | **Vehicles** | | **Persons** | |
| Travel Speed (Average) | 24.7 | km/h | 24.7 | km/h |
| Travel Distance (Total) | 1319.0 | veh-km/h | 1582.8 | pers-km/h |
| Travel Time (Total) | 53.4 | veh-h/h | 64.1 | pers-h/h |
| | | | | |
| Demand Flows (Total) | 1621 | veh/h | 1946 | pers/h |
| Percent Heavy Vehicles (Demand) | 0.8 | % | | |
| Degree of Saturation | 1.202 | | | |
| Practical Spare Capacity | -25.1 | % | | |
| Effective Intersection Capacity | 1349 | veh/h | | |
| | | | | |
| Control Delay (Total) | 26.12 | veh-h/h | 31.35 | pers-h/h |
| Control Delay (Average) | 58.0 | sec | 58.0 | sec |
| Control Delay (Worst Lane) | 137.5 | sec | | |
| Control Delay (Worst Movement) | 137.5 | sec | 137.5 | sec |
| Geometric Delay (Average) | 0.0 | sec | | |
| Stop-Line Delay (Average) | 58.0 | sec | | |
| Idling Time (Average) | 53.2 | sec | | |
| Intersection Level of Service (LOS) | LOS E | | | |
| | | | | |
| 95% Back of Queue - Vehicles (Worst Lane) | 26.2 | veh | | |
| 95% Back of Queue - Distance (Worst Lane) | 200.5 | m | | |
| Queue Storage Ratio (Worst Lane) | 1.36 | | | |
| Total Effective Stops | 1736 | veh/h | 2084 | pers/h |
| Effective Stop Rate | 1.07 | per veh | 1.07 | per pers |
| Proportion Queued | 0.87 | | 0.87 | |
| Performance Index | 166.3 | | 166.3 | |
| | | | | |
| Cost (Total) | 716.76 | $/h | 716.76 | $/h |
| Fuel Consumption (Total) | 195.0 | L/h | | |
| Carbon Dioxide (Total) | 460.7 | kg/h | | |
| Hydrocarbons (Total) | 0.047 | kg/h | | |
| Carbon Monoxide (Total) | 0.475 | kg/h | | |
| NOx (Total) | 0.460 | kg/h | | |

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Intersection LOS value for Vehicles is based on average delay for all vehicle movements.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.

| Intersection Performance - Annual Values | | | | |
|---|---|---|---|---|
| **Performance Measure** | **Vehicles** | | **Persons** | |
| Demand Flows (Total) | 778,286 | veh/y | 933,944 | pers/y |
| Delay | 12,539 | veh-h/y | 15,046 | pers-h/y |
| Effective Stops | 833,412 | veh/y | 1,000,094 | pers/y |
| Travel Distance | 633,129 | veh-km/y | 759,755 | pers-km/y |
| Travel Time | 25,642 | veh-h/y | 30,770 | pers-h/y |
| | | | | |
| Cost | 344,044 | $/y | 344,044 | $/y |
| Fuel Consumption | 93,620 | L/y | | |
| Carbon Dioxide | 221,136 | kg/y | | |
| Hydrocarbons | 22 | kg/y | | |
| Carbon Monoxide | 228 | kg/y | | |
| NOx | 221 | kg/y | | |

# MOVEMENT SUMMARY

## Site: 109 [109-PR-101 @ PR-166 (PM) SINGLE]

Four-way intersection with 2-lane approaches (Signals)

Signals - Fixed Time Isolated Cycle Time = 71 seconds (User-Given Phase Times)

**Movement Performance - Vehicles**

| Mov ID | OD Mov | Demand Flows Total veh/h | HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| South: PR-101 | | | | | | | | | | | |
| 3 | L2 | 131 | 0.0 | 1.036 | 84.1 | LOS F | 20.3 | 154.4 | 1.00 | 1.48 | 22.6 |
| 8 | T1 | 227 | 0.0 | 1.036 | 84.1 | LOS F | 20.3 | 154.4 | 1.00 | 1.48 | 15.6 |
| 18 | R2 | 72 | 0.0 | 0.067 | 0.7 | LOS A | 0.4 | 3.3 | 0.20 | 0.16 | 45.4 |
| Approach | | 430 | 0.0 | 1.036 | 70.2 | LOS E | 20.3 | 154.4 | 0.87 | 1.26 | 21.0 |
| East: PR-166 | | | | | | | | | | | |
| 1 | L2 | 83 | 4.0 | 0.246 | 23.6 | LOS C | 2.5 | 19.4 | 0.87 | 0.68 | 35.6 |
| 6 | T1 | 192 | 0.0 | 0.273 | 16.3 | LOS B | 3.9 | 29.4 | 0.79 | 0.64 | 49.7 |
| 16 | R2 | 104 | 0.0 | 0.273 | 7.8 | LOS A | 2.3 | 17.8 | 0.73 | 0.59 | 45.3 |
| Approach | | 379 | 0.9 | 0.273 | 15.6 | LOS B | 3.9 | 29.4 | 0.79 | 0.64 | 44.5 |
| North: PR-101 | | | | | | | | | | | |
| 7 | L2 | 84 | 0.0 | 1.202 | 137.5 | LOS F | 26.2 | 200.5 | 1.00 | 1.79 | 11.8 |
| 4 | T1 | 239 | 1.3 | 1.202 | 137.5 | LOS F | 26.2 | 200.5 | 1.00 | 1.79 | 10.9 |
| 14 | R2 | 44 | 0.0 | 1.202 | 137.5 | LOS F | 26.2 | 200.5 | 1.00 | 1.79 | 11.8 |
| Approach | | 368 | 0.9 | 1.202 | 137.5 | LOS F | 26.2 | 200.5 | 1.00 | 1.79 | 11.2 |
| West: PR-166 | | | | | | | | | | | |
| 5 | L2 | 111 | 0.0 | 0.315 | 24.0 | LOS C | 3.4 | 25.6 | 0.89 | 0.71 | 32.7 |
| 2 | T1 | 238 | 2.7 | 0.323 | 16.4 | LOS B | 4.5 | 35.3 | 0.81 | 0.66 | 49.6 |
| 12 | R2 | 96 | 0.0 | 0.323 | 9.1 | LOS A | 3.0 | 23.0 | 0.78 | 0.64 | 42.7 |
| Approach | | 445 | 1.4 | 0.323 | 16.7 | LOS B | 4.5 | 35.3 | 0.82 | 0.67 | 44.1 |
| All Vehicles | | 1621 | 0.8 | 1.202 | 58.0 | LOS E | 26.2 | 200.5 | 0.87 | 1.07 | 24.7 |

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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# LANE SUMMARY

## Site: 109 [109-PR-101 @ PR-166 (PM) SINGLE]

Four-way intersection with 2-lane approaches (Signals)

Signals - Fixed Time Isolated Cycle Time = 71 seconds (User-Given Phase Times)

**Lane Use and Performance**

| | Demand Flows Total veh/h | HV % | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Average Delay sec | Level of Service | 95% Back of Queue Veh | Dist m | Lane Config | Lane Length m | Cap. Adj. % | Prob. Block. % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| South: PR-101 | | | | | | | | | | | | | |
| Lane 1 | 358 | 0.0 | 346[1] | 1.036 | 100 | 84.1 | LOS F | 20.3 | 154.4 | Short | 7 | 0.0 | NA |
| Lane 2 | 72 | 0.0 | 1067 | 0.067 | 100 | 0.7 | LOS A | 0.4 | 3.3 | Full | 500 | 0.0 | 0.0 |
| Approach | 430 | 0.0 | | 1.036 | | 70.2 | LOS E | 20.3 | 154.4 | | | | |
| East: PR-166 | | | | | | | | | | | | | |
| Lane 1 | 83 | 4.0 | 339 | 0.246 | 100 | 23.6 | LOS C | 2.5 | 19.4 | Short | 50 | 0.0 | NA |
| Lane 2 | 142 | 0.0 | 518 | 0.273 | 100 | 19.4 | LOS B | 3.9 | 29.4 | Full | 500 | 0.0 | 0.0 |
| Lane 3 | 154 | 0.0 | 564 | 0.273 | 100 | 7.8 | LOS A | 2.3 | 17.8 | Full | 500 | 0.0 | 0.0 |
| Approach | 379 | 0.9 | | 0.273 | | 15.6 | LOS B | 3.9 | 29.4 | | | | |
| North: PR-101 | | | | | | | | | | | | | |
| Lane 1 | 368 | 0.9 | 306 | 1.202 | 100 | 137.5 | LOS F | 26.2 | 200.5 | Full | 90 | 0.0 | 79.8 |
| Approach | 368 | 0.9 | | 1.202 | | 137.5 | LOS F | 26.2 | 200.5 | | | | |
| West: PR-166 | | | | | | | | | | | | | |
| Lane 1 | 111 | 0.0 | 352 | 0.315 | 100 | 24.0 | LOS C | 3.4 | 25.6 | Short | 45 | 0.0 | NA |
| Lane 2 | 163 | 2.7 | 504 | 0.323 | 100 | 19.7 | LOS B | 4.5 | 35.3 | Full | 500 | 0.0 | 0.0 |
| Lane 3 | 171 | 1.2 | 530 | 0.323 | 100 | 9.1 | LOS A | 3.0 | 23.0 | Full | 500 | 0.0 | 0.0 |
| Approach | 445 | 1.4 | | 0.323 | | 16.7 | LOS B | 4.5 | 35.3 | | | | |
| Intersection | 1621 | 0.8 | | 1.202 | | 58.0 | LOS E | 26.2 | 200.5 | | | | |

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.
LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 6).
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

1 Reduced capacity due to a short lane effect. Short lane queues may extend into the full-length lanes. Some upstream delays at entry to short lanes are not included.

# LANE FLOWS

## Site: 109 [109-PR-101 @ PR-166 (PM) SINGLE]

Four-way intersection with 2-lane approaches (Signals)

Signals - Fixed Time Isolated Cycle Time = 71 seconds (User-Given Phase Times)

**Approach Lane Flows (veh/h)**

South: PR-101

| Mov. From S To Exit: | L2 W | T1 N | R2 E | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 131 | 227 | - | 358 | 0.0 | 346[1] | 1.036 | 100 | 100.0 | 2 |
| Lane 2 | - | - | 72 | 72 | 0.0 | 1067 | 0.067 | 100 | NA | NA |
| Approach | 131 | 227 | 72 | 430 | 0.0 | | 1.036 | | | |

East: PR-166

| Mov. From E To Exit: | L2 S | T1 W | R2 N | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 83 | - | - | 83 | 4.0 | 339 | 0.246 | 100 | 0.0 | 2 |
| Lane 2 | - | 142 | - | 142 | 0.0 | 518 | 0.273 | 100 | NA | NA |
| Lane 3 | - | 50 | 104 | 154 | 0.0 | 564 | 0.273 | 100 | NA | NA |
| Approach | 83 | 192 | 104 | 379 | 0.9 | | 0.273 | | | |

North: PR-101

| Mov. From N To Exit: | L2 E | T1 S | R2 W | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 84 | 239 | 44 | 368 | 0.9 | 306 | 1.202 | 100 | NA | NA |
| Approach | 84 | 239 | 44 | 368 | 0.9 | | 1.202 | | | |

West: PR-166

| Mov. From W To Exit: | L2 N | T1 E | R2 S | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 111 | - | - | 111 | 0.0 | 352 | 0.315 | 100 | 0.0 | 2 |
| Lane 2 | - | 163 | - | 163 | 2.7 | 504 | 0.323 | 100 | NA | NA |
| Lane 3 | - | 75 | 96 | 171 | 1.2 | 530 | 0.323 | 100 | NA | NA |
| Approach | 111 | 238 | 96 | 445 | 1.4 | | 0.323 | | | |

| | Total | %HV | Deg.Satn (v/c) |
|---|---|---|---|
| Intersection | 1621 | 0.8 | 1.202 |

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

1 Reduced capacity due to a short lane effect. Short lane queues may extend into the full-length lanes. Some upstream delays at entry to short lanes are not included.

# INTERSECTION SUMMARY

## Site: 110 [110-PR-122 @ PR-102 (PM)]

New Site
Signals - Fixed Time Isolated Cycle Time = 87 seconds (User-Given Phase Times)

| Intersection Performance - Hourly Values | | | | |
|---|---|---|---|---|
| **Performance Measure** | **Vehicles** | | **Persons** | |
| Travel Speed (Average) | 10.5 | km/h | 10.5 | km/h |
| Travel Distance (Total) | 2296.4 | veh-km/h | 2755.6 | pers-km/h |
| Travel Time (Total) | 218.7 | veh-h/h | 262.4 | pers-h/h |
| Demand Flows (Total) | 2803 | veh/h | 3364 | pers/h |
| Percent Heavy Vehicles (Demand) | 2.0 | % | | |
| Degree of Saturation | 2.106 | | | |
| Practical Spare Capacity | -57.3 | % | | |
| Effective Intersection Capacity | 1331 | veh/h | | |
| Control Delay (Total) | 154.96 | veh-h/h | 185.95 | pers-h/h |
| Control Delay (Average) | 199.0 | sec | 199.0 | sec |
| Control Delay (Worst Lane) | 526.6 | sec | | |
| Control Delay (Worst Movement) | 526.6 | sec | 526.6 | sec |
| Geometric Delay (Average) | 0.0 | sec | | |
| Stop-Line Delay (Average) | 199.0 | sec | | |
| Idling Time (Average) | 196.2 | sec | | |
| Intersection Level of Service (LOS) | LOS F | | | |
| 95% Back of Queue - Vehicles (Worst Lane) | 89.7 | veh | | |
| 95% Back of Queue - Distance (Worst Lane) | 695.3 | m | | |
| Queue Storage Ratio (Worst Lane) | 0.85 | | | |
| Total Effective Stops | 3972 | veh/h | 4766 | pers/h |
| Effective Stop Rate | 1.42 | per veh | 1.42 | per pers |
| Proportion Queued | 0.82 | | 0.82 | |
| Performance Index | 611.8 | | 611.8 | |
| Cost (Total) | 2883.88 | $/h | 2883.88 | $/h |
| Fuel Consumption (Total) | 404.8 | L/h | | |
| Carbon Dioxide (Total) | 956.4 | kg/h | | |
| Hydrocarbons (Total) | 0.104 | kg/h | | |
| Carbon Monoxide (Total) | 0.657 | kg/h | | |
| NOx (Total) | 0.814 | kg/h | | |

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Intersection LOS value for Vehicles is based on average delay for all vehicle movements.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.

| Intersection Performance - Annual Values | | | | |
|---|---|---|---|---|
| **Performance Measure** | **Vehicles** | | **Persons** | |
| Demand Flows (Total) | 1,345,524 | veh/y | 1,614,629 | pers/y |
| Delay | 74,380 | veh-h/y | 89,256 | pers-h/y |
| Effective Stops | 1,906,395 | veh/y | 2,287,674 | pers/y |
| Travel Distance | 1,102,251 | veh-km/y | 1,322,701 | pers-km/y |
| Travel Time | 104,978 | veh-h/y | 125,973 | pers-h/y |
| Cost | 1,384,261 | $/y | 1,384,261 | $/y |
| Fuel Consumption | 194,319 | L/y | | |
| Carbon Dioxide | 459,077 | kg/y | | |
| Hydrocarbons | 50 | kg/y | | |
| Carbon Monoxide | 315 | kg/y | | |
| NOx | 391 | kg/y | | |

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# MOVEMENT SUMMARY

## Site: 110 [110-PR-122 @ PR-102 (PM)]

New Site
Signals - Fixed Time Isolated Cycle Time = 87 seconds (User-Given Phase Times)

**Movement Performance - Vehicles**

| Mov ID | OD Mov | Demand Flows Total veh/h | HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| South: PR-122 | | | | | | | | | | | |
| 3 | L2 | 116 | 2.5 | 0.632 | 40.9 | LOS D | 5.3 | 40.8 | 0.99 | 0.83 | 27.0 |
| 8 | T1 | 248 | 0.0 | 0.632 | 22.5 | LOS C | 13.8 | 104.8 | 0.88 | 0.81 | 29.2 |
| 18 | R2 | 145 | 0.0 | 0.632 | 22.3 | LOS C | 13.8 | 104.8 | 0.88 | 0.81 | 31.9 |
| Approach | | 508 | 0.6 | 0.632 | 26.6 | LOS C | 13.8 | 104.8 | 0.90 | 0.82 | 29.4 |
| East: PR-102 | | | | | | | | | | | |
| 1 | L2 | 24 | 12.5 | 1.035 | 96.7 | LOS F | 20.1 | 155.4 | 1.00 | 1.41 | 19.3 |
| 6 | T1 | 281 | 1.1 | 1.035 | 96.7 | LOS F | 20.1 | 155.4 | 1.00 | 1.41 | 19.4 |
| 16 | R2 | 268 | 1.6 | 0.259 | 3.9 | LOS A | 3.5 | 27.0 | 0.35 | 0.30 | 36.8 |
| Approach | | 573 | 1.8 | 1.035 | 53.3 | LOS D | 20.1 | 155.4 | 0.70 | 0.89 | 23.6 |
| North: PR-122 | | | | | | | | | | | |
| 7 | L2 | 374 | 3.7 | 2.023 | 497.8 | LOS F | 54.4 | 426.0 | 1.00 | 2.45 | 4.4 |
| 4 | T1 | 434 | 2.0 | 0.355 | 20.9 | LOS C | 7.0 | 54.2 | 0.78 | 0.66 | 30.2 |
| 14 | R2 | 268 | 1.6 | 0.254 | 4.9 | LOS A | 4.0 | 30.7 | 0.40 | 0.34 | 36.3 |
| Approach | | 1076 | 2.5 | 2.023 | 182.6 | LOS F | 54.4 | 426.0 | 0.76 | 1.20 | 10.1 |
| West: PR-102 | | | | | | | | | | | |
| 5 | L2 | 277 | 2.0 | 2.106 | 526.6 | LOS F | 89.7 | 695.3 | 1.00 | 2.90 | 4.3 |
| 2 | T1 | 326 | 2.6 | 2.106 | 526.6 | LOS F | 89.7 | 695.3 | 1.00 | 2.90 | 5.8 |
| 12 | R2 | 44 | 5.1 | 0.048 | 1.1 | LOS A | 0.4 | 2.8 | 0.21 | 0.16 | 38.2 |
| Approach | | 646 | 2.5 | 2.106 | 491.0 | LOS F | 89.7 | 695.3 | 0.95 | 2.72 | 5.4 |
| All Vehicles | | 2803 | 2.0 | 2.106 | 199.0 | LOS F | 89.7 | 695.3 | 0.82 | 1.42 | 10.5 |

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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# LANE SUMMARY

## Site: 110 [110-PR-122 @ PR-102 (PM)]

New Site
Signals - Fixed Time Isolated Cycle Time = 87 seconds (User-Given Phase Times)

**Lane Use and Performance**

| | Demand Flows Total veh/h | HV % | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Average Delay sec | Level of Service | 95% Back of Queue Veh | Dist m | Lane Config | Lane Length m | Cap. Adj. % | Prob. Block. % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| South: PR-122 | | | | | | | | | | | | | |
| Lane 1 | 119 | 2.4 | 188 | 0.632 | 100 | 40.9 | LOS D | 5.3 | 40.8 | Full | 500 | 0.0 | 0.0 |
| Lane 2 | 390 | 0.0 | 616 | 0.632 | 100 | 22.3 | LOS C | 13.8 | 104.8 | Full | 500 | 0.0 | 0.0 |
| Approach | 508 | 0.6 | | 0.632 | | 26.6 | LOS C | 13.8 | 104.8 | | | | |
| East: PR-102 | | | | | | | | | | | | | |
| Lane 1 | 305 | 2.0 | 294 | 1.035 | 100 | 96.7 | LOS F | 20.1 | 155.4 | Full | 500 | 0.0 | 0.0 |
| Lane 2 | 268 | 1.6 | 1036 | 0.259 | 100 | 3.9 | LOS A | 3.5 | 27.0 | Short | 65 | 0.0 | NA |
| Approach | 573 | 1.8 | | 1.035 | | 53.3 | LOS D | 20.1 | 155.4 | | | | |
| North: PR-122 | | | | | | | | | | | | | |
| Lane 1 | 374 | 3.7 | 185 | 2.023 | 100 | 497.8 | LOS F | 54.4 | 426.0 | Short | 80 | 0.0 | NA |
| Lane 2 | 217 | 2.0 | 611 | 0.355 | 100 | 20.9 | LOS C | 7.0 | 54.2 | Full | 200 | 0.0 | 75.4[8] |
| Lane 3 | 217 | 2.0 | 611 | 0.355 | 100 | 20.9 | LOS C | 7.0 | 54.2 | Full | 200 | 0.0 | 0.0 |
| Lane 4 | 268 | 1.6 | 1055 | 0.254 | 100 | 4.9 | LOS A | 4.0 | 30.7 | Short | 80 | 0.0 | NA |
| Approach | 1076 | 2.5 | | 2.023 | | 182.6 | LOS F | 54.4 | 426.0 | | | | |
| West: PR-102 | | | | | | | | | | | | | |
| Lane 1 | 603 | 2.3 | 286[1] | 2.106 | 100 | 526.6 | LOS F | 89.7 | 695.3 | Full | 500 | 0.0 | 35.1 |
| Lane 2 | 44 | 5.1 | 914 | 0.048 | 100 | 1.1 | LOS A | 0.4 | 2.8 | Short | 50 | 0.0 | NA |
| Approach | 646 | 2.5 | | 2.106 | | 491.0 | LOS F | 89.7 | 695.3 | | | | |
| Intersection | 2803 | 2.0 | | 2.106 | | 199.0 | LOS F | 89.7 | 695.3 | | | | |

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.
LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 6).
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

1 Reduced capacity due to a short lane effect. Short lane queues may extend into the full-length lanes. Some upstream delays at entry to short lanes are not included.
8 Probability of Blockage has been set on the basis of a queue that overflows from a short lane.

# LANE FLOWS

## Site: 110 [110-PR-122 @ PR-102 (PM)]

New Site
Signals - Fixed Time Isolated Cycle Time = 87 seconds (User-Given Phase Times)

**Approach Lane Flows (veh/h)**

South: PR-122

| Mov. From S To Exit: | L2 W | T1 N | R2 E | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 116 | 3 | - | 119 | 2.4 | 188 | 0.632 | 100 | NA | NA |
| Lane 2 | - | 245 | 145 | 390 | 0.0 | 616 | 0.632 | 100 | NA | NA |
| Approach | 116 | 248 | 145 | 508 | 0.6 | | 0.632 | | | |

East: PR-102

| Mov. From E To Exit: | L2 S | T1 W | R2 N | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 24 | 281 | - | 305 | 2.0 | 294 | 1.035 | 100 | NA | NA |
| Lane 2 | - | - | 268 | 268 | 1.6 | 1036 | 0.259 | 100 | 0.0 | 1 |
| Approach | 24 | 281 | 268 | 573 | 1.8 | | 1.035 | | | |

North: PR-122

| Mov. From N To Exit: | L2 E | T1 S | R2 W | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 374 | - | - | 374 | 3.7 | 185 | 2.023 | 100 | 100.0 | 2 |
| Lane 2 | - | 217 | - | 217 | 2.0 | 611 | 0.355 | 100 | NA | NA |
| Lane 3 | - | 217 | - | 217 | 2.0 | 611 | 0.355 | 100 | NA | NA |
| Lane 4 | - | - | 268 | 268 | 1.6 | 1055 | 0.254 | 100 | 0.0 | 3 |
| Approach | 374 | 434 | 268 | 1076 | 2.5 | | 2.023 | | | |

West: PR-102

| Mov. From W To Exit: | L2 N | T1 E | R2 S | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 277 | 326 | - | 603 | 2.3 | 286[1] | 2.106 | 100 | NA | NA |
| Lane 2 | - | - | 44 | 44 | 5.1 | 914 | 0.048 | 100 | 0.0 | 1 |
| Approach | 277 | 326 | 44 | 646 | 2.5 | | 2.106 | | | |

| | Total | %HV | Deg.Satn (v/c) |
|---|---|---|---|
| Intersection | 2803 | 2.0 | 2.106 |

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

1 Reduced capacity due to a short lane effect. Short lane queues may extend into the full-length lanes. Some upstream delays at entry to short lanes are not included.

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# INTERSECTION SUMMARY

## Site: 111 [111-PR-102 @ PR-166 (PM)]

Four-way intersection with 2-lane approaches (Signals)

Signals - Fixed Time Isolated Cycle Time = 112 seconds (User-Given Phase Times)

| Intersection Performance - Hourly Values | | | | |
|---|---|---|---|---|
| **Performance Measure** | **Vehicles** | | **Persons** | |
| Travel Speed (Average) | 35.1 | km/h | 35.1 | km/h |
| Travel Distance (Total) | 1492.2 | veh-km/h | 1790.7 | pers-km/h |
| Travel Time (Total) | 42.5 | veh-h/h | 51.0 | pers-h/h |
| | | | | |
| Demand Flows (Total) | 1469 | veh/h | 1763 | pers/h |
| Percent Heavy Vehicles (Demand) | 0.3 | % | | |
| Degree of Saturation | 0.761 | | | |
| Practical Spare Capacity | 18.2 | % | | |
| Effective Intersection Capacity | 1929 | veh/h | | |
| | | | | |
| Control Delay (Total) | 10.85 | veh-h/h | 13.03 | pers-h/h |
| Control Delay (Average) | 26.6 | sec | 26.6 | sec |
| Control Delay (Worst Lane) | 44.4 | sec | | |
| Control Delay (Worst Movement) | 44.4 | sec | 44.4 | sec |
| Geometric Delay (Average) | 0.0 | sec | | |
| Stop-Line Delay (Average) | 26.6 | sec | | |
| Idling Time (Average) | 22.8 | sec | | |
| Intersection Level of Service (LOS) | LOS C | | | |
| | | | | |
| 95% Back of Queue - Vehicles (Worst Lane) | 26.7 | veh | | |
| 95% Back of Queue - Distance (Worst Lane) | 203.0 | m | | |
| Queue Storage Ratio (Worst Lane) | 0.25 | | | |
| Total Effective Stops | 1122 | veh/h | 1347 | pers/h |
| Effective Stop Rate | 0.76 | per veh | 0.76 | per pers |
| Proportion Queued | 0.85 | | 0.85 | |
| Performance Index | 179.5 | | 179.5 | |
| | | | | |
| Cost (Total) | 507.60 | $/h | 507.60 | $/h |
| Fuel Consumption (Total) | 133.6 | L/h | | |
| Carbon Dioxide (Total) | 313.9 | kg/h | | |
| Hydrocarbons (Total) | 0.031 | kg/h | | |
| Carbon Monoxide (Total) | 0.294 | kg/h | | |
| NOx (Total) | 0.121 | kg/h | | |

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Intersection LOS value for Vehicles is based on average delay for all vehicle movements.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.

| Intersection Performance - Annual Values | | | | |
|---|---|---|---|---|
| **Performance Measure** | **Vehicles** | | **Persons** | |
| Demand Flows (Total) | 705,027 | veh/y | 846,033 | pers/y |
| Delay | 5,210 | veh-h/y | 6,252 | pers-h/y |
| Effective Stops | 538,772 | veh/y | 646,527 | pers/y |
| Travel Distance | 716,261 | veh-km/y | 859,513 | pers-km/y |
| Travel Time | 20,388 | veh-h/y | 24,466 | pers-h/y |
| | | | | |
| Cost | 243,646 | $/y | 243,646 | $/y |
| Fuel Consumption | 64,105 | L/y | | |
| Carbon Dioxide | 150,679 | kg/y | | |
| Hydrocarbons | 15 | kg/y | | |
| Carbon Monoxide | 141 | kg/y | | |
| NOx | 58 | kg/y | | |

# MOVEMENT SUMMARY

## Site: 111 [111-PR-102 @ PR-166 (PM)]

Four-way intersection with 2-lane approaches (Signals)

Signals - Fixed Time Isolated Cycle Time = 112 seconds (User-Given Phase Times)

**Movement Performance - Vehicles**

| Mov ID | OD Mov | Demand Flows Total veh/h | HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| South: PR-166 | | | | | | | | | | | |
| 3 | L2 | 68 | 0.0 | 0.304 | 44.4 | LOS D | 3.4 | 26.2 | 0.94 | 0.73 | 32.4 |
| 8 | T1 | 56 | 0.0 | 0.398 | 27.5 | LOS C | 3.8 | 28.5 | 0.95 | 0.75 | 27.4 |
| 18 | R2 | 40 | 0.0 | 0.398 | 27.5 | LOS C | 3.8 | 28.5 | 0.95 | 0.75 | 38.4 |
| Approach | | 164 | 0.0 | 0.398 | 34.5 | LOS C | 3.8 | 28.5 | 0.95 | 0.74 | 31.6 |
| East: PR-102 | | | | | | | | | | | |
| 1 | L2 | 40 | 0.0 | 0.648 | 18.5 | LOS B | 25.2 | 192.5 | 0.75 | 0.68 | 44.0 |
| 6 | T1 | 526 | 0.9 | 0.648 | 18.5 | LOS B | 25.2 | 192.5 | 0.75 | 0.68 | 42.7 |
| 16 | R2 | 48 | 0.0 | 0.648 | 18.5 | LOS B | 25.2 | 192.5 | 0.75 | 0.68 | 29.8 |
| Approach | | 614 | 0.7 | 0.648 | 18.5 | LOS B | 25.2 | 192.5 | 0.75 | 0.68 | 41.3 |
| North: Inter American University | | | | | | | | | | | |
| 7 | L2 | 53 | 0.0 | 0.673 | 42.4 | LOS D | 8.0 | 60.7 | 1.00 | 0.92 | 24.0 |
| 4 | T1 | 40 | 0.0 | 0.673 | 42.4 | LOS D | 8.0 | 60.7 | 1.00 | 0.92 | 24.9 |
| 14 | R2 | 68 | 0.0 | 0.673 | 42.4 | LOS D | 8.0 | 60.7 | 1.00 | 0.92 | 24.1 |
| Approach | | 160 | 0.0 | 0.673 | 42.4 | LOS D | 8.0 | 60.7 | 1.00 | 0.92 | 24.3 |
| West: PR-102 | | | | | | | | | | | |
| 5 | L2 | 112 | 0.0 | 0.761 | 28.7 | LOS C | 26.7 | 203.0 | 0.89 | 0.82 | 27.1 |
| 2 | T1 | 335 | 0.0 | 0.761 | 28.7 | LOS C | 26.7 | 203.0 | 0.89 | 0.82 | 37.7 |
| 12 | R2 | 84 | 0.0 | 0.761 | 28.7 | LOS C | 26.7 | 203.0 | 0.89 | 0.82 | 38.8 |
| Approach | | 531 | 0.0 | 0.761 | 28.7 | LOS C | 26.7 | 203.0 | 0.89 | 0.82 | 35.0 |
| All Vehicles | | 1469 | 0.3 | 0.761 | 26.6 | LOS C | 26.7 | 203.0 | 0.85 | 0.76 | 35.1 |

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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# LANE SUMMARY

## Site: 111 [111-PR-102 @ PR-166 (PM)]

Four-way intersection with 2-lane approaches (Signals)

Signals - Fixed Time Isolated Cycle Time = 112 seconds (User-Given Phase Times)

**Lane Use and Performance**

| | Demand Flows Total veh/h | HV % | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Average Delay sec | Level of Service | 95% Back of Queue Veh | 95% Back of Queue Dist m | Lane Config | Lane Length m | Cap. Adj. % | Prob. Block. % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| South: PR-166 | | | | | | | | | | | | | |
| Lane 1 | 68 | 0.0 | 223 | 0.304 | 100 | 44.4 | LOS D | 3.4 | 26.2 | Full | 500 | 0.0 | 0.0 |
| Lane 2 | 96 | 0.0 | 241 | 0.398 | 100 | 27.5 | LOS C | 3.8 | 28.5 | Full | 500 | 0.0 | 0.0 |
| Approach | 164 | 0.0 | | 0.398 | | 34.5 | LOS C | 3.8 | 28.5 | | | | |
| East: PR-102 | | | | | | | | | | | | | |
| Lane 1 | 614 | 0.7 | 946 | 0.648 | 100 | 18.5 | LOS B | 25.2 | 192.5 | Full | 500 | 0.0 | 0.0 |
| Approach | 614 | 0.7 | | 0.648 | | 18.5 | LOS B | 25.2 | 192.5 | | | | |
| North: Inter American University | | | | | | | | | | | | | |
| Lane 1 | 160 | 0.0 | 238 | 0.673 | 100 | 42.4 | LOS D | 8.0 | 60.7 | Full | 500 | 0.0 | 0.0 |
| Approach | 160 | 0.0 | | 0.673 | | 42.4 | LOS D | 8.0 | 60.7 | | | | |
| West: PR-102 | | | | | | | | | | | | | |
| Lane 1 | 531 | 0.0 | 698 | 0.761 | 100 | 28.7 | LOS C | 26.7 | 203.0 | Full | 500 | 0.0 | 0.0 |
| Approach | 531 | 0.0 | | 0.761 | | 28.7 | LOS C | 26.7 | 203.0 | | | | |
| Intersection | 1469 | 0.3 | | 0.761 | | 26.6 | LOS C | 26.7 | 203.0 | | | | |

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.
LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 6).
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

# LANE FLOWS

## Site: 111 [111-PR-102 @ PR-166 (PM)]

Four-way intersection with 2-lane approaches (Signals)

Signals - Fixed Time Isolated Cycle Time = 112 seconds (User-Given Phase Times)

**Approach Lane Flows (veh/h)**

South: PR-166

| Mov. From S To Exit: | L2 W | T1 N | R2 E | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 68 | - | - | 68 | 0.0 | 223 | 0.304 | 100 | NA | NA |
| Lane 2 | - | 56 | 40 | 96 | 0.0 | 241 | 0.398 | 100 | NA | NA |
| Approach | 68 | 56 | 40 | 164 | 0.0 | | 0.398 | | | |

East: PR-102

| Mov. From E To Exit: | L2 S | T1 W | R2 N | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 40 | 526 | 48 | 614 | 0.7 | 946 | 0.648 | 100 | NA | NA |
| Approach | 40 | 526 | 48 | 614 | 0.7 | | 0.648 | | | |

North: Inter American University

| Mov. From N To Exit: | L2 E | T1 S | R2 W | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 53 | 40 | 68 | 160 | 0.0 | 238 | 0.673 | 100 | NA | NA |
| Approach | 53 | 40 | 68 | 160 | 0.0 | | 0.673 | | | |

West: PR-102

| Mov. From W To Exit: | L2 N | T1 E | R2 S | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 112 | 335 | 84 | 531 | 0.0 | 698 | 0.761 | 100 | NA | NA |
| Approach | 112 | 335 | 84 | 531 | 0.0 | | 0.761 | | | |

| | Total | %HV | Deg.Satn (v/c) |
|---|---|---|---|
| Intersection | 1469 | 0.3 | 0.761 |

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

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# Appendix C:

## Signal Warrant Analysis Data and Results

# Warrants Summary

| Information | | | |
|---|---|---|---|
| Analyst | | Intersection | 104-A |
| Agency/Co | BYA | Jurisdiction | San Germán - Lajas |
| Date Performed | 2/15/2023 | Units | U.S. Metric |
| Project ID | | Time Period Analyzed | 6:00 AM - 6:00 PM |
| East/West Street | PR-320 | North/South Street | PR-122 (West Ramp) |
| File Name | HCS2010_Warrants_INT_104A.xhy | Major Street | East-West |

Project Description

| General | | | | Roadway Network | |
|---|---|---|---|---|---|
| Major Street Speed (kph) | 75 | ☐ | Population < 10,000 | Two Major Routes | ☐ |
| Nearest Signal (m) | 500 | ☐ | Coordinated Signal System | Weekend Count | ☐ |
| Crashes (per year) | 0 | ☐ | Adequate Trials of Alternatives | 5-yr Growth Factor | 2 |

| *Geometry and Traffic* | EB | | | WB | | | NB | | | SB | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | LT | TH | RT | LT | TH | RT | LT | TH | RT | LT | TH | RT |
| Number of lanes, N | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 1 | 0 |
| Lane usage | L | TR | | | LTR | | | LTR | | | LTR | |
| Vehicle Volume Averages (vph) | 67 | 49 | 1 | 1 | 12 | 13 | 1 | 1 | 1 | 99 | 1 | 37 |
| Peds (ped/h) / Gaps (gaps/h) | -- | 0 / 0 | -- | -- | 0 / 0 | -- | -- | 0 / 0 | -- | -- | 0 / 0 | -- |
| Delay (s/veh) / (veh-hr) | -- | 0 / 0 | -- | -- | 0 / 0 | -- | -- | 0 / 0 | -- | -- | 0 / 0 | -- |

| | |
|---|---|
| ***Warrant 1: Eight-Hour Vehicular Volume*** | ☐ |
| 1 A. Minimum Vehicular Volumes (Both major approaches --and-- higher minor approach) --or-- | ☐ |
| 1 B. Interruption of Continuous Traffic (Both major approaches --and-- higher minor approach) --or-- | ☐ |
| 1 (56%) Vehicular --and-- Interruption Volumes (Both major approaches --and-- higher minor approach) | ☐ |
| ***Warrant 2: Four-Hour Vehicular Volume*** | ☐ |
| 2 A. Four-Hour Vehicular Volumes (Both major approaches --and-- higher minor approach) | ☐ |
| ***Warrant 3: Peak Hour*** | ☐ |
| 3 A. Peak-Hour Conditions (Minor delay --and-- minor volume --and-- total volume ) --or-- | ☐ |
| 3 B. Peak- Hour Vehicular Volumes (Both major approaches --and-- higher minor approach) | ☐ |
| ***Warrant 4: Pedestrian Volume*** | ☐ |
| 4 A. Four Hour Volumes --or-- | ☐ |
| 4 B. One-Hour Volumes | ☐ |
| ***Warrant 5: School Crossing*** | ☐ |
| 5. Student Volumes --and-- | ☐ |
| 5. Gaps Same Period | ☐ |
| ***Warrant 6: Coordinated Signal System*** | ☐ |
| 6. Degree of Platooning (Predominant direction or both directions) | ☐ |
| ***Warrant 7: Crash Experience*** | ☐ |
| 7 A. Adequate trials of alternatives, observance and enforcement failed --and-- | ☐ |
| 7 B. Reported crashes susceptible to correction by signal (12-month period) --and-- | ☐ |
| 7 C. (56%) Volumes for Warrants 1A, 1B --or-- 4 are satisfied | ☐ |

| | |
|---|---|
| ***Warrant 8: Roadway Network*** | ☐ |
| 8 A. Weekday Volume (Peak hour total --and-- projected warrants 1, 2 or 3) --or-- | ☐ |
| 8 B. Weekend Volume (Five hours total) | ☐ |
| ***Warrant 9: Grade Crossing*** | ☐ |
| 9 A. Grade Crossing within 43 m --and-- | ☐ |
| 9 B. Peak-Hour Vehicular Volumes | ☐ |

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# Warrants Volume

## Information

| | | | |
|---|---|---|---|
| Analyst | | Intersection | 104-A |
| Agency/Co | BYA | Jurisdiction | San Germán - Lajas |
| Date Performed | 2/15/2023 | Units | U.S. Metric |
| Project ID | | Time Period Analyzed | 6:00 AM - 6:00 PM |
| East/West Street | PR-320 | North/South Street | PR-122 (West Ramp) |
| File Name | HCS2010_Warrants_INT_104A.xhy | Major Street | East-West |

Project Description

## Warrant 1

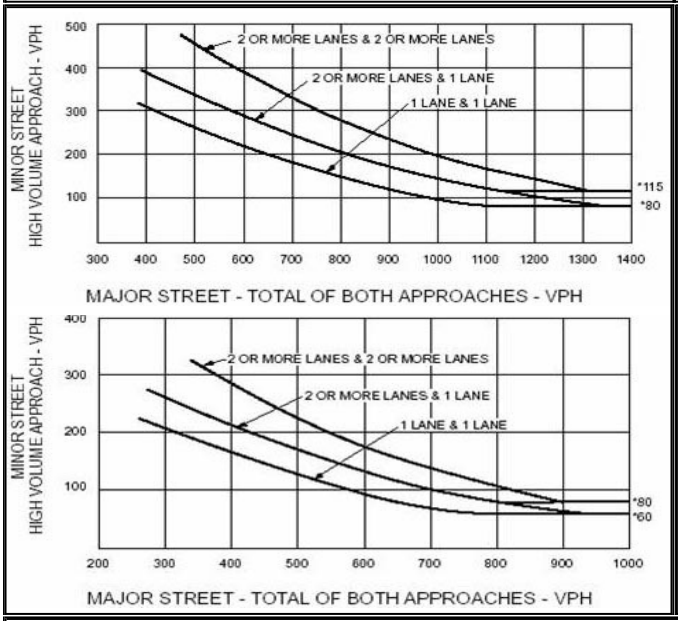
### Condition A—Minimum Vehicular Volume

| Number of lanes for moving traffic on each approach | | Vehicles per hour on major street (total of both approaches) | | | | Vehicles per hour on higher-volume minor-street approach (one direction only) | | | |
|---|---|---|---|---|---|---|---|---|---|
| Major Street | Minor Street | 100% | 80% | 70% | 56% | 100% | 80% | 70% | 56% |
| 1 | 1 | 500 | 400 | 350 | 280 | 150 | 120 | 105 | 84 |
| 2 or more | 1 | 600 | 480 | 420 | 336 | 150 | 120 | 105 | 84 |
| 2 or more | 2 or more | 600 | 480 | 420 | 336 | 200 | 160 | 140 | 112 |
| 1 | 2 or more | 500 | 400 | 350 | 280 | 200 | 160 | 140 | 112 |

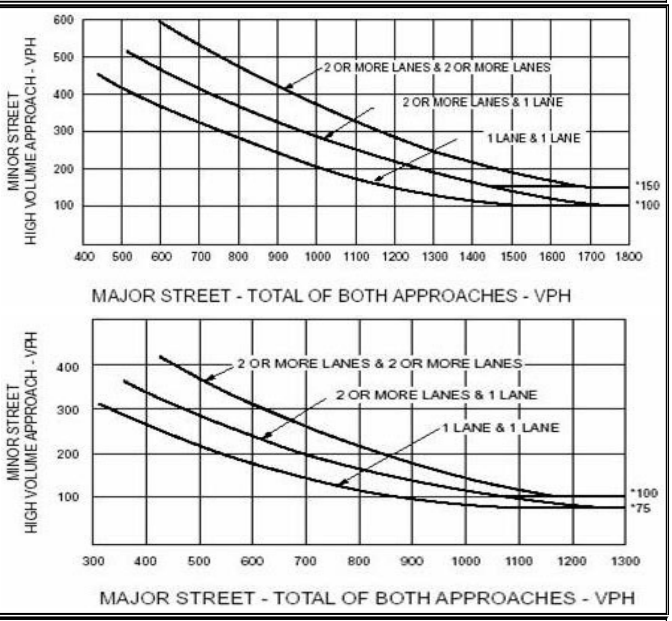
### Condition B—Interruption of Continuous Traffic

| Number of lanes for moving traffic on each approach | | Vehicles per hour on major street (total of both approaches) | | | | Vehicles per hour on higher-volume minor-street approach (one direction only) | | | |
|---|---|---|---|---|---|---|---|---|---|
| Major Street | Minor Street | 100% | 80% | 70% | 56% | 100% | 80% | 70% | 56% |
| 1 | 1 | 750 | 600 | 525 | 420 | 75 | 60 | 53 | 42 |
| 2 or more | 1 | 900 | 720 | 630 | 504 | 75 | 60 | 53 | 42 |
| 2 or more | 2 or more | 900 | 720 | 630 | 504 | 100 | 80 | 70 | 56 |
| 1 | 2 or more | 750 | 600 | 525 | 420 | 100 | 80 | 70 | 56 |

## Warrant 2




## Warrant 3




## Volume Summary

**Major Street Lanes** 2+ **Minor Street Lanes** 1 **Speed** 75 **Population** 10000+

| Hours | Major Volume | Minor Volume | Total Volume | 1A (70%) | 1A (56%) | 1B (70%) | 1B (56%) | 2 (70%) | 3A (70%) | 3B (70%) |
|---|---|---|---|---|---|---|---|---|---|---|
| 06-07 | 42 | 24 | 69 | No | No | No | No | No | No | No |
| 07-08 | 208 | 139 | 350 | No | No | No | No | No | No | No |
| 08-09 | 145 | 92 | 240 | No | No | No | No | No | No | No |
| 09-10 | 119 | 132 | 254 | No | No | No | No | No | No | No |
| 10-11 | 99 | 115 | 217 | No | No | No | No | No | No | No |
| 11-12 | 111 | 113 | 227 | No | No | No | No | No | No | No |
| 12-13 | 157 | 118 | 278 | No | No | No | No | No | No | No |
| 13-14 | 217 | 185 | 405 | No | No | No | No | No | No | No |
| 14-15 | 228 | 185 | 416 | No | No | No | No | No | No | No |
| 15-16 | 271 | 232 | 506 | No | No | No | No | No | No | No |
| 16-17 | 68 | 164 | 235 | No | No | No | No | No | No | No |
| 17-18 | 78 | 157 | 238 | No | No | No | No | No | No | No |
| Totals | 1743 | 1656 | 3435 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

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# Warrants Summary

| Information | | | |
|---|---|---|---|
| Analyst | | Intersection | 104-B |
| Agency/Co | BYA | Jurisdiction | San Germán - Lajas |
| Date Performed | 2/15/2023 | Units | U.S. Metric |
| Project ID | Extension PR-122 | Time Period Analyzed | 6:00 AM - 6:00 PM |
| East/West Street | PR-320 | North/South Street | PR-122 (East Ramp) |
| File Name | HCS2010_Warrants_INT_104B.xhy | Major Street | East-West |

Project Description *Extension PR-122*

| General | | | | Roadway Network | |
|---|---|---|---|---|---|
| Major Street Speed (kph) | 75 | ☐ | Population < 10,000 | Two Major Routes | ☐ |
| Nearest Signal (m) | 500 | ☐ | Coordinated Signal System | Weekend Count | ☐ |
| Crashes (per year) | 0 | ☐ | Adequate Trials of Alternatives | 5-yr Growth Factor | 2 |

| ***Geometry and Traffic*** | EB | | | WB | | | NB | | | SB | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | LT | TH | RT | LT | TH | RT | LT | TH | RT | LT | TH | RT |
| Number of lanes, N | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Lane usage | L | T | | | TR | | | | | | LR | |
| Vehicle Volume Averages (vph) | 12 | 136 | 0 | 0 | 19 | 56 | 0 | 0 | 0 | 17 | 0 | 6 |
| Peds (ped/h) / Gaps (gaps/h) | -- | 0 / 0 | -- | -- | 0 / 0 | -- | -- | 0 / 0 | -- | -- | 0 / 0 | -- |
| Delay (s/veh) / (veh-hr) | -- | 0 / 0 | -- | -- | 0 / 0 | -- | -- | 0 / 0 | -- | -- | 0 / 0 | -- |

| | |
|---|---|
| ***Warrant 1: Eight-Hour Vehicular Volume*** | ☐ |
| 1 A. Minimum Vehicular Volumes (Both major approaches --and-- higher minor approach) --or-- | ☐ |
| 1 B. Interruption of Continuous Traffic (Both major approaches --and-- higher minor approach) --or-- | ☐ |
| 1 (56%) Vehicular --and-- Interruption Volumes (Both major approaches --and-- higher minor approach) | ☐ |
| ***Warrant 2: Four-Hour Vehicular Volume*** | ☐ |
| 2 A. Four-Hour Vehicular Volumes (Both major approaches --and-- higher minor approach) | ☐ |
| ***Warrant 3: Peak Hour*** | ☐ |
| 3 A. Peak-Hour Conditions (Minor delay --and-- minor volume --and-- total volume ) --or-- | ☐ |
| 3 B. Peak- Hour Vehicular Volumes (Both major approaches --and-- higher minor approach) | ☐ |
| ***Warrant 4: Pedestrian Volume*** | ☐ |
| 4 A. Four Hour Volumes --or-- | ☐ |
| 4 B. One-Hour Volumes | ☐ |
| ***Warrant 5: School Crossing*** | ☐ |
| 5. Student Volumes --and-- | ☐ |
| 5. Gaps Same Period | ☐ |
| ***Warrant 6: Coordinated Signal System*** | ☐ |
| 6. Degree of Platooning (Predominant direction or both directions) | ☐ |
| ***Warrant 7: Crash Experience*** | ☐ |
| 7 A. Adequate trials of alternatives, observance and enforcement failed --and-- | ☐ |
| 7 B. Reported crashes susceptible to correction by signal (12-month period) --and-- | ☐ |
| 7 C. (56%) Volumes for Warrants 1A, 1B --or-- 4 are satisfied | ☐ |

| | |
|---|---|
| ***Warrant 8: Roadway Network*** | ☐ |
| 8 A. Weekday Volume (Peak hour total --and-- projected warrants 1, 2 or 3) --or-- | ☐ |
| 8 B. Weekend Volume (Five hours total) | ☐ |
| ***Warrant 9: Grade Crossing*** | ☐ |
| 9 A. Grade Crossing within 43 m --and-- | ☐ |
| 9 B. Peak-Hour Vehicular Volumes | ☐ |

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# Warrants Volume

## Information

| | | | |
|---|---|---|---|
| Analyst | | Intersection | 104-B |
| Agency/Co | BYA | Jurisdiction | San Germán - Lajas |
| Date Performed | 2/15/2023 | Units | U.S. Metric |
| Project ID | Extension PR-122 | Time Period Analyzed | 6:00 AM - 6:00 PM |
| East/West Street | PR-320 | North/South Street | PR-122 (East Ramp) |
| File Name | HCS2010_Warrants_INT_104B.xhy | Major Street | East-West |

Project Description *Extension PR-122*

## *Warrant 1*

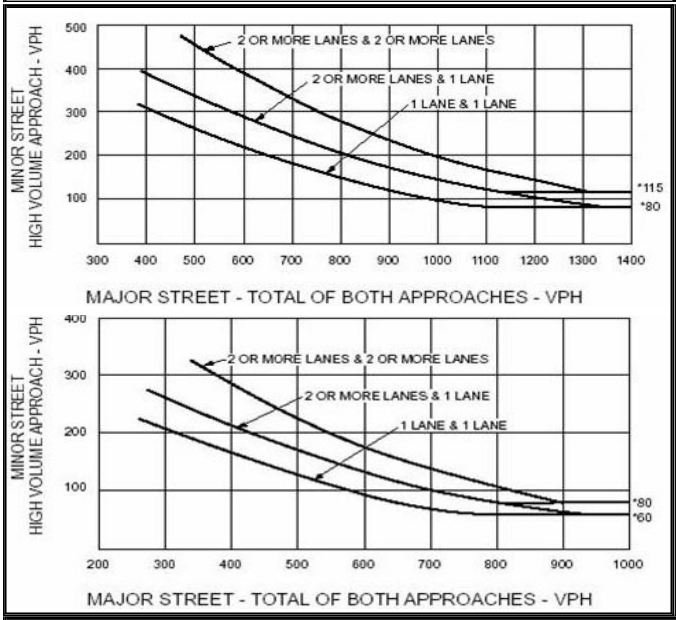
### Condition A—Minimum Vehicular Volume

| Number of lanes for moving traffic on each approach | | Vehicles per hour on major street (total of both approaches) | | | | Vehicles per hour on higher-volume minor-street approach (one direction only) | | | |
|---|---|---|---|---|---|---|---|---|---|
| Major Street | Minor Street | 100% | 80% | 70% | 56% | 100% | 80% | 70% | 56% |
| 1 | 1 | 500 | 400 | 350 | 280 | 150 | 120 | 105 | 84 |
| 2 or more | 1 | 600 | 480 | 420 | 336 | 150 | 120 | 105 | 84 |
| 2 or more | 2 or more | 600 | 480 | 420 | 336 | 200 | 160 | 140 | 112 |
| 1 | 2 or more | 500 | 400 | 350 | 280 | 200 | 160 | 140 | 112 |

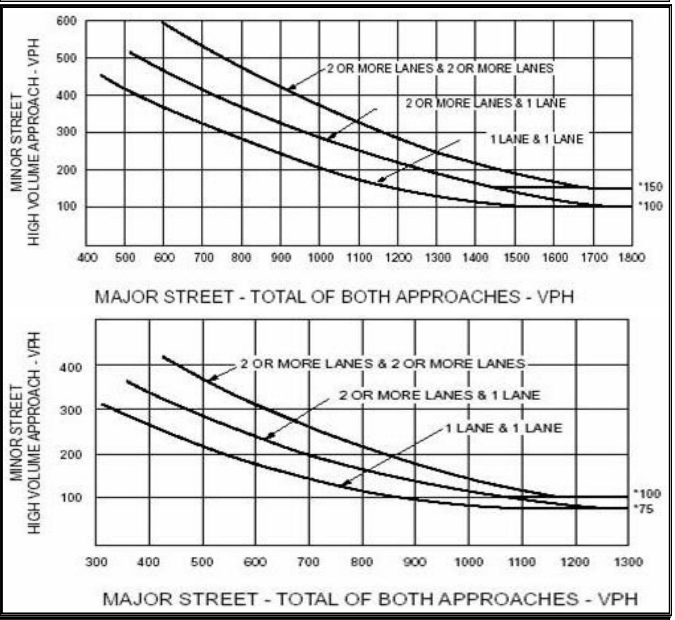
### Condition B—Interruption of Continuous Traffic

| Number of lanes for moving traffic on each approach | | Vehicles per hour on major street (total of both approaches) | | | | Vehicles per hour on higher-volume minor-street approach (one direction only) | | | |
|---|---|---|---|---|---|---|---|---|---|
| Major Street | Minor Street | 100% | 80% | 70% | 56% | 100% | 80% | 70% | 56% |
| 1 | 1 | 750 | 600 | 525 | 420 | 75 | 60 | 53 | 42 |
| 2 or more | 1 | 900 | 720 | 630 | 504 | 75 | 60 | 53 | 42 |
| 2 or more | 2 or more | 900 | 720 | 630 | 504 | 100 | 80 | 70 | 56 |
| 1 | 2 or more | 750 | 600 | 525 | 420 | 100 | 80 | 70 | 56 |

## *Warrant 2*




## *Warrant 3*




## *Volume Summary*

**Major Street Lanes** 2+ **Minor Street Lanes** 1 **Speed** 75 **Population** 10000+

| Hours | Major Volume | Minor Volume | Total Volume | 1A (70%) | 1A (56%) | 1B (70%) | 1B (56%) | 2 (70%) | 3A (70%) | 3B (70%) |
|---|---|---|---|---|---|---|---|---|---|---|
| 06-07 | 140 | 13 | 153 | No | No | No | No | No | No | No |
| 07-08 | 253 | 28 | 281 | No | No | No | No | No | No | No |
| 08-09 | 182 | 21 | 203 | No | No | No | No | No | No | No |
| 09-10 | 196 | 15 | 211 | No | No | No | No | No | No | No |
| 10-11 | 162 | 19 | 181 | No | No | No | No | No | No | No |
| 11-12 | 167 | 11 | 178 | No | No | No | No | No | No | No |
| 12-13 | 179 | 31 | 210 | No | No | No | No | No | No | No |
| 13-14 | 262 | 32 | 294 | No | No | No | No | No | No | No |
| 14-15 | 286 | 36 | 322 | No | No | No | No | No | No | No |
| 15-16 | 396 | 34 | 430 | No | No | No | No | No | No | No |
| 16-17 | 241 | 23 | 264 | No | No | No | No | No | No | No |
| 17-18 | 237 | 25 | 262 | No | No | No | No | No | No | No |
| Totals | 2701 | 288 | 2989 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

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# Warrants Summary

| Information | | | |
|---|---|---|---|
| Analyst | | Intersection | 107 |
| Agency/Co | BYA | Jurisdiction | San Germán - Lajas |
| Date Performed | 2/15/2023 | Units | U.S. Metric |
| Project ID | Extension PR-122 | Time Period Analyzed | 6:00 AM - 6:00 PM |
| East/West Street | PR166 | North/South Street | PR-122 |
| File Name | HCS2010_Warrants_INT_107.xhy | Major Street | North-South |

Project Description *Extension PR-122*

| General | | | | Roadway Network | |
|---|---|---|---|---|---|
| Major Street Speed (kph) | 64 | ☐ | Population < 10,000 | Two Major Routes | ☐ |
| Nearest Signal (m) | 500 | ☐ | Coordinated Signal System | Weekend Count | ☐ |
| Crashes (per year) | 0 | ☐ | Adequate Trials of Alternatives | 5-yr Growth Factor | 2 |

| *Geometry and Traffic* | EB | | | WB | | | NB | | | SB | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | LT | TH | RT | LT | TH | RT | LT | TH | RT | LT | TH | RT |
| Number of lanes, N | 1 | 0 | 1 | 0 | 0 | 0 | 1 | 2 | 0 | 0 | 2 | 0 |
| Lane usage | L | | R | | | | L | T | | | TR | |
| Vehicle Volume Averages (vph) | 90 | 0 | 214 | 0 | 0 | 0 | 207 | 49 | 0 | 0 | 97 | 266 |
| Peds (ped/h) / Gaps (gaps/h) | -- | 0 / 0 | -- | -- | 0 / 0 | -- | -- | 0 / 0 | -- | -- | 0 / 0 | -- |
| Delay (s/veh) / (veh-hr) | -- | 0 / 0 | -- | -- | 0 / 0 | -- | -- | 0 / 0 | -- | -- | 0 / 0 | -- |

| | |
|---|---|
| ***Warrant 1: Eight-Hour Vehicular Volume*** | ☐ |
| 1 A. Minimum Vehicular Volumes (Both major approaches --and-- higher minor approach) --or-- | ☐ |
| 1 B. Interruption of Continuous Traffic (Both major approaches --and-- higher minor approach) --or-- | ☐ |
| 1 (80%) Vehicular --and-- Interruption Volumes (Both major approaches --and-- higher minor approach) | ☐ |
| ***Warrant 2: Four-Hour Vehicular Volume*** | ☑ |
| 2 A. Four-Hour Vehicular Volumes (Both major approaches --and-- higher minor approach) | ☑ |
| ***Warrant 3: Peak Hour*** | ☐ |
| 3 A. Peak-Hour Conditions (Minor delay --and-- minor volume --and-- total volume ) --or-- | ☐ |
| 3 B. Peak- Hour Vehicular Volumes (Both major approaches --and-- higher minor approach) | ☐ |
| ***Warrant 4: Pedestrian Volume*** | ☐ |
| 4 A. Four Hour Volumes --or-- | ☐ |
| 4 B. One-Hour Volumes | ☐ |
| ***Warrant 5: School Crossing*** | ☐ |
| 5. Student Volumes --and-- | ☐ |
| 5. Gaps Same Period | ☐ |
| ***Warrant 6: Coordinated Signal System*** | ☐ |
| 6. Degree of Platooning (Predominant direction or both directions) | ☐ |
| ***Warrant 7: Crash Experience*** | ☐ |
| 7 A. Adequate trials of alternatives, observance and enforcement failed --and-- | ☐ |
| 7 B. Reported crashes susceptible to correction by signal (12-month period) --and-- | ☐ |
| 7 C. (80%) Volumes for Warrants 1A, 1B --or-- 4 are satisfied | ☑ |

| | |
|---|---|
| ***Warrant 8: Roadway Network*** | ☐ |
| 8 A. Weekday Volume (Peak hour total --and-- projected warrants 1, 2 or 3) --or-- | ☐ |
| 8 B. Weekend Volume (Five hours total) | ☐ |
| ***Warrant 9: Grade Crossing*** | ☐ |
| 9 A. Grade Crossing within 43 m --and-- | ☐ |
| 9 B. Peak-Hour Vehicular Volumes | ☐ |

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# Warrants Volume

## Information

| | | | |
|---|---|---|---|
| Analyst | | Intersection | 107 |
| Agency/Co | BYA | Jurisdiction | San Germán - Lajas |
| Date Performed | 2/15/2023 | Units | U.S. Metric |
| Project ID | Extension PR-122 | Time Period Analyzed | 6:00 AM - 6:00 PM |
| East/West Street | PR166 | North/South Street | PR-122 |
| File Name | HCS2010_Warrants_INT_107.xhy | Major Street | North-South |

Project Description *Extension PR-122*

## *Warrant 1*

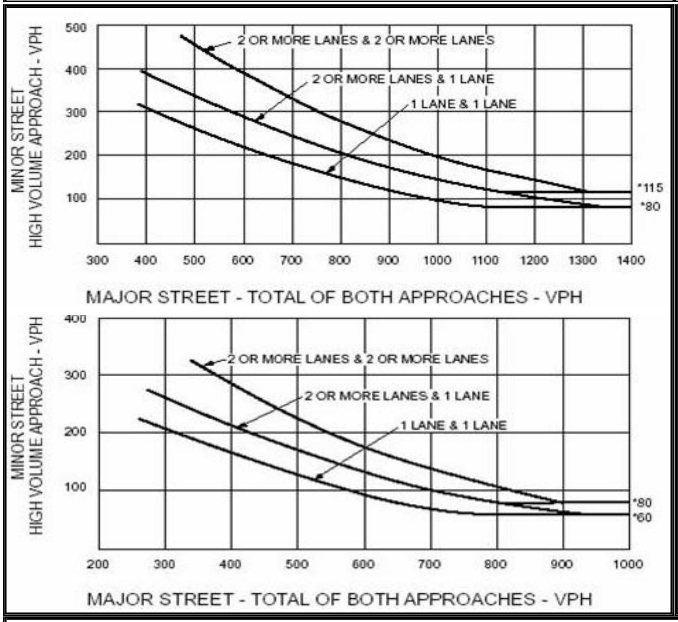
### Condition A—Minimum Vehicular Volume

| Number of lanes for moving traffic on each approach | | Vehicles per hour on major street (total of both approaches) | | | | Vehicles per hour on higher-volume minor-street approach (one direction only) | | | |
|---|---|---|---|---|---|---|---|---|---|
| Major Street | Minor Street | 100% | 80% | 70% | 56% | 100% | 80% | 70% | 56% |
| 1 | 1 | 500 | 400 | 350 | 280 | 150 | 120 | 105 | 84 |
| 2 or more | 1 | 600 | 480 | 420 | 336 | 150 | 120 | 105 | 84 |
| 2 or more | 2 or more | 600 | 480 | 420 | 336 | 200 | 160 | 140 | 112 |
| 1 | 2 or more | 500 | 400 | 350 | 280 | 200 | 160 | 140 | 112 |

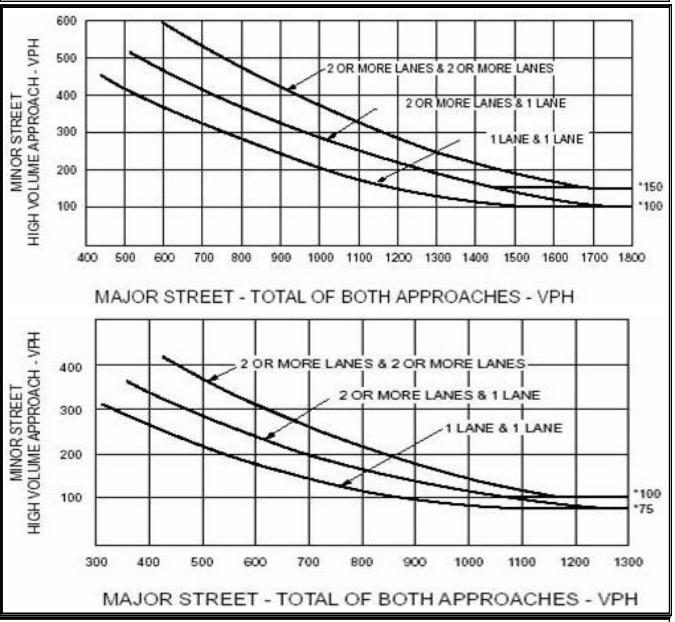
### Condition B—Interruption of Continuous Traffic

| Number of lanes for moving traffic on each approach | | Vehicles per hour on major street (total of both approaches) | | | | Vehicles per hour on higher-volume minor-street approach (one direction only) | | | |
|---|---|---|---|---|---|---|---|---|---|
| Major Street | Minor Street | 100% | 80% | 70% | 56% | 100% | 80% | 70% | 56% |
| 1 | 1 | 750 | 600 | 525 | 420 | 75 | 60 | 53 | 42 |
| 2 or more | 1 | 900 | 720 | 630 | 504 | 75 | 60 | 53 | 42 |
| 2 or more | 2 or more | 900 | 720 | 630 | 504 | 100 | 80 | 70 | 56 |
| 1 | 2 or more | 750 | 600 | 525 | 420 | 100 | 80 | 70 | 56 |

## *Warrant 2*




## *Warrant 3*




## *Volume Summary*

**Major Street Lanes** 2+ **Minor Street Lanes** 2+ **Speed** 64 **Population** 10000+

| Hours | Major Volume | Minor Volume | Total Volume | 1A (100%) | 1A (80%) | 1B (100%) | 1B (80%) | 2 (100%) | 3A (100%) | 3B (100%) |
|---|---|---|---|---|---|---|---|---|---|---|
| 06-07 | 466 | 110 | 576 | No | No | No | No | No | No | No |
| 07-08 | 643 | 453 | 1096 | Yes | Yes | No | No | Yes | No | No |
| 08-09 | 539 | 327 | 866 | No | Yes | No | No | No | No | No |
| 09-10 | 480 | 247 | 727 | No | Yes | No | No | No | No | No |
| 10-11 | 494 | 260 | 754 | No | Yes | No | No | No | No | No |
| 11-12 | 563 | 257 | 820 | No | Yes | No | No | No | No | No |
| 12-13 | 653 | 316 | 969 | Yes | Yes | No | No | No | No | No |
| 13-14 | 669 | 369 | 1038 | Yes | Yes | No | No | Yes | No | No |
| 14-15 | 786 | 405 | 1191 | Yes | Yes | No | Yes | Yes | No | No |
| 15-16 | 786 | 449 | 1235 | Yes | Yes | No | Yes | Yes | No | No |
| 16-17 | 687 | 304 | 991 | Yes | Yes | No | No | No | No | No |
| 17-18 | 679 | 163 | 842 | No | Yes | No | No | No | No | No |
| Totals | 7445 | 3660 | 11105 | 6 | 11 | 0 | 2 | 4 | 0 | 0 |

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# Appendix D:

## Capacity Analysis Data and Results– Proposed Condition Opening Year (2028 Horizon)

# INTERSECTION SUMMARY

## Site: 104A [104A-PR-122 @ PR-321 (AM)]

Stop (Two-Way)

| Intersection Performance - Hourly Values | | | | |
|---|---|---|---|---|
| **Performance Measure** | **Vehicles** | | **Persons** | |
| Travel Speed (Average) | 30.0 | km/h | 30.0 | km/h |
| Travel Distance (Total) | 313.9 | veh-km/h | 376.7 | pers-km/h |
| Travel Time (Total) | 10.5 | veh-h/h | 12.6 | pers-h/h |
| | | | | |
| Demand Flows (Total) | 550 | veh/h | 661 | pers/h |
| Percent Heavy Vehicles (Demand) | 1.0 | % | | |
| Degree of Saturation | 0.255 | | | |
| Practical Spare Capacity | 214.1 | % | | |
| Effective Intersection Capacity | 2161 | veh/h | | |
| | | | | |
| Control Delay (Total) | 1.07 | veh-h/h | 1.28 | pers-h/h |
| Control Delay (Average) | 7.0 | sec | 7.0 | sec |
| Control Delay (Worst Lane) | 10.6 | sec | | |
| Control Delay (Worst Movement) | 11.2 | sec | 11.2 | sec |
| Geometric Delay (Average) | 0.0 | sec | | |
| Stop-Line Delay (Average) | 7.0 | sec | | |
| Idling Time (Average) | 6.6 | sec | | |
| Intersection Level of Service (LOS) | NA | | | |
| | | | | |
| 95% Back of Queue - Vehicles (Worst Lane) | 1.2 | veh | | |
| 95% Back of Queue - Distance (Worst Lane) | 9.4 | m | | |
| Queue Storage Ratio (Worst Lane) | 0.02 | | | |
| Total Effective Stops | 55 | veh/h | 66 | pers/h |
| Effective Stop Rate | 0.10 | per veh | 0.10 | per pers |
| Proportion Queued | 0.18 | | 0.18 | |
| Performance Index | 11.8 | | 11.8 | |
| | | | | |
| Cost (Total) | 131.77 | $/h | 131.77 | $/h |
| Fuel Consumption (Total) | 44.8 | L/h | | |
| Carbon Dioxide (Total) | 105.5 | kg/h | | |
| Hydrocarbons (Total) | 0.011 | kg/h | | |
| Carbon Monoxide (Total) | 0.148 | kg/h | | |
| NOx (Total) | 0.099 | kg/h | | |

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
NA: Intersection LOS for Vehicles is Not Applicable for two-way sign control since the average intersection delay is not a good LOS measure due to zero delays associated with major road movements.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.

| Intersection Performance - Annual Values | | | | |
|---|---|---|---|---|
| **Performance Measure** | **Vehicles** | | **Persons** | |
| Demand Flows (Total) | 264,209 | veh/y | 317,051 | pers/y |
| Delay | 513 | veh-h/y | 615 | pers-h/y |
| Effective Stops | 26,391 | veh/y | 31,670 | pers/y |
| Travel Distance | 150,682 | veh-km/y | 180,818 | pers-km/y |
| Travel Time | 5,031 | veh-h/y | 6,037 | pers-h/y |
| | | | | |
| Cost | 63,247 | $/y | 63,247 | $/y |
| Fuel Consumption | 21,490 | L/y | | |
| Carbon Dioxide | 50,658 | kg/y | | |
| Hydrocarbons | 5 | kg/y | | |
| Carbon Monoxide | 71 | kg/y | | |
| NOx | 47 | kg/y | | |

# LANE FLOWS

## Site: 104A [104A-PR-122 @ PR-321 (AM)]

Stop (Two-Way)

| Approach Lane Flows (veh/h) | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| South: Local | | | | | | | | | | |
| Mov. From S To Exit: | L2 W | T1 N | R2 E | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
| Lane 1 | 4 | 4 | 4 | 13 | 0.0 | 841 | 0.015 | 100 | NA | NA |
| Approach | 4 | 4 | 4 | 13 | 0.0 | | 0.015 | | | |
| East: PR-321 | | | | | | | | | | |
| Mov. From E To Exit: | L2 S | T1 W | R2 N | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
| Lane 1 | 4 | 40 | 28 | 72 | 0.0 | 1736 | 0.042 | 100 | NA | NA |
| Approach | 4 | 40 | 28 | 72 | 0.0 | | 0.042 | | | |
| North: PR-122 (Southbound) | | | | | | | | | | |
| Mov. From N To Exit: | L2 E | T1 S | R2 W | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
| Lane 1 | 112 | 4 | 104 | 220 | 1.9 | 865 | 0.255 | 100 | NA | NA |
| Approach | 112 | 4 | 104 | 220 | 1.9 | | 0.255 | | | |
| West: PR-321 | | | | | | | | | | |
| Mov. From W To Exit: | L2 N | T1 E | R2 S | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
| Lane 1 | 141 | - | - | 141 | 1.2 | 934 | 0.151 | 100 | 0.0 | 2 |
| Lane 2 | - | 100 | 4 | 104 | 0.0 | 1905 | 0.055 | 100 | NA | NA |
| Approach | 141 | 100 | 4 | 245 | 0.7 | | 0.151 | | | |
| | Total | %HV | Deg.Satn (v/c) | | | | | | | |
| Intersection | 550 | 1.0 | | 0.255 | | | | | | |

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

# LANE SUMMARY

## Site: 104A [104A-PR-122 @ PR-321 (AM)]

Stop (Two-Way)

| Lane Use and Performance | Demand Flows Total veh/h | HV % | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Average Delay sec | Level of Service | 95% Back of Queue Veh | Dist m | Lane Config | Lane Length m | Cap. Adj. % | Prob. Block. % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Local | | | | | | | | | | | | | |
| Lane 1 | 13 | 0.0 | 841 | 0.015 | 100 | 9.3 | LOS A | 0.1 | 0.5 | Full | 500 | 0.0 | 0.0 |
| Approach | 13 | 0.0 | | 0.015 | | 9.3 | LOS A | 0.1 | 0.5 | | | | |
| East: PR-321 | | | | | | | | | | | | | |
| Lane 1 | 72 | 0.0 | 1736 | 0.042 | 100 | 0.7 | LOS A | 0.0 | 0.3 | Full | 120 | 0.0 | 0.0 |
| Approach | 72 | 0.0 | | 0.042 | | 0.7 | NA | 0.0 | 0.3 | | | | |
| North: PR-122 (Southbound) | | | | | | | | | | | | | |
| Lane 1 | 220 | 1.9 | 865 | 0.255 | 100 | 10.6 | LOS B | 1.2 | 9.4 | Full | 160 | 0.0 | 0.0 |
| Approach | 220 | 1.9 | | 0.255 | | 10.6 | LOS B | 1.2 | 9.4 | | | | |
| West: PR-321 | | | | | | | | | | | | | |
| Lane 1 | 141 | 1.2 | 934 | 0.151 | 100 | 9.5 | LOS A | 0.7 | 5.7 | Short | 60 | 0.0 | NA |
| Lane 2 | 104 | 0.0 | 1905 | 0.055 | 100 | 0.0 | LOS A | 0.0 | 0.0 | Full | 500 | 0.0 | 0.0 |
| Approach | 245 | 0.7 | | 0.151 | | 5.5 | LOS A | 0.7 | 5.7 | | | | |
| Intersection | 550 | 1.0 | | 0.255 | | 7.0 | NA | 1.2 | 9.4 | | | | |

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.
LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection).
Minor Road Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 6).
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road lanes.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

# MOVEMENT SUMMARY

## Site: 104A [104A-PR-122 @ PR-321 (AM)]

Stop (Two-Way)

| Movement Performance - Vehicles | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mov ID | OD Mov | Demand Flows Total veh/h | HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
| South: Local | | | | | | | | | | | |
| 3 | L2 | 4 | 0.0 | 0.015 | 9.6 | LOS A | 0.1 | 0.5 | 0.29 | 0.15 | 31.8 |
| 8 | T1 | 4 | 0.0 | 0.015 | 9.6 | LOS A | 0.1 | 0.5 | 0.29 | 0.15 | 24.7 |
| 18 | R2 | 4 | 0.0 | 0.015 | 8.8 | LOS A | 0.1 | 0.5 | 0.29 | 0.15 | 23.5 |
| Approach | | 13 | 0.0 | 0.015 | 9.3 | LOS A | 0.1 | 0.5 | 0.29 | 0.15 | 26.9 |
| East: PR-321 | | | | | | | | | | | |
| 1 | L2 | 4 | 0.0 | 0.042 | 2.7 | LOS A | 0.0 | 0.3 | 0.03 | 0.00 | 28.5 |
| 6 | T1 | 40 | 0.0 | 0.042 | 0.6 | LOS A | 0.0 | 0.3 | 0.03 | 0.00 | 67.3 |
| 16 | R2 | 28 | 0.0 | 0.042 | 0.6 | LOS A | 0.0 | 0.3 | 0.03 | 0.00 | 51.4 |
| Approach | | 72 | 0.0 | 0.042 | 0.7 | NA | 0.0 | 0.3 | 0.03 | 0.00 | 57.5 |
| North: PR-122 (Southbound) | | | | | | | | | | | |
| 7 | L2 | 112 | 1.8 | 0.255 | 11.2 | LOS B | 1.2 | 9.4 | 0.19 | 0.12 | 8.9 |
| 4 | T1 | 4 | 0.0 | 0.255 | 10.8 | LOS B | 1.2 | 9.4 | 0.19 | 0.12 | 22.0 |
| 14 | R2 | 104 | 2.0 | 0.255 | 9.9 | LOS A | 1.2 | 9.4 | 0.19 | 0.12 | 35.8 |
| Approach | | 220 | 1.9 | 0.255 | 10.6 | LOS B | 1.2 | 9.4 | 0.19 | 0.12 | 18.3 |
| West: PR-321 | | | | | | | | | | | |
| 5 | L2 | 141 | 1.2 | 0.151 | 9.5 | LOS A | 0.7 | 5.7 | 0.34 | 0.19 | 45.8 |
| 2 | T1 | 100 | 0.0 | 0.055 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.00 | 40.0 |
| 12 | R2 | 4 | 0.0 | 0.055 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.00 | 63.2 |
| Approach | | 245 | 0.7 | 0.151 | 5.5 | LOS A | 0.7 | 5.7 | 0.19 | 0.11 | 43.7 |
| All Vehicles | | 550 | 1.0 | 0.255 | 7.0 | NA | 1.2 | 9.4 | 0.18 | 0.10 | 30.0 |

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Minor Road Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

# INTERSECTION SUMMARY

## Site: 104B [104B-PR-122 @ PR-321 (AM)]

Stop (Two-Way)

| Intersection Performance - Hourly Values | | | | |
|---|---|---|---|---|
| **Performance Measure** | **Vehicles** | | **Persons** | |
| Travel Speed (Average) | 53.2 | km/h | 53.2 | km/h |
| Travel Distance (Total) | 253.1 | veh-km/h | 303.7 | pers-km/h |
| Travel Time (Total) | 4.8 | veh-h/h | 5.7 | pers-h/h |
| | | | | |
| Demand Flows (Total) | 413 | veh/h | 496 | pers/h |
| Percent Heavy Vehicles (Demand) | 1.1 | % | | |
| Degree of Saturation | 0.104 | | | |
| Practical Spare Capacity | 840.3 | % | | |
| Effective Intersection Capacity | 3966 | veh/h | | |
| | | | | |
| Control Delay (Total) | 0.15 | veh-h/h | 0.18 | pers-h/h |
| Control Delay (Average) | 1.3 | sec | 1.3 | sec |
| Control Delay (Worst Lane) | 9.3 | sec | | |
| Control Delay (Worst Movement) | 10.0 | sec | 10.0 | sec |
| Geometric Delay (Average) | 0.0 | sec | | |
| Stop-Line Delay (Average) | 1.3 | sec | | |
| Idling Time (Average) | 1.3 | sec | | |
| Intersection Level of Service (LOS) | NA | | | |
| | | | | |
| 95% Back of Queue - Vehicles (Worst Lane) | 0.2 | veh | | |
| 95% Back of Queue - Distance (Worst Lane) | 1.4 | m | | |
| Queue Storage Ratio (Worst Lane) | 0.00 | | | |
| Total Effective Stops | 7 | veh/h | 8 | pers/h |
| Effective Stop Rate | 0.02 | per veh | 0.02 | per pers |
| Proportion Queued | 0.03 | | 0.03 | |
| Performance Index | 4.3 | | 4.3 | |
| | | | | |
| Cost (Total) | 79.93 | $/h | 79.93 | $/h |
| Fuel Consumption (Total) | 32.6 | L/h | | |
| Carbon Dioxide (Total) | 76.7 | kg/h | | |
| Hydrocarbons (Total) | 0.008 | kg/h | | |
| Carbon Monoxide (Total) | 0.116 | kg/h | | |
| NOx (Total) | 0.074 | kg/h | | |

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
NA: Intersection LOS for Vehicles is Not Applicable for two-way sign control since the average intersection delay is not a good LOS measure due to zero delays associated with major road movements.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.

| Intersection Performance - Annual Values | | | | |
|---|---|---|---|---|
| **Performance Measure** | **Vehicles** | | **Persons** | |
| Demand Flows (Total) | 198,401 | veh/y | 238,082 | pers/y |
| Delay | 74 | veh-h/y | 89 | pers-h/y |
| Effective Stops | 3,307 | veh/y | 3,969 | pers/y |
| Travel Distance | 121,479 | veh-km/y | 145,774 | pers-km/y |
| Travel Time | 2,285 | veh-h/y | 2,742 | pers-h/y |
| | | | | |
| Cost | 38,365 | $/y | 38,365 | $/y |
| Fuel Consumption | 15,626 | L/y | | |
| Carbon Dioxide | 36,825 | kg/y | | |
| Hydrocarbons | 4 | kg/y | | |
| Carbon Monoxide | 56 | kg/y | | |
| NOx | 35 | kg/y | | |

# LANE FLOWS

## Site: 104B [104B-PR-122 @ PR-321 (AM)]

Stop (Two-Way)

**Approach Lane Flows (veh/h)**

East: PR-321

| Mov. From E To Exit: | T1 W | R2 N | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 44 | 111 | 156 | 1.6 | 1638 | 0.095 | 100 | NA | NA |
| Approach | 44 | 111 | 156 | 1.6 | | 0.095 | | | |

North: PR-122 (Northbound)

| Mov. From N To Exit: | L2 E | R2 W | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 20 | 20 | 40 | 0.0 | 873 | 0.046 | 100 | NA | NA |
| Approach | 20 | 20 | 40 | 0.0 | | 0.046 | | | |

West: PR-321

| Mov. From W To Exit: | L2 N | T1 E | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 20 | - | 20 | 0.0 | 900 | 0.022 | 100 | NA | NA |
| Lane 2 | - | 198 | 198 | 1.1 | 1898 | 0.104 | 100 | NA | NA |
| Approach | 20 | 198 | 218 | 1.0 | | 0.104 | | | |

| | Total | %HV | Deg.Satn (v/c) |
|---|---|---|---|
| Intersection | 413 | 1.1 | 0.104 |

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

# LANE SUMMARY

## Site: 104B [104B-PR-122 @ PR-321 (AM)]

Stop (Two-Way)

| Lane Use and Performance | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Demand Flows Total veh/h | HV % | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Average Delay sec | Level of Service | 95% Back of Queue Veh | Dist m | Lane Config | Lane Length m | Cap. Adj. % | Prob. Block. % |
| East: PR-321 | | | | | | | | | | | | | |
| Lane 1 | 156 | 1.6 | 1638 | 0.095 | 100 | 0.0 | LOS A | 0.0 | 0.0 | Full | 500 | 0.0 | 0.0 |
| Approach | 156 | 1.6 | | 0.095 | | 0.0 | NA | 0.0 | 0.0 | | | | |
| North: PR-122 (Northbound) | | | | | | | | | | | | | |
| Lane 1 | 40 | 0.0 | 873 | 0.046 | 100 | 9.3 | LOS A | 0.2 | 1.4 | Full | 160 | 0.0 | 0.0 |
| Approach | 40 | 0.0 | | 0.046 | | 9.3 | LOS A | 0.2 | 1.4 | | | | |
| West: PR-321 | | | | | | | | | | | | | |
| Lane 1 | 20 | 0.0 | 900 | 0.022 | 100 | 9.1 | LOS A | 0.1 | 0.7 | Full | 120 | 0.0 | 0.0 |
| Lane 2 | 198 | 1.1 | 1898 | 0.104 | 100 | 0.0 | LOS A | 0.0 | 0.0 | Full | 120 | 0.0 | 0.0 |
| Approach | 218 | 1.0 | | 0.104 | | 0.8 | LOS A | 0.1 | 0.7 | | | | |
| Intersection | 413 | 1.1 | | 0.104 | | 1.3 | NA | 0.2 | 1.4 | | | | |

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.
LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection).
Minor Road Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 6).
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road lanes.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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# MOVEMENT SUMMARY

## Site: 104B [104B-PR-122 @ PR-321 (AM)]

Stop (Two-Way)

| Movement Performance - Vehicles | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Mov ID | OD Mov | Demand Flows Total veh/h | HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
| East: PR-321 | | | | | | | | | | | |
| 6 | T1 | 44 | 0.0 | 0.095 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.00 | 64.9 |
| 16 | R2 | 111 | 2.3 | 0.095 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.00 | 60.3 |
| Approach | | 156 | 1.6 | 0.095 | 0.0 | NA | 0.0 | 0.0 | 0.00 | 0.00 | 61.4 |
| North: PR-122 (Northbound) | | | | | | | | | | | |
| 7 | L2 | 20 | 0.0 | 0.046 | 10.0 | LOS A | 0.2 | 1.4 | 0.17 | 0.09 | 36.6 |
| 14 | R2 | 20 | 0.0 | 0.046 | 8.7 | LOS A | 0.2 | 1.4 | 0.17 | 0.09 | 16.3 |
| Approach | | 40 | 0.0 | 0.046 | 9.3 | LOS A | 0.2 | 1.4 | 0.17 | 0.09 | 26.5 |
| West: PR-321 | | | | | | | | | | | |
| 5 | L2 | 20 | 0.0 | 0.022 | 9.1 | LOS A | 0.1 | 0.7 | 0.34 | 0.17 | 31.4 |
| 2 | T1 | 198 | 1.1 | 0.104 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.00 | 57.6 |
| Approach | | 218 | 1.0 | 0.104 | 0.8 | LOS A | 0.1 | 0.7 | 0.03 | 0.02 | 55.5 |
| All Vehicles | | 413 | 1.1 | 0.104 | 1.3 | NA | 0.2 | 1.4 | 0.03 | 0.02 | 53.2 |

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Minor Road Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

# INTERSECTION SUMMARY

## Site: 107 [107-PR-122 @ PR-166 (AM)]

Signals - Fixed Time Isolated Cycle Time = 64 seconds (User-Given Phase Times)

| Intersection Performance - Hourly Values | | | | |
|---|---|---|---|---|
| **Performance Measure** | **Vehicles** | | **Persons** | |
| Travel Speed (Average) | 44.1 | km/h | 44.1 | km/h |
| Travel Distance (Total) | 1269.8 | veh-km/h | 1523.8 | pers-km/h |
| Travel Time (Total) | 28.8 | veh-h/h | 34.5 | pers-h/h |
| Demand Flows (Total) | 1247 | veh/h | 1497 | pers/h |
| Percent Heavy Vehicles (Demand) | 1.8 | % | | |
| Degree of Saturation | 0.698 | | | |
| Practical Spare Capacity | 28.9 | % | | |
| Effective Intersection Capacity | 1786 | veh/h | | |
| Control Delay (Total) | 5.54 | veh-h/h | 6.65 | pers-h/h |
| Control Delay (Average) | 16.0 | sec | 16.0 | sec |
| Control Delay (Worst Lane) | 23.6 | sec | | |
| Control Delay (Worst Movement) | 23.6 | sec | 23.6 | sec |
| Geometric Delay (Average) | 0.0 | sec | | |
| Stop-Line Delay (Average) | 16.0 | sec | | |
| Idling Time (Average) | 12.7 | sec | | |
| Intersection Level of Service (LOS) | LOS B | | | |
| 95% Back of Queue - Vehicles (Worst Lane) | 10.7 | veh | | |
| 95% Back of Queue - Distance (Worst Lane) | 83.0 | m | | |
| Queue Storage Ratio (Worst Lane) | 0.10 | | | |
| Total Effective Stops | 796 | veh/h | 955 | pers/h |
| Effective Stop Rate | 0.64 | per veh | 0.64 | per pers |
| Proportion Queued | 0.75 | | 0.75 | |
| Performance Index | 65.2 | | 65.2 | |
| Cost (Total) | 408.02 | $/h | 408.02 | $/h |
| Fuel Consumption (Total) | 131.1 | L/h | | |
| Carbon Dioxide (Total) | 309.5 | kg/h | | |
| Hydrocarbons (Total) | 0.029 | kg/h | | |
| Carbon Monoxide (Total) | 0.395 | kg/h | | |
| NOx (Total) | 0.345 | kg/h | | |

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Intersection LOS value for Vehicles is based on average delay for all vehicle movements.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.

| Intersection Performance - Annual Values | | | | |
|---|---|---|---|---|
| **Performance Measure** | **Vehicles** | | **Persons** | |
| Demand Flows (Total) | 598,632 | veh/y | 718,358 | pers/y |
| Delay | 2,661 | veh-h/y | 3,193 | pers-h/y |
| Effective Stops | 381,991 | veh/y | 458,390 | pers/y |
| Travel Distance | 609,524 | veh-km/y | 731,429 | pers-km/y |
| Travel Time | 13,811 | veh-h/y | 16,573 | pers-h/y |
| Cost | 195,850 | $/y | 195,850 | $/y |
| Fuel Consumption | 62,939 | L/y | | |
| Carbon Dioxide | 148,577 | kg/y | | |
| Hydrocarbons | 14 | kg/y | | |
| Carbon Monoxide | 190 | kg/y | | |
| NOx | 166 | kg/y | | |

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# LANE FLOWS

## Site: 107 [107-PR-122 @ PR-166 (AM)]

Signals - Fixed Time Isolated Cycle Time = 64 seconds (User-Given Phase Times)

**Approach Lane Flows (veh/h)**

South: PR-122

| Mov. From S To Exit: | L2 W | T1 N | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 313 | - | 313 | 2.2 | 608 | 0.514 | 100 | 0.0 | 2 |
| Lane 2 | - | 44 | 44 | 0.0 | 653 | 0.068 | 100 | NA | NA |
| Lane 3 | - | 44 | 44 | 0.0 | 653 | 0.068 | 100 | NA | NA |
| Approach | 313 | 88 | 401 | 1.7 | | 0.514 | | | |

North: PR-122

| Mov. From N To Exit: | T1 S | R2 W | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 48 | - | 48 | 0.0 | 297 | 0.163 | 75[5] | NA | NA |
| Lane 2 | - | 255 | 255 | 1.8 | 1172 | 0.217 | 100 | NA | NA |
| Approach | 48 | 255 | 303 | 1.5 | | 0.217 | | | |

West: PR-166

| Mov. From W To Exit: | L2 N | R2 S | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 199 | - | 199 | 2.3 | 553 | 0.359 | 100 | NA | NA |
| Lane 2 | - | 345 | 345 | 1.9 | 494 | 0.698 | 100 | NA | NA |
| Approach | 199 | 345 | 543 | 2.0 | | 0.698 | | | |

| | Total | %HV | Deg.Satn (v/c) |
|---|---|---|---|
| Intersection | 1247 | 1.8 | 0.698 |

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

5 Lane under-utilisation found by the program

# LANE SUMMARY

## Site: 107 [107-PR-122 @ PR-166 (AM)]

Signals - Fixed Time Isolated Cycle Time = 64 seconds (User-Given Phase Times)

**Lane Use and Performance**

| | Demand Flows Total veh/h | HV % | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Average Delay sec | Level of Service | 95% Back of Queue Veh | Dist m | Lane Config | Lane Length m | Cap. Adj. % | Prob. Block. % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| South: PR-122 | | | | | | | | | | | | | |
| Lane 1 | 313 | 2.2 | 608 | 0.514 | 100 | 17.3 | LOS B | 8.3 | 64.4 | Short | 80 | 0.0 | NA |
| Lane 2 | 44 | 0.0 | 653 | 0.068 | 100 | 14.1 | LOS B | 0.9 | 7.1 | Full | 500 | 0.0 | 0.0 |
| Lane 3 | 44 | 0.0 | 653 | 0.068 | 100 | 14.1 | LOS B | 0.9 | 7.1 | Full | 500 | 0.0 | 0.0 |
| Approach | 401 | 1.7 | | 0.514 | | 16.6 | LOS B | 8.3 | 64.4 | | | | |
| North: PR-122 | | | | | | | | | | | | | |
| Lane 1 | 48 | 0.0 | 297 | 0.163 | 75[5] | 23.6 | LOS C | 1.3 | 10.2 | Full | 500 | 0.0 | 0.0 |
| Lane 2 | 255 | 1.8 | 1172 | 0.217 | 100 | 2.6 | LOS A | 2.2 | 17.2 | Full | 500 | 0.0 | 0.0 |
| Approach | 303 | 1.5 | | 0.217 | | 5.9 | LOS A | 2.2 | 17.2 | | | | |
| West: PR-166 | | | | | | | | | | | | | |
| Lane 1 | 199 | 2.3 | 553 | 0.359 | 100 | 17.3 | LOS B | 5.0 | 38.7 | Full | 500 | 0.0 | 0.0 |
| Lane 2 | 345 | 1.9 | 494 | 0.698 | 100 | 23.4 | LOS C | 10.7 | 83.0 | Full | 500 | 0.0 | 0.0 |
| Approach | 543 | 2.0 | | 0.698 | | 21.2 | LOS C | 10.7 | 83.0 | | | | |
| Intersection | 1247 | 1.8 | | 0.698 | | 16.0 | LOS B | 10.7 | 83.0 | | | | |

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.
LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 6).
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

5 Lane under-utilisation found by the program

# MOVEMENT SUMMARY

## Site: 107 [107-PR-122 @ PR-166 (AM)]

Signals - Fixed Time Isolated Cycle Time = 64 seconds (User-Given Phase Times)

| Movement Performance - Vehicles | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Mov ID | OD Mov | Demand Flows Total veh/h | HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
| South: PR-122 | | | | | | | | | | | |
| 3 | L2 | 313 | 2.2 | 0.514 | 17.3 | LOS B | 8.3 | 64.4 | 0.85 | 0.72 | 46.5 |
| 8 | T1 | 88 | 0.0 | 0.068 | 14.1 | LOS B | 0.9 | 7.1 | 0.70 | 0.53 | 41.6 |
| Approach | | 401 | 1.7 | 0.514 | 16.6 | LOS B | 8.3 | 64.4 | 0.81 | 0.68 | 45.3 |
| North: PR-122 | | | | | | | | | | | |
| 4 | T1 | 48 | 0.0 | 0.163 | 23.6 | LOS C | 1.3 | 10.2 | 0.90 | 0.67 | 38.6 |
| 14 | R2 | 255 | 1.8 | 0.217 | 2.6 | LOS A | 2.2 | 17.2 | 0.33 | 0.28 | 44.9 |
| Approach | | 303 | 1.5 | 0.217 | 5.9 | LOS A | 2.2 | 17.2 | 0.42 | 0.34 | 43.8 |
| West: PR-166 | | | | | | | | | | | |
| 5 | L2 | 199 | 2.3 | 0.359 | 17.3 | LOS B | 5.0 | 38.7 | 0.82 | 0.68 | 44.7 |
| 12 | R2 | 345 | 1.9 | 0.698 | 23.4 | LOS C | 10.7 | 83.0 | 0.94 | 0.83 | 42.8 |
| Approach | | 543 | 2.0 | 0.698 | 21.2 | LOS C | 10.7 | 83.0 | 0.89 | 0.77 | 43.5 |
| All Vehicles | | 1247 | 1.8 | 0.698 | 16.0 | LOS B | 10.7 | 83.0 | 0.75 | 0.64 | 44.1 |

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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# TIMING ANALYSIS

## Site: 107 [107-PR-122 @ PR-166 (AM)]

Signals - Fixed Time Isolated Cycle Time = 64 seconds (User-Given Phase Times)

**Phase Times specified by the user**
**Phase Sequence: Leading Left Turn**
**Reference Phase: Phase A**
**Input Phase Sequence: A, B, C**
**Output Phase Sequence: A, B, C**

**Movement Timing Information**

| Mov ID | Mov Class | Mov Type | PHASE MATRIX [ From | To | First Green Oppd | Priority | Und ] [ From | To | Second Green Oppd | Priority | Und ] | Lost Time 1st Grn sec | Lost Time 2nd Grn sec | ReqMovTime 1st Grn sec | ReqMovTime 2nd Grn sec | Eff Green 1st Grn sec | Eff Green 2nd Grn sec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| South | | PR-122 | | | | | | | | | | | | | | | |
| 3 | # | | *A | B | | | | | | | | 4 | | 16.6 | | 22 | |
| 8 | # | | A | B | | | | | | | | 4 | | 10.0 Min | | 22 | |
| North | | PR-122 | | | | | | | | | | | | | | | |
| 4 | # | | *B | C | | | | | | | | 4 | | 10.0 Min | | 10 | |
| 14 | # | Slip/ Bypass | A | B | Yes | | | B | A | | | 13 | 4 | 0.0 1 | 0.0 1 | 13 | 34 |
| West | | PR-166 | | | | | | | | | | | | | | | |
| 5 | # | | *C | A | | | | | | | | 4 | | 12.0 | | 20 | |
| 12 | # | | C | A | | Yes | | | | | | 4 | | 19.5 | | 20 | |

\# Combined timing results are shown for all Movement Classes except any listed separately.
* Critical Movement/Green Period
1 This Green Period of the movement was treated as Undetected and not included in signal timing calculations.

## Critical Movements and Cycle Time

| Critical Mov ID | Appr & Dest | Green Period | Phases [ From | To ] | Adjusted Lost Time sec | Adjusted Flow Ratio | Req Green Time Ratio | Required Mov Time sec | |
|---|---|---|---|---|---|---|---|---|---|
| 3LV | S_W | 1 | A | B | 4 | 0.177 | 0.196 | 16.6 | |
| 4LV | N_S | 1 | B | C | 10 | – | – | 10.0 | Min |
| 5LV | W_N | 1 | C | A | 4 | 0.112 | 0.125 | 12.0 | |
| | | | | Total | 18 | 0.289 | 0.321 | 38.5 | |

| Cycle Time (sec): | Minimum | Maximum | Practical | Chosen |
|---|---|---|---|---|
| | 30 | 150 | 30 | 64 |

Min/Max When the Required Movement Time is subject to minimum or maximum condition, the Flow Ratio and the corresponding Required Green Time Ratio are not used for cycle time calculations and the Adjusted Lost Time equals the Required Movement Time.

## Phase Information

| Phase | Ref. Phase | Change Time sec | Starting Intergreen sec | Green Start sec | Displayed Green sec | Green End sec | Terminating Intergreen sec | Phase Time sec | Phase Split % |
|---|---|---|---|---|---|---|---|---|---|
| A | Yes | 0 | 4 | 4 | 22 | 26 | 4 | 26 | 41 |
| B | No | 26 | 4 | 30 | 10 | 40 | 4 | 14 | 22 |
| C | No | 40 | 4 | 44 | 20 | 64 | 4 | 24 | 38 |

This table gives adjusted values of Intergreen Time, Phase Time and Green Time values in cases of Pedestrian Actuation, Phase Actuation and Phase Frequency values (user-specified or implied) less than 100%. See the Phase Information section in the Detailed Output report for input values of Yellow Time, All-Red Time and the unadjusted Intergreen Times.

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# INTERSECTION SUMMARY

## Site: 104A [104A-PR-122 @ PR-321 (PM)]

Stop (Two-Way)

| Intersection Performance - Hourly Values | | | | |
|---|---|---|---|---|
| **Performance Measure** | **Vehicles** | | **Persons** | |
| Travel Speed (Average) | 24.9 | km/h | 24.9 | km/h |
| Travel Distance (Total) | 284.9 | veh-km/h | 341.8 | pers-km/h |
| Travel Time (Total) | 11.4 | veh-h/h | 13.7 | pers-h/h |
| | | | | |
| Demand Flows (Total) | 531 | veh/h | 637 | pers/h |
| Percent Heavy Vehicles (Demand) | 1.0 | % | | |
| Degree of Saturation | 0.284 | | | |
| Practical Spare Capacity | 181.5 | % | | |
| Effective Intersection Capacity | 1867 | veh/h | | |
| | | | | |
| Control Delay (Total) | 1.09 | veh-h/h | 1.31 | pers-h/h |
| Control Delay (Average) | 7.4 | sec | 7.4 | sec |
| Control Delay (Worst Lane) | 11.0 | sec | | |
| Control Delay (Worst Movement) | 11.3 | sec | 11.3 | sec |
| Geometric Delay (Average) | 0.0 | sec | | |
| Stop-Line Delay (Average) | 7.4 | sec | | |
| Idling Time (Average) | 7.1 | sec | | |
| Intersection Level of Service (LOS) | NA | | | |
| | | | | |
| 95% Back of Queue - Vehicles (Worst Lane) | 1.4 | veh | | |
| 95% Back of Queue - Distance (Worst Lane) | 10.9 | m | | |
| Queue Storage Ratio (Worst Lane) | 0.03 | | | |
| Total Effective Stops | 43 | veh/h | 51 | pers/h |
| Effective Stop Rate | 0.08 | per veh | 0.08 | per pers |
| Proportion Queued | 0.15 | | 0.15 | |
| Performance Index | 10.8 | | 10.8 | |
| | | | | |
| Cost (Total) | 128.31 | $/h | 128.31 | $/h |
| Fuel Consumption (Total) | 38.8 | L/h | | |
| Carbon Dioxide (Total) | 91.3 | kg/h | | |
| Hydrocarbons (Total) | 0.010 | kg/h | | |
| Carbon Monoxide (Total) | 0.129 | kg/h | | |
| NOx (Total) | 0.064 | kg/h | | |

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
NA: Intersection LOS for Vehicles is Not Applicable for two-way sign control since the average intersection delay is not a good LOS measure due to zero delays associated with major road movements.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.

| Intersection Performance - Annual Values | | | | |
|---|---|---|---|---|
| **Performance Measure** | **Vehicles** | | **Persons** | |
| Demand Flows (Total) | 254,700 | veh/y | 305,640 | pers/y |
| Delay | 522 | veh-h/y | 627 | pers-h/y |
| Effective Stops | 20,414 | veh/y | 24,497 | pers/y |
| Travel Distance | 136,729 | veh-km/y | 164,075 | pers-km/y |
| Travel Time | 5,490 | veh-h/y | 6,588 | pers-h/y |
| | | | | |
| Cost | 61,589 | $/y | 61,589 | $/y |
| Fuel Consumption | 18,622 | L/y | | |
| Carbon Dioxide | 43,839 | kg/y | | |
| Hydrocarbons | 5 | kg/y | | |
| Carbon Monoxide | 62 | kg/y | | |
| NOx | 31 | kg/y | | |

# LANE FLOWS

## Site: 104A [104A-PR-122 @ PR-321 (PM)]

Stop (Two-Way)

| Approach Lane Flows (veh/h) | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| South: Local | | | | | | | | | | |
| Mov. From S To Exit: | L2 W | T1 N | R2 E | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
| Lane 1 | 4 | 4 | 4 | 13 | 0.0 | 863 | 0.015 | 100 | NA | NA |
| Approach | 4 | 4 | 4 | 13 | 0.0 | | 0.015 | | | |
| East: PR-321 | | | | | | | | | | |
| Mov. From E To Exit: | L2 S | T1 W | R2 N | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
| Lane 1 | 4 | 20 | 8 | 32 | 0.0 | 1742 | 0.018 | 100 | NA | NA |
| Approach | 4 | 20 | 8 | 32 | 0.0 | | 0.018 | | | |
| North: PR-122 (Southbound) | | | | | | | | | | |
| Mov. From N To Exit: | L2 E | T1 S | R2 W | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
| Lane 1 | 173 | 4 | 60 | 238 | 1.6 | 836 | 0.284 | 100 | NA | NA |
| Approach | 173 | 4 | 60 | 238 | 1.6 | | 0.284 | | | |
| West: PR-321 | | | | | | | | | | |
| Mov. From W To Exit: | L2 N | T1 E | R2 S | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
| Lane 1 | 127 | - | - | 127 | 1.2 | 1016 | 0.125 | 100 | 0.0 | 2 |
| Lane 2 | - | 117 | 4 | 121 | 0.0 | 1907 | 0.063 | 100 | NA | NA |
| Approach | 127 | 117 | 4 | 248 | 0.6 | | 0.125 | | | |

| | Total | %HV | Deg.Satn (v/c) |
|---|---|---|---|
| Intersection | 531 | 1.0 | 0.284 |

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

# LANE SUMMARY

## Site: 104A [104A-PR-122 @ PR-321 (PM)]

Stop (Two-Way)

| Lane Use and Performance | Demand Flows Total veh/h | HV % | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Average Delay sec | Level of Service | 95% Back of Queue Veh | Dist m | Lane Config | Lane Length m | Cap. Adj. % | Prob. Block. % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Local | | | | | | | | | | | | | |
| Lane 1 | 13 | 0.0 | 863 | 0.015 | 100 | 9.2 | LOS A | 0.1 | 0.4 | Full | 500 | 0.0 | 0.0 |
| Approach | 13 | 0.0 | | 0.015 | | 9.2 | LOS A | 0.1 | 0.4 | | | | |
| East: PR-321 | | | | | | | | | | | | | |
| Lane 1 | 32 | 0.0 | 1742 | 0.018 | 100 | 1.0 | LOS A | 0.0 | 0.2 | Full | 120 | 0.0 | 0.0 |
| Approach | 32 | 0.0 | | 0.018 | | 1.0 | NA | 0.0 | 0.2 | | | | |
| North: PR-122 (Southbound) | | | | | | | | | | | | | |
| Lane 1 | 238 | 1.6 | 836 | 0.284 | 100 | 11.0 | LOS B | 1.4 | 10.9 | Full | 160 | 0.0 | 0.0 |
| Approach | 238 | 1.6 | | 0.284 | | 11.0 | LOS B | 1.4 | 10.9 | | | | |
| West: PR-321 | | | | | | | | | | | | | |
| Lane 1 | 127 | 1.2 | 1016 | 0.125 | 100 | 9.1 | LOS A | 0.6 | 4.8 | Short | 60 | 0.0 | NA |
| Lane 2 | 121 | 0.0 | 1907 | 0.063 | 100 | 0.0 | LOS A | 0.0 | 0.0 | Full | 500 | 0.0 | 0.0 |
| Approach | 248 | 0.6 | | 0.125 | | 4.6 | LOS A | 0.6 | 4.8 | | | | |
| Intersection | 531 | 1.0 | | 0.284 | | 7.4 | NA | 1.4 | 10.9 | | | | |

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.
LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection).
Minor Road Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 6).
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road lanes.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

# MOVEMENT SUMMARY

## Site: 104A [104A-PR-122 @ PR-321 (PM)]

Stop (Two-Way)

| Movement Performance - Vehicles | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Mov ID | OD Mov | Demand Flows Total veh/h | HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
| South: Local | | | | | | | | | | | |
| 3 | L2 | 4 | 0.0 | 0.015 | 9.3 | LOS A | 0.1 | 0.4 | 0.29 | 0.14 | 31.8 |
| 8 | T1 | 4 | 0.0 | 0.015 | 9.5 | LOS A | 0.1 | 0.4 | 0.29 | 0.14 | 24.7 |
| 18 | R2 | 4 | 0.0 | 0.015 | 8.9 | LOS A | 0.1 | 0.4 | 0.29 | 0.14 | 23.5 |
| Approach | | 13 | 0.0 | 0.015 | 9.2 | LOS A | 0.1 | 0.4 | 0.29 | 0.14 | 27.0 |
| East: PR-321 | | | | | | | | | | | |
| 1 | L2 | 4 | 0.0 | 0.018 | 2.6 | LOS A | 0.0 | 0.2 | 0.08 | 0.00 | 28.5 |
| 6 | T1 | 20 | 0.0 | 0.018 | 0.7 | LOS A | 0.0 | 0.2 | 0.08 | 0.00 | 67.5 |
| 16 | R2 | 8 | 0.0 | 0.018 | 1.0 | LOS A | 0.0 | 0.2 | 0.08 | 0.00 | 51.7 |
| Approach | | 32 | 0.0 | 0.018 | 1.0 | NA | 0.0 | 0.2 | 0.08 | 0.00 | 54.2 |
| North: PR-122 (Southbound) | | | | | | | | | | | |
| 7 | L2 | 173 | 2.2 | 0.284 | 11.3 | LOS B | 1.4 | 10.9 | 0.17 | 0.12 | 8.8 |
| 4 | T1 | 4 | 0.0 | 0.284 | 11.0 | LOS B | 1.4 | 10.9 | 0.17 | 0.12 | 21.9 |
| 14 | R2 | 60 | 0.0 | 0.284 | 10.1 | LOS B | 1.4 | 10.9 | 0.17 | 0.12 | 35.9 |
| Approach | | 238 | 1.6 | 0.284 | 11.0 | LOS B | 1.4 | 10.9 | 0.17 | 0.12 | 13.5 |
| West: PR-321 | | | | | | | | | | | |
| 5 | L2 | 127 | 1.2 | 0.125 | 9.1 | LOS A | 0.6 | 4.8 | 0.23 | 0.10 | 46.1 |
| 2 | T1 | 117 | 0.0 | 0.063 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.00 | 40.0 |
| 12 | R2 | 4 | 0.0 | 0.063 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.00 | 63.2 |
| Approach | | 248 | 0.6 | 0.125 | 4.6 | LOS A | 0.6 | 4.8 | 0.12 | 0.05 | 43.4 |
| All Vehicles | | 531 | 1.0 | 0.284 | 7.4 | NA | 1.4 | 10.9 | 0.15 | 0.08 | 24.9 |

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Minor Road Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

# INTERSECTION SUMMARY

## Site: 104B [104B-PR-122 @ PR-321 (PM)]

Stop (Two-Way)

| Intersection Performance - Hourly Values | | | | |
|---|---|---|---|---|
| **Performance Measure** | **Vehicles** | | **Persons** | |
| Travel Speed (Average) | 51.0 | km/h | 51.0 | km/h |
| Travel Distance (Total) | 239.7 | veh-km/h | 287.6 | pers-km/h |
| Travel Time (Total) | 4.7 | veh-h/h | 5.6 | pers-h/h |
| | | | | |
| Demand Flows (Total) | 405 | veh/h | 486 | pers/h |
| Percent Heavy Vehicles (Demand) | 1.0 | % | | |
| Degree of Saturation | 0.143 | | | |
| Practical Spare Capacity | 587.1 | % | | |
| Effective Intersection Capacity | 2840 | veh/h | | |
| | | | | |
| Control Delay (Total) | 0.21 | veh-h/h | 0.25 | pers-h/h |
| Control Delay (Average) | 1.9 | sec | 1.9 | sec |
| Control Delay (Worst Lane) | 9.6 | sec | | |
| Control Delay (Worst Movement) | 10.2 | sec | 10.2 | sec |
| Geometric Delay (Average) | 0.0 | sec | | |
| Stop-Line Delay (Average) | 1.9 | sec | | |
| Idling Time (Average) | 1.8 | sec | | |
| Intersection Level of Service (LOS) | NA | | | |
| | | | | |
| 95% Back of Queue - Vehicles (Worst Lane) | 0.2 | veh | | |
| 95% Back of Queue - Distance (Worst Lane) | 1.6 | m | | |
| Queue Storage Ratio (Worst Lane) | 0.00 | | | |
| Total Effective Stops | 5 | veh/h | 5 | pers/h |
| Effective Stop Rate | 0.01 | per veh | 0.01 | per pers |
| Proportion Queued | 0.03 | | 0.03 | |
| Performance Index | 4.3 | | 4.3 | |
| | | | | |
| Cost (Total) | 71.11 | $/h | 71.11 | $/h |
| Fuel Consumption (Total) | 28.2 | L/h | | |
| Carbon Dioxide (Total) | 66.4 | kg/h | | |
| Hydrocarbons (Total) | 0.007 | kg/h | | |
| Carbon Monoxide (Total) | 0.103 | kg/h | | |
| NOx (Total) | 0.049 | kg/h | | |

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
NA: Intersection LOS for Vehicles is Not Applicable for two-way sign control since the average intersection delay is not a good LOS measure due to zero delays associated with major road movements.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.

| Intersection Performance - Annual Values | | | | |
|---|---|---|---|---|
| **Performance Measure** | **Vehicles** | | **Persons** | |
| Demand Flows (Total) | 194,415 | veh/y | 233,298 | pers/y |
| Delay | 102 | veh-h/y | 122 | pers-h/y |
| Effective Stops | 2,164 | veh/y | 2,596 | pers/y |
| Travel Distance | 115,036 | veh-km/y | 138,044 | pers-km/y |
| Travel Time | 2,257 | veh-h/y | 2,708 | pers-h/y |
| | | | | |
| Cost | 34,134 | $/y | 34,134 | $/y |
| Fuel Consumption | 13,548 | L/y | | |
| Carbon Dioxide | 31,893 | kg/y | | |
| Hydrocarbons | 3 | kg/y | | |
| Carbon Monoxide | 49 | kg/y | | |
| NOx | 23 | kg/y | | |

# LANE FLOWS

## Site: 104B [104B-PR-122 @ PR-321 (PM)]

Stop (Two-Way)

| Approach Lane Flows (veh/h) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| East: PR-321 | | | | | | | | | |
| Mov. From E To Exit: | T1 W | R2 N | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
| Lane 1 | 12 | 40 | 52 | 0.0 | 1652 | 0.031 | 100 | NA | NA |
| Approach | 12 | 40 | 52 | 0.0 | | 0.031 | | | |
| North: PR-122 (Northbound) | | | | | | | | | |
| Mov. From N To Exit: | L2 E | R2 W | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
| Lane 1 | 28 | 16 | 44 | 0.0 | 827 | 0.053 | 100 | NA | NA |
| Approach | 28 | 16 | 44 | 0.0 | | 0.053 | | | |
| West: PR-321 | | | | | | | | | |
| Mov. From W To Exit: | L2 N | T1 E | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
| Lane 1 | 40 | - | 40 | 0.0 | 1039 | 0.038 | 100 | NA | NA |
| Lane 2 | - | 270 | 270 | 1.5 | 1891 | 0.143 | 100 | NA | NA |
| Approach | 40 | 270 | 309 | 1.3 | | 0.143 | | | |
| | Total | %HV | Deg.Satn (v/c) | | | | | | |
| Intersection | 405 | 1.0 | | 0.143 | | | | | |

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

# LANE SUMMARY

## Site: 104B [104B-PR-122 @ PR-321 (PM)]

Stop (Two-Way)

| Lane Use and Performance | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Demand Flows | | Cap. | Deg. | Lane | Average | Level of | 95% Back of Queue | | Lane | Lane | Cap. | Prob. |
| | Total | HV | | Satn | Util. | Delay | Service | Veh | Dist | Config | Length | Adj. | Block. |
| | veh/h | % | veh/h | v/c | % | sec | | | m | | m | % | % |
| East: PR-321 | | | | | | | | | | | | | |
| Lane 1 | 52 | 0.0 | 1652 | 0.031 | 100 | 0.0 | LOS A | 0.0 | 0.0 | Full | 500 | 0.0 | 0.0 |
| Approach | 52 | 0.0 | | 0.031 | | 0.0 | NA | 0.0 | 0.0 | | | | |
| North: PR-122 (Northbound) | | | | | | | | | | | | | |
| Lane 1 | 44 | 0.0 | 827 | 0.053 | 100 | 9.6 | LOS A | 0.2 | 1.6 | Full | 160 | 0.0 | 0.0 |
| Approach | 44 | 0.0 | | 0.053 | | 9.6 | LOS A | 0.2 | 1.6 | | | | |
| West: PR-321 | | | | | | | | | | | | | |
| Lane 1 | 40 | 0.0 | 1039 | 0.038 | 100 | 8.6 | LOS A | 0.2 | 1.3 | Full | 120 | 0.0 | 0.0 |
| Lane 2 | 270 | 1.5 | 1891 | 0.143 | 100 | 0.0 | LOS A | 0.0 | 0.0 | Full | 120 | 0.0 | 0.0 |
| Approach | 309 | 1.3 | | 0.143 | | 1.1 | LOS A | 0.2 | 1.3 | | | | |
| Intersection | 405 | 1.0 | | 0.143 | | 1.9 | NA | 0.2 | 1.6 | | | | |

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.
LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection).
Minor Road Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 6).
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road lanes.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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# MOVEMENT SUMMARY

## Site: 104B [104B-PR-122 @ PR-321 (PM)]

Stop (Two-Way)

| Movement Performance - Vehicles | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Mov ID | OD Mov | Demand Flows Total veh/h | HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
| East: PR-321 | | | | | | | | | | | |
| 6 | T1 | 12 | 0.0 | 0.031 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.00 | 64.2 |
| 16 | R2 | 40 | 0.0 | 0.031 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.00 | 60.0 |
| Approach | | 52 | 0.0 | 0.031 | 0.0 | NA | 0.0 | 0.0 | 0.00 | 0.00 | 60.9 |
| North: PR-122 (Northbound) | | | | | | | | | | | |
| 7 | L2 | 28 | 0.0 | 0.053 | 10.2 | LOS B | 0.2 | 1.6 | 0.07 | 0.04 | 36.4 |
| 14 | R2 | 16 | 0.0 | 0.053 | 8.6 | LOS A | 0.2 | 1.6 | 0.07 | 0.04 | 16.1 |
| Approach | | 44 | 0.0 | 0.053 | 9.6 | LOS A | 0.2 | 1.6 | 0.07 | 0.04 | 29.1 |
| West: PR-321 | | | | | | | | | | | |
| 5 | L2 | 40 | 0.0 | 0.038 | 8.6 | LOS A | 0.2 | 1.3 | 0.19 | 0.07 | 31.6 |
| 2 | T1 | 270 | 1.5 | 0.143 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.00 | 57.4 |
| Approach | | 309 | 1.3 | 0.143 | 1.1 | LOS A | 0.2 | 1.3 | 0.02 | 0.01 | 54.6 |
| All Vehicles | | 405 | 1.0 | 0.143 | 1.9 | NA | 0.2 | 1.6 | 0.03 | 0.01 | 51.0 |

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Minor Road Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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# INTERSECTION SUMMARY

## Site: 107 [107-PR-122 @ PR-166 (PM)]

Signals - Fixed Time Isolated Cycle Time = 64 seconds (User-Given Phase Times)

| Intersection Performance - Hourly Values | | | | |
|---|---|---|---|---|
| **Performance Measure** | **Vehicles** | | **Persons** | |
| Travel Speed (Average) | 43.6 | km/h | 43.6 | km/h |
| Travel Distance (Total) | 1517.8 | veh-km/h | 1821.4 | pers-km/h |
| Travel Time (Total) | 34.8 | veh-h/h | 41.8 | pers-h/h |
| Demand Flows (Total) | 1490 | veh/h | 1788 | pers/h |
| Percent Heavy Vehicles (Demand) | 1.7 | % | | |
| Degree of Saturation | 0.755 | | | |
| Practical Spare Capacity | 19.3 | % | | |
| Effective Intersection Capacity | 1974 | veh/h | | |
| Control Delay (Total) | 6.25 | veh-h/h | 7.50 | pers-h/h |
| Control Delay (Average) | 15.1 | sec | 15.1 | sec |
| Control Delay (Worst Lane) | 26.0 | sec | | |
| Control Delay (Worst Movement) | 26.0 | sec | 26.0 | sec |
| Geometric Delay (Average) | 0.0 | sec | | |
| Stop-Line Delay (Average) | 15.1 | sec | | |
| Idling Time (Average) | 12.0 | sec | | |
| Intersection Level of Service (LOS) | LOS B | | | |
| 95% Back of Queue - Vehicles (Worst Lane) | 12.2 | veh | | |
| 95% Back of Queue - Distance (Worst Lane) | 94.4 | m | | |
| Queue Storage Ratio (Worst Lane) | 0.12 | | | |
| Total Effective Stops | 892 | veh/h | 1071 | pers/h |
| Effective Stop Rate | 0.60 | per veh | 0.60 | per pers |
| Proportion Queued | 0.70 | | 0.70 | |
| Performance Index | 76.2 | | 76.2 | |
| Cost (Total) | 494.86 | $/h | 494.86 | $/h |
| Fuel Consumption (Total) | 156.6 | L/h | | |
| Carbon Dioxide (Total) | 369.7 | kg/h | | |
| Hydrocarbons (Total) | 0.034 | kg/h | | |
| Carbon Monoxide (Total) | 0.454 | kg/h | | |
| NOx (Total) | 0.401 | kg/h | | |

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Intersection LOS value for Vehicles is based on average delay for all vehicle movements.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.

| Intersection Performance - Annual Values | | | | |
|---|---|---|---|---|
| **Performance Measure** | **Vehicles** | | **Persons** | |
| Demand Flows (Total) | 715,005 | veh/y | 858,007 | pers/y |
| Delay | 3,001 | veh-h/y | 3,602 | pers-h/y |
| Effective Stops | 428,263 | veh/y | 513,916 | pers/y |
| Travel Distance | 728,541 | veh-km/y | 874,249 | pers-km/y |
| Travel Time | 16,713 | veh-h/y | 20,056 | pers-h/y |
| Cost | 237,532 | $/y | 237,532 | $/y |
| Fuel Consumption | 75,177 | L/y | | |
| Carbon Dioxide | 177,435 | kg/y | | |
| Hydrocarbons | 16 | kg/y | | |
| Carbon Monoxide | 218 | kg/y | | |
| NOx | 193 | kg/y | | |

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# LANE FLOWS

## Site: 107 [107-PR-122 @ PR-166 (PM)]

Signals - Fixed Time Isolated Cycle Time = 64 seconds (User-Given Phase Times)

**Approach Lane Flows (veh/h)**

South: PR-122

| Mov. From S To Exit: | L2 W | T1 N | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 215 | - | 215 | 2.0 | 610 | 0.353 | 100 | 0.0 | 2 |
| Lane 2 | - | 42 | 42 | 0.0 | 653 | 0.064 | 100 | NA | NA |
| Lane 3 | - | 42 | 42 | 0.0 | 653 | 0.064 | 100 | NA | NA |
| Approach | 215 | 84 | 299 | 1.4 | | 0.353 | | | |

North: PR-122

| Mov. From N To Exit: | T1 S | R2 W | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 76 | - | 76 | 0.0 | 297 | 0.256 | 69[5] | NA | NA |
| Lane 2 | - | 467 | 467 | 1.8 | 1250 | 0.374 | 100 | NA | NA |
| Approach | 76 | 467 | 543 | 1.5 | | 0.374 | | | |

West: PR-166

| Mov. From W To Exit: | L2 N | R2 S | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 275 | - | 275 | 2.1 | 554 | 0.497 | 100 | NA | NA |
| Lane 2 | - | 372 | 372 | 2.0 | 493 | 0.755 | 100 | NA | NA |
| Approach | 275 | 372 | 647 | 2.1 | | 0.755 | | | |

| | Total | %HV | Deg.Satn (v/c) |
|---|---|---|---|
| Intersection | 1490 | 1.7 | 0.755 |

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

5 Lane under-utilisation found by the program

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# LANE SUMMARY

## Site: 107 [107-PR-122 @ PR-166 (PM)]

Signals - Fixed Time Isolated Cycle Time = 64 seconds (User-Given Phase Times)

**Lane Use and Performance**

| | Demand Flows Total veh/h | HV % | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Average Delay sec | Level of Service | 95% Back of Queue Veh | Dist m | Lane Config | Lane Length m | Cap. Adj. % | Prob. Block. % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| South: PR-122 | | | | | | | | | | | | | |
| Lane 1 | 215 | 2.0 | 610 | 0.353 | 100 | 15.9 | LOS B | 5.2 | 40.3 | Short | 80 | 0.0 | NA |
| Lane 2 | 42 | 0.0 | 653 | 0.064 | 100 | 14.1 | LOS B | 0.9 | 6.8 | Full | 500 | 0.0 | 0.0 |
| Lane 3 | 42 | 0.0 | 653 | 0.064 | 100 | 14.1 | LOS B | 0.9 | 6.8 | Full | 500 | 0.0 | 0.0 |
| Approach | 299 | 1.4 | | 0.353 | | 15.4 | LOS B | 5.2 | 40.3 | | | | |
| North: PR-122 | | | | | | | | | | | | | |
| Lane 1 | 76 | 0.0 | 297 | 0.256 | 69[5] | 24.1 | LOS C | 2.2 | 16.4 | Full | 500 | 0.0 | 0.0 |
| Lane 2 | 467 | 1.8 | 1250 | 0.374 | 100 | 2.8 | LOS A | 3.8 | 28.9 | Full | 500 | 0.0 | 0.0 |
| Approach | 543 | 1.5 | | 0.374 | | 5.8 | LOS A | 3.8 | 28.9 | | | | |
| West: PR-166 | | | | | | | | | | | | | |
| Lane 1 | 275 | 2.1 | 554 | 0.497 | 100 | 18.4 | LOS B | 7.4 | 57.5 | Full | 500 | 0.0 | 0.0 |
| Lane 2 | 372 | 2.0 | 493 | 0.755 | 100 | 26.0 | LOS C | 12.2 | 94.4 | Full | 500 | 0.0 | 0.0 |
| Approach | 647 | 2.1 | | 0.755 | | 22.8 | LOS C | 12.2 | 94.4 | | | | |
| Intersection | 1490 | 1.7 | | 0.755 | | 15.1 | LOS B | 12.2 | 94.4 | | | | |

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.
LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 6).
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

5 Lane under-utilisation found by the program

# MOVEMENT SUMMARY

## Site: 107 [107-PR-122 @ PR-166 (PM)]

Signals - Fixed Time Isolated Cycle Time = 64 seconds (User-Given Phase Times)

**Movement Performance - Vehicles**

| Mov ID | OD Mov | Demand Flows Total veh/h | HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | 95% Back of Queue Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| South: PR-122 | | | | | | | | | | | |
| 3 | L2 | 215 | 2.0 | 0.353 | 15.9 | LOS B | 5.2 | 40.3 | 0.79 | 0.66 | 47.3 |
| 8 | T1 | 84 | 0.0 | 0.064 | 14.1 | LOS B | 0.9 | 6.8 | 0.70 | 0.53 | 41.7 |
| Approach | | 299 | 1.4 | 0.353 | 15.4 | LOS B | 5.2 | 40.3 | 0.76 | 0.62 | 45.6 |
| North: PR-122 | | | | | | | | | | | |
| 4 | T1 | 76 | 0.0 | 0.256 | 24.1 | LOS C | 2.2 | 16.4 | 0.92 | 0.70 | 38.4 |
| 14 | R2 | 467 | 1.8 | 0.374 | 2.8 | LOS A | 3.8 | 28.9 | 0.31 | 0.27 | 44.8 |
| Approach | | 543 | 1.5 | 0.374 | 5.8 | LOS A | 3.8 | 28.9 | 0.40 | 0.33 | 43.8 |
| West: PR-166 | | | | | | | | | | | |
| 5 | L2 | 275 | 2.1 | 0.497 | 18.4 | LOS B | 7.4 | 57.5 | 0.86 | 0.73 | 44.2 |
| 12 | R2 | 372 | 2.0 | 0.755 | 26.0 | LOS C | 12.2 | 94.4 | 0.96 | 0.88 | 41.5 |
| Approach | | 647 | 2.1 | 0.755 | 22.8 | LOS C | 12.2 | 94.4 | 0.92 | 0.81 | 42.6 |
| All Vehicles | | 1490 | 1.7 | 0.755 | 15.1 | LOS B | 12.2 | 94.4 | 0.70 | 0.60 | 43.6 |

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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# TIMING ANALYSIS

## Site: 107 [107-PR-122 @ PR-166 (PM)]

Signals - Fixed Time Isolated Cycle Time = 64 seconds (User-Given Phase Times)

**Phase Times specified by the user**
**Phase Sequence: Leading Left Turn**
**Reference Phase: Phase A**
**Input Phase Sequence: A, B, C**
**Output Phase Sequence: A, B, C**

**Movement Timing Information**

| Mov ID | Mov Class | Mov Type | PHASE MATRIX First Green [ From | To | Oppd | Priority | Und ] | PHASE MATRIX Second Green [ From | To | Oppd | Priority | Und ] | Lost Time 1st Grn sec | Lost Time 2nd Grn sec | ReqMovTime 1st Grn sec | ReqMovTime 2nd Grn sec | Eff Green 1st Grn sec | Eff Green 2nd Grn sec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| South | | PR-122 | | | | | | | | | | | | | | | | |
| 3 | # | | *A | B | | | | | | | | | 4 | | 12.6 | | 22 | |
| 8 | # | | A | B | | | | | | | | | 4 | | 10.0 Min | | 22 | |
| North | | PR-122 | | | | | | | | | | | | | | | | |
| 4 | # | | *B | C | | | | | | | | | 4 | | 10.0 Min | | 10 | |
| 14 | # | Slip/ Bypass | A | B | Yes | | | B | A | | | | 9 | 4 | 0.0 1 | 0.0 1 | 17 | 34 |
| West | | PR-166 | | | | | | | | | | | | | | | | |
| 5 | # | | *C | A | | | | | | | | | 4 | | 15.0 | | 20 | |
| 12 | # | | C | A | | | Yes | | | | | | 4 | | 20.8 | | 20 | |

\# Combined timing results are shown for all Movement Classes except any listed separately.
* Critical Movement/Green Period
1 This Green Period of the movement was treated as Undetected and not included in signal timing calculations.

## Critical Movements and Cycle Time

| Critical Mov ID | Appr & Dest | Green Period | Phases [ From | To ] | Adjusted Lost Time sec | Adjusted Flow Ratio | Req Green Time Ratio | Required Mov Time sec | |
|---|---|---|---|---|---|---|---|---|---|
| 3LV | S_W | 1 | A | B | 4 | 0.121 | 0.135 | 12.6 | |
| 4LV | N_S | 1 | B | C | 10 | – | – | 10.0 | Min |
| 5LV | W_N | 1 | C | A | 4 | 0.155 | 0.172 | 15.0 | |
| | | | | Total | 18 | 0.276 | 0.307 | 37.7 | |

| Cycle Time (sec): | Minimum | Maximum | Practical | Chosen |
|---|---|---|---|---|
| | 30 | 150 | 30 | 64 |

Min/Max When the Required Movement Time is subject to minimum or maximum condition, the Flow Ratio and the corresponding Required Green Time Ratio are not used for cycle time calculations and the Adjusted Lost Time equals the Required Movement Time.

## Phase Information

| Phase | Ref. Phase | Change Time sec | Starting Intergreen sec | Green Start sec | Displayed Green sec | Green End sec | Terminating Intergreen sec | Phase Time sec | Phase Split % |
|---|---|---|---|---|---|---|---|---|---|
| A | Yes | 0 | 4 | 4 | 22 | 26 | 4 | 26 | 41 |
| B | No | 26 | 4 | 30 | 10 | 40 | 4 | 14 | 22 |
| C | No | 40 | 4 | 44 | 20 | 64 | 4 | 24 | 38 |

This table gives adjusted values of Intergreen Time, Phase Time and Green Time values in cases of Pedestrian Actuation, Phase Actuation and Phase Frequency values (user-specified or implied) less than 100%. See the Phase Information section in the Detailed Output report for input values of Yellow Time, All-Red Time and the unadjusted Intergreen Times.

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# Appendix E:

## Capacity Analysis Data and Results– Proposed Condition 10-Years from Opening (2038 Horizon)

# INTERSECTION SUMMARY

## Site: 104A [104A-PR-122 @ PR-321 (AM)]

Stop (Two-Way)

| Intersection Performance - Hourly Values | | | | |
|---|---|---|---|---|
| **Performance Measure** | **Vehicles** | | **Persons** | |
| Travel Speed (Average) | 29.7 | km/h | 29.7 | km/h |
| Travel Distance (Total) | 370.9 | veh-km/h | 445.1 | pers-km/h |
| Travel Time (Total) | 12.5 | veh-h/h | 15.0 | pers-h/h |
| | | | | |
| Demand Flows (Total) | 653 | veh/h | 783 | pers/h |
| Percent Heavy Vehicles (Demand) | 1.1 | % | | |
| Degree of Saturation | 0.311 | | | |
| Practical Spare Capacity | 157.1 | % | | |
| Effective Intersection Capacity | 2097 | veh/h | | |
| | | | | |
| Control Delay (Total) | 1.28 | veh-h/h | 1.53 | pers-h/h |
| Control Delay (Average) | 7.0 | sec | 7.0 | sec |
| Control Delay (Worst Lane) | 11.4 | sec | | |
| Control Delay (Worst Movement) | 12.2 | sec | 12.2 | sec |
| Geometric Delay (Average) | 0.0 | sec | | |
| Stop-Line Delay (Average) | 7.0 | sec | | |
| Idling Time (Average) | 6.7 | sec | | |
| Intersection Level of Service (LOS) | NA | | | |
| | | | | |
| 95% Back of Queue - Vehicles (Worst Lane) | 1.5 | veh | | |
| 95% Back of Queue - Distance (Worst Lane) | 11.8 | m | | |
| Queue Storage Ratio (Worst Lane) | 0.03 | | | |
| Total Effective Stops | 73 | veh/h | 88 | pers/h |
| Effective Stop Rate | 0.11 | per veh | 0.11 | per pers |
| Proportion Queued | 0.18 | | 0.18 | |
| Performance Index | 14.0 | | 14.0 | |
| | | | | |
| Cost (Total) | 155.84 | $/h | 155.84 | $/h |
| Fuel Consumption (Total) | 52.1 | L/h | | |
| Carbon Dioxide (Total) | 122.8 | kg/h | | |
| Hydrocarbons (Total) | 0.013 | kg/h | | |
| Carbon Monoxide (Total) | 0.173 | kg/h | | |
| NOx (Total) | 0.118 | kg/h | | |

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
NA: Intersection LOS for Vehicles is Not Applicable for two-way sign control since the average intersection delay is not a good LOS measure due to zero delays associated with major road movements.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.

| Intersection Performance - Annual Values | | | | |
|---|---|---|---|---|
| **Performance Measure** | **Vehicles** | | **Persons** | |
| Demand Flows (Total) | 313,234 | veh/y | 375,880 | pers/y |
| Delay | 612 | veh-h/y | 734 | pers-h/y |
| Effective Stops | 35,222 | veh/y | 42,267 | pers/y |
| Travel Distance | 178,024 | veh-km/y | 213,629 | pers-km/y |
| Travel Time | 5,992 | veh-h/y | 7,190 | pers-h/y |
| | | | | |
| Cost | 74,802 | $/y | 74,802 | $/y |
| Fuel Consumption | 25,003 | L/y | | |
| Carbon Dioxide | 58,956 | kg/y | | |
| Hydrocarbons | 6 | kg/y | | |
| Carbon Monoxide | 83 | kg/y | | |
| NOx | 57 | kg/y | | |

# LANE FLOWS

## Site: 104A [104A-PR-122 @ PR-321 (AM)]

Stop (Two-Way)

| Approach Lane Flows (veh/h) | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| South: Local | | | | | | | | | | |
| Mov. From S To Exit: | L2 W | T1 N | R2 E | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
| Lane 1 | 4 | 4 | 4 | 13 | 0.0 | 783 | 0.016 | 100 | NA | NA |
| Approach | 4 | 4 | 4 | 13 | 0.0 | | 0.016 | | | |
| East: PR-321 | | | | | | | | | | |
| Mov. From E To Exit: | L2 S | T1 W | R2 N | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
| Lane 1 | 4 | 44 | 32 | 80 | 0.0 | 1731 | 0.046 | 100 | NA | NA |
| Approach | 4 | 44 | 32 | 80 | 0.0 | | 0.046 | | | |
| North: PR-122 (Southbound) | | | | | | | | | | |
| Mov. From N To Exit: | L2 E | T1 S | R2 W | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
| Lane 1 | 133 | 4 | 116 | 254 | 1.6 | 816 | 0.311 | 100 | NA | NA |
| Approach | 133 | 4 | 116 | 254 | 1.6 | | 0.311 | | | |
| West: PR-321 | | | | | | | | | | |
| Mov. From W To Exit: | L2 N | T1 E | R2 S | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
| Lane 1 | 156 | - | - | 156 | 2.0 | 912 | 0.171 | 100 | 0.0 | 2 |
| Lane 2 | - | 146 | 4 | 151 | 0.0 | 1909 | 0.079 | 100 | NA | NA |
| Approach | 156 | 146 | 4 | 306 | 1.0 | | 0.171 | | | |
| | Total | %HV | Deg.Satn (v/c) | | | | | | | |
| Intersection | 653 | 1.1 | | 0.311 | | | | | | |

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

# LANE SUMMARY

## Site: 104A [104A-PR-122 @ PR-321 (AM)]

Stop (Two-Way)

| Lane Use and Performance | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Demand Flows Total veh/h | HV % | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Average Delay sec | Level of Service | 95% Back of Queue Veh | Dist m | Lane Config | Lane Length m | Cap. Adj. % | Prob. Block. % |
| South: Local | | | | | | | | | | | | | |
| Lane 1 | 13 | 0.0 | 783 | 0.016 | 100 | 9.7 | LOS A | 0.1 | 0.5 | Full | 500 | 0.0 | 0.0 |
| Approach | 13 | 0.0 | | 0.016 | | 9.7 | LOS A | 0.1 | 0.5 | | | | |
| East: PR-321 | | | | | | | | | | | | | |
| Lane 1 | 80 | 0.0 | 1731 | 0.046 | 100 | 0.7 | LOS A | 0.0 | 0.3 | Full | 120 | 0.0 | 0.0 |
| Approach | 80 | 0.0 | | 0.046 | | 0.7 | NA | 0.0 | 0.3 | | | | |
| North: PR-122 (Southbound) | | | | | | | | | | | | | |
| Lane 1 | 254 | 1.6 | 816 | 0.311 | 100 | 11.4 | LOS B | 1.5 | 11.8 | Full | 160 | 0.0 | 0.0 |
| Approach | 254 | 1.6 | | 0.311 | | 11.4 | LOS B | 1.5 | 11.8 | | | | |
| West: PR-321 | | | | | | | | | | | | | |
| Lane 1 | 156 | 2.0 | 912 | 0.171 | 100 | 9.8 | LOS A | 0.9 | 6.6 | Short | 60 | 0.0 | NA |
| Lane 2 | 151 | 0.0 | 1909 | 0.079 | 100 | 0.0 | LOS A | 0.0 | 0.0 | Full | 500 | 0.0 | 0.0 |
| Approach | 306 | 1.0 | | 0.171 | | 5.0 | LOS A | 0.9 | 6.6 | | | | |
| Intersection | 653 | 1.1 | | 0.311 | | 7.0 | NA | 1.5 | 11.8 | | | | |

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.
LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection).
Minor Road Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 6).
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road lanes.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

# MOVEMENT SUMMARY

## Site: 104A [104A-PR-122 @ PR-321 (AM)]

Stop (Two-Way)

| Movement Performance - Vehicles | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Mov ID | OD Mov | Demand Flows Total veh/h | HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
| South: Local | | | | | | | | | | | |
| 3 | L2 | 4 | 0.0 | 0.016 | 10.1 | LOS B | 0.1 | 0.5 | 0.35 | 0.20 | 31.7 |
| 8 | T1 | 4 | 0.0 | 0.016 | 9.9 | LOS A | 0.1 | 0.5 | 0.35 | 0.20 | 24.6 |
| 18 | R2 | 4 | 0.0 | 0.016 | 9.0 | LOS A | 0.1 | 0.5 | 0.35 | 0.20 | 23.4 |
| Approach | | 13 | 0.0 | 0.016 | 9.7 | LOS A | 0.1 | 0.5 | 0.35 | 0.20 | 26.9 |
| East: PR-321 | | | | | | | | | | | |
| 1 | L2 | 4 | 0.0 | 0.046 | 2.8 | LOS A | 0.0 | 0.3 | 0.04 | 0.00 | 28.5 |
| 6 | T1 | 44 | 0.0 | 0.046 | 0.6 | LOS A | 0.0 | 0.3 | 0.04 | 0.00 | 67.2 |
| 16 | R2 | 32 | 0.0 | 0.046 | 0.6 | LOS A | 0.0 | 0.3 | 0.04 | 0.00 | 51.2 |
| Approach | | 80 | 0.0 | 0.046 | 0.7 | NA | 0.0 | 0.3 | 0.04 | 0.00 | 57.7 |
| North: PR-122 (Southbound) | | | | | | | | | | | |
| 7 | L2 | 133 | 1.6 | 0.311 | 12.2 | LOS B | 1.5 | 11.8 | 0.22 | 0.15 | 8.8 |
| 4 | T1 | 4 | 0.0 | 0.311 | 11.6 | LOS B | 1.5 | 11.8 | 0.22 | 0.15 | 21.9 |
| 14 | R2 | 116 | 1.8 | 0.311 | 10.5 | LOS B | 1.5 | 11.8 | 0.22 | 0.15 | 35.5 |
| Approach | | 254 | 1.6 | 0.311 | 11.4 | LOS B | 1.5 | 11.8 | 0.22 | 0.15 | 17.8 |
| West: PR-321 | | | | | | | | | | | |
| 5 | L2 | 156 | 2.0 | 0.171 | 9.8 | LOS A | 0.9 | 6.6 | 0.36 | 0.22 | 45.6 |
| 2 | T1 | 146 | 0.0 | 0.079 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.00 | 40.0 |
| 12 | R2 | 4 | 0.0 | 0.079 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.00 | 63.2 |
| Approach | | 306 | 1.0 | 0.171 | 5.0 | LOS A | 0.9 | 6.6 | 0.18 | 0.11 | 43.1 |
| All Vehicles | | 653 | 1.1 | 0.311 | 7.0 | NA | 1.5 | 11.8 | 0.18 | 0.11 | 29.7 |

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Minor Road Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

# INTERSECTION SUMMARY

## Site: 104B [104B-PR-122 @ PR-321 (AM)]

Stop (Two-Way)

| Intersection Performance - Hourly Values | | | | |
|---|---|---|---|---|
| **Performance Measure** | **Vehicles** | | **Persons** | |
| Travel Speed (Average) | 53.8 | km/h | 53.8 | km/h |
| Travel Distance (Total) | 294.3 | veh-km/h | 353.2 | pers-km/h |
| Travel Time (Total) | 5.5 | veh-h/h | 6.6 | pers-h/h |
| | | | | |
| Demand Flows (Total) | 477 | veh/h | 573 | pers/h |
| Percent Heavy Vehicles (Demand) | 1.0 | % | | |
| Degree of Saturation | 0.121 | | | |
| Practical Spare Capacity | 711.2 | % | | |
| Effective Intersection Capacity | 3951 | veh/h | | |
| | | | | |
| Control Delay (Total) | 0.17 | veh-h/h | 0.20 | pers-h/h |
| Control Delay (Average) | 1.3 | sec | 1.3 | sec |
| Control Delay (Worst Lane) | 9.6 | sec | | |
| Control Delay (Worst Movement) | 10.4 | sec | 10.4 | sec |
| Geometric Delay (Average) | 0.0 | sec | | |
| Stop-Line Delay (Average) | 1.3 | sec | | |
| Idling Time (Average) | 1.2 | sec | | |
| Intersection Level of Service (LOS) | NA | | | |
| | | | | |
| 95% Back of Queue - Vehicles (Worst Lane) | 0.2 | veh | | |
| 95% Back of Queue - Distance (Worst Lane) | 1.6 | m | | |
| Queue Storage Ratio (Worst Lane) | 0.00 | | | |
| Total Effective Stops | 9 | veh/h | 11 | pers/h |
| Effective Stop Rate | 0.02 | per veh | 0.02 | per pers |
| Proportion Queued | 0.03 | | 0.03 | |
| Performance Index | 4.9 | | 4.9 | |
| | | | | |
| Cost (Total) | 91.57 | $/h | 91.57 | $/h |
| Fuel Consumption (Total) | 37.2 | L/h | | |
| Carbon Dioxide (Total) | 87.7 | kg/h | | |
| Hydrocarbons (Total) | 0.009 | kg/h | | |
| Carbon Monoxide (Total) | 0.134 | kg/h | | |
| NOx (Total) | 0.079 | kg/h | | |

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
NA: Intersection LOS for Vehicles is Not Applicable for two-way sign control since the average intersection delay is not a good LOS measure due to zero delays associated with major road movements.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.

| Intersection Performance - Annual Values | | | | |
|---|---|---|---|---|
| **Performance Measure** | **Vehicles** | | **Persons** | |
| Demand Flows (Total) | 229,117 | veh/y | 274,941 | pers/y |
| Delay | 81 | veh-h/y | 97 | pers-h/y |
| Effective Stops | 4,432 | veh/y | 5,319 | pers/y |
| Travel Distance | 141,283 | veh-km/y | 169,539 | pers-km/y |
| Travel Time | 2,626 | veh-h/y | 3,151 | pers-h/y |
| | | | | |
| Cost | 43,955 | $/y | 43,955 | $/y |
| Fuel Consumption | 17,866 | L/y | | |
| Carbon Dioxide | 42,089 | kg/y | | |
| Hydrocarbons | 4 | kg/y | | |
| Carbon Monoxide | 64 | kg/y | | |
| NOx | 38 | kg/y | | |

# LANE FLOWS

## Site: 104B [104B-PR-122 @ PR-321 (AM)]

Stop (Two-Way)

| Approach Lane Flows (veh/h) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| East: PR-321 | | | | | | | | | |
| Mov. From E To Exit: | T1 W | R2 N | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
| Lane 1 | 56 | 128 | 184 | 1.4 | 1648 | 0.112 | 100 | NA | NA |
| Approach | 56 | 128 | 184 | 1.4 | | 0.112 | | | |
| North: PR-122 (Northbound) | | | | | | | | | |
| Mov. From N To Exit: | L2 E | R2 W | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
| Lane 1 | 24 | 20 | 44 | 0.0 | 822 | 0.053 | 100 | NA | NA |
| Approach | 24 | 20 | 44 | 0.0 | | 0.053 | | | |
| West: PR-321 | | | | | | | | | |
| Mov. From W To Exit: | L2 N | T1 E | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
| Lane 1 | 20 | - | 20 | 0.0 | 867 | 0.023 | 100 | NA | NA |
| Lane 2 | - | 230 | 230 | 1.0 | 1900 | 0.121 | 100 | NA | NA |
| Approach | 20 | 230 | 250 | 0.9 | | 0.121 | | | |
| | Total | %HV | Deg.Satn (v/c) | | | | | | |
| Intersection | 477 | 1.0 | | 0.121 | | | | | |

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

# LANE SUMMARY

## Site: 104B [104B-PR-122 @ PR-321 (AM)]

Stop (Two-Way)

| Lane Use and Performance | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Demand Flows Total veh/h | HV % | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Average Delay sec | Level of Service | 95% Back of Queue Veh | Dist m | Lane Config | Lane Length m | Cap. Adj. % | Prob. Block. % |
| East: PR-321 | | | | | | | | | | | | | |
| Lane 1 | 184 | 1.4 | 1648 | 0.112 | 100 | 0.0 | LOS A | 0.0 | 0.0 | Full | 500 | 0.0 | 0.0 |
| Approach | 184 | 1.4 | | 0.112 | | 0.0 | NA | 0.0 | 0.0 | | | | |
| North: PR-122 (Northbound) | | | | | | | | | | | | | |
| Lane 1 | 44 | 0.0 | 822 | 0.053 | 100 | 9.6 | LOS A | 0.2 | 1.6 | Full | 160 | 0.0 | 0.0 |
| Approach | 44 | 0.0 | | 0.053 | | 9.6 | LOS A | 0.2 | 1.6 | | | | |
| West: PR-321 | | | | | | | | | | | | | |
| Lane 1 | 20 | 0.0 | 867 | 0.023 | 100 | 9.3 | LOS A | 0.1 | 0.8 | Full | 120 | 0.0 | 0.0 |
| Lane 2 | 230 | 1.0 | 1900 | 0.121 | 100 | 0.0 | LOS A | 0.0 | 0.0 | Full | 120 | 0.0 | 0.0 |
| Approach | 250 | 0.9 | | 0.121 | | 0.7 | LOS A | 0.1 | 0.8 | | | | |
| Intersection | 477 | 1.0 | | 0.121 | | 1.3 | NA | 0.2 | 1.6 | | | | |

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.
LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection).
Minor Road Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 6).
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road lanes.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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# MOVEMENT SUMMARY

## Site: 104B [104B-PR-122 @ PR-321 (AM)]

Stop (Two-Way)

| Movement Performance - Vehicles | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Mov ID | OD Mov | Demand Flows Total veh/h | HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
| East: PR-321 | | | | | | | | | | | |
| 6 | T1 | 56 | 0.0 | 0.112 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.00 | 65.1 |
| 16 | R2 | 128 | 2.0 | 0.112 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.00 | 60.5 |
| Approach | | 184 | 1.4 | 0.112 | 0.0 | NA | 0.0 | 0.0 | 0.00 | 0.00 | 61.8 |
| North: PR-122 (Northbound) | | | | | | | | | | | |
| 7 | L2 | 24 | 0.0 | 0.053 | 10.4 | LOS B | 0.2 | 1.6 | 0.21 | 0.12 | 36.5 |
| 14 | R2 | 20 | 0.0 | 0.053 | 8.8 | LOS A | 0.2 | 1.6 | 0.21 | 0.12 | 16.2 |
| Approach | | 44 | 0.0 | 0.053 | 9.6 | LOS A | 0.2 | 1.6 | 0.21 | 0.12 | 27.3 |
| West: PR-321 | | | | | | | | | | | |
| 5 | L2 | 20 | 0.0 | 0.023 | 9.3 | LOS A | 0.1 | 0.8 | 0.37 | 0.20 | 31.3 |
| 2 | T1 | 230 | 1.0 | 0.121 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.00 | 57.6 |
| Approach | | 250 | 0.9 | 0.121 | 0.7 | LOS A | 0.1 | 0.8 | 0.03 | 0.02 | 55.8 |
| All Vehicles | | 477 | 1.0 | 0.121 | 1.3 | NA | 0.2 | 1.6 | 0.03 | 0.02 | 53.8 |

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Minor Road Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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# INTERSECTION SUMMARY

## Site: 107 [107-PR-122 @ PR-166 (AM)]

Signals - Fixed Time Isolated Cycle Time = 64 seconds (User-Given Phase Times)

| Intersection Performance - Hourly Values | | | | |
|---|---|---|---|---|
| **Performance Measure** | **Vehicles** | | **Persons** | |
| Travel Speed (Average) | 43.1 | km/h | 43.1 | km/h |
| Travel Distance (Total) | 1415.6 | veh-km/h | 1698.8 | pers-km/h |
| Travel Time (Total) | 32.9 | veh-h/h | 39.4 | pers-h/h |
| Demand Flows (Total) | 1390 | veh/h | 1668 | pers/h |
| Percent Heavy Vehicles (Demand) | 1.8 | % | | |
| Degree of Saturation | 0.798 | | | |
| Practical Spare Capacity | 12.8 | % | | |
| Effective Intersection Capacity | 1743 | veh/h | | |
| Control Delay (Total) | 7.01 | veh-h/h | 8.41 | pers-h/h |
| Control Delay (Average) | 18.2 | sec | 18.2 | sec |
| Control Delay (Worst Lane) | 28.8 | sec | | |
| Control Delay (Worst Movement) | 28.8 | sec | 28.8 | sec |
| Geometric Delay (Average) | 0.0 | sec | | |
| Stop-Line Delay (Average) | 18.2 | sec | | |
| Idling Time (Average) | 14.6 | sec | | |
| Intersection Level of Service (LOS) | LOS B | | | |
| 95% Back of Queue - Vehicles (Worst Lane) | 13.5 | veh | | |
| 95% Back of Queue - Distance (Worst Lane) | 104.5 | m | | |
| Queue Storage Ratio (Worst Lane) | 0.13 | | | |
| Total Effective Stops | 948 | veh/h | 1137 | pers/h |
| Effective Stop Rate | 0.68 | per veh | 0.68 | per pers |
| Proportion Queued | 0.78 | | 0.78 | |
| Performance Index | 76.8 | | 76.8 | |
| Cost (Total) | 470.03 | $/h | 470.03 | $/h |
| Fuel Consumption (Total) | 148.1 | L/h | | |
| Carbon Dioxide (Total) | 349.6 | kg/h | | |
| Hydrocarbons (Total) | 0.033 | kg/h | | |
| Carbon Monoxide (Total) | 0.445 | kg/h | | |
| NOx (Total) | 0.386 | kg/h | | |

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Intersection LOS value for Vehicles is based on average delay for all vehicle movements.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.

| Intersection Performance - Annual Values | | | | |
|---|---|---|---|---|
| **Performance Measure** | **Vehicles** | | **Persons** | |
| Demand Flows (Total) | 667,392 | veh/y | 800,871 | pers/y |
| Delay | 3,365 | veh-h/y | 4,038 | pers-h/y |
| Effective Stops | 454,970 | veh/y | 545,964 | pers/y |
| Travel Distance | 679,503 | veh-km/y | 815,404 | pers-km/y |
| Travel Time | 15,773 | veh-h/y | 18,928 | pers-h/y |
| Cost | 225,617 | $/y | 225,617 | $/y |
| Fuel Consumption | 71,087 | L/y | | |
| Carbon Dioxide | 167,801 | kg/y | | |
| Hydrocarbons | 16 | kg/y | | |
| Carbon Monoxide | 214 | kg/y | | |
| NOx | 185 | kg/y | | |

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# LANE FLOWS

## Site: 107 [107-PR-122 @ PR-166 (AM)]

Signals - Fixed Time Isolated Cycle Time = 64 seconds (User-Given Phase Times)

**Approach Lane Flows (veh/h)**

South: PR-122

| Mov. From S To Exit: | L2 W | T1 N | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 349 | - | 349 | 2.1 | 609 | 0.572 | 100 | 0.0 | 2 |
| Lane 2 | - | 42 | 42 | 0.0 | 653 | 0.064 | 100 | NA | NA |
| Lane 3 | - | 42 | 42 | 0.0 | 653 | 0.064 | 100 | NA | NA |
| Approach | 349 | 84 | 433 | 1.7 | | 0.572 | | | |

North: PR-122

| Mov. From N To Exit: | T1 S | R2 W | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 68 | - | 68 | 0.0 | 297 | 0.229 | 95[5] | NA | NA |
| Lane 2 | - | 275 | 275 | 1.7 | 1146 | 0.240 | 100 | NA | NA |
| Approach | 68 | 275 | 343 | 1.4 | | 0.240 | | | |

West: PR-166

| Mov. From W To Exit: | L2 N | R2 S | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 221 | - | 221 | 2.1 | 554 | 0.399 | 100 | NA | NA |
| Lane 2 | - | 393 | 393 | 2.1 | 493 | 0.798 | 100 | NA | NA |
| Approach | 221 | 393 | 614 | 2.1 | | 0.798 | | | |

| | Total | %HV | Deg.Satn (v/c) |
|---|---|---|---|
| Intersection | 1390 | 1.8 | 0.798 |

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

5 Lane under-utilisation found by the program

# LANE SUMMARY

## Site: 107 [107-PR-122 @ PR-166 (AM)]

Signals - Fixed Time Isolated Cycle Time = 64 seconds (User-Given Phase Times)

**Lane Use and Performance**

| | Demand Flows Total veh/h | HV % | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Average Delay sec | Level of Service | 95% Back of Queue Veh | Dist m | Lane Config | Lane Length m | Cap. Adj. % | Prob. Block. % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| South: PR-122 | | | | | | | | | | | | | |
| Lane 1 | 349 | 2.1 | 609 | 0.572 | 100 | 18.3 | LOS B | 9.6 | 74.4 | Short | 80 | 0.0 | NA |
| Lane 2 | 42 | 0.0 | 653 | 0.064 | 100 | 14.1 | LOS B | 0.9 | 6.8 | Full | 500 | 0.0 | 0.0 |
| Lane 3 | 42 | 0.0 | 653 | 0.064 | 100 | 14.1 | LOS B | 0.9 | 6.8 | Full | 500 | 0.0 | 0.0 |
| Approach | 433 | 1.7 | | 0.572 | | 17.5 | LOS B | 9.6 | 74.4 | | | | |
| North: PR-122 | | | | | | | | | | | | | |
| Lane 1 | 68 | 0.0 | 297 | 0.229 | 95[5] | 23.9 | LOS C | 1.9 | 14.5 | Full | 500 | 0.0 | 0.0 |
| Lane 2 | 275 | 1.7 | 1146 | 0.240 | 100 | 3.0 | LOS A | 2.6 | 20.1 | Full | 500 | 0.0 | 0.0 |
| Approach | 343 | 1.4 | | 0.240 | | 7.1 | LOS A | 2.6 | 20.1 | | | | |
| West: PR-166 | | | | | | | | | | | | | |
| Lane 1 | 221 | 2.1 | 554 | 0.399 | 100 | 17.6 | LOS B | 5.7 | 43.9 | Full | 500 | 0.0 | 0.0 |
| Lane 2 | 393 | 2.1 | 493 | 0.798 | 100 | 28.8 | LOS C | 13.5 | 104.5 | Full | 500 | 0.0 | 0.0 |
| Approach | 614 | 2.1 | | 0.798 | | 24.8 | LOS C | 13.5 | 104.5 | | | | |
| Intersection | 1390 | 1.8 | | 0.798 | | 18.2 | LOS B | 13.5 | 104.5 | | | | |

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.
LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 6).
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

5 Lane under-utilisation found by the program

# MOVEMENT SUMMARY

## Site: 107 [107-PR-122 @ PR-166 (AM)]

Signals - Fixed Time Isolated Cycle Time = 64 seconds (User-Given Phase Times)

**Movement Performance - Vehicles**

| Mov ID | OD Mov | Demand Flows Total veh/h | HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | 95% Back of Queue Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| South: PR-122 | | | | | | | | | | | |
| 3 | L2 | 349 | 2.1 | 0.572 | 18.3 | LOS B | 9.6 | 74.4 | 0.87 | 0.74 | 46.0 |
| 8 | T1 | 84 | 0.0 | 0.064 | 14.1 | LOS B | 0.9 | 6.8 | 0.70 | 0.53 | 41.7 |
| Approach | | 433 | 1.7 | 0.572 | 17.5 | LOS B | 9.6 | 74.4 | 0.84 | 0.70 | 45.1 |
| North: PR-122 | | | | | | | | | | | |
| 4 | T1 | 68 | 0.0 | 0.229 | 23.9 | LOS C | 1.9 | 14.5 | 0.91 | 0.70 | 38.4 |
| 14 | R2 | 275 | 1.7 | 0.240 | 3.0 | LOS A | 2.6 | 20.1 | 0.36 | 0.30 | 44.7 |
| Approach | | 343 | 1.4 | 0.240 | 7.1 | LOS A | 2.6 | 20.1 | 0.47 | 0.38 | 43.3 |
| West: PR-166 | | | | | | | | | | | |
| 5 | L2 | 221 | 2.1 | 0.399 | 17.6 | LOS B | 5.7 | 43.9 | 0.83 | 0.69 | 44.6 |
| 12 | R2 | 393 | 2.1 | 0.798 | 28.8 | LOS C | 13.5 | 104.5 | 0.98 | 0.92 | 40.2 |
| Approach | | 614 | 2.1 | 0.798 | 24.8 | LOS C | 13.5 | 104.5 | 0.92 | 0.84 | 41.7 |
| All Vehicles | | 1390 | 1.8 | 0.798 | 18.2 | LOS B | 13.5 | 104.5 | 0.78 | 0.68 | 43.1 |

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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# TIMING ANALYSIS

## Site: 107 [107-PR-122 @ PR-166 (AM)]

Signals - Fixed Time Isolated Cycle Time = 64 seconds (User-Given Phase Times)

**Phase Times specified by the user**
**Phase Sequence: Leading Left Turn**
**Reference Phase: Phase A**
**Input Phase Sequence: A, B, C**
**Output Phase Sequence: A, B, C**

**Movement Timing Information**

| Mov ID | Mov Class | Mov Type | PHASE MATRIX [ From | To | First Green Oppd | Priority | Und ] | [ From | To | Second Green Oppd | Priority | Und ] | Lost Time 1st Grn sec | Lost Time 2nd Grn sec | ReqMovTime 1st Grn sec | ReqMovTime 2nd Grn sec | Eff Green 1st Grn sec | Eff Green 2nd Grn sec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| South | | PR-122 | | | | | | | | | | | | | | | | |
| 3 | # | | *A | B | | | | | | | | | 4 | | 18.0 | | 22 | |
| 8 | # | | A | B | | | | | | | | | 4 | | 10.0 Min | | 22 | |
| North | | PR-122 | | | | | | | | | | | | | | | | |
| 4 | # | | *B | C | | | | | | | | | 4 | | 10.0 Min | | 10 | |
| 14 | # | Slip/ Bypass | A | B | Yes | | | B | A | | | | 14 | 4 | 0.0 1 | 0.0 1 | 12 | 34 |
| West | | PR-166 | | | | | | | | | | | | | | | | |
| 5 | # | | *C | A | | | | | | | | | 4 | | 12.9 | | 20 | |
| 12 | # | | C | A | | Yes | | | | | | | 4 | | 21.7 | | 20 | |

\# Combined timing results are shown for all Movement Classes except any listed separately.
* Critical Movement/Green Period
1 This Green Period of the movement was treated as Undetected and not included in signal timing calculations.

## Critical Movements and Cycle Time

| Critical Mov ID | Appr & Dest | Green Period | Phases [ From | To ] | Adjusted Lost Time sec | Adjusted Flow Ratio | Req Green Time Ratio | Required Mov Time sec | |
|---|---|---|---|---|---|---|---|---|---|
| 3LV | S_W | 1 | A | B | 4 | 0.197 | 0.219 | 18.0 | |
| 4LV | N_S | 1 | B | C | 10 | – | – | 10.0 | Min |
| 5LV | W_N | 1 | C | A | 4 | 0.125 | 0.139 | 12.9 | |
| | | | | Total | 18 | 0.322 | 0.357 | 40.9 | |

| Cycle Time (sec): | Minimum | Maximum | Practical | Chosen |
|---|---|---|---|---|
| | 30 | 150 | 30 | 64 |

Min/Max When the Required Movement Time is subject to minimum or maximum condition, the Flow Ratio and the corresponding Required Green Time Ratio are not used for cycle time calculations and the Adjusted Lost Time equals the Required Movement Time.

## Phase Information

| Phase | Ref. Phase | Change Time sec | Starting Intergreen sec | Green Start sec | Displayed Green sec | Green End sec | Terminating Intergreen sec | Phase Time sec | Phase Split % |
|---|---|---|---|---|---|---|---|---|---|
| A | Yes | 0 | 4 | 4 | 22 | 26 | 4 | 26 | 41 |
| B | No | 26 | 4 | 30 | 10 | 40 | 4 | 14 | 22 |
| C | No | 40 | 4 | 44 | 20 | 64 | 4 | 24 | 38 |

This table gives adjusted values of Intergreen Time, Phase Time and Green Time values in cases of Pedestrian Actuation, Phase Actuation and Phase Frequency values (user-specified or implied) less than 100%. See the Phase Information section in the Detailed Output report for input values of Yellow Time, All-Red Time and the unadjusted Intergreen Times.

# INTERSECTION SUMMARY

## Site: 104A [104A-PR-122 @ PR-321 (PM)]

Stop (Two-Way)

| Intersection Performance - Hourly Values | | | | |
|---|---|---|---|---|
| **Performance Measure** | **Vehicles** | | **Persons** | |
| Travel Speed (Average) | 24.8 | km/h | 24.8 | km/h |
| Travel Distance (Total) | 314.5 | veh-km/h | 377.4 | pers-km/h |
| Travel Time (Total) | 12.7 | veh-h/h | 15.2 | pers-h/h |
| | | | | |
| Demand Flows (Total) | 587 | veh/h | 704 | pers/h |
| Percent Heavy Vehicles (Demand) | 1.1 | % | | |
| Degree of Saturation | 0.326 | | | |
| Practical Spare Capacity | 145.4 | % | | |
| Effective Intersection Capacity | 1800 | veh/h | | |
| | | | | |
| Control Delay (Total) | 1.24 | veh-h/h | 1.49 | pers-h/h |
| Control Delay (Average) | 7.6 | sec | 7.6 | sec |
| Control Delay (Worst Lane) | 11.6 | sec | | |
| Control Delay (Worst Movement) | 11.9 | sec | 11.9 | sec |
| Geometric Delay (Average) | 0.0 | sec | | |
| Stop-Line Delay (Average) | 7.6 | sec | | |
| Idling Time (Average) | 7.3 | sec | | |
| Intersection Level of Service (LOS) | NA | | | |
| | | | | |
| 95% Back of Queue - Vehicles (Worst Lane) | 1.7 | veh | | |
| 95% Back of Queue - Distance (Worst Lane) | 12.8 | m | | |
| Queue Storage Ratio (Worst Lane) | 0.03 | | | |
| Total Effective Stops | 56 | veh/h | 67 | pers/h |
| Effective Stop Rate | 0.10 | per veh | 0.10 | per pers |
| Proportion Queued | 0.16 | | 0.16 | |
| Performance Index | 12.1 | | 12.1 | |
| | | | | |
| Cost (Total) | 141.84 | $/h | 141.84 | $/h |
| Fuel Consumption (Total) | 42.8 | L/h | | |
| Carbon Dioxide (Total) | 100.7 | kg/h | | |
| Hydrocarbons (Total) | 0.011 | kg/h | | |
| Carbon Monoxide (Total) | 0.142 | kg/h | | |
| NOx (Total) | 0.071 | kg/h | | |

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
NA: Intersection LOS for Vehicles is Not Applicable for two-way sign control since the average intersection delay is not a good LOS measure due to zero delays associated with major road movements.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.

| Intersection Performance - Annual Values | | | | |
|---|---|---|---|---|
| **Performance Measure** | **Vehicles** | | **Persons** | |
| Demand Flows (Total) | 281,718 | veh/y | 338,062 | pers/y |
| Delay | 595 | veh-h/y | 715 | pers-h/y |
| Effective Stops | 26,771 | veh/y | 32,125 | pers/y |
| Travel Distance | 150,967 | veh-km/y | 181,160 | pers-km/y |
| Travel Time | 6,088 | veh-h/y | 7,306 | pers-h/y |
| | | | | |
| Cost | 68,082 | $/y | 68,082 | $/y |
| Fuel Consumption | 20,537 | L/y | | |
| Carbon Dioxide | 48,348 | kg/y | | |
| Hydrocarbons | 5 | kg/y | | |
| Carbon Monoxide | 68 | kg/y | | |
| NOx | 34 | kg/y | | |

# LANE FLOWS

## Site: 104A [104A-PR-122 @ PR-321 (PM)]

Stop (Two-Way)

**Approach Lane Flows (veh/h)**

South: Local

| Mov. From S To Exit: | L2 W | T1 N | R2 E | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 4 | 4 | 4 | 13 | 0.0 | 840 | 0.015 | 100 | NA | NA |
| Approach | 4 | 4 | 4 | 13 | 0.0 | | 0.015 | | | |

East: PR-321

| Mov. From E To Exit: | L2 S | T1 W | R2 N | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 4 | 24 | 8 | 36 | 0.0 | 1752 | 0.021 | 100 | NA | NA |
| Approach | 4 | 24 | 8 | 36 | 0.0 | | 0.021 | | | |

North: PR-122 (Southbound)

| Mov. From N To Exit: | L2 E | T1 S | R2 W | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 193 | 4 | 68 | 265 | 1.4 | 813 | 0.326 | 100 | NA | NA |
| Approach | 193 | 4 | 68 | 265 | 1.4 | | 0.326 | | | |

West: PR-321

| Mov. From W To Exit: | L2 N | T1 E | R2 S | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 137 | - | - | 137 | 1.1 | 1006 | 0.136 | 100 | 0.0 | 2 |
| Lane 2 | - | 132 | 4 | 136 | 0.9 | 1891 | 0.072 | 100 | NA | NA |
| Approach | 137 | 132 | 4 | 273 | 1.0 | | 0.136 | | | |

| | Total | %HV | Deg.Satn (v/c) |
|---|---|---|---|
| Intersection | 587 | 1.1 | 0.326 |

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

# LANE SUMMARY

## Site: 104A [104A-PR-122 @ PR-321 (PM)]

Stop (Two-Way)

| Lane Use and Performance | Demand Flows Total veh/h | HV % | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Average Delay sec | Level of Service | 95% Back of Queue Veh | Dist m | Lane Config | Lane Length m | Cap. Adj. % | Prob. Block. % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Local | | | | | | | | | | | | | |
| Lane 1 | 13 | 0.0 | 840 | 0.015 | 100 | 9.4 | LOS A | 0.1 | 0.5 | Full | 500 | 0.0 | 0.0 |
| Approach | 13 | 0.0 | | 0.015 | | 9.4 | LOS A | 0.1 | 0.5 | | | | |
| East: PR-321 | | | | | | | | | | | | | |
| Lane 1 | 36 | 0.0 | 1752 | 0.021 | 100 | 1.0 | LOS A | 0.0 | 0.3 | Full | 120 | 0.0 | 0.0 |
| Approach | 36 | 0.0 | | 0.021 | | 1.0 | NA | 0.0 | 0.3 | | | | |
| North: PR-122 (Southbound) | | | | | | | | | | | | | |
| Lane 1 | 265 | 1.4 | 813 | 0.326 | 100 | 11.6 | LOS B | 1.7 | 12.8 | Full | 160 | 0.0 | 0.0 |
| Approach | 265 | 1.4 | | 0.326 | | 11.6 | LOS B | 1.7 | 12.8 | | | | |
| West: PR-321 | | | | | | | | | | | | | |
| Lane 1 | 137 | 1.1 | 1006 | 0.136 | 100 | 9.1 | LOS A | 0.7 | 5.2 | Short | 60 | 0.0 | NA |
| Lane 2 | 136 | 0.9 | 1891 | 0.072 | 100 | 0.0 | LOS A | 0.0 | 0.0 | Full | 500 | 0.0 | 0.0 |
| Approach | 273 | 1.0 | | 0.136 | | 4.6 | LOS A | 0.7 | 5.2 | | | | |
| Intersection | 587 | 1.1 | | 0.326 | | 7.6 | NA | 1.7 | 12.8 | | | | |

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.
LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection).
Minor Road Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 6).
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road lanes.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

# MOVEMENT SUMMARY

## Site: 104A [104A-PR-122 @ PR-321 (PM)]

Stop (Two-Way)

| Movement Performance - Vehicles | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mov ID | OD Mov | Demand Flows Total veh/h | HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
| South: Local | | | | | | | | | | | |
| 3 | L2 | 4 | 0.0 | 0.015 | 9.5 | LOS A | 0.1 | 0.5 | 0.32 | 0.16 | 31.8 |
| 8 | T1 | 4 | 0.0 | 0.015 | 9.6 | LOS A | 0.1 | 0.5 | 0.32 | 0.16 | 24.7 |
| 18 | R2 | 4 | 0.0 | 0.015 | 9.0 | LOS A | 0.1 | 0.5 | 0.32 | 0.16 | 23.5 |
| Approach | | 13 | 0.0 | 0.015 | 9.4 | LOS A | 0.1 | 0.5 | 0.32 | 0.16 | 26.9 |
| East: PR-321 | | | | | | | | | | | |
| 1 | L2 | 4 | 0.0 | 0.021 | 2.6 | LOS A | 0.0 | 0.3 | 0.07 | 0.00 | 28.7 |
| 6 | T1 | 24 | 0.0 | 0.021 | 0.6 | LOS A | 0.0 | 0.3 | 0.07 | 0.00 | 68.2 |
| 16 | R2 | 8 | 0.0 | 0.021 | 1.0 | LOS A | 0.0 | 0.3 | 0.07 | 0.00 | 52.5 |
| Approach | | 36 | 0.0 | 0.021 | 1.0 | NA | 0.0 | 0.3 | 0.07 | 0.00 | 56.0 |
| North: PR-122 (Southbound) | | | | | | | | | | | |
| 7 | L2 | 193 | 1.9 | 0.326 | 11.9 | LOS B | 1.7 | 12.8 | 0.20 | 0.14 | 8.8 |
| 4 | T1 | 4 | 0.0 | 0.326 | 11.5 | LOS B | 1.7 | 12.8 | 0.20 | 0.14 | 21.8 |
| 14 | R2 | 68 | 0.0 | 0.326 | 10.5 | LOS B | 1.7 | 12.8 | 0.20 | 0.14 | 35.7 |
| Approach | | 265 | 1.4 | 0.326 | 11.6 | LOS B | 1.7 | 12.8 | 0.20 | 0.14 | 13.4 |
| West: PR-321 | | | | | | | | | | | |
| 5 | L2 | 137 | 1.1 | 0.136 | 9.1 | LOS A | 0.7 | 5.2 | 0.25 | 0.12 | 46.0 |
| 2 | T1 | 132 | 1.0 | 0.072 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.00 | 40.0 |
| 12 | R2 | 4 | 0.0 | 0.072 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.00 | 63.2 |
| Approach | | 273 | 1.0 | 0.136 | 4.6 | LOS A | 0.7 | 5.2 | 0.13 | 0.06 | 43.3 |
| All Vehicles | | 587 | 1.1 | 0.326 | 7.6 | NA | 1.7 | 12.8 | 0.16 | 0.10 | 24.8 |

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Minor Road Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

# INTERSECTION SUMMARY

## Site: 104B [104B-PR-122 @ PR-321 (PM)]

Stop (Two-Way)

| Intersection Performance - Hourly Values | | | | |
|---|---|---|---|---|
| **Performance Measure** | **Vehicles** | | **Persons** | |
| Travel Speed (Average) | 51.3 | km/h | 51.3 | km/h |
| Travel Distance (Total) | 264.9 | veh-km/h | 317.9 | pers-km/h |
| Travel Time (Total) | 5.2 | veh-h/h | 6.2 | pers-h/h |
| | | | | |
| Demand Flows (Total) | 447 | veh/h | 536 | pers/h |
| Percent Heavy Vehicles (Demand) | 1.1 | % | | |
| Degree of Saturation | 0.158 | | | |
| Practical Spare Capacity | 518.9 | % | | |
| Effective Intersection Capacity | 2821 | veh/h | | |
| | | | | |
| Control Delay (Total) | 0.22 | veh-h/h | 0.27 | pers-h/h |
| Control Delay (Average) | 1.8 | sec | 1.8 | sec |
| Control Delay (Worst Lane) | 9.8 | sec | | |
| Control Delay (Worst Movement) | 10.4 | sec | 10.4 | sec |
| Geometric Delay (Average) | 0.0 | sec | | |
| Stop-Line Delay (Average) | 1.8 | sec | | |
| Idling Time (Average) | 1.8 | sec | | |
| Intersection Level of Service (LOS) | NA | | | |
| | | | | |
| 95% Back of Queue - Vehicles (Worst Lane) | 0.2 | veh | | |
| 95% Back of Queue - Distance (Worst Lane) | 1.7 | m | | |
| Queue Storage Ratio (Worst Lane) | 0.00 | | | |
| Total Effective Stops | 5 | veh/h | 6 | pers/h |
| Effective Stop Rate | 0.01 | per veh | 0.01 | per pers |
| Proportion Queued | 0.03 | | 0.03 | |
| Performance Index | 4.7 | | 4.7 | |
| | | | | |
| Cost (Total) | 78.83 | $/h | 78.83 | $/h |
| Fuel Consumption (Total) | 31.5 | L/h | | |
| Carbon Dioxide (Total) | 74.2 | kg/h | | |
| Hydrocarbons (Total) | 0.008 | kg/h | | |
| Carbon Monoxide (Total) | 0.115 | kg/h | | |
| NOx (Total) | 0.058 | kg/h | | |

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
NA: Intersection LOS for Vehicles is Not Applicable for two-way sign control since the average intersection delay is not a good LOS measure due to zero delays associated with major road movements.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.

| Intersection Performance - Annual Values | | | | |
|---|---|---|---|---|
| **Performance Measure** | **Vehicles** | | **Persons** | |
| Demand Flows (Total) | 214,384 | veh/y | 257,261 | pers/y |
| Delay | 108 | veh-h/y | 130 | pers-h/y |
| Effective Stops | 2,557 | veh/y | 3,069 | pers/y |
| Travel Distance | 127,146 | veh-km/y | 152,576 | pers-km/y |
| Travel Time | 2,480 | veh-h/y | 2,977 | pers-h/y |
| | | | | |
| Cost | 37,837 | $/y | 37,837 | $/y |
| Fuel Consumption | 15,131 | L/y | | |
| Carbon Dioxide | 35,628 | kg/y | | |
| Hydrocarbons | 4 | kg/y | | |
| Carbon Monoxide | 55 | kg/y | | |
| NOx | 28 | kg/y | | |

# LANE FLOWS

## Site: 104B [104B-PR-122 @ PR-321 (PM)]

Stop (Two-Way)

**Approach Lane Flows (veh/h)**

East: PR-321

| Mov. From E To Exit: | T1 W | R2 N | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 12 | 48 | 60 | 0.0 | 1644 | 0.037 | 100 | NA | NA |
| Approach | 12 | 48 | 60 | 0.0 | | 0.037 | | | |

North: PR-122 (Northbound)

| Mov. From N To Exit: | L2 E | R2 W | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 28 | 16 | 44 | 0.0 | 799 | 0.055 | 100 | NA | NA |
| Approach | 28 | 16 | 44 | 0.0 | | 0.055 | | | |

West: PR-321

| Mov. From W To Exit: | L2 N | T1 E | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 44 | - | 44 | 0.0 | 1027 | 0.042 | 100 | NA | NA |
| Lane 2 | - | 299 | 299 | 1.7 | 1887 | 0.158 | 100 | NA | NA |
| Approach | 44 | 299 | 342 | 1.5 | | 0.158 | | | |

| | Total | %HV | Deg.Satn (v/c) |
|---|---|---|---|
| Intersection | 447 | 1.1 | 0.158 |

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

# LANE SUMMARY

## Site: 104B [104B-PR-122 @ PR-321 (PM)]

Stop (Two-Way)

| Lane Use and Performance | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Demand Flows | | Cap. | Deg. | Lane | Average | Level of | 95% Back of Queue | | Lane | Lane | Cap. | Prob. |
| | Total | HV | | Satn | Util. | Delay | Service | Veh | Dist | Config | Length | Adj. | Block. |
| | veh/h | % | veh/h | v/c | % | sec | | | m | | m | % | % |
| East: PR-321 | | | | | | | | | | | | | |
| Lane 1 | 60 | 0.0 | 1644 | 0.037 | 100 | 0.0 | LOS A | 0.0 | 0.0 | Full | 500 | 0.0 | 0.0 |
| Approach | 60 | 0.0 | | 0.037 | | 0.0 | NA | 0.0 | 0.0 | | | | |
| North: PR-122 (Northbound) | | | | | | | | | | | | | |
| Lane 1 | 44 | 0.0 | 799 | 0.055 | 100 | 9.8 | LOS A | 0.2 | 1.7 | Full | 160 | 0.0 | 0.0 |
| Approach | 44 | 0.0 | | 0.055 | | 9.8 | LOS A | 0.2 | 1.7 | | | | |
| West: PR-321 | | | | | | | | | | | | | |
| Lane 1 | 44 | 0.0 | 1027 | 0.042 | 100 | 8.7 | LOS A | 0.2 | 1.5 | Full | 120 | 0.0 | 0.0 |
| Lane 2 | 299 | 1.7 | 1887 | 0.158 | 100 | 0.0 | LOS A | 0.0 | 0.0 | Full | 120 | 0.0 | 0.0 |
| Approach | 342 | 1.5 | | 0.158 | | 1.1 | LOS A | 0.2 | 1.5 | | | | |
| Intersection | 447 | 1.1 | | 0.158 | | 1.8 | NA | 0.2 | 1.7 | | | | |

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.
LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection).
Minor Road Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 6).
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road lanes.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

# MOVEMENT SUMMARY

## Site: 104B [104B-PR-122 @ PR-321 (PM)]

Stop (Two-Way)

| Movement Performance - Vehicles | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Mov ID | OD Mov | Demand Flows Total veh/h | HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
| East: PR-321 | | | | | | | | | | | |
| 6 | T1 | 12 | 0.0 | 0.037 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.00 | 63.8 |
| 16 | R2 | 48 | 0.0 | 0.037 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.00 | 59.7 |
| Approach | | 60 | 0.0 | 0.037 | 0.0 | NA | 0.0 | 0.0 | 0.00 | 0.00 | 60.4 |
| North: PR-122 (Northbound) | | | | | | | | | | | |
| 7 | L2 | 28 | 0.0 | 0.055 | 10.4 | LOS B | 0.2 | 1.7 | 0.07 | 0.04 | 36.3 |
| 14 | R2 | 16 | 0.0 | 0.055 | 8.6 | LOS A | 0.2 | 1.7 | 0.07 | 0.04 | 16.1 |
| Approach | | 44 | 0.0 | 0.055 | 9.8 | LOS A | 0.2 | 1.7 | 0.07 | 0.04 | 29.0 |
| West: PR-321 | | | | | | | | | | | |
| 5 | L2 | 44 | 0.0 | 0.042 | 8.7 | LOS A | 0.2 | 1.5 | 0.21 | 0.08 | 31.6 |
| 2 | T1 | 299 | 1.7 | 0.158 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.00 | 57.3 |
| Approach | | 342 | 1.5 | 0.158 | 1.1 | LOS A | 0.2 | 1.5 | 0.03 | 0.01 | 54.5 |
| All Vehicles | | 447 | 1.1 | 0.158 | 1.8 | NA | 0.2 | 1.7 | 0.03 | 0.01 | 51.3 |

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Minor Road Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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# INTERSECTION SUMMARY

## Site: 107 [107-PR-122 @ PR-166 (PM)]

Signals - Fixed Time Isolated Cycle Time = 64 seconds (User-Given Phase Times)

| Intersection Performance - Hourly Values | | | | |
|---|---|---|---|---|
| **Performance Measure** | **Vehicles** | | **Persons** | |
| Travel Speed (Average) | 43.7 | km/h | 43.7 | km/h |
| Travel Distance (Total) | 1658.4 | veh-km/h | 1990.1 | pers-km/h |
| Travel Time (Total) | 38.0 | veh-h/h | 45.6 | pers-h/h |
| Demand Flows (Total) | 1627 | veh/h | 1953 | pers/h |
| Percent Heavy Vehicles (Demand) | 2.1 | % | | |
| Degree of Saturation | 0.693 | | | |
| Practical Spare Capacity | 29.8 | % | | |
| Effective Intersection Capacity | 2347 | veh/h | | |
| Control Delay (Total) | 6.58 | veh-h/h | 7.90 | pers-h/h |
| Control Delay (Average) | 14.6 | sec | 14.6 | sec |
| Control Delay (Worst Lane) | 24.3 | sec | | |
| Control Delay (Worst Movement) | 24.3 | sec | 24.3 | sec |
| Geometric Delay (Average) | 0.0 | sec | | |
| Stop-Line Delay (Average) | 14.6 | sec | | |
| Idling Time (Average) | 11.5 | sec | | |
| Intersection Level of Service (LOS) | LOS B | | | |
| 95% Back of Queue - Vehicles (Worst Lane) | 10.6 | veh | | |
| 95% Back of Queue - Distance (Worst Lane) | 82.0 | m | | |
| Queue Storage Ratio (Worst Lane) | 0.10 | | | |
| Total Effective Stops | 974 | veh/h | 1169 | pers/h |
| Effective Stop Rate | 0.60 | per veh | 0.60 | per pers |
| Proportion Queued | 0.70 | | 0.70 | |
| Performance Index | 83.3 | | 83.3 | |
| Cost (Total) | 538.22 | $/h | 538.22 | $/h |
| Fuel Consumption (Total) | 172.1 | L/h | | |
| Carbon Dioxide (Total) | 406.6 | kg/h | | |
| Hydrocarbons (Total) | 0.037 | kg/h | | |
| Carbon Monoxide (Total) | 0.493 | kg/h | | |
| NOx (Total) | 0.488 | kg/h | | |

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Intersection LOS value for Vehicles is based on average delay for all vehicle movements.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.

| Intersection Performance - Annual Values | | | | |
|---|---|---|---|---|
| **Performance Measure** | **Vehicles** | | **Persons** | |
| Demand Flows (Total) | 781,148 | veh/y | 937,378 | pers/y |
| Delay | 3,159 | veh-h/y | 3,791 | pers-h/y |
| Effective Stops | 467,553 | veh/y | 561,064 | pers/y |
| Travel Distance | 796,053 | veh-km/y | 955,264 | pers-km/y |
| Travel Time | 18,222 | veh-h/y | 21,866 | pers-h/y |
| Cost | 258,344 | $/y | 258,344 | $/y |
| Fuel Consumption | 82,621 | L/y | | |
| Carbon Dioxide | 195,159 | kg/y | | |
| Hydrocarbons | 18 | kg/y | | |
| Carbon Monoxide | 236 | kg/y | | |
| NOx | 234 | kg/y | | |

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# LANE FLOWS

## Site: 107 [107-PR-122 @ PR-166 (PM)]

Signals - Fixed Time Isolated Cycle Time = 64 seconds (User-Given Phase Times)

**Approach Lane Flows (veh/h)**

South: PR-122

| Mov. From S To Exit: | L2 W | T1 N | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 251 | - | 251 | 1.9 | 611 | 0.410 | 100 | 0.0 | 2 |
| Lane 2 | - | 52 | 52 | 1.4 | 644 | 0.081 | 100 | NA | NA |
| Lane 3 | - | 52 | 52 | 1.4 | 644 | 0.081 | 100 | NA | NA |
| Approach | 251 | 104 | 355 | 1.7 | | 0.410 | | | |

North: PR-122

| Mov. From N To Exit: | T1 S | R2 W | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 89 | - | 89 | 0.0 | 297 | 0.298 | 68[5] | NA | NA |
| Lane 2 | - | 531 | 531 | 2.2 | 1215 | 0.437 | 100 | NA | NA |
| Approach | 89 | 531 | 619 | 1.9 | | 0.437 | | | |

West: PR-166

| Mov. From W To Exit: | L2 N | R2 S | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 312 | - | 312 | 2.6 | 551 | 0.566 | 100 | NA | NA |
| Lane 2 | - | 341 | 341 | 2.3 | 492 | 0.693 | 100 | NA | NA |
| Approach | 312 | 341 | 653 | 2.4 | | 0.693 | | | |

| | Total | %HV | Deg.Satn (v/c) |
|---|---|---|---|
| Intersection | 1627 | 2.1 | 0.693 |

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

5 Lane under-utilisation found by the program

# LANE SUMMARY

## Site: 107 [107-PR-122 @ PR-166 (PM)]

Signals - Fixed Time Isolated Cycle Time = 64 seconds (User-Given Phase Times)

**Lane Use and Performance**

| | Demand Flows Total veh/h | HV % | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Average Delay sec | Level of Service | 95% Back of Queue Veh | Dist m | Lane Config | Lane Length m | Cap. Adj. % | Prob. Block. % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| South: PR-122 | | | | | | | | | | | | | |
| Lane 1 | 251 | 1.9 | 611 | 0.410 | 100 | 16.4 | LOS B | 6.3 | 48.4 | Short | 80 | 0.0 | NA |
| Lane 2 | 52 | 1.4 | 644 | 0.081 | 100 | 14.2 | LOS B | 1.1 | 8.6 | Full | 500 | 0.0 | 0.0 |
| Lane 3 | 52 | 1.4 | 644 | 0.081 | 100 | 14.2 | LOS B | 1.1 | 8.6 | Full | 500 | 0.0 | 0.0 |
| Approach | 355 | 1.7 | | 0.410 | | 15.7 | LOS B | 6.3 | 48.4 | | | | |
| North: PR-122 | | | | | | | | | | | | | |
| Lane 1 | 89 | 0.0 | 297 | 0.298 | 68[5] | 24.3 | LOS C | 2.5 | 19.3 | Full | 500 | 0.0 | 0.0 |
| Lane 2 | 531 | 2.2 | 1215 | 0.437 | 100 | 3.7 | LOS A | 5.0 | 38.7 | Full | 500 | 0.0 | 0.0 |
| Approach | 619 | 1.9 | | 0.437 | | 6.6 | LOS A | 5.0 | 38.7 | | | | |
| West: PR-166 | | | | | | | | | | | | | |
| Lane 1 | 312 | 2.6 | 551 | 0.566 | 100 | 19.5 | LOS B | 8.8 | 68.3 | Full | 500 | 0.0 | 0.0 |
| Lane 2 | 341 | 2.3 | 492 | 0.693 | 100 | 23.2 | LOS C | 10.6 | 82.0 | Full | 500 | 0.0 | 0.0 |
| Approach | 653 | 2.4 | | 0.693 | | 21.4 | LOS C | 10.6 | 82.0 | | | | |
| Intersection | 1627 | 2.1 | | 0.693 | | 14.6 | LOS B | 10.6 | 82.0 | | | | |

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.
LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 6).
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

5 Lane under-utilisation found by the program

# MOVEMENT SUMMARY

## Site: 107 [107-PR-122 @ PR-166 (PM)]

Signals - Fixed Time Isolated Cycle Time = 64 seconds (User-Given Phase Times)

**Movement Performance - Vehicles**

| Mov ID | OD Mov | Demand Flows Total veh/h | HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | 95% Back of Queue Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| South: PR-122 | | | | | | | | | | | |
| 3 | L2 | 251 | 1.9 | 0.410 | 16.4 | LOS B | 6.3 | 48.4 | 0.81 | 0.68 | 47.1 |
| 8 | T1 | 104 | 1.4 | 0.081 | 14.2 | LOS B | 1.1 | 8.6 | 0.70 | 0.54 | 41.6 |
| Approach | | 355 | 1.7 | 0.410 | 15.7 | LOS B | 6.3 | 48.4 | 0.78 | 0.64 | 45.3 |
| North: PR-122 | | | | | | | | | | | |
| 4 | T1 | 89 | 0.0 | 0.298 | 24.3 | LOS C | 2.5 | 19.3 | 0.92 | 0.72 | 38.3 |
| 14 | R2 | 531 | 2.2 | 0.437 | 3.7 | LOS A | 5.0 | 38.7 | 0.36 | 0.32 | 44.3 |
| Approach | | 619 | 1.9 | 0.437 | 6.6 | LOS A | 5.0 | 38.7 | 0.44 | 0.37 | 43.3 |
| West: PR-166 | | | | | | | | | | | |
| 5 | L2 | 312 | 2.6 | 0.566 | 19.5 | LOS B | 8.8 | 68.3 | 0.89 | 0.75 | 43.6 |
| 12 | R2 | 341 | 2.3 | 0.693 | 23.2 | LOS C | 10.6 | 82.0 | 0.93 | 0.83 | 42.8 |
| Approach | | 653 | 2.4 | 0.693 | 21.4 | LOS C | 10.6 | 82.0 | 0.91 | 0.79 | 43.2 |
| All Vehicles | | 1627 | 2.1 | 0.693 | 14.6 | LOS B | 10.6 | 82.0 | 0.70 | 0.60 | 43.7 |

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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# TIMING ANALYSIS

## Site: 107 [107-PR-122 @ PR-166 (PM)]

Signals - Fixed Time Isolated Cycle Time = 64 seconds (User-Given Phase Times)

**Phase Times specified by the user**
**Phase Sequence: Leading Left Turn**
**Reference Phase: Phase A**
**Input Phase Sequence: A, B, C**
**Output Phase Sequence: A, B, C**

**Movement Timing Information**

| Mov ID | Mov Class | Mov Type | PHASE MATRIX First Green [ From | To | Oppd | Priority | Und ] | PHASE MATRIX Second Green [ From | To | Oppd | Priority | Und ] | Lost Time 1st Grn sec | Lost Time 2nd Grn sec | ReqMovTime 1st Grn sec | ReqMovTime 2nd Grn sec | Eff Green 1st Grn sec | Eff Green 2nd Grn sec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| South | | PR-122 | | | | | | | | | | | | | | | | |
| 3 | # | | *A | B | | | | | | | | | 4 | | 14.0 | | 22 | |
| 8 | # | | A | B | | | | | | | | | 4 | | 10.0 Min | | 22 | |
| North | | PR-122 | | | | | | | | | | | | | | | | |
| 4 | # | | *B | C | | | | | | | | | 4 | | 10.0 Min | | 10 | |
| 14 | # | Slip/ Bypass | A | B | Yes | | | B | A | | | | 10 | 4 | 0.0 1 | 0.0 1 | 16 | 34 |
| West | | PR-166 | | | | | | | | | | | | | | | | |
| 5 | # | | *C | A | | | | | | | | | 4 | | 16.6 | | 20 | |
| 12 | # | | C | A | | | Yes | | | | | | 4 | | 19.4 | | 20 | |

\# Combined timing results are shown for all Movement Classes except any listed separately.
* Critical Movement/Green Period
1 This Green Period of the movement was treated as Undetected and not included in signal timing calculations.

## Critical Movements and Cycle Time

| Critical Mov ID | Appr & Dest | Green Period | Phases [ From | To ] | Adjusted Lost Time sec | Adjusted Flow Ratio | Req Green Time Ratio | Required Mov Time sec | |
|---|---|---|---|---|---|---|---|---|---|
| 3LV | S_W | 1 | A | B | 4 | 0.141 | 0.157 | 14.0 | |
| 4LV | N_S | 1 | B | C | 10 | – | – | 10.0 | Min |
| 5LV | W_N | 1 | C | A | 4 | 0.177 | 0.196 | 16.6 | |
| | | | | Total | 18 | 0.318 | 0.353 | 40.6 | |

| Cycle Time (sec): | Minimum | Maximum | Practical | Chosen |
|---|---|---|---|---|
| | 30 | 150 | 30 | 64 |

Min/Max When the Required Movement Time is subject to minimum or maximum condition, the Flow Ratio and the corresponding Required Green Time Ratio are not used for cycle time calculations and the Adjusted Lost Time equals the Required Movement Time.

## Phase Information

| Phase | Ref. Phase | Change Time sec | Starting Intergreen sec | Green Start sec | Displayed Green sec | Green End sec | Terminating Intergreen sec | Phase Time sec | Phase Split % |
|---|---|---|---|---|---|---|---|---|---|
| A | Yes | 0 | 4 | 4 | 22 | 26 | 4 | 26 | 41 |
| B | No | 26 | 4 | 30 | 10 | 40 | 4 | 14 | 22 |
| C | No | 40 | 4 | 44 | 20 | 64 | 4 | 24 | 38 |

This table gives adjusted values of Intergreen Time, Phase Time and Green Time values in cases of Pedestrian Actuation, Phase Actuation and Phase Frequency values (user-specified or implied) less than 100%. See the Phase Information section in the Detailed Output report for input values of Yellow Time, All-Red Time and the unadjusted Intergreen Times.

# Appendix F:

## Capacity Analysis Data and Results– Proposed Condition 20-Years from Opening (2048 Horizon)

# INTERSECTION SUMMARY

## Site: 104A [104A-PR-122 @ PR-321 (AM) - Import]

Stop (Two-Way)

| Intersection Performance - Hourly Values | | | | |
|---|---|---|---|---|
| **Performance Measure** | **Vehicles** | | **Persons** | |
| Travel Speed (Average) | 29.6 | km/h | 29.6 | km/h |
| Travel Distance (Total) | 395.7 | veh-km/h | 474.8 | pers-km/h |
| Travel Time (Total) | 13.4 | veh-h/h | 16.0 | pers-h/h |
| Demand Flows (Total) | 698 | veh/h | 837 | pers/h |
| Percent Heavy Vehicles (Demand) | 1.7 | % | | |
| Degree of Saturation | 0.347 | | | |
| Practical Spare Capacity | 130.4 | % | | |
| Effective Intersection Capacity | 2010 | veh/h | | |
| Control Delay (Total) | 1.48 | veh-h/h | 1.78 | pers-h/h |
| Control Delay (Average) | 7.6 | sec | 7.6 | sec |
| Control Delay (Worst Lane) | 11.8 | sec | | |
| Control Delay (Worst Movement) | 12.6 | sec | 12.6 | sec |
| Geometric Delay (Average) | 0.0 | sec | | |
| Stop-Line Delay (Average) | 7.6 | sec | | |
| Idling Time (Average) | 7.2 | sec | | |
| Intersection Level of Service (LOS) | NA | | | |
| 95% Back of Queue - Vehicles (Worst Lane) | 1.8 | veh | | |
| 95% Back of Queue - Distance (Worst Lane) | 13.6 | m | | |
| Queue Storage Ratio (Worst Lane) | 0.03 | | | |
| Total Effective Stops | 94 | veh/h | 112 | pers/h |
| Effective Stop Rate | 0.13 | per veh | 0.13 | per pers |
| Proportion Queued | 0.21 | | 0.21 | |
| Performance Index | 15.7 | | 15.7 | |
| Cost (Total) | 169.50 | $/h | 169.50 | $/h |
| Fuel Consumption (Total) | 57.9 | L/h | | |
| Carbon Dioxide (Total) | 136.7 | kg/h | | |
| Hydrocarbons (Total) | 0.014 | kg/h | | |
| Carbon Monoxide (Total) | 0.190 | kg/h | | |
| NOx (Total) | 0.153 | kg/h | | |

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
NA: Intersection LOS for Vehicles is Not Applicable for two-way sign control since the average intersection delay is not a good LOS measure due to zero delays associated with major road movements.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.

| Intersection Performance - Annual Values | | | | |
|---|---|---|---|---|
| **Performance Measure** | **Vehicles** | | **Persons** | |
| Demand Flows (Total) | 334,986 | veh/y | 401,983 | pers/y |
| Delay | 710 | veh-h/y | 852 | pers-h/y |
| Effective Stops | 44,949 | veh/y | 53,938 | pers/y |
| Travel Distance | 189,916 | veh-km/y | 227,899 | pers-km/y |
| Travel Time | 6,410 | veh-h/y | 7,691 | pers-h/y |
| Cost | 81,361 | $/y | 81,361 | $/y |
| Fuel Consumption | 27,792 | L/y | | |
| Carbon Dioxide | 65,594 | kg/y | | |
| Hydrocarbons | 7 | kg/y | | |
| Carbon Monoxide | 91 | kg/y | | |
| NOx | 74 | kg/y | | |

# LANE FLOWS

## Site: 104A [104A-PR-122 @ PR-321 (AM) - Import]

Stop (Two-Way)

| Approach Lane Flows (veh/h) | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| South: Local | | | | | | | | | | |
| Mov. From S To Exit: | L2 W | T1 N | R2 E | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
| Lane 1 | 4 | 4 | 4 | 13 | 0.0 | 789 | 0.016 | 100 | NA | NA |
| Approach | 4 | 4 | 4 | 13 | 0.0 | | 0.016 | | | |
| East: PR-321 | | | | | | | | | | |
| Mov. From E To Exit: | L2 S | T1 W | R2 N | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
| Lane 1 | 4 | 48 | 39 | 91 | 3.1 | 1675 | 0.054 | 100 | NA | NA |
| Approach | 4 | 48 | 39 | 91 | 3.1 | | 0.054 | | | |
| North: PR-122 (Southbound) | | | | | | | | | | |
| Mov. From N To Exit: | L2 E | T1 S | R2 W | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
| Lane 1 | 143 | 4 | 135 | 282 | 1.4 | 812 | 0.347 | 100 | NA | NA |
| Approach | 143 | 4 | 135 | 282 | 1.4 | | 0.347 | | | |
| West: PR-321 | | | | | | | | | | |
| Mov. From W To Exit: | L2 N | T1 E | R2 S | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
| Lane 1 | 180 | - | - | 180 | 1.8 | 888 | 0.203 | 100 | 0.0 | 2 |
| Lane 2 | - | 128 | 4 | 132 | 1.6 | 1878 | 0.070 | 100 | NA | NA |
| Approach | 180 | 128 | 4 | 312 | 1.7 | | 0.203 | | | |

| | Total | %HV | Deg.Satn (v/c) |
|---|---|---|---|
| Intersection | 698 | 1.7 | 0.347 |

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

# LANE SUMMARY

## Site: 104A [104A-PR-122 @ PR-321 (AM) - Import]

Stop (Two-Way)

| Lane Use and Performance | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Demand Flows Total veh/h | HV % | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Average Delay sec | Level of Service | 95% Back of Queue Veh | Dist m | Lane Config | Lane Length m | Cap. Adj. % | Prob. Block. % |
| South: Local | | | | | | | | | | | | | |
| Lane 1 | 13 | 0.0 | 789 | 0.016 | 100 | 9.6 | LOS A | 0.1 | 0.5 | Full | 500 | 0.0 | 0.0 |
| Approach | 13 | 0.0 | | 0.016 | | 9.6 | LOS A | 0.1 | 0.5 | | | | |
| East: PR-321 | | | | | | | | | | | | | |
| Lane 1 | 91 | 3.1 | 1675 | 0.054 | 100 | 0.7 | LOS A | 0.0 | 0.3 | Full | 120 | 0.0 | 0.0 |
| Approach | 91 | 3.1 | | 0.054 | | 0.7 | NA | 0.0 | 0.3 | | | | |
| North: PR-122 (Southbound) | | | | | | | | | | | | | |
| Lane 1 | 282 | 1.4 | 812 | 0.347 | 100 | 11.8 | LOS B | 1.8 | 13.6 | Full | 160 | 0.0 | 0.0 |
| Approach | 282 | 1.4 | | 0.347 | | 11.8 | LOS B | 1.8 | 13.6 | | | | |
| West: PR-321 | | | | | | | | | | | | | |
| Lane 1 | 180 | 1.8 | 888 | 0.203 | 100 | 10.1 | LOS B | 1.0 | 8.0 | Short | 60 | 0.0 | NA |
| Lane 2 | 132 | 1.6 | 1878 | 0.070 | 100 | 0.0 | LOS A | 0.0 | 0.0 | Full | 500 | 0.0 | 0.0 |
| Approach | 312 | 1.7 | | 0.203 | | 5.8 | LOS A | 1.0 | 8.0 | | | | |
| Intersection | 698 | 1.7 | | 0.347 | | 7.6 | NA | 1.8 | 13.6 | | | | |

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.
LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection).
Minor Road Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 6).
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road lanes.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

# MOVEMENT SUMMARY

## Site: 104A [104A-PR-122 @ PR-321 (AM) - Import]

Stop (Two-Way)

| Movement Performance - Vehicles | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Mov ID | OD Mov | Demand Flows Total veh/h | HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
| South: Local | | | | | | | | | | | |
| 3 | L2 | 4 | 0.0 | 0.016 | 10.1 | LOS B | 0.1 | 0.5 | 0.34 | 0.19 | 31.7 |
| 8 | T1 | 4 | 0.0 | 0.016 | 9.9 | LOS A | 0.1 | 0.5 | 0.34 | 0.19 | 24.6 |
| 18 | R2 | 4 | 0.0 | 0.016 | 9.0 | LOS A | 0.1 | 0.5 | 0.34 | 0.19 | 23.4 |
| Approach | | 13 | 0.0 | 0.016 | 9.6 | LOS A | 0.1 | 0.5 | 0.34 | 0.19 | 26.9 |
| East: PR-321 | | | | | | | | | | | |
| 1 | L2 | 4 | 0.0 | 0.054 | 2.9 | LOS A | 0.0 | 0.3 | 0.03 | 0.00 | 28.5 |
| 6 | T1 | 48 | 0.0 | 0.054 | 0.6 | LOS A | 0.0 | 0.3 | 0.03 | 0.00 | 67.1 |
| 16 | R2 | 39 | 7.1 | 0.054 | 0.6 | LOS A | 0.0 | 0.3 | 0.03 | 0.00 | 49.8 |
| Approach | | 91 | 3.1 | 0.054 | 0.7 | NA | 0.0 | 0.3 | 0.03 | 0.00 | 57.3 |
| North: PR-122 (Southbound) | | | | | | | | | | | |
| 7 | L2 | 143 | 1.4 | 0.347 | 12.6 | LOS B | 1.8 | 13.6 | 0.24 | 0.16 | 8.8 |
| 4 | T1 | 4 | 0.0 | 0.347 | 11.9 | LOS B | 1.8 | 13.6 | 0.24 | 0.16 | 21.8 |
| 14 | R2 | 135 | 1.5 | 0.347 | 10.9 | LOS B | 1.8 | 13.6 | 0.24 | 0.16 | 35.3 |
| Approach | | 282 | 1.4 | 0.347 | 11.8 | LOS B | 1.8 | 13.6 | 0.24 | 0.16 | 18.2 |
| West: PR-321 | | | | | | | | | | | |
| 5 | L2 | 180 | 1.8 | 0.203 | 10.1 | LOS B | 1.0 | 8.0 | 0.40 | 0.25 | 45.4 |
| 2 | T1 | 128 | 1.7 | 0.070 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.00 | 40.0 |
| 12 | R2 | 4 | 0.0 | 0.070 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.00 | 63.2 |
| Approach | | 312 | 1.7 | 0.203 | 5.8 | LOS A | 1.0 | 8.0 | 0.23 | 0.15 | 43.4 |
| All Vehicles | | 698 | 1.7 | 0.347 | 7.6 | NA | 1.8 | 13.6 | 0.21 | 0.13 | 29.6 |

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Minor Road Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

# INTERSECTION SUMMARY

## Site: 104B [104B-PR-122 @ PR-321 (AM) - Import]

Stop (Two-Way)

| Intersection Performance - Hourly Values | | | | |
|---|---|---|---|---|
| **Performance Measure** | **Vehicles** | | **Persons** | |
| Travel Speed (Average) | 53.9 | km/h | 53.9 | km/h |
| Travel Distance (Total) | 333.0 | veh-km/h | 399.7 | pers-km/h |
| Travel Time (Total) | 6.2 | veh-h/h | 7.4 | pers-h/h |
| | | | | |
| Demand Flows (Total) | 542 | veh/h | 650 | pers/h |
| Percent Heavy Vehicles (Demand) | 2.1 | % | | |
| Degree of Saturation | 0.135 | | | |
| Practical Spare Capacity | 623.3 | % | | |
| Effective Intersection Capacity | 3997 | veh/h | | |
| | | | | |
| Control Delay (Total) | 0.19 | veh-h/h | 0.23 | pers-h/h |
| Control Delay (Average) | 1.3 | sec | 1.3 | sec |
| Control Delay (Worst Lane) | 9.9 | sec | | |
| Control Delay (Worst Movement) | 10.8 | sec | 10.8 | sec |
| Geometric Delay (Average) | 0.0 | sec | | |
| Stop-Line Delay (Average) | 1.3 | sec | | |
| Idling Time (Average) | 1.2 | sec | | |
| Intersection Level of Service (LOS) | NA | | | |
| | | | | |
| 95% Back of Queue - Vehicles (Worst Lane) | 0.2 | veh | | |
| 95% Back of Queue - Distance (Worst Lane) | 1.7 | m | | |
| Queue Storage Ratio (Worst Lane) | 0.00 | | | |
| Total Effective Stops | 13 | veh/h | 16 | pers/h |
| Effective Stop Rate | 0.02 | per veh | 0.02 | per pers |
| Proportion Queued | 0.04 | | 0.04 | |
| Performance Index | 5.5 | | 5.5 | |
| | | | | |
| Cost (Total) | 105.99 | $/h | 105.99 | $/h |
| Fuel Consumption (Total) | 44.1 | L/h | | |
| Carbon Dioxide (Total) | 104.2 | kg/h | | |
| Hydrocarbons (Total) | 0.011 | kg/h | | |
| Carbon Monoxide (Total) | 0.154 | kg/h | | |
| NOx (Total) | 0.131 | kg/h | | |

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
NA: Intersection LOS for Vehicles is Not Applicable for two-way sign control since the average intersection delay is not a good LOS measure due to zero delays associated with major road movements.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.

| Intersection Performance - Annual Values | | | | |
|---|---|---|---|---|
| **Performance Measure** | **Vehicles** | | **Persons** | |
| Demand Flows (Total) | 259,969 | veh/y | 311,963 | pers/y |
| Delay | 93 | veh-h/y | 112 | pers-h/y |
| Effective Stops | 6,262 | veh/y | 7,515 | pers/y |
| Travel Distance | 159,862 | veh-km/y | 191,834 | pers-km/y |
| Travel Time | 2,964 | veh-h/y | 3,557 | pers-h/y |
| | | | | |
| Cost | 50,874 | $/y | 50,874 | $/y |
| Fuel Consumption | 21,187 | L/y | | |
| Carbon Dioxide | 50,025 | kg/y | | |
| Hydrocarbons | 5 | kg/y | | |
| Carbon Monoxide | 74 | kg/y | | |
| NOx | 63 | kg/y | | |

# LANE FLOWS

## Site: 104B [104B-PR-122 @ PR-321 (AM) - Import]

Stop (Two-Way)

| Approach Lane Flows (veh/h) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| East: PR-321 | | | | | | | | | |
| Mov. From E To Exit: | T1 W | R2 N | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
| Lane 1 | 67 | 148 | 214 | 3.2 | 1622 | 0.132 | 100 | NA | NA |
| Approach | 67 | 148 | 214 | 3.2 | | 0.132 | | | |
| North: PR-122 (Northbound) | | | | | | | | | |
| Mov. From N To Exit: | L2 E | R2 W | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
| Lane 1 | 24 | 20 | 44 | 0.0 | 781 | 0.056 | 100 | NA | NA |
| Approach | 24 | 20 | 44 | 0.0 | | 0.056 | | | |
| West: PR-321 | | | | | | | | | |
| Mov. From W To Exit: | L2 N | T1 E | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
| Lane 1 | 28 | - | 28 | 0.0 | 831 | 0.034 | 100 | NA | NA |
| Lane 2 | - | 256 | 256 | 1.7 | 1886 | 0.135 | 100 | NA | NA |
| Approach | 28 | 256 | 284 | 1.6 | | 0.135 | | | |
| | Total | %HV | Deg.Satn (v/c) | | | | | | |
| Intersection | 542 | 2.1 | | 0.135 | | | | | |

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

# LANE SUMMARY

## Site: 104B [104B-PR-122 @ PR-321 (AM) - Import]

Stop (Two-Way)

| Lane Use and Performance | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Demand Flows Total veh/h | HV % | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Average Delay sec | Level of Service | 95% Back of Queue Veh | Dist m | Lane Config | Lane Length m | Cap. Adj. % | Prob. Block. % |
| East: PR-321 | | | | | | | | | | | | | |
| Lane 1 | 214 | 3.2 | 1622 | 0.132 | 100 | 0.0 | LOS A | 0.0 | 0.0 | Full | 500 | 0.0 | 0.0 |
| Approach | 214 | 3.2 | | 0.132 | | 0.0 | NA | 0.0 | 0.0 | | | | |
| North: PR-122 (Northbound) | | | | | | | | | | | | | |
| Lane 1 | 44 | 0.0 | 781 | 0.056 | 100 | 9.9 | LOS A | 0.2 | 1.7 | Full | 160 | 0.0 | 0.0 |
| Approach | 44 | 0.0 | | 0.056 | | 9.9 | LOS A | 0.2 | 1.7 | | | | |
| West: PR-321 | | | | | | | | | | | | | |
| Lane 1 | 28 | 0.0 | 831 | 0.034 | 100 | 9.5 | LOS A | 0.1 | 1.1 | Full | 120 | 0.0 | 0.0 |
| Lane 2 | 256 | 1.7 | 1886 | 0.135 | 100 | 0.0 | LOS A | 0.0 | 0.0 | Full | 120 | 0.0 | 0.0 |
| Approach | 284 | 1.6 | | 0.135 | | 0.9 | LOS A | 0.1 | 1.1 | | | | |
| Intersection | 542 | 2.1 | | 0.135 | | 1.3 | NA | 0.2 | 1.7 | | | | |

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.
LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection).
Minor Road Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 6).
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road lanes.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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# MOVEMENT SUMMARY

## Site: 104B [104B-PR-122 @ PR-321 (AM) - Import]

Stop (Two-Way)

| Movement Performance - Vehicles | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Mov ID | OD Mov | Demand Flows Total veh/h | HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
| East: PR-321 | | | | | | | | | | | |
| 6 | T1 | 67 | 4.8 | 0.132 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.00 | 65.1 |
| 16 | R2 | 148 | 2.5 | 0.132 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.00 | 60.4 |
| Approach | | 214 | 3.2 | 0.132 | 0.0 | NA | 0.0 | 0.0 | 0.00 | 0.00 | 61.7 |
| North: PR-122 (Northbound) | | | | | | | | | | | |
| 7 | L2 | 24 | 0.0 | 0.056 | 10.8 | LOS B | 0.2 | 1.7 | 0.24 | 0.15 | 36.4 |
| 14 | R2 | 20 | 0.0 | 0.056 | 8.8 | LOS A | 0.2 | 1.7 | 0.24 | 0.15 | 16.1 |
| Approach | | 44 | 0.0 | 0.056 | 9.9 | LOS A | 0.2 | 1.7 | 0.24 | 0.15 | 27.2 |
| West: PR-321 | | | | | | | | | | | |
| 5 | L2 | 28 | 0.0 | 0.034 | 9.5 | LOS A | 0.1 | 1.1 | 0.40 | 0.24 | 31.1 |
| 2 | T1 | 256 | 1.7 | 0.135 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.00 | 57.3 |
| Approach | | 284 | 1.6 | 0.135 | 0.9 | LOS A | 0.1 | 1.1 | 0.04 | 0.02 | 55.1 |
| All Vehicles | | 542 | 2.1 | 0.135 | 1.3 | NA | 0.2 | 1.7 | 0.04 | 0.02 | 53.9 |

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Minor Road Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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# INTERSECTION SUMMARY

## Site: 107 [107-PR-122 @ PR-166 (AM) - Import]

Signals - Fixed Time Isolated Cycle Time = 64 seconds (User-Given Phase Times)

| Intersection Performance - Hourly Values | | | | |
|---|---|---|---|---|
| **Performance Measure** | **Vehicles** | | **Persons** | |
| Travel Speed (Average) | 41.2 | km/h | 41.2 | km/h |
| Travel Distance (Total) | 1622.1 | veh-km/h | 1946.5 | pers-km/h |
| Travel Time (Total) | 39.4 | veh-h/h | 47.3 | pers-h/h |
| Demand Flows (Total) | 1593 | veh/h | 1912 | pers/h |
| Percent Heavy Vehicles (Demand) | 1.8 | % | | |
| Degree of Saturation | 0.905 | | | |
| Practical Spare Capacity | -0.6 | % | | |
| Effective Intersection Capacity | 1760 | veh/h | | |
| Control Delay (Total) | 9.71 | veh-h/h | 11.65 | pers-h/h |
| Control Delay (Average) | 21.9 | sec | 21.9 | sec |
| Control Delay (Worst Lane) | 41.1 | sec | | |
| Control Delay (Worst Movement) | 41.1 | sec | 41.1 | sec |
| Geometric Delay (Average) | 0.0 | sec | | |
| Stop-Line Delay (Average) | 21.9 | sec | | |
| Idling Time (Average) | 18.0 | sec | | |
| Intersection Level of Service (LOS) | LOS C | | | |
| 95% Back of Queue - Vehicles (Worst Lane) | 17.9 | veh | | |
| 95% Back of Queue - Distance (Worst Lane) | 138.1 | m | | |
| Queue Storage Ratio (Worst Lane) | 0.17 | | | |
| Total Effective Stops | 1158 | veh/h | 1389 | pers/h |
| Effective Stop Rate | 0.73 | per veh | 0.73 | per pers |
| Proportion Queued | 0.80 | | 0.80 | |
| Performance Index | 94.8 | | 94.8 | |
| Cost (Total) | 565.56 | $/h | 565.56 | $/h |
| Fuel Consumption (Total) | 171.9 | L/h | | |
| Carbon Dioxide (Total) | 405.8 | kg/h | | |
| Hydrocarbons (Total) | 0.038 | kg/h | | |
| Carbon Monoxide (Total) | 0.512 | kg/h | | |
| NOx (Total) | 0.439 | kg/h | | |

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Intersection LOS value for Vehicles is based on average delay for all vehicle movements.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.

| Intersection Performance - Annual Values | | | | |
|---|---|---|---|---|
| **Performance Measure** | **Vehicles** | | **Persons** | |
| Demand Flows (Total) | 764,669 | veh/y | 917,603 | pers/y |
| Delay | 4,659 | veh-h/y | 5,590 | pers-h/y |
| Effective Stops | 555,739 | veh/y | 666,887 | pers/y |
| Travel Distance | 778,587 | veh-km/y | 934,305 | pers-km/y |
| Travel Time | 18,904 | veh-h/y | 22,685 | pers-h/y |
| Cost | 271,467 | $/y | 271,467 | $/y |
| Fuel Consumption | 82,525 | L/y | | |
| Carbon Dioxide | 194,790 | kg/y | | |
| Hydrocarbons | 18 | kg/y | | |
| Carbon Monoxide | 246 | kg/y | | |
| NOx | 211 | kg/y | | |

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# LANE FLOWS

## Site: 107 [107-PR-122 @ PR-166 (AM) - Import]

Signals - Fixed Time Isolated Cycle Time = 64 seconds (User-Given Phase Times)

**Approach Lane Flows (veh/h)**

South: PR-122

| Mov. From S To Exit: | L2 W | T1 N | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 382 | - | 382 | 2.2 | 609 | 0.628 | 100 | 10.4 | 2 |
| Lane 2 | - | 50 | 50 | 1.4 | 644 | 0.078 | 100 | NA | NA |
| Lane 3 | - | 50 | 50 | 1.4 | 644 | 0.078 | 100 | NA | NA |
| Approach | 382 | 100 | 482 | 2.0 | | 0.628 | | | |

North: PR-122

| Mov. From N To Exit: | T1 S | R2 W | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 72 | - | 72 | 0.0 | 297 | 0.244 | 83[5] | NA | NA |
| Lane 2 | - | 329 | 329 | 1.8 | 1119 | 0.294 | 100 | NA | NA |
| Approach | 72 | 329 | 401 | 1.5 | | 0.294 | | | |

West: PR-166

| Mov. From W To Exit: | L2 N | R2 S | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 263 | - | 263 | 1.8 | 556 | 0.473 | 100 | NA | NA |
| Lane 2 | - | 447 | 447 | 1.9 | 494 | 0.905 | 100 | NA | NA |
| Approach | 263 | 447 | 710 | 1.8 | | 0.905 | | | |

| | Total | %HV | Deg.Satn (v/c) |
|---|---|---|---|
| Intersection | 1593 | 1.8 | 0.905 |

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

5 Lane under-utilisation found by the program

# LANE SUMMARY

## Site: 107 [107-PR-122 @ PR-166 (AM) - Import]

Signals - Fixed Time Isolated Cycle Time = 64 seconds (User-Given Phase Times)

**Lane Use and Performance**

| | Demand Flows Total veh/h | HV % | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Average Delay sec | Level of Service | 95% Back of Queue Veh | Dist m | Lane Config | Lane Length m | Cap. Adj. % | Prob. Block. % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| South: PR-122 | | | | | | | | | | | | | |
| Lane 1 | 382 | 2.2 | 609 | 0.628 | 100 | 19.4 | LOS B | 11.0 | 84.9 | Short | 80 | 0.0 | NA |
| Lane 2 | 50 | 1.4 | 644 | 0.078 | 100 | 14.2 | LOS B | 1.1 | 8.2 | Full | 500 | 0.0 | 0.0 |
| Lane 3 | 50 | 1.4 | 644 | 0.078 | 100 | 14.2 | LOS B | 1.1 | 8.2 | Full | 500 | 0.0 | 0.0 |
| Approach | 482 | 2.0 | | 0.628 | | 18.3 | LOS B | 11.0 | 84.9 | | | | |
| North: PR-122 | | | | | | | | | | | | | |
| Lane 1 | 72 | 0.0 | 297 | 0.244 | 83[5] | 24.0 | LOS C | 2.0 | 15.5 | Full | 500 | 0.0 | 0.0 |
| Lane 2 | 329 | 1.8 | 1119 | 0.294 | 100 | 3.7 | LOS A | 3.5 | 26.7 | Full | 500 | 0.0 | 0.0 |
| Approach | 401 | 1.5 | | 0.294 | | 7.4 | LOS A | 3.5 | 26.7 | | | | |
| West: PR-166 | | | | | | | | | | | | | |
| Lane 1 | 263 | 1.8 | 556 | 0.473 | 100 | 18.2 | LOS B | 7.0 | 54.0 | Full | 500 | 0.0 | 0.0 |
| Lane 2 | 447 | 1.9 | 494 | 0.905 | 100 | 41.1 | LOS D | 17.9 | 138.1 | Full | 500 | 0.0 | 0.0 |
| Approach | 710 | 1.8 | | 0.905 | | 32.6 | LOS C | 17.9 | 138.1 | | | | |
| Intersection | 1593 | 1.8 | | 0.905 | | 21.9 | LOS C | 17.9 | 138.1 | | | | |

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.
LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 6).
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

5 Lane under-utilisation found by the program

# MOVEMENT SUMMARY

## Site: 107 [107-PR-122 @ PR-166 (AM) - Import]

Signals - Fixed Time Isolated Cycle Time = 64 seconds (User-Given Phase Times)

| Movement Performance - Vehicles | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mov ID | OD Mov | Demand Flows Total veh/h | HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
| South: PR-122 | | | | | | | | | | | |
| 3 | L2 | 382 | 2.2 | 0.628 | 19.4 | LOS B | 11.0 | 84.9 | 0.89 | 0.77 | 45.3 |
| 8 | T1 | 100 | 1.4 | 0.078 | 14.2 | LOS B | 1.1 | 8.2 | 0.70 | 0.53 | 41.6 |
| Approach | | 482 | 2.0 | 0.628 | 18.3 | LOS B | 11.0 | 84.9 | 0.85 | 0.72 | 44.5 |
| North: PR-122 | | | | | | | | | | | |
| 4 | T1 | 72 | 0.0 | 0.244 | 24.0 | LOS C | 2.0 | 15.5 | 0.91 | 0.70 | 38.4 |
| 14 | R2 | 329 | 1.8 | 0.294 | 3.7 | LOS A | 3.5 | 26.7 | 0.40 | 0.34 | 44.3 |
| Approach | | 401 | 1.5 | 0.294 | 7.4 | LOS A | 3.5 | 26.7 | 0.49 | 0.40 | 43.1 |
| West: PR-166 | | | | | | | | | | | |
| 5 | L2 | 263 | 1.8 | 0.473 | 18.2 | LOS B | 7.0 | 54.0 | 0.86 | 0.72 | 44.3 |
| 12 | R2 | 447 | 1.9 | 0.905 | 41.1 | LOS D | 17.9 | 138.1 | 1.00 | 1.03 | 35.5 |
| Approach | | 710 | 1.8 | 0.905 | 32.6 | LOS C | 17.9 | 138.1 | 0.95 | 0.92 | 38.3 |
| All Vehicles | | 1593 | 1.8 | 0.905 | 21.9 | LOS C | 17.9 | 138.1 | 0.80 | 0.73 | 41.2 |

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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# TIMING ANALYSIS

## Site: 107 [107-PR-122 @ PR-166 (AM) - Import]

Signals - Fixed Time Isolated Cycle Time = 64 seconds (User-Given Phase Times)

**Phase Times specified by the user**
**Phase Sequence: Leading Left Turn**
**Reference Phase: Phase A**
**Input Phase Sequence: A, B, C**
**Output Phase Sequence: A, B, C**

**Movement Timing Information**

| Mov ID | Mov Class | Mov Type | PHASE MATRIX [ From | To | First Green Oppd | Priority | Und ] | [ From | To | Second Green Oppd | Priority | Und ] | Lost Time 1st Grn sec | Lost Time 2nd Grn sec | ReqMovTime 1st Grn sec | ReqMovTime 2nd Grn sec | Eff Green 1st Grn sec | Eff Green 2nd Grn sec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| South | | PR-122 | | | | | | | | | | | | | | | | |
| 3 | # | | *A | B | | | | | | | | | 4 | | 19.3 | | 22 | |
| 8 | # | | A | B | | | | | | | | | 4 | | 10.0 Min | | 22 | |
| North | | PR-122 | | | | | | | | | | | | | | | | |
| 4 | # | | *B | C | | | | | | | | | 4 | | 10.0 Min | | 10 | |
| 14 | # | Slip/ Bypass | A | B | Yes | | | B | A | | | | 15 | 4 | 0.0 1 | 0.0 1 | 11 | 34 |
| West | | PR-166 | | | | | | | | | | | | | | | | |
| 5 | # | | *C | A | | | | | | | | | 4 | | 14.5 | | 20 | |
| 12 | # | | C | A | | Yes | | | | | | | 4 | | 24.1 | | 20 | |

\# Combined timing results are shown for all Movement Classes except any listed separately.
* Critical Movement/Green Period
1 This Green Period of the movement was treated as Undetected and not included in signal timing calculations.

## Critical Movements and Cycle Time

| Critical Mov ID | Appr & Dest | Green Period | Phases [ From | To ] | Adjusted Lost Time sec | Adjusted Flow Ratio | Req Green Time Ratio | Required Mov Time sec | |
|---|---|---|---|---|---|---|---|---|---|
| 3LV | S_W | 1 | A | B | 4 | 0.216 | 0.240 | 19.3 | |
| 4LV | N_S | 1 | B | C | 10 | – | – | 10.0 | Min |
| 5LV | W_N | 1 | C | A | 4 | 0.148 | 0.164 | 14.5 | |
| | | | | Total | 18 | 0.364 | 0.404 | 43.8 | |

| Cycle Time (sec): | Minimum | Maximum | Practical | Chosen |
|---|---|---|---|---|
| | 30 | 150 | 30 | 64 |

Min/Max When the Required Movement Time is subject to minimum or maximum condition, the Flow Ratio and the corresponding Required Green Time Ratio are not used for cycle time calculations and the Adjusted Lost Time equals the Required Movement Time.

## Phase Information

| Phase | Ref. Phase | Change Time sec | Starting Intergreen sec | Green Start sec | Displayed Green sec | Green End sec | Terminating Intergreen sec | Phase Time sec | Phase Split % |
|---|---|---|---|---|---|---|---|---|---|
| A | Yes | 0 | 4 | 4 | 22 | 26 | 4 | 26 | 41 |
| B | No | 26 | 4 | 30 | 10 | 40 | 4 | 14 | 22 |
| C | No | 40 | 4 | 44 | 20 | 64 | 4 | 24 | 38 |

This table gives adjusted values of Intergreen Time, Phase Time and Green Time values in cases of Pedestrian Actuation, Phase Actuation and Phase Frequency values (user-specified or implied) less than 100%. See the Phase Information section in the Detailed Output report for input values of Yellow Time, All-Red Time and the unadjusted Intergreen Times.

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# INTERSECTION SUMMARY

## Site: 104A [104A-PR-122 @ PR-321 (PM)]

Stop (Two-Way)

| Intersection Performance - Hourly Values | | | | |
|---|---|---|---|---|
| **Performance Measure** | **Vehicles** | | **Persons** | |
| Travel Speed (Average) | 24.6 | km/h | 24.6 | km/h |
| Travel Distance (Total) | 356.1 | veh-km/h | 427.4 | pers-km/h |
| Travel Time (Total) | 14.5 | veh-h/h | 17.3 | pers-h/h |
| Demand Flows (Total) | 670 | veh/h | 804 | pers/h |
| Percent Heavy Vehicles (Demand) | 1.4 | % | | |
| Degree of Saturation | 0.385 | | | |
| Practical Spare Capacity | 107.8 | % | | |
| Effective Intersection Capacity | 1740 | veh/h | | |
| Control Delay (Total) | 1.50 | veh-h/h | 1.80 | pers-h/h |
| Control Delay (Average) | 8.1 | sec | 8.1 | sec |
| Control Delay (Worst Lane) | 12.6 | sec | | |
| Control Delay (Worst Movement) | 13.0 | sec | 13.0 | sec |
| Geometric Delay (Average) | 0.0 | sec | | |
| Stop-Line Delay (Average) | 8.1 | sec | | |
| Idling Time (Average) | 7.6 | sec | | |
| Intersection Level of Service (LOS) | NA | | | |
| 95% Back of Queue - Vehicles (Worst Lane) | 2.9 | veh | | |
| 95% Back of Queue - Distance (Worst Lane) | 22.1 | m | | |
| Queue Storage Ratio (Worst Lane) | 0.06 | | | |
| Total Effective Stops | 98 | veh/h | 117 | pers/h |
| Effective Stop Rate | 0.15 | per veh | 0.15 | per pers |
| Proportion Queued | 0.19 | | 0.19 | |
| Performance Index | 15.6 | | 15.6 | |
| Cost (Total) | 163.68 | $/h | 163.68 | $/h |
| Fuel Consumption (Total) | 49.8 | L/h | | |
| Carbon Dioxide (Total) | 117.4 | kg/h | | |
| Hydrocarbons (Total) | 0.013 | kg/h | | |
| Carbon Monoxide (Total) | 0.164 | kg/h | | |
| NOx (Total) | 0.105 | kg/h | | |

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
NA: Intersection LOS for Vehicles is Not Applicable for two-way sign control since the average intersection delay is not a good LOS measure due to zero delays associated with major road movements.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.

| Intersection Performance - Annual Values | | | | |
|---|---|---|---|---|
| **Performance Measure** | **Vehicles** | | **Persons** | |
| Demand Flows (Total) | 321,673 | veh/y | 386,007 | pers/y |
| Delay | 720 | veh-h/y | 864 | pers-h/y |
| Effective Stops | 46,997 | veh/y | 56,397 | pers/y |
| Travel Distance | 170,944 | veh-km/y | 205,133 | pers-km/y |
| Travel Time | 6,936 | veh-h/y | 8,323 | pers-h/y |
| Cost | 78,564 | $/y | 78,564 | $/y |
| Fuel Consumption | 23,912 | L/y | | |
| Carbon Dioxide | 56,371 | kg/y | | |
| Hydrocarbons | 6 | kg/y | | |
| Carbon Monoxide | 78 | kg/y | | |
| NOx | 50 | kg/y | | |

# LANE FLOWS

## Site: 104A [104A-PR-122 @ PR-321 (PM)]

Stop (Two-Way)

**Approach Lane Flows (veh/h)**

South: Local

| Mov. From S To Exit: | L2 W | T1 N | R2 E | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 4 | 4 | 4 | 13 | 0.0 | 816 | 0.015 | 100 | NA | NA |
| Approach | 4 | 4 | 4 | 13 | 0.0 | | 0.015 | | | |

East: PR-321

| Mov. From E To Exit: | L2 S | T1 W | R2 N | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 4 | 28 | 16 | 48 | 0.0 | 1733 | 0.028 | 100 | NA | NA |
| Approach | 4 | 28 | 16 | 48 | 0.0 | | 0.028 | | | |

North: PR-122 (Southbound)

| Mov. From N To Exit: | L2 E | T1 S | R2 W | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 220 | 4 | 72 | 296 | 1.3 | 770 | 0.385 | 100 | NA | NA |
| Approach | 220 | 4 | 72 | 296 | 1.3 | | 0.385 | | | |

West: PR-321

| Mov. From W To Exit: | L2 N | T1 E | R2 S | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 161 | - | - | 161 | 2.8 | 976 | 0.165 | 100 | 0.0 | 2 |
| Lane 2 | - | 148 | 4 | 152 | 0.8 | 1894 | 0.080 | 100 | NA | NA |
| Approach | 161 | 148 | 4 | 313 | 1.9 | | 0.165 | | | |

| | Total | %HV | Deg.Satn (v/c) |
|---|---|---|---|
| Intersection | 670 | 1.4 | 0.385 |

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

# LANE SUMMARY

## Site: 104A [104A-PR-122 @ PR-321 (PM)]

Stop (Two-Way)

| Lane Use and Performance | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Demand Flows Total veh/h | HV % | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Average Delay sec | Level of Service | 95% Back of Queue Veh | Dist m | Lane Config | Lane Length m | Cap. Adj. % | Prob. Block. % |
| South: Local | | | | | | | | | | | | | |
| Lane 1 | 13 | 0.0 | 816 | 0.015 | 100 | 9.5 | LOS A | 0.1 | 0.5 | Full | 500 | 0.0 | 0.0 |
| Approach | 13 | 0.0 | | 0.015 | | 9.5 | LOS A | 0.1 | 0.5 | | | | |
| East: PR-321 | | | | | | | | | | | | | |
| Lane 1 | 48 | 0.0 | 1733 | 0.028 | 100 | 0.8 | LOS A | 0.0 | 0.3 | Full | 120 | 0.0 | 0.0 |
| Approach | 48 | 0.0 | | 0.028 | | 0.8 | NA | 0.0 | 0.3 | | | | |
| North: PR-122 (Southbound) | | | | | | | | | | | | | |
| Lane 1 | 296 | 1.3 | 770 | 0.385 | 100 | 12.6 | LOS B | 2.9 | 22.1 | Full | 160 | 0.0 | 0.0 |
| Approach | 296 | 1.3 | | 0.385 | | 12.6 | LOS B | 2.9 | 22.1 | | | | |
| West: PR-321 | | | | | | | | | | | | | |
| Lane 1 | 161 | 2.8 | 976 | 0.165 | 100 | 9.4 | LOS A | 0.8 | 6.5 | Short | 60 | 0.0 | NA |
| Lane 2 | 152 | 0.8 | 1894 | 0.080 | 100 | 0.0 | LOS A | 0.0 | 0.0 | Full | 500 | 0.0 | 0.0 |
| Approach | 313 | 1.9 | | 0.165 | | 4.8 | LOS A | 0.8 | 6.5 | | | | |
| Intersection | 670 | 1.4 | | 0.385 | | 8.1 | NA | 2.9 | 22.1 | | | | |

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.
LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection).
Minor Road Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 6).
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road lanes.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

# MOVEMENT SUMMARY

## Site: 104A [104A-PR-122 @ PR-321 (PM)]

Stop (Two-Way)

| Movement Performance - Vehicles | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mov ID | OD Mov | Demand Flows Total veh/h | HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
| South: Local | | | | | | | | | | | |
| 3 | L2 | 4 | 0.0 | 0.015 | 9.7 | LOS A | 0.1 | 0.5 | 0.34 | 0.18 | 31.8 |
| 8 | T1 | 4 | 0.0 | 0.015 | 9.7 | LOS A | 0.1 | 0.5 | 0.34 | 0.18 | 24.6 |
| 18 | R2 | 4 | 0.0 | 0.015 | 9.1 | LOS A | 0.1 | 0.5 | 0.34 | 0.18 | 23.5 |
| Approach | | 13 | 0.0 | 0.015 | 9.5 | LOS A | 0.1 | 0.5 | 0.34 | 0.18 | 26.9 |
| East: PR-321 | | | | | | | | | | | |
| 1 | L2 | 4 | 0.0 | 0.028 | 2.7 | LOS A | 0.0 | 0.3 | 0.06 | 0.00 | 28.5 |
| 6 | T1 | 28 | 0.0 | 0.028 | 0.6 | LOS A | 0.0 | 0.3 | 0.06 | 0.00 | 67.3 |
| 16 | R2 | 16 | 0.0 | 0.028 | 0.7 | LOS A | 0.0 | 0.3 | 0.06 | 0.00 | 51.5 |
| Approach | | 48 | 0.0 | 0.028 | 0.8 | NA | 0.0 | 0.3 | 0.06 | 0.00 | 56.0 |
| North: PR-122 (Southbound) | | | | | | | | | | | |
| 7 | L2 | 220 | 1.7 | 0.385 | 13.0 | LOS B | 2.9 | 22.1 | 0.25 | 0.25 | 8.7 |
| 4 | T1 | 4 | 0.0 | 0.385 | 12.4 | LOS B | 2.9 | 22.1 | 0.25 | 0.25 | 21.6 |
| 14 | R2 | 72 | 0.0 | 0.385 | 11.3 | LOS B | 2.9 | 22.1 | 0.25 | 0.25 | 35.2 |
| Approach | | 296 | 1.3 | 0.385 | 12.6 | LOS B | 2.9 | 22.1 | 0.25 | 0.25 | 13.0 |
| West: PR-321 | | | | | | | | | | | |
| 5 | L2 | 161 | 2.8 | 0.165 | 9.4 | LOS A | 0.8 | 6.5 | 0.28 | 0.14 | 45.7 |
| 2 | T1 | 148 | 0.9 | 0.080 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.00 | 40.0 |
| 12 | R2 | 4 | 0.0 | 0.080 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.00 | 63.2 |
| Approach | | 313 | 1.9 | 0.165 | 4.8 | LOS A | 0.8 | 6.5 | 0.15 | 0.07 | 43.2 |
| All Vehicles | | 670 | 1.4 | 0.385 | 8.1 | NA | 2.9 | 22.1 | 0.19 | 0.15 | 24.6 |

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Minor Road Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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# INTERSECTION SUMMARY

## Site: 104B [104B-PR-122 @ PR-321 (PM)]

Stop (Two-Way)

| Intersection Performance - Hourly Values | | | | |
|---|---|---|---|---|
| **Performance Measure** | **Vehicles** | | **Persons** | |
| Travel Speed (Average) | 51.2 | km/h | 51.2 | km/h |
| Travel Distance (Total) | 326.7 | veh-km/h | 392.0 | pers-km/h |
| Travel Time (Total) | 6.4 | veh-h/h | 7.7 | pers-h/h |
| | | | | |
| Demand Flows (Total) | 549 | veh/h | 659 | pers/h |
| Percent Heavy Vehicles (Demand) | 0.9 | % | | |
| Degree of Saturation | 0.183 | | | |
| Practical Spare Capacity | 436.3 | % | | |
| Effective Intersection Capacity | 3004 | veh/h | | |
| | | | | |
| Control Delay (Total) | 0.30 | veh-h/h | 0.36 | pers-h/h |
| Control Delay (Average) | 2.0 | sec | 2.0 | sec |
| Control Delay (Worst Lane) | 10.4 | sec | | |
| Control Delay (Worst Movement) | 11.1 | sec | 11.1 | sec |
| Geometric Delay (Average) | 0.0 | sec | | |
| Stop-Line Delay (Average) | 2.0 | sec | | |
| Idling Time (Average) | 1.9 | sec | | |
| Intersection Level of Service (LOS) | NA | | | |
| | | | | |
| 95% Back of Queue - Vehicles (Worst Lane) | 0.3 | veh | | |
| 95% Back of Queue - Distance (Worst Lane) | 2.5 | m | | |
| Queue Storage Ratio (Worst Lane) | 0.01 | | | |
| Total Effective Stops | 12 | veh/h | 14 | pers/h |
| Effective Stop Rate | 0.02 | per veh | 0.02 | per pers |
| Proportion Queued | 0.04 | | 0.04 | |
| Performance Index | 6.0 | | 6.0 | |
| | | | | |
| Cost (Total) | 98.15 | $/h | 98.15 | $/h |
| Fuel Consumption (Total) | 38.9 | L/h | | |
| Carbon Dioxide (Total) | 91.6 | kg/h | | |
| Hydrocarbons (Total) | 0.010 | kg/h | | |
| Carbon Monoxide (Total) | 0.142 | kg/h | | |
| NOx (Total) | 0.066 | kg/h | | |

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
NA: Intersection LOS for Vehicles is Not Applicable for two-way sign control since the average intersection delay is not a good LOS measure due to zero delays associated with major road movements.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.

| Intersection Performance - Annual Values | | | | |
|---|---|---|---|---|
| **Performance Measure** | **Vehicles** | | **Persons** | |
| Demand Flows (Total) | 263,518 | veh/y | 316,222 | pers/y |
| Delay | 144 | veh-h/y | 173 | pers-h/y |
| Effective Stops | 5,720 | veh/y | 6,864 | pers/y |
| Travel Distance | 156,808 | veh-km/y | 188,170 | pers-km/y |
| Travel Time | 3,064 | veh-h/y | 3,677 | pers-h/y |
| | | | | |
| Cost | 47,113 | $/y | 47,113 | $/y |
| Fuel Consumption | 18,682 | L/y | | |
| Carbon Dioxide | 43,973 | kg/y | | |
| Hydrocarbons | 5 | kg/y | | |
| Carbon Monoxide | 68 | kg/y | | |
| NOx | 32 | kg/y | | |

# LANE FLOWS

## Site: 104B [104B-PR-122 @ PR-321 (PM)]

Stop (Two-Way)

**Approach Lane Flows (veh/h)**

East: PR-321

| Mov. From E To Exit: | T1 W | R2 N | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 24 | 68 | 92 | 0.0 | 1661 | 0.055 | 100 | NA | NA |
| Approach | 24 | 68 | 92 | 0.0 | | 0.055 | | | |

North: PR-122 (Northbound)

| Mov. From N To Exit: | L2 E | R2 W | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 40 | 20 | 60 | 0.0 | 730 | 0.082 | 100 | NA | NA |
| Approach | 40 | 20 | 60 | 0.0 | | 0.082 | | | |

West: PR-321

| Mov. From W To Exit: | L2 N | T1 E | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 52 | - | 52 | 0.0 | 982 | 0.053 | 100 | NA | NA |
| Lane 2 | - | 345 | 345 | 1.5 | 1891 | 0.183 | 100 | NA | NA |
| Approach | 52 | 345 | 397 | 1.3 | | 0.183 | | | |

| | Total | %HV | Deg.Satn (v/c) |
|---|---|---|---|
| Intersection | 549 | 0.9 | 0.183 |

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

# LANE SUMMARY

## Site: 104B [104B-PR-122 @ PR-321 (PM)]

Stop (Two-Way)

| Lane Use and Performance | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Demand Flows | | Cap. | Deg. Satn | Lane Util. | Average Delay | Level of Service | 95% Back of Queue | | Lane Config | Lane Length | Cap. Adj. | Prob. Block. |
| | Total veh/h | HV % | veh/h | v/c | % | sec | | Veh | Dist m | | m | % | % |
| East: PR-321 | | | | | | | | | | | | | |
| Lane 1 | 92 | 0.0 | 1661 | 0.055 | 100 | 0.0 | LOS A | 0.0 | 0.0 | Full | 500 | 0.0 | 0.0 |
| Approach | 92 | 0.0 | | 0.055 | | 0.0 | NA | 0.0 | 0.0 | | | | |
| North: PR-122 (Northbound) | | | | | | | | | | | | | |
| Lane 1 | 60 | 0.0 | 730 | 0.082 | 100 | 10.4 | LOS B | 0.3 | 2.5 | Full | 160 | 0.0 | 0.0 |
| Approach | 60 | 0.0 | | 0.082 | | 10.4 | LOS B | 0.3 | 2.5 | | | | |
| West: PR-321 | | | | | | | | | | | | | |
| Lane 1 | 52 | 0.0 | 982 | 0.053 | 100 | 8.9 | LOS A | 0.2 | 1.8 | Full | 120 | 0.0 | 0.0 |
| Lane 2 | 345 | 1.5 | 1891 | 0.183 | 100 | 0.0 | LOS A | 0.0 | 0.0 | Full | 120 | 0.0 | 0.0 |
| Approach | 397 | 1.3 | | 0.183 | | 1.2 | LOS A | 0.2 | 1.8 | | | | |
| Intersection | 549 | 0.9 | | 0.183 | | 2.0 | NA | 0.3 | 2.5 | | | | |

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.
LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection).
Minor Road Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 6).
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road lanes.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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# MOVEMENT SUMMARY

## Site: 104B [104B-PR-122 @ PR-321 (PM)]

Stop (Two-Way)

| Movement Performance - Vehicles | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Mov ID | OD Mov | Demand Flows Total veh/h | HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
| East: PR-321 | | | | | | | | | | | |
| 6 | T1 | 24 | 0.0 | 0.055 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.00 | 64.6 |
| 16 | R2 | 68 | 0.0 | 0.055 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.00 | 60.3 |
| Approach | | 92 | 0.0 | 0.055 | 0.0 | NA | 0.0 | 0.0 | 0.00 | 0.00 | 61.3 |
| North: PR-122 (Northbound) | | | | | | | | | | | |
| 7 | L2 | 40 | 0.0 | 0.082 | 11.1 | LOS B | 0.3 | 2.5 | 0.14 | 0.09 | 36.0 |
| 14 | R2 | 20 | 0.0 | 0.082 | 8.8 | LOS A | 0.3 | 2.5 | 0.14 | 0.09 | 16.0 |
| Approach | | 60 | 0.0 | 0.082 | 10.4 | LOS B | 0.3 | 2.5 | 0.14 | 0.09 | 29.4 |
| West: PR-321 | | | | | | | | | | | |
| 5 | L2 | 52 | 0.0 | 0.053 | 8.9 | LOS A | 0.2 | 1.8 | 0.27 | 0.12 | 31.5 |
| 2 | T1 | 345 | 1.5 | 0.183 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.00 | 57.4 |
| Approach | | 397 | 1.3 | 0.183 | 1.2 | LOS A | 0.2 | 1.8 | 0.03 | 0.02 | 54.5 |
| All Vehicles | | 549 | 0.9 | 0.183 | 2.0 | NA | 0.3 | 2.5 | 0.04 | 0.02 | 51.2 |

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Minor Road Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

# INTERSECTION SUMMARY

## Site: 107 [107-PR-122 @ PR-166 (PM)]

Signals - Fixed Time Isolated Cycle Time = 64 seconds (User-Given Phase Times)

| Intersection Performance - Hourly Values | | | | |
|---|---|---|---|---|
| **Performance Measure** | **Vehicles** | | **Persons** | |
| Travel Speed (Average) | 43.0 | km/h | 43.0 | km/h |
| Travel Distance (Total) | 1854.9 | veh-km/h | 2225.9 | pers-km/h |
| Travel Time (Total) | 43.2 | veh-h/h | 51.8 | pers-h/h |
| Demand Flows (Total) | 1820 | veh/h | 2184 | pers/h |
| Percent Heavy Vehicles (Demand) | 1.9 | % | | |
| Degree of Saturation | 0.767 | | | |
| Practical Spare Capacity | 17.4 | % | | |
| Effective Intersection Capacity | 2373 | veh/h | | |
| Control Delay (Total) | 8.03 | veh-h/h | 9.64 | pers-h/h |
| Control Delay (Average) | 15.9 | sec | 15.9 | sec |
| Control Delay (Worst Lane) | 26.7 | sec | | |
| Control Delay (Worst Movement) | 26.7 | sec | 26.7 | sec |
| Geometric Delay (Average) | 0.0 | sec | | |
| Stop-Line Delay (Average) | 15.9 | sec | | |
| Idling Time (Average) | 12.6 | sec | | |
| Intersection Level of Service (LOS) | LOS B | | | |
| 95% Back of Queue - Vehicles (Worst Lane) | 12.6 | veh | | |
| 95% Back of Queue - Distance (Worst Lane) | 97.1 | m | | |
| Queue Storage Ratio (Worst Lane) | 0.12 | | | |
| Total Effective Stops | 1155 | veh/h | 1385 | pers/h |
| Effective Stop Rate | 0.63 | per veh | 0.63 | per pers |
| Proportion Queued | 0.73 | | 0.73 | |
| Performance Index | 97.3 | | 97.3 | |
| Cost (Total) | 612.05 | $/h | 612.05 | $/h |
| Fuel Consumption (Total) | 192.2 | L/h | | |
| Carbon Dioxide (Total) | 453.8 | kg/h | | |
| Hydrocarbons (Total) | 0.042 | kg/h | | |
| Carbon Monoxide (Total) | 0.550 | kg/h | | |
| NOx (Total) | 0.512 | kg/h | | |

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Intersection LOS value for Vehicles is based on average delay for all vehicle movements.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.

| Intersection Performance - Annual Values | | | | |
|---|---|---|---|---|
| **Performance Measure** | **Vehicles** | | **Persons** | |
| Demand Flows (Total) | 873,642 | veh/y | 1,048,370 | pers/y |
| Delay | 3,857 | veh-h/y | 4,628 | pers-h/y |
| Effective Stops | 554,175 | veh/y | 665,010 | pers/y |
| Travel Distance | 890,354 | veh-km/y | 1,068,425 | pers-km/y |
| Travel Time | 20,715 | veh-h/y | 24,858 | pers-h/y |
| Cost | 293,786 | $/y | 293,786 | $/y |
| Fuel Consumption | 92,268 | L/y | | |
| Carbon Dioxide | 217,846 | kg/y | | |
| Hydrocarbons | 20 | kg/y | | |
| Carbon Monoxide | 264 | kg/y | | |
| NOx | 246 | kg/y | | |

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# LANE SUMMARY

## Site: 107 [107-PR-122 @ PR-166 (PM)]

Signals - Fixed Time Isolated Cycle Time = 64 seconds (User-Given Phase Times)

**Lane Use and Performance**

| | Demand Flows Total veh/h | HV % | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Average Delay sec | Level of Service | 95% Back of Queue Veh | Dist m | Lane Config | Lane Length m | Cap. Adj. % | Prob. Block. % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| South: PR-122 | | | | | | | | | | | | | |
| Lane 1 | 280 | 1.6 | 612 | 0.457 | 100 | 16.7 | LOS B | 7.2 | 55.3 | Short | 80 | 0.0 | NA |
| Lane 2 | 56 | 1.2 | 646 | 0.086 | 100 | 14.2 | LOS B | 1.2 | 9.2 | Full | 500 | 0.0 | 0.0 |
| Lane 3 | 56 | 1.2 | 646 | 0.086 | 100 | 14.2 | LOS B | 1.2 | 9.2 | Full | 500 | 0.0 | 0.0 |
| Approach | 391 | 1.5 | | 0.457 | | 16.0 | LOS B | 7.2 | 55.3 | | | | |
| North: PR-122 | | | | | | | | | | | | | |
| Lane 1 | 93 | 0.0 | 297 | 0.312 | 61[5] | 24.4 | LOS C | 2.7 | 20.3 | Full | 500 | 0.0 | 0.0 |
| Lane 2 | 609 | 2.1 | 1194 | 0.510 | 100 | 4.9 | LOS A | 6.8 | 52.3 | Full | 500 | 0.0 | 0.0 |
| Approach | 701 | 1.9 | | 0.510 | | 7.4 | LOS A | 6.8 | 52.3 | | | | |
| West: PR-166 | | | | | | | | | | | | | |
| Lane 1 | 349 | 2.2 | 553 | 0.631 | 100 | 20.9 | LOS C | 10.3 | 79.5 | Full | 500 | 0.0 | 0.0 |
| Lane 2 | 378 | 2.0 | 493 | 0.767 | 100 | 26.7 | LOS C | 12.6 | 97.1 | Full | 500 | 0.0 | 0.0 |
| Approach | 727 | 2.1 | | 0.767 | | 24.0 | LOS C | 12.6 | 97.1 | | | | |
| Intersection | 1820 | 1.9 | | 0.767 | | 15.9 | LOS B | 12.6 | 97.1 | | | | |

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.
LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 6).
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

5 Lane under-utilisation found by the program

# LANE FLOWS

## Site: 107 [107-PR-122 @ PR-166 (PM)]

Signals - Fixed Time Isolated Cycle Time = 64 seconds (User-Given Phase Times)

**Approach Lane Flows (veh/h)**

South: PR-122

| Mov. From S To Exit: | L2 W | T1 N | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 280 | - | 280 | 1.6 | 612 | 0.457 | 100 | 0.0 | 2 |
| Lane 2 | - | 56 | 56 | 1.2 | 646 | 0.086 | 100 | NA | NA |
| Lane 3 | - | 56 | 56 | 1.2 | 646 | 0.086 | 100 | NA | NA |
| Approach | 280 | 112 | 391 | 1.5 | | 0.457 | | | |

North: PR-122

| Mov. From N To Exit: | T1 S | R2 W | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 93 | - | 93 | 0.0 | 297 | 0.312 | 61[5] | NA | NA |
| Lane 2 | - | 609 | 609 | 2.1 | 1194 | 0.510 | 100 | NA | NA |
| Approach | 93 | 609 | 701 | 1.9 | | 0.510 | | | |

West: PR-166

| Mov. From W To Exit: | L2 N | R2 S | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 349 | - | 349 | 2.2 | 553 | 0.631 | 100 | NA | NA |
| Lane 2 | - | 378 | 378 | 2.0 | 493 | 0.767 | 100 | NA | NA |
| Approach | 349 | 378 | 727 | 2.1 | | 0.767 | | | |

| | Total | %HV | Deg.Satn (v/c) |
|---|---|---|---|
| Intersection | 1820 | 1.9 | 0.767 |

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

5 Lane under-utilisation found by the program

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# MOVEMENT SUMMARY

## Site: 107 [107-PR-122 @ PR-166 (PM)]

Signals - Fixed Time Isolated Cycle Time = 64 seconds (User-Given Phase Times)

**Movement Performance - Vehicles**

| Mov ID | OD Mov | Demand Flows Total veh/h | HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | 95% Back of Queue Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| South: PR-122 | | | | | | | | | | | |
| 3 | L2 | 280 | 1.6 | 0.457 | 16.7 | LOS B | 7.2 | 55.3 | 0.83 | 0.70 | 46.9 |
| 8 | T1 | 112 | 1.2 | 0.086 | 14.2 | LOS B | 1.2 | 9.2 | 0.71 | 0.54 | 41.6 |
| Approach | | 391 | 1.5 | 0.457 | 16.0 | LOS B | 7.2 | 55.3 | 0.79 | 0.65 | 45.2 |
| North: PR-122 | | | | | | | | | | | |
| 4 | T1 | 93 | 0.0 | 0.312 | 24.4 | LOS C | 2.7 | 20.3 | 0.93 | 0.72 | 38.2 |
| 14 | R2 | 609 | 2.1 | 0.510 | 4.9 | LOS A | 6.8 | 52.3 | 0.42 | 0.37 | 43.7 |
| Approach | | 701 | 1.9 | 0.510 | 7.4 | LOS A | 6.8 | 52.3 | 0.48 | 0.42 | 42.9 |
| West: PR-166 | | | | | | | | | | | |
| 5 | L2 | 349 | 2.2 | 0.631 | 20.9 | LOS C | 10.3 | 79.5 | 0.91 | 0.78 | 42.9 |
| 12 | R2 | 378 | 2.0 | 0.767 | 26.7 | LOS C | 12.6 | 97.1 | 0.96 | 0.89 | 41.1 |
| Approach | | 727 | 2.1 | 0.767 | 24.0 | LOS C | 12.6 | 97.1 | 0.94 | 0.84 | 41.9 |
| All Vehicles | | 1820 | 1.9 | 0.767 | 15.9 | LOS B | 12.6 | 97.1 | 0.73 | 0.63 | 43.0 |

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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# TIMING ANALYSIS

## Site: 107 [107-PR-122 @ PR-166 (PM)]

Signals - Fixed Time Isolated Cycle Time = 64 seconds (User-Given Phase Times)

**Phase Times specified by the user**
**Phase Sequence: Leading Left Turn**
**Reference Phase: Phase A**
**Input Phase Sequence: A, B, C**
**Output Phase Sequence: A, B, C**

**Movement Timing Information**

| Mov ID | Mov Class | Mov Type | PHASE MATRIX First Green [ From | To | Oppd | Priority | Und ] | PHASE MATRIX Second Green [ From | To | Oppd | Priority | Und ] | Lost Time 1st Grn sec | Lost Time 2nd Grn sec | ReqMovTime 1st Grn sec | ReqMovTime 2nd Grn sec | Eff Green 1st Grn sec | Eff Green 2nd Grn sec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| South | | PR-122 | | | | | | | | | | | | | | | | |
| 3 | # | | *A | B | | | | | | | | | 4 | | 15.2 | | 22 | |
| 8 | # | | A | B | | | | | | | | | 4 | | 10.0 Min | | 22 | |
| North | | PR-122 | | | | | | | | | | | | | | | | |
| 4 | # | | *B | C | | | | | | | | | 4 | | 10.0 Min | | 10 | |
| 14 | # | Slip/ Bypass | A | B | Yes | | | B | A | | | | 11 | 4 | 0.0 1 | 0.0 1 | 15 | 34 |
| West | | PR-166 | | | | | | | | | | | | | | | | |
| 5 | # | | *C | A | | | | | | | | | 4 | | 18.0 | | 20 | |
| 12 | # | | C | A | | Yes | | | | | | | 4 | | 21.0 | | 20 | |

\# Combined timing results are shown for all Movement Classes except any listed separately.
* Critical Movement/Green Period
1 This Green Period of the movement was treated as Undetected and not included in signal timing calculations.

## Critical Movements and Cycle Time

| Critical Mov ID | Appr & Dest | Green Period | Phases [ From | To ] | Adjusted Lost Time sec | Adjusted Flow Ratio | Req Green Time Ratio | Required Mov Time sec | |
|---|---|---|---|---|---|---|---|---|---|
| 3LV | S_W | 1 | A | B | 4 | 0.157 | 0.175 | 15.2 | |
| 4LV | N_S | 1 | B | C | 10 | – | – | 10.0 | Min |
| 5LV | W_N | 1 | C | A | 4 | 0.197 | 0.219 | 18.0 | |
| | | | | Total | 18 | 0.354 | 0.394 | 43.2 | |

| Cycle Time (sec): | Minimum | Maximum | Practical | Chosen |
|---|---|---|---|---|
| | 30 | 150 | 30 | 64 |

Min/Max When the Required Movement Time is subject to minimum or maximum condition, the Flow Ratio and the corresponding Required Green Time Ratio are not used for cycle time calculations and the Adjusted Lost Time equals the Required Movement Time.

## Phase Information

| Phase | Ref. Phase | Change Time sec | Starting Intergreen sec | Green Start sec | Displayed Green sec | Green End sec | Terminating Intergreen sec | Phase Time sec | Phase Split % |
|---|---|---|---|---|---|---|---|---|---|
| A | Yes | 0 | 4 | 4 | 22 | 26 | 4 | 26 | 41 |
| B | No | 26 | 4 | 30 | 10 | 40 | 4 | 14 | 22 |
| C | No | 40 | 4 | 44 | 20 | 64 | 4 | 24 | 38 |

This table gives adjusted values of Intergreen Time, Phase Time and Green Time values in cases of Pedestrian Actuation, Phase Actuation and Phase Frequency values (user-specified or implied) less than 100%. See the Phase Information section in the Detailed Output report for input values of Yellow Time, All-Red Time and the unadjusted Intergreen Times.

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# Appendix G:

## Capacity Analysis Data and Results– No Action Scenario (2048 Horizon)

# INTERSECTION SUMMARY

## Site: 101 [101-PR-116 @ PR-315 (AM)]

New Site
Signals - Fixed Time Isolated Cycle Time = 87 seconds (User-Given Phase Times)

| Intersection Performance - Hourly Values | | | | |
|---|---|---|---|---|
| **Performance Measure** | **Vehicles** | | **Persons** | |
| Travel Speed (Average) | 17.5 | km/h | 17.5 | km/h |
| Travel Distance (Total) | 3236.5 | veh-km/h | 3883.8 | pers-km/h |
| Travel Time (Total) | 185.3 | veh-h/h | 222.4 | pers-h/h |
| Demand Flows (Total) | 3183 | veh/h | 3820 | pers/h |
| Percent Heavy Vehicles (Demand) | 1.9 | % | | |
| Degree of Saturation | 1.328 | | | |
| Practical Spare Capacity | -32.2 | % | | |
| Effective Intersection Capacity | 2397 | veh/h | | |
| Control Delay (Total) | 97.99 | veh-h/h | 117.59 | pers-h/h |
| Control Delay (Average) | 110.8 | sec | 110.8 | sec |
| Control Delay (Worst Lane) | 194.1 | sec | | |
| Control Delay (Worst Movement) | 194.1 | sec | 194.1 | sec |
| Geometric Delay (Average) | 0.0 | sec | | |
| Stop-Line Delay (Average) | 110.8 | sec | | |
| Idling Time (Average) | 110.2 | sec | | |
| Intersection Level of Service (LOS) | LOS F | | | |
| 95% Back of Queue - Vehicles (Worst Lane) | 56.8 | veh | | |
| 95% Back of Queue - Distance (Worst Lane) | 434.7 | m | | |
| Queue Storage Ratio (Worst Lane) | 0.53 | | | |
| Total Effective Stops | 4482 | veh/h | 5379 | pers/h |
| Effective Stop Rate | 1.41 | per veh | 1.41 | per pers |
| Proportion Queued | 0.95 | | 0.95 | |
| Performance Index | 668.1 | | 668.1 | |
| Cost (Total) | 2367.11 | $/h | 2367.11 | $/h |
| Fuel Consumption (Total) | 398.7 | L/h | | |
| Carbon Dioxide (Total) | 941.2 | kg/h | | |
| Hydrocarbons (Total) | 0.087 | kg/h | | |
| Carbon Monoxide (Total) | 0.556 | kg/h | | |
| NOx (Total) | 0.729 | kg/h | | |

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Intersection LOS value for Vehicles is based on average delay for all vehicle movements.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.

| Intersection Performance - Annual Values | | | | |
|---|---|---|---|---|
| **Performance Measure** | **Vehicles** | | **Persons** | |
| Demand Flows (Total) | 1,528,026 | veh/y | 1,833,631 | pers/y |
| Delay | 47,036 | veh-h/y | 56,443 | pers-h/y |
| Effective Stops | 2,151,529 | veh/y | 2,581,835 | pers/y |
| Travel Distance | 1,553,531 | veh-km/y | 1,864,238 | pers-km/y |
| Travel Time | 88,949 | veh-h/y | 106,739 | pers-h/y |
| Cost | 1,136,214 | $/y | 1,136,214 | $/y |
| Fuel Consumption | 191,373 | L/y | | |
| Carbon Dioxide | 451,784 | kg/y | | |
| Hydrocarbons | 42 | kg/y | | |
| Carbon Monoxide | 267 | kg/y | | |
| NOx | 350 | kg/y | | |

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# LANE FLOWS

## Site: 101 [101-PR-116 @ PR-315 (AM)]

New Site
Signals - Fixed Time Isolated Cycle Time = 87 seconds (User-Given Phase Times)

**Approach Lane Flows (veh/h)**

South: PR-116

| Mov. From S To Exit: | L2 W | T1 N | R2 E | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 299 | 157 | - | 455 | 2.0 | 415 | 1.098 | 100 | NA | NA |
| Lane 2 | - | 351 | 113 | 464 | 2.2 | 422 | 1.098 | 100 | NA | NA |
| Approach | 299 | 508 | 113 | 919 | 2.1 | | 1.098 | | | |

East: PR-315

| Mov. From E To Exit: | L2 S | T1 W | R2 N | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 206 | 449 | - | 655 | 0.9 | 528[1] | 1.240 | 100 | NA | NA |
| Lane 2 | - | - | 265 | 265 | 0.5 | 1102 | 0.241 | 100 | 0.0 | 1 |
| Approach | 206 | 449 | 265 | 920 | 0.8 | | 1.240 | | | |

North: PR-116

| Mov. From N To Exit: | L2 E | T1 S | R2 W | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 141 | 238 | - | 379 | 4.6 | 410 | 0.924 | 100 | NA | NA |
| Lane 2 | - | 164 | 255 | 418 | 1.4 | 453 | 0.924 | 100 | NA | NA |
| Approach | 141 | 401 | 255 | 797 | 2.9 | | 0.924 | | | |

West: PR-315

| Mov. From W To Exit: | L2 N | T1 E | R2 S | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 145 | 223 | 179 | 547 | 2.0 | 412 | 1.328 | 100 | NA | NA |
| Approach | 145 | 223 | 179 | 547 | 2.0 | | 1.328 | | | |

| | Total | %HV | Deg.Satn (v/c) |
|---|---|---|---|
| Intersection | 3183 | 1.9 | 1.328 |

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

1 Reduced capacity due to a short lane effect. Short lane queues may extend into the full-length lanes. Some upstream delays at entry to short lanes are not included.

# LANE SUMMARY

## Site: 101 [101-PR-116 @ PR-315 (AM)]

New Site
Signals - Fixed Time Isolated Cycle Time = 87 seconds (User-Given Phase Times)

**Lane Use and Performance**

| | Demand Flows Total veh/h | HV % | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Average Delay sec | Level of Service | 95% Back of Queue Veh | Dist m | Lane Config | Lane Length m | Cap. Adj. % | Prob. Block. % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| South: PR-116 | | | | | | | | | | | | | |
| Lane 1 | 455 | 2.0 | 415 | 1.098 | 100 | 103.9 | LOS F | 32.5 | 251.4 | Full | 500 | 0.0 | 0.0 |
| Lane 2 | 464 | 2.2 | 422 | 1.098 | 100 | 110.0 | LOS F | 28.1 | 217.2 | Full | 500 | 0.0 | 0.0 |
| Approach | 919 | 2.1 | | 1.098 | | 107.0 | LOS F | 32.5 | 251.4 | | | | |
| East: PR-315 | | | | | | | | | | | | | |
| Lane 1 | 655 | 0.9 | 528[1] | 1.240 | 100 | 146.1 | LOS F | 56.8 | 434.7 | Full | 500 | 0.0 | 0.0 |
| Lane 2 | 265 | 0.5 | 1102 | 0.241 | 100 | 4.0 | LOS A | 3.1 | 23.6 | Short | 60 | 0.0 | NA |
| Approach | 920 | 0.8 | | 1.240 | | 105.2 | LOS F | 56.8 | 434.7 | | | | |
| North: PR-116 | | | | | | | | | | | | | |
| Lane 1 | 379 | 4.6 | 410 | 0.924 | 100 | 59.0 | LOS E | 20.7 | 163.0 | Full | 500 | 0.0 | 0.0 |
| Lane 2 | 418 | 1.4 | 453 | 0.924 | 100 | 69.6 | LOS E | 20.1 | 154.3 | Full | 500 | 0.0 | 0.0 |
| Approach | 797 | 2.9 | | 0.924 | | 64.5 | LOS E | 20.7 | 163.0 | | | | |
| West: PR-315 | | | | | | | | | | | | | |
| Lane 1 | 547 | 2.0 | 412 | 1.328 | 100 | 194.1 | LOS F | 48.4 | 374.3 | Full | 500 | 0.0 | 0.0 |
| Approach | 547 | 2.0 | | 1.328 | | 194.1 | LOS F | 48.4 | 374.3 | | | | |
| Intersection | 3183 | 1.9 | | 1.328 | | 110.8 | LOS F | 56.8 | 434.7 | | | | |

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.
LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 6).
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

1 Reduced capacity due to a short lane effect. Short lane queues may extend into the full-length lanes. Some upstream delays at entry to short lanes are not included.

# MOVEMENT SUMMARY

## Site: 101 [101-PR-116 @ PR-315 (AM)]

New Site
Signals - Fixed Time Isolated Cycle Time = 87 seconds (User-Given Phase Times)

**Movement Performance - Vehicles**

| Mov ID | OD Mov | Demand Flows Total veh/h | HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| South: PR-116 | | | | | | | | | | | |
| 3 | L2 | 299 | 2.4 | 1.098 | 103.9 | LOS F | 32.5 | 251.4 | 1.00 | 1.41 | 18.2 |
| 8 | T1 | 508 | 1.2 | 1.098 | 108.1 | LOS F | 32.5 | 251.4 | 1.00 | 1.40 | 17.3 |
| 18 | R2 | 113 | 5.2 | 1.098 | 110.0 | LOS F | 28.1 | 217.2 | 1.00 | 1.39 | 17.0 |
| Approach | | 919 | 2.1 | 1.098 | 107.0 | LOS F | 32.5 | 251.4 | 1.00 | 1.40 | 17.6 |
| East: PR-315 | | | | | | | | | | | |
| 1 | L2 | 206 | 2.3 | 1.240 | 146.1 | LOS F | 56.8 | 434.7 | 1.00 | 1.81 | 15.0 |
| 6 | T1 | 449 | 0.3 | 1.240 | 146.1 | LOS F | 56.8 | 434.7 | 1.00 | 1.81 | 15.0 |
| 16 | R2 | 265 | 0.5 | 0.241 | 4.0 | LOS A | 3.1 | 23.6 | 0.41 | 0.34 | 37.6 |
| Approach | | 920 | 0.8 | 1.240 | 105.2 | LOS F | 56.8 | 434.7 | 0.83 | 1.38 | 18.1 |
| North: PR-116 | | | | | | | | | | | |
| 7 | L2 | 141 | 6.3 | 0.924 | 59.0 | LOS E | 20.7 | 163.0 | 1.00 | 1.13 | 24.1 |
| 4 | T1 | 401 | 3.5 | 0.924 | 63.3 | LOS E | 20.7 | 163.0 | 1.00 | 1.17 | 23.4 |
| 14 | R2 | 255 | 0.0 | 0.924 | 69.6 | LOS E | 20.1 | 154.3 | 1.00 | 1.23 | 22.7 |
| Approach | | 797 | 2.9 | 0.924 | 64.5 | LOS E | 20.7 | 163.0 | 1.00 | 1.18 | 23.3 |
| West: PR-315 | | | | | | | | | | | |
| 5 | L2 | 145 | 1.1 | 1.328 | 194.1 | LOS F | 48.4 | 374.3 | 1.00 | 1.79 | 12.1 |
| 2 | T1 | 223 | 0.0 | 1.328 | 194.1 | LOS F | 48.4 | 374.3 | 1.00 | 1.79 | 12.2 |
| 12 | R2 | 179 | 5.2 | 1.328 | 194.1 | LOS F | 48.4 | 374.3 | 1.00 | 1.79 | 12.2 |
| Approach | | 547 | 2.0 | 1.328 | 194.1 | LOS F | 48.4 | 374.3 | 1.00 | 1.79 | 12.2 |
| All Vehicles | | 3183 | 1.9 | 1.328 | 110.8 | LOS F | 56.8 | 434.7 | 0.95 | 1.41 | 17.5 |

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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# INTERSECTION SUMMARY

## Site: 102 [102-PR-122 @ PR-116 (AM)]

New Site
Signals - Fixed Time Isolated Cycle Time = 82 seconds (User-Given Phase Times)

| Intersection Performance - Hourly Values | | | | |
|---|---|---|---|---|
| **Performance Measure** | **Vehicles** | | **Persons** | |
| Travel Speed (Average) | 42.0 | km/h | 42.0 | km/h |
| Travel Distance (Total) | 1819.0 | veh-km/h | 2182.8 | pers-km/h |
| Travel Time (Total) | 43.3 | veh-h/h | 52.0 | pers-h/h |
| Demand Flows (Total) | 1776 | veh/h | 2131 | pers/h |
| Percent Heavy Vehicles (Demand) | 1.9 | % | | |
| Degree of Saturation | 0.453 | | | |
| Practical Spare Capacity | 98.6 | % | | |
| Effective Intersection Capacity | 3919 | veh/h | | |
| Control Delay (Total) | 5.60 | veh-h/h | 6.72 | pers-h/h |
| Control Delay (Average) | 11.4 | sec | 11.4 | sec |
| Control Delay (Worst Lane) | 25.6 | sec | | |
| Control Delay (Worst Movement) | 25.6 | sec | 25.6 | sec |
| Geometric Delay (Average) | 0.0 | sec | | |
| Stop-Line Delay (Average) | 11.4 | sec | | |
| Idling Time (Average) | 9.4 | sec | | |
| Intersection Level of Service (LOS) | LOS B | | | |
| 95% Back of Queue - Vehicles (Worst Lane) | 9.4 | veh | | |
| 95% Back of Queue - Distance (Worst Lane) | 72.4 | m | | |
| Queue Storage Ratio (Worst Lane) | 0.04 | | | |
| Total Effective Stops | 628 | veh/h | 754 | pers/h |
| Effective Stop Rate | 0.35 | per veh | 0.35 | per pers |
| Proportion Queued | 0.43 | | 0.43 | |
| Performance Index | 64.1 | | 64.1 | |
| Cost (Total) | 481.71 | $/h | 481.71 | $/h |
| Fuel Consumption (Total) | 146.4 | L/h | | |
| Carbon Dioxide (Total) | 346.0 | kg/h | | |
| Hydrocarbons (Total) | 0.028 | kg/h | | |
| Carbon Monoxide (Total) | 0.324 | kg/h | | |
| NOx (Total) | 0.314 | kg/h | | |

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Intersection LOS value for Vehicles is based on average delay for all vehicle movements.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.

| Intersection Performance - Annual Values | | | | |
|---|---|---|---|---|
| **Performance Measure** | **Vehicles** | | **Persons** | |
| Demand Flows (Total) | 852,408 | veh/y | 1,022,889 | pers/y |
| Delay | 2,690 | veh-h/y | 3,227 | pers-h/y |
| Effective Stops | 301,521 | veh/y | 361,825 | pers/y |
| Travel Distance | 873,110 | veh-km/y | 1,047,732 | pers-km/y |
| Travel Time | 20,785 | veh-h/y | 24,942 | pers-h/y |
| Cost | 231,222 | $/y | 231,222 | $/y |
| Fuel Consumption | 70,268 | L/y | | |
| Carbon Dioxide | 166,067 | kg/y | | |
| Hydrocarbons | 13 | kg/y | | |
| Carbon Monoxide | 156 | kg/y | | |
| NOx | 151 | kg/y | | |

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# LANE FLOWS

## Site: 102 [102-PR-122 @ PR-116 (AM)]

New Site
Signals - Fixed Time Isolated Cycle Time = 82 seconds (User-Given Phase Times)

**Approach Lane Flows (veh/h)**

NorthEast: PR-122

| Mov. From NE To Exit: | T1 SW | R2 NW | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 99 | - | 99 | 0.6 | 461 | 0.214 | 100 | 0.0 | 2 |
| Lane 2 | 99 | - | 99 | 0.6 | 461 | 0.214 | 100 | NA | NA |
| Lane 3 | - | 67 | 67 | 2.4 | 1573 | 0.042 | 100 | NA | NA |
| Approach | 198 | 67 | 264 | 1.1 | | 0.214 | | | |

NorthWest: PR-116

| Mov. From NW To Exit: | L2 NE | R2 SW | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 130 | - | 130 | 1.0 | 437 | 0.298 | 100 | NA | NA |
| Lane 2 | - | 503 | 503 | 3.8 | 1552 | 0.324 | 100 | 0.0 | 1 |
| Approach | 130 | 503 | 633 | 3.2 | | 0.324 | | | |

SouthWest: PR-116

| Mov. From SW To Exit: | L2 NW | T1 NE | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 295 | - | 295 | 1.6 | 652 | 0.453 | 100 | 22.1 | 2 |
| Lane 2 | 295 | - | 295 | 1.6 | 652 | 0.453 | 100 | 22.1 | 3 |
| Lane 3 | - | 144 | 144 | 0.4 | 1893 | 0.076 | 100 | NA | NA |
| Lane 4 | - | 144 | 144 | 0.4 | 1893 | 0.076 | 100 | NA | NA |
| Approach | 591 | 288 | 879 | 1.2 | | 0.453 | | | |

| | Total | %HV | Deg.Satn (v/c) |
|---|---|---|---|
| Intersection | 1776 | 1.9 | 0.453 |

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

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# LANE SUMMARY

## Site: 102 [102-PR-122 @ PR-116 (AM)]

New Site
Signals - Fixed Time Isolated Cycle Time = 82 seconds (User-Given Phase Times)

**Lane Use and Performance**

| | Demand Flows Total veh/h | HV % | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Average Delay sec | Level of Service | 95% Back of Queue Veh | Dist m | Lane Config | Lane Length m | Cap. Adj. % | Prob. Block. % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| NorthEast: PR-122 | | | | | | | | | | | | | |
| Lane 1 | 99 | 0.6 | 461 | 0.214 | 100 | 24.9 | LOS C | 3.2 | 24.5 | Short | 60 | 0.0 | NA |
| Lane 2 | 99 | 0.6 | 461 | 0.214 | 100 | 24.9 | LOS C | 3.2 | 24.5 | Full | 500 | 0.0 | 0.0 |
| Lane 3 | 67 | 2.4 | 1573 | 0.042 | 100 | 0.0 | LOS A | 0.0 | 0.0 | Full | 500 | 0.0 | 0.0 |
| Approach | 264 | 1.1 | | 0.214 | | 18.6 | LOS B | 3.2 | 24.5 | | | | |
| NorthWest: PR-116 | | | | | | | | | | | | | |
| Lane 1 | 130 | 1.0 | 437 | 0.298 | 100 | 25.6 | LOS C | 4.4 | 33.4 | Full | 500 | 0.0 | 0.0 |
| Lane 2 | 503 | 3.8 | 1552 | 0.324 | 100 | 0.1 | LOS A | 0.0 | 0.0 | Short | 60 | 0.0 | NA |
| Approach | 633 | 3.2 | | 0.324 | | 5.3 | LOS A | 4.4 | 33.4 | | | | |
| SouthWest: PR-116 | | | | | | | | | | | | | |
| Lane 1 | 295 | 1.6 | 652 | 0.453 | 100 | 20.1 | LOS C | 9.4 | 72.4 | Short | 60 | 0.0 | NA |
| Lane 2 | 295 | 1.6 | 652 | 0.453 | 100 | 20.1 | LOS C | 9.4 | 72.4 | Short | 60 | 0.0 | NA |
| Lane 3 | 144 | 0.4 | 1893 | 0.076 | 100 | 0.0 | LOS A | 0.0 | 0.0 | Full | 500 | 0.0 | 0.0 |
| Lane 4 | 144 | 0.4 | 1893 | 0.076 | 100 | 0.0 | LOS A | 0.0 | 0.0 | Full | 500 | 0.0 | 0.0 |
| Approach | 879 | 1.2 | | 0.453 | | 13.5 | LOS B | 9.4 | 72.4 | | | | |
| Intersection | 1776 | 1.9 | | 0.453 | | 11.4 | LOS B | 9.4 | 72.4 | | | | |

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.
LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 6).
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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# MOVEMENT SUMMARY

## Site: 102 [102-PR-122 @ PR-116 (AM)]

New Site
Signals - Fixed Time Isolated Cycle Time = 82 seconds (User-Given Phase Times)

| Movement Performance - Vehicles | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Mov ID | OD Mov | Demand Flows Total veh/h | HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
| NorthEast: PR-122 | | | | | | | | | | | |
| 6 | T1 | 198 | 0.6 | 0.214 | 24.9 | LOS C | 3.2 | 24.5 | 0.84 | 0.66 | 45.1 |
| 16 | R2 | 67 | 2.4 | 0.042 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.00 | 58.0 |
| Approach | | 264 | 1.1 | 0.214 | 18.6 | LOS B | 3.2 | 24.5 | 0.63 | 0.49 | 47.8 |
| NorthWest: PR-116 | | | | | | | | | | | |
| 7 | L2 | 130 | 1.0 | 0.298 | 25.6 | LOS C | 4.4 | 33.4 | 0.86 | 0.69 | 35.1 |
| 14 | R2 | 503 | 3.8 | 0.324 | 0.1 | LOS A | 0.0 | 0.0 | 0.00 | 0.00 | 39.7 |
| Approach | | 633 | 3.2 | 0.324 | 5.3 | LOS A | 4.4 | 33.4 | 0.18 | 0.14 | 38.7 |
| SouthWest: PR-116 | | | | | | | | | | | |
| 5 | L2 | 591 | 1.6 | 0.453 | 20.1 | LOS C | 9.4 | 72.4 | 0.81 | 0.69 | 37.1 |
| 2 | T1 | 288 | 0.4 | 0.076 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.00 | 65.0 |
| Approach | | 879 | 1.2 | 0.453 | 13.5 | LOS B | 9.4 | 72.4 | 0.54 | 0.46 | 43.1 |
| All Vehicles | | 1776 | 1.9 | 0.453 | 11.4 | LOS B | 9.4 | 72.4 | 0.43 | 0.35 | 42.0 |

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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# INTERSECTION SUMMARY

## Site: 104 [104-PR-122 @ PR-321 (AM)]

Three-way intersection with 2-lane major road (Stop control)
Stop (Two-Way)

| Intersection Performance - Hourly Values | | | | |
|---|---|---|---|---|
| **Performance Measure** | **Vehicles** | | **Persons** | |
| Travel Speed (Average) | 50.3 | km/h | 50.3 | km/h |
| Travel Distance (Total) | 859.6 | veh-km/h | 1031.6 | pers-km/h |
| Travel Time (Total) | 17.1 | veh-h/h | 20.5 | pers-h/h |
| | | | | |
| Demand Flows (Total) | 850 | veh/h | 1020 | pers/h |
| Percent Heavy Vehicles (Demand) | 0.4 | % | | |
| Degree of Saturation | 0.544 | | | |
| Practical Spare Capacity | 47.0 | % | | |
| Effective Intersection Capacity | 1561 | veh/h | | |
| | | | | |
| Control Delay (Total) | 2.26 | veh-h/h | 2.72 | pers-h/h |
| Control Delay (Average) | 9.6 | sec | 9.6 | sec |
| Control Delay (Worst Lane) | 15.6 | sec | | |
| Control Delay (Worst Movement) | 15.7 | sec | 15.7 | sec |
| Geometric Delay (Average) | 0.0 | sec | | |
| Stop-Line Delay (Average) | 9.6 | sec | | |
| Idling Time (Average) | 7.1 | sec | | |
| Intersection Level of Service (LOS) | NA | | | |
| | | | | |
| 95% Back of Queue - Vehicles (Worst Lane) | 6.8 | veh | | |
| 95% Back of Queue - Distance (Worst Lane) | 52.0 | m | | |
| Queue Storage Ratio (Worst Lane) | 0.04 | | | |
| Total Effective Stops | 323 | veh/h | 388 | pers/h |
| Effective Stop Rate | 0.38 | per veh | 0.38 | per pers |
| Proportion Queued | 0.33 | | 0.33 | |
| Performance Index | 26.8 | | 26.8 | |
| | | | | |
| Cost (Total) | 222.82 | $/h | 222.82 | $/h |
| Fuel Consumption (Total) | 86.6 | L/h | | |
| Carbon Dioxide (Total) | 203.7 | kg/h | | |
| Hydrocarbons (Total) | 0.021 | kg/h | | |
| Carbon Monoxide (Total) | 0.269 | kg/h | | |
| NOx (Total) | 0.130 | kg/h | | |

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
NA: Intersection LOS for Vehicles is Not Applicable for two-way sign control since the average intersection delay is not a good LOS measure due to zero delays associated with major road movements.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.

| Intersection Performance - Annual Values | | | | |
|---|---|---|---|---|
| **Performance Measure** | **Vehicles** | | **Persons** | |
| Demand Flows (Total) | 407,828 | veh/y | 489,393 | pers/y |
| Delay | 1,086 | veh-h/y | 1,304 | pers-h/y |
| Effective Stops | 155,056 | veh/y | 186,067 | pers/y |
| Travel Distance | 412,625 | veh-km/y | 495,150 | pers-km/y |
| Travel Time | 8,210 | veh-h/y | 9,852 | pers-h/y |
| | | | | |
| Cost | 106,955 | $/y | 106,955 | $/y |
| Fuel Consumption | 41,553 | L/y | | |
| Carbon Dioxide | 97,769 | kg/y | | |
| Hydrocarbons | 10 | kg/y | | |
| Carbon Monoxide | 129 | kg/y | | |
| NOx | 62 | kg/y | | |

# LANE FLOWS

## Site: 104 [104-PR-122 @ PR-321 (AM)]

Three-way intersection with 2-lane major road (Stop control)
Stop (Two-Way)

**Approach Lane Flows (veh/h)**

South: PR-122

| Mov. From S To Exit: | L2 W | R2 E | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 374 | 24 | 398 | 0.5 | 732 | 0.544 | 100 | NA | NA |
| Approach | 374 | 24 | 398 | 0.5 | | 0.544 | | | |

East: PR-321

| Mov. From E To Exit: | L2 S | T1 W | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 49 | 146 | 196 | 0.7 | 1630 | 0.120 | 100 | NA | NA |
| Approach | 49 | 146 | 196 | 0.7 | | 0.120 | | | |

West: PR-321

| Mov. From W To Exit: | T1 E | R2 S | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 59 | 196 | 256 | 0.0 | 854 | 0.299 | 100 | NA | NA |
| Approach | 59 | 196 | 256 | 0.0 | | 0.299 | | | |

| | Total | %HV | Deg.Satn (v/c) |
|---|---|---|---|
| Intersection | 850 | 0.4 | 0.544 |

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

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# LANE SUMMARY

## Site: 104 [104-PR-122 @ PR-321 (AM)]

Three-way intersection with 2-lane major road (Stop control)
Stop (Two-Way)

| Lane Use and Performance | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Demand Flows Total veh/h | HV % | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Average Delay sec | Level of Service | 95% Back of Queue Veh | Dist m | Lane Config | Lane Length m | Cap. Adj. % | Prob. Block. % |
| South: PR-122 | | | | | | | | | | | | | |
| Lane 1 | 398 | 0.5 | 732 | 0.544 | 100 | 15.6 | LOS C | 6.8 | 52.0 | Full | 500 | 0.0 | 0.0 |
| Approach | 398 | 0.5 | | 0.544 | | 15.6 | LOS C | 6.8 | 52.0 | | | | |
| East: PR-321 | | | | | | | | | | | | | |
| Lane 1 | 196 | 0.7 | 1630 | 0.120 | 100 | 0.0 | LOS A | 0.0 | 0.0 | Full | 500 | 0.0 | 0.0 |
| Approach | 196 | 0.7 | | 0.120 | | 0.0 | NA | 0.0 | 0.0 | | | | |
| West: PR-321 | | | | | | | | | | | | | |
| Lane 1 | 256 | 0.0 | 854 | 0.299 | 100 | 7.5 | LOS A | 1.6 | 12.5 | Full | 500 | 0.0 | 0.0 |
| Approach | 256 | 0.0 | | 0.299 | | 7.5 | NA | 1.6 | 12.5 | | | | |
| Intersection | 850 | 0.4 | | 0.544 | | 9.6 | NA | 6.8 | 52.0 | | | | |

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.
LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection).
Minor Road Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 6).
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road lanes.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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# MOVEMENT SUMMARY

## Site: 104 [104-PR-122 @ PR-321 (AM)]

Three-way intersection with 2-lane major road (Stop control)
Stop (Two-Way)

| Movement Performance - Vehicles | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mov ID | OD Mov | Demand Flows Total veh/h | HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
| South: PR-122 | | | | | | | | | | | |
| 3 | L2 | 374 | 0.0 | 0.544 | 15.7 | LOS C | 6.8 | 52.0 | 0.56 | 0.74 | 44.9 |
| 18 | R2 | 24 | 8.3 | 0.544 | 14.4 | LOS B | 6.8 | 52.0 | 0.56 | 0.74 | 45.0 |
| Approach | | 398 | 0.5 | 0.544 | 15.6 | LOS C | 6.8 | 52.0 | 0.56 | 0.74 | 44.9 |
| East: PR-321 | | | | | | | | | | | |
| 1 | L2 | 49 | 2.9 | 0.120 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.00 | 60.1 |
| 6 | T1 | 146 | 0.0 | 0.120 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.00 | 63.4 |
| Approach | | 196 | 0.7 | 0.120 | 0.0 | NA | 0.0 | 0.0 | 0.00 | 0.00 | 62.5 |
| West: PR-321 | | | | | | | | | | | |
| 2 | T1 | 59 | 0.0 | 0.299 | 9.8 | LOS A | 1.6 | 12.5 | 0.21 | 0.11 | 53.5 |
| 12 | R2 | 196 | 0.0 | 0.299 | 6.8 | LOS A | 1.6 | 12.5 | 0.21 | 0.11 | 51.8 |
| Approach | | 256 | 0.0 | 0.299 | 7.5 | NA | 1.6 | 12.5 | 0.21 | 0.11 | 52.2 |
| All Vehicles | | 850 | 0.4 | 0.544 | 9.6 | NA | 6.8 | 52.0 | 0.33 | 0.38 | 50.3 |

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Minor Road Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

# INTERSECTION SUMMARY

## Site: 109 [109-PR-101 @ PR-166 (AM) SINGLE]

Four-way intersection with 2-lane approaches (Signals)

Signals - Fixed Time Isolated Cycle Time = 87 seconds (User-Given Phase Times)

| Intersection Performance - Hourly Values | | | | |
|---|---|---|---|---|
| **Performance Measure** | **Vehicles** | | **Persons** | |
| Travel Speed (Average) | 8.7 | km/h | 8.7 | km/h |
| Travel Distance (Total) | 2187.6 | veh-km/h | 2625.1 | pers-km/h |
| Travel Time (Total) | 250.0 | veh-h/h | 300.0 | pers-h/h |
| Demand Flows (Total) | 2693 | veh/h | 3232 | pers/h |
| Percent Heavy Vehicles (Demand) | 0.3 | % | | |
| Degree of Saturation | 2.212 | | | |
| Practical Spare Capacity | -59.3 | % | | |
| Effective Intersection Capacity | 1218 | veh/h | | |
| Control Delay (Total) | 198.78 | veh-h/h | 238.53 | pers-h/h |
| Control Delay (Average) | 265.7 | sec | 265.7 | sec |
| Control Delay (Worst Lane) | 572.7 | sec | | |
| Control Delay (Worst Movement) | 572.7 | sec | 572.7 | sec |
| Geometric Delay (Average) | 0.0 | sec | | |
| Stop-Line Delay (Average) | 265.7 | sec | | |
| Idling Time (Average) | 264.1 | sec | | |
| Intersection Level of Service (LOS) | LOS F | | | |
| 95% Back of Queue - Vehicles (Worst Lane) | 113.8 | veh | | |
| 95% Back of Queue - Distance (Worst Lane) | 864.5 | m | | |
| Queue Storage Ratio (Worst Lane) | 3.92 | | | |
| Total Effective Stops | 4505 | veh/h | 5406 | pers/h |
| Effective Stop Rate | 1.67 | per veh | 1.67 | per pers |
| Proportion Queued | 0.84 | | 0.84 | |
| Performance Index | 575.3 | | 575.3 | |
| Cost (Total) | 3461.22 | $/h | 3461.22 | $/h |
| Fuel Consumption (Total) | 490.1 | L/h | | |
| Carbon Dioxide (Total) | 1152.1 | kg/h | | |
| Hydrocarbons (Total) | 0.128 | kg/h | | |
| Carbon Monoxide (Total) | 0.994 | kg/h | | |
| NOx (Total) | 0.358 | kg/h | | |

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Intersection LOS value for Vehicles is based on average delay for all vehicle movements.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.

| Intersection Performance - Annual Values | | | | |
|---|---|---|---|---|
| **Performance Measure** | **Vehicles** | | **Persons** | |
| Demand Flows (Total) | 1,292,669 | veh/y | 1,551,203 | pers/y |
| Delay | 95,413 | veh-h/y | 114,496 | pers-h/y |
| Effective Stops | 2,162,257 | veh/y | 2,594,708 | pers/y |
| Travel Distance | 1,050,056 | veh-km/y | 1,260,067 | pers-km/y |
| Travel Time | 120,009 | veh-h/y | 144,011 | pers-h/y |
| Cost | 1,661,385 | $/y | 1,661,385 | $/y |
| Fuel Consumption | 235,267 | L/y | | |
| Carbon Dioxide | 553,022 | kg/y | | |
| Hydrocarbons | 62 | kg/y | | |
| Carbon Monoxide | 477 | kg/y | | |
| NOx | 172 | kg/y | | |

# LANE FLOWS

## Site: 109 [109-PR-101 @ PR-166 (AM) SINGLE]

Four-way intersection with 2-lane approaches (Signals)

Signals - Fixed Time Isolated Cycle Time = 87 seconds (User-Given Phase Times)

**Approach Lane Flows (veh/h)**

South: PR-101

| Mov. From S To Exit: | L2 W | T1 N | R2 E | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 196 | 570 | - | 766 | 0.0 | 364[1] | 2.101 | 100 | 100.0 | 2 |
| Lane 2 | - | - | 152 | 152 | 0.0 | 1011 | 0.150 | 100 | NA | NA |
| Approach | 196 | 570 | 152 | 917 | 0.0 | | 2.101 | | | |

East: PR-166

| Mov. From E To Exit: | L2 S | T1 W | R2 N | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 116 | - | - | 116 | 0.0 | 287 | 0.404 | 100 | 0.0 | 2 |
| Lane 2 | - | 255 | - | 255 | 0.0 | 704 | 0.363 | 100 | NA | NA |
| Lane 3 | - | 128 | 117 | 245 | 1.5 | 676 | 0.363 | 100 | NA | NA |
| Approach | 116 | 383 | 117 | 616 | 0.6 | | 0.404 | | | |

North: PR-101

| Mov. From N To Exit: | L2 E | T1 S | R2 W | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 131 | 333 | 49 | 513 | 0.0 | 232 | 2.212 | 100 | NA | NA |
| Approach | 131 | 333 | 49 | 513 | 0.0 | | 2.212 | | | |

West: PR-166

| Mov. From W To Exit: | L2 N | T1 E | R2 S | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 155 | - | - | 155 | 0.0 | 287 | 0.538 | 100 | 12.3 | 2 |
| Lane 2 | - | 239 | - | 239 | 1.4 | 694 | 0.344 | 100 | NA | NA |
| Lane 3 | - | 61 | 192 | 254 | 0.3 | 738 | 0.344 | 100 | NA | NA |
| Approach | 155 | 300 | 192 | 647 | 0.7 | | 0.538 | | | |

| | Total | %HV | Deg.Satn (v/c) |
|---|---|---|---|
| Intersection | 2693 | 0.3 | 2.212 |

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

1 Reduced capacity due to a short lane effect. Short lane queues may extend into the full-length lanes. Some upstream delays at entry to short lanes are not included.

# LANE SUMMARY

## Site: 109 [109-PR-101 @ PR-166 (AM) SINGLE]

Four-way intersection with 2-lane approaches (Signals)

Signals - Fixed Time Isolated Cycle Time = 87 seconds (User-Given Phase Times)

**Lane Use and Performance**

| | Demand Flows Total veh/h | HV % | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Average Delay sec | Level of Service | 95% Back of Queue Veh | 95% Back of Queue Dist m | Lane Config | Lane Length m | Cap. Adj. % | Prob. Block. % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| South: PR-101 | | | | | | | | | | | | | |
| Lane 1 | 766 | 0.0 | 364[1] | 2.101 | 100 | 520.6 | LOS F | 113.8 | 864.5 | Short | 7 | 0.0 | NA |
| Lane 2 | 152 | 0.0 | 1011 | 0.150 | 100 | 1.1 | LOS A | 1.3 | 9.8 | Full | 500 | 0.0 | 55.4[8] |
| Approach | 917 | 0.0 | | 2.101 | | 434.8 | LOS F | 113.8 | 864.5 | | | | |
| East: PR-166 | | | | | | | | | | | | | |
| Lane 1 | 116 | 0.0 | 287 | 0.404 | 100 | 32.7 | LOS C | 4.6 | 34.8 | Short | 50 | 0.0 | NA |
| Lane 2 | 255 | 0.0 | 704 | 0.363 | 100 | 18.4 | LOS B | 7.8 | 59.6 | Full | 500 | 0.0 | 0.0 |
| Lane 3 | 245 | 1.5 | 676 | 0.363 | 100 | 13.6 | LOS B | 5.8 | 45.0 | Full | 500 | 0.0 | 0.0 |
| Approach | 616 | 0.6 | | 0.404 | | 19.2 | LOS B | 7.8 | 59.6 | | | | |
| North: PR-101 | | | | | | | | | | | | | |
| Lane 1 | 513 | 0.0 | 232 | 2.212 | 100 | 572.7 | LOS F | 75.7 | 575.1 | Full | 90 | 0.0 | 100.0 |
| Approach | 513 | 0.0 | | 2.212 | | 572.7 | LOS F | 75.7 | 575.1 | | | | |
| West: PR-166 | | | | | | | | | | | | | |
| Lane 1 | 155 | 0.0 | 287 | 0.538 | 100 | 34.5 | LOS C | 6.4 | 48.8 | Short | 45 | 0.0 | NA |
| Lane 2 | 239 | 1.4 | 694 | 0.344 | 100 | 18.3 | LOS B | 7.3 | 55.9 | Full | 500 | 0.0 | 0.0 |
| Lane 3 | 254 | 0.3 | 738 | 0.344 | 100 | 6.6 | LOS A | 3.9 | 30.0 | Full | 500 | 0.0 | 0.0 |
| Approach | 647 | 0.7 | | 0.538 | | 17.5 | LOS B | 7.3 | 55.9 | | | | |
| Intersection | 2693 | 0.3 | | 2.212 | | 265.7 | LOS F | 113.8 | 864.5 | | | | |

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.
LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 6).
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

1 Reduced capacity due to a short lane effect. Short lane queues may extend into the full-length lanes. Some upstream delays at entry to short lanes are not included.
8 Probability of Blockage has been set on the basis of a queue that overflows from a short lane.

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# MOVEMENT SUMMARY

## Site: 109 [109-PR-101 @ PR-166 (AM) SINGLE]

Four-way intersection with 2-lane approaches (Signals)

Signals - Fixed Time Isolated Cycle Time = 87 seconds (User-Given Phase Times)

**Movement Performance - Vehicles**

| Mov ID | OD Mov | Demand Flows Total veh/h | HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| South: PR-101 | | | | | | | | | | | |
| 3 | L2 | 196 | 0.0 | 2.101 | 520.6 | LOS F | 113.8 | 864.5 | 1.00 | 3.01 | 6.0 |
| 8 | T1 | 570 | 0.0 | 2.101 | 520.6 | LOS F | 113.8 | 864.5 | 1.00 | 3.01 | 3.7 |
| 18 | R2 | 152 | 0.0 | 0.150 | 1.1 | LOS A | 1.3 | 9.8 | 0.22 | 0.18 | 45.2 |
| Approach | | 917 | 0.0 | 2.101 | 434.8 | LOS F | 113.8 | 864.5 | 0.87 | 2.54 | 5.4 |
| East: PR-166 | | | | | | | | | | | |
| 1 | L2 | 116 | 0.0 | 0.404 | 32.7 | LOS C | 4.6 | 34.8 | 0.93 | 0.74 | 32.7 |
| 6 | T1 | 383 | 0.0 | 0.363 | 16.8 | LOS B | 7.8 | 59.6 | 0.74 | 0.64 | 49.4 |
| 16 | R2 | 117 | 3.1 | 0.363 | 13.6 | LOS B | 5.8 | 45.0 | 0.72 | 0.65 | 41.4 |
| Approach | | 616 | 0.6 | 0.404 | 19.2 | LOS B | 7.8 | 59.6 | 0.77 | 0.66 | 43.8 |
| North: PR-101 | | | | | | | | | | | |
| 7 | L2 | 131 | 0.0 | 2.212 | 572.7 | LOS F | 75.7 | 575.1 | 1.00 | 2.65 | 3.5 |
| 4 | T1 | 333 | 0.0 | 2.212 | 572.7 | LOS F | 75.7 | 575.1 | 1.00 | 2.65 | 3.4 |
| 14 | R2 | 49 | 0.0 | 2.212 | 572.7 | LOS F | 75.7 | 575.1 | 1.00 | 2.65 | 3.4 |
| Approach | | 513 | 0.0 | 2.212 | 572.7 | LOS F | 75.7 | 575.1 | 1.00 | 2.65 | 3.4 |
| West: PR-166 | | | | | | | | | | | |
| 5 | L2 | 155 | 0.0 | 0.538 | 34.5 | LOS C | 6.4 | 48.8 | 0.96 | 0.78 | 28.3 |
| 2 | T1 | 300 | 1.4 | 0.344 | 15.9 | LOS B | 7.3 | 55.9 | 0.72 | 0.61 | 50.1 |
| 12 | R2 | 192 | 0.0 | 0.344 | 6.6 | LOS A | 3.9 | 30.0 | 0.64 | 0.55 | 43.3 |
| Approach | | 647 | 0.7 | 0.538 | 17.5 | LOS B | 7.3 | 55.9 | 0.75 | 0.63 | 42.7 |
| All Vehicles | | 2693 | 0.3 | 2.212 | 265.7 | LOS F | 113.8 | 864.5 | 0.84 | 1.67 | 8.7 |

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

# INTERSECTION SUMMARY

## Site: 110 [110-PR-122 @ PR-102 (AM)]

New Site
Signals - Fixed Time Isolated Cycle Time = 121 seconds (User-Given Phase Times)

| Intersection Performance - Hourly Values | | | | |
|---|---|---|---|---|
| **Performance Measure** | **Vehicles** | | **Persons** | |
| Travel Speed (Average) | 10.8 | km/h | 10.8 | km/h |
| Travel Distance (Total) | 3014.3 | veh-km/h | 3617.2 | pers-km/h |
| Travel Time (Total) | 279.1 | veh-h/h | 334.9 | pers-h/h |
| Demand Flows (Total) | 3647 | veh/h | 4376 | pers/h |
| Percent Heavy Vehicles (Demand) | 2.3 | % | | |
| Degree of Saturation | 2.312 | | | |
| Practical Spare Capacity | -61.1 | % | | |
| Effective Intersection Capacity | 1578 | veh/h | | |
| Control Delay (Total) | 190.58 | veh-h/h | 228.70 | pers-h/h |
| Control Delay (Average) | 188.1 | sec | 188.1 | sec |
| Control Delay (Worst Lane) | 650.1 | sec | | |
| Control Delay (Worst Movement) | 650.1 | sec | 650.1 | sec |
| Geometric Delay (Average) | 0.0 | sec | | |
| Stop-Line Delay (Average) | 188.1 | sec | | |
| Idling Time (Average) | 193.5 | sec | | |
| Intersection Level of Service (LOS) | LOS F | | | |
| 95% Back of Queue - Vehicles (Worst Lane) | 87.6 | veh | | |
| 95% Back of Queue - Distance (Worst Lane) | 675.0 | m | | |
| Queue Storage Ratio (Worst Lane) | 0.83 | | | |
| Total Effective Stops | 4774 | veh/h | 5729 | pers/h |
| Effective Stop Rate | 1.31 | per veh | 1.31 | per pers |
| Proportion Queued | 0.85 | | 0.85 | |
| Performance Index | 866.4 | | 866.4 | |
| Cost (Total) | 3700.82 | $/h | 3700.82 | $/h |
| Fuel Consumption (Total) | 523.8 | L/h | | |
| Carbon Dioxide (Total) | 1237.8 | kg/h | | |
| Hydrocarbons (Total) | 0.130 | kg/h | | |
| Carbon Monoxide (Total) | 0.811 | kg/h | | |
| NOx (Total) | 1.052 | kg/h | | |

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Intersection LOS value for Vehicles is based on average delay for all vehicle movements.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.

| Intersection Performance - Annual Values | | | | |
|---|---|---|---|---|
| **Performance Measure** | **Vehicles** | | **Persons** | |
| Demand Flows (Total) | 1,750,561 | veh/y | 2,100,673 | pers/y |
| Delay | 91,480 | veh-h/y | 109,776 | pers-h/y |
| Effective Stops | 2,291,620 | veh/y | 2,749,945 | pers/y |
| Travel Distance | 1,446,860 | veh-km/y | 1,736,232 | pers-km/y |
| Travel Time | 133,952 | veh-h/y | 160,742 | pers-h/y |
| Cost | 1,776,392 | $/y | 1,776,392 | $/y |
| Fuel Consumption | 251,429 | L/y | | |
| Carbon Dioxide | 594,124 | kg/y | | |
| Hydrocarbons | 62 | kg/y | | |
| Carbon Monoxide | 389 | kg/y | | |
| NOx | 505 | kg/y | | |

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# LANE FLOWS

## Site: 110 [110-PR-122 @ PR-102 (AM)]

New Site
Signals - Fixed Time Isolated Cycle Time = 121 seconds (User-Given Phase Times)

**Approach Lane Flows (veh/h)**

South: PR-122

| Mov. From S To Exit: | L2 W | T1 N | R2 E | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 181 | - | - | 181 | 0.0 | 78 | 2.312 | 100 | NA | NA |
| Lane 2 | - | 325 | 91 | 416 | 0.9 | 357 | 1.164 | 50[5] | NA | NA |
| Approach | 181 | 325 | 91 | 598 | 0.6 | | 2.312 | | | |

East: PR-102

| Mov. From E To Exit: | L2 S | T1 W | R2 N | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 33 | 578 | - | 610 | 1.6 | 357[1] | 1.708 | 100 | NA | NA |
| Lane 2 | - | - | 335 | 335 | 1.1 | 1047 | 0.320 | 100 | 0.0 | 1 |
| Approach | 33 | 578 | 335 | 946 | 1.4 | | 1.708 | | | |

North: PR-122

| Mov. From N To Exit: | L2 E | T1 S | R2 W | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 437 | - | - | 437 | 3.6 | 266 | 1.644 | 100 | 100.0 | 2 |
| Lane 2 | - | 199 | - | 199 | 3.5 | 349 | 0.571 | 100 | NA | NA |
| Lane 3 | - | 199 | - | 199 | 3.5 | 349 | 0.571 | 100 | NA | NA |
| Lane 4 | - | - | 663 | 663 | 2.3 | 913[1] | 0.725 | 100 | 86.9 | 3 |
| Approach | 437 | 399 | 663 | 1499 | 3.0 | | 1.644 | | | |

West: PR-102

| Mov. From W To Exit: | L2 N | T1 E | R2 S | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 192 | 324 | - | 516 | 3.1 | 367[1] | 1.404 | 100 | NA | NA |
| Lane 2 | - | - | 89 | 89 | 7.1 | 977 | 0.091 | 100 | 0.0 | 1 |
| Approach | 192 | 324 | 89 | 605 | 3.7 | | 1.404 | | | |

| | Total | %HV | Deg.Satn (v/c) |
|---|---|---|---|
| Intersection | 3647 | 2.3 | 2.312 |

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

1 Reduced capacity due to a short lane effect. Short lane queues may extend into the full-length lanes. Some upstream delays at entry to short lanes are not included.

5 Lane under-utilisation found by the program

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Project: C:\Users\BYA 44\Desktop\New Folder (2)\0_COVID\20-PR-122\TRAFICO\SIDRA\FUTURE NO ACTION 2048
\PR122_FUTURE_NO_ACTION_2048_AM.sip7

# LANE SUMMARY

## Site: 110 [110-PR-122 @ PR-102 (AM)]

New Site
Signals - Fixed Time Isolated Cycle Time = 121 seconds (User-Given Phase Times)

**Lane Use and Performance**

| | Demand Flows Total veh/h | HV % | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Average Delay sec | Level of Service | 95% Back of Queue Veh | Dist m | Lane Config | Lane Length m | Cap. Adj. % | Prob. Block. % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| South: PR-122 | | | | | | | | | | | | | |
| Lane 1 | 181 | 0.0 | 78 | 2.312 | 100 | 650.1 | LOS F | 31.5 | 239.7 | Full | 500 | 0.0 | 0.0 |
| Lane 2 | 416 | 0.9 | 357 | 1.164 | 50[5] | 123.0 | LOS F | 32.1 | 246.1 | Full | 500 | 0.0 | 0.0 |
| Approach | 598 | 0.6 | | 2.312 | | 283.0 | LOS F | 32.1 | 246.1 | | | | |
| East: PR-102 | | | | | | | | | | | | | |
| Lane 1 | 610 | 1.6 | 357[1] | 1.708 | 100 | 356.8 | LOS F | 87.6 | 675.0 | Full | 500 | 0.0 | 32.3 |
| Lane 2 | 335 | 1.1 | 1047 | 0.320 | 100 | 6.0 | LOS A | 6.7 | 51.4 | Short | 65 | 0.0 | NA |
| Approach | 946 | 1.4 | | 1.708 | | 232.4 | LOS F | 87.6 | 675.0 | | | | |
| North: PR-122 | | | | | | | | | | | | | |
| Lane 1 | 437 | 3.6 | 266 | 1.644 | 100 | 337.1 | LOS F | 61.1 | 478.6 | Short | 80 | 0.0 | NA |
| Lane 2 | 199 | 3.5 | 349 | 0.571 | 100 | 45.1 | LOS D | 11.2 | 87.9 | Full | 200 | 0.0 | 86.8[8] |
| Lane 3 | 199 | 3.5 | 349 | 0.571 | 100 | 45.1 | LOS D | 11.2 | 87.9 | Full | 200 | 0.0 | 1.1[8] |
| Lane 4 | 663 | 2.3 | 913[1] | 0.725 | 100 | 19.7 | LOS B | 24.7 | 191.5 | Short | 80 | 0.0 | NA |
| Approach | 1499 | 3.0 | | 1.644 | | 119.1 | LOS F | 61.1 | 478.6 | | | | |
| West: PR-102 | | | | | | | | | | | | | |
| Lane 1 | 516 | 3.1 | 367[1] | 1.404 | 100 | 230.0 | LOS F | 62.1 | 484.5 | Full | 500 | 0.0 | 2.2 |
| Lane 2 | 89 | 7.1 | 977 | 0.091 | 100 | 1.6 | LOS A | 1.0 | 8.2 | Short | 50 | 0.0 | NA |
| Approach | 605 | 3.7 | | 1.404 | | 196.3 | LOS F | 62.1 | 484.5 | | | | |
| Intersection | 3647 | 2.3 | | 2.312 | | 188.1 | LOS F | 87.6 | 675.0 | | | | |

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.
LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 6).
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

1 Reduced capacity due to a short lane effect. Short lane queues may extend into the full-length lanes. Some upstream delays at entry to short lanes are not included.
5 Lane under-utilisation found by the program
8 Probability of Blockage has been set on the basis of a queue that overflows from a short lane.

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# MOVEMENT SUMMARY

## Site: 110 [110-PR-122 @ PR-102 (AM)]

New Site
Signals - Fixed Time Isolated Cycle Time = 121 seconds (User-Given Phase Times)

| Movement Performance - Vehicles | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mov ID | OD Mov | Demand Flows Total veh/h | HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
| South: PR-122 | | | | | | | | | | | |
| 3 | L2 | 181 | 0.0 | 2.312 | 650.1 | LOS F | 31.5 | 239.7 | 1.00 | 1.85 | 4.7 |
| 8 | T1 | 325 | 1.1 | 1.164 | 123.0 | LOS F | 32.1 | 246.1 | 1.00 | 1.32 | 12.1 |
| 18 | R2 | 91 | 0.0 | 1.164 | 123.0 | LOS F | 32.1 | 246.1 | 1.00 | 1.32 | 15.3 |
| Approach | | 598 | 0.6 | 2.312 | 283.0 | LOS F | 32.1 | 246.1 | 1.00 | 1.48 | 7.9 |
| East: PR-102 | | | | | | | | | | | |
| 1 | L2 | 33 | 11.1 | 1.708 | 356.8 | LOS F | 87.6 | 675.0 | 1.00 | 2.20 | 7.9 |
| 6 | T1 | 578 | 1.1 | 1.708 | 356.8 | LOS F | 87.6 | 675.0 | 1.00 | 2.20 | 7.9 |
| 16 | R2 | 335 | 1.1 | 0.320 | 6.0 | LOS A | 6.7 | 51.4 | 0.37 | 0.33 | 35.7 |
| Approach | | 946 | 1.4 | 1.708 | 232.4 | LOS F | 87.6 | 675.0 | 0.78 | 1.54 | 10.1 |
| North: PR-122 | | | | | | | | | | | |
| 7 | L2 | 437 | 3.6 | 1.644 | 337.1 | LOS F | 61.1 | 478.6 | 1.00 | 1.80 | 6.1 |
| 4 | T1 | 399 | 3.5 | 0.571 | 45.1 | LOS D | 11.2 | 87.9 | 0.95 | 0.79 | 23.5 |
| 14 | R2 | 663 | 2.3 | 0.725 | 19.7 | LOS B | 24.7 | 191.5 | 0.65 | 0.59 | 30.1 |
| Approach | | 1499 | 3.0 | 1.644 | 119.1 | LOS F | 61.1 | 478.6 | 0.83 | 1.00 | 13.5 |
| West: PR-102 | | | | | | | | | | | |
| 5 | L2 | 192 | 3.1 | 1.404 | 230.0 | LOS F | 62.1 | 484.5 | 1.00 | 1.80 | 8.4 |
| 2 | T1 | 324 | 3.1 | 1.404 | 230.0 | LOS F | 62.1 | 484.5 | 1.00 | 1.80 | 10.9 |
| 12 | R2 | 89 | 7.1 | 0.091 | 1.6 | LOS A | 1.0 | 8.2 | 0.21 | 0.17 | 38.0 |
| Approach | | 605 | 3.7 | 1.404 | 196.3 | LOS F | 62.1 | 484.5 | 0.88 | 1.56 | 11.4 |
| All Vehicles | | 3647 | 2.3 | 2.312 | 188.1 | LOS F | 87.6 | 675.0 | 0.85 | 1.31 | 10.8 |

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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# INTERSECTION SUMMARY

## Site: 111 [111-PR-102 @ PR-166 (AM)]

Four-way intersection with 2-lane approaches (Signals)

Signals - Fixed Time Isolated Cycle Time = 112 seconds (User-Given Phase Times)

| Intersection Performance - Hourly Values | | | | |
|---|---|---|---|---|
| **Performance Measure** | **Vehicles** | | **Persons** | |
| Travel Speed (Average) | 11.7 | km/h | 11.7 | km/h |
| Travel Distance (Total) | 2654.6 | veh-km/h | 3185.5 | pers-km/h |
| Travel Time (Total) | 226.8 | veh-h/h | 272.2 | pers-h/h |
| | | | | |
| Demand Flows (Total) | 2614 | veh/h | 3137 | pers/h |
| Percent Heavy Vehicles (Demand) | 0.9 | % | | |
| Degree of Saturation | 1.790 | | | |
| Practical Spare Capacity | -49.7 | % | | |
| Effective Intersection Capacity | 1460 | veh/h | | |
| | | | | |
| Control Delay (Total) | 160.53 | veh-h/h | 192.63 | pers-h/h |
| Control Delay (Average) | 221.1 | sec | 221.1 | sec |
| Control Delay (Worst Lane) | 374.5 | sec | | |
| Control Delay (Worst Movement) | 374.5 | sec | 374.5 | sec |
| Geometric Delay (Average) | 0.0 | sec | | |
| Stop-Line Delay (Average) | 221.1 | sec | | |
| Idling Time (Average) | 225.9 | sec | | |
| Intersection Level of Service (LOS) | LOS F | | | |
| | | | | |
| 95% Back of Queue - Vehicles (Worst Lane) | 172.7 | veh | | |
| 95% Back of Queue - Distance (Worst Lane) | 1324.3 | m | | |
| Queue Storage Ratio (Worst Lane) | 1.62 | | | |
| Total Effective Stops | 4037 | veh/h | 4845 | pers/h |
| Effective Stop Rate | 1.54 | per veh | 1.54 | per pers |
| Proportion Queued | 0.97 | | 0.97 | |
| Performance Index | 918.3 | | 918.3 | |
| | | | | |
| Cost (Total) | 3166.73 | $/h | 3166.73 | $/h |
| Fuel Consumption (Total) | 477.5 | L/h | | |
| Carbon Dioxide (Total) | 1124.4 | kg/h | | |
| Hydrocarbons (Total) | 0.122 | kg/h | | |
| Carbon Monoxide (Total) | 0.896 | kg/h | | |
| NOx (Total) | 0.687 | kg/h | | |

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Intersection LOS value for Vehicles is based on average delay for all vehicle movements.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.

| Intersection Performance - Annual Values | | | | |
|---|---|---|---|---|
| **Performance Measure** | **Vehicles** | | **Persons** | |
| Demand Flows (Total) | 1,254,659 | veh/y | 1,505,591 | pers/y |
| Delay | 77,053 | veh-h/y | 92,464 | pers-h/y |
| Effective Stops | 1,937,892 | veh/y | 2,325,471 | pers/y |
| Travel Distance | 1,274,191 | veh-km/y | 1,529,030 | pers-km/y |
| Travel Time | 108,862 | veh-h/y | 130,634 | pers-h/y |
| | | | | |
| Cost | 1,520,029 | $/y | 1,520,029 | $/y |
| Fuel Consumption | 229,223 | L/y | | |
| Carbon Dioxide | 539,707 | kg/y | | |
| Hydrocarbons | 59 | kg/y | | |
| Carbon Monoxide | 430 | kg/y | | |
| NOx | 330 | kg/y | | |

# LANE FLOWS

## Site: 111 [111-PR-102 @ PR-166 (AM)]

Four-way intersection with 2-lane approaches (Signals)

Signals - Fixed Time Isolated Cycle Time = 112 seconds (User-Given Phase Times)

**Approach Lane Flows (veh/h)**

South: PR-166

| Mov. From S To Exit: | L2 W | T1 N | R2 E | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 247 | - | - | 247 | 1.5 | 220 | 1.123 | 100 | NA | NA |
| Lane 2 | - | 148 | 78 | 226 | 0.0 | 238 | 0.951 | 100 | NA | NA |
| Approach | 247 | 148 | 78 | 473 | 0.8 | | 1.123 | | | |

East: PR-102

| Mov. From E To Exit: | L2 S | T1 W | R2 N | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 38 | 471 | 54 | 564 | 1.1 | 796 | 0.709 | 100 | NA | NA |
| Approach | 38 | 471 | 54 | 564 | 1.1 | | 0.709 | | | |

North: Inter American University

| Mov. From N To Exit: | L2 E | T1 S | R2 W | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 28 | 71 | 226 | 324 | 0.0 | 280 | 1.156 | 100 | NA | NA |
| Approach | 28 | 71 | 226 | 324 | 0.0 | | 1.156 | | | |

West: PR-102

| Mov. From W To Exit: | L2 N | T1 E | R2 S | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 274 | 753 | 226 | 1253 | 1.1 | 700 | 1.790 | 100 | NA | NA |
| Approach | 274 | 753 | 226 | 1253 | 1.1 | | 1.790 | | | |

| | Total | %HV | Deg.Satn (v/c) |
|---|---|---|---|
| Intersection | 2614 | 0.9 | 1.790 |

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

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# LANE SUMMARY

## Site: 111 [111-PR-102 @ PR-166 (AM)]

Four-way intersection with 2-lane approaches (Signals)

Signals - Fixed Time Isolated Cycle Time = 112 seconds (User-Given Phase Times)

**Lane Use and Performance**

| | Demand Flows Total veh/h | HV % | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Average Delay sec | Level of Service | 95% Back of Queue Veh | Dist m | Lane Config | Lane Length m | Cap. Adj. % | Prob. Block. % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| South: PR-166 | | | | | | | | | | | | | |
| Lane 1 | 247 | 1.5 | 220 | 1.123 | 100 | 140.8 | LOS F | 22.0 | 169.6 | Full | 500 | 0.0 | 0.0 |
| Lane 2 | 226 | 0.0 | 238 | 0.951 | 100 | 87.5 | LOS F | 15.5 | 117.9 | Full | 500 | 0.0 | 0.0 |
| Approach | 473 | 0.8 | | 1.123 | | 115.3 | LOS F | 22.0 | 169.6 | | | | |
| East: PR-102 | | | | | | | | | | | | | |
| Lane 1 | 564 | 1.1 | 796 | 0.709 | 100 | 26.3 | LOS C | 26.8 | 205.5 | Full | 500 | 0.0 | 0.0 |
| Approach | 564 | 1.1 | | 0.709 | | 26.3 | LOS C | 26.8 | 205.5 | | | | |
| North: Inter American University | | | | | | | | | | | | | |
| Lane 1 | 324 | 0.0 | 280 | 1.156 | 100 | 121.5 | LOS F | 22.0 | 167.2 | Full | 500 | 0.0 | 0.0 |
| Approach | 324 | 0.0 | | 1.156 | | 121.5 | LOS F | 22.0 | 167.2 | | | | |
| West: PR-102 | | | | | | | | | | | | | |
| Lane 1 | 1253 | 1.1 | 700 | 1.790 | 100 | 374.5 | LOS F | 172.7 | 1324.3 | Full | 500 | 0.0 | 97.0 |
| Approach | 1253 | 1.1 | | 1.790 | | 374.5 | LOS F | 172.7 | 1324.3 | | | | |
| Intersection | 2614 | 0.9 | | 1.790 | | 221.1 | LOS F | 172.7 | 1324.3 | | | | |

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.
LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 6).
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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# MOVEMENT SUMMARY

## Site: 111 [111-PR-102 @ PR-166 (AM)]

Four-way intersection with 2-lane approaches (Signals)

Signals - Fixed Time Isolated Cycle Time = 112 seconds (User-Given Phase Times)

**Movement Performance - Vehicles**

| Mov ID | OD Mov | Demand Flows Total veh/h | HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| South: PR-166 | | | | | | | | | | | |
| 3 | L2 | 247 | 1.5 | 1.123 | 140.8 | LOS F | 22.0 | 169.6 | 1.00 | 1.15 | 17.0 |
| 8 | T1 | 148 | 0.0 | 0.951 | 87.5 | LOS F | 15.5 | 117.9 | 1.00 | 1.05 | 18.9 |
| 18 | R2 | 78 | 0.0 | 0.951 | 87.5 | LOS F | 15.5 | 117.9 | 1.00 | 1.05 | 23.5 |
| Approach | | 473 | 0.8 | 1.123 | 115.3 | LOS F | 22.0 | 169.6 | 1.00 | 1.10 | 18.4 |
| East: PR-102 | | | | | | | | | | | |
| 1 | L2 | 38 | 0.0 | 0.709 | 26.3 | LOS C | 26.8 | 205.5 | 0.86 | 0.78 | 40.2 |
| 6 | T1 | 471 | 1.3 | 0.709 | 26.3 | LOS C | 26.8 | 205.5 | 0.86 | 0.78 | 39.1 |
| 16 | R2 | 54 | 0.0 | 0.709 | 26.3 | LOS C | 26.8 | 205.5 | 0.86 | 0.78 | 28.0 |
| Approach | | 564 | 1.1 | 0.709 | 26.3 | LOS C | 26.8 | 205.5 | 0.86 | 0.78 | 37.7 |
| North: Inter American University | | | | | | | | | | | |
| 7 | L2 | 28 | 0.0 | 1.156 | 121.5 | LOS F | 22.0 | 167.2 | 1.00 | 1.53 | 14.3 |
| 4 | T1 | 71 | 0.0 | 1.156 | 121.5 | LOS F | 22.0 | 167.2 | 1.00 | 1.53 | 14.6 |
| 14 | R2 | 226 | 0.0 | 1.156 | 121.5 | LOS F | 22.0 | 167.2 | 1.00 | 1.53 | 14.3 |
| Approach | | 324 | 0.0 | 1.156 | 121.5 | LOS F | 22.0 | 167.2 | 1.00 | 1.53 | 14.4 |
| West: PR-102 | | | | | | | | | | | |
| 5 | L2 | 274 | 0.0 | 1.790 | 374.5 | LOS F | 172.7 | 1324.3 | 1.00 | 2.06 | 7.4 |
| 2 | T1 | 753 | 1.1 | 1.790 | 374.5 | LOS F | 172.7 | 1324.3 | 1.00 | 2.06 | 8.0 |
| 12 | R2 | 226 | 2.2 | 1.790 | 374.5 | LOS F | 172.7 | 1324.3 | 1.00 | 2.06 | 8.0 |
| Approach | | 1253 | 1.1 | 1.790 | 374.5 | LOS F | 172.7 | 1324.3 | 1.00 | 2.06 | 7.8 |
| All Vehicles | | 2614 | 0.9 | 1.790 | 221.1 | LOS F | 172.7 | 1324.3 | 0.97 | 1.54 | 11.7 |

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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# INTERSECTION SUMMARY

## Site: 101 [101-PR-116 @ PR-315 (AM)]

New Site
Signals - Fixed Time Isolated Cycle Time = 87 seconds (User-Given Phase Times)

| Intersection Performance - Hourly Values | | | | |
|---|---|---|---|---|
| **Performance Measure** | **Vehicles** | | **Persons** | |
| Travel Speed (Average) | 15.7 | km/h | 15.7 | km/h |
| Travel Distance (Total) | 3196.8 | veh-km/h | 3836.1 | pers-km/h |
| Travel Time (Total) | 204.0 | veh-h/h | 244.8 | pers-h/h |
| Demand Flows (Total) | 3145 | veh/h | 3774 | pers/h |
| Percent Heavy Vehicles (Demand) | 2.0 | % | | |
| Degree of Saturation | 1.616 | | | |
| Practical Spare Capacity | -44.3 | % | | |
| Effective Intersection Capacity | 1945 | veh/h | | |
| Control Delay (Total) | 115.86 | veh-h/h | 139.03 | pers-h/h |
| Control Delay (Average) | 132.6 | sec | 132.6 | sec |
| Control Delay (Worst Lane) | 310.7 | sec | | |
| Control Delay (Worst Movement) | 310.7 | sec | 310.7 | sec |
| Geometric Delay (Average) | 0.0 | sec | | |
| Stop-Line Delay (Average) | 132.6 | sec | | |
| Idling Time (Average) | 133.8 | sec | | |
| Intersection Level of Service (LOS) | LOS F | | | |
| 95% Back of Queue - Vehicles (Worst Lane) | 81.2 | veh | | |
| 95% Back of Queue - Distance (Worst Lane) | 625.0 | m | | |
| Queue Storage Ratio (Worst Lane) | 0.77 | | | |
| Total Effective Stops | 4518 | veh/h | 5422 | pers/h |
| Effective Stop Rate | 1.44 | per veh | 1.44 | per pers |
| Proportion Queued | 0.96 | | 0.96 | |
| Performance Index | 771.2 | | 771.2 | |
| Cost (Total) | 2632.70 | $/h | 2632.70 | $/h |
| Fuel Consumption (Total) | 420.1 | L/h | | |
| Carbon Dioxide (Total) | 991.7 | kg/h | | |
| Hydrocarbons (Total) | 0.094 | kg/h | | |
| Carbon Monoxide (Total) | 0.593 | kg/h | | |
| NOx (Total) | 0.754 | kg/h | | |

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Intersection LOS value for Vehicles is based on average delay for all vehicle movements.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.

| Intersection Performance - Annual Values | | | | |
|---|---|---|---|---|
| **Performance Measure** | **Vehicles** | | **Persons** | |
| Demand Flows (Total) | 1,509,425 | veh/y | 1,811,310 | pers/y |
| Delay | 55,611 | veh-h/y | 66,733 | pers-h/y |
| Effective Stops | 2,168,764 | veh/y | 2,602,517 | pers/y |
| Travel Distance | 1,534,458 | veh-km/y | 1,841,350 | pers-km/y |
| Travel Time | 97,920 | veh-h/y | 117,504 | pers-h/y |
| Cost | 1,263,694 | $/y | 1,263,694 | $/y |
| Fuel Consumption | 201,646 | L/y | | |
| Carbon Dioxide | 476,001 | kg/y | | |
| Hydrocarbons | 45 | kg/y | | |
| Carbon Monoxide | 285 | kg/y | | |
| NOx | 362 | kg/y | | |

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# LANE FLOWS

## Site: 101 [101-PR-116 @ PR-315 (AM)]

New Site
Signals - Fixed Time Isolated Cycle Time = 87 seconds (User-Given Phase Times)

**Approach Lane Flows (veh/h)**

South: PR-116

| Mov. From S To Exit: | L2 W | T1 N | R2 E | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 180 | 277 | - | 456 | 1.0 | 424 | 1.076 | 100 | NA | NA |
| Lane 2 | - | 231 | 240 | 471 | 1.4 | 437 | 1.076 | 100 | NA | NA |
| Approach | 180 | 508 | 240 | 927 | 1.2 | | 1.076 | | | |

East: PR-315

| Mov. From E To Exit: | L2 S | T1 W | R2 N | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 246 | 213 | - | 460 | 3.1 | 458[1] | 1.004 | 100 | NA | NA |
| Lane 2 | - | - | 195 | 195 | 1.9 | 1061 | 0.184 | 100 | 0.0 | 1 |
| Approach | 246 | 213 | 195 | 655 | 2.7 | | 1.004 | | | |

North: PR-116

| Mov. From N To Exit: | L2 E | T1 S | R2 W | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 205 | 211 | - | 415 | 3.1 | 414 | 1.004 | 100 | NA | NA |
| Lane 2 | - | 275 | 152 | 428 | 2.0 | 426 | 1.004 | 100 | NA | NA |
| Approach | 205 | 486 | 152 | 843 | 2.5 | | 1.004 | | | |

West: PR-315

| Mov. From W To Exit: | L2 N | T1 E | R2 S | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 216 | 282 | 222 | 720 | 1.6 | 446 | 1.616 | 100 | NA | NA |
| Approach | 216 | 282 | 222 | 720 | 1.6 | | 1.616 | | | |

| | Total | %HV | Deg.Satn (v/c) |
|---|---|---|---|
| Intersection | 3145 | 2.0 | 1.616 |

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

1 Reduced capacity due to a short lane effect. Short lane queues may extend into the full-length lanes. Some upstream delays at entry to short lanes are not included.

# LANE SUMMARY

## Site: 101 [101-PR-116 @ PR-315 (AM)]

New Site
Signals - Fixed Time Isolated Cycle Time = 87 seconds (User-Given Phase Times)

**Lane Use and Performance**

| | Demand Flows Total veh/h | HV % | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Average Delay sec | Level of Service | 95% Back of Queue Veh | Dist m | Lane Config | Lane Length m | Cap. Adj. % | Prob. Block. % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| South: PR-116 | | | | | | | | | | | | | |
| Lane 1 | 456 | 1.0 | 424 | 1.076 | 100 | 96.6 | LOS F | 31.5 | 241.0 | Full | 500 | 0.0 | 0.0 |
| Lane 2 | 471 | 1.4 | 437 | 1.076 | 100 | 100.3 | LOS F | 26.6 | 204.8 | Full | 500 | 0.0 | 0.0 |
| Approach | 927 | 1.2 | | 1.076 | | 98.5 | LOS F | 31.5 | 241.0 | | | | |
| East: PR-315 | | | | | | | | | | | | | |
| Lane 1 | 460 | 3.1 | 458[1] | 1.004 | 100 | 72.0 | LOS F | 28.3 | 220.3 | Full | 500 | 0.0 | 0.0 |
| Lane 2 | 195 | 1.9 | 1061 | 0.184 | 100 | 3.3 | LOS A | 1.9 | 14.9 | Short | 60 | 0.0 | NA |
| Approach | 655 | 2.7 | | 1.004 | | 51.5 | LOS D | 28.3 | 220.3 | | | | |
| North: PR-116 | | | | | | | | | | | | | |
| Lane 1 | 415 | 3.1 | 414 | 1.004 | 100 | 78.7 | LOS F | 25.7 | 200.3 | Full | 500 | 0.0 | 0.0 |
| Lane 2 | 428 | 2.0 | 426 | 1.004 | 100 | 83.2 | LOS F | 21.6 | 166.6 | Full | 500 | 0.0 | 0.0 |
| Approach | 843 | 2.5 | | 1.004 | | 81.0 | LOS F | 25.7 | 200.3 | | | | |
| West: PR-315 | | | | | | | | | | | | | |
| Lane 1 | 720 | 1.6 | 446 | 1.616 | 100 | 310.7 | LOS F | 81.2 | 625.0 | Full | 500 | 0.0 | 25.3 |
| Approach | 720 | 1.6 | | 1.616 | | 310.7 | LOS F | 81.2 | 625.0 | | | | |
| Intersection | 3145 | 2.0 | | 1.616 | | 132.6 | LOS F | 81.2 | 625.0 | | | | |

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.
LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 6).
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

1 Reduced capacity due to a short lane effect. Short lane queues may extend into the full-length lanes. Some upstream delays at entry to short lanes are not included.

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# MOVEMENT SUMMARY

## Site: 101 [101-PR-116 @ PR-315 (AM)]

New Site
Signals - Fixed Time Isolated Cycle Time = 87 seconds (User-Given Phase Times)

**Movement Performance - Vehicles**

| Mov ID | OD Mov | Demand Flows Total veh/h | HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| South: PR-116 | | | | | | | | | | | |
| 3 | L2 | 180 | 0.6 | 1.076 | 96.6 | LOS F | 31.5 | 241.0 | 1.00 | 1.42 | 19.0 |
| 8 | T1 | 508 | 1.2 | 1.076 | 98.3 | LOS F | 31.5 | 241.0 | 1.00 | 1.39 | 18.4 |
| 18 | R2 | 240 | 1.6 | 1.076 | 100.3 | LOS F | 26.6 | 204.8 | 1.00 | 1.35 | 17.8 |
| Approach | | 927 | 1.2 | 1.076 | 98.5 | LOS F | 31.5 | 241.0 | 1.00 | 1.38 | 18.3 |
| East: PR-315 | | | | | | | | | | | |
| 1 | L2 | 246 | 3.9 | 1.004 | 72.0 | LOS F | 28.3 | 220.3 | 1.00 | 1.27 | 22.1 |
| 6 | T1 | 213 | 2.1 | 1.004 | 72.0 | LOS F | 28.3 | 220.3 | 1.00 | 1.27 | 22.1 |
| 16 | R2 | 195 | 1.9 | 0.184 | 3.3 | LOS A | 1.9 | 14.9 | 0.39 | 0.32 | 37.9 |
| Approach | | 655 | 2.7 | 1.004 | 51.5 | LOS D | 28.3 | 220.3 | 0.82 | 0.98 | 25.2 |
| North: PR-116 | | | | | | | | | | | |
| 7 | L2 | 205 | 3.0 | 1.004 | 78.7 | LOS F | 25.7 | 200.3 | 1.00 | 1.27 | 21.3 |
| 4 | T1 | 486 | 3.1 | 1.004 | 81.3 | LOS F | 25.7 | 200.3 | 1.00 | 1.24 | 20.2 |
| 14 | R2 | 152 | 0.0 | 1.004 | 83.2 | LOS F | 21.6 | 166.6 | 1.00 | 1.22 | 19.6 |
| Approach | | 843 | 2.5 | 1.004 | 81.0 | LOS F | 25.7 | 200.3 | 1.00 | 1.24 | 20.3 |
| West: PR-315 | | | | | | | | | | | |
| 5 | L2 | 216 | 2.9 | 1.616 | 310.7 | LOS F | 81.2 | 625.0 | 1.00 | 2.15 | 8.7 |
| 2 | T1 | 282 | 0.4 | 1.616 | 310.7 | LOS F | 81.2 | 625.0 | 1.00 | 2.15 | 8.7 |
| 12 | R2 | 222 | 1.8 | 1.616 | 310.7 | LOS F | 81.2 | 625.0 | 1.00 | 2.15 | 8.7 |
| Approach | | 720 | 1.6 | 1.616 | 310.7 | LOS F | 81.2 | 625.0 | 1.00 | 2.15 | 8.7 |
| All Vehicles | | 3145 | 2.0 | 1.616 | 132.6 | LOS F | 81.2 | 625.0 | 0.96 | 1.44 | 15.7 |

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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# INTERSECTION SUMMARY

## Site: 102 [102-PR-122 @ PR-116 (AM)]

New Site
Signals - Fixed Time Isolated Cycle Time = 82 seconds (User-Given Phase Times)

| Intersection Performance - Hourly Values | | | | |
|---|---|---|---|---|
| **Performance Measure** | **Vehicles** | | **Persons** | |
| Travel Speed (Average) | 41.0 | km/h | 41.0 | km/h |
| Travel Distance (Total) | 2077.3 | veh-km/h | 2492.8 | pers-km/h |
| Travel Time (Total) | 50.6 | veh-h/h | 60.8 | pers-h/h |
| Demand Flows (Total) | 2027 | veh/h | 2432 | pers/h |
| Percent Heavy Vehicles (Demand) | 2.9 | % | | |
| Degree of Saturation | 0.670 | | | |
| Practical Spare Capacity | 34.3 | % | | |
| Effective Intersection Capacity | 3024 | veh/h | | |
| Control Delay (Total) | 6.29 | veh-h/h | 7.55 | pers-h/h |
| Control Delay (Average) | 11.2 | sec | 11.2 | sec |
| Control Delay (Worst Lane) | 31.7 | sec | | |
| Control Delay (Worst Movement) | 31.7 | sec | 31.7 | sec |
| Geometric Delay (Average) | 0.0 | sec | | |
| Stop-Line Delay (Average) | 11.2 | sec | | |
| Idling Time (Average) | 9.4 | sec | | |
| Intersection Level of Service (LOS) | LOS B | | | |
| 95% Back of Queue - Vehicles (Worst Lane) | 11.6 | veh | | |
| 95% Back of Queue - Distance (Worst Lane) | 89.6 | m | | |
| Queue Storage Ratio (Worst Lane) | 0.11 | | | |
| Total Effective Stops | 669 | veh/h | 803 | pers/h |
| Effective Stop Rate | 0.33 | per veh | 0.33 | per pers |
| Proportion Queued | 0.39 | | 0.39 | |
| Performance Index | 78.5 | | 78.5 | |
| Cost (Total) | 574.07 | $/h | 574.07 | $/h |
| Fuel Consumption (Total) | 175.6 | L/h | | |
| Carbon Dioxide (Total) | 416.1 | kg/h | | |
| Hydrocarbons (Total) | 0.033 | kg/h | | |
| Carbon Monoxide (Total) | 0.369 | kg/h | | |
| NOx (Total) | 0.515 | kg/h | | |

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Intersection LOS value for Vehicles is based on average delay for all vehicle movements.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.

| Intersection Performance - Annual Values | | | | |
|---|---|---|---|---|
| **Performance Measure** | **Vehicles** | | **Persons** | |
| Demand Flows (Total) | 972,815 | veh/y | 1,167,378 | pers/y |
| Delay | 3,019 | veh-h/y | 3,623 | pers-h/y |
| Effective Stops | 321,205 | veh/y | 385,446 | pers/y |
| Travel Distance | 997,125 | veh-km/y | 1,196,550 | pers-km/y |
| Travel Time | 24,311 | veh-h/y | 29,173 | pers-h/y |
| Cost | 275,556 | $/y | 275,556 | $/y |
| Fuel Consumption | 84,298 | L/y | | |
| Carbon Dioxide | 199,741 | kg/y | | |
| Hydrocarbons | 16 | kg/y | | |
| Carbon Monoxide | 177 | kg/y | | |
| NOx | 247 | kg/y | | |

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# LANE FLOWS

## Site: 102 [102-PR-122 @ PR-116 (AM)]

New Site
Signals - Fixed Time Isolated Cycle Time = 82 seconds (User-Given Phase Times)

**Approach Lane Flows (veh/h)**

NorthEast: PR-122

| Mov. From NE To Exit: | T1 SW | R2 NW | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 68 | - | 68 | 2.9 | 450 | 0.150 | 100 | 0.0 | 2 |
| Lane 2 | 68 | - | 68 | 2.9 | 450 | 0.150 | 100 | NA | NA |
| Lane 3 | - | 33 | 33 | 4.0 | 1548 | 0.022 | 100 | NA | NA |
| Approach | 136 | 33 | 169 | 3.1 | | 0.150 | | | |

NorthWest: PR-116

| Mov. From NW To Exit: | L2 NE | R2 SW | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 290 | - | 290 | 2.2 | 432 | 0.670 | 100 | NA | NA |
| Lane 2 | - | 721 | 721 | 4.0 | 1549 | 0.465 | 100 | 0.0 | 1 |
| Approach | 290 | 721 | 1010 | 3.4 | | 0.670 | | | |

SouthWest: PR-116

| Mov. From SW To Exit: | L2 NW | T1 NE | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 257 | - | 257 | 2.5 | 646 | 0.398 | 100 | 7.4 | 2 |
| Lane 2 | 257 | - | 257 | 2.5 | 646 | 0.398 | 100 | 7.4 | 3 |
| Lane 3 | - | 167 | 167 | 1.5 | 1871 | 0.089 | 100 | NA | NA |
| Lane 4 | - | 167 | 167 | 1.5 | 1871 | 0.089 | 100 | NA | NA |
| Approach | 514 | 333 | 848 | 2.1 | | 0.398 | | | |

| | Total | %HV | Deg.Satn (v/c) |
|---|---|---|---|
| Intersection | 2027 | 2.9 | 0.670 |

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

# LANE SUMMARY

## Site: 102 [102-PR-122 @ PR-116 (AM)]

New Site
Signals - Fixed Time Isolated Cycle Time = 82 seconds (User-Given Phase Times)

**Lane Use and Performance**

| | Demand Flows Total veh/h | HV % | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Average Delay sec | Level of Service | 95% Back of Queue Veh | Dist m | Lane Config | Lane Length m | Cap. Adj. % | Prob. Block. % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| NorthEast: PR-122 | | | | | | | | | | | | | |
| Lane 1 | 68 | 2.9 | 450 | 0.150 | 100 | 24.4 | LOS C | 2.2 | 16.8 | Short | 60 | 0.0 | NA |
| Lane 2 | 68 | 2.9 | 450 | 0.150 | 100 | 24.4 | LOS C | 2.2 | 16.8 | Full | 500 | 0.0 | 0.0 |
| Lane 3 | 33 | 4.0 | 1548 | 0.022 | 100 | 0.0 | LOS A | 0.0 | 0.0 | Full | 500 | 0.0 | 0.0 |
| Approach | 169 | 3.1 | | 0.150 | | 19.6 | LOS B | 2.2 | 16.8 | | | | |
| NorthWest: PR-116 | | | | | | | | | | | | | |
| Lane 1 | 290 | 2.2 | 432 | 0.670 | 100 | 31.7 | LOS C | 11.6 | 89.6 | Full | 500 | 0.0 | 0.0 |
| Lane 2 | 721 | 4.0 | 1549 | 0.465 | 100 | 0.1 | LOS A | 0.0 | 0.0 | Short | 60 | 0.0 | NA |
| Approach | 1010 | 3.4 | | 0.670 | | 9.2 | LOS A | 11.6 | 89.6 | | | | |
| SouthWest: PR-116 | | | | | | | | | | | | | |
| Lane 1 | 257 | 2.5 | 646 | 0.398 | 100 | 19.6 | LOS B | 7.9 | 61.6 | Short | 60 | 0.0 | NA |
| Lane 2 | 257 | 2.5 | 646 | 0.398 | 100 | 19.6 | LOS B | 7.9 | 61.6 | Short | 60 | 0.0 | NA |
| Lane 3 | 167 | 1.5 | 1871 | 0.089 | 100 | 0.0 | LOS A | 0.0 | 0.0 | Full | 500 | 0.0 | 0.0 |
| Lane 4 | 167 | 1.5 | 1871 | 0.089 | 100 | 0.0 | LOS A | 0.0 | 0.0 | Full | 500 | 0.0 | 0.0 |
| Approach | 848 | 2.1 | | 0.398 | | 11.9 | LOS B | 7.9 | 61.6 | | | | |
| Intersection | 2027 | 2.9 | | 0.670 | | 11.2 | LOS B | 11.6 | 89.6 | | | | |

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.
LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 6).
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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# MOVEMENT SUMMARY

## Site: 102 [102-PR-122 @ PR-116 (AM)]

New Site
Signals - Fixed Time Isolated Cycle Time = 82 seconds (User-Given Phase Times)

| Movement Performance - Vehicles | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Mov ID | OD Mov | Demand Flows Total veh/h | HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
| NorthEast: PR-122 | | | | | | | | | | | |
| 6 | T1 | 136 | 2.9 | 0.150 | 24.4 | LOS C | 2.2 | 16.8 | 0.82 | 0.63 | 45.4 |
| 16 | R2 | 33 | 4.0 | 0.022 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.00 | 57.9 |
| Approach | | 169 | 3.1 | 0.150 | 19.6 | LOS B | 2.2 | 16.8 | 0.66 | 0.51 | 47.4 |
| NorthWest: PR-116 | | | | | | | | | | | |
| 7 | L2 | 290 | 2.2 | 0.670 | 31.7 | LOS C | 11.6 | 89.6 | 0.96 | 0.83 | 33.1 |
| 14 | R2 | 721 | 4.0 | 0.465 | 0.1 | LOS A | 0.0 | 0.0 | 0.00 | 0.00 | 39.7 |
| Approach | | 1010 | 3.4 | 0.670 | 9.2 | LOS A | 11.6 | 89.6 | 0.27 | 0.24 | 37.5 |
| SouthWest: PR-116 | | | | | | | | | | | |
| 5 | L2 | 514 | 2.5 | 0.398 | 19.6 | LOS B | 7.9 | 61.6 | 0.79 | 0.67 | 37.3 |
| 2 | T1 | 333 | 1.5 | 0.089 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.00 | 65.0 |
| Approach | | 848 | 2.1 | 0.398 | 11.9 | LOS B | 7.9 | 61.6 | 0.48 | 0.40 | 44.8 |
| All Vehicles | | 2027 | 2.9 | 0.670 | 11.2 | LOS B | 11.6 | 89.6 | 0.39 | 0.33 | 41.0 |

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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# INTERSECTION SUMMARY

## Site: 104 [104-PR-122 @ PR-321 (AM)]

Three-way intersection with 2-lane major road (Stop control)
Stop (Two-Way)

| Intersection Performance - Hourly Values | | | | |
|---|---|---|---|---|
| **Performance Measure** | **Vehicles** | | **Persons** | |
| Travel Speed (Average) | 49.0 | km/h | 49.0 | km/h |
| Travel Distance (Total) | 782.7 | veh-km/h | 939.3 | pers-km/h |
| Travel Time (Total) | 16.0 | veh-h/h | 19.2 | pers-h/h |
| Demand Flows (Total) | 774 | veh/h | 928 | pers/h |
| Percent Heavy Vehicles (Demand) | 1.9 | % | | |
| Degree of Saturation | 0.523 | | | |
| Practical Spare Capacity | 52.9 | % | | |
| Effective Intersection Capacity | 1478 | veh/h | | |
| Control Delay (Total) | 2.44 | veh-h/h | 2.93 | pers-h/h |
| Control Delay (Average) | 11.4 | sec | 11.4 | sec |
| Control Delay (Worst Lane) | 14.7 | sec | | |
| Control Delay (Worst Movement) | 14.8 | sec | 14.8 | sec |
| Geometric Delay (Average) | 0.0 | sec | | |
| Stop-Line Delay (Average) | 11.4 | sec | | |
| Idling Time (Average) | 8.9 | sec | | |
| Intersection Level of Service (LOS) | NA | | | |
| 95% Back of Queue - Vehicles (Worst Lane) | 6.8 | veh | | |
| 95% Back of Queue - Distance (Worst Lane) | 52.6 | m | | |
| Queue Storage Ratio (Worst Lane) | 0.04 | | | |
| Total Effective Stops | 301 | veh/h | 362 | pers/h |
| Effective Stop Rate | 0.39 | per veh | 0.39 | per pers |
| Proportion Queued | 0.34 | | 0.34 | |
| Performance Index | 28.4 | | 28.4 | |
| Cost (Total) | 210.23 | $/h | 210.23 | $/h |
| Fuel Consumption (Total) | 79.1 | L/h | | |
| Carbon Dioxide (Total) | 187.0 | kg/h | | |
| Hydrocarbons (Total) | 0.018 | kg/h | | |
| Carbon Monoxide (Total) | 0.235 | kg/h | | |
| NOx (Total) | 0.244 | kg/h | | |

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
NA: Intersection LOS for Vehicles is Not Applicable for two-way sign control since the average intersection delay is not a good LOS measure due to zero delays associated with major road movements.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.

| Intersection Performance - Annual Values | | | | |
|---|---|---|---|---|
| **Performance Measure** | **Vehicles** | | **Persons** | |
| Demand Flows (Total) | 371,345 | veh/y | 445,614 | pers/y |
| Delay | 1,172 | veh-h/y | 1,406 | pers-h/y |
| Effective Stops | 144,631 | veh/y | 173,558 | pers/y |
| Travel Distance | 375,712 | veh-km/y | 450,854 | pers-km/y |
| Travel Time | 7,671 | veh-h/y | 9,206 | pers-h/y |
| Cost | 100,912 | $/y | 100,912 | $/y |
| Fuel Consumption | 37,954 | L/y | | |
| Carbon Dioxide | 89,745 | kg/y | | |
| Hydrocarbons | 9 | kg/y | | |
| Carbon Monoxide | 113 | kg/y | | |
| NOx | 117 | kg/y | | |

# LANE FLOWS

## Site: 104 [104-PR-122 @ PR-321 (AM)]

Three-way intersection with 2-lane major road (Stop control)
Stop (Two-Way)

**Approach Lane Flows (veh/h)**

South: PR-122

| Mov. From S To Exit: | L2 W | R2 E | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 373 | 29 | 402 | 1.7 | 768 | 0.523 | 100 | NA | NA |
| Approach | 373 | 29 | 402 | 1.7 | | 0.523 | | | |

East: PR-321

| Mov. From E To Exit: | L2 S | T1 W | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 16 | 59 | 75 | 3.1 | 1595 | 0.047 | 100 | NA | NA |
| Approach | 16 | 59 | 75 | 3.1 | | 0.047 | | | |

West: PR-321

| Mov. From W To Exit: | T1 E | R2 S | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 129 | 167 | 297 | 1.9 | 760 | 0.390 | 100 | NA | NA |
| Approach | 129 | 167 | 297 | 1.9 | | 0.390 | | | |

| | Total | %HV | Deg.Satn (v/c) |
|---|---|---|---|
| Intersection | 774 | 1.9 | 0.523 |

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

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# LANE SUMMARY

## Site: 104 [104-PR-122 @ PR-321 (AM)]

Three-way intersection with 2-lane major road (Stop control)
Stop (Two-Way)

**Lane Use and Performance**

| | Demand Flows Total veh/h | HV % | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Average Delay sec | Level of Service | 95% Back of Queue Veh | Dist m | Lane Config | Lane Length m | Cap. Adj. % | Prob. Block. % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| South: PR-122 | | | | | | | | | | | | | |
| Lane 1 | 402 | 1.7 | 768 | 0.523 | 100 | 14.7 | LOS B | 6.8 | 52.6 | Full | 500 | 0.0 | 0.0 |
| Approach | 402 | 1.7 | | 0.523 | | 14.7 | LOS B | 6.8 | 52.6 | | | | |
| East: PR-321 | | | | | | | | | | | | | |
| Lane 1 | 75 | 3.1 | 1595 | 0.047 | 100 | 0.0 | LOS A | 0.0 | 0.0 | Full | 500 | 0.0 | 0.0 |
| Approach | 75 | 3.1 | | 0.047 | | 0.0 | NA | 0.0 | 0.0 | | | | |
| West: PR-321 | | | | | | | | | | | | | |
| Lane 1 | 297 | 1.9 | 760 | 0.390 | 100 | 9.7 | LOS A | 2.5 | 19.3 | Full | 500 | 0.0 | 0.0 |
| Approach | 297 | 1.9 | | 0.390 | | 9.7 | NA | 2.5 | 19.3 | | | | |
| Intersection | 774 | 1.9 | | 0.523 | | 11.4 | NA | 6.8 | 52.6 | | | | |

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.
LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection).
Minor Road Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 6).
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road lanes.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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# MOVEMENT SUMMARY

## Site: 104 [104-PR-122 @ PR-321 (AM)]

Three-way intersection with 2-lane major road (Stop control)
Stop (Two-Way)

| Movement Performance - Vehicles | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Mov ID | OD Mov | Demand Flows Total veh/h | HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
| South: PR-122 | | | | | | | | | | | |
| 3 | L2 | 373 | 1.8 | 0.523 | 14.8 | LOS B | 6.8 | 52.6 | 0.57 | 0.70 | 45.3 |
| 18 | R2 | 29 | 0.0 | 0.523 | 13.8 | LOS B | 6.8 | 52.6 | 0.57 | 0.70 | 45.8 |
| Approach | | 402 | 1.7 | 0.523 | 14.7 | LOS B | 6.8 | 52.6 | 0.57 | 0.70 | 45.3 |
| East: PR-321 | | | | | | | | | | | |
| 1 | L2 | 16 | 6.7 | 0.047 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.00 | 59.9 |
| 6 | T1 | 59 | 2.1 | 0.047 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.00 | 63.6 |
| Approach | | 75 | 3.1 | 0.047 | 0.0 | NA | 0.0 | 0.0 | 0.00 | 0.00 | 62.8 |
| West: PR-321 | | | | | | | | | | | |
| 2 | T1 | 129 | 3.4 | 0.390 | 11.4 | LOS B | 2.5 | 19.3 | 0.10 | 0.06 | 52.7 |
| 12 | R2 | 167 | 0.8 | 0.390 | 8.3 | LOS A | 2.5 | 19.3 | 0.10 | 0.06 | 51.1 |
| Approach | | 297 | 1.9 | 0.390 | 9.7 | NA | 2.5 | 19.3 | 0.10 | 0.06 | 51.8 |
| All Vehicles | | 774 | 1.9 | 0.523 | 11.4 | NA | 6.8 | 52.6 | 0.34 | 0.39 | 49.0 |

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Minor Road Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

# INTERSECTION SUMMARY

## Site: 109 [109-PR-101 @ PR-166 (AM) SINGLE]

Four-way intersection with 2-lane approaches (Signals)

Signals - Fixed Time Isolated Cycle Time = 87 seconds (User-Given Phase Times)

| Intersection Performance - Hourly Values | | | | |
|---|---|---|---|---|
| **Performance Measure** | **Vehicles** | | **Persons** | |
| Travel Speed (Average) | 12.7 | km/h | 12.7 | km/h |
| Travel Distance (Total) | 1805.4 | veh-km/h | 2166.5 | pers-km/h |
| Travel Time (Total) | 142.0 | veh-h/h | 170.4 | pers-h/h |
| Demand Flows (Total) | 2218 | veh/h | 2662 | pers/h |
| Percent Heavy Vehicles (Demand) | 0.8 | % | | |
| Degree of Saturation | 1.854 | | | |
| Practical Spare Capacity | -51.5 | % | | |
| Effective Intersection Capacity | 1196 | veh/h | | |
| Control Delay (Total) | 101.69 | veh-h/h | 122.02 | pers-h/h |
| Control Delay (Average) | 165.1 | sec | 165.1 | sec |
| Control Delay (Worst Lane) | 414.5 | sec | | |
| Control Delay (Worst Movement) | 414.5 | sec | 414.5 | sec |
| Geometric Delay (Average) | 0.0 | sec | | |
| Stop-Line Delay (Average) | 165.1 | sec | | |
| Idling Time (Average) | 162.6 | sec | | |
| Intersection Level of Service (LOS) | LOS F | | | |
| 95% Back of Queue - Vehicles (Worst Lane) | 65.1 | veh | | |
| 95% Back of Queue - Distance (Worst Lane) | 494.8 | m | | |
| Queue Storage Ratio (Worst Lane) | 3.37 | | | |
| Total Effective Stops | 3131 | veh/h | 3757 | pers/h |
| Effective Stop Rate | 1.41 | per veh | 1.41 | per pers |
| Proportion Queued | 0.84 | | 0.84 | |
| Performance Index | 371.1 | | 371.1 | |
| Cost (Total) | 1948.25 | $/h | 1948.25 | $/h |
| Fuel Consumption (Total) | 343.8 | L/h | | |
| Carbon Dioxide (Total) | 810.0 | kg/h | | |
| Hydrocarbons (Total) | 0.086 | kg/h | | |
| Carbon Monoxide (Total) | 0.754 | kg/h | | |
| NOx (Total) | 0.504 | kg/h | | |

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Intersection LOS value for Vehicles is based on average delay for all vehicle movements.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.

| Intersection Performance - Annual Values | | | | |
|---|---|---|---|---|
| **Performance Measure** | **Vehicles** | | **Persons** | |
| Demand Flows (Total) | 1,064,607 | veh/y | 1,277,528 | pers/y |
| Delay | 48,810 | veh-h/y | 58,572 | pers-h/y |
| Effective Stops | 1,502,673 | veh/y | 1,803,208 | pers/y |
| Travel Distance | 866,588 | veh-km/y | 1,039,905 | pers-km/y |
| Travel Time | 68,162 | veh-h/y | 81,795 | pers-h/y |
| Cost | 935,159 | $/y | 935,159 | $/y |
| Fuel Consumption | 165,034 | L/y | | |
| Carbon Dioxide | 388,802 | kg/y | | |
| Hydrocarbons | 42 | kg/y | | |
| Carbon Monoxide | 362 | kg/y | | |
| NOx | 242 | kg/y | | |

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# LANE FLOWS

## Site: 109 [109-PR-101 @ PR-166 (AM) SINGLE]

Four-way intersection with 2-lane approaches (Signals)

Signals - Fixed Time Isolated Cycle Time = 87 seconds (User-Given Phase Times)

**Approach Lane Flows (veh/h)**

South: PR-101

| Mov. From S To Exit: | L2 W | T1 N | R2 E | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 178 | 308 | - | 486 | 0.0 | 312[1] | 1.559 | 100 | 100.0 | 2 |
| Lane 2 | - | - | 97 | 97 | 0.0 | 1006 | 0.097 | 100 | NA | NA |
| Approach | 178 | 308 | 97 | 583 | 0.0 | | 1.559 | | | |

East: PR-166

| Mov. From E To Exit: | L2 S | T1 W | R2 N | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 115 | - | - | 115 | 4.3 | 275 | 0.418 | 100 | 0.0 | 2 |
| Lane 2 | - | 205 | - | 205 | 0.0 | 704 | 0.291 | 100 | NA | NA |
| Lane 3 | - | 59 | 147 | 206 | 1.9 | 708 | 0.291 | 100 | NA | NA |
| Approach | 115 | 264 | 147 | 526 | 1.7 | | 0.418 | | | |

North: PR-101

| Mov. From N To Exit: | L2 E | T1 S | R2 W | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 114 | 320 | 61 | 495 | 0.0 | 267 | 1.854 | 100 | NA | NA |
| Approach | 114 | 320 | 61 | 495 | 0.0 | | 1.854 | | | |

West: PR-166

| Mov. From W To Exit: | L2 N | T1 E | R2 S | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 154 | - | - | 154 | 0.0 | 287 | 0.537 | 100 | 12.1 | 2 |
| Lane 2 | - | 229 | - | 229 | 2.4 | 687 | 0.334 | 100 | NA | NA |
| Lane 3 | - | 98 | 132 | 230 | 1.0 | 688 | 0.334 | 100 | NA | NA |
| Approach | 154 | 327 | 132 | 613 | 1.3 | | 0.537 | | | |

| | Total | %HV | Deg.Satn (v/c) |
|---|---|---|---|
| Intersection | 2218 | 0.8 | 1.854 |

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

1 Reduced capacity due to a short lane effect. Short lane queues may extend into the full-length lanes. Some upstream delays at entry to short lanes are not included.

# LANE SUMMARY

## Site: 109 [109-PR-101 @ PR-166 (AM) SINGLE]

Four-way intersection with 2-lane approaches (Signals)

Signals - Fixed Time Isolated Cycle Time = 87 seconds (User-Given Phase Times)

**Lane Use and Performance**

| | Demand Flows Total veh/h | HV % | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Average Delay sec | Level of Service | 95% Back of Queue Veh | Dist m | Lane Config | Lane Length m | Cap. Adj. % | Prob. Block. % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| South: PR-101 | | | | | | | | | | | | | |
| Lane 1 | 486 | 0.0 | 312[1] | 1.559 | 100 | 288.8 | LOS F | 56.9 | 432.1 | Short | 7 | 0.0 | NA |
| Lane 2 | 97 | 0.0 | 1006 | 0.097 | 100 | 1.0 | LOS A | 0.8 | 5.9 | Full | 500 | 0.0 | 0.0 |
| Approach | 583 | 0.0 | | 1.559 | | 240.7 | LOS F | 56.9 | 432.1 | | | | |
| East: PR-166 | | | | | | | | | | | | | |
| Lane 1 | 115 | 4.3 | 275 | 0.418 | 100 | 32.9 | LOS C | 4.6 | 36.0 | Short | 50 | 0.0 | NA |
| Lane 2 | 205 | 0.0 | 704 | 0.291 | 100 | 17.8 | LOS B | 6.1 | 46.0 | Full | 500 | 0.0 | 0.0 |
| Lane 3 | 206 | 1.9 | 708 | 0.291 | 100 | 6.8 | LOS A | 3.1 | 24.3 | Full | 500 | 0.0 | 0.0 |
| Approach | 526 | 1.7 | | 0.418 | | 16.8 | LOS B | 6.1 | 46.0 | | | | |
| North: PR-101 | | | | | | | | | | | | | |
| Lane 1 | 495 | 0.0 | 267 | 1.854 | 100 | 414.5 | LOS F | 65.1 | 494.8 | Full | 90 | 0.0 | 100.0 |
| Approach | 495 | 0.0 | | 1.854 | | 414.5 | LOS F | 65.1 | 494.8 | | | | |
| West: PR-166 | | | | | | | | | | | | | |
| Lane 1 | 154 | 0.0 | 287 | 0.537 | 100 | 34.4 | LOS C | 6.4 | 48.7 | Short | 45 | 0.0 | NA |
| Lane 2 | 229 | 2.4 | 687 | 0.334 | 100 | 18.2 | LOS B | 6.9 | 53.8 | Full | 500 | 0.0 | 0.0 |
| Lane 3 | 230 | 1.0 | 688 | 0.334 | 100 | 9.1 | LOS A | 4.5 | 34.2 | Full | 500 | 0.0 | 0.0 |
| Approach | 613 | 1.3 | | 0.537 | | 18.8 | LOS B | 6.9 | 53.8 | | | | |
| Intersection | 2218 | 0.8 | | 1.854 | | 165.1 | LOS F | 65.1 | 494.8 | | | | |

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.
LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 6).
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

1 Reduced capacity due to a short lane effect. Short lane queues may extend into the full-length lanes. Some upstream delays at entry to short lanes are not included.

# MOVEMENT SUMMARY

## Site: 109 [109-PR-101 @ PR-166 (AM) SINGLE]

Four-way intersection with 2-lane approaches (Signals)

Signals - Fixed Time Isolated Cycle Time = 87 seconds (User-Given Phase Times)

**Movement Performance - Vehicles**

| Mov ID | OD Mov | Demand Flows Total veh/h | HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| South: PR-101 | | | | | | | | | | | |
| 3 | L2 | 178 | 0.0 | 1.559 | 288.8 | LOS F | 56.9 | 432.1 | 1.00 | 2.37 | 9.7 |
| 8 | T1 | 308 | 0.0 | 1.559 | 288.8 | LOS F | 56.9 | 432.1 | 1.00 | 2.37 | 6.2 |
| 18 | R2 | 97 | 0.0 | 0.097 | 1.0 | LOS A | 0.8 | 5.9 | 0.21 | 0.17 | 45.2 |
| Approach | | 583 | 0.0 | 1.559 | 240.7 | LOS F | 56.9 | 432.1 | 0.87 | 2.00 | 9.1 |
| East: PR-166 | | | | | | | | | | | |
| 1 | L2 | 115 | 4.3 | 0.418 | 32.9 | LOS C | 4.6 | 36.0 | 0.94 | 0.75 | 32.6 |
| 6 | T1 | 264 | 0.0 | 0.291 | 15.3 | LOS B | 6.1 | 46.0 | 0.70 | 0.59 | 50.4 |
| 16 | R2 | 147 | 2.7 | 0.291 | 6.8 | LOS A | 3.1 | 24.3 | 0.64 | 0.54 | 46.0 |
| Approach | | 526 | 1.7 | 0.418 | 16.8 | LOS B | 6.1 | 46.0 | 0.74 | 0.61 | 43.8 |
| North: PR-101 | | | | | | | | | | | |
| 7 | L2 | 114 | 0.0 | 1.854 | 414.5 | LOS F | 65.1 | 494.8 | 1.00 | 2.52 | 4.6 |
| 4 | T1 | 320 | 0.0 | 1.854 | 414.5 | LOS F | 65.1 | 494.8 | 1.00 | 2.52 | 4.5 |
| 14 | R2 | 61 | 0.0 | 1.854 | 414.5 | LOS F | 65.1 | 494.8 | 1.00 | 2.52 | 4.6 |
| Approach | | 495 | 0.0 | 1.854 | 414.5 | LOS F | 65.1 | 494.8 | 1.00 | 2.52 | 4.5 |
| West: PR-166 | | | | | | | | | | | |
| 5 | L2 | 154 | 0.0 | 0.537 | 34.4 | LOS C | 6.4 | 48.7 | 0.96 | 0.78 | 28.3 |
| 2 | T1 | 327 | 2.4 | 0.334 | 15.4 | LOS B | 6.9 | 53.8 | 0.72 | 0.61 | 50.3 |
| 12 | R2 | 132 | 0.0 | 0.334 | 9.1 | LOS A | 4.5 | 34.2 | 0.70 | 0.59 | 42.7 |
| Approach | | 613 | 1.3 | 0.537 | 18.8 | LOS B | 6.9 | 53.8 | 0.78 | 0.65 | 42.9 |
| All Vehicles | | 2218 | 0.8 | 1.854 | 165.1 | LOS F | 65.1 | 494.8 | 0.84 | 1.41 | 12.7 |

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

# INTERSECTION SUMMARY

## Site: 110 [110-PR-122 @ PR-102 (AM)]

New Site
Signals - Fixed Time Isolated Cycle Time = 121 seconds (User-Given Phase Times)

| Intersection Performance - Hourly Values | | | | |
|---|---|---|---|---|
| **Performance Measure** | **Vehicles** | | **Persons** | |
| Travel Speed (Average) | 8.0 | km/h | 8.0 | km/h |
| Travel Distance (Total) | 3205.1 | veh-km/h | 3846.1 | pers-km/h |
| Travel Time (Total) | 401.0 | veh-h/h | 481.2 | pers-h/h |
| Demand Flows (Total) | 3918 | veh/h | 4702 | pers/h |
| Percent Heavy Vehicles (Demand) | 2.0 | % | | |
| Degree of Saturation | 2.744 | | | |
| Practical Spare Capacity | -67.2 | % | | |
| Effective Intersection Capacity | 1428 | veh/h | | |
| Control Delay (Total) | 303.24 | veh-h/h | 363.89 | pers-h/h |
| Control Delay (Average) | 278.6 | sec | 278.6 | sec |
| Control Delay (Worst Lane) | 848.1 | sec | | |
| Control Delay (Worst Movement) | 848.1 | sec | 848.1 | sec |
| Geometric Delay (Average) | 0.0 | sec | | |
| Stop-Line Delay (Average) | 278.6 | sec | | |
| Idling Time (Average) | 287.0 | sec | | |
| Intersection Level of Service (LOS) | LOS F | | | |
| 95% Back of Queue - Vehicles (Worst Lane) | 134.7 | veh | | |
| 95% Back of Queue - Distance (Worst Lane) | 1042.0 | m | | |
| Queue Storage Ratio (Worst Lane) | 1.28 | | | |
| Total Effective Stops | 5845 | veh/h | 7014 | pers/h |
| Effective Stop Rate | 1.49 | per veh | 1.49 | per pers |
| Proportion Queued | 0.87 | | 0.87 | |
| Performance Index | 1119.9 | | 1119.9 | |
| Cost (Total) | 5455.48 | $/h | 5455.48 | $/h |
| Fuel Consumption (Total) | 691.6 | L/h | | |
| Carbon Dioxide (Total) | 1632.9 | kg/h | | |
| Hydrocarbons (Total) | 0.184 | kg/h | | |
| Carbon Monoxide (Total) | 1.115 | kg/h | | |
| NOx (Total) | 1.226 | kg/h | | |

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Intersection LOS value for Vehicles is based on average delay for all vehicle movements.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.

| Intersection Performance - Annual Values | | | | |
|---|---|---|---|---|
| **Performance Measure** | **Vehicles** | | **Persons** | |
| Demand Flows (Total) | 1,880,630 | veh/y | 2,256,756 | pers/y |
| Delay | 145,555 | veh-h/y | 174,666 | pers-h/y |
| Effective Stops | 2,805,420 | veh/y | 3,366,504 | pers/y |
| Travel Distance | 1,538,428 | veh-km/y | 1,846,113 | pers-km/y |
| Travel Time | 192,477 | veh-h/y | 230,973 | pers-h/y |
| Cost | 2,618,630 | $/y | 2,618,630 | $/y |
| Fuel Consumption | 331,976 | L/y | | |
| Carbon Dioxide | 783,787 | kg/y | | |
| Hydrocarbons | 88 | kg/y | | |
| Carbon Monoxide | 535 | kg/y | | |
| NOx | 588 | kg/y | | |

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# LANE FLOWS

## Site: 110 [110-PR-122 @ PR-102 (AM)]

New Site
Signals - Fixed Time Isolated Cycle Time = 121 seconds (User-Given Phase Times)

**Approach Lane Flows (veh/h)**

South: PR-122

| Mov. From S To Exit: | L2 W | T1 N | R2 E | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 164 | - | - | 164 | 2.6 | 60 | 2.744 | 100 | NA | NA |
| Lane 2 | - | 352 | 205 | 556 | 0.0 | 365 | 1.523 | 55[5] | NA | NA |
| Approach | 164 | 352 | 205 | 721 | 0.6 | | 2.744 | | | |

East: PR-102

| Mov. From E To Exit: | L2 S | T1 W | R2 N | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 33 | 387 | - | 420 | 2.1 | 336[1] | 1.252 | 100 | NA | NA |
| Lane 2 | - | - | 368 | 368 | 1.5 | 1043 | 0.353 | 100 | 0.0 | 1 |
| Approach | 33 | 387 | 368 | 788 | 1.8 | | 1.252 | | | |

North: PR-122

| Mov. From N To Exit: | L2 E | T1 S | R2 W | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 530 | - | - | 530 | 3.8 | 265 | 1.997 | 100 | 100.0 | 2 |
| Lane 2 | - | 309 | - | 309 | 2.3 | 354 | 0.873 | 100 | NA | NA |
| Lane 3 | - | 309 | - | 309 | 2.3 | 354 | 0.873 | 100 | NA | NA |
| Lane 4 | - | - | 378 | 378 | 1.4 | 1039 | 0.364 | 100 | 0.0 | 3 |
| Approach | 530 | 618 | 378 | 1526 | 2.6 | | 1.997 | | | |

West: PR-102

| Mov. From W To Exit: | L2 N | T1 E | R2 S | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 380 | 442 | - | 822 | 2.1 | 394[1] | 2.086 | 100 | NA | NA |
| Lane 2 | - | - | 61 | 61 | 5.6 | 934 | 0.065 | 100 | 0.0 | 1 |
| Approach | 380 | 442 | 61 | 883 | 2.4 | | 2.086 | | | |

| | Total | %HV | Deg.Satn (v/c) |
|---|---|---|---|
| Intersection | 3918 | 2.0 | 2.744 |

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

1 Reduced capacity due to a short lane effect. Short lane queues may extend into the full-length lanes. Some upstream delays at entry to short lanes are not included.

5 Lane under-utilisation found by the program

Project: C:\Users\BYA 44\Desktop\New Folder (2)\0_COVID\20-PR-122\TRAFICO\SIDRA\FUTURE NO ACTION 2048
\PR122_FUTURE_NO_ACTION_2048_PM.sip7

# LANE SUMMARY

## Site: 110 [110-PR-122 @ PR-102 (AM)]

New Site
Signals - Fixed Time Isolated Cycle Time = 121 seconds (User-Given Phase Times)

**Lane Use and Performance**

| | Demand Flows Total veh/h | HV % | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Average Delay sec | Level of Service | 95% Back of Queue Veh | Dist m | Lane Config | Lane Length m | Cap. Adj. % | Prob. Block. % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| South: PR-122 | | | | | | | | | | | | | |
| Lane 1 | 164 | 2.6 | 60 | 2.744 | 100 | 848.1 | LOS F | 30.6 | 238.0 | Full | 500 | 0.0 | 0.0 |
| Lane 2 | 556 | 0.0 | 365 | 1.523 | 55[5] | 266.6 | LOS F | 62.2 | 472.7 | Full | 500 | 0.0 | 0.0 |
| Approach | 721 | 0.6 | | 2.744 | | 399.1 | LOS F | 62.2 | 472.7 | | | | |
| East: PR-102 | | | | | | | | | | | | | |
| Lane 1 | 420 | 2.1 | 336[1] | 1.252 | 100 | 171.9 | LOS F | 44.5 | 344.4 | Full | 500 | 0.0 | 0.0 |
| Lane 2 | 368 | 1.5 | 1043 | 0.353 | 100 | 5.5 | LOS A | 7.0 | 54.1 | Short | 65 | 0.0 | NA |
| Approach | 788 | 1.8 | | 1.252 | | 94.2 | LOS F | 44.5 | 344.4 | | | | |
| North: PR-122 | | | | | | | | | | | | | |
| Lane 1 | 530 | 3.8 | 265 | 1.997 | 100 | 486.9 | LOS F | 84.8 | 664.9 | Short | 80 | 0.0 | NA |
| Lane 2 | 309 | 2.3 | 354 | 0.873 | 100 | 66.8 | LOS E | 21.4 | 165.4 | Full | 200 | 0.0 | 100.0[8] |
| Lane 3 | 309 | 2.3 | 354 | 0.873 | 100 | 66.8 | LOS E | 21.4 | 165.4 | Full | 200 | 0.0 | 0.0 |
| Lane 4 | 378 | 1.4 | 1039 | 0.364 | 100 | 8.4 | LOS A | 9.1 | 69.8 | Short | 80 | 0.0 | NA |
| Approach | 1526 | 2.6 | | 1.997 | | 198.2 | LOS F | 84.8 | 664.9 | | | | |
| West: PR-102 | | | | | | | | | | | | | |
| Lane 1 | 822 | 2.1 | 394[1] | 2.086 | 100 | 519.2 | LOS F | 134.7 | 1042.0 | Full | 500 | 0.0 | 73.3 |
| Lane 2 | 61 | 5.6 | 934 | 0.065 | 100 | 3.3 | LOS A | 0.9 | 7.4 | Short | 50 | 0.0 | NA |
| Approach | 883 | 2.4 | | 2.086 | | 483.8 | LOS F | 134.7 | 1042.0 | | | | |
| Intersection | 3918 | 2.0 | | 2.744 | | 278.6 | LOS F | 134.7 | 1042.0 | | | | |

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.
LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 6).
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

1 Reduced capacity due to a short lane effect. Short lane queues may extend into the full-length lanes. Some upstream delays at entry to short lanes are not included.
5 Lane under-utilisation found by the program
8 Probability of Blockage has been set on the basis of a queue that overflows from a short lane.

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# MOVEMENT SUMMARY

## Site: 110 [110-PR-122 @ PR-102 (AM)]

New Site
Signals - Fixed Time Isolated Cycle Time = 121 seconds (User-Given Phase Times)

**Movement Performance - Vehicles**

| Mov ID | OD Mov | Demand Flows Total veh/h | HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| South: PR-122 | | | | | | | | | | | |
| 3 | L2 | 164 | 2.6 | 2.744 | 848.1 | LOS F | 30.6 | 238.0 | 1.00 | 1.66 | 3.8 |
| 8 | T1 | 352 | 0.0 | 1.523 | 266.6 | LOS F | 62.2 | 472.7 | 1.00 | 1.72 | 7.1 |
| 18 | R2 | 205 | 0.0 | 1.523 | 266.6 | LOS F | 62.2 | 472.7 | 1.00 | 1.72 | 9.4 |
| Approach | | 721 | 0.6 | 2.744 | 399.1 | LOS F | 62.2 | 472.7 | 1.00 | 1.71 | 6.1 |
| East: PR-102 | | | | | | | | | | | |
| 1 | L2 | 33 | 13.6 | 1.252 | 171.9 | LOS F | 44.5 | 344.4 | 1.00 | 1.64 | 13.5 |
| 6 | T1 | 387 | 1.1 | 1.252 | 171.9 | LOS F | 44.5 | 344.4 | 1.00 | 1.64 | 13.5 |
| 16 | R2 | 368 | 1.5 | 0.353 | 5.5 | LOS A | 7.0 | 54.1 | 0.35 | 0.31 | 35.9 |
| Approach | | 788 | 1.8 | 1.252 | 94.2 | LOS F | 44.5 | 344.4 | 0.70 | 1.02 | 17.7 |
| North: PR-122 | | | | | | | | | | | |
| 7 | L2 | 530 | 3.8 | 1.997 | 486.9 | LOS F | 84.8 | 664.9 | 1.00 | 2.02 | 4.5 |
| 4 | T1 | 618 | 2.3 | 0.873 | 66.8 | LOS E | 21.4 | 165.4 | 1.00 | 1.03 | 19.6 |
| 14 | R2 | 378 | 1.4 | 0.364 | 8.4 | LOS A | 9.1 | 69.8 | 0.45 | 0.39 | 34.6 |
| Approach | | 1526 | 2.6 | 1.997 | 198.2 | LOS F | 84.8 | 664.9 | 0.86 | 1.22 | 9.5 |
| West: PR-102 | | | | | | | | | | | |
| 5 | L2 | 380 | 1.7 | 2.086 | 519.2 | LOS F | 134.7 | 1042.0 | 1.00 | 2.36 | 4.3 |
| 2 | T1 | 442 | 2.5 | 2.086 | 519.2 | LOS F | 134.7 | 1042.0 | 1.00 | 2.36 | 5.8 |
| 12 | R2 | 61 | 5.6 | 0.065 | 3.3 | LOS A | 0.9 | 7.4 | 0.28 | 0.22 | 37.4 |
| Approach | | 883 | 2.4 | 2.086 | 483.8 | LOS F | 134.7 | 1042.0 | 0.95 | 2.21 | 5.5 |
| All Vehicles | | 3918 | 2.0 | 2.744 | 278.6 | LOS F | 134.7 | 1042.0 | 0.87 | 1.49 | 8.0 |

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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# INTERSECTION SUMMARY

## Site: 111 [111-PR-102 @ PR-166 (AM)]

Four-way intersection with 2-lane approaches (Signals)

Signals - Fixed Time Isolated Cycle Time = 112 seconds (User-Given Phase Times)

| Intersection Performance - Hourly Values | | | | |
|---|---|---|---|---|
| **Performance Measure** | **Vehicles** | | **Persons** | |
| Travel Speed (Average) | 16.7 | km/h | 16.7 | km/h |
| Travel Distance (Total) | 2049.7 | veh-km/h | 2459.7 | pers-km/h |
| Travel Time (Total) | 122.5 | veh-h/h | 147.0 | pers-h/h |
| | | | | |
| Demand Flows (Total) | 2018 | veh/h | 2421 | pers/h |
| Percent Heavy Vehicles (Demand) | 0.3 | % | | |
| Degree of Saturation | 1.595 | | | |
| Practical Spare Capacity | -43.6 | % | | |
| Effective Intersection Capacity | 1265 | veh/h | | |
| | | | | |
| Control Delay (Total) | 75.72 | veh-h/h | 90.86 | pers-h/h |
| Control Delay (Average) | 135.1 | sec | 135.1 | sec |
| Control Delay (Worst Lane) | 299.4 | sec | | |
| Control Delay (Worst Movement) | 299.4 | sec | 299.4 | sec |
| Geometric Delay (Average) | 0.0 | sec | | |
| Stop-Line Delay (Average) | 135.1 | sec | | |
| Idling Time (Average) | 133.0 | sec | | |
| Intersection Level of Service (LOS) | LOS F | | | |
| | | | | |
| 95% Back of Queue - Vehicles (Worst Lane) | 93.3 | veh | | |
| 95% Back of Queue - Distance (Worst Lane) | 708.9 | m | | |
| Queue Storage Ratio (Worst Lane) | 0.87 | | | |
| Total Effective Stops | 2696 | veh/h | 3235 | pers/h |
| Effective Stop Rate | 1.34 | per veh | 1.34 | per pers |
| Proportion Queued | 0.98 | | 0.98 | |
| Performance Index | 459.7 | | 459.7 | |
| | | | | |
| Cost (Total) | 1637.21 | $/h | 1637.21 | $/h |
| Fuel Consumption (Total) | 271.3 | L/h | | |
| Carbon Dioxide (Total) | 637.5 | kg/h | | |
| Hydrocarbons (Total) | 0.068 | kg/h | | |
| Carbon Monoxide (Total) | 0.521 | kg/h | | |
| NOx (Total) | 0.203 | kg/h | | |

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Intersection LOS value for Vehicles is based on average delay for all vehicle movements.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.

| Intersection Performance - Annual Values | | | | |
|---|---|---|---|---|
| **Performance Measure** | **Vehicles** | | **Persons** | |
| Demand Flows (Total) | 968,435 | veh/y | 1,162,122 | pers/y |
| Delay | 36,343 | veh-h/y | 43,612 | pers-h/y |
| Effective Stops | 1,294,135 | veh/y | 1,552,962 | pers/y |
| Travel Distance | 983,867 | veh-km/y | 1,180,641 | pers-km/y |
| Travel Time | 58,819 | veh-h/y | 70,583 | pers-h/y |
| | | | | |
| Cost | 785,862 | $/y | 785,862 | $/y |
| Fuel Consumption | 130,202 | L/y | | |
| Carbon Dioxide | 306,023 | kg/y | | |
| Hydrocarbons | 32 | kg/y | | |
| Carbon Monoxide | 250 | kg/y | | |
| NOx | 98 | kg/y | | |

# LANE FLOWS

## Site: 111 [111-PR-102 @ PR-166 (AM)]

Four-way intersection with 2-lane approaches (Signals)

Signals - Fixed Time Isolated Cycle Time = 112 seconds (User-Given Phase Times)

**Approach Lane Flows (veh/h)**

South: PR-166

| Mov. From S To Exit: | L2 W | T1 N | R2 E | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 94 | - | - | 94 | 0.0 | 223 | 0.420 | 100 | NA | NA |
| Lane 2 | - | 77 | 53 | 130 | 0.0 | 241 | 0.541 | 100 | NA | NA |
| Approach | 94 | 77 | 53 | 224 | 0.0 | | 0.541 | | | |

East: PR-102

| Mov. From E To Exit: | L2 S | T1 W | R2 N | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 56 | 724 | 65 | 844 | 0.7 | 946 | 0.892 | 100 | NA | NA |
| Approach | 56 | 724 | 65 | 844 | 0.7 | | 0.892 | | | |

North: Inter American University

| Mov. From N To Exit: | L2 E | T1 S | R2 W | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 70 | 55 | 94 | 218 | 0.0 | 239 | 0.916 | 100 | NA | NA |
| Approach | 70 | 55 | 94 | 218 | 0.0 | | 0.916 | | | |

West: PR-102

| Mov. From W To Exit: | L2 N | T1 E | R2 S | Total | %HV | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Prob. SL Ov. % | Ov. Lane No. |
|---|---|---|---|---|---|---|---|---|---|---|
| Lane 1 | 155 | 461 | 115 | 731 | 0.0 | 459 | 1.595 | 100 | NA | NA |
| Approach | 155 | 461 | 115 | 731 | 0.0 | | 1.595 | | | |

| | Total | %HV | Deg.Satn (v/c) |
|---|---|---|---|
| Intersection | 2018 | 0.3 | 1.595 |

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

# LANE SUMMARY

## Site: 111 [111-PR-102 @ PR-166 (AM)]

Four-way intersection with 2-lane approaches (Signals)

Signals - Fixed Time Isolated Cycle Time = 112 seconds (User-Given Phase Times)

**Lane Use and Performance**

| | Demand Flows Total veh/h | HV % | Cap. veh/h | Deg. Satn v/c | Lane Util. % | Average Delay sec | Level of Service | 95% Back of Queue Veh | Dist m | Lane Config | Lane Length m | Cap. Adj. % | Prob. Block. % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| South: PR-166 | | | | | | | | | | | | | |
| Lane 1 | 94 | 0.0 | 223 | 0.420 | 100 | 45.4 | LOS D | 4.9 | 37.3 | Full | 500 | 0.0 | 0.0 |
| Lane 2 | 130 | 0.0 | 241 | 0.541 | 100 | 34.7 | LOS C | 5.9 | 44.8 | Full | 500 | 0.0 | 0.0 |
| Approach | 224 | 0.0 | | 0.541 | | 39.2 | LOS D | 5.9 | 44.8 | | | | |
| East: PR-102 | | | | | | | | | | | | | |
| Lane 1 | 844 | 0.7 | 946 | 0.892 | 100 | 32.9 | LOS C | 49.0 | 374.7 | Full | 500 | 0.0 | 0.0 |
| Approach | 844 | 0.7 | | 0.892 | | 32.9 | LOS C | 49.0 | 374.7 | | | | |
| North: Inter American University | | | | | | | | | | | | | |
| Lane 1 | 218 | 0.0 | 239 | 0.916 | 100 | 78.2 | LOS E | 14.0 | 106.1 | Full | 500 | 0.0 | 0.0 |
| Approach | 218 | 0.0 | | 0.916 | | 78.2 | LOS E | 14.0 | 106.1 | | | | |
| West: PR-102 | | | | | | | | | | | | | |
| Lane 1 | 731 | 0.0 | 459 | 1.595 | 100 | 299.4 | LOS F | 93.3 | 708.9 | Full | 500 | 0.0 | 36.9 |
| Approach | 731 | 0.0 | | 1.595 | | 299.4 | LOS F | 93.3 | 708.9 | | | | |
| Intersection | 2018 | 0.3 | | 1.595 | | 135.1 | LOS F | 93.3 | 708.9 | | | | |

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.
LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 6).
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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# MOVEMENT SUMMARY

## Site: 111 [111-PR-102 @ PR-166 (AM)]

Four-way intersection with 2-lane approaches (Signals)

Signals - Fixed Time Isolated Cycle Time = 112 seconds (User-Given Phase Times)

**Movement Performance - Vehicles**

| Mov ID | OD Mov | Demand Flows Total veh/h | HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| South: PR-166 | | | | | | | | | | | |
| 3 | L2 | 94 | 0.0 | 0.420 | 45.4 | LOS D | 4.9 | 37.3 | 0.96 | 0.76 | 32.0 |
| 8 | T1 | 77 | 0.0 | 0.541 | 34.7 | LOS C | 5.9 | 44.8 | 0.97 | 0.80 | 26.0 |
| 18 | R2 | 53 | 0.0 | 0.541 | 34.7 | LOS C | 5.9 | 44.8 | 0.97 | 0.80 | 35.6 |
| Approach | | 224 | 0.0 | 0.541 | 39.2 | LOS D | 5.9 | 44.8 | 0.97 | 0.78 | 30.3 |
| East: PR-102 | | | | | | | | | | | |
| 1 | L2 | 56 | 0.0 | 0.892 | 32.9 | LOS C | 49.0 | 374.7 | 0.96 | 0.98 | 37.5 |
| 6 | T1 | 724 | 0.8 | 0.892 | 32.9 | LOS C | 49.0 | 374.7 | 0.96 | 0.98 | 36.5 |
| 16 | R2 | 65 | 0.0 | 0.892 | 32.9 | LOS C | 49.0 | 374.7 | 0.96 | 0.98 | 26.7 |
| Approach | | 844 | 0.7 | 0.892 | 32.9 | LOS C | 49.0 | 374.7 | 0.96 | 0.98 | 35.6 |
| North: Inter American University | | | | | | | | | | | |
| 7 | L2 | 70 | 0.0 | 0.916 | 78.2 | LOS E | 14.0 | 106.1 | 1.00 | 1.27 | 19.5 |
| 4 | T1 | 55 | 0.0 | 0.916 | 78.2 | LOS E | 14.0 | 106.1 | 1.00 | 1.27 | 20.0 |
| 14 | R2 | 94 | 0.0 | 0.916 | 78.2 | LOS E | 14.0 | 106.1 | 1.00 | 1.27 | 19.5 |
| Approach | | 218 | 0.0 | 0.916 | 78.2 | LOS E | 14.0 | 106.1 | 1.00 | 1.27 | 19.6 |
| West: PR-102 | | | | | | | | | | | |
| 5 | L2 | 155 | 0.0 | 1.595 | 299.4 | LOS F | 93.3 | 708.9 | 1.00 | 1.94 | 8.7 |
| 2 | T1 | 461 | 0.0 | 1.595 | 299.4 | LOS F | 93.3 | 708.9 | 1.00 | 1.94 | 9.5 |
| 12 | R2 | 115 | 0.0 | 1.595 | 299.4 | LOS F | 93.3 | 708.9 | 1.00 | 1.94 | 9.6 |
| Approach | | 731 | 0.0 | 1.595 | 299.4 | LOS F | 93.3 | 708.9 | 1.00 | 1.94 | 9.3 |
| All Vehicles | | 2018 | 0.3 | 1.595 | 135.1 | LOS F | 93.3 | 708.9 | 0.98 | 1.34 | 16.7 |

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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# APPENDIX 14: Permits Obtained / To be Obtained

# Exhibit 14.1 – Environmental Recommendations Issued by the OGPe

## Recomendaciones

Extensión de la Carretera PR-122 San German Lajas

# Datos de Localización

De acuerdo a la información suministrada se propone una actividad: Público en:

### Dirección Física

URB EL RETIRO CALLE SANTIAGO SAN GERMAN
Lajas Puerto Rico, 00729

### Dueño

Puerto Rico Highway & Transportation Authority

### Número(s) de Catastro

720-079-001-22

### Calificación

Distrito(s) de Calificación: VIAL (84%), A.g (15%), R.i

Distrito en el Mapa de Inundabilidad: X (91.6%), A (8.4%)

Tipo de Suelo: Lo (32.2%), DeD (26.4%), JaC (17.7%),

### Cabida

Cabida según escritura: 50116.47 metros cuadrados

### Medioambiente

El Departamento de Recursos Naturales y Ambientales (DRNA) través de su Oficial de Permiso asignado a la OGPe evaluó la solicitud de recomendación para un proyecto. Extensión de la Carretera PR-122 San German Lajas. Sobre este particular, el DRNA emite los siguientes comentarios: 1. El predio propuesto para desarrollo ha sido identificado como Zona A de acuerdo con la hoja de los Mapas de Niveles de Inundación Base Recomendados preparados por la Agencia Federal para el Manejo de Emergencias y adoptados por la Junta de Planificación según la Resolución Núm. ABFE-02 del 11 de julio de 2018. A estos efectos, se deberá cumplir con las disposiciones del Reglamento de Planificación Núm. 13 (Reglamento sobre Áreas Especiales de Peligro a Inundación). 2. De haber un impacto a la Quebrada con relación a la construcción del puente, previo a la otorgación de un permiso deberá radicar una Recomendación de la División de Medioambiente para que la misma sea referida para el Departamento de Recursos Naturales y Ambientales (DRNA), agencia con jurisdicción sobre los cuerpos de agua. Además, deberá radicar una solicitud de Estudio Hidrológico-Hidráulico (H-H) ante el DRNA. Además, se le apercibe que: • Previo a cualquier extracción de la corteza terrestre deberá cumplir con la Regla 3.4.1 y Sección 3.4.1.3 – (Permiso Único Incidental Operacional - Permiso de Actividad Incidental a una obra autorizada) del Reglamento Conjunto para la evaluación y expedición de permisos relacionados al desarrollo, uso de terrenos y operación de negocios. Se le apercibe que la Ley Núm. 132 de 25 de junio de 1968, según enmendada y su Reglamento, prohíben la extracción, excavación, remoción y dragado de material de la corteza terrestre sin el permiso correspondiente. • De ser necesario el corte de árboles, deberá cumplir con la Regla 3.4.1 y 3.4.2 – (Permiso Único Incidental Operacional - Autorización de Corte, Poda, Trasplante y Siembra de Árboles) del Reglamento Conjunto para la evaluación y expedición de permisos relacionados al desarrollo, uso de terrenos y operación de negocios. Se le apercibe que la Ley Núm. 133 de 1 de julio de 1975, según enmendada prohíbe el corte y poda de árboles sin el permiso correspondiente. • Deberá establecer un programa de reforestación utilizando especies nativas que además de ayudar a minimizar la erosión beneficien la vida silvestre. Esta medida es cónsona con la Ley para Fomentar la Siembra de Árboles Cuyas Frutas y/o Semillas Provean Alimento a Especies de Aves Silvestres de Puerto Rico (Ley Núm. 97 de 24 de junio de 1998), la cual establece lo

## Recomendaciones

Extensión de la Carretera PR-122 San German Lajas

siguiente: “En todo proyecto de reforestación en que se utilicen fondos públicos o privados, o en una combinación de estos, un 15% en las áreas rurales y un 10% en las áreas urbanas del total de árboles a ser sembrados, serán de especies cuyas frutas y/o semillas sirvan de alimento a las aves silvestres que residan temporal o permanentemente en ésta”. • Deberá Presentar Certificación de Hábitat, según el Capítulo 9.13 del Reglamento Conjunto para la evaluación y expedición de permisos relacionados al desarrollo, uso de terrenos y operación de negocios. Dicha Certificación deberá ser tramitada en el DRNA, en conformidad con la Ley Núm. 241 de 15 de agosto de 1999, La Nueva Ley de Vida Silvestre de Puerto Rico, el Reglamento 6765 Reglamento para Regir La Conservación y el Manejo de La Vida Silvestre, Las Especies Exóticas y la Caza en el Estado Libre Asociado de Puerto Rico y la Orden Administrativa Núm. 2010-09, Para Establecer los Procedimientos y Requisitos Para La Evaluación, Categorización y Mitigación de Hábitats. • Deberá cumplir con las disposiciones del Reglamento Conjunto para la evaluación y expedición de permisos relacionados al desarrollo Sección 5.1.2.2 Análisis de riesgos a deslizamientos y otras condiciones del subsuelo, que indica: para todo proyecto de urbanización, incluyendo urbanizaciones vía excepción, se tomará en consideración el riesgo a deslizamientos y otras condiciones del subsuelo mediante la presentación de un estudio geotécnico certificado por un ingeniero licenciado que evalúe la geología e hidrología del terreno, presencia de fallas geológicas, historial de deslizamientos en la zona, susceptibilidad del terreno a los mismos, topografía, presencia del materiales de depósitos de deslizamientos (QI) según descritos en los cuadrángulos geológicos de Puerto Rico por el USGS y las propiedades ingenieriles del subsuelo, entre otros. • De tener alguna descarga de escorrentía a cualquier cuerpo de agua durante la operación, deberá consultar a la Agencia Federal de Protección Ambiental para determinar si dichas descargas requieren un permiso “NPDES” de acuerdo al Código Federal de Reglamentación Número 40, Sección 122.26 (b) (14) (x). • Para la fase de Permiso de Urbanización o de Construcción será responsabilidad del Peticionario previo las labores de remoción de extracción de los materiales de la corteza terrestre el obtener y mantener en vigor el Permiso General Consolidado por la Oficina de Gerencias de Permisos (OGPe) para el área de operaciones objeto del permiso” a través de la Regla 3.4.1 - Permiso Único Incidental Operacional del Reglamento Conjunto para la Evaluación y Expedición de Permisos Relacionados al Desarrollo, Uso de Terrenos y Operación de Negocios del 2 de enero de 2021. • De descubrirse en el predio objeto de desarrollo algún cuerpo de agua superficial o subterráneo, sea perenne o intermitente, deberá informarlo inmediatamente al DRNA y demás agencias concernidas. No informar hallazgos de este tipo, así como las medidas de mitigación que se implantarán para proteger estos recursos naturales conllevará una revocación automática de la presente comunicación de no objeción y podrá ser base para acciones legales por parte de la Junta de Planificación (JP) en los foros correspondientes. • Deberá cumplir con las disposiciones de la Sección 5.1.9.4 (Manejo de Aguas Pluviales) del Reglamento Conjunto para la evaluación y expedición de permisos relacionados al desarrollo, uso de terrenos y operación de negocios. Esta recomendación es solamente aplicable a la situación de hechos y los datos según presentados y evaluados en el caso y el Secretario Auxiliar se reserva el derecho de reevaluar, variar o modificar el mismo en cualquier momento anterior a la emisión del permiso o la acción administrativa correspondiente por parte de la agencia solicitante o proponente cuando surja nueva información oficial específica estableciendo que el derecho aplicable o las condiciones ambientales en el predio han cambiado sustancialmente, o cuando el endoso original se emitió bajo premisas falsas o fraudulentas.

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Permisos Operacionales (ADS-JCA)

La Secretaría Auxiliar de Permisos, Endosos y Servicios Especializados del DRNA ha recibido la solicitud de Recomendación Medioambiente (SRM) referida electrónicamente por la Oficina de Gerencia de Permisos (OGPe) relacionada con el proyecto de referencia para la correspondiente evaluación y comentarios. La acción propuesta consiste en en extender la Carretera PR-122 existente, conocida coma la Avenida Casto Pérez, desde su actual intersección con el extremo este de la carretera PR-166 (Desvío Sur de San Germán) hasta su intersección con la carretera PR-621 en Lajas. Continuando con el proceso de planificación conceptualizado en el año 2003, este proyecto tiene la intención de proveer una carretera de mayor capacidad y mejor alineación para acomodar el volumen de tránsito actual y futuro en una forma que sea rápida y a la vez segura. El completar este tramo de la PR-122 hasta Lajas, tendría el efecto de facilitar y mejorar el transporte de bienes, personas y servicios entre el pueblo de Lajas y la carretera PR-2, cumpliendo así con uno de los principales objetivos del proyecto. El proyecto propuesto está ubicado dentro de la Región Oeste de Puerto Rico; específicamente entre los pueblos de San Germán y Lajas. Su alineación corre mayormente paralelo a la Carretera PR-101 y aproximadamente un (1) kilómetro (km.) al este de la misma, con una longitud total de 2.2 kms y un ancho de servidumbre mínimo de 33.5 metros (m.). En su trayectoria, pasa entre la Comunidad El Retiro y una quebrada sin nombre en San Germán y continúa hacia Lajas, cruzando por encima de la Carretera PR-321 en el km 1.0. La extensión de la Carretera PR-122 de San Germán a Lajas será diseñada para cumplir con los requisitos de una clasificación R-5 de acuerdo al Manual de Diseño de la Autoridad de Carreteras y Transportación (ACT). Tendrá una sección típica similar a la utilizada en la ampliación de la Avenida Casto Pérez en San Germán, o sea, que tendrá cuatro (4) carriles de 3.65 m de ancho cada uno, y estará dividida por una barrera de hormigón o por una isleta central, dependiendo del tramo que corresponda. En ambos casos, se dejará una faja de seguridad a cada lado de la protección central para cumplir con las normas mínimas de diseño establecidas en los estándares locales y federales aplicables. Además, se proveerá un paseo de 2.40 m a cada lado de la vía propuesta, de los cuales 1.80 m serán pavimentados. El DRNA emite sus comentarios al proyecto propuesto basados en la aplicación de leyes y reglamentos vigentes promulgados por la extinta ADS*(ver nota al final del documento) relacionadas con el manejo y disposición de los desperdicios sólidos y los materiales reciclables y entre otras regulaciones para las diferentes fases del proyecto. Las recomendaciones son de aplicabilidad al proyecto propuesto de este obtener la autorización y permisos requeridos para su ubicación, desarrollo, construcción u operación. Tomando en consideración lo antes mencionado se emiten las siguientes recomendaciones: 1. Todo desarrollo propuesto deberá promover la recuperación de materiales reciclables y el manejo y disposición tanto de los reciclables como de los desperdicios sólidos sea el adecuado, según dispuesto bajo Ley Núm. 70 - 1992, Ley para la Reducción y Reciclaje de los Desperdicios Sólidos, según enmendada; Reglamento para la Reducción, Reutilización y Reciclaje de Desperdicios Sólidos (Reglamento Núm. 6825 de 2004), según enmendado Reglamento Núm. 7940 de 2010, conocido como “Enmienda al Reglamento para la Reducción, Reutilización y el Reciclaje de los Desperdicios Sólidos en Puerto Rico. Desarrollar e implantar reglas y requisitos para establecer estrategias que disminuyan el volumen, cantidad y peligrosidad de los

## Recomendaciones

Extensión de la Carretera PR-122 San German Lajas

residuos sólidos que requerirán disposición final y propiciar su viabilidad económica y ambiental. Designar un área para la recuperación de materiales reciclables generados durante la construcción Indicar la entidad responsable (municipio o compañía privada) del recogido y disposición de los desperdicios sólidos y los materiales reciclables. 2. Cumplir con los requerimientos establecidos bajo el Reglamento Conjunto para la evaluación y expedición de permisos relacionados al desarrollo, uso de terrenos y operación de negocios (Reglamento Conjunto) Todo desarrollo propuesto deberá cumplir con las disposiciones bajo las Secciones 3.2.1.1 y 3.2.1.2, Regla 3.2.1 Permisos de Construcción del Capítulo 3.2 Edificación y Conservación de energía; Capitulo 3.4 Permisos de Medioambiente, Regla 3.4.1 Permiso único incidental operacional, Capitulo 3.6 Permisos generales del Tomo III Permisos para el desarrollo y negocios del Reglamento Conjunto, según aplique. Cumplir con las disposiciones de la Sección 5.1.9.4 (Obras Pluviales) del Reglamento Conjunto, según aplique. 3. Toda obra o desarrollo propuesto que realice alguna de las disposiciones incluidas en el Capítulo 3.2 Edificación y Conservación de energía Regla 3.2.1 Permisos de construcción Sección 3.2.1.1 Disposiciones generales, y/o Regla 3.2.2 Actividad de demolición; deberá radicar en el DRNA el Plan de Reciclaje fase de construcción para su correspondiente evaluación. Este deberá cumplir con lo siguiente (según aplique): a. Para los proyectos en los cuales no se emplee más de 10 personas, el desarrollador, proponente o contratista solicitará una Exención para la radicación del Formulario del Plan de Reciclaje para la fase de construcción. La solicitud para la exención del Plan de Reciclaje puede radicarla a través de la página del DRNA en Formularios en línea. b. Para los proyectos que empleen más de 10 personas deberá radicar el Formulario del Plan de Reciclaje para la fase de Construcción, junto a un Memorial Explicativo. c. En caso de demoliciones, deberán radicar el Formulario del Plan de Reciclaje e indicar la cantidad de escombros de construcción a generarse en el proyecto que incluya alternativas para el manejo (reciclaje, reúso) y disposición. d. Tanto el Formulario del Plan de Reciclaje para la fase de construcción como de demolición pueden radicarlo a través de la dirección electrónica construccion@drna.pr.gov 4. Todo proceso de almacenaje, manejo y disposición de los desperdicios sólidos no peligrosos a ser generados durante las diferentes fases del proyecto propuesto, serán realizados en conformidad con lo estipulado bajo el Reglamento para el manejo de desperdicios no peligrosos, Reglamento Núm. 5717-1997. 5. Mantener los camiones de carga que se utilicen para transportar escombros y/o materiales de construcción cubiertos con toldos mientras estén en movimiento, para evitar la generación de polvo fugitivo. Los camiones de acarreo de desperdicios deberán contar con el Permiso para Operar Servicios de Recolección o Transportación de desperdicios Sólidos No- Peligrosos (Permiso DS-1), emitido por el DRNA, para transportarlos hasta una instalación de disposición final o reciclaje. 6. Deberán tomar las medidas necesarias para controlar el área durante la construcción para evitar exponer a los vehículos a recoger lodo, polvo, sustancias pegajosas o material viscoso en las ruedas u otras partes del vehículo, los cuales a su vez puedan ser depositados en las calles u otro sitio público y así mantener las vías públicas y alrededores del proyecto libres de acumulación de desechos de construcción. 7. Tomar las medidas necesarias para evitar que residuos de sustancias orgánicas e inorgánicas como aceites, combustibles u otras sustancias químicas, puedan ser arrastradas por la escorrentía y ganen acceso a cuerpo de agua o sistema pluvial del área. 8. Se tomará en consideración todo lo concerniente al manejo de aguas pluviales y control de escorrentías del predio. Tomar las medidas necesarias para el control de erosión y prevención de la sedimentación durante la realización de las obras. 9. Todos los materiales excedentes y escombros de construcción resultantes deberán haberse removido

## Recomendaciones

Extensión de la Carretera PR-122 San German Lajas

completamente del lugar, una vez completadas las obras. Se deberá disponer de estos de manera adecuada. 10. De efectuar movimiento de tierra que por su volumen total excedan de 40m3, solicitar a través de la Oficina de Gerencia de Permisos (OGPe) el Permiso Único Incidental Operacional, a tenor con la Regla 3.4.1 del Reglamento Conjunto. 11. Todo desarrollo de acuerdo con la actividad propuesta cumplirá con lo requerido en la Sección 3.4.1.2., Capitulo 3.4 Permisos de Medioambiente del Reglamento Conjunto, según aplique. 12. En relación con el posible uso de equipos que puedan ser fuentes de emisión atmosféricas (generadores de electricidad, entre otros) deberán obtener del Área de Calidad de Aire del DRNA los permisos correspondientes conforme al Reglamento Número 5300 del 28 de agosto de 1995 conocido como el Reglamento para el Control de la Contaminación Atmosférica. 13. En lo relacionado al nivel de sonido máximo permitido, cumplir con el Reglamento Número 8019 del 9 de mayo de 2011, conocido como el Reglamento para el Control de la Contaminación por Ruido. 14. El proponente/desarrollador/contratista del proyecto será responsable de cumplimentar las Leyes y Reglamentos antes mencionadas. Cumplirá con los permisos requeridos bajo las leyes y reglamentos vigentes. Además, de la documentación requerida por las agencias concernidas (En particular con los requerimientos y recomendaciones otras Áreas y Divisiones del DRNA). Las recomendaciones emitidas aplican a los hechos presentados y evaluados al momento. El DRNA se reserva el derecho de reevaluar y modificar los mismos en el caso de surgir información oficial que identifique que las condiciones han cambiado, o cuando los comentarios hayan sido emitidos bajo premisas falsas. Además, el DRNA tiene la facultad de solicitar cualquier información adicional que entienda pertinente y que, de conformidad con las leyes y reglamentaciones vigentes, garantice el interés público y la protección del ambiente. *Nota : “De acuerdo con el Plan de Reorganización del Departamento de Recursos Naturales y Ambientales de 2018, Ley 171 del 2 de agosto de 2018, Sección 92 – Cláusula de sustitución – Cualquier referencia a la Autoridad de Desperdicios Sólidos y la Junta de Calidad Ambiental, contenida en cualquier ley, reglamento o documento oficial del Gobierno de Puerto Rico se entenderá enmendada a los efectos de referirse al Departamento de Recursos Naturales y Ambientales que se entenderá como su sucesor para todos los fines legales correspondientes.”

JP

EL CASO FUE EVALUADO POR LA JUNTA DE PLANIFICACION, OFICINA DE GEOLOGIA EL 2 DE JUNIO DE 2023, SE INCLUYO REPOERTE EVALUATIVO.

## Condiciones Especiales

NINGUNA

## Condiciones Generales

Esta recomendación es solamente aplicable a la situación de hechos y los datos según presentados y evaluados en el caso. La OGPe se reserva el derecho de reevaluar, variar o modificar el mismo en cualquier momento anterior a la emisión del permiso o la acción administrativa correspondiente por parte de la agencia solicitante o proponente cuando surja nueva información oficial específica estableciendo que el derecho aplicable o las condiciones ambientales en el predio han cambiado sustancialmente, o cuando la recomendación original se emitió bajo premisas falsas o fraudulentas.

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Extensión de la Carretera PR-122 San German Lajas

Las vigencias de las diferentes agencias del proceso de recomendación serán las establecidas en los comunicados que estas emiten conforme a sus reglamentos.

## Firma / Sellos

**Fecha de Expedición:**

19/SEP/2023

Lcdo. Félix E. Rivera Torres
Secretario Auxiliar
Departamento de Desarrollo Económico y Comercio de Puerto Rico
Oficina de Gerencia de Permisos

***Lcdo. Félix E. Rivera Torres***

***Secretario Auxiliar de la OGPe***

# Exhibit 14.2 – PRASA Consultation

20 de noviembre de 2024

Lcdo. Félix Rivera Torres
Secretario Auxiliar
Oficina de Gerencia de Permisos
PO Box 41179
San Juan Puerto Rico 00940-1179

Estimada Licenciado Rivera:

**AAA-RO-24-41-0016; LAJAS – EXTENSION DE LA PR-122 DE SAN GERMAN A LAJAS PROPIEDAD DE LA AUTORIDAD DE CARRETERAS Y TRANSPORTACION DE PUERTO RICO**
**PR-122 BO. RETIRO HASTA PR-321, BO. ANCONES**
**OGPe 2022- 466230-SRI-308399**
**(RECOMENDACIONES)**

Nos referimos al proyecto de epígrafe, sometido ante nuestra consideración para que se informe en cuanto a las facilidades de agua y alcantarillado sanitario existentes, que puedan servir al mismo. De acuerdo con el memorial explicativo, el proyecto consiste en extender la PR-122 existente en la intersección con la PR-166 hasta la PR-321 en el barrio Ancones del Municipio de Lajas.

El dueño del proyecto deberá el instalar tubería de 6" de diámetro a lo largo de la nueva carretera para futuro desarrollo. Además, deberá instalar válvulas de control al inicio y final del tramo. Las tuberías existentes que sean impactadas bajo el proyecto deberán ser instaladas en tubería de 4" de diámetro.

Antes de iniciar el proceso de construcción, deberá someter para aprobación de esta Autoridad, los planos de las obras de acueducto y/o alcantarillado par los que se solicita permiso, los cuales deberán estar sellados y firmados por el profesional responsable de los mismo.

Deberá cumplirse con los requisitos establecidos en el *Reglamento Conjunto de permisos para Obras de Construcción y Usos de Terrenos.*

**Los planos deberán ser sometidos, evaluados y aprobados por este Autoridad, de acuerdo al Reglamento para la Certificación de Planos de Construcción, antes de proceder con la construcción de las obras. Todas las instalaciones que vayan a ser transferidas a la AAA deben ser construidas en espacio público, de manera que se eviten las servidumbres de paso de instalaciones de servicio de agua o alcantarillado.**

El desarrollador someterá los planos del proyecto a escala, orientado al norte y en **formato DWG o DXF y en PDF**. Este tiene que ser incluir un polígono (área) de extensión territorial del proyecto georreferenciado al sistema de coordenadas North American Datum de 1983 (NAD 83). Además, tiene que indicar si la unidad de medida utilizada es en pies o metros y la revisión del NAD 83 que utilizo.

**AAA-RO-24-41-0016; LAJAS – EXTENSION DE LA PR-122 DE SAN GERMAN A LAJAS PROPIEDAD DE LA AUTORIDAD DE CARRETERAS Y TRANSPORTACION DE PUERTO RICO**
**PR-122 BO. RETIRO HASTA PR-321, BO. ANCONES**
**OGPe: 2022- 466230-SRI-308399**
**(RECOMENDACIONES)**

Al someter el plano final para aprobación, se deberá cumplir también con los siguientes requisitos:

1. Someter los documentos de certificación del ingeniero o arquitecto debidamente cumplimentados:

a. AAA-972 (Solicitud de Aprobación de planos de Construcción)
b. AAA-1294 (Certificación de Ingeniero o arquitecto)

2. Someter un estimado desglosado y por partida de las obras de acueducto a instalarse en el proyecto.

Esta recomendación estará vigente por el término de dos (2) años, a partir de la fecha de esta comunicación, al cabo del cual, de no haberse sometido planos de construcción de las obras de acueductos y alcantarillado sanitario, el proyecto deberá someterse nuevamente ante la consideración de esta Autoridad.

Cordialmente,



Ing. Glorymar Cortes Areizaga, P.E.
Directora de Infraestructura
AAA- Región Oeste

24 de febrero de 2025

Lcdo. Félix Rivera Torres
Secretario Auxiliar
Oficina de Gerencia de Permisos (OGPe)
PO BOX 41179
San Juan, Puerto Rico 00940-1179

Estimado licenciado Rivera:

**AAA-RO-24-41-0016 – SAN GERMAN – EXTENSIÓN DE LA CARRETERA PR-122 SAN GERMAN A LAJAS PROPIEDAD AUTORIDAD DE CARRETERAS**
**PR-122 BO ANCONES, SAN GERMAN HASTA PR-321 BO. SANTA ROSA, LAJAS**
**OGPE 2022-466230-SRI-312607**
**(RECONSIDERACION DE RECOMENDACIONES)**

Nos referimos al proyecto de epígrafe, sometido ante nuestra consideración para que se informe en cuanto a la reconsideración de Recomendaciones para las facilidades de agua y alcantarillado sanitario existentes, que puedan servir al mismo. De acuerdo con el memorial explicativo y documentos sometidos el proyecto consiste en extender la PR 122 desde el Barrio El Retiro en San Germán a campo traviesa hasta la PR 321 en el Barrio Ancones de Lajas.

El proponente solicita reconsideración de las recomendaciones para instalación de tubería de seis (6) pulgadas en el proyecto propuesto. Mantenemos el requerimiento establecido en las recomendaciones emitidas para la interconexión de tuberías entre los dos extremos de la carretera propuesta.

La Autoridad de Acueductos y Alcantarillados se reserva el derecho de requerir cualquier obra de mejora pertinente que por omisión involuntaria no se haya incluido en estas recomendaciones y que, a su juicio, sea necesaria para el funcionamiento adecuado de los sistemas de distribución de agua y/o alcantarillado sanitario propuestos. Esto incluye obras construidas que no estén de acuerdo con las normas de la Autoridad y que su efecto sea en detrimento de los sistemas a ser instalados.

Estas recomendaciones estarán vigentes por el término de dos (2) años, a partir de la fecha de esta comunicación, al cabo del cual, de no haberse sometido planos de construcción de

las obras de acueducto y alcantarillado sanitario, el proyecto deberá someterse nuevamente ante la consideración de esta Autoridad.

Cordialmente,

Ing. Augusto H Ortiz II, PE (Lic. 180103)

Digitally signed by Ing. Augusto H Ortiz II, PE (Lic. 180103)
Date: 2025.02.24 [illegible]

Ing. Augusto Ortiz Mercado, P.E., M-ASCE
Gerente Técnico Oficina PPP
Directorado de Infraestructura -Región Oeste

Cc: Expediente, Archivo de Lectura

AOM

AUTORIDAD DE ACUEDUCTOS
Y ALCANTARILLADOS

AAA

GOBIERNO DE PUERTO RICO

22 de agosto de 2025

Lcdo. Félix Rivera Torres
Secretario Auxiliar
Oficina de Gerencia de Permisos (OGPe)
PO BOX 41179
San Juan, Puerto Rico 00940-1179

Estimado licenciado Rivera:

**AAA-RO-24-41-0016: LAJAS - EXTENSION DE LA CARRETERA PR-122 SAN GERMAN A LAJAS**
**PROPIEDAD DE AUTORIDAD DE CARRETERAS**
**PR-122, BO. ANCONES, SAN GERMAN HASTA PR-321, BO. SANTA ROSA, LAJAS**
**OGPE 2022-466230-SRI-319141**
**(PLANOS COMENTADOS)**

Recientemente personal técnico de nuestra oficina evaluó los planos revisados sometidos a través de la oficina de Gerencia de Permisos sobre el proyecto en referencia. Adjunto los planos hidráulicos con nuestros comentarios marcados en rojo. Deberá someter los planos corregidos a través de la Oficina de Gerencias de Permisos.

Recomendamos el solicitar una reunión para discutir los señalamientos y de aclarar alguna duda, puede comunicarse mediante correo electrónico a augusto.ortiz@acueductospr.com

Cordialmente, ING Augusto H Ortiz II PE Digitally signed by ING Augusto H Ortiz II PE Date: 2025.08.22 16:01:55 -04'00'

Ing. Augusto Ortiz Mercado, P.E., M-ASCE
Gerente Técnico Oficina PPP
Directorado de Infraestructura -Región Oeste

Cc: Expediente, Archivo de Lectura

AOM/jrp

**ANEJO**: Planos marcados en rojo

AUTORIDAD DE ACUEDUCTOS Y ALCANTARILLADOS

AAA

GOBIERNO DE PUERTO RICO

22 de junio de 2026

Ing. Miguel A. Manzano Rivera
Secretario Auxiliar
Oficina de Gerencia de Permisos
PO Box 41179 San Juan, Puerto Rico 00940-1179

Estimado Ingeniero Manzano:

**AAA-RO-24-41-0016 – SAN GERMAN - LAJAS – EXTENSION DE LA CARRETERA PR-122 SAN GERMAN A LAJAS PROPIEDAD DE LA AUTORIDAD DE CARRETERAS**
**PR-122 BO. ANCONES, SAN GERMAN HASTA PR-321, BO. SANTA ROSA, LAJAS**
**OGPE 2022-466230-SRI-330079**
**(RECONSIDERACION DE RECOMENDACIONES)**

Nos referimos al proyecto de epígrafe, sometido a nuestra consideración para que se informe en cuanto a la reconsideración de las recomendaciones para las facilidades de agua y alcantarillado sanitario existente que pueda servir al mismo. De acuerdo con el memorial explicativo y los documentos sometidos, el proyecto consiste en extender la carretera PR-122, a campo traviesa, desde el Barrio Retiro en San Germán hasta la carretera PR-321 en el barrio Ancones de Lajas.

El proponente solicita la reconsideración de las recomendaciones emitidas el 20 de noviembre de 2024, relacionadas a la instalación de una tubería de seis (6) pulgadas en el proyecto propuesto. Se acepta la propuesta de eliminar el requisito de instalación de la tubería de seis (6) pulgadas a lo largo de la nueva carretera, al entenderse que la misma no es necesaria en esta etapa del proyecto ni responde a una demanda inmediata del sistema de esta Autoridad.

No obstante, deberá presentar los planos hidráulicos para la aprobación de esta Autoridad debido a que existe facilidades de acueductos que será impactada por el proyecto.

Antes de iniciar el proceso de construcción, deberá someter para aprobación de esta Autoridad, los planos de las obras de acueducto y/o alcantarillado para los que se solicita permiso, los cuales deberán estar sellados y firmados por el profesional responsable de los mismo.

Deberá cumplirse con los requisitos establecidos en el *Reglamento Conjunto de permisos para Obras de Construcción y Usos de Terrenos.*

**Los planos deberán ser sometidos, evaluados y aprobados por este Autoridad, de acuerdo con el Reglamento para la Certificación de Planos de Construcción, antes de proceder con la construcción de las obras. Todas las instalaciones que vayan a ser transferidas a la AAA deben ser construidas en espacio público, de manera que se eviten las servidumbres de paso de instalaciones de servicio de agua o alcantarillado.**

El desarrollador someterá los planos del proyecto a escala, orientado al norte y en formato DWG o DXF y en PDF. Este tiene que ser incluir un polígono (área) de extensión territorial del proyecto georreferenciado al sistema de coordenadas North American Datum de 1983 (NAD 83). Además, tiene que indicar si la unidad de medida utilizada es en pies o metros y la revisión del NAD 83 que utilizó.

Al someter el plano final para aprobación, se deberá cumplir también con los siguientes requisitos:

1. Someter los documentos de certificación del ingeniero o arquitecto debidamente cumplimentados:
    a. AAA-972 (Solicitud de Aprobación de planos de Construcción)
    b. AAA-1294 (Certificación de Ingeniero o arquitecto)

2. Someter un estimado desglosado y por partida de las obras de acueducto a instalarse en el proyecto.

Esta recomendación estará vigente por el término de dos (2) años, a partir de la fecha de esta comunicación. Al cabo de dicho término, de no haberse sometido planos de construcción de las obras de acueductos y alcantarillado sanitario, el proyecto deberá someterse nuevamente ante la consideración de esta Autoridad.

De tener alguna duda o para brindarle más información, puede comunicarse a nuestra Agencia al correo electrónico augusto.ortiz@acueductospr.com.

Cordialmente,



Ing. Glorymar Cortés Areizaga, P.E.
Directora Infraestructura
Región Oeste

Cc: Expediente, Archivo de Lectura

# Exhibit 14.3 – PR Telecommunications Bureau Consultation

# Recomendaciones

Extensión de la Carretera PR-122 San German Lajas

## Datos de Localización

De acuerdo a la información suministrada se propone una actividad: Público en:

### Dirección Física

URB EL RETIRO CALLE SANTIAGO SAN GERMAN
Lajas Puerto Rico, 00729

### Número(s) de Catastro

720-079-001-22

### Calificación

Distrito(s) de Calificación: VIAL (84%), A.g (15%), R.i (1%)

Distrito en el Mapa de Inundabilidad: X (91.6%), A (8.4%)

Tipo de Suelo: Lo (32.2%), DeD (26.4%), JaC (17.7%), DeC (6.1%), DeD (5.3%), DeD (4.7%), FrA (4.3%), DeF (3.1%), SgF (0.3%)

### Dueño

Puerto Rico Highway & Transportation Authority

### Certificado por

Ingeniero : Miguel Pérez, Lic. No. 19609

### Cabida

Cabida según escritura: 50116.47 metros cuadrados

## Condiciones Especiales

NINGUNA

## Condiciones Generales

Esta recomendación es solamente aplicable a la situación de hechos y los datos según presentados y evaluados en el caso. La OGPe se reserva el derecho de reevaluar, variar o modificar el mismo en cualquier momento anterior a la emisión del permiso o la acción administrativa correspondiente por parte de la agencia solicitante o proponente cuando surja nueva información oficial específica estableciendo que el derecho aplicable o las condiciones ambientales en el predio han cambiado sustancialmente, o cuando la recomendación original se emitió bajo premisas falsas o fraudulentas.

Las vigencias de las diferentes agencias del proceso de recomendación serán las establecidas en los comunicados que estas emiten conforme a sus reglamentos.

## Recomendaciones

Extensión de la Carretera PR-122 San German Lajas

## Firma / Sellos

**Fecha de Expedición:**

25/SEP/2024

Lcdo. Félix E. Rivera Torres
Secretario Auxiliar
Departamento de Desarrollo Económico y Comercio de Puerto Rico
Oficina de Gerencia de Permisos

**Lcdo. Félix E. Rivera Torres**

**Secretario Auxiliar de la OGPe**

SBP SINGLE BUSINESS PORTAL

# Exhibit 14.4 – LUMA Consultation

lunes, 14 de octubre de 2024

Sr. Pedro Ramos Vélez
Gerente División Infraestructura
Y Códigos e Infraestructura
PO Box 41118
Santurce, PR 00940

Estimado señor Ramos:

| | |
|---|---|
| OGPe: | 2022-466230-SRI-308396 |
| LUMA: | 24-3-0079 |
| Carga: | 0 kVA |
| Proyecto: | Extensión de la Carretera PR-122 San German Lajas |
| Dirección: | PR-122 |
| Municipio: | Lajas, PR |

**LUMA** cómo agente operador del Sistema de Transmisión y Distribución eléctrica de la Autoridad de Energía Eléctrica (AEE) le presenta sus comentarios relacionados a consulta de facilidades para el proyecto de extensión de la Carretera PR-122 entre Lajas y San German.

El diseñador deberá leer y entender este informe; de haber dudas relacionadas al mismo, debe aclararlas con el Ingeniero Supervisor de la Región de Ponce antes de radicar el plano para endoso. En adición, debe analizar y estudiar este informe e incluir y conformar parte del plano las notas pertinentes que se especifican como “Incluir nota al efecto en los planos de diseño”.

Incluimos nuestra evaluación del Proyecto y representación gráfica con información sobre facilidades eléctricas relacionadas al mismo:

1. El Proyecto está localizado en:

   Número de Catastro: 720-079-001-22

   Centroide del proyecto:

   Coordenadas proyección en metros +Este +Norte (134948.27220280, 224457.53740235).

   Coordenadas Geográficas Latitud y Longitud (18.061476, -67.044111).

2. El proyecto consiste en la extensión de la carretera PR-122 entre los Municipios de San German y Lajas.

3. El proyecto no requiere de un punto de conexión.

4. El proyecto no requiere plano para endoso, no obstante, del proyecto requerir alguna relocalización de líneas eléctricas que trascurren por el área será requerido que se someta un plano con el diseño propuesto.

5. Deberá asegurarse que el diseño cumple con los reglamentos y comunicados aplicables de AEE y LUMA.
    a. En el sector existen:
        i. Líneas aéreas de subtransmisión a un voltaje de 38 kV (L1600 y L1200).
        ii. Líneas aéreas trifásicas de distribución primaria con 4 conductores calibre número 266 ACSR a un voltaje de 2.40/4.16 kV (Alimentador 6404-01)
        iii. Líneas aéreas trifásicas de distribucion primaria con 4 conductores calibre número 266 ACSR a un voltaje de 2.40 / 4.16 kV (Alimentador 6404-04)
        iv. Líneas aéreas monofásicas de distribucion primaria con 2 conductores (vivo y neutral) calibre número 1/0 ACSR a un voltaje de 2.40 kV (Alimentador 6404-04)
        v. Líneas aéreas monofásicas de distribucion primarias con 3 conductores (2 vivos y neutral) calibre número 4 CU HD a un voltaje de 4.16 / 7.20 kV (Alimentador 6601-04)
        vi. Líneas aéreas monofásicas de distribucion primarias con 2 conductores (vivos y neutral) calibre número 1/0 ASCR a un voltaje de 4.16 kV (Alimentador 6601-04)
        vii. Líneas aéreas de distribución secundaria a un voltaje de 120/240 V que discurren en la carretera PR-321 km. 1.0 que sirven a los clientes y facilidades adyacentes.
    b. El proponente será responsable de obtener y gestionar todos los endosos de las agencias reguladoras pertinentes tales como:
        i. Departamento de Recursos Naturales y Ambientales (DRNA) - Declaración de Impacto Ambiental (DIA),
        ii. Instituto de Cultura Puertorriqueña - División de Permisos Arqueológicos,
        iii. Cuerpo de Ingenieros de Estados Unidos,
        iv. Departamento de Transportación y Obras Públicas Estatal o Municipal,
        v. Junta de Planificación,
        vi. Oficina de Gerencia y Permisos (OGPe),
        vii. Otras agencias gubernamentales, federales y privadas requeridos para el desarrollo del proyecto
6. Este Proyecto está afectado por líneas eléctricas, por tanto:
    a. El dueño del proyecto es responsable de cumplir con los requisitos establecidos en el Reglamento de Servidumbres para la Autoridad de Energía Eléctrica. Toda nueva servidumbre para constituirse para líneas y equipos eléctricos debe cumplir con los requisitos establecidos en el Apéndice B del Reglamento. De igual forma, con los requisitos relacionados a las servidumbres asociadas a instalaciones eléctricas existentes en el área del proyecto.
    b. El proyecto está afectado por líneas aéreas de distribución primaria y secundaria. Estas ocupan una franja de servidumbre de 10 pies de ancho, 5 pies a cada lado, a lo largo de las líneas.

c. Cualquier trabajo necesario de reubicación de líneas eléctricas energizadas, será realizado por LUMA con cargos al Dueño y deberá coordinarse con el Gerente de Distrito correspondiente. Además, se prohíbe la realización de cualquier tipo de trabajo en las franjas de servidumbre de paso eléctricas sin la autorización escrita de LUMA (land@lumapr.com). LUMA no aprobará la conexión de Proyectos con condiciones de invasión de servidumbres o que no cumplan con los despejos de seguridad requeridos.

d. Dentro de los límites de este proyecto discurre la línea eléctrica de subtransmisión de 38 KV, Número 1200 y 1600. Por tanto, el dueño del proyecto será responsable de solicitar certificación al área al Departamento de Terrenos de LUMA (land.records@lumapr.com) quien administra el catastro de la Autoridad. También, puede acceder a más información utilizando la siguiente dirección: http://lumapr.com/servicios-de-servidumbre/. Deberá completar todo el proceso de certificación y endoso de los planos conforme exige el Reglamento 7282. El endoso que emite la oficina de terrenos no es un endoso para uso de la servidumbre sino solamente certifica los derechos reales a favor de la Autoridad en el lugar. Deberá ilustrar en los planos de diseño las líneas de transmisión con su correspondiente servidumbre certificada y entregar dicha certificación con los planos para el endoso. Incluir nota al efecto en los planos de diseño. En adición, deberá cumplir con lo siguiente:

   i. No se permite ninguna construcción, movimiento de tierra, rodaje ni ninguna actividad incompatible con el derecho de servidumbre establecido en el terreno. Se refiere al desarrollador al Reglamento 7282 de 25 de enero de 2007 Para Servidumbres Para La Autoridad de Energía Eléctrica (Reglamento 7282) y la Ley 143 de 1979 (Ley 143), según enmendada. Cualquier asunto relacionado a las servidumbres se regirá por el Reglamento y ley antes citada.

   ii. El uso del área de las servidumbres de paso de líneas de sub-transmisión, no está permitida. LUMA permite el uso de la servidumbre de paso, vía excepción, para algunos usos específicos. Cualquier excepción en el uso del área de servidumbre deberá ser solicitado al Departamento de Terrenos de LUMA quien hará la evaluación correspondiente conforme al Reglamento. No se hará ninguna obra en área de servidumbre sin el consentimiento escrito según requerido en el Reglamento y comunicados técnicos correspondientes. De realizarse alguna obra o actividad incompatible con el derecho de servidumbre el proponente, su contratista o desarrollador será responsable de cualquier daño causado a propiedad, persona o ambiente.

e. Deberá localizar las líneas y estructuras eléctricas de transmisión y distribución a instrumento de agrimensura preciso y calibrado, y respetar las servidumbres de paso de aquellas que pasen por el Proyecto. En caso de la construcción de nuevas líneas eléctricas que requieran servidumbre deberá incluir en el plano de diseño la ubicación exacta, su ancho y una leyenda que describa la misma en conjunto con la tabla de mensura certificada por un agrimensor o ingeniero licenciado autorizado a ejercer la profesión de la agrimensura en Puerto Rico (RPA) (Secc. IV, Art. C – 1j del Reglamento de Servidumbres). En adición, deberá indicar claramente los límites del Proyecto, colindantes y propietarios afectados. El Dueño es responsable de cumplir con los requisitos establecidos en el Reglamento de Servidumbres para la Autoridad de Energía Eléctrica, con relación a las nuevas servidumbres a constituirse como parte del Proyecto y a las servidumbres asociadas a instalaciones eléctricas existentes en el área del Proyecto.

7. El dueño deberá tomar las debidas precauciones, utilizar equipo protector y seguir las reglas de seguridad necesarias al trabajar cerca de líneas eléctricas energizadas. Deberá coordinar con la Oficina de Ingeniería de Distribución Región de Ponce (ingenieria.distribucionponce@lumapr.com) la desconexión de energía en las líneas vivas cuando la proximidad de los trabajos a éstas sea de alto riesgo y exposición.

8. Incluimos como parte de esta evaluación, un diagrama con información gráfica sobre facilidades eléctricas existentes.

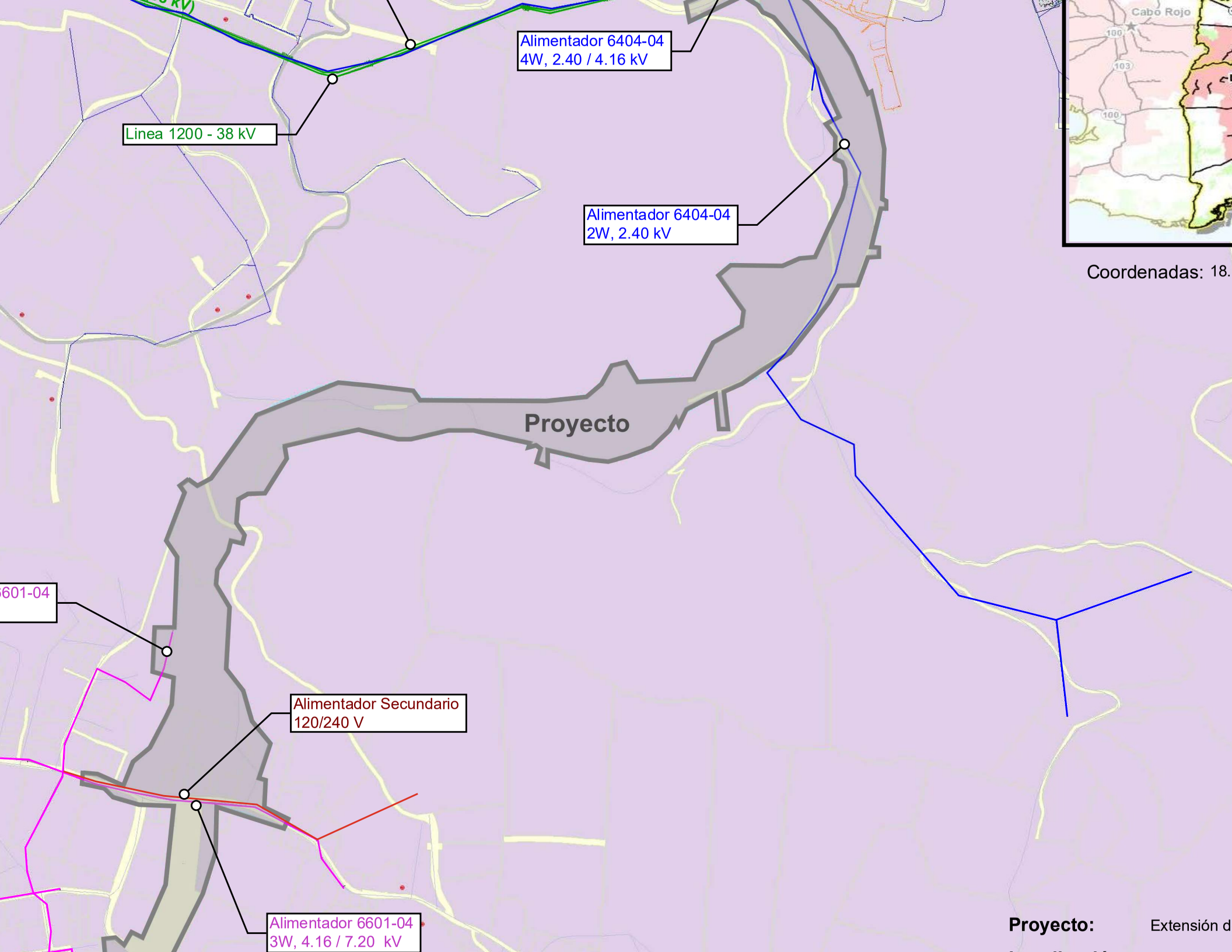
9. Cualquier duda sobre esta evaluación y su contenido, puede comunicarse a nuestra oficina al correo electrónico ingenieria.distribucionponce@lumapr.com y al número telefónico (787) 521-5621.
10. Esta evaluación caduca al año de la fecha de emisión, y cancela y sustituye cualquier otra realizada previamente.

Cordialmente,

Digitally signed by Alex J. Rodríguez Rodríguez
Date: 2024.10.14 09:59:50 -04'00'

Alex J. Rodríguez, PE
Ingeniero de Distribución
Ingeniería de Distribución Región Ponce

Evaluado por: Carlos G. Colón Turpeau


Alimentador 6404-04
4W, 2.40 / 4.16 kV
Linea 1200 - 38 kV
Alimentador 6404-04
2W, 2.40 kV
Proyecto
6601-04
Alimentador Secundario
120/240 V
Alimentador 6601-04
3W, 4.16 / 7.20 kV
Cabo Rojo
Coordenadas: 18.
Proyecto:
Extensión d

# Exhibit 14.5 – USACE Nationwide Permit

**DEPARTMENT OF THE ARMY**
**U.S. ARMY CORPS OF ENGINEERS, CARIBBEAN DISTRICT**
**FUNDACIÓN Á. RAMOS ANNEX BLDG.**
**383 FRANKLIN D. ROOSEVELT AVE.**
**SAN JUAN, PUERTO RICO 00918**

April 22, 2026

Regulatory Branch
SAA-2026-00019 (NWP-YCP)

Luis E. Rodríguez-Rosa
Deputy Executive Director
P.R. Highway and Transportation Authority
P.O. Box 42007
San Juan, Puerto Rico 00940-2007
Sent via email: lurodriguez@act.p.gov

Dear Mr. Rodríguez-Rosa:

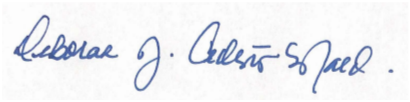
Reference is made to your request for re-verification of an activity previously verified by the U.S. Army Corps of Engineers (Corps) on June 10, 2025, under the 2021 Nationwide Permits. The project was originally assigned file number SAJ-2002-06830 (NWP-YCP) under the Jacksonville District; however, it has been assigned file number SAA-2026-00019 (NWP-YCP) under the Caribbean District. The project involves the construction of a three-cell concrete box culvert within Maresúa Creek, which would result in the permanent and temporary discharge of fill material into approximately 0.2245 and 0.02694 acre of waters of the United States, respectively. The project site is located at State Road PR-122, Municipality of San Germán, Puerto Rico (18.066827°, -67.043723°). Your request indicates there are no changes to the previously verified project.

Your activity is authorized by Nationwide Permit (NWP) 14 (Linear Transportation Projects). This re-verification is based on the activity being performed in accordance with the drawings attached to our previous letter; the terms and conditions of the 2026 NWPs found in the January 8, 2026, Federal Register (91 FR 768); the Caribbean District regional conditions dated February 17, 2026; and the entirety of our previous letter, including the special conditions and attachments (except for the expiration date and the “Notice of Intent to be Covered by the General Water Quality Certificate for Applicable Cases of the U.S. Army Corps of Engineers Nationwide Permits” (DNER Form GWQC-02), which has been replaced by the attached form (DNER Form GWQC-04)). This verification is valid until **March 15, 2031.** Furthermore, if you commence or are under contract to commence this activity before the date that the relevant NWP expires or is modified or revoked, you will have 12 months from the date of expiration, modification or revocation of the NWP to complete the activity under the present terms and conditions of this NWP.

You can access the Corps Caribbean District's Regulatory web page for links to view NWP information at: https://www.sad.usace.army.mil/Missions/Regulatory/Puerto-Rico/. Please be aware this Internet address is case sensitive and should be entered as it appears above.

Thank you for your cooperation with our permit program. The Corps Caribbean District Regulatory Branch is committed to perform its duties in an efficient and timely manner while working to preserve our nation's aquatic resources. Should you have any questions regarding this letter, or if you are unable to access the aforementioned web page link, please contact Ms. Yariellys E. Cruz Pérez by telephone at 787-599-1854 (mobile) / 787-474-2381 (office), or by email at yariellys.e.cruzperez@usace.army.mil.

Sincerely,



For Vivian Gerena
Lead Regulatory Program Manager

Cc:
Miguel A. Pérez (mperez@byaea.com)
DNER – Point Sources Permits Division, Water Quality Area

**DEPARTMENT OF THE ARMY**
**U.S. ARMY CORPS OF ENGINEERS, CARIBBEAN DISTRICT**
**FUNDACIÓN ÁNGEL RAMOS ANNEX BLDG.**
**383 FRANKLIN D. ROOSEVELT AVE.**
**SAN JUAN, PUERTO RICO 00918**

June 10, 2025

Regulatory Branch
SAJ-2002-06830 (NWP-YCP)

Luis E. Rodríguez Rosa
Deputy Executive Director
PR Highway and Transportation Authority
Centro Gubernamental Roberto Sánchez Virella
P.O. Box 42007
San Juan, Puerto Rico 00940-2007
Sent via email: lurodriguez@act.p.gov

Dear Mr. Rodríguez Rosa:

The U.S. Army Corps of Engineers (Corps) has completed the review of your Department of the Army (DA) permit application regarding the proposed work to construct a three-cell concrete box culvert which would impact water of the Maresúa Creek. The project site is located at State Road PR-122, Municipality of San Germán, Puerto Rico (18.066827°, -67.043723°). Please reference file number SAJ-2002-06830 (NWP-YCP) in all future correspondence concerning this project.

A review of the submitted information and drawings indicates that the proposed work would result in permanent and temporary discharge of fill material into approximately 0.2245 and 0.02694 acres of waters of the United States, respectively. The project activities would include: (1) the construction of a three-cell box culvert, 73.96 long, with flared wingwalls; (2) the installation of a pool-type energy dissipator for erosion and sediment control; (3) embankment improvements that would consist in the placement of 183.8419 cubic yards of earth fill; (4) the placement of 82.0315 cubic yards of riprap protection; (5) the placement of 816.6934 cubic yards of earth cut for box culvert, pool-type energy dissipator and apron construction/installation purposes; (6) the implementation of soil erosion and sedimentation control measures (such as silt fences); (7) the installation of temporary berms for creek flow redirection purposes that would cover a surface area of jurisdictional waters of 0.01174 acres and the associated volume of fill material below the OHWM would be 14.96 cubic yards; and (8) the installation of a temporary crossing that would be 26.6028 meters long, and consist of four strategically placed 42" diameter pipes to allow better redirection of the creek flow allowing to divide the construction in phases, and would cover a surface area of jurisdictional waters of 0.0152 acres and the associated volume of fill material below the OHWM would be 45.804 cubic yards.

The project, as depicted on the enclosed drawings, is authorized by Nationwide Permit (NWP) 14 (Linear Transportation Projects), pursuant to Section 404 of the Clean Water Act (33 U.S.C. § 1344). **This verification is valid until March 14, 2026.** In order for this NWP authorization to be valid, you must ensure that the work is performed in accordance with the Nationwide Permit General Conditions, the Jacksonville District Regional Conditions, and the General and Project-Specific Special Conditions listed below. Furthermore, if you commence or are under contract to commence this activity before the date that the relevant NWP is modified or revoked, you will have 12 months from the date of the modification or revocation of the NWP to complete the activity under the present terms and conditions of this NWP. You can access the U.S. Army Corps of Engineers (Corps) Jacksonville District's Regulatory Source Book webpage for links to view NWP information at: https://www.saj.usace.army.mil/Missions/Regulatory/Source-Book/. Please be aware this Internet address is case sensitive and should be entered as it appears above. Once there, you will need to select "Nationwide Permits." Among other things, this part of the Source Book contains links to the federal register containing the text of the pertinent NWP authorization and the associated NWP general conditions, as well as separate links to the regional conditions applicable to the pertinent NWP verification.

You must comply with all of the special and general conditions for NWP-14, including any project-specific conditions included in this letter and all conditions incorporated by reference as described above.

**General Conditions:**

1. The time limit for completing the work authorized ends on **March 14, 2026**.

2. You must maintain the activity authorized by this permit in good condition and in conformance with the terms and conditions of this permit. You are not relieved of this requirement if you abandon the permitted activity, although you may make a good faith transfer to a third party in compliance with General Condition 4 below. Should you wish to cease to maintain the authorized activity, or should you desire to abandon it without a good faith transfer, you must obtain a modification of this permit from this office, which may require restoration of the area.

3. If you discover any previously unknown historic or archeological remains while accomplishing the activity authorized by this permit, you must immediately notify this office of what you have found. We will initiate the Federal and state coordination required to determine if the remains warrant a recovery effort or if the site is eligible for listing in the National Register of Historic Places.

4. If you sell the property associated with this permit you must obtain the signature of the new owner on the attached transfer form and forward a copy to this office to validate the transfer of this authorization.

5. If a conditioned water quality certification has been issued for your project, you must comply with the conditions specified in the certification as special conditions to this permit. For your convenience, a copy of the certification is attached (Attachment A) if it contains such conditions.

6. You must allow a representative from this office to inspect the authorized activity at any time deemed necessary to ensure that it is being or has been accomplished in accordance with the terms and conditions of your permit.

**Project Specific Special Conditions:**

The following project specific special conditions are included with this verification:

1. **Reporting Address:** The Permittee shall submit all reports, notifications, documentation, and correspondence required by the general and special conditions of this permit to either (not both) of the following addresses:

   a. For electronic mail (preferred): RD-Antilles@usace.army.mil (not to exceed 15 MB).

   b. For standard mail: U.S. Army Corps of Engineers, Caribbean District, Regulatory Branch, Fund. Ángel Ramos Annex. Bldg., 383 Franklin Delano Roosevelt Ave., San Juan, PR 00918.

The Permittee shall reference this permit number, SAJ-2002-06830 (NWP-YCP), on all submittals.

2. **Commencement Notification:** Within 10 days from the date of initiating the work authorized by this permit, the Permittee shall submit a completed "Commencement Notification" form (attached).

3. **Posting of Permit:** The Permittee shall have available and maintain for review a copy of this permit and approved plans at the construction site.

4. **Certification of Compliance**: Within 60 days of completion of the work authorized by this permit, the Permittee shall complete the ENG Form 6285 – "Certification of Compliance with Department of the Army Permit" (located at https://www.publications.usace.army.mil/Portals/76/Eng_Form_6285_2024%20Dec%20FINAL.pdf) and submit it to the Corps.

5. **Cultural Resources/Historic Properties:**

   a. No structure or work shall adversely affect, impact, or disturb properties listed in the *National Register of Historic Places* (NRHP), or those eligible for inclusion in the NRHP.

   b. If, during the ground disturbing activities and construction work within the permit area, there are archaeological/cultural materials encountered which were not the subject of a previous cultural resources assessment survey (and which shall include, but not be limited to: pottery, modified shell, human remains, ceramics, stone tools or metal implements, dugout canoes, evidence of structures or any other physical remains that could be associated with native cultures or early colonial settlement), the Permittee shall immediately stop all work and ground-disturbing activities within a 100-meter diameter of the discovery and notify the Corps at the addresses listed in the **Reporting Address Special Condition** within the same business day (8 hours). The Corps shall coordinate with the Puerto Rico State Historic Preservation Officer (SHPO) to assess the significance of the discovery and devise appropriate actions.

   c. Additional cultural resources assessments may be required of the permit area in the case of unanticipated discoveries as referenced in accordance with the above Special Condition and, if deemed necessary by the PRSHPO or Corps, in accordance with 36 CFR 800 or 33 CFR 325, Appendix C (5). Based on the circumstances of the discovery, equity to all parties, and considerations of the public interest, the Corps may modify, suspend, or revoke the permit in accordance with 33 CFR Part 325.7. Such activity shall not resume on non-federal lands without written authorization from the PRSHPO for finds under his or her jurisdiction, and from the Corps.

   d. In the unlikely event that unmarked human remains are identified on non-federal lands, all work and ground disturbing activities within a 100-meter diameter of the human remains shall immediately cease and the Permittee shall immediately notify the Corps and PRHSPO within the same business day (8-hours). The Corps shall coordinate with the appropriate SHPO. Based on the circumstances of the discovery, equity to all parties, and considerations of the public interest, the Corps may modify, suspend, or revoke the permit in accordance with 33 CFR Part 325.7. Such activity shall not resume without written authorization from the PRSHPO and from the Corps.

6. **Best Management Practices:**

   a. **Erosion Control:** Prior to the initiation of any work authorized by this permit, the Permittee shall install erosion control measures along the perimeter of all work areas to prevent the displacement of fill material outside the work area into waters of the United States. The erosion control measures shall remain in place and be maintained until all authorized work is completed and the work areas are stabilized.

   b. **Fill Material:** The Permittee shall use only clean fill material for this project. The fill material shall be free from items such as trash, debris, automotive parts, asphalt, construction materials, concrete block with exposed reinforcement bars, and soils contaminated with any toxic substance in toxic amounts, in accordance with Section 307 of the Clean Water Act.

   c. **Turbidity Barriers:** Prior to the initiation of any of the work authorized by this permit, the Permittee shall install turbidity barriers around all work areas that are in, or adjacent to, surface waters. The turbidity barriers shall remain in place and be maintained daily until the authorized work has been completed. Turbidity barriers shall be removed upon stabilization of the work area.

7. The Permittee shall comply with the Conservation Measures for the Puerto Rican boa (*Chilabothrus inornatus*) revised January 2024, and additional conditions in the U.S. Fish and Wildlife (USFWS) letter dated March 24, 2021, as read below:

   a. If forested areas will be cleared during Puerto Rican nightjar nesting season (April to July), we recommend experienced and qualified biologists should search for nightjar nests prior to vegetation removal.

   b. If nests are found, contact the Service immediately and postpone the activity until the nightjar fledges.

8. The Permittee shall comply with the provisions enclosed in the Archeological Monitoring Work Plan PR-122 from PR-321 to PR-166 Lajas – San Germán AC-012201 SHPO-CF-03-22-24-01 dated December 10, 2024 and approved by the PR-SHPO via letter dated January 9, 2025.

9. **Temporary Impacts**: Immediately after completion of the authorized work, all temporary fill material must be removed in their entirety and the affected areas of waters of the United States, including wetlands, completely restored to pre-existing conditions. The areas affected by temporary fills must be revegetated, as appropriate.

10. You must file a "Notice of Intent to be covered by the General Water Quality Certificate" (DNER Form GWQC-02), copy enclosed, with the Puerto Rico Department of Natural and Environmental Resources, Water Quality Area. A copy of the stamped form GWQC-02 must be provided to this office.

This letter of authorization does not give absolute Federal authority to perform the work as specified on your application. In addition, this letter of authorization does not preclude the necessity to obtain any other Federal, State, or local permits, which may be required.

Thank you for your cooperation with our permit program. The Corps' Caribbean District Regultaory Branch is committed to improving service to our customers. We strive to perform our duties in an efficient and timely manner while working to preserve our nation's aquatic resources. Should you have any questions related to this NWP verification or have issues accessing the documents referenced in this letter, please contact Ms. Yariellys E. Cruz Pérez, by telephone at 787-599-1854 (Cellular) or at 787-474-2381 (Landline), or by email at yariellys.e.cruzperez@usace.army.mil.

Sincerely,

Digitally signed by GERENA.VIVIAN.1241984024
Date: 2025.06.10 14:58:50 -04'00'

Vivian Gerena
Lead Regulatory Program Manager

Enclosures

Cc:
Agent
PRDNER – Point Sources Permits Division, Water Quality Area

**DEPARTMENT OF THE ARMY PERMIT TRANSFER REQUEST**

**DA PERMIT NUMBER: SAJ-2002-06830 (NWP-YCP)**

When the structures or work authorized by this permit are still in existence at the time the property is transferred, the terms and conditions of this permit will continue to be binding on the new owner(s) of the property. Although the construction period for works authorized by Department of the Army permits is finite, the permit itself, with its limitations, does not expire.

To validate the transfer of this permit and the associated responsibilities associated with compliance with its terms and conditions, have the transferee sign and date below and mail to the U.S. Army Corps of Engineers, Caribbean District, Regulatory Branch, Fund. Ángel Ramos Annex Bldg., 383 Franklin Delano Roosevelt Ave., San Juan, P.R. 00918 or submit via electronic mail to: RD-Antilles@usace.army.mil (not to exceed 15 MB).

_____
**(TRANSFEREE-SIGNATURE)**

_____
**(DATE)**

_____
**(NAME-PRINTED)**

_____

_____
**(MAILING ADDRESS)**

_____
**(CITY, STATE, ZIP CODE)**

_____
**(SUBDIVISION)**

_____ _____
**(LOT)** **(BLOCK)**

_____
**(STREET ADDRESS)**

# APPENDIX 15: Public Outreach

**REUNIÓN PARTICIPACIÓN CIUDADANA EXTENSIÓN PR-122 DESDE LA PR-321 HASTA LA PR-166, SAN GERMÁN-LAJAS, PR, AC-012201**
**miércoles, 28 de enero de 2026**














AUTORIDAD DE CARRETERAS
Y TRANSPORTACIÓN

ACT

GOBIERNO DE PUERTO RICO

# REUNIÓN PARTICIPACIÓN CIUDADANA
## Extensión de la Carretera PR-122 desde la PR-321 hasta la PR-166
## San Germán – Lajas, Puerto Rico
## AC-012201
## miércoles, 28 de enero de 2026

NOMBRE: Ivelisse Santiago Ramos

RESIDENTE: X INQUILINO: ___ COMERCIO: ___ INSTITUCIÓN: ___ OTROS: ___

LUGAR QUE REPRESENTA: Comunidad El Retiro

CARGO QUE EJERCE: ___

DIRECCIÓN POSTAL: P.O. Box 2912

TELÉFONO: (787) 206-5114

COMENTARIOS: Algún site o dirección en la que se pueda accesar a la información y la presentación que se ofreció hoy en el Centro Cultural de Lajas

correo electrónico - ivelissesantiago78@gmail.com

Ing. Alexandra Velázquez Delgado, PE
Directora, Oficina de Pre-Construcción
Autoridad de Carreteras y Transportación
PO Box 42007, San Juan, Puerto Rico 00940-2007

Re: Extensión de la Carretera PR-122 desde la PR-321 hasta la PR-166
San Germán-Lajas, PR
AC-012201

AUTORIDAD DE CARRETERAS
Y TRANSPORTACIÓN

ACT

GOBIERNO DE PUERTO RICO

# REUNIÓN PARTICIPACIÓN CIUDADANA
## Extensión de la Carretera PR-122 desde la PR-321 hasta la PR-166
## San Germán – Lajas, Puerto Rico
## AC-012201
## miércoles, 28 de enero de 2026

NOMBRE: Ricky Martinez

RESIDENTE: X INQUILINO: ___ COMERCIO: ___ INSTITUCIÓN: ___ OTROS: ___

LUGAR QUE REPRESENTA: Bo Santa Rosa, Lajas

CARGO QUE EJERCE: ___

DIRECCIÓN POSTAL: HC 5 Box 25939 Lajas, PR 00667

TELÉFONO: (772) 342-7397

COMENTARIOS: Que los ciudadanos tengamos una certeza que este proyecto se cumpla en el tiempo que esta planeado, para que sea de beneficio de las comunidades afectadas


Ing. Alexandra Velázquez Delgado, PE
Directora, Oficina de Pre-Construcción
Autoridad de Carreteras y Transportación
PO Box 42007, San Juan, Puerto Rico 00940-2007


Re: Extensión de la Carretera PR-122 desde la PR-321 hasta la PR-166
San Germán-Lajas, PR
AC-012201

AUTORIDAD DE CARRETERAS
Y TRANSPORTACIÓN

ACT

GOBIERNO DE PUERTO RICO

# REUNIÓN PARTICIPACIÓN CIUDADANA
## Extensión de la Carretera PR-122 desde la PR-321 hasta la PR-166
## San Germán – Lajas, Puerto Rico
## AC-012201
## miércoles, 28 de enero de 2026

NOMBRE: Nancy A. Ortiz Vázquez / Luis Ureta Ortiz

RESIDENTE: X INQUILINO: ___ COMERCIO: ___ INSTITUCIÓN: ___ OTROS: ___

LUGAR QUE REPRESENTA: _____

CARGO QUE EJERCE: Retirada

DIRECCIÓN POSTAL: PO Box 25, San Germán, PR 00683

TELÉFONO: 787-340-8781 / 787-475-3631

COMENTARIOS: Interesamos una reunión con los Consultores / Ingenieros de ACT


Ing. Alexandra Velázquez Delgado, PE
Directora, Oficina de Pre-Construcción
Autoridad de Carreteras y Transportación
PO Box 42007, San Juan, Puerto Rico 00940-2007


Re: Extensión de la Carretera PR-122 desde la PR-321 hasta la PR-166
San Germán-Lajas, PR
AC-012201

AUTORIDAD DE CARRETERAS
Y TRANSPORTACIÓN

ACT

GOBIERNO DE PUERTO RICO

# REUNIÓN PARTICIPACIÓN CIUDADANA
## Extensión de la Carretera PR-122 desde la PR-321 hasta la PR-166
## San Germán – Lajas, Puerto Rico
## AC-012201
## miércoles, 28 de enero de 2026

NOMBRE: Angel M Rivera

RESIDENTE: ✓ INQUILINO: ___ COMERCIO: ___ INSTITUCIÓN: ___ OTROS: ___

LUGAR QUE REPRESENTA: Barrio Retiro San Germán PR

CARGO QUE EJERCE: _____

DIRECCIÓN POSTAL: _____

TELÉFONO: 939 639 6551

COMENTARIOS: Que comience lo más pronto posible


Ing. Alexandra Velázquez Delgado, PE
Directora, Oficina de Pre-Construcción
Autoridad de Carreteras y Transportación
PO Box 42007, San Juan, Puerto Rico 00940-2007


Re: Extensión de la Carretera PR-122 desde la PR-321 hasta la PR-166
San Germán-Lajas, PR
AC-012201

BYA BEHAR-YBARRA AND ASSOCIATES LLC
ENGINEERING • ARCHITECTURE • ENVIRONMENTAL • PROJECT MANAGEMENT
554 Calle Perseo, Suite J-3, San Juan, P.R. 00920 Tel.(787)783-0290



# Citizen Participation Meeting

## Centro Cultural Anastacio Ruiz Irizarry, Lajas, Puerto Rico

## January 28, 2026

## Spanish Transcription

ESTADO LIBRE ASOCIADO DE PUERTO RICO
DEPARTAMENTO DE TRANSPORTACIÓN Y OBRAS PÚBLICAS
AUTORIDAD DE CARRETERAS Y TRANSPORTACIÓN
SAN JUAN, PUERTO RICO

RE:

REUNIÓN DE PARTICIPACIÓN CIUDADANA

FECHA : 28 de enero de 2026

HORA : 6:08 p.m.

CLIENTE : AUTORIDAD DE CARRETERAS Y TRANSPORTACIÓN DE PUERTO RICO

DIRECCIÓN : Oficina de Preconstrucción
Piso 15
División Desarrollo de Programas
San Juan, Puerto Rico

CELEBRADA EN : Centro Cultural Anastasio Ruiz Irizarry
Calle Flamboyán, Esq. Plaza Artesanal
Lajas, Puerto Rico

COMPARECIENTES

MAESTRA CEREMONIA:

Sra. Olga Pagani Candelario - Moderadora

POR BEHAR-YBARRA & ASSOCIATES:

Ing. Miguel Pérez Correa
Ing. Adolfo Hernández Santiago
Ing. Yazmín Acevedo

POR EL MUNICIPIO DE LAJAS:

Hon. Jayson Martínez Maldonado - Alcalde
Hon. Olga Rodríguez Moreno - Vicealcaldesa
Sr. Luis Armando Román - Representante Distrito 21

POR LA AUTORIDAD DE CARRETERAS:

Ing. Luis Rodríguez Rosa - Ayudante Ejecutivo Senior y Gerente Principal Interino

Sra. Dailynne Salgado

Sra. Janira Vázquez

TAQUÍGRAFA DE RÉCORD:

Sra. Jasmine Marie Carreras

TÉCNICO DE SONIDO:

Sra. Yanira Rodríguez Ortega

* * *

Los procedimientos se desarrollaron según surge de la siguiente transcripción.

- 0 -

SRA. MODERADORA:

Sí, buenas tardes. En aproximadamente de 10 a 15 minutos estaremos dando comienzo con la reunión.

FUERA DE RÉCORD

SRA. MODERADORA:

Sí, buenas tardes. Para efectos de récord, mi nombre es Olga Pagani. Trabajo en la Autoridad de Carreteras y Transportación en la Oficina de Preconstrucción. Bienvenidos al Centro Cultural Anastacio Ruiz Irizarry, en el Municipio de Lajas, donde esta tarde-noche se celebrará una Reunión de Participación Ciudadana para el Proyecto Número

AC012201, extensión de la Carretera PR-122, desde la PR-321 hasta la PR-166, en San Germán y Lajas, Puerto Rico.

Damos comienzo a esta reunión a las 6:15 p.m., hoy miércoles, 28 de enero del 2026. Queremos informarles que esta reunión está siendo grabada con el propósito de documentar el trabajo. Por lo tanto, les vamos a solicitar que al momento de dirigirse a nuestros consultores o funcionarios públicos digan su nombre y lugar de residencia.

Antes de comenzar, vamos a reconocer la presencia de la señora Olga Rodríguez Moreno, vicealcaldesa del Municipio de Lajas; del señor Luis Armando Román, en representación de la representante del Distrito 21, honorable Omayra Martínez; del ingeniero Luis E. Rodríguez Rosa, ayudante ejecutivo senior y gerente principal interino de la División de Desarrollo de Programas; de los diseñadores del proyecto y consultores de la Autoridad de Carreteras, Behar-Ybarra & Associates, Miguel Pérez, Jazmín Acevedo; gerente del proyecto y consultores de la Autoridad de Carreteras, de AtkinsRéalis, ingeniero Kevin Martin. Presento ante usted al ingeniero Luis Rodríguez para un saludo.

ING. RODRÍGUEZ:

Buenas tardes a todos. Mi nombre es Luis Rodríguez, soy ayudante del director ejecutivo y gerente interino

senior de la División de Desarrollo de Programas de la Autoridad, ¿verdad? Les damos las más expresiva gracias por estar presentes. Es un público bastante concurrido en esta... en este taller informativo, donde vamos a discutir la fase 1 del conector Lajas-San Germán, ¿verdad?

La fase número 2 fue construida ya para los años 2008 a 2012, aproximadamente. Así que esta es la continuación de la fase que faltaba de este proyecto. Es un proyecto con fondos combinados, ¿verdad?, de, de la Administración Federal de Carreteras, pero los fondos principales provienen del Departamento de la Vivienda Federal, HUD, por sus siglas en inglés, ¿verdad?

Así que seguimos las regulaciones establecidas por dicha agencia federal y a través de la Administración de... del Departamento de la Vivienda, ¿verdad?, que son... es la agencia que también está envuelta en este proceso. No tengo más que decir, ¿verdad?

Tengo los consultores aquí que van a estar dando un... una breve descripción del proyecto, ¿verdad?, y de todos los retos que ha conllevado y en la etapa en que se encuentra ahora mismo. Y dará información sobre detalles principales, ¿verdad?, del diseño, las mitigaciones posiblemente y otro... y otros aspectos ambientales importantes.

Estamos ahora mismo en una etapa ambiental, ¿verdad?,

que hay que concluir para luego entrar en un proceso de adquisición de propiedades, ¿verdad?, y de mitigación de... requerida por agencias estatales. Así que los dejo con Olga para que continúe con el protocolo.

SRA. MODERADORA:

Cabe mencionar que nos acompaña también de Behar-Ybarra & Associates, el ingeniero Adolfo Hernández. Voy a dejar con ustedes a la vicealcaldesa del municipio, la señora Olga Rodríguez.

SRA. VICEALCALDESA:

Sí, buenas tardes a todos los presentes y muchas gracias por comparecer, ¿verdad?, y atender esta petición que hiciéramos de una vista pública para este conector. Nada. Excusamos al alcalde. Está en una actividad con la gobernadora, a Jason Martínez, ¿verdad?, pero que tan pronto él llegue, pues se va a integrar a la... a la reunión, ¿verdad? Y, pues, espero que tengan... las preguntas que tengan a bien hacer, pues tienen el personal técnico, ¿verdad?, que son los que le pueden ayudar en cuanto a ello. Okey. Muchas gracias a todos y bienvenidos aquí al Municipio de Lasas.

SRA. MODERADORA:

Muchas gracias. Esta Reunión de Participación Ciudadana fue anunciada a la comunidad a través de cruzacalles, hoja suelta y publicación en el periódico Primera Hora. El

objetivo principal de estos trabajos durante esta tarde-noche es presentarles a ustedes el proyecto propuesto, que consiste en la extensión de la PR-122, desde la PR-321 hasta la PR-166, en los municipios de San Germán y Lajas.

Primero daremos lectura del aviso público. Segundo. Se ofrecerá una presentación de forma ininterrumpida. Vamos a solicitarles a todos que coloquen sus celulares en forma de vibración. Aquellas personas que tengan que atender una llamada, pueden salir del salón. Las personas que tengan dudas o preguntas sobre la información que estaremos presentando, tendrán la oportunidad de hacerlas una vez finalice la presentación de una forma ordenada y respetuosa. Vamos a dar, entonces, lectura del aviso público. Los dejo con Dailynne Salgado.

SRA. SALGADO:

Sí, buenas tardes. Este anuncio lee de la siguiente forma: "Reunión Participación Ciudadana, extensión de la Carretera PR-122, desde la PR-321 hasta la PR-166, San Germán y Lajas, Puerto Rico. El número de proyecto es la AC012201.

El Departamento de Transportación y Obras Públicas, la Autoridad de Carreteras y Transportación y la Administración Federal de Carreteras desean informar a los... a las organizaciones privadas, agencias gubernamentales estatales y federales, entidades municipales y al público en general,

que se estará llevando a cabo una reunión de participación ciudadana para presentar el proyecto de la extensión de la PR-22, 122, perdón, desde la PR-321 hasta la PR-166, en los municipios de San Germán y Lajas.

El proyecto consiste en la extensión de la Carretera PR-122, desde el área urbana en el Barrio El Retiro, en el punto de la intersección de la PR-166, en la Avenida Ángel Castro Pérez, en San Germán, hasta el punto de intersección con la PR-116, aproximadamente 1.5 kilómetros del Centro Urbano del Municipio de Lajas".

SRA. MODERADORA:

"La Reunión de Participación Ciudadana se llevará a cabo el miércoles, 28 de enero del 2026, a partir de las 6:00 de la tarde en el Centro Cultural Anastasio Ruiz Irizarry, Calle Flamboyán, esquina Plaza Artesanal, Lajas, Puerto Rico. De necesitar acomodo razonable, notifíquelo con cinco días de antelación al 721-8787, extensión 1401, o mediante correo electrónico opagani@act.pr.gov.

Cualquier ciudadano que desee someter comentarios sobre aspectos relevantes al proyecto, puede enviarlos oea@act.pr.gov o dirigirlo a la ingeniera Alexandra Velázquez Delgado, directora Oficina de Preconstrucción, Autoridad de Carreteras y Transportación, P.O. Box 42007, San Juan, Puerto Rico 00940-2007. Los comentarios se recibirán dentro de los próximos 30 días calendario a

partir de la fecha de la celebración de la Reunión de Participación Ciudadana. Firma el doctor Edwin E. González Montalvo, secretario del Departamento de Transportación y Obras Públicas y director ejecutivo de la Autoridad de Carreteras y Transportación".

Presento ante usted al ingeniero Miguel Pérez, de Behar-Ybarra & Associates, consultor de la Autoridad de Carreteras, quien dará comienzo con la presentación sobre el proyecto.

ING. PÉREZ:

Sí, muy buenas noches a todos. Estaremos comenzando con la presentación. ¿Me escuchan? Un poquito más. Como agenda de la presentación de hoy, les estaremos hablando de la localización general del proyecto. Daríamos un poquito del trasfondo de... o la historia de cómo se ha dado el, el, el proyecto, ¿verdad? Que ya el, el ingeniero Luis Rodríguez les dio un... una pequeña historia, ¿verdad?, de las fases que ya se han construido.

El propósito de este proyecto, las necesidades existentes, ¿verdad?, del, del corredor de estudio, daríamos una descripción de lo que se propone, ¿verdad?, como parte de este proyecto, las consideraciones ambientales o los retos que nos hemos encontrado con el desarrollo de este proyecto, descripción de las alternativas que hemos considerado, ¿verdad?, para proveerles una

mejor alternativa y costo efectiva para, para el propósito del proyecto.

Vamos a hablar brevemente de la comparación y los resultados de estas alternativas y cómo llegamos a una alternativa recomendada, ¿verdad?, O selecciona tentativamente para, para el desarrollo del proyecto, cuál sería el, el itinerario del proyecto y el plan de trabajo para la fase 1.

La localización del proyecto, la Autoridad de Carretera y Transportación de Puerto Rico y el Departamento de Transportación de los Estados Unidos, a través de la Administración Federal de Carreteras, 'Federal Highway Administration', por sus siglas en, en, en inglés, FHWA, proponer extensión de la avenida Ángel Castro Pérez, la PR... conocida como la PR-122, desde la Carretera PR-321 a hasta la Carretera PR-166. Dentro de los límites de los municipios de San Germán y Lajas de Puerto Rico y el largo del proyecto es aproximadamente unos 2.7 kilómetros.

En la imagen a la derecha se muestra la ubicación del proyecto, ¿verdad?, que está cerca en los límites de Lajas y San Germán. En la imagen a la izquierda se muestran los límites que mencioné anteriormente, que comenzando desde la PR-321 hasta el final de, de la 122 de Lajas hacia San Germán, que conecta con la 321.

Dentro del trasfondo del proyecto, para darles un

poquito de historia, ¿verdad?, y contexto del, del desarrollo del proyecto, este es un proyecto que lleva en planificación desde el 1968. Que es donde se identifica la necesidad de la ruta... de una ruta alterna a lo que es la Carretera PR-101. En el 2002, la Autoridad de Carreteras con sus... con otros consultores completa un estudio de alternativas, donde se evaluaron cuatro posibles rutas. Siendo la alternativa seleccionada, ¿verdad?, la que se construyó como fase 1, fase 2, ¿verdad?, en, en el año 2003, ¿verdad?, aproximadamente. Perdón, 2014.

En el 2003 la Autoridad de Carreteras realiza la evaluación ambiental de la alternativa seleccionada en el 2002. En el 2003 la Junta de Planificación endosó ese documento ambiental a nivel local y en el 2014, disculpen, fue que comenzó la fase... la, la fase 1, que es la que fue incluida en el STIP del 2016 y del 2017 para prevenir el incumplimiento ambiental, siguiendo los procedimientos de NEPA.

No es hasta el 1995, ¿verdad?, que comienzan los planos finales de esa fase 1 y 2 y la construcción de la fase 2 comienza alrededor del 2008 y ya se termina para el 2009, 2010 aproximadamente, donde pues se decide... se toma la decisión de detener lo que era la fase 1. Que es la que estamos presentándoles en el día de hoy.

La fase 2, como se menciona, se completa alrededor del

2010, pero no es hasta el 2012 donde se completan todos los cierres del proyecto ¿verdad? Eso siempre toma un poquito más luego de la construcción del proyecto. Y no fue hasta el 2019 que es que surge la necesidad de poder completar esta ruta, ¿verdad?, y, y la evaluación de nuevas alternativas, evaluando las consideraciones originales de la lineación, ¿verdad? Y aquí es lo que nos trae hoy en la noche.

ING. RODRÍGUEZ:

Miguel, déjame aclarar algo.

ING. PÉREZ:

Sí.

ING. RODRÍGUEZ:

Ahí dice "2003, Junta de Planificación". Eso es un error. Es la desaparecida Junta de Calidad Ambiental.

ING. PÉREZ:

Junta de Calidad Ambiental.

ING. RODRÍGUEZ:

Eso es un errorcito. Así que perdonen.

ING. PÉREZ:

Gracias, Luis. Propósito del proyecto. En términos... El corredor de la PR-122 en términos de obra es proveer un ensanche y una extensión para aumento de capacidad vehicular en la región, mejorar la movilidad de transporte y conectividad del área con mejores accesos, adicionales a

lo que sería la red vial de la PR-101 y proveería un acceso directo de la PR-10 a través de San Germán hasta, hasta Lajas, a la zona turística. Conectando la zona turística de Lajas, que actualmente no existe, o existe por otros medios.

La planificación. En términos de planificación, en parte del plan de transporte multinodal a largo plazo del 2040, fue incluida la carretera, el cual busca un mejor desempeño del sistema de transporte a nivel isla, la rehabilitación, economía y proveer la sustentabilidad ambiental de sus proyectos, de la Autoridad de Carreteras.

En términos legales, el proyecto busca cumplir con la Resolución 488 del 10 de septiembre del 2001, donde la Cámara de Representantes de Puerto Rico solicitó se realizara un estudio de factibilidad para atender la... para extender la PR-116 en Lajas y la PR-122 en San Germán o completando este proyecto. En términos de ambiente, el proyecto pretende... tiene que cumplir con la política pública ambiental establecida por la Ley Número 9 de 1970, según enmendada, el plan vial de la región oeste de Puerto Rico, y los mapas de extensión urbana de los municipios incluidos, Lares y... Lajas, Lajas y... perdón, Lajas y, y San Germán.

Necesidad existente en términos de... El sistema actual necesita movilidad de acceso. Sabemos que es la, la

única carretera que nos conecta desde la PR-2 hacia, hacia San... hacia Lajas, ¿verdad?, es la 101. Con esta carretera se piensa aumentar...tenemos pensado aumentar y mejorar las opciones de viaje para los residentes, visitantes y trabajadores de ambas regiones. Crear oportunidades para mejorar los modos de transporte no motorizados, mediante la... el desarrollo de sus redes y mejores conexiones a destinos clave.

En términos de seguridad se va a mejorar la seguridad y la protección del sistema de transporte y la capacidad para respaldar emergencias. Proporcionar inversiones para mejorar el entorno de viaje de los usuarios con instalaciones seguras que sean capaces de recuperarse para hacer frente a emergencias.

En términos de rendimiento, pues mantener y operar las instalaciones y servicios de transporte en Puerto Rico de manera positiva, para mejorar la economía y la eficiencia, aprovechando la capacidad disponible de... con términos de seguridad y, y la... y, y la protección adecuada de estas vías. En términos de economía, mejorar la conectividad global, económica, facilitando el movimiento eficiente de las actividades de transporte, negocios, entre ambas... y turismo, entre ambas... entre ambas regiones o municipios.

Descripción de la acción propuesta. Como mencionó... se mencionó anteriormente, este proyecto fue dividido. Una

vez terminó la planificación su construcción fue dividido en dos fases. Lo que sería la fase 1, que es la que estamos presentando en el día de hoy, y por razones en aquel momento se construyó la fase 2, ¿verdad? Que fue la que actualmente utilizamos y termina al final de la PR-321, que tiene un acceso temporero, ¿verdad?, una conexión temporero a la 321.

El otro tramo de la PR-122 es la que conocemos existente. Que está en el casco de, de, de San Germán, ¿verdad?, y estaría pendiente el tramito, que es el que, como les mencioné, nos trae... nos trae a esta noche, el, el... para completar lo que sería la ruta. Okey. Ahí no se me quedó nada.

Descripción de la acción propuesta. La construcción de la fase 2, como les mencioné, finalizó el cierre del proyecto en abril del 2012. El 17 de septiembre del 2014 se aprobó el proyecto de la fase 1 para comenzar la revisión ambiental. Que fue lo que les mencionamos en, en términos del cumplimiento con el proceso NEPA federal, NEPA.

Esto durante el desarrollo del proyecto fue modificado. Y como les mencionó Luis, hubo la oportunidad de conseguir fondos a nivel de HUD. Y ese documento, pues, tuvo que hacer una evolución, ¿verdad?, para también cumplir con esos requisitos de esa agencia federal.

La fase 2 ya construida presenta un tramo típico, ¿verdad?, de la que tenemos dividido en cuatro carriles, que incluye paseos pavimentados a ambos lados para facilitar y mejorar el transporte de mercancía, personas y servicios entre ambos municipios. Para cumplir con los requisitos, requisitos de un código de clase de diseño R-5, que es como se está tomando la carretera y de acuerdo al Manual de Diseño de la Autoridad de Carreteras.

La fase 2, prácticamente, estaría manteniendo esa misma sección. Que es lo que se ilustra en la figura que ven en, en pantalla. El, el ancho aproximado es alrededor de 22 metros, ¿verdad?, acomodando los dos carriles por dirección, su paseo y la sección varía, puede variar con una... dependiendo el lugar donde me encuentre, con una mediana de aproximadamente seis metros o una barrera New Jersey, tipo New Jersey. Que algunos tramos es la que tenemos, en la que se construyó en la fase... en la fase 2.

Para las consideraciones ambientales del proyecto se definió un área de estudio de aproximadamente 1.71 millas de largo, 2.75 metros, ¿verdad?, de, de kilómetros, que es el, el largo del proyecto, comenzando desde las cercanías del Municipio de Lajas. Específicamente, en la intersección con la PR-321, dirigiéndonos hacia el norte, hacia la carretera PR-166, en el Municipio de San Juan.

El propósito de establecer este, este corredor es

poder hacer los análisis pertinentes en términos ambientales, ¿verdad? Que todo proyecto de desarrollo tiene que cumplir, ¿no? Voy a tratar de tocar algunos de los más relevantes, ¿verdad? Sabemos que hay muchos más retos, pero tocamos los más importantes en esta presentación.

Uno de los primeros retos que tenemos en la mayoría de los proyectos. Gracias a dios, en este la... no, no está ubicado en una zona inundable, según los mapas de FEMA. Un 'checkmark' en ese punto. Pudimos cumplir con esto sin mayores, ¿verdad? Siempre en todos estos proyectos se hace un estudio de HH y todo tipo de escorrentía que venga de alguna quebrada o, o algún... o algún cuerpo que sea efímera. Que recibe agua simplemente cuando está lloviendo, pues se hacen los diseños para, para que la carretera no afecte la continuidad de ese... de ese... de ese flujo, ¿no?

Otro, otro ambiente... otro punto que, ¿verdad?, en los proyectos tiene un efecto, sería la, la parte de humedales. En este proyecto solamente, se pudieron identificar humedales tipo ribereño. Identificados mayormente en la Quebrada Maresúa y en la quebrada sin nombre. La quebrada sin nombre es la que discurre prácticamente paralelo desde la mitad del proyecto hasta casi llegar hasta la intersección actual de la 166 con la 122 y la Maresúa... ¿Perdón?

LCDO. RODRÍGUEZ:

Esa es la que va de retiro.

ING. PAGÁN:

De retiro. Okey. Aclarado. Y entonces, la Maresúa cruza paralelo a... la, la 122 la cruza, y, y más adelante la verán con un poquito más de detalle. En términos, según el inventario de humedales, ¿verdad?, como les mencioné, según la, la Pesca y Vida Silvestre de Estados Unidos, que ese es el Fish and Wildlife, los humedales están identificados como ribereños.

Se hizo un estudio ya de HUD, ¿verdad?, para determinar o evaluar cualquier diferencia en esto. Gracias a Dios se identificaron, el proyecto ya se presentó al Cuerpo de Ingenieros y aceptaron los cambios que solicitamos, que estamos proponiendo.

En términos de consideraciones. Otra de las consideraciones ambientales fueron las especies de peligro de extinción, ¿verdad? Según el sitio de web IPaC, el U.S. Fish and Wildlife, se identificaron, ¿verdad?, que dentro del corredor existen una serie de especies que están o están consideradas, ¿verdad?, como peligrosas de que su hábitat se pierda.

La boa puertorriqueña, aunque esto es una especie que se encuentra en todo Puerto Rico, sigue, sigue... se identifica casi en la mayoría de los proyectos y ya existen

protocolos para poder atenderla. No vemos ningún problema en ese tipo de especie. Otro que se... que el, el Fish and Wildlife identificó es el Puerto Rican Nightjar. Eso es como lo, lo que conocen como el guabairo.

El 'blackbird' o la mariquita. Ese, sí, se identificó, aunque en revisiones que hizo el U.S. Fish and Wildlife recientemente las alejó más del corredor, pero todavía... Que diga, más de lo que sería la lineación propuesta, todavía se muestra ahí en la... en una parte del proyecto que todavía aparentemente, debe haber un hábitat.

Ellos todavía están estudiando esta especie. Esta especie normalmente, es más área de mar y/o cuencas de río, ¿verdad?, y no, no aparece, pero está bajo evaluación. Recientemente, identificaron que en el corredor se está creando un hábitat crítico para lo que le llaman el Palo de Rosa o el Árbol de Rosa.

Y también identificaron un 'Puerto Rican skink'. Que eso es un lagartijo. También es un hábitat que se encuentra también en toda el área. Ya prácticamente nosotros tenemos conversaciones con el U.S. Fish and Wildlife para proveer mitigaciones para, para estos... estas especies, ¿verdad? Y estamos todavía en esos acuerdos y esperamos completarlo prontamente.

Otro punto y uno de los más críticos en este proyecto fueron los sitios arqueológicos que se identificaron.

Sabemos que San Germán y, y Lajas cuando hicimos el, el, 'screen' de, de escritorio, dentro de la... dentro del corredor se identificaron una serie de sitios históricos. San Germán tiene especialmente una serie de estructuras que están dentro del Registro Nacional Histórico. Además, estas estructuras que aunque están un poquito más alejadas y están concentradas más en el pueblo de San Germán, en, en el proyecto se pudo identificar que antes corría por ahí lo que se conocía el antiguo ferrocarril de circunvalación de la American Railroad Company de Puerto Rico.

Como parte de esa estructura se construyeron una serie de atarjeas, ¿verdad?, o, o drenaje, por donde pasaban estas vías, las cuales todavía están funcionales algunas de ellas, otras están... algunas de ellas se han obstruido, ¿verdad?, con la, la sedimentación. Pero según los estudios que se prepararon arqueológicos fase 1-A, 1-B, fase 2 y conservación, las agencias federales entendían que esas estructuras tenían un valor histórico, de alguna forma tendríamos que documentarlas y registrarlas. Estamos en ese proceso.

Gracias a Dios, con el proyecto estamos en unos acuerdos y dentro de esos acuerdos que estaría discutiendo más adelante, estamos más allá que acá, ¿verdad? En ese sentido, ya ellos nos aprobaron la... lo que sería el corredor de estudios, siempre y cuando hagamos todos los

esfuerzos de que podamos mantener la mayoría de las atarjeas sin afectarse. Si tuviéramos que afectar una, que buscáramos la medida de documentarlas y, y preservarlas de alguna forma, en ese sentido, las que se quedan.

Para que tengan una idea de... a lo largo del corredor se identificaron un total de 16 elementos históricos, a lo largo de la inicial... a lo largo de la lineación. De esos 16, siete tenían un impacto directo o indirecto de lo que era la huella principal de la carretera. Menciono esto porque como parte del desarrollo del proyecto, se tuvieron que evaluar alternativas, ¿verdad?, para tratar de conservar esas estructuras y minimizar ese impacto, y poder llegar a los acuerdos con estas agencias federales pertinentes.

Otra infraestructura que... otra infraestructura que pudimos identificar, aunque no encontramos registro o propietarios de esta, identificamos unos caminos que utilizaban algunos usuarios, ¿verdad?, como 'mountain bike trails' o caminos vecinales. Esos en algún momento los tomamos en consideración también a la hora del diseño, ¿verdad? Y uno de los retos también que tuvimos para tratar de no, no afectarlo o minimizar el impacto a estos. Disculpen.

Ahora voy a entrar a lo que serían las descripciones de las alternativas que se estudiaron para, para el

desarrollo del proyecto, ¿verdad? Estas alternativas se desarrollan, ¿verdad?, con el esfuerzo de poder brindar un diseño amigable con el medio ambiente, considerando la evaluación de las alternativas previas, ¿verdad? Que toda esa planificación que se hizo en el pasado, no es tirarla al, al zafacón, como uno menciona. Es aprender de lo que ellos hicieron y tratar de implementar medidas nuevas que, que hagan más viable el proyecto, en ese sentido, mitigando los componentes ambientales dentro del área de estudio.

Como parte de eso, se tuvo que modificar la lineación que se propuso en el 2002, ¿verdad?, tratando de evitar lo menos posible los impactos a estas estructuras históricas que teníamos del tren anteriormente. Como parte del estudio se hicieron alrededor de cuatro... se evaluaron alrededor de cuatro alternativas. En estas alternativas se compararon su efectividad y el cumplimiento de la necesidad con el... con la necesidad del proyecto. Se compararon entre sí varios aspectos.

Dentro de lo más importante era el... en términos de seguridad, su constructividad, el medio ambiente, ¿verdad? Entre los que más mencionamos, costo de... costo de construcción siempre contribuye, pero a veces la más... la solución más barata no es la más efectiva, ¿verdad?, basado en los... en los... en los proyectos que hemos trabajado, ¿verdad?

Y en adición, pues, a veces nos olvidamos de lo que es los costos de ciclo de vida, lo que son los costos de mantenimiento y rehabilitación. Sabemos que a veces construimos, pero nos olvidamos de que eso hay que mantenerlo, hay que trabajarlo. Pues se tomó en cada una de esas alternativas, basado en sus características, cuál era la que presentaba el mejor costo de vida en términos de inversión, en ese sentido.

Como les mencioné, dentro de las cuatro alternativas que consideramos, se consideraron tres lineamientos, ¿verdad? Eso lo explico más adelante. Dice, "Adiós, tres lineamientos, cuatro alternativas", pero más adelante lo estaré explicando. Definitivamente, consideramos la primera alternativa, la preferida el documento ambiental local preparado para el corredor en el 2003. Esa es una de las alternativas que consideramos y evaluamos basado en los nuevos datos que teníamos.

Debido a las condiciones topográficas, los lineamientos propuestos, ¿verdad?, que se estudiaron en este corredor y debido a las montañas que están dentro de ese valle, pues prácticamente las alternativas que se estudiaron para completar estaban limitadas en ese corredor. No obstante, ya el estudio que se había hecho anteriormente de ruta contemplaba otros lados, pero también fueron descartados.

Por eso nos volvimos de nuevo a esa parte de planificación. Y el propósito principal era completar esta ruta, lo que me limitaba el análisis de, de alternativas a esa área, ¿verdad?, que estamos en cuestión y que definimos hace un momento atrás.

La alternativa A, es la alternativa previamente estudiada en el documento ambiental en el 2003. Esta alternativa comienza en la PR-122, en el punto de intersección de la PR-321. Esto no cambia en ninguna de las alternativas y continúa hacia el norte en dirección en la... a la PR-166 en San Germán. El largo aproximado eran 2.7 kilómetros, 2.8 kilómetros aproximadamente.

Se, se proveía una intersección a desnivel, tipo trébol, en la PR-321 con una estructura. Proveía un acceso al camino local mediante una caja estructural, un 'box culvert' en sus... por sus siglas de inglés. Se proveía una intersección a lo que era la comunidad El Retiro, y otra intersección en la 166. Eso es lo que se había contemplado en... como parte de la fase... lo que era la fase 1 y para la cual se había obtenido un... a nivel local, ¿verdad?, un permiso ambiental.

Al entrar a las agencias federales tenemos que revisar todas estas... todos estos estudios nuevamente para cumplir con eso. Entonces, ahí es que surgen las otras... las otras alternativas, para entonces ver a base de lo

estudiado cómo podríamos minimizar todas aquellas consideraciones ambientales que afectaron, afectaron el proyecto en su pasado y están afectando actualmente.

En términos de la alternativa b, la alternativa es similar a la alternativa de la lineación A. En ese... en ese caso lo que se hizo se hizo fue una pequeña modificación a lo que sería el perfil de la carretera. El perfil de la carretera para explicarles, más o menos una visual de cómo se estaría comportando la carretera cuando me estoy moviendo hacia ella, ¿verdad? Una forma más sencilla para que lo puedan visualizar, tratando de evitar, ¿verdad?, el, el, el lo que sería el movimiento de, de tierra, que era uno de los costos que aumentaba el proyecto.

De acuerdo a los estudios geotécnicos, hay roca en esa área, la cual va a necesitar explosivos o tal vez un 'presplitting', ¿verdad? Y lo que queríamos era minimizar esas, esas áreas, ese costo en ese sentido. Esa fue la primera solución sencilla, ¿verdad? Todavía no hemos entrado en las consideraciones ambientales del proyecto, pero uno de los rasgos que pudimos observar de la alternativa original, era su alto costo en el movimiento de tierra.

Ya en la alternativa C, se toma en consideración una variación en la lineación en algunos puntos. Esto es para lograr y, y se usa la utilización de puentes, ¿verdad?, y

muros de retención, con el propósito de mitigar el impacto a las alternativas sensitivas, tales como los sitios arqueológicos identificados en el estudio previo. Mayormente, ese era el, el, el 'issue' o la situación que teníamos con la lineación.

Se estudiaron esas alternativas y siguieron modificándose, ¿verdad?, y llegamos hasta la alternativa d, en la que ya se consideró para evitar cualquier impacto, ¿verdad?, en, en estas estructuras, de que toda la ruta en vez de, de que fuera carretera se introdujeran más puentes en el... en la lineación. Esto sí aumentaba los costos de construcción, pero proveía una alternativa un poquito más viable en términos a los impactos que sería el, el del medio ambiente en la carretera.

Más o menos en la siguiente tabla, lo que les presento es una comparación de esta alternativas. Aquí ilustramos algunos datos cuantitativos entre ellas. Aquí lo más relevante, ¿verdad?, estamos más o menos en el... en largo es aproximadamente, pero es la diferencia en los costos de construcción que tiene uno y que va variando en aquel momento.

Estos costos han aumentado un poquito más en estos días, desde $24,000,000 hasta $47,000,000, ¿verdad?, lo que costaba implementar esta, esta estructura. Otro dato importante es la diferencia en términos de impacto, en

términos del área de corte y relleno, siendo la alternativa D la más... la más... la que menos impacto presentaba, ¿verdad?, en ese sentido. Esos datos cualitativos y cuantitativos de cada una de esas alternativas, lo que hicimos, trabajamos una matriz, en la cual comparamos y le asignamos valores a cada una de ellas, para luego determinar cuál de las alternativas era la más efectiva.

A esa alternativa se le asignaba un valor. ¿verdad?, y entre más cerca del... de la posición número 1, era la alternativa. Entre más puntos tenía en términos de la razón, mejor era la alternativa. De todo este análisis que se realizó, ¿verdad?, del resultado, surgió que la alternativa B era la que presentaba el mejor opción. Y esta, porque tenía una combinación de estructura y muro, en lugar de solo puente o solo movimiento de tierra, pues a nivel de costo efectivo era la más... la que presentó su mejor, mejor razón o mejor posición.

A base de esta... de este análisis, pues es la que se desarrollaron los planos preliminares y los cuales estaríamos discutiendo un poquito con más detalle en adelante, ¿verdad? Simplemente, le estamos dando una pequeña historia de los trabajos que se han hecho para el desarrollo de este proyecto.

Si se fijan, la lineación es bastante similar a lo que se había considerado en el pasado, como les mencioné, con

algunas pequeñas diferencias, que a, a esta escala no se pueden notar, pero a, a, a nivel más, más de cerca sí se podrían considerar. Siempre nos mantenemos con la consideración de la alternativa de la intersección al nivel con la PR-321, tipo trébol.

Se tuvo que incluir un nuevo puente para mantener varias de las atarjeas arqueológicas identificadas en este punto. Esto pues, también nos permitió a que parte de los caminos existentes se mantuvieran. Se mantuvo la intersección con la... hacia la Comunidad El Retiro.

Modificamos e incluimos un, un segundo... un tercer puente en la.... en el acceso... en el acceso local que lleva... que lleva a otras residencias del... de la Comunidad El Retiro. Que está un poquito luego de la... del área de los 'bleachers' o la cancha que se ubica allí en la Comunidad El Retiro. Se mantuvo la intersección con la... con la PR-166.

El proyecto al momento no considera semáforos. Por lo menos, los estudios de tránsito a la fecha de inauguración no, no lo contempla. Sí, y se incluye la iluminación de la carretera. El proyecto va, va a contar con iluminación. Y también tenemos una estructura en la Quebrada Maresúa. Entendemos que, eventualmente, se va... se va a categorizar como, como puente, ¿verdad?, debido a que es una tarjea o un 'box culvert' de tres celdas de, de 10 pies de alto por

10 pies de ancho. O sea, que estamos hablando de una estructura de 30 pies, la cual va a permitir que el flujo de la Quebrada Maresúa no se vea afectado.

En términos de la quebrada sin nombre, que es la que discurre prácticamente paralelo con la lineación, se trabajó, ¿verdad?, para que la lineación no afectara esos niveles ni tuviera un efecto directo a esa... a esa quebrada. No obstante, todos saben que dentro de esa montaña existen una serie de, de quebradas, ¿verdad?, que tenemos que trabajar. Se trabajaron, mejor dicho.

Se, se proponen una serie de tuberías para canalizarlas y llevarlas a una serie de puntos estratégicos que no tengan un efecto directo a lo que sería las, las comunidades aguas abajo, ¿no? Esto todo en cumplimiento con el Departamento de Recursos Naturales.

En la siguiente imagen les ilustro, más o menos, la intersección en trébol. Para darles una idea, ¿verdad?, si vengo del área de Lajas y quisiera bajarme a la 321, continúo en este carril, utilizo el, el carril de desaceleración ubicado aquí en donde les muestro, y entonces, aquí tengo la opción de quedarme hacia la izquierda o la derecha, adonde quiera moverme en la 321. Para acá llegaría a la 101, y me disculpan, acá llegaría a otra área que no tengo el, el dato ahora mismo, pero podría llegar a a la... a la otra carretera.

En el caso de que de la 321 quiera subir a la 122 en el área de San Germán, ¿verdad?, los vehículos que vienen de la 321 desde este punto tendrían que llegar hasta esta rampita que esta aquí ubicada y continúan con un carril de aceleración y entran a la 322. Si vengo de la 101, pasan esta intersección y entonces subirían por la rampa de acá, y, y se irían hacia, hacia San Germán.

En el caso de que venga de San Germán y quiera bajar hacia la 321, utilizo la rampa que está ubicada a la parte este... oeste del proyecto y entonces aquí decido si quiero ir a la izquierda o la derecha, si me quiero ir a la PR-101 o a otros lugares. Si quiero subir de la 321 para llegar hacia Lajas, utilizo la rampa que está ubicada en, en la parte oeste del proyecto y me conecto hacia San Germán.

Esos serían los... prácticamente, los cuatro movimientos que tendríamos para poder accesar hacia, hacia Lajas y hacia San Germán. Aquí le ilustramos una idea, una perspectiva para que puedan visualizar mejor los movimientos de la intersección. Aquí estaríamos mostrando la PR 321 desde el nivel de abajo, ¿verdad? Este sería el puente que se estaría construyendo, sus muros de retención, estos serían los 'loops' que se proponen.

La sección de la pared 321 se ensancha un poco en el área del proyecto para que tenga dos carriles en una dirección para acomodar los, los flujos o los solos,

¿verdad?, a los virajes a la izquierda y se mantiene solo un carril en otra dirección. Les muestro el puente 1-A. Este puente durante el desarrollo del proyecto, como les mencioné, tuvimos que incluirlo para proteger varias de las atarjeas y poder llegar al cumplimiento o la mitigación necesaria que nos solicitó tanto SHPO, como el ICP. Este puente tiene aproximadamente un largo de 128 metros, si no me equivoco, y como les mencioné, el propósito es ese, tratar de mitigar y mantener esos caminos.

A continuación, más o menos para que tengan una idea de cómo estaría atravesando, estas son una de las atarjeas que se estaría manteniendo. Esta es otra de las atarjeas o estructuras históricas que se identificaron. Como les menciono, como parte del proyecto se están tratando de mantener los caminos existentes.

Entendemos que dentro del valor histórico de esa estructura, pues esto podría generar una serie de, de turismo, ¿verdad?, en ese sentido, si se logran mantener. Y con el proyecto, como parte de los acuerdos, se estarían protegiendo esas estructuras, ¿verdad?, una vez se pase a, a estas... a la agencia pertinente.

En la figura aquí abajo, se muestran parte de los muros de retención que tuvimos que incluir. Esto pues, fue para salvar varias de las otras estructuras de drenaje existentes y mantenerlas. O sea, que el, el proyecto su

costo original que se había planificado, pues tuvo una serie de incrementos debido a los cumplimientos o requisitos, ¿verdad?, de mitigación del proyecto.

Aquí mostramos la intersección hacia en la Comunidad El Retiro. Actualmente, la Comunidad El Retiro entraba... entra por este punto por aquí. Este acceso que ustedes tenían, pues se va a tener que cerrar, ¿verdad?, porque queremos dar la continuidad de la 122. Y entonces, para que ustedes vuelvan a tener acceso se crea una nueva intersección, un poquito más... unos metros más hacia abajo de la Carretera 122 y se mantiene similar el uso de sus carreteras.

O sea, que la comunidad va a poder accesar en este punto. Si quieren moverse a su izquierda, pues lo pueden continuar haciendo. Lo único es que aquí al final, pues van a tener un 'dead end', ¿verdad? Que todavía entiendo que por aquí hay una residencia. Para darle acceso a esa residencia si me mantengo aquí a lo que sería a mi izquierda, pues lo podríamos hacer continuando a los residentes que están más aquí hacia arriba y aquellos residentes que están más hacia, hacia el área sur del proyecto, pues se mejora la carreterita de acceso local que tienen ahí, hasta un punto de la PR-122, un poquito más abajo, más se construye un puente.

O sea, que tanto la Comunidad El Retiro, como los

residentes más abajo hacia el sur de la Comunidad El Retiro, pues no se están afectando o se les proveen los accesos pertinentes. Esto es dentro parte de los requisitos, ¿verdad?, lo que... con, con el proyecto.

Como les mencioné ahorita, al final del proyecto quedaron cuatro estructuras que no, no se pudieron... que se afectaban con el proyecto. Dos de esas estructuras las pudimos salvar. Dos de esas estructuras las pudimos salvar con la inclusión del puente y los muros de retención. No obstante, dos estructuras van a tener un impacto directo con el proyecto.

Lo que se propuso en ese momento es que una de las estructuras se documentara y se presentara, ¿verdad?, la documentación correspondiente y se demoliera. La otra estructura que es un poquito más pequeña se propone relocalizar para crear un sitio histórico, ¿verdad?, o un punto estratégico. Especialmente, estamos tratando de ubicarlo en donde se formaría la intersección con la PR-21. La idea es que el público, pues, pueda llegar a ese punto. Se presenta la documentación debida de la historia, del tren ferro... ferro... del, del tren y esas atarjeas.

Eso es como parte de los requisitos, ¿verdad?, o de los acuerdos que hemos llegado con estas agencias, pues es uno de las... de las... de los retos, ¿verdad?, que este proyecto tiene a la hora de, de comenzar la construcción.

Lo más importante es tener a tiempo el proyecto.

Actualmente, estamos en el proceso ambiental, como les mencionó el ingeniero Luis Rodríguez. Nuestra intención es tener completado el documento ambiental ahora para este tercer trimestre del 2026. Nos quedan pocos estudios ya en términos de aprobación. En términos de los requisitos de HUD, especialmente, como parte del proyecto el 'step' 8 de inundación. Ese todavía lo estamos trabajando. Ya estamos en el 'step' 7. Nos falta uno más y completamos.

Y actualmente, en términos arqueológicos logramos el endoso de SHPO. Eso es algo bueno. Fish and Wildlife, como les mencioné, surgieron unas especies que todavía estamos dialogando con ellos. Que lo más seguro exista un proceso de, de mitigación en términos que tengamos que hacer una transferencia de terreno. Esas son cositas que ahora mismo estamos trabajando y esperamos completar antes de ese... de estos... en estos próximos meses para poder completar el documento ambiental.

En términos de plano, ya el proyecto está diseñado un 35 por ciento. Los planos de adquisición están completados también. Algo importante, este proyecto, la agencia para acelerar el proceso de construcción piensa sacarlo del formato diseño construcción.

Me explico. Se tira una subasta donde ya el contratista viene con un diseñador y con el 35 por ciento

parte del proyecto se empieza a construir y durante la construcción se completa el diseño y se va terminando la obra. Eso es con el propósito de... Sabemos, ¿verdad?, el tiempo que llevamos con este proyecto, que la agencia lleva con el proyecto y poder acelerar ese proceso.

Eso tenemos pensado que para el cuarto trimestre del 2026, empiece ese, ese comienzo... comience ese proceso de construcción. Debe ser 2027. Eso es un errorcito, ¿verdad, Kevin? ¿No, es 2026? Okey. Pues el cuarto trimestre del 2026. Ah, bueno, sí, disculpen. El proceso de, de... el proceso de diseño de construcción podría estar para el cuarto trimestre 2026, pero no necesariamente la construcción. Es correcto. Sí, sí.

Hay que completar la... Perdóname, es que no lo vi más alante. Hay que completar la parte de adquisición, ¿verdad? Y como les mencionó Luis al principio, hasta que yo no complete el documento ambiental. Yo no puedo empezar el proceso de adquisiciones hasta una vez tenga el proceso ambiental completado. Sí, queremos trabajar de forma acelerada el... la, la... el proceso de contratación del contratista para evitar eso, pero hasta que no complete el proceso de adquisición, la construcción no puede empezar.

O sea, que ahí es que estaríamos empezando. Que aunque el proyecto no contempla creo que cuatro realojos... Tres, tres, tres realojos solamente, que se afectan con el

proyecto, tres residencias, hay mucho terreno, ¿verdad?, que se queda enclavado o se ve afectado con el proyecto y esas adquisiciones, pues toman un tiempo y dilatan un poquito el proceso.

Sí, nuestra planificación, la planificación de la agencia, ¿verdad?, es poder terminar ese proceso de adquisición para el primer trimestre, trimestre del 2028. Es importante señalarles que como parte del proyecto, ya hay un tramo que fue adquirido. Especialmente, en la PR-321 al principio del proyecto.

O sea, la intención es que si logramos un acuerdo con estas agencias, nos permitan por lo menos, empezar construyendo en ese... en ese... en ese principio del proyecto a lo que se completan las adquisiciones, ¿verdad? Eso es parte de las estrategias que la agencia está evaluando, siempre con la meta de acelerar y que el proyecto sea completado lo más pronto posible.

El proyecto se estima, ¿verdad?, que si todo lo que tenemos aquí planificado se logra, ¿verdad?, que ya para el tercer trimestre del 2029, pues se termine la construcción y, y se pueda hacer la inauguración de, de este proyecto, ¿verdad? Que a nuestro entender, es bastante importante para la región, ¿verdad?, tanto como para Lares y San Germán.

Al igual que, como les mencioné, la Autoridad de

Carreteras tiene como intención, ¿verdad?, para eso mismo, acelerar el proyecto, no subastarlo en una en un solo proyecto. O sea, piensa segregarlo en, en tres proyectos. Esto pues, lo que nos va a ayudar también es precisamente que pueda trabajar tres fases a la misma vez minimizando el tiempo de construcción del proyecto.

Esto es algo que se está dialogando. Se están preparando los documentos de contrato para eso y, y, y esperamos tenerlos completados, como les mencioné, en ese cuarto trimestre de este año para que puedan comenzar el proceso de licitación.

Cualquiera que desee someter comentario sobre aspectos relevantes al proyecto, puede enviarlos a la siguiente dirección de correo electrónico, oea@act.pr.gov o dirigirlos a la siguiente dirección: Ingeniera Alexandra Velázquez Delgado, directora, Oficina de Preconstrucción, Autoridad de Carreteras y Transportación, P.O. Box 42007, San Juan, Puerto Rico, 00940-2007. Los comentarios se, se recibirán dentro de los próximos 30 días calendario a partir de la fecha de la celebración de la Reunión de Participación Ciudadana. Esto sería todo de mi parte. Así que los dejo con Olga.

SRA. MODERADORA:

Okey. Vamos a dar inicio con la apertura de las preguntas o comentarios que ustedes desean exponer. Vamos

a recordar que estamos grabando la reunión para propósitos de documentar el trabajo. Así que deberían de identificarse con su nombre completo.

Vamos a respetarnos unos a otros. Vamos a expresarnos de, de una forma concisa para así tener un tiempo prudente en que todos podrían... puedan expresarse. Aquellos que deseen someterse sus comentario, como comentó el ingeniero Miguel Pérez, se lo pueden entregar por 'e-mail' o... Al registro nosotros les entregamos una hoja, que pueden hacérnosla llegar. Al finalizar, el que no la tenga, pues nos la solicita y amablemente se la entregamos. Sí, vamos a darles cinco minutos por pregunta. Así que van a dirigirse aquí en el centro.

SR. CARLOS MOLINA:

Muy buenas noches a todos, mi nombre es Carlos Molina, agrónomo de profesión con especialidad en Economía Agrícola del Colegio de Mayagüez. Yo tengo... No me pongo ni tengo ningún, ¿verdad?, ningún punto. Estamos en la primera vista pública, pero tengo varias preguntas que me preocupan a la hora de hacer el proyecto.

Dentro de las preocupaciones que yo tengo, más como agrónomo, residente de Lajas, ¿verdad? Soy del Barrio Lajas Arriba, pero en el Barrio El Retiro, Sector La Tea, Camino Los Pinos, en San Germán, nosotros tenemos una propiedad, ¿verdad?, una finca de producción de ganado y

producción de ovejo.

¿Qué me preocupa a mí del proyecto a la hora de evaluar? Porque sabemos que terrenos colindantes a la finca de nosotros van a estar siendo impactados. Porque si transitamos, ¿verdad?, si ustedes están parados en la Hacienda La Culminante, doblamos a la derecha, salimos del Camino Los Pinos, vamos a hacia la carretera... la Avenida Harry Luis Pérez, creo que se llama, que es la que van a... si no me equivoco.

ING. PÉREZ:

Unjú.

SR. CARLOS MOLINA:

Estamos claros, ¿verdad?

ING. PÉREZ:

Sí.

SR. CARLOS MOLINA:

Entonces, a mí me preocupa que a la medida que se haga la carretera y con ese impacto, que la obra parece una de película, que los terrenos colindantes luego sean, que van a ser algunos expropiados. No, no podemos llevarnos a engaño. Yo creo que el alcalde San Germán, que es agrónomo, estudió conmigo, debe tener conocimiento, ¿verdad?, de los impactos agrícolas que va a tener el área. Me preocupa que los terrenos colindantes a esa área, luego de expropiados porque hicimos la obra, no nos desplacen a nosotros los

agricultores.

¿Por qué nos, nos pueden expropiar... nos pueden desplazar? Porque luego viene quizás... Hoy estamos diciendo que va ser una avenida y estamos de acuerdo, va a conectar San Germán con, con Lajas y estamos perfecto. Donde tengo preocupación es que luego de terminada la obra no nos movamos a que queramos urbanizar terrenos colindantes. Que puede pasar.

ING. PÉREZ:

Unjú.

SR. CARLOS MOLINA:

O sea, estamos claros en eso.

ING. PÉREZ:

Unjú.

SR. CARLOS MOLINA:

Entonces, vamos a seguir recortando terrenos agrícolas, terrenos de producción agrícola, donde agricultores como yo, agricultores como compañeros, ¿verdad?, vamos a ser impactados. Eso es una preocupación. Uno. Y yo también me preocupo un poco que las obras no pasen como la Carretera 118, que transita en dirección de La Tea hacia Christian. Que es la de Los Pinos la que estamos hablando. Que hoy, por los dos alcaldes, no puedo hablar de... ¿verdad?, está completamente abandonada.

Comenzó con un, un proceso en el Sector La Tea, pero

nunca se terminó el área de Christian, que conecta con Christian. Son preocupaciones que levanto. Yo creo que va a ser la primera vista pública. Creo que se van a llevar más a cabo.

ING. PÉREZ:

Unjú.

SR. CARLOS MOLINA:

Y, oye, para llevarla, ¿verdad?, como proceso de información, creo que la obra si se realiza con lo... con la... con lo que usted habló, con los beneficios ambientales, con los... llevando un, un desarrollo sostenible, como debe ser, no debemos tener problemas, pero me preocupan esos dos puntos, ¿verdad? Quiero dejarlos como alerta y como que en las próximas vistas públicas podamos seguir participando para ver qué lo que va a ir pasando y nos puedan contestar esas preguntas.

ING. PÉREZ:

Claro que sí.

SR. CARLOS MOLINA:

Agradecido por haber realizado esto y agradecido por... a Olga, por haber, ¿verdad?, convocado este tipo de actividad.

ING. PÉREZ:

Gracias, gracias por su sugerencia, ¿verdad? La tomaremos en consideración. En términos de la carretera,

¿verdad?, tiene sus controles de acceso controlados, ¿verdad?, que fueron los que mencioné. La Autoridad de Carreteras no desarrolla... no desarrolla proyectos, ¿verdad? Y cuando adquiere es porque alguna finca se queda enclavada o porque no tiene acceso. Esas son las razones que utiliza, ¿verdad?

Aquellas fincas que se mantienen, tienen su acceso y se mantiene su uso. Queda, ¿verdad?, de que otros desarrollos privados no las compren, que las, las adquieran. O sea, el propósito de la Autoridad de Carreteras no es desplazar. Al contrario, ¿verdad?, tratamos de evitarlo y lo pudieron ver con la Comunidad El Retiro, ¿verdad? Sí, sabemos que lamentablemente con el desarrollo de un proyecto se tienen que afectar algunas áreas, ¿verdad?, pero tratamos de minimizarlo.

Tú sabes, como consultor de la agencia, la Autoridad de Carreteras no, no, no desplaza ni, ni interrumpe, ¿verdad? Eso a veces, como tú mencionas, surge por otros, ¿verdad?, y no es control de la agencia, entiendo, entiendo yo. Pero nos llevamos la preocupación y, y cualquier planteamiento o información o dato que podamos incluir en el diseño, se tomará en consideración. Así que agradecido.

El proceso, lo principal de estas vistas es poder obtener, ¿verdad?, sus, sus inquietudes. Nosotros como diseñadores podemos presentar un, un proyecto, pero las

necesidades las tienen ustedes. Conocen el área mejor que nosotros. Precisamente, lo que queremos es recibir de ustedes es cómo podemos hacer el, el, el proyecto más efectivo y que atienda, ¿verdad?, todas las necesidades. A lo mejor algunas se quedan. No, no podemos complacer a todos, ¿verdad?, pero, pero la idea es poder darle al pueblo un, un mejor proyecto, un mejor diseño. Así que agradecido por la sugerencia.

ING. RODRÍGUEZ:

Quería añadir también, Luis Rodríguez, para propósito de récord, que después de este taller informativo, el propósito principal es recoger temprano, en la etapa de planificación de este proyecto todos sus comentarios y sugerencias u observaciones. Posteriormente, a esto, se prepara un documento ambiental, ¿verdad?, se circula entre agencias estatales y federales y después va a una vista pública. Que es la segunda oportunidad que tienen.

ING. PÉREZ:

Unjú.

ING. RODRÍGUEZ:

Luego de esa vista pública, entonces, nosotros vol-vemos nuevamente al taller de trabajo a evaluar los comentarios, observaciones y sugerencias. Los plasmamos dentro del documento ambiental y sale un documento final.

ING. PÉREZ:

Final.

ING. RODRÍGUEZ:

Que es el que endosan o rechazan, ¿verdad?, las agencias estatales y federales.

SRA. MARANGELIE RIVERA:

Buenas noches para todos. Marangelie Rivera Ortiz, trabajadora social de profesión de la Comunidad El Retiro. ¿Verdad?, en algún momento dialogó o expresó que iban a ser expropiadas tres propiedades. Quería verificar bien si es en todo el trayecto de la ruta o de la comunidad. Y también cuando presentó el proyecto vi como que prácticamente la entrada a la comunidad sería modificada, ¿verdad?, usted habló por entre medio del 'bleacher'. Sería que como por allí entraríamos para los dos extremos de la comunidad.

Y la otra pregunta ¿verdad?, en la parte de las especies en peligro de extinción, el Monte de El Retiro es un pulmón, no solamente del área de San Germán, ¿verdad? Es lo que nos conecta con el pueblo de Lajas. Sería, ¿verdad?, importante darle seguridad a esos animalitos, ¿verdad?, que están allí, ¿verdad?, porque lamentablemente, vemos que a la... a la larga, ¿verdad?, lo que son los recursos naturales lamentablemente están siendo explotados.

Así que sería importante, ¿verdad?, darle un mayor seguimiento para sobre salvarla, ¿verdad?, y salvaguardar

estas en peligro... estas especies en peligro de extinción. Aunque la boa puertorriqueña está en todos lados, pero está en peligro de extinción.

ING. PÉREZ:

Sí, muchas gracias por la sugerencia. Sí, vamos de nuevo a la imagen, para aclararle la... Perdón, para récord, ingeniero Miguel Pérez o Miguel Pérez. Ya me... ya me dijeron algo. Déjame ver cómo puedo usar esto aquí, Luis. En términos de la primera pregunta, sí, se mantiene la intersección hacia la... hacia la Comunidad El Retiro.

Como les mencioné, este tramito que por aquí conectaba es el único que se cierra, ¿verdad? Pero se cierra dándole un 'dead end', ¿verdad?, o un 'cul-de-sac', lo que se conoce. Pero, sí, van a tener esta opción de poder entrar. Esto tiene un carril de entrada, uno de salida, dividido mediante una mediana, ¿verdad? Que fue la que ilustré ahorita.

Aquí está la ubicación, ¿verdad?, de donde a lo mejor se propone crear ese, ese... esa identificación, ese 'wild findings', en términos de los hallazgos arqueológicos del proyecto. Es correcto. En, en términos de la segunda pregunta, de una de las preguntas, como parte del desarrollo del proyecto todavía estamos en el proceso de discusión con las agencias pertinentes, y es posible que como parte del proyecto se adquieran terrenos adicionales

para la mitigación y la conservación de estas especies.

Algunas se han identificado ya alrededor de dos parcelas. Todavía estamos en discusión con esa agencia, ¿verdad? y poder llegar a esos acuerdos, a esos memorandos de entendimiento entre la Autoridad de Carreteras, en este caso Recursos Naturales, para lograr esos aspectos. Y me quedó una pregunta más.

SRA. MARANGELIE RIVERA:

De las propiedades.

ING. PÉREZ:

De las propiedades. Las propiedades que estamos adquiriendo como parte de la intersección que estamos proponiendo, entiendo que por aquí ubican unas propiedades que son unos establos, si no me equivoco, y hay otra propiedad por aquí, que sí, esta residencial. Que esta está ubicada aquí y por la proximidad del proyecto y por seguridad la estamos adquiriendo. Entiendo que es una propiedad, pero hay... puede ser que existan dos familias en esa... en esa propiedad.

Y la tercera propiedad es otra que por seguridad, una vez pasamos este caminito, es una que está en elevado, en madera, que veo solita al principio, esa sería la tercera propiedad. Todo lo demás es terreno y esos son los únicos tres de realojo que tendríamos en el proyecto.

ING. RODRÍGUEZ:

Para récord Luis Rodríguez nuevamente. Como parte, como indicó Miguel Pérez, el ingeniero Miguel Pérez, como parte del proyecto, estamos discutiendo con el Departamento de Recursos Naturales un... una, una mitigación por hábitat de vida silvestre y especies en peligro de extinción. Es una cantidad como de 200 o 300 cuerdas, ¿verdad? De 200 o 300 cuerdas para mitigar dicho efecto.

SR. EDWIN RIVERA:

Sí, buenas, buenas tardes, Edwin Rivera, retirado. Ya que estamos hablando de esa área, ¿verdad?, y yo entiendo un poquito de eso, donde usted dijo, ¿verdad?, que está la intersección, ahí hay una área que es la área recreativa de nosotros. No se podía pensar en un futuro. Es una área recreativa, un centro comunal que tenemos. ¿Qué va a hacer con esa área?

ING. PÉREZ:

Eso, eso está ubicado...

SR. EDWIN RIVERA:

En donde usted señaló en la intersección.

ING. PÉREZ:

...por aquí, si no me equivoco.

SR. EDWIN RIVERA:

Donde están los 'bleachers'.

ING. PÉREZ:

Por aquí en donde están los 'bleachers'.

SR. EDWIN RIVERA:

Por donde están los 'bleachers'.

ING. PÉREZ:

Por donde están los 'bleachers'.

SR. EDWIN RIVERA:

Ajá. Ahí mismo, ahí mismo.

ING. PÉREZ:

Por aquí.

SR. EDWIN RIVERA:

Es un centro comunal, una área recreativa. Gracias.

ING. PÉREZ:

Sí. Definitivamente. Bueno, con la intersección no. Lo que se afecta simplemente es el área de los 'bleachers', ¿verdad? Lo que es el área comunal y eso no se... no se ve afectado, ¿verdad? Eso es una inquietud que nos llevaríamos y, y la dialogaríamos, ¿verdad? La localizaría para que vean que el proyecto no lo afecta ni nada en ese... en ese sentido. Gracias. Perfecto. Gracias.

SR. JOSÉ SANTIAGO:

Buenas. Mira, yo soy José Santiago. Mi preocupación son dos. Estás cortando el monte y en... y en el tercer camino está la Piedra del Puño. ¿Se va a ver afectada?

ING. PÉREZ:

No.

SR. JOSÉ SANTIAGO:

Entonces, la otra preocupación es el camino de casa. Tú sabes que ese camino es pequeño. La quebrada prácticamente los recoge. Y si lo van a anchar las dos, ¿las residencias que habemos allí se nos rodaría el terreno?

ING. PÉREZ:

No, estamos cuadrados ahí. Tampoco. Como parte del proyecto, la atarjea que está dentro de su propiedad...

SR. JOSÉ SANTIAGO:

Unjú.

ING. PÉREZ:

...no la... se está manteniendo y no se está viendo afectada.

SR. JOSÉ SANTIAGO:

Unjú.

ING. PÉREZ:

Y entonces, las escorrentías de esa atarjea mediante una canalización aguas arriba, las estamos llevando a otro punto para que incluso, no, no reciba descarga por ahí en ese punto.

SR. JOSÉ SANTIAGO:

Pero bajando se encuentra la casa de Hermel, de Agapito y Gladys.

ING. PÉREZ:

Unjú.

SR. JOSÉ SANTIAGO:

¿Al ananchar (sic) la carretera...

ING. PÉREZ:

No.

SR. JOSÉ SANTIAGO:

...se le coge terreno a ellos?

ING. PÉREZ:

No, a ellos puede ser que se les afecte. No, podríamos verificarle un poquito más datos, pero como le mencioné, en términos de relocalización o afectamiento...

SR. JOSÉ SANTIAGO:

Unjú.

ING. PÉREZ:

O sea, la única casa por, por situación de seguridad fue esa.

SR. JOSÉ SANTIAGO:

Claro, sí.

ING. PÉREZ:

No, durante la evaluación no vimos que esas carreteras tuvieran un efecto durante el proceso de construcción que tuvieran un daño. Por eso las estamos manteniendo. Incluso, en un momento dado, ¿verdad?, se estudió y que estamos haciendo inversión de un puente, un camino y

estamos hablando de unos 10 o 12 residentes. Se consideró eso y comoquiera se decidió, ¿verdad?, mantenerlos, porque no, no tenía un, un impacto directo con la construcción del proyecto.

SR. JOSÉ SANTIAGO:

Esperemos que Recursos Naturales se ocupe de canalizar la quebrá (sic), porque la quebrá se va quedar con el camino.

ING. PÉREZ:

Como parte de... como parte de este proyecto, la única canalización que tenemos es la Quebrada Maresúa. Y como te mencioné, para aliviar las, las escorrentía a las atarjeas existentes, se hace una, una canalización. No es una canalización, vamos a ponerle así, porque hablamos de canalización y, y entendemos que estamos...

SR. JOSÉ SANTIAGO:

Sí, una tubería.

ING. PÉREZ:

...una es simplemente, ¿verdad?...

SR. JOSÉ SANTIAGO:

Una tubería, sí.

ING. PÉREZ:

...un drenaje lateral que es típico de Carreteras...

SR. JOSÉ SANTIAGO:

Unjú.

ING. PÉREZ:

...llevando esas aguas a esos puntos bajos...

SR. JOSÉ SANTIAGO:

Sí, sí.

ING. PÉREZ:

...donde están más, más controlados.

SR. JOSÉ SANTIAGO:

No, pero hay unos fondos aprobados ahora que van a canalizar parte de la quebrada.

ING. PÉREZ:

La Sin Nombre.

SR. JOSÉ SANTIAGO:

La de Retiro.

ING. PÉREZ:

La de Retiro.

SR. JOSÉ SANTIAGO:

Ajá.

ING. PÉREZ:

Disculpe, no Sin Nombre, la de Retiro.

SR. JOSÉ SANTIAGO:

Sí.

ING. PÉREZ:

Okey. Perfecto. No, tenemos conocimiento, pero gracias por su pregunta y sugerencia.

SR. JOSÉ SANTIAGO:

Okey. Gracias.

ING. PÉREZ:

No, a ustedes.

SRA. ELSA RIVERA:

Buenas noches. Elsa Rivera de Lajas. Quería saber si durante la construcción los que estamos por la 321 vamos a perder el acceso en algún momento hacia la 122 o seguir derecho.

ING. PÉREZ:

No, como todo proyecto de construcción, ¿verdad?, como parte del desarrollo del proyecto se, se genera un plan de mantenimiento de tráfico, en el cual se tratan de mantener los accesos actuales antes de o existentes del proyecto, ¿verdad?, y si fuera necesario se crean los desvíos correspondientes. El proyecto, por lo menos lo que estamos planificando, ¿verdad?, una vez salga de la 321, no creo que tengamos un impacto directo, porque entro a campo traviesa y tengo muchos tramos que no debería afectar su flujo normal que tienen ahora.

Sabemos que cuando hay construcción siempre hay una pequeña de incomodidad, porque hay que poner unas barreras de seguridad y cumplir con unos requisitos, pero tal vez cuando estemos construyendo y estemos más adelantado, cuando vayamos a poner las vigas del puente, es posible que

haya unos cierres momentarios a lo que se colocan esas vías, pero ese día sería único impacto. O sea, en términos de acceso no lo estarían perdiendo, en ese sentido.

SR. JOSÉ GALARZA:

Sí, muy buenas, mi nombre es José Galarza, residente de Lajas. Mi intención es dar un represen.... un relativo no al proyecto, sino a la intención del proyecto, que es mejorar el flujo vehicular de la 122. Cuando se hizo la Castro Pérez, que termina en el cruce de la 166, el tramo de la 166 a la 102, que la 102 viene siendo la Avenida Interamericana...

ING. PÉREZ:

Unjú.

SR. JOSÉ GALARZA:

...son los últimos 500 metros de lo que se hizo de la Castro Pérez. De siempre, siempre, siempre, de los cuatro carriles que hay allí, siempre se han bloqueado dos a nivel de estacionamiento. Y esto sería tal vez para la Autoridad de Carreteras, Obras Públicas y tal vez para el Gobierno Municipal de San Germán, para que se vaya haciendo ya un plan para ir orientando al ciudadano en San Germán de que ya eso va a ser próximamente un carril.

Que pongan tal vez rotulación de prohibido estacionarse mucho antes de que el proyecto se termine, para que ya esa conciencia esté de que eso no se puede estacionar,

no se puede usar, para que el flujo sea completamente y se puede utilizar los cuatro carriles que ustedes planean...

ING. PÉREZ:

Perfecto.

SR. JOSÉ GALARZA:

...poner en San Germán. Que viene siendo lo que llaman la Farmacia Magie. De ese tramo que hay allí. Que eso es... de siempre ha sido estacionamiento y ya esa es la mentalidad en San Germán que eso es parking.

ING. PÉREZ:

Okey.

SR. JOSÉ GALARZA:

Esa es mi preocupación.

ING. PÉREZ:

Okey. La tomáremos en consideración y si habría que trabajar alguna medida o una mitigación en ese sentido, pues, se incluiría la rotulación pertinente, ya en términos de lo que es el límite del proyecto, ¿verdad? Estamos hablando que esto es un poquito más fuera del límite del proyecto porque, ¿verdad?, no está dentro del alcance original del proyecto, pero nos llevamos su preocupación y, y, y la discutiríamos con, con la Autoridad de carreteras.

SR. JOSÉ GALARZA:

La intención se pierde.

ING. PÉREZ:

Ah, nuevamente, para récord el ingeniero Miguel Pérez.

SR. JAIME CAMACHO:

Sí, buenas noches.

ING. PÉREZ:

Buenas noches.

SR. JAIME CAMACHO:

Mi nombre es Jaime Camacho Román, residente de nuestro Municipio de Lajas. Seis puntos para expresarme. Actualmente, ¿qué trabajos se han realizado o se están realizando? ¿O es ninguno como tal?

ING. PÉREZ:

Actualmente, ya lo que es el plano preliminar se completó. Los estimados de costos, la mayoría o todos los estudios ambientales están completados. Actualmente, nos encontramos ya discutiendo el primer borrador del documento ambiental. Como les mencionamos, nos quedan dos discusiones con dos agencias, que sería Recursos... Departamento de Recursos Naturales para la parte de hábitat y el 'step' 8, que es una publicación en términos de unidades y cuerpos de agua. Una vez completemos esos dos... esas dos coordinaciones, ya al documento ambiental se le hace una última revisión y saldría publicación.

SR. JAIME CAMACHO:

¿Quiere decir que si yo deseo acceder a los estudios,

tengo acceso total a ellos?

ING. PÉREZ:

Sí, sí.

ING. RODRÍGUEZ:

¿Cómo? ¿Perdón?

ING. PÉREZ:

Accesos a los estudios.

SR. JAIME CAMACHO:

Pregunto. Que si yo deseo tener acceso a los estudios de impacto, ¿ya están accesibles para...?

ING. RODRÍGUEZ:

No, no están accesibles. Luis Rodríguez para récord. No están accesibles todavía porque requieren unas revisiones. El consultor somete el documento, nosotros revisamos, discutimos con las agencias, añadimos comentarios si ellos tienen y una vez que ellos nos dicen que está disponible para el público, entonces es que comienza ese proceso de difusión pública. Todavía no están disponibles para el público.

ING. PÉREZ:

Okey.

SR. JAIME CAMACHO:

¿Fuera de los tres puentes mencionados, quiere decir que el resto de la carretera es abrir monte abierto completamente?

ING. PÉREZ:

Para récord el ingeniero Miguel Pérez. Correcto. Existen alrededor de dos desmontes principales. El primer desmonte o, o corte, ¿verdad?, sería ubicado en, en, en la intersección de la PR-321. Y el segundo desmonte está ubicado entre terminando el puente de la... el puente 1-A, que es el que salva las estructuras arqueológicas, y la Comunidad El Retiro.

SR. JAIME CAMACHO:

Okey. El otro punto. En las vías podemos observar un arco bien pronunciado, como tal. ¿Cuál es el propósito de ese arco?

ING. PÉREZ:

Para efecto de récord el ingeniero Miguel Pérez de nuevo. ¿El, el arco se refiere a este que está presentado aquí?

SR. JAIME CAMACHO:

No, antes, antes.

ING. PÉREZ:

Déjeme ir para acá.

SR. JAIME CAMACHO:

El que sube desde el... desde el monte y va llegando casi a la... a la quebrada. Sí, no, ese. ese arco allí.

ING. PÉREZ:

¿Este de aquí?

SR. JAIME CAMACHO:

Ese completo hasta llegar a El Retiro.

ING. PÉREZ:

Okey. Cuando se... Bueno, ¿puede repetir la pregunta si no es mucha molestia?

SR. JAIME CAMACHO:

¿Por qué... por qué tan pronunciado...

ING. PÉREZ:

Ah, okey.

SR. JAIME CAMACHO:

...el arco este...

ING. PÉREZ:

Okey.

SR. JAIME CAMACHO:

...donde usted está marcando a llegar a la quebrada sin nombre como usted mencionó?

ING. PÉREZ:

Sí, al principio, como traté de explicar, el, el, el área de estudio, aquí, la parte topográfica del proyecto, si yo entraba más hacia acá lo que eran los, los cortes o los rellenos del proyecto me aumentaban, afectaban más a esta comunidad. Por ende, siempre en reglamento, ¿verdad?, con los requisitos de la Carretera R-5 se diseña esta curvatura, ¿verdad?, que es la que menciona aquí, pero el propósito es eso, evitar aumentar lo que sería el desmonte

de terreno, utilizar parte del sobrante del material de, de relleno... de corte que sale de esta intersección y este otro cortecito que tenemos aquí, poder depositarlo en esa área.

Eso, ¿verdad?, como parte del diseño se determina el radio mínimo, se da el peralte correspondiente para que la carretera esté en cumplimiento con las velocidades marcadas, ¿verdad?, y siempre se toma un, un efecto de seguridad. Pero la razón principal fue, pues, evitar o tratar de balancear lo que es el movimiento de tierra del proyecto.

SR. JAIME CAMACHO:

¿Quiere decir que, entonces, no sería viable en, en línea recta de allí de donde usted está marcando a terminar acá en El Retiro?

ING. PÉREZ:

Es correcto. El, el primer punto como ingeniero de tránsito es del punto A al punto B es una línea recta. Lamentablemente, a veces, pues tenemos restricciones de terreno, restricciones ambientales que no lo permiten, ¿verdad? Y en este caso, pues como te menciono, a nivel topográfico, a nivel de condiciones, pues fueron las limitaciones que tuvimos en ese sentido.

Tratamos de hacerlo lo más recto posible, pero dentro de las evaluaciones que hicimos, lo que hacía era aumentar

más los costos, agravar un poquito más la situación ambiental y al final, pues, ¿verdad?, dentro de la evaluación que se hizo, la alternativa más costo-efectivo era hacer esta lineación tipo S... tipo S o tipo curva, ¿no?, en ese sentido. Pero ambas están diseñadas, ¿verdad?, para que cumplan con la velocidad de, de diseño, ¿verdad?, de la carretera. Que en términos de seguridad a los usuarios no deberían tener ningún, ningún problema, en ese sentido.

SR. JAIME CAMACHO:

¿Los proponentes del proyecto, qué beneficio voy a tener yo en tiempo de llegada en dicho... en dicho tramo contrario a la 101?

ING. PÉREZ:

Excelente pregunta. El, el, el proyecto, ¿verdad?, si lo vemos como un solo, el tiempo de recorrido entre la 321 y la que usan actualmente, que es la 166, la diferencia son minutos. No, no es 4 o 3 minutos como mucho en diferencia. El beneficio mayor, ¿verdad?, de, de completar la ruta es la conexión de la PR-2 de San Germán ¿verdad?, desde la PR-2 hasta el área de Lajas. Y ahí hay una economía, ¿verdad?, casi de 15 o 16 minutos, según los, los estudios.

Me explico, ¿verdad? Si yo lo veo como un solo, ¿verdad?, pues tal vez la ruta que uso por aquí para llegar a este punto, no hay un, un, un beneficio que llegue a más

de 10 minutos, porque estamos hablando que el recorrido es como entre 4 a 5 minutos lo que pudimos correr en aquel... en aquel momento. Puede ser que sea menos en algunos puntos fuera de hora pico, ¿verdad?, pero en los momentos que lo estudiamos estuvimos en ese recorrido entre 4 a 5 minutos.

La diferencia de aquí, pues sí, reduce a un minuto y medio, pero a lo mejor dicen, "¿Pero estamos invirtiendo para 3 minutos?". Pero no, tenemos que verlo que es un plan. Es un macro, ¿no?, ¿verdad?, y lo que queremos es conectar la PR-2 con el área turística de San Germán en una ruta más, más accesible y, y más, más, más segura.

SR. JAIME CAMACHO:

Y última inquietud. ¿Por qué se realizaron las, las vistas en Lajas y no en San Germán, cuando es a San Germán a quien le compete el, el proyecto?

ING. PÉREZ:

Con mucho gusto. Sí, no, como mencionó por ahí uno de sus... de los compañeros... de los residentes, la primera que pudimos coordinar fue la de Lajas. San Germán, ya estamos en, en diálogo, ¿verdad?, con el... con el señor alcalde. Esperamos que en las próximas semanas podamos coordinar el lugar y la y la localización, enviar el aviso público y hacerlo. La intención de la Autoridad de Carreteras y nosotros es realizar dos talleres informativos

en cada uno de los municipios.

SR. JAIME CAMACHO:

Gracias, muy amable, de su parte.

ING. PÉREZ:

No, gracias a usted. Buenas noches.

SR. JAVIER RODRÍGUEZ:

Javier Rodríguez, dueño de finca y proyecto. ¿Esa comunidad que está a la parte de arriba cuál es?

ING. PÉREZ:

Te la busco ahora. Para efecto del récord, el ingeniero Miguel Pérez. Esa creo que te la debo. Dame un segundito por aquí, a ver si puedo hacer esa...

ING. RODRÍGUEZ:

¿Alguien aquí es de San Germán? ¿La curva arriba eso es lo que llaman...?

ING. PÉREZ:

Esta de aquí. ¿Cómo se llama?

PERSONA SIN IDENTIFICAR:

Chorro Colí.

ING. PÉREZ:

¿Choco Colí?

PERSONA SIN IDENTIFICAR:

Chorro Colí.

ING. PÉREZ:

Ah, Chorro. Okey. Disculpen que no me sepa la

comunidad. Así que les pido disculpas.

ING. RODRÍGUEZ:

Okey. Sabemos que esto es un área de conservación para la vida... la vida silvestre...

ING. PÉREZ:

Unjú.

ING. RODRÍGUEZ:

...que está en peligro de extinción. ¿Qué presión le va a causar a las fincas adyacentes que ya tienen proyectos sometidos prácticamente, a sus finales que ahora Fish and Wildlife les pueda poner... los puedan poner como conservación y como pararles el proyecto?

ING. PÉREZ:

Esa es una muy buena pregunta.

ING. RODRÍGUEZ:

Bueno, nosotros coordinamos con el Fish and Wildlife Service y con Recursos Naturales. Las áreas de conservación las determinan dichas agencias. No somos nosotros, ¿verdad?

ING. PÉREZ:

Unjú.

ING. RODRÍGUEZ:

Nosotros presentamos nuestros proyectos y coordinamos con ellos. Y establecemos con ellos acuerdos, ¿verdad? Si hay impacto sobre especie en peligro de extinción,

establecimos medidas de mitigación y compra de terrenos que se les ceden a ellos a perpetuidad. Pero los terrenos adyacentes no es... no está bajo nuestra jurisdicción. Eso está bajo la jurisdicción...

ING. PÉREZ:

Es la jurisdicción de ellos mismos.

ING. RODRÍGUEZ:

...de otras agencias.

SR. JAVIER RODRÍGUEZ:

O sea, ¿puede haber un impacto sobre esos terrenos?

ING. RODRÍGUEZ:

No te...

SR. JAVIER RODRÍGUEZ:

Ya que estas, estas franjas que van a cortar, la vida silvestre, obviamente, no se va a quedar ahí, porque va a haber contaminación, va a haber ruido y se van a expandir a las áreas alrededor. Por lo cual, va convertir toda esa área en conservación, parando proyectos, parando desarrollo, parando extensiones de familias, poder añadirles a casas, poder añadir marquesinas.

ING. RODRÍGUEZ:

Por el proyecto de nosotros no es. Recursos Naturales y Fish and Wildlife Service tienen sus normas, tienen su reglamento.

SR. JAVIER RODRÍGUEZ:

Correcto.

ING. RODRÍGUEZ:

Cuando usted somete un proyecto, usted tiene que cumplir con todas las normas estatales y federales, de acuerdo a lo que ellos les indiquen, ¿verdad?...

SR. JAVIER RODRÍGUEZ:

Unjú.

ING. RODRÍGUEZ:

...y con eso tiene que cumplir. No hay forma. Nosotros no tenemos control sobre eso. Nosotros somos una agencia, ¿verdad?, de Carreteras que coordinamos todos los impactos ambientales de nuestros proyectos con ellos y cumplimos con las normas estatales y federales.

SR. JAVIER RODRÍGUEZ:

¿Qué beneficio le tiene esta carretera a San Germán?

ING. PÉREZ:

¿A San Juan o a... ¿A San Juan?

SR. JAVIER RODRÍGUEZ:

A San Germán.

ING. PÉREZ:

A San Germán, a San Germán. El beneficio...

SR. JAVIER RODRÍGUEZ:

Porque no tiene ningún conector, excepto con El Retiro, para ningún otro barrio. Christian, quizás.

ING. PÉREZ:

Sí, como le mencioné... Para récord el ingeniero Miguel Pérez nuevamente. El beneficio... Como les mencionamos, buscamos un beneficio en término regional. De que el proyecto atraviesa San Germán y atraviesa Lajas, ¿verdad?, que ver como un conjunto.

Si planteamos, ¿qué beneficio San Germán podría tener? Pues, es algo bastante especulativo, ¿verdad?, porque como vemos, a lo mejor el punto de interés, si lo vemos desde el punto de vista estratégico, es Lajas, ¿verdad? Más se va a beneficiar Lajas que San Germán, pero de algún modo ¿verdad?, otros s estudios han reflejado que un buen sistema de transporte, ¿verdad?, efectivo, seguro, en, en alguna medida pequeña o, o, o mínima, por decirlo, no cero, recibe ese estado, ¿verdad?, o esas condiciones.

Un ejemplo, te puedo dar algunos de mejoras de Carreteras que han beneficiado y han creado mayor movimiento de vehículos y esas regiones se han, han... eso, eso... esas, esas localizaciones, esos lotes dentro de esa esas...

SR. JAVIER RODRÍGUEZ:

¿Esta carretera se va ...

ING. PÉREZ:

...que esas carreteras se han beneficiado.

SR. JAVIER RODRÍGUEZ:

a convertir en un 'toll road'...

ING. PÉREZ:

Esas carreteras se han beneficiado.

SR. JAVIER RODRÍGUEZ:

...en algún momento?

ING. PÉREZ:

¿Perdón?

SR. JAVIER RODRÍGUEZ:

¿Va a convertirse en un 'toll road' en algún momento?

ING. PÉREZ:

No, eso no está planificado. Por el momento, en el documento ambiental no se ha está...

SR. JAVIER RODRÍGUEZ:

Por el momento, ¿pero hay posibilidad?

ING. PÉREZ:

Ya eso es algo que, que Carreteras es... Pero entiendo que... Si se le va a poner algún peaje.

ING. RODRÍGUEZ:

No, no tiene peaje.

SR. JAVIER RODRÍGUEZ:

Hasta el momento.

ING. RODRÍGUEZ:

No tiene peaje. Si, si, si se le fuera a poner peaje, lo hubiéramos incluido en documento ambiental.

ING. PÉREZ:

Sí.

ING. RODRÍGUEZ:

No tiene peaje.

ING. PÉREZ:

No tiene peaje.

SR. JAVIER RODRÍGUEZ:

'So', la pregunta original...

ING. RODRÍGUEZ:

Por lo menos, este proyecto....

SR. JAVIER RODRÍGUEZ:

...¿la conservación va a expandir...

ING. RODRÍGUEZ:

...no va a tenerlo.

SR. JAVIER RODRÍGUEZ:

...de la franja de la carretera hacia afuera?

ING. PÉREZ:

La conver... Los, los terrenos que estaríamos utilizando para conservar van a estar dentro de lo que sería el corredor de estudio. El área de donde se va extender se va a tratar de limitar a lo que es el estudio, ¿verdad? Por mencionarte, se han identificado una serie de remanentes de parcelas, que en algún momento o se están quedando enclavadas porque se pierde su acceso...

SR. JAVIER RODRÍGUEZ:

Unjú.

ING. PÉREZ:

...pues la negociación es mostrarle a ellos que esas parcelas que se están quedando tienen el mismo valor ecológico que ellos requieren para cederlas. Si ellos están de, de acuerdo, pues esa franja que se acordó, por decirte dos cuerdas, tres cuerdas, esas tres cuerdas...

SR. JAVIER RODRÍGUEZ:

¿Pero esas franjas van a ser allí en...

ING. PÉREZ:

Dentro de, de... Cerca, cerca del corredor de estudio del proyecto.

SR. JAVIER RODRÍGUEZ:

Cerca.

ING. PÉREZ:

No, no fuera del proyecto ni... La Autoridad en otros proyectos ha buscado parcelas en otros predios, pero como le mencionamos...

SR. JAVIER RODRÍGUEZ:

¿A cuánta distancia del Barrio en móvil más o menos?

ING. PÉREZ:

Va a depender, pero eso, eso... ese dato, como no hemos llegado a un acuerdo, no te puedo decir ahora, "Mira, van a ser cinco cuerdas, seis cuerdas". Pero a base de los

estudios estamos hablando que el acuerdo va a ser una transferencia de alrededor de 200 cuerdas que tendríamos que cederle.

SR. JAVIER RODRÍGUEZ:

¿Cuántas cuerdas está afectando el tramo como tal?

ING. PÉREZ:

Alrededor de... Creo que estamos en las.. En dos cuerdas nada más tengo 200, alrededor de 300, 400 cuerdas.

SR. JAVIER RODRÍGUEZ:

O sea, que es bastante.

ING. PÉREZ:

No todas. Y, y aclaro, no, no todas. El, el impacto del proyecto, ¿verdad?, toca una totalidad de 400 cuerdas, ¿verdad?, pero la huella como tal estamos hablando que son 45 cuerdas. Para que tengas una idea, son remanentes que están quedando. Yo puedo tener una parcela que tiene 100 cuerdas, pero solamente le estoy adquiriendo 5 cuerdas, pero en mi término de consideración estoy tocando alrededor de, de esas cuerdas. Pero el impacto directo de la carretera son 45 cuerdas.

SR. JAVIER RODRÍGUEZ:

¿Este proyecto ya estará afectando a otros?

ING. PÉREZ:

¿Otros terrenos?

SR. JAVIER RODRÍGUEZ:

Otros proyectos...

ING. PÉREZ:

Por lo menos...

SR. JAVIER RODRÍGUEZ:

...que estén en marcha.

ING. PÉREZ:

...entendemos que no, ¿verdad? Con la planificación de este proyecto, hasta donde yo sé, la Autoridad de Carreteras no tiene más intervención en esta región. Habría que verlo con planificación estratégica. Nos podemos llevar ese, ese, ese punto y, y para la próxima visita que tengamos traerles una contestación a eso, pero hasta donde yo sé es completar este tramo de la 321.

Sé que dentro del documento de planificación de la Autoridad de Carreteras, estratégica, tiene una serie de proyectos que quieren desarrollar, ¿verdad?, pero ahora mismo no, no tengo el conocimiento y sería una falta de respeto yo decirte, "Sí, mira, este es lo único". Pero me llevo el ejercicio y te lo... te lo dejo saber.

SR. JAVIER RODRÍGUEZ:

Gracias.

ING. PÉREZ:

Está bien. Cómo no.

SRA. MODERADORA:

Para récord, Olga Pagani. Queremos incorporar al honorable Alcalde del Municipio de Lajas, Jason Martínez Maldonado, para un saludo.

SR. ALCALDE:

Bueno, buenas noches. Les extiendo un saludo. Disculpen la tardanza, pero tenía otros compromisos previos. Yo creo que, que este proyecto me parece espectacular. Yo creo que estas vistas son necesarias. Yo sé que se empezaron por acá por Lajas, pero comoquiera que sea, esto es un proyecto que se está retomando, que ya tiene muchos estudios adelantados. Es mi prioridad conectar a Lajas con San Germán y San Germán con Lajas.

Tendrán muchas preocupaciones. Yo creo que se han atendido muchas en la noche de hoy. Estas vistas se harán en San Germán también, para beneficio de nuestro vecinos sangermeños. Que yo creo que aquí hay más gente de San Germán que de Lajas. Bienvenidos a Lajas a todos.

Espero que el proyecto les guste, espero que aclaren todas sus dudas, ¿verdad? Y esto, esto, de verdad, lo que nos trae es progreso. Nos trae muchas ventajas, tanto en, en, por ejemplo, una emergencia de nosotros los adultos que tengamos que utilizar esta carretera para ir al, al hospital en San Germán, ya que en el CDT, tal vez no contamos con muchos equipos todavía para atender muchas

necesidades.

Yo voy a seguir trabajando mano a mano con este proyecto, junto al alcalde de San Germán, porque esto no se trata ni de colores ni nada más que sea la salud del pueblo de San Germán y la salud del pueblo de Lajas. Así que dicho esto, aquí tienen un amigo. Yo le voy a estar dando duro a esto, seguimiento, persecución, para que se dé este proyecto.

Así que yo les doy las gracias por venir a estas vistas aquí en Lajas, aclarar las dudas. Los que queden con dudas, pues pronto se va a estar anunciando una fecha en San Germán para que aclaren todas sus dudas, ya que este proyecto impacta mucho el Municipio de San Germán. Estamos hablando que esto es un 90 por ciento San Germán y un 10 por ciento nuestro pueblo de Lajas.

Pero yo sé que el alcalde allá en San Germán y este servidor estamos bien interesados, bien dispuestos a que esto se dé. Buenas noches para todos y gracias por estar aquí con nosotros esta noche. Los dejo para que terminen aquí las, las vistas.

ING. PÉREZ:

Muchas gracias.

SR. RICKY MARTÍNEZ:

Muy buenas... muy buenas noches. Mi nombre es Ricky Martínez, de aquí del área de Santa Rosa, Lajas. Gracias

a ustedes por la presentación esa. Yo creo que es un proyecto que hacía falta por muchos años. Lo digo por, por, mayormente mi comunidad en donde yo vivo, es una comunidad envejeciente, ¿no? Donde la facilidad de llegar a dos hospitales grandes que tenemos aquí, que es La Concepción, se nos hace más fácil.

Yo creo que la carretera vieja, que yo le llamo, es incómoda, es un poco peligrosa, tanto para la ambulancia y para cualquier equipo de emergencia. Mucha gente se preocupa por la cuestión, ¿cómo es?, ecológica, pero nosotros... somos nosotros mismos los puertorriqueños los que hacemos el peor trabajo en eso. Si no cuidamos nuestras tierras, no le podemos echar la culpa al Departamento de Transportación. Somos nosotros que tenemos que cuidar nuestros terrenos.

Quiero hacer una pregunta y es, se usa mucho en la comunidad de Lajas, tanto San Germán con la cuestión de la bicicletas, 'mountain bikes' y 'road bikes'. ¿Ustedes van a crear un, un acceso para como se hace muchas veces en Estados Unidos, donde hay un 'bike line'?

ING. PÉREZ:

Sí, buenas noches. Para efecto de récord, Miguel Pérez nuevamente. Como en el proyecto se mencionó, hay una serie de carriles de, de bicicletas, ¿verdad?, 'mountain bike' y como parte del desarrollo del proyecto tratamos de

minimizar el impacto a estas, ¿verdad?

Como le mencioné, hay una serie de, de desmontes o cortes en la... en la carretera que algunos de esos caminos, ¿verdad?, que fueron construidos por residentes o por otros, se verían afectados. Pero entendemos, ¿verdad?, que una vez completado el proyecto la continuidad de esos... de esos caminos puede, puede reabrirse de nuevo. Se están dejando unos accesos o unos puntos estratégicos, ¿verdad?, de que se le pueda dar continuidad, ¿verdad?

La, la Autoridad de Carreteras puede adquirir terrenos, pero su propósito es construir carreteras, ¿verdad?, no es... y, y tratar de mantener, ¿verdad? Y durante nuestra investigación de título, pues, no pudimos identificar una titularidad de esos caminos. Por ende, pues, ellos como agencias de gobierno, pues no pueden entrar a trabajar en eso, pero como parte de, de, de su conciencia, ¿verdad?, tratamos de minimizarlos y mantenerlos y afectarlos lo menos posible.

SR. RICKY MARTÍNEZ:

No, pero...

ING. PÉREZ:

Pero, sí, se dejan unos puntos de acceso, especialmente debajo del puente y eso, tú sabes.

SR. RICKY MARTÍNEZ:

No, yo, yo entiendo los 'trails'.

ING. PÉREZ:

Sí.

SR. RICKY MARTÍNEZ:

...que no están en la carretera.

ING. PÉREZ:

No, el, el...

SR. RICKY MARTÍNEZ:

Es un 'bike lane' en la carretera, como se hace en...

ING. PÉREZ:

Ah, no, disculpe, no. Ingeniero Miguel Pérez. No, la carretera no se está considerando como una carretera completa, ¿verdad? Simplemente se está dando carriles de... para vehículos, ¿verdad? No, no considera un 'bike lane' paralelo a, a, a la... a la carretera. Estamos tratando de mantener la misma sección de carretera que tenía originalmente y veamos que lo que quisiéramos crear es como una arteria entre, entre la PR-2, Municipio de Lajas y San Germán.

Tal vez el uso de vehículos a través de la carretera no sea la carretera muy segura para ese sentido, pero por el momento no se está considerando. No quiere decir que no, ¿verdad? Es una sugerencia que nos podríamos llevar, pero como dato técnico, por lo menos la visión en este momento, es que sea un colector, ¿verdad?..

SR. RICKY MARTÍNEZ:

Okey.

ING. PÉREZ:

...en ese sentido.

SR. RICKY MARTÍNEZ:

Pues muchas gracias.

ING. PÉREZ:

Cómo no.

SR. ADALBERTO VILLAFLORES:

Sí, buenas noches a todos. Mi nombre es Adalberto Villaflores. Soy el presidente de la Legislatura Municipal de San Germán. Considero que es un proyecto favorable para ambos pueblos, Lajas y San Germán, y es por la accesibilidad. Mucha gente de Lajas viene a tener servicios médicos a San Germán. Igual, San Germán puede moverse fácilmente a Lajas.

Yo he sido testigo de que yo estoy en el pueblo de San Germán y para un... para un carro y me dice, "¿Por dónde cojo para Lajas?" y uno tiene que decirle, "Coge por aquí, después subes a la izquierda, después a la derecha". O sea, por esta avenida sería fácil. "Mira, coge esta avenida y llegas directamente a Lajas".

O sea, es beneficioso para los turistas que vienen de Lajas a San Germán y los turistas de San Germán que van a Lajas. Eso ayuda al comercio. Así que eso es todo.

Gracias.

ING. PÉREZ:

Muchas gracias.

SR. JAIME CAMACHO:

Jaime Camacho Román, nuevamente para record. ¿Se tiene conocimiento o ya se sabe cuál es el costo total del proyecto?

ING. PÉREZ:

Sí, buenas noches. Para efecto de récord, ingeniero Miguel Pérez. Sí, el proyecto empezamos con alrededor cuarenta y pico, cuarenta y pico de millones dólares con las cambios que hemos tenido que hacer. La Autoridad de Carreteras en estos tiempos está experimentando un incremento en costos de construcción y manos de obra. Actualmente, estamos estimando que el proyecto al final de completar los estudios, estaríamos haciendo una inversión de alrededor 60, 60, $60,000,000 aproximadamente.

SR. JAIME CAMACHO:

Gracias.

ING. PÉREZ:

Gracias.

SR. JOSHUA CORDERO:

Buenas noches, Joshua Cordero, residente de la 321. Mi propiedad es la que queda en la salida que vendría de San Germán hacia la 321, la que queda en la misma esquina.

En cuanto a la distancia de la salida hacia la propiedad, ¿más o menos, tiene un aproximado a qué distancia quedaría? Y si hay alguna medida de seguridad en cuanto al... a las vallas de seguridad.

ING. PÉREZ:

Déjame, déjame buscarlo. ¿Me dijiste en la 321?

SR. JOSHUA CORDERO:

Correcto.

ING. PÉREZ:

¿Ahí?

SR. JOSHUA CORDERO:

Es en la foto anterior.

ING. PÉREZ:

¿Más o menos me dices dónde está ubicada tu propiedad?

SR. JOSHUA CORDERO:

La propiedad es la que queda cuando tienes la salida que baja de San Germán hacia la 321. Esa de aquí.

ING. PÉREZ:

¿Por aquí?

SR. JOSHUA CORDERO:

Esa de ahí.

ING. PÉREZ:

¿Esa de aquí?

SR. JOSHUA CORDERO:

Sí.

ING. PÉREZ:

Mira, de aquí a esta... a esta distancia... Déjame ver. Ingeniero Miguel Pérez, para efectos de récord. Como parte de las... de las consultas que hacemos con la Autoridad de Carreteras y Control de Acceso, ¿verdad?, ellos por medidas de seguridad recomiendan que desde la entrada o la salida hacia un punto se cumpla con una distancia mínima. Esa distancia varía dependiendo de la zonificación y el tipo de carretera.

Para este tipo de carretera estamos hablando entre 10 a... entre 15 a 25 metros. Aquí estamos hablando de unos 30 metros. O sea, que no deberías tener ningún problema en ese sentido en términos de seguridad. Barreras de seguridad, en ese momento, entiendo que no tengo en ese proyecto porque no vimos la necesidad, pero cualquier preocupación, ¿verdad?, en ese sentido nos la llevamos y, y la evaluamos.

SR. JOSHUA CORDERO:

Okey.

ING. PÉREZ:

Vale.

SR. JOSHUA CORDERO:

Muchas gracias entonces.

SRA. DORA MARRERO:

Mi nombre es Dora Marrero. Yo soy residente del

Sector Christian, en el sector Las Piedras. Una pregunta. Ya que se está protegiendo la fauna, pregunto, ¿no llegaron a encontrar cuevas en esa zona?

ING. PÉREZ:

Por lo menos, los estudios geotécnicos que hicimos dentro del corredor de estudio no identificaron cuevas. Como le mencioné, a término ambiental fuimos a un corredor más amplio, pero el, el estudio geotécnico se limita más al área de impacto. Por lo menos, en la área de impacto del proyecto no se identificaron esas cuevas. Si existiera alguna cueva, ¿verdad?, estaría fuera de lo que sería el límite de construcción del proyecto o algún sumidero no se vería afectado con el proyecto porque no se pudo identificar.

SRA. DORA MARRERO:

Sí, pues yo, yo sé del sumidero...

ING. PÉREZ:

Unjú.

SRA. DORA MARRERO:

...porque yo vivo en el Sector Las Piedras y caminábamos por la Quebrada Medina...

ING. PÉREZ:

Sí.

SRA. DORA MARRERO:

...y por ahí encontrábamos sumideros. Que son los que

alimentan la Quebrada Maresúa. O sea, que la Quebrada Maresúa se alimenta arriba en el monte. Tal vez algunos de esos montes que hay por allí son cuevas, porque eso son aguas subterráneas que bajan al sumidero y por ahí siguen...

ING. PÉREZ:

Seguro.

SRA. DORA MARRERO:

...por una piedra y quedan en Maresúa.

ING. PÉREZ:

No, excelente por su comentario, ¿verdad? Ingeniero Miguel Pérez de nuevo. Precisamente, eso es lo que queremos saber de estas vistas, ¿verdad? Nosotros no podemos conocer toda el área. Si ya ustedes caminan por ahí y las vean...

SRA. DORA MARRERO:

Sí.

ING. PÉREZ:

...e identifican esas áreas, pues yo me llevo esa preocupación y verificamos, ¿verdad? Si hubiera que implementar algo, pues se tomaría en consideración.

SRA. DORA MARRERO:

Esa quebrada tiene muchos árboles de ceiba.

ING. PÉREZ:

Unjú.

SRA. DORA MARRERO:

Tiene vivienda para muchas aves endémicas.

ING. PÉREZ:

Okey.

SRA. DORA MARRERO:

Y también hay pozos.

ING. PÉREZ:

Okey. Y para cuestión de ubicarme, estaríamos hablando, entiendo que el camino es por aquí un poquito más abajito para acá, ¿verdad?

SRA. DORA MARRERO:

No, eso es... Eso desemboca para Maresúa, la parte de...

ING. PÉREZ:

Sí, lo veo acá. Sí, sería más o menos, como por este punto por aquí. De aquí estaríamos hablando. Si no me equivoco, la quebrada que usted menciona es una que sale por aquí de sale de...

SRA. DORA MARRERO:

La que sale por el Chorro de Colí.

ING. PÉREZ:

Correcto.

SRA. DORA MARRERO:

Esa es la que sale a Chorro de Colí, que emana de una montaña bien grande que hay. Ahí sale el chorro de agua y

coge...

ING. PÉREZ:

Ah, okey.

SRA. DORA MARRERO:

...y se va derecho abajo.

ING. PÉREZ:

Ya estoy ubicado. Muchas gracias.

SRA. DORA MARRERO:

Okey. Entonces, le iba a decir, me alegra mucho este tramo, primero, por seguridad. Porque nosotros que vivimos allí tenemos que dar la vuelta por la cuesta o por, por la otra zona de Maresúa. Y eso en es cuestión de... en una emergencia eso es vida o muerte. Porque en una tormenta nosotros quedamos incomunicados por los árboles. Allí sería una ventaja porque ese es un tramos bien corto.

Segundo. Para el turismo, excelente. San Germán se beneficia mucho porque pueden rotular todas esas zonas históricas. De todo Puerto Rico vienen allí y económicamente, hay progreso, negocio. O sea, que esto es un proyecto espectacular.

ING. PÉREZ:

Muchas gracias.

SRA. DORA MARRERO:

Segundo. Me imagino que le pondrán rótulo a esas zonas turísticas para que la gente de otros pueblos puedan

venir a verlo, de otros países puedan venir a verlo también. Que usted explicó que el alumbrado lo van a colocar. La rotulación, pues, por seguridad.

ING. PÉREZ:

Sí.

SRA. DORA MARRERO:

Porque dicen, "¿Cómo llego a Lajas? ¿Cómo llego a San Germán?". Pues poner unos rótulos gigantes, porque a veces que los rótulos son pequeñitos, viene alguien y los tumba y se quedan y no los ponen y a las personas uno tiene que estar indicándoles cómo llegar a los sitios y a veces ni llegan.

Entonces, déjeme ver algo más. Okey. Señales para orientación y turismo. Entonces, la conservación de... la protección de las aves en peligro de extinción por Recursos Naturales. Pero me preocupa esta área de la... de los pozos que hay por allí, porque en una ocasión yo bajé por esa quebrada y encontramos la palanca que usan para sacar el agua todavía está existente. Están tapadas con, con las hojas de la bambúa.

ING. PÉREZ:

Okey.

SRA. DORA MARRERO:

Porque hace muchos años, muchos años, alguien iba a construir una iglesia por allí. Recursos Naturales le

pidió un espacio que tiene que tener entre la construcción y las... y las quebradas. La persona no quiso admitir que eso tenía que hacerlo por ley. Por lo tanto, no le dieron permiso para que fabricara.

Pero lo importante es que esta quebrada que va por Las Piedras, que yo camino por ella y salgo adonde está el, el Centro de Ancianos que está aquí en San Germán. El Centro de Ancianos, allí con un conector tú caminas a pie, porque eso es un camino vecinal y te lleva directamente a la curva de... Esa es la curva de los perros.

ING. PÉREZ:

Okey.

SRA. DORA MARRERO:

Y ahí eso es un tramo cortito para poder llegar.

ING. PÉREZ:

Okey.

SRA. DORA MARRERO:

Pero que me alegra mucho de este proyecto.

ING. PÉREZ:

Gracias.

SRA. DORA MARRERO:

Es un avance al 100 por ciento, porque en una emergencia los minutos cuentan. Y allí yo creo que ustedes se la, como dicen por ahí, se la comieron.

ING. PÉREZ:

Muchas gracias, muchas gracias.

SR. JAIME CAMACHO:

Jaime Camacho, nuevamente para récord. Usted mencionó, Pérez, que terminando el proyecto son alrededor de $60,000,000. Okey. ¿Ya esos fondos están segregados=? ¿Ya están señalados de dónde se van a sacar?

ING. RODRÍGUEZ:

Como indiqué... Luis Rodríguez para récord nuevamente. Como indiqué al principio del saludo, ¿verdad?, este proyecto tiene varios, varios fondos. Tiene fondos de la Administración Federal de Carreteras, pero el fondo principal es del Departamento de la Vivienda Federal, HUD, por sus siglas en inglés. HUD es el que está auspiciando este proyecto. Hay $3,000,000 que son de la Administración Federal de Carreteras.

Eso es un dinero que, que consiguió cuando era Comisionada Residente la gobernadora, ¿verdad? Están allí y hablamos con la Administración Federal para unirlos a este proyecto. Así que todo el dinero referente a este proyecto está separado para su construcción.

SR. JAIME CAMACHO:

O sea, ¿que según su conocimiento no debe pasar de los $60,000,000?

ING. RODRÍGUEZ:

¿Perdón?

SR. JAIME CAMACHO:

¿Según el conocimiento de todos ustedes no debe pasar de los $60,000,000?

ING. RODRÍGUEZ:

Si pasara, pues habría que hacer una enmienda al, al, al dinero, a los fondos de Vivienda y ellos lo consideran y nos dan entonces el restante. Así que funciona de esa forma. Hasta ahora son $60,000,000 de dólares.

SR. JAIME CAMACHO:

Okey. Gracias.

SRA. MARÍA C. GARCÍA:

Buenas noches. Para efectos de récord, mi nombre es María Cristina García, legisladora municipal por el PIP en San Germán. Tengo varias inquietudes, pero, ¿verdad?, quería resaltar que este proyecto me alegra que no está impactando directamente las residencias de la comunidad, ¿verdad?, o el Barrio El Retiro.

Esto es una comunidad que está asentada allí desde 1898 y ellos generación tras generación y diferentes administraciones, ¿verdad?, ellos consiguieron los títulos de propiedad en ese barrio. Así que el, el barrio ha resistido y han continuado su lucha por permanecer allí y me alegra sobremanera de que continúen allí.

En cuanto a las entradas quería cerciorarme de la información, ¿quedarían con una sola entrada, que fue la que usted mostró ahorita con el carril ancho a nivel donde están los 'bleachers' de la comunidad actualmente?

ING. PÉREZ:

Sí, para, para récord, el ingeniero Miguel Pérez. Y es correcto, se quedaría con esa entrada.

SRA. MARÍA C. GARCÍA:

¿La entrada donde ellos están habitualmente, verdad, o la que tienen actualmente, esa se cerraría?

ING. PÉREZ:

Esa se cerraría. Correcto.

SRA. MARÍA C. GARCÍA:

Okey. Ahorita mencionó que había una expropiación de tres terrenos, ¿verdad?, de 3 parcelas, por llamarle de alguna manera. Una de ellas era lo que conocemos como los potreros. Que, pues, no tendría un impacto directo en familias. Pero que sí, actualmente, hay dos familias que están residiendo, como decir al final, donde se conectaría con el puente, que es lo que yo entendí ahorita.

ING. PÉREZ:

Unjú. Esa que está aquí.

SRA. MARÍA C. GARCÍA:

Esas familias, el conocimiento que yo tengo es que no tienen los títulos de propiedad. Particularmente, ellos,

no. Los que están más adentrados, ¿verdad?, a, a la... a las residencias que están más colindantes esos, sí.

ING. PÉREZ:

Okey.

SRA. MARÍA C. GARCÍA:

¿Qué opciones de vivienda o de, verdad, de reubicación, localización se le estaría ofreciendo a esas familias? ¿Sería allí mismo en esa comunidad o estarían dándole otra alternativa?

ING. RODRÍGUEZ:

Perdona. Es que hay una división que nosotros tenemos, que es la División de Adquisición de Propiedades, y es los que se... son los que se encargan de todo este proceso, ¿verdad? Siempre se reúnen con las personas afectadas, buscan diferentes opciones que se ajusten, ¿verdad?, a, a...

ING. PÉREZ:

A sus necesidades.

ING. RODRÍGUEZ:

...a las necesidades de las... de las familias. Son muy profesionales. Siempre ellos, ellos son los que se encargan de todo ese proceso. No tenemos representante de ellos ahora, en este momento, ¿verdad?

SRA. MARÍA C. GARCÍA:

Okey.

ING. RODRÍGUEZ:

Pero sí, cuando entre la etapa de adquisición de propiedades ellos van a comunicar con todos ellos. En la próxima vista pública, ¿verdad?, porque esto es un taller informativo.

SRA. MARÍA C. GARCÍA:

Entiendo.

ING. RODRÍGUEZ:

¿Quién? Ah, perdona, no los había visto. Caramba, me equivoqué. Aquí está la joven.

SRA. MARÍA C. GARCÍA:

Adelante.

ING. RODRÍGUEZ:

Quizás te puede contestar la pregunta. Adelante.

SRA. JANIRA VÁZQUEZ:

Buenas noches. Para efectos del récord, Janira Vázquez del área... de la División de, de Adquisiciones de Propiedades de la Autoridad de Carreteras.

SRA. MARÍA C. GARCÍA:

Buenas noches.

SRA. JANIRA VÁZQUEZ:

Como bien le estaba explicando él, del área nuestra y de otros... otras coordinadoras de realojo, se van a estar comunicando específicamente con las familias que ocupan esas propiedades que van a estar siendo impactadas.

SRA. MARÍA C. GARCÍA:

Unjú.

SRA. JANIRA VÁZQUEZ:

No podría darle muchos detalles específicos de esas familias en particular, ¿verdad?, porque son casos individuales...

SRA. MARÍA C. GARCÍA:

Claro.

SRA. JANIRA VÁZQUEZ:

...y hay que atenderlos individualmente...

SRA. MARÍA C. GARCÍA:

Claro.

SRA. JANIRA VÁZQUEZ:

...pero sí se van a... en algún... en el momento en que toque, se van a reunir con las familias, los vamos a llamar y se les van a explicar todos los beneficios a los que pudieran tener derecho. Pero sí, hay unos requisitos con los que hay que cumplir, pero pues, como le digo, sería ya cuando nos reuniéramos con la familia que pudiéramos identificar qué opciones tienen.

SRA. MARÍA C. GARCÍA:

Okey. ¿Y en términos generales, como que no hay un margen de posibilidades que se pudiera publicar, por ejemplo, reubicarlos en residencial o allí mismo en algún lote que se identifique?

SRA. JANIRA VÁZQUEZ:

Sí, pero todo va a depender de que las familias cumplan con los requisitos que van a necesitar cumplir. Por eso es importante esperar a que nos podamos reunir con ellos y ver que cumplan con los requisitos y que puedan presentar una serie de documentos que se les van a pedir, pero sí, hay alternativas de realojo disponible.

SRA. MARÍA C. GARCÍA:

Okey. La segunda inquietud que tengo es en cuanto a la mitigación del impacto ambiental respecto a las especies en peligro de extinción. A mí me preocupa particularmente, el Guabairo, que quizás ustedes no tengan la respuesta, ¿pero qué opciones de mitigación reales? O sea, para que nosotros nos vayamos de aquí con posibilidades de mitigación para estas especies. ¿Hay alguna respuesta posible?

ING. PÉREZ:

Sí, la, la mitigación es la transferencia de terreno.

ING. RODRÍGUEZ:

Y la monitoría biológica.

ING. PÉREZ:

Y la monitoría biológica.

ING. RODRÍGUEZ:

Bueno, como indicamos en la presentación, ¿no?.. Luis Rodríguez, nuevamente para récord. El proyecto tiene unas

coordinaciones con el Departamento de Recursos Naturales y con el... con el Servicio Federal de Pesca y Vida Silvestre, lo que es el U.S. Fish and Wildlife Service, ¿verdad? Como parte de todo ese proceso se tienen que hacer unas transferencias de terreno. Bueno, unas compras de terreno para hábitat de vida silvestre.

También el proyecto durante su etapa de construcción va a cumplir con unos requerimientos de monitoría biológica. Y para eso se contrata a un biólogo o una firma de biología, vamos a decir así, que va a estar durante la etapa de construcción monitoreando que en el área del proyecto no esté el Guabairo.

Eso nos pasó en otro proyecto, ¿verdad?, y lo hicimos de esa forma. Fue en Peñuelas, Peñuelas. Así que la agencia tiene mucha experiencia en ese tipo de proyecto, ¿verdad?, que incluye una monitoría biológica durante la etapa de construcción.

SRA. MARÍA C. GARCÍA:

Sí, que lo que debo de entender es que se hace quizás un censo...

ING. RODRÍGUEZ:

Bueno...

SRA. MARÍA C. GARCÍA:

...de lo que quizás se pudiera estar encontrando por allí.

ING. RODRÍGUEZ:

Bueno, no realmente, un censo. Es que durante la etapa de construcción el biólogo va adelante mirando las áreas donde se va a trabajar y va a tomar una decisión en conjunto con el contratista. Si aparece el área... un área donde están anidando la especie...

SRA. MARÍA C. GARCÍA:

Unjú.

ING. RODRÍGUEZ:

...detiene los trabajos alrededor de esa área...

SRA. MARÍA C. GARCÍA:

Okey.

ING. RODRÍGUEZ:

...y hasta que la especie no salga, no da el visto bueno para entrar en ese sector.

SRA. MARÍA C. GARCÍA:

Okey.

ING. RODRÍGUEZ:

Igual es la monitoría arqueológica. El proyecto va a llevar una monitoría arqueológica y es de igual forma.

SRA. MARÍA C. GARCÍA:

Okey.

ING. RODRÍGUEZ:

Aquí es diferente porque es el arqueólogo el que va a estar monitoreando las áreas arqueológicas y otras áreas

que posiblemente superficialmente no se vieron y él va...

SRA. MARÍA C. GARCÍA:

Unjú.

ING. RODRÍGUEZ:

...va a estar preparando informes mensuales, sometiéndolos a la agencia y nosotros los sometemos a las agencias estatales y federales.

SRA. MARÍA C. GARCÍA:

Okey. Como parte de este proyecto, como ustedes son Autoridad de Carreteras, ¿verdad?, o, o representantes de este departamento, ya se identificó que la Quebrada El Retiro, pues no está registrada. ¿Se pudiera trabajar eso en el proceso? ¿Se pudiera registrar? Porque es que en el plano aparece como quebrada sin nombre.

ING. PÉREZ:

Esa, esa nomenclatura... El ingeniero Miguel Pérez, para récord. La nomenclatura de las quebradas las define el mismo Cuerpo de Ingenieros. Podríamos dialogar con ellos si ellos son los que pueden darle el nombre ya, ¿verdad? Normalmente, esa injerencia la tienen ellos, ¿verdad?

SRA. MARÍA C. GARCÍA:

Okey.

ING. PÉREZ:

O sea, no es algo de la Autoridad de Carretera, pero

es algo que se podría presentar dentro de las discusiones que tendremos y las reuniones que tenemos con ellos.

SRA. MARÍA C. GARCÍA:

Okey.

ING. PÉREZ:

Unjú.

SRA. MARÍA C. GARCÍA:

Y por último, en términos de los...

ING. PÉREZ:

Pero yo si quieren...

SRA. MARÍA C. GARCÍA:

Ajá.

ING. PÉREZ:

...y perdone, en el plano ya yo le voy a poner la Quebrada El Retiro. Así que tranquilos.

SRA. MARÍA C. GARCÍA:

No, no, para que quede claro que es de El Retiro.

ING. PÉREZ:

Aquí me corrigieron y es la Quebrada El retiro.

SRA. MARÍA C. GARCÍA:

Aquí, allá y del más allá también.

ING. PÉREZ:

Eso no hay ningún problema.

SRA. MARÍA C. GARCÍA:

Okey. Entonces, por último, ¿en términos de los

terrenos colindantes al, verdad, al propuesto proyecto, deprecia o aumenta? No tengo claro eso.

ING. PÉREZ:

Okey. ¿Puedes repetir la pregunta de nuevo?

SRA. MARÍA C. GARCÍA:

Sí. ¿Los terrenos colindantes, supongamos que ya está hecho el proyecto, deprecian o aumentan el costo?

ING. PÉREZ:

Eso es una buena pregunta. No, no es mi 'expertise', ¿verdad? No, no soy tasador.

ING. RODRÍGUEZ:

Es que eso va a depender de la accesibilidad.

ING. PÉREZ:

La accesibilidad. Unjú.

ING. RODRÍGUEZ:

El proyecto tiene accesibilidad, ¿verdad?, en ciertos puntos.

ING. PÉREZ:

En ciertos puntos controlados, sí.

ING. RODRÍGUEZ:

Controlados, ¿verdad? No, no sabemos contestarte esa pregunta en estos momentos, de verdad.

SRA. MARÍA C. GARCÍA:

Okey. Gracias.

ING. RODRÍGUEZ:

Eso es una cuestión de mercado y no sé.

ING. PÉREZ:

Sí.

SRA. MARÍA C. GARCÍA:

Entiendo. Gracias.

SRA. MODERADORA:

Olga Pagani, para récord. ¿Alguna otra pregunta? Pues no habiendo más preguntas ni comentarios, damos por terminada esta Reunión de Participación Ciudadana a las 8:05 de la noche. No sin antes expresar nuestro agradecimiento por su presencia y que tengan muy buenas noches.

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SE DIO POR TERMINADA LA REUNIÓN

DE PARTICIPACIÓN CIUDADANA

* * *

CERTIFICACIÓN DE LA TAQUÍGRAFA

CERTIFICO que la que antecede es la transcripción fiel y correcta del récord tomado por la suscribiente de los procedimientos habidos durante esta reunión.

En San Juan, Puerto Rico, a 12 de febrero de 2026.



JASMINE MARIE CARRERAS

TAQUÍGRAFA

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# Citizen Participation Meeting

## Centro Cultural Anastacio Ruiz Irizarry, Lajas, Puerto Rico

## January 28, 2026

## English Transcription

**COMMONWEALTH OF PUERTO RICO**
**DEPARTMENT OF TRANSPORTATION AND PUBLIC WORKS**
**PUERTO RICO HIGHWAY AND TRANSPORTATION AUTHORITY**
**SAN JUAN, PUERTO RICO**

RE:

CITIZEN PARTICIPATION
MEETING

DATE : January 28, 2026

TIME : 6:08 p.m.

CLIENT : PUERTO RICO HIGHWAY
AND TRANSPORTATION AUTHORITY

ADDRESS : Preconstruction Office
15th Floor
Program Development Division
San Juan, Puerto Rico

HELD AT : Anastasio Ruiz Iriarry Cultural Center
Corner of Flamboyán Street
and Plaza Artesanal
Lajas, Puerto Rico

APPEARANCES

MASTER OF CEREMONIES:

Ms. Olga Pagani Candelario - Moderator

FOR BEHAR-YBARRA & ASSOCIATES:

Engineer Miguel Pérez Correa
Engineer Adolfo Hernández Santiago
Engineer Yazmín Acevedo

FOR THE MUNICIPALITY OF LAJAS:

The Honorable Jayson Martínez Maldonado - Mayor
The Honorable Olga Rodríguez Moreno - Vice mayor
Mr. Luis Armando Román - Representative, District 21



I, Juan E. Segarra, USCCI #06-067/translator, certify that the foregoing is a true and accurate translation, to the best of my abilities, of the document in Spanish which I have seen.

FOR THE PR HIGHWAY AUTHORITY:

Engineer Luis Rodríguez Rosa - Senior Executive Aide and Acting Principal Manager

Mrs. Dailynne Salgado

Mrs. Janira Vázquez

COURT REPORTER:

Mrs. Jasmine Marie Carreras

SOUND TECHNICIAN:

Mrs. Yanira Rodríguez Ortega

* * *

The proceedings developed as follows in this transcript.

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MADAME MODERATOR:

Yes, good afternoon. We will be commencing the meeting in approximately ten to 15 minutes.

OFF THE RECORD

MADAME MODERATOR:

Yes, good evening. For the record, my name is Olga Pagani. I work for the Puerto Rico Highway and Transportation Authority, at the Preconstruction Office. Welcome to the Anastasio Ruiz Irizarry Cultural Center, in the Municipality of Lajas, where we will be holding a Citizen Participation Meeting this evening for Project

Number AC012201, the extension of Road PR-122, from PR-321 to PR-166, in San Germán and Lajas, Puerto Rico.

We are commencing this meeting at 6:15 p.m., today, Wednesday, January 28, 2026. We would like to inform you that this meeting is being recorded for the purpose of documenting the work. Therefore, we will request that whenever you address our consultants or public officers, you state your name and place of residence.

Before we begin, we will acknowledge the presence of Mrs. Olga Rodríguez Moreno, Vice mayor of the Municipality of Lajas; Mr. Luis Armando Román, as a representative of the Honorable Omayra Martínez, Representative for District 21; Engineer Luis E. Rodríguez Rosa, senior executive aide and acting principal manager for the Program Development Division; the project designers and consultants for the Puerto Rico Highway Authority, Behar-Ybarra & Associates, Miguel Pérez, Jazmín Acevedo; project manager and consultant for the Puerto Rico Highway Authority, from AtkinsRéalis, Engineer Kevin Martin. I present to you Engineer Luis Rodríguez for a greeting.

MR. RODRÍGUEZ:

Good evening, everyone. My name is Luis Rodríguez; I am an aide to the Executive Director and acting senior

manager for the Program Development Division at the Puerto Rico Highway Authority. We would like to extend our warmest thanks for being here. It is quite a well-attended audience this... this informative workshop, where we will discuss phase 1 of the Lajas-San Germán connector, right?

Phase 2 was built back during the years 2008 to 2012, approximately. So this is the continuation of the phase that was left in that project. It is a project with combined funds, right, from the US Highway Administration, but the main funds come from the US Department of Housing and Urban Development, or HUD, for its English acronym.

So we are following the regulations set forth by this federal agency and through the Administration... the Department of Housing, which are... which is the agency that is also involved in this process. I have nothing further to say, right?

I have the consultants here, who will provide a brief description of the project, right, and all of the challenges that it has entailed, and the stage the project is currently in. And they will provide information regarding the main details of the design, possible mitigations and other... other important environmental aspects.

We are now in an environmental stage, right,

which needs to be finished in order to enter a process of property acquisitions, right, and mitigation of... required by state agencies. So I will leave you with Olga to continue with the protocol.

MADAM MODERATOR:

It is important to mention that we are also joined by Engineer Adolfo Hernández, from Behar-Ybarra & Associates. I will leave you with the Municipality's vice mayor, Mrs. Olga Rodríguez.

HON. VICE-MAYOR:

Yes, good evening to everyone present, and thank you for appearing and addressing this request we made for a public hearing regarding this connector. Nothing. We have excused the Mayor. He is at an event with the Governor, Jayson Martínez is, but as soon as he arrives, he will join the meeting, right? And I hope you have... whatever questions you may have, you have technical personnel, which are the ones who can help with regard to that. Okay. Thank you all very much, and welcome to the Municipality of Lajas.

MADAM MODERATOR:

Thank you very much. This Citizen Participation Meeting was announced to the community in banners, flyers and an advertisement in the Primera Hora newspaper. The

main purpose of these business matters this evening is to present to you the proposed project, which consists in the extension of PR-122, from PR-321 up to PR-166, in the Municipalities of San Germán and Lajas.

We will first read the public notice. Secondly, we will provide a presentation with no interruptions. We will ask that everyone place their cellphones in vibrating mode. Those of you who need to answer a call may step out of the room. To those who have questions regarding the information we will be presenting, once the presentation is finished, you will have a chance to ask questions in an orderly and respectful manner. Let's then read the public announcement. I leave you with Dailynne Salgado.

MRS. SALGADO:

Yes, good evening. This announcement reads as follows: "Citizen Participation Meeting, extension of Road PR-122 from PR-321 up to PR-166, San Germán and Lajas, Puerto Rico. Project number is AC012201.

"The Department of Transportation and Public Works, The Puerto Rico Highway and Transportation Authority and the US Highway Administration wish to inform... private organizations, federal and state government agencies, municipal entities and the

general public that a citizen participation meeting will be held to present the project for the extension of PR-22 -- 122, sorry, from PR-321 up to PR-166, in the Municipalities of San Germán and Lajas.

The project consists of an extension of Road PR-122 from the urban area of Barrio El Retiro [Ward], at the point of the intersection of PR-166 on Ángel Castro Pérez Avenue in San Germán, up to the point of the intersection with PR-116, approximately 1.5 kilometers from the Municipality of Lajas' urban center."

MADAM MODERATOR:

"The citizen participation meeting will be held on Wednesday, January 28, 2026, starting at six in the evening, at the Anastasio Ruiz Irizarry Cultural Center, on Flamboyán Street, corner of Plaza Artesanal, Lajas, Puerto Rico. Should you need reasonable accommodations, notify five days in advance to 721-8787, extension 1401, or via e-mail at opagani2act.pr.gov.

"Any citizen who wishes to submit comments regarding aspects relevant to the project may send them to oea@act.pr.gov, or send them to engineer Alexandra Velázquez Delgado, Director of the Preconstruction Office, Puerto Rico Highway and transportation Authority, P.O. Box 42007, San Juan, Puerto Rico 00940-2007. Comments will be received within 30 calendar days

from the date of the citizen participation meeting. Signed by Dr. Edwin E. González Montalvo, Secretary of the Puerto Rico Department of Transportation and Public Works, and executive director of the Puerto Rico Highway and Transportation Authority."

I present to you Engineer Miguel Pérez, from Behar-Ybarra & Associates, consultant to the Puerto Rico Highway Authority, who will begin the presentation on the project.

MR. PÉREZ:

Yes, good evening to everyone. We are starting the presentation. Can you hear me? A bit more. As noted in the agenda for today's presentation, we will be talking about the general location of the project. We will provide a little background on... or the history of how the project has come about, right? Which Engineer Luis Rodríguez already gave you a bit of history of the phases that have already been built.

The purpose of this project, the existing needs of the corridor in the study, we will provide a description of what is proposed as part of this project, the environmental considerations or challenges we have run into with the development of this project, a description of the alternatives we have considered, right, to provide you with a better

and cost-effective alternative for the purpose of the project.

We are briefly going to discuss the comparison and results of these alternatives, and how we came to a recommended alternative, or a tentatively selected alternative for the development of the project, what the project itinerary would be and the work plan for phase 1.

The location of the project, The Puerto Rico Highway and Transportation Authority and the United States Transportation Department, by way of the Federal Highway Administration, from its English acronym, FHWA, propose the extension of Ángel Castro Pérez Avenue, PR... known as PR-122, from Road PR-321 up to Road PR-166. Within the boundaries of the Municipalities of San German and Lajas in Puerto Rico, and the length of the project is approximately 2.7 kilometers.

The image on the right shows the location of the project, which is near the boundaries of Lajas and San Germán. The image on the left shows the limits I mentioned earlier, which begin on PR-321 until the end of 122 from Lajas to San Germán, which connects with 321.

As part of the background of the project, just

to give you a little history, right, and context on the development of the project, this is a project that has been in planning since 1968. That is where they identified the need for a route... for an alternate route to Road PR-101. In 2002, the Puerto Rico Highway Authority along with... with other consultants, completed a study of alternatives wherein four possible routes were evaluated. The alternative selected was the one built as phase 1, phase 2, in 2003, right, approximately. Pardon me, 2014.

In 2003, the Puerto Rico Highway Authority conducted an environmental assessment of the alternative that was selected in 2002. In 2003, the Planning Board endorsed that environmental document locally; and in 2014, pardon me, was when phase... phase 1 began, which is the one that was included in the STIP of 2016 and 2017 to prevent environmental non-compliance, following the NEPA procedures.

It was not until 1995, right, that the final plans of that phase 1 and 2 began, and construction of phase 2 began around 2008, and was finished in 2009, 2010, approximately, where it was decided... the decision was made to stop phase 1. That is what we are presenting to you today.

Phase 2, as we mentioned, was completed around

2010, but it was not until 2012 that all the project closings were completed. That always takes a little longer after the construction of the project. And it was not until 2019 that the need arose to be able to complete that route, and the assessment of new alternatives, evaluating the original considerations of the alignment, right? Which is what brings us here tonight.

MR. RODRÍGUEZ:

Miguel, allow me to clarify something.

MR. PÉREZ:

Yes.

MR. RODRÍGUEZ:

It says there, "2003, Planning Board." That is an error. It is the former Environmental Quality Board.

MR. PÉREZ:

Environmental Quality Board.

MR. RODRÍGUEZ:

That is a small error. So we apologize.

MR. PÉREZ:

Thank you, Luis. Purpose of the project. In terms... the corridor on PR-122 in terms of work is to provide widening and an extension to increase the vehicular capacity in the region, to improve mobility in transportation and connectivity in the area with

better access, in addition to the highway network of PR-101, and it would provide direct access from PR-10 through San Germán until Lajas, the tourist zone. Connecting the Lajas tourist zone, which does not exist at this time, or exists through other ways.

Planning. In terms of planning, as part of the long-term multimodal transportation plan of 2040, the road was included, which seeks a better performance of the transportation system island-wide, rehabilitation, economy and providing environmental sustainability of its projects by the Puerto Rico Highway Authority.

In legal terms, the project seeks to comply with Resolution 488 of September 10, 2001, whereby the Puerto Rico House of Representatives requested a feasibility assessment be made to address the... to extend the PR-116 in Lajas and PR-122 in San Germán, or completing this project. In terms of the environment, the project intends to... it has to comply with the public environmental policy established by Act 9 of 1970, as amended, the highway plan for the western region of Puerto Rico, and maps of urban extension for the municipalities including Lares and... Lajas, Lajas; and... sorry, Lajas and San Germán.

An existing need in terms of... the current system needs movement access. We know that the only

road that connects us from PR-2 toward San... toward Lajas, right, is 101. With this road, we are thinking of increasing... we are thinking of increasing and improving the travel options for residents, visitors and workers in both regions. Creating opportunities to improve non-motorized transportation means through development of its networks and improving connections to key destinations.

In terms of safety, we will improve safety and protection of the transportation system and capacity to support emergencies. Providing investments to improve the users' travel environment with safe installations that will be able to recover to face emergencies.

In terms of performance, maintaining and operating installations and transportation services in Puerto Rico in a positive manner to improve economy and efficiency, taking advantage of the available capacity of... in terms of safety and... and adequate protection of these roads. In terms of economy, improving global, economic connectivity facilitating efficient movement of transportation and business activities between both... and tourism, between both regions or municipalities.

Description of the proposed job. As mentioned before, this project was divided. Once

planning was finished, construction was divided into two phases. Phase 1, which is the one we are presenting today, and for reasons back then phase 2 was constructed, right? Which was the one we currently use, and ends at the end of PR-321, which has temporary access, right, a temporary connection to 321.

The other span of PR-122 is the existing one we are familiar with. Which is in the city center of San Germán, and whose stretch is pending, which is the one, like I said, that brings us here tonight... in order to complete the route. Okay. I did not leave anything out.

Description of the proposed action. Construction of phase 2, as I mentioned, finished the closing of the project in April of 2012. On September 17, 2014,the phase 1 project was approved to begin the environmental assessment. Which is what we mentioned in terms of compliance with the federal NEPA process.

This was modified during the development of the project. And as Luis mentioned, there was an opportunity to obtain funds at HUD level. And that document had to evolve, right, so as to also comply with requirements of that federal agency.

The already built phase 2 presents a typical stretch which is divided into four lanes, including paved breakdown lanes to facilitate and improve transportation of merchandise, people and services between both municipalities. To comply with the requirements of an R-5 design class code, which is how the road is being considered, and according to the Puerto Rico Highway Authority Design Manual.

Phase 2 pretty much would maintain that same section. Which is what is shown in the figure you see in the screen. The approximate width is approximately 22 meters, right, accommodating the two lanes in each direction, its shoulder and the section can vary with a... depending on the place I'm at, with a median of about six meters or a New Jersey barrier, a New Jersey-like barrier. Which in some stretches is what we have, in which phase 2 was constructed.

As to environmental considerations of the project, we selected an area of approximately 1.71 miles in length, 2.75 meters, right, kilometers, which is the length of the project, beginning at the surroundings of the Municipality of Lajas. Specifically, the intersection with PR-321 northbound, to Road PR-166, in the Municipality of San Juan.

The purpose of establishing this corridor is to be able

to perform the relevant analyses in environmental terms, right? Which every development project needs to comply with, right? I'm going to try to touch upon some of the most relevant ones. We know there are many more challenges, but we touch upon the most important ones in this presentation.

One of the first challenges we have in most projects. Thank God, this one... it is not located in a flood zone, according to FEMA maps. A check mark in this item. We were able to comply with this without any big, right? An HH study is conducted in all of these projects, and every kind of runoff coming from any creek or any... any fleeting body. Which receives water simply when it is raining, thus designs are made so that the road will not affect continuity of that flow, right?

Another environment... another point that affects projects would be wetlands. We were only able to identify riverside wetlands. Mostly identified in Maresúa creek and in No-name creek. No-name creek is the one that flows pretty much parallel from halfway into the project until almost reaching the current intersection of 166 and 122 and Maresúa... Pardon me?

MR. RODRÍGUEZ:

That's the one that goes back.

MR. PAGÁN:

It goes back. Okay. That's clear. And then, Maresúa crosses parallel to... it crosses 122 and further down you'll see it a bit more in detail. In terms of, according to the wetland inventory, right, as I mentioned, according to the US Fish and Wildlife, wetlands are identified as being riverside.

A HUD study was already conducted, right, to determine or assess any difference in this. Thank God they were identified, the project waws already presented before the US Army Corps of Engineers, and they accepted the changes we requested, we propose.

In terms of considerations. Another environmental consideration was endangered species, right? According to the IPaC website, the US Fish and Wildlife identified that there are a series of species within the corridor which are considered to be in danger of losing their habitat.

The Puerto Rican boa, although this species is found all over Puerto Rico, it continues... it is identified in the majority of projects, and protocols to

be able to address it already exist. We do not see any problem with this kind of species. Another one that... which the US Fish and Wildlife identified is the Puerto Rican Nightjar. That is what is known as the "Guabairo."

The blackbird or "Mariquita." That one was identified, although recent revisions made by the US Fish and Wildlife placed them farther away from the corridor, but still... I mean, more than the proposed alignment, it is still shown there in the... in a portion of the project that apparently still houses a habitat.

They are still studying that species. This species is usually more in sea areas and riverbeds, and does not appear, but it is under evaluation. They recently identified that a critical habitat is being created for what they call the "Palo de Rosa" or "Árbol de Rosa."

And they also identified a Puerto Rican skink, which is a lizard. It is also a habitat found in the entire area. We pretty much have conversations with the US Fish and Wildlife to provide mitigation for these... these species, right? And we are still in agreements and hope to complete that soon.

Another item, and one of the most critical ones in this project were the archeological sites that were

identified. We know that San Germán and Lajas, when we did the desk screen, within... a series of archeological sites were identified within the corridor. San Germán especially has a series of structures that are in the National Historic Registry. Furthermore, although these structures are a bit farther away and are more concentrated in the gown of San Germán, we were able to identify in the project that what used to be known as the Puerto Rico American Railroad Company's Circling Railroad.

As part of that structure, a series of culverts or drains, were built, through which these roads would travel, and some of them are still functioning; others are... some of them have been obstructed with sedimentation. But according to the archeological studies prepared, phase 1-A, 1-B, phase 2 and conservation, federal agencies believed those structures had a historic value, we would have to somehow document and register them. We are in that process.

Thank God, with this project, we are in agreements, and within those agreements we will be discussing later on, we are more than halfway there, In that sense, they already approved the study corridor, as long as we make all efforts to maintain

most of the culverts unaffected. If we had to affect one, that we seek for a way to document it, and in that sense, somehow preserve the ones that are left.

Just so you have an idea... throughout the length of the corridor, a total of 16 historic elements were identified, throughout the initial... the alignment. Of those 16, seven had a direct or indirect impact on the main footprint of the road. I say this because as part of the project development, we had to evaluate alternatives to try to conserve those structures and minimize the impact, and be able to reach agreements with the corresponding federal agencies.

Another infrastructure which... another infrastructure which we were able to identify, although we did not find any registry or owners, we identified some pathways utilized by some users, like mountain trails and neighboring paths. At some point we also took those into consideration when the time came for the design, right? And one of our challenges [was] to try to not affect it or minimize the impact. Pardon me.

I am now going to go into the description of the alternatives studied for the development of the

project. These alternatives are developed in an effort to be able to provide a design that is environmentally friendly, considering the evaluation of prior alternatives, right? Which all the planning that was done in the past, it's not to just throw it in the trash, as we say. It is to learn from what they did and try to implement new measures that will make the project more feasible, in that sense, mitigating the environmental components within the area of study.

As part of that, we had to modify the alignment proposed in 2002, right? trying to avoid as [much] as possible the impact on these historic train structures we had before. As part of the study, we conducted around four... we evaluated around four alternatives. As for these alternatives, we assessed their effectiveness and compliance between the need and... with the project needs. Several aspects were compared against each other.

As part of the most important part was... in terms of safety, its constructability, the environment, right? Among the ones we mentioned the most, the cost of... cost of construction is always a contributing factor, but sometimes the most... the cheapest solution is not the most effective one, right? based on the... on the projects we have worked on.

Additionally, sometimes we forget about life-cycle cost, which is cost of maintenance and rehabilitation. We know that we sometimes build, but we forget that we have to maintain it, we have to work on it. So in each one of those alternatives, based on their characteristics, we considered which one would present the best cost over the life of the project in terms of investment, in that sense.

As I mentioned, as part of the four alternatives we considered, we considered three alignments, right? I will explain that later on. It says, "Goodbye, three alignments, four alternatives." But I will explain that later on. We definitely considered the first alternative, the preferred one in the local environmental document prepared for the corridor in 2003. That is one of the alternatives we considered and assessed based on the new information we had.

Given the topographic conditions, the proposed alignments that were studied in this corridor and because of the mountains that are in that valley, the alternatives studied in order to complete were pretty much limited in that corridor. Nevertheless, the route study that had been done before contemplated other areas, but they were also ruled out.

That is why we went back to that part of the planning. And the main purpose was to complete this route, which would limit my analysis of alternatives to that area, right, which we are assessing and which we defined a moment ago.

Alternative "A" is the alternative that was previously studied in the 2003 environmental document. This alternative begins on PR-122, at the intersection of PR-321. This does not change in any of the alternatives, and continues northbound on... to PR-166 in San Germán. The approximate length was 2.7 kilometers, approximately 2.8 kilometers.

An sloping cloverleaf intersection was provided with a structure on PR-321. It provided an access to a local road through a box culvert... based on its English acronym. It provided an intersection for the El Retiro community and another intersection on 166. That is what had been considered in... as part of phase... phase 1 and for which an environmental permit had been obtained at a local level.

When we go into federal agencies, we have to review all of these... all of these studies once again to comply with that. Then that is when the other... the other alternatives come up, so that we can then see, based on

what has been studied, how we can minimize all of those environmental considerations that affected the project in the past and at the present time.

In terms of alternative B, the alternative is similar to the alignment in alternative A. In that case, what we did was we made a small modification to the road profile. The profile of the road, just to explain, more or less a visual idea of how the road will behave when I move toward it, right? A simpler way for you to visualize it, trying to avoid the movement of land, which was one of the things that increased the cost of the project.

According to geotechnical studies, there is rock in that area, which will need explosives or perhaps a pre-splitting. And what we wanted was to minimize those areas, that cost, in that sense. That was the first simple solution. We have not yet entered into the project's environmental considerations, but one of the features we were able to observe from the original alternative was the high cost of movement of land.

Now, in alternative C, we take into account a variation in the alignment at certain points. This is to be able to achieve, and we use bridges, right, and

retention walls, for the purpose of mitigating the impact to sensitive alternatives, such as the archaeological sites identified in the previous study. That was mostly the issue or the situation we were facing with the alignment.

Those alternatives continued being evaluated and modified, and we reached alternative D, in which we considered to avoid any impact in those structures, for the entire route, instead of it being a highway, we introduced more bridges in the alignment. This did increase construction costs, but it provided an alternative that was a bit more viable in terms of the environmental impact on the road.

The next chart more or less presents a comparison of these alternatives. We illustrate some quantitative information among them. The most relevant part here, we're more or less in the... it is an approximation in length, but it is the difference in construction costs we have, and which varies at that time.

These costs have increased a bit more in recent days, from $24,000,000 to $47,000,000, right, what it would cost to implement this structure. Another important piece of information is the difference in

terms of impact, in terms of the area of cutting and filling, and alternative D continues to be the most... the one that presented the least impact in that sense. That qualitative and quantitative data for each alternative, what we did was we worked on a matrix wherein we compared and assigned values to each one in order to determine which was the most effective one.

A value was assigned to that alternative, and the closer to... to position 1, that was the alternative. The more points it had in terms of ratio, the better the alternative was. From this whole analysis conducted, the result, it turned out that alternative B presented the best option. And this one, because it had a combination of a structure and a wall, instead of just a bridge or just movement of land, in terms of cost-effectiveness, it was the most... the one that presented the best position.

Based on this... this analysis, that is the one based on which the preliminary drawings were developed, and which we will discuss a bit more in detail later on. We're simply providing a bit of history of the work done for the development of this project.

If you see, the alignment is quite similar to what had been considered in the past, like I mentioned,

with some small differences, which are not noticeable at this scale. But on a closer level, they could be considered. We always remain with the consideration of the alternative of the cloverleaf intersection with PR-321.

We had to include a new bridge to maintain some of the archaeological culvers identified at this point. This also allowed us to maintain some of the existing paths. We kept the intersection with... toward El Retiro community.

We modified and even included a second... a third bridge at the... in the access... the local access that leads to other residences in the El Retiro community. Which is a bit further down the... after the bleachers or the sports court located at El Retiro community. We kept the intersection with PR-166.

At this time, the project does not consider traffic lights. At least the traffic studies at the time of the inauguration does not take it into account. We do include road illumination. The project will include illumination. And we also have a structure at Maresúa creek. We believe that eventually, we will... it will be characterized as a bridge, given the fact that it is a box culvert with three cells that are ten

feet high by ten feed wide. In other words, we are talking about a 30-foot structure, which will allow the Maresúa creek flow to not be affected.

In terms of the No-name creek, which is the one that flows practically parallel to the alignment, we worked so that the alignment did not affect those levels nor would it have a direct effect on that creek. However, everyone knows that there are a series of creeks inside that mountain, right, which we need to work on. They were worked on, I should say.

A series of pipelines have been proposed to channel them and lead them to a series of strategic points that will not have a direct effect on the communities downstream, right? All of this in compliance with the Department of Natural Resources.

In this next image, I am illustrating more or less the cloverleaf intersection. Just to give you an idea, right, if I'm coming from the Lajas area and wanted to get off to 321, I continue on this lane, I use the deceleration lane located here where I'm showing you, and then I have the option of staying to the left or to the right, wherever I wish to move to on 321. Over here it would reach 101; and you'll forgive me, over here it would take me to another area for which I don't have the information right now, but I could get to the other road.

In the event that I wanted to go to 122 from 321 in the San Germán area, vehicles coming from 321 from this point would have to reach this little ramp located here and would continue with an acceleration lane and enter into 322. If I'm coming from 101, they pass this intersection and would then go up this ramp over here, and would head toward San Germán.

If I am coming from San Germán and want to go down toward 321, I use the ramp located on the east... west side of the project, and then I decide here whether I want to go left or right; whether I want to go to PR-101 or somewhere else. If I want to go up from 321 to get to Lajas, I use the ramp on the west side of the project and connect toward San Germán.

Those would be the... pretty much the four movements we would have to be able to access toward Lajas and toward San Germán. We are illustrating an idea, a perspective so you can better visualize the intersection movements. Here we are showing PR-321 from the lower level, right? This would be the bridge that would be built, its retention walls; these would be the loops proposed.

The section of wall 321 widens a bit in the project area so that it will have two lanes in one direction in order to accommodate the flow and the "right turn

only's"; and we keep only one lane in the opposite direction. I am showing you bridge 1-A. during the development of the project, as I mentioned, we had to include this bridge in order to protect several of the culverts and be able to reach compliance or the necessary mitigation that was requested by both SHPO as ICP. This bridge is approximately 128 meters in length, if I'm not mistaken; and like I said, its purpose is that, to tray to mitigate and keep those pathways.

Coming up, more or less for you to have an idea of how you would be traveling, these are some of the culverts that will be maintained. This is another of the culverts or historic structures that were identified. Like I said, we are trying to maintain the existing pathways as part of the project.

We believe that as part of the historic value of that structure, this could give rise to a series of, to tourism, in that sense, if we are able to keep them. And part of the agreements with the project, we would be protecting those structures once it is passed on to these... to the corresponding agency.

In the image down here, we are showing some of the retention walls we had to include. This was done to save some of the other existing drainage structures and maintain them. In other words, the original cost

of the project that had been planned had a series of increases as a result of the project's compliance requirements for mitigation.

We are showing here the intersection toward El Retiro community. At the present time, the El Retiro community comes in through this spot here. This access you used to have will need to be closed, because we want to give continuity to 122. And then, in order for you to regain access, we are creating a new intersection a bit further... a few meters further down on road 122, and the use of its roads is kept similar.

In other words, the community will be able to access at this point. If you want to move to the left, they can continue to do so. The only thing is that in the end here, there will be a dead end, right? Which I believe there is a residence around here. In order to provide access to that residence, if I stay here to my left, we would be able to do it continuing the residents that are further up here and residents that are more toward the southern part of the project; and then the local access road they have there is improved all the way up to a spot on PR-122, a bit further down, in addition to a bridge being built.

In other words, both the El Retiro community and

residents further down toward the south part of El Retiro community are not being affected, or are being provided the corresponding access. This is part of the requirements of the project.

As I mentioned earlier, at the end of the project, we have four structures that were unable to be... that were affected by the project. We were able to save two of those structures. We were able to save two of those structures by including the bridge and the retention walls. However, there are two structures that will be directly impacted by the project.

What we proposed at that time was for one of the structures to be documented and presented, right, for the corresponding documentation to be presented and for it to be demolished. The other structure, which is a bit smaller, is proposed to be relocated to create a historic site or a strategic point. We are particularly trying to place it where the intersection with PR-21 would be formed. The idea is for the public to be able to get to that point. We provide the appropriate documentation on the history, the train and those culverts.

That is part of the requirements or the agreements we have come to with these agencies, as it is one of the... the challenges that this project faces when the time comes to begin construction. The most

important thing is to have the project on time.

At the present time, we are in the environmental process, as Engineer Luis Rodríguez mentioned. Our intention is to complete the environmental document by the third quarter of 2026. We have a few studies left to do in terms of approval. In terms of the HUD requirements, specifically, as part of the project, is step 8 for flooding. We are still working on that one. We are already on step 7. We have one more to do and we'll complete it.

And at the present time, in archeological terms, we were able to obtain the SHPO endorsement. That is a good thing. Fish and Wildlife, like I mentioned, some species came up that we are still in conversations with them. Most likely we will have a mitigation process in terms of us having to do a land transfer. Those are little things that we are working on right now, and we expect to complete them before that... in these next few months in order to complete the environmental document.

In terms of the plans, 35% of the project has already been designed. The acquisition plans are also completed. Something important, this project, the agency to accelerate the construction process expects to remove it from the design construction format.

I'll explain myself. An auction is held wherein the contractor comes with a designer and with 35 percent,

part of the projects begins construction; and the design is completed during construction and the project is finished. That is with the goal of... We know, right, how long we've had this project for, the agency has had this project, and to be able to speed that process up.

We are thinking that by the fourth quarter of 2026 we will begin... begin that construction process. It should be 2027. That is an error, right, Kevin? No, it's 2026? Okay. Then the fourth quarter of 2026. Oh, well, yes, pardon me. The process of construction design could be ready by the fourth quarter of 2026, but not necessarily so for construction. That's correct. Yes, yes.

We have to finish the... Pardon me, I just did not see it further up ahead. We have to complete the acquisition portion, right? And like Luis said in the beginning, not until I finish the environmental document. I cannot begin the acquisition process until I have completed the environmental process. Yes, we want to work quickly for the... for the process of hiring the contractor in order to avoid that, but construction cannot begin until the acquisition process is finished.

In other words, that is where we'd be starting. So although the project does not contemplate four rehousing... three, only three instances of rehousing,

three residences that are affected by the project, there is a lot of land, right, that remains embedded by the project, and those acquisitions take time and delay the process a bit.

Yes, our planning, planning by the agency, right, is to be able to finish that acquisition process by the first quarter of 2028. It is important to point out that as part of the project, there is a stretch that was already acquired. Particularly at the beginning of the project on PR-321.

In other words, the purpose is that if we reach an agreement with these agencies, they will at least allow us to begin construction on that... on that beginning of the project while we complete the acquisitions, right? That is part of the strategy that the agency is evaluating, always with the goal of speeding it up and for the project to be completed as soon as possible.

It is estimated that if everything that we have planned here for the project is accomplished, right, construction can be finished by the third quarter of 2029 and this project can be inaugurated, right? Which, as far as we understand, is quite important for the region, right, for Lares as well as for San Germán.

Likewise, as I mentioned, the Puerto Rico Highway

Authority has that same intent, to speed up the project, not to auction it off in one single project. In other words, they are thinking of segregating it into three projects. What this will help us with is to allow for three phases to be worked on at the same time, minimizing the project's construction time.

This is something that is being discussed. The contract documents are being prepared for that, and we expect to have them completed, as I said, during that fourth trimester of this year so that the bidding process can begin.

Anyone who wishes to submit comments regarding aspects that are relevant to the project may send them to the following e-mail address, oea@act.pr.gov, or mail them to the following address: Engineer Alexandra Velázquez Delgado, Director, Preconstruction Office, Puerto Rico Highway and Transportation Authority, P.O. Box 42007, San Juan, Puerto Rico 00940-2007. Comments will be received within 30 calendar days from the date of the Citizen Participation Meeting. That will be all for me. So I will leave you with Olga.

MADAM MODERATOR:

Okay. Let's begin opening the floor for questions or comments you may wish to share. Let us

remember we are recording the meeting for purposes of documenting the work. So you should identify yourselves with your full name.

Let us respect one another. Let us speak in a concise manner, so that we can have a prudent period of time for everyone to be able to express themselves. Those of you who wish to submit a comment, as Engineer Miguel Pérez stated, you may do so via e-mail or... We provided a sheet at registration that you can send us. When we're finished, whoever does not have one, you can ask us for it and we will gladly provide it. Yes, let's allow five minutes per question. So you will speak over here in the center.

MR. CARLOS MOLINA:

Good evening, everyone. My name is Carlos Molina, I am an agronomist by trade, specialized in Agricultural Economy in the [University of Puerto Rico] Mayagüez Campus. I have... I'm not objecting, nor do I have a point. We're in the first public hearing, but I have several questions that are of concern to me when the time comes to do the project.

Among my concerns, more so as an agronomist, a resident of Lajas, right? I am from the Lajas Arriba ward, but over at El Retiro ward, Sector La Tea, Camino Los Pinos, in San Germán, we have a property, a farm for production of livestock and sheep

husbandry.

What worries me about the project when time comes to evaluate it? Because we know that plots of land adjoining our farm are going to be impinged upon. Because if we travel, right, if you're standing on Hacienda La Culminante, we make a right, come out of Camino Los Pinos, head over to the road... Harry Luis Pérez Avenue, I think it's called, which is the one to... if I'm not mistaken.

MR. PÉREZ:

Um-hmm.

MR. CARLOS MOLINA:

We're clear, right?

MR. PÉREZ:

Yes.

MR. CARLOS MOLINA:

So then, my concern is that inasmuch as the road is built and with that impact, which the project seems like from the movies, that the adjoining land will later, some of them will be expropriated. No, we cannot be misled. I believe that the mayor of San Germán, who is an agronomist, he studied with me, should have knowledge, right, of the agricultural impact the area will experience. I am worried that the land adjacent to that area, after being expropriated because the

project was done, they displace us farmers.

Why can they expropriate... can we be displaced? Because then perhaps they'll come... Today we're saying that it will be an avenue, and we agree, it will connect San Germán to Lajas, and that's perfect. Where I'm concerned is that after the project is done, they might move and say they wish to urbanize adjoining land. Which can happen.

MR. PÉREZ:

Um-hmm.

MR. CARLOS MOLINA:

I mean, we are clear as to that.

MR. PÉREZ:

Um-hmm.

MR. CARLOS MOLINA:

So then we'll keep cutting farming land, land for agricultural production, wherein farmers like me, farmers like colleagues, will be affected. That is one concern. One. And I am also worried that the project will happen like Road 118, which travels from La Tea to Christian. Which is the one at Los Pinos, the one we're discussing. Which today, because of both mayors, I cannot speak about... right? It's completely abandoned.

It started with a process in La Tea Sector, but

the Christian area was never finished, as it connects to Christian. These are concerns I bring up. I think it will be the first public hearing. I think they will have more.

MR. PÉREZ:

Um-hmm.

MR. CARLOS MOLINA:

And listen, in order to do it, right, as an informative process, I believe that if the project is done with... with... with what you discussed, with the environmental benefits, with the... carrying out a sustainable development as it should be, we should not have problems, but those two issues worry me, right? I want to point them out as an alert, and so that we can continue participating in the coming public hearings in order to see what happens and you may answer those questions for us.

MR. PÉREZ:

Of course.

MR. CARLOS MOLINA:

I thank you for having done this and I am thankful for... to Olga for having announced this kind of event.

MR. PÉREZ:

Thank you, thank you for your suggestion. We will take it into consideration. In terms of the road,

right? you have controlled access, right, which are the ones I mentioned. The Puerto Rico Highway Authority does not develop.... they do not develop projects. And when they acquire property is because a plot of land is embedded or because there is no access. Those are the reasons for it, right?

Those plots of land that remain, they have access and their use continues. It is up to other private developments to not buy them, acquire them. In other words, the purpose of the Puerto Rico Highway Authority is not to displace. On the contrary, right, we try to avoid it, and you were able to see it with the El Retiro community, right? Yes, we know that, unfortunately, certain areas have to be affected with the development of a project, but we try to minimize that.

You know, as a consultant for the agency, the Puerto Rico Highway Authority does not displace nor does it interrupt. Sometimes, as you mentioned, it happens because of others, right, and it is not under the agency's control, I believe. But we will take that concern, and any statement or information or piece of data we can include in the design will be taken into consideration. So thank you.

The process, the main thing in these hearings is to be able to receive your concerns. As designers, we can present a project, but you are

the ones with the needs. You know the area better than we do. Precisely, what we wish is to get from you how it is we can make the project more effective, and for it to address all needs. Perhaps some are left out. We cannot please everyone, right? But the idea is to give the people a better project, a better design. So I thank you for your suggestion.

MR. RODRÍGUEZ:

I also wanted to add, Luis Rodríguez, for the record, that after this informative workshop, the main purpose is to gather all of your comments or suggestions or observations early on, during the planning stage of this project. After this, we will prepare an environmental document, right; it will be distributed to state and federal agencies, and then goes to a public hearing. Which is the second chance you have.

MR. PÉREZ:

Um-hmm.

MR. RODRÍGUEZ:

After that public hearing, we then go back to the workshop again to evaluate comments, observations and suggestions. We will note them in the environmental document, and a final document will be produced.

MR. PÉREZ:

A final one.

MR. RODRÍGUEZ:

Which is the one that is either endorsed or rejected by state and federal agencies.

MRS. MARANGELIE RIVERA:

Good evening to everyone. Marangelie Rivera Ortiz, a social worker by trade in the El Retiro community. At some point, you mentioned that three properties will be expropriated. I wanted to verify specifically whether it is throughout the entire span of the route, or the community. And also, when the project was presented, I saw like the entrance to the community will pretty much be modified, right? You mentioned in between the bleachers. It would mean that we will enter both ends of the community through there.

And my other question, in the part about endangered species, Monte in El Retiro is a lung not only for the San Germán area, right? It is what connects us to the town of Lajas. It would be important to safeguard those little animals there, right? Because unfortunately, we see that in the long run, natural resources are unfortunately being exploited.

So it would be important to give more follow-up as to saving it and safeguard these

species that are endangered. Although the Puerto Rican boa is all over, but it is endangered.

MR. PÉREZ:

Yes, thank you very much for your suggestion. Yes, let's go back to the image, just to clarify... Pardon me, for the record, Engineer Miguel Pérez, or Miguel Pérez. I... they already told me something. Let's see how I can use this here, Luis. In terms of your first question, yes, the intersection to El Retiro community will remain.

As I mentioned, that stretch that used to connect over here is the only one that will be closed. But it will be closed by giving it a dead end, right, or a cul-de-sac. But yes, they will have this option to be able to go in. This has an entry lane, an exit lane, divided by a median, right? Which was the one I illustrated earlier.

Here is the location of where perhaps we propose to create that identification, that wild finding, in terms of the archaeological finds of the project. That's correct. As for your second question, one of your questions, as part of the development of the project, we are still in the process of having conversations with the corresponding agencies, and it is possible that, as part of the project, some additional plots of land may be acquired for the

mitigation and conservation of these species.

Some have already been identified, around two parcels. We are still in conversations with that agency and to be able to reach those agreements, those memorandums of agreement between the Puerto Rico Highway Authority, in this case the Department of Natural Resources, to achieve those aspects. And I have one additional question.

MRS. MARANGELIE RIVERA:

Regarding the properties.

MR. PÉREZ:

Regarding the properties. The properties we are acquiring as part of the intersection we propose, I believe that around here there are some properties which are some stables, if I am not mistaken, and there is another property over here, which is residential. This one is located here, and because of its proximity to the project and because of safety, we are acquiring it. I believe it is a property, but there... there may exist two families in that property.

And the third property is another one that because of safety, once we pass through this pathway, it is one that is elevated, made of wood, that I see is alone in the beginning, that would be the third property. Everything else is land, and those are the only three rehousing instances we'd have in the project.

MR. RODRÍGUEZ:

For the record, Luis Rodríguez once again. As Miguel Pérez, Engineer Miguel Pérez, said, as part of the project we are in conversations with the Department of Natural Resources... a mitigation for a wildlife habitat and endangered species. It is around 200 or 300 "cuerdas," right? From 200 to 300 "cuerdas" to mitigate that effect.

MR. EDWIN RIVERA:

Yes, good evening. Edwin Rivera, retired. Given that we're talking about that area, and I understand a bit about that, where you said, right, that the intersection is located, there is an area there which is a recreational area of ours. We could not think of the future. It is a recreational area, a community center we have. What are you going to do with that area?

MR. PÉREZ:

That is located...

MR. EDWIN RIVERA:

Where you indicated in the intersection.

MR. PÉREZ:

... over here, if I'm not mistaken.

MR. EDWIN RIVERA:

Where the bleachers are.

I, Juan E. Segarra, USCCI #06-067/translator, certify that the foregoing is a true and accurate translation, to the best of my abilities, of the document in Spanish which I have seen.

MR. PÉREZ:

Over here, where the bleachers are.

MR. EDWIN RIVERA:

Around where the bleachers are.

MR. PÉREZ:

Around where the bleachers are.

MR. EDWIN RIVERA:

Uh-huh. Right there, right there.

MR. PÉREZ:

Over here.

MR. EDWIN RIVERA:

It's a community center, a recreational area. Thank you.

MR. PÉREZ:

Yes. Definitely. Well, not with the intersection. The only thing that is affected is the bleachers area, right? The communal area and that is not... is not affected, right? That was a concern that we would take and we would discuss it, right? I would locate it so that you can see that the project does not affect it or anything in that... in that sese. Thank you. Perfect. Thank you.

MR. JOSÉ SANTIAGO:

Greetings. Look, I am José Santiago. I have two concerns. You're cutting through the hill and... and the Piedra del Puño is on the third path. Will it be affected?

I, Juan E. Segarra, USCCI #06-067/translator, certify that the foregoing is a true and accurate translation, to the best of my abilities, of the document in Spanish which I have seen.

MR. PÉREZ:

No.

MR. JOSÉ SANTIAGO:

So then, my other concern is the road home. You know that path is narrow. The creek pretty much narrows them. And if you're going to widen the two, will the land of the residences located there be shifted?

MR. PÉREZ:

No, we're set there. No. As part of the project, the culvert that is inside your property...

MR. JOSÉ SANTIAGO:

Um-hmm.

MR. PÉREZ:

... is not... is maintained and it is not getting affected.

MR. JOSÉ SANTIAGO:

Um-hmm.

MR. PÉREZ:

And then, we are taking the runoff from that culvert through an upstream drainage system and taking them to another area, which that area will not receive a discharge at that point.

MR. JOSÉ SANTIAGO:

But if you go further down, Hermel, Agapito and Gladys' house is there.

MR. PÉREZ:

Um-hmm.

MR. JOSÉ SANTIAGO:

When you widen the road...

MR. PÉREZ:

No.

MR. JOSÉ SANTIAGO:

... do you take from their land?

MR. PÉREZ:

No, they may be affected. No, we could verify additional data for you, but like I mentioned, in terms of relocation or being affected...

MR. JOSÉ SANTIAGO:

Um-hmm.

MR. PÉREZ:

I mean, for reasons of safety, the only house was that one.

MR. JOSÉ SANTIAGO:

Of course, yes.

MR. PÉREZ:

No, during the evaluation, we did not see those roads having an effect during the construction process, experiencing damage. That is why we are maintaining them. In fact, at one point in time a study was done and we are making an investment for a

bridge, a path and we're talking about ten or 12 residents. We took that into consideration and still decided to maintain them, because there was no direct impact from the construction of the project.

MR. JOSÉ SANTIAGO:

We hope that the Department of Natural Resources make sure to drain the creek, because the creek will take over the path.

MR. PÉREZ:

As part of the... as part of this project, the only drain we have is Maresúa creek. And as I said, in order to alleviate the runoff to the existing culverts, we drain it. It is not a drainage system, let's put it that way, because we talk about drainage system and we believe we are...

MR. JOSÉ SANTIAGO:

Yes, a pipeline.

MR. PÉREZ:

... it is simply...

MR. JOSÉ SANTIAGO:

A pipeline, yes.

MR. PÉREZ:

... a lateral drain which is typical of the Puerto Rico...

MR. JOSÉ SANTIAGO:

Um-hmm.

MR. PÉREZ:

... Highway Authority to take that water to those low points...

MR. JOSÉ SANTIAGO:

Yes, yes.

MR. PÉREZ:

... where they're more controlled.

MR. JOSÉ SANTIAGO:

No, but there are funds approved right now that will drain part of the creek.

MR. PÉREZ:

The No-name creek.

MR. JOSÉ SANTIAGO:

The one in Retiro.

MR. PÉREZ:

The one in Retiro.

MR. JOSÉ SANTIAGO:

Uh-huh.

MR. PÉREZ:

Pardon me, not No-name; the one in Retiro.

MR. JOSÉ SANTIAGO:

Yes.

MR. PÉREZ:

Okay. Perfect. No, we are aware, but thank you for your question and your suggestion.

MR. JOSÉ SANTIAGO:

Okay. Thank you.

MR. PÉREZ:

No, thank you.

MRS. ELSA RIVERA:

Good evening. Elsa Rivera, from Lajas. I wanted to know whether those of us who are around 321 will lose access to 122 at any time, or will keep going straight during construction.

MR. PÉREZ:

No, as any construction project, right, as part of the development of the project, there is a traffic maintenance plan, in which we try to maintain the current or existing access in the project. And if it were necessary, we would create the appropriate detours. The project, at least what we're planning on, right, once you exit 321, I don't think we will have a direct impact, because I enter open field, and I have many stretches that should no affect the normal flow you have now.

We know that whenever there is construction, there is always some discomfort, because we have to place safety barriers and comply with some requirements, but perhaps when we are building and are further ahead, when we put the rafters on the bridge, there is a possibility that momentary

closings will happen while those beams are placed, but that would be the only impact that day. In other words, you will not lose access in that sense.

MR. JOSÉ GALARZA:

Yes, good evening, my name is José Galarza, a resident of Lajas. My intention is to provide a repre.. not for the project, rather the intent of the project, which is to improve traffic flow on 122. When Castro Pérez was done, which ends in the intersection with 166, the span from 166 to 102, which 102 is the Interamerican Avenue...

MR. PÉREZ:

Um-hmm.

MR. JOSÉ GALARZA:

... they are the last 500 meters of what was done in Castro Pérez. The entire time, of the four lanes there, two have always been blocked for parking. And perhaps this would be for the Puerto Rico Highway Authority, Public Works, and perhaps for the San Germán Municipal Government, to start developing a plan to provide orientation to citizens in San Germán that that will soon become a lane.

Perhaps they should place signage prohibiting parking long before the project is finished, so that awareness is created as to the fact that one cannot park there, it cannot

be used, so that the traffic flow is complete, and for the four lanes you are planning to be able to be used.

MR. PÉREZ:

Perfect.

MR. JOSÉ GALARZA:

... put in San Germán. Which ends up what they call Farmacia Magie [pharmacy]. From that stretch there. Which is... it has always been a parking area, and that is already the mentality in San Germán, that that is parking area.

MR. PÉREZ:

Okay.

MR. JOSÉ GALARZA:

That is my concern.

MR. PÉREZ:

Okay. We will take it into consideration, and if any measure or mitigation in that sense needs to be made, then the appropriate signage would be included in terms of the limitations of the project, right? We are saying that this is a bit beyond the limit of the project, because it is not within the original scope for the project. But we will take your concern and will discuss it with the Puerto Rico Highway Authority.

MR. JOSÉ GALARZA:

The intent is lost.

MR. PÉREZ:

Once again, Engineer Miguel Pérez, for the record.

MR. JAIME CAMACHO:

Yes, good evening.

MR. PÉREZ:

Good evening.

MR. JAIME CAMACHO:

My name is Jaime Camacho Román, a resident of our Municipality of Lajas. Six items to speak about. What work has been done or is currently being done? Or is it none as such?

MR. PÉREZ:

Presently, the preliminary plan was completed. The cost estimates, most or all of the environmental studies have been completed. At the present time we are discussing the first draft of the environmental document. As we said, we have two conversations left with two agencies, which would be Natural... the Department of Natural Resources for the habitat portion, and Step 8, which is a publication in terms of units and bodies of water. Once we complete those two... those two arrangements, we do one final review of the environmental document and it will be published.

MR. JAIME CAMACHO:

Do you mean to say that if I wish to access the

studies, I have total access to them?

MR. PÉREZ:

Yes, yes.

MR. RODRÍGUEZ:

How? Pardon me?

MR. PÉREZ:

Access to the studies.

MR. JAIME CAMACHO:

I'm asking, if I wish to have access to the impact studies, are they accessible to...?

MR. RODRÍGUEZ:

No, they are not accessible. Luis Rodríguez, for the record. They are not accessible yet because they require some revisions. The consultant will submit the document, we review, discuss it with the agencies, add comments if they have any, and once they tell us it is available for the pubic, it is then that we begin the process of public diffusion. They are not available to the public yet.

MR. PÉREZ:

Okay.

MR. JAIME CAMACHO:

Aside from the three bridges that were mentioned, does that mean that the rest of the road is to open up the woodland completely?

MR. PÉREZ:

For the record, Engineer Miguel Pérez. Correct. There are two main land clearances, The first land clearance, or cut, would be located on the PR-321 intersection. And the second land clearance is located between the end of the bridge in... bridge 1-A, which is the one that saves the archaeological structures and the El Retiro community.

MR. JAIME CAMACHO:

Okay. My other point. We can see that there is a very sharp arc as such. What is the purpose of that arc?

MR. PÉREZ:

For the record, Engineer Miguel Pérez again. By the arc, are you referring to this one presented here?

MR. JAIME CAMACHO:

No, before, before.

MR. PÉREZ:

Let me come over here.

MR. JAIME CAMACHO:

The one that goes up from... from the hill and almost reaches the creek. Yes, no, that one. That arc there.

MR. PÉREZ:

This one here?

MR. JAIME CAMACHO:

That whole one up until you reach El Retiro.

MR. PÉREZ:

Okay. When... Well, could you repeat the question, if it's not too much trouble?

MR. JAIME CAMACHO:

Why... Why is it so marked...

MR. PÉREZ:

Oh, okay.

MR. JAIME CAMACHO:

... this arc...

MR. PÉREZ:

Okay.

MR. JAIME CAMACHO:

... where you're marking, up until you reach the No-name creek, as you mentioned?

MR. PÉREZ:

Yes, in the beginning, as I tried to explain the area of study, here, the topographical part of the project, if I were to go further into over here, the cuts or the landfill for the project would increase, they would affect this community more. Therefore, in the bylaws, right, with the requirements of Road R-5, this curvature is designed, the one mentioned here, but the purpose is that, to avoid increasing the land

clearance, to use part of the remaining material for landfill... from the clearance that comes from that intersection and this other one we have here, to be able to deposit it into that area.

As part of the design, the minimum radius is determined, the appropriate banking of the road is done so that the road is in compliance with the speed markers, and we always take the safety effect. But the main reason was to avoid or try to balance the land movement of the project.

MR. JAIME CAMACHO:

Does that mean that it would not be possible to go in a straight line from where you're marking there until the end here in El Retiro?

MR. PÉREZ:

That's correct. The first point as a traffic engineer is a straight line from point A to point B. Unfortunately, sometimes we have land restrictions, environmental restrictions that do not allow for that, right? And in this case, as I said, at a topographic level, in terms of conditions, those were the limitations we had in that sense.

We tried to do it as straight as possible, but among the evaluations we conducted, what it did

was it increased costs, it aggravated the environmental situation a bit more; and in the end, as part of the evaluation conducted, the most cost-effective option was to do an S-type alignment, or a curve-like alignment, in that sense. But they are both designed to comply with the speed of, the design, of the road. Which in terms of safety for users, they should not have any problems in that sense.

MR. JAIME CAMACHO:

The proponents of the project, what is my benefit in terms of arrival in that span, as opposed to 101?

MR. PÉREZ:

Excellent question. The project, if we look at it as a single one, the time traveled between 321 and the one you currently use, which is 166, the difference is minutes. The difference is not four or three minutes at most. The greater benefit, of completing the route is the connection to PR-2 in San Germán, right, from PR-2 up to the area of Lajas. And there is an economy there of almost 15 or 16 minutes, according to the studies.

I'll explain, right? If I look at it as a single one, then perhaps the route I take over here to get tot his point, there is no benefit that will get to

more than ten minutes, because we're saying that the drive is like between four and five minutes, what we were able to take at that... at that time. Perhaps it is less at some points outside of peak hours, but during the times we studied it, we spent between four and five minutes driving through.

The difference here, well, yes, it reduces it to a minute and a half, but perhaps they'll say, "But are we investing for three minutes?" But no, we have to look at it as a plan. It is a macro, right? And what we want is to connect PR-2 with the tourist area in San Germán in a more accessible and safer route.

MR. JAIME CAMACHO:

And one last concern. Why were the hearings held in Lajas and not in San Germán, when the project is mostly concerning San Germán?

MR. PÉREZ:

Gladly. Yes, no, like one of your... one of the colleagues... the residents, said, the first one we were able to schedule was the one in Lajas. San Germán, we are in conversations with the mayor. We hope that we can schedule the place and location in the next few weeks, and send the public notice and do it. Puerto Rico Highway and our intention is to conduct two informative workshops in each one of the

municipalities.

MR. JORGE CAMACHO:

Thank you; that is very kind of you.

MR. PÉREZ:

No, thank you. Good evening.

MR. JAVIER RODRÍGUEZ:

Javier Rodríguez, owner of a farm and project. Which is the community located on the top area?

MR. PÉREZ:

I'll look it up for you now. For the record, Engineer Miguel Pérez. I think I owe you that one. Give me a second here, to see if I can do that...

MR. RODRÍGUEZ:

Is anyone here from San Germán? The curve up there, is that what they call...?

MR. PÉREZ:

This one here. What is its name?

UNIDENTIFIED SPEAKER:

Chorro Colí.

MR. PÉREZ:

Choco Colí?

UNIDENTIFIED SPEAKER:

Chorro Colí.

MR. PÉREZ:

Oh, "Chorro." Okay. Pardon me for not being

familiar with the community. My apologies.

MR. RODRÍGUEZ:

Okay. We know that this is a wildlife conservation... conservation area...

MR. PÉREZ:

Um-hmm.

MR. RODRÍGUEZ:

... which is endangered. What pressure will it cause upon adjacent farms that already pretty much have projects submitted, reaching their conclusion, now that Fish and Wildlife can place them... place them as conservations and sort of stop the project?

MR. PÉREZ:

That is a very good question.

MR. RODRÍGUEZ:

Well, we coordinated with the Fish and Wildlife Service and with the Department of Natural Resources. Said agencies are the ones that determine conservation areas. It is not us, right?

MR. PÉREZ:

Um-hmm.

MR. RODRÍGUEZ:

We present our projects and coordinate with them. And we establish agreements with them, right? If there is an impact on an endangered species, we established

mitigation measures and purchase of land that will be ceded to them in perpetuity. But the adjacent plots of land are not... are not under our jurisdiction. That is under the jurisdiction...

MR. PÉREZ:

It is their jurisdiction.

MR. RODRÍGUEZ:

... of other agencies.

MR. JAVIER RODRÍGUEZ:

So can there be an impact on those plots of land?

MR. RODRÍGUEZ:

I cannot...

MR. JAVIER RODRÍGUEZ:

Given that these areas that you will cut, obviously wildlife will not remain there, because there will be pollution, there will be noise and it will expand onto surrounding areas. Therefore, that entire area will become conservation area, stopping projects, stopping development, stopping family extensions, being able to add houses, being able to add carports.

MR. RODRÍGUEZ:

It is not because of our project. The Department of Natural Resources and Fish and Wildlife Services have their norms; they have their bylaws.

MR. JAVIER RODRÍGUEZ:

Correct.

MR. RODRÍGUEZ:

When you submit a project, you have to comply with all state and federal norms, according to what they tell you, right?...

MR. JAVIER RODRÍGUEZ:

Um-hmm.

MR. RODRÍGUEZ:

... and you have to comply with that. There is no way. We do not have control over that. We are an agency from the Puerto Rico Highway Authority and we coordinate all of the environmental impacts in our projects with them, and we comply with state and federal norms.

MR. JAVIER RODRÍGUEZ:

What is the benefit of this road for San Germán?

MR. PÉREZ:

San Juan, or... for San Juan?

MR. JAVIER RODRÍGUEZ:

For San Germán.

MR. PÉREZ:

For San Germán, for San Germán. The benefit...

MR. JAVIER RODRÍGUEZ:

Because it does not have a connector to any other ward, except for El Retiro. Perhaps Christian.

I, Juan E. Segarra, USCCI #06-067/translator, certify that the foregoing is a true and accurate translation, to the best of my abilities, of the document in Spanish which I have seen.

MR. PÉREZ:

Yes, like I said... For the record, Engineer Miguel Pérez once again. The benefit... Like we said, we looked for a benefit in regional terms. As the project travels through San Germán and through Lajas, to be looked at as a set.

If we say, what benefit could there be for San Germán? Well, that's quite speculative, because as we can see, perhaps the point of interest, if we look at it from a strategic standpoint, is Lajas, right? Lajas will benefit more than San Germán; but somehow, right, other studies have shown that a good, effective, safe transportation system somehow to a small or minimal degree, not zero, receives that state, or those conditions.

An example, I can give you several improvements by the Puerto Rico Highway Authority that have benefited and created a greater movement of vehicles, and those regions have... those locations, those lots within those...

MR. JAVIER RODRÍGUEZ:

Is that road going to be...

MR. PÉREZ:

... those roads have benefited.

MR. JAVIER RODRÍGUEZ:

... turned into a toll road...

MR. PÉREZ:

Those roads have benefited.

MR. JAVIER RODRÍGUEZ:

... at any time?

MR. PÉREZ:

Pardon me?

MR. JAVIER RODRÍGUEZ:

Is it ever going to be turned into a toll road?

MR. PÉREZ:

No, that is not planned. For the moment, in the environmental document, it has not been...

MR. JAVIER RODRÍGUEZ:

For the moment; but is there a possibility?

MR. PÉREZ:

That's something that the Puerto Rico Highway Authority... But I believe... if a toll station will be placed there.

MR. RODRÍGUEZ:

No, there is no toll station.

MR. JAVIER RODRÍGUEZ:

As of now.

MR. RODRÍGUEZ:

It doesn't have a toll. If, if a toll station were to be put there, we would've included it in the environmental document.

MR. PÉREZ:

Yes.

MR. RODRÍGUEZ:

There is no toll.

MR. PÉREZ:

There is no toll.

MR. JAVIER RODRÍGUEZ:

So my original question...

MR. RODRÍGUEZ:

At least this project...

MR. JAVIER RODRÍGUEZ:

... will the conservation expand...

MR. RODRÍGUEZ:

... will not have one.

MR. JAVIER RODRÍGUEZ:

... from the edge of the road outward?

MR. PÉREZ:

The conver... The plots of land we would be using for conservation will be within the study corridor. We will try to limit the area that will be extended to the study. Just to mention, we have identified a series of remnant parcels, which at some point are either left embedded because their access is lost...

MR. JAVIER RODRÍGUEZ:

Um-hmm.

MR. PÉREZ:

... so the negotiation is to show them that those parcels that are being left have the same ecological value that they require for them to be ceded. If they agree, then the part that was agreed to, just to say two, three "cuerdas," those three "cuerdas"...

MR. JAVIER RODRÍGUEZ:

But are those strips going to be there...

MR. PÉREZ:

Within... Near the project's study corridor.

MR. JAVIER RODRÍGUEZ:

Near.

MR. PÉREZ:

No, not outside the project or... In other projects, the Puerto Rico Highway Authority has looked for parcels in other areas, but like we said...

MR. JAVIER RODRÍGUEZ:

How far away from the Ward by car, more or less?

MR. PÉREZ:

It will depend, that's why... that piece of information, since we have not reached an agreement, I cannot tell you right now, "Look, it will be five

'cuerdas,' seis 'cuerdas.'" But based on the studies, we're saying that the agreement will be a transfer of about 200 "cuerdas" that we would have to cede.

MR. JAVIER RODRÍGUEZ:

How many "cuerdas" is the stretch affecting as such?

MR. PÉREZ:

Around... I think we are at... In two "cuerdas" I have only 200; around 300, 400 "cuerdas."

MR. JAVIER RODRÍGUEZ:

So it is quite a lot.

MR. PÉREZ:

Not all of them. And I will clarify: Not all of them. The impact of the project touches a total of 400 "cuerdas," but the footprint as such, we're talking about 45 "cuerdas." Just for you to have an idea, they are remnants that are being left. I can have a parcel with 100 "cuerdas," but I am only acquiring five of those "cuerdas," but in my consideration term, I am touching around those "cuerdas." But the direct impact of the road is 45 "cuerdas."

MR. JAVIER RODRÍGUEZ:

Is that project already going to affect others?

MR. PÉREZ:

Other plots of land?

MR. JAVIER RODRÍGUEZ:

Other projects...

MR. PÉREZ:

At least...

MR. JAVIER RODRÍGUEZ:

... that are ongoing.

MR. PÉREZ:

... we don't believe so, right? With the planning of this project, as far as I know, the Puerto Rico Highway Authority has no additional intervention in this region. We would have to look at it with strategic planning. We can take that point and next visit we have, we will bring back an answer for you; but as far as I know, it is to complete that stretch in 321.

I know that within the Puerto Rico Highway Authority's strategic planning document, there are a series of projects they wish to develop, right? But as of now, I do not know, and it would be disrespectful of me to say, "Yes, see, this is the only one." But I will take it with me and will let you know.

MR. JAVIER RODRÍGUEZ:

Thank you.

MR. PÉREZ:

Alright. Of course.

MADAME MODERATOR:

For the record, Olga Pagani. We would like to incorporate the Honorable Mayor of the Municipality of Lajas, Jayson Martínez Maldonado, for a greeting.

HON. MAYOR:

Well, good evening. Greetings to you. Pardon my tardiness, but I had other prior engagements. I believe that, that this project seems to me to be spectacular. I believe these hearings are necessary. I know they started over here in Lajas, but either way, this is a project that is being picked up again, that has moved forward with many studies. It is my priority to connect Lajas to San Germán and vice versa.

You will have many concerns. I think that many of those have been addressed this evening. These hearings will also be held in San Germán, for the benefit of our San Germán neighbors. Which I think there are more people from San Germán than from Lajas. Welcome to Lajas, everyone.

I hope you like the project; I hope they clarify all of your questions. And this, really, all it does is bring progress. It brings many advantages, both in, for example, an emergency for us adults that have to use that road to go to the hospital in San Germán, given that at the DTC perhaps we don't have as much equipment yet to deal

with many needs.

I am going to continue working hand in hand with this project, along with the mayor of San Germán, because this is not about colors or anything other than the health of the people of San Germán and the health of the people of Lajas. So that being said, you have a friend in me. I will work hard on this, follow up, so that this project happens.

So I thank you for coming to these hearings here in Lajas, to clarify doubts. Those of you who still have questions, we will soon announce a date for San Germán for them to answer all of your questions, given that this project has a big impact in the Municipality of San Germán. We are saying that this is 90 percent San Germán and ten percent in our town of Lajas.

But I know that the mayor over there in San Germán and I are very interested, very willing for this to happen. Good evening to everyone, and thank you for being here with us tonight. I will leave you to finish the hearing.

MR. PÉREZ:

Thank you very much.

MR. RICKY MARTÍNEZ:

Good... good evening. My name is Ricky Martínez, from the area of Santa Rosa, Lajas. Thank

you for that presentation. I think that it is a project that was needed for many years. I say it mostly because of the community where I live, it is an elderly community. The ease of getting to two big hospitals we have here, which is La Concepción, is easier.

I think that the old road, as I call it, is uncomfortable; it is a bit dangerous, for ambulances as well as for any kind of emergency. Many people are concerned because of the, how do you say, the ecological issue, but we... we Puerto Ricans are the ones who do the worst job of that. If we do not take care of our lands, we cannot blame the Department of Transportation. We are the ones who have to take care of our lands.

I want to ask a question, and it is: In the Lajas community as well as in San Germán, there is a high use of bicycles, both mountain bikes and road bikes. Are you going to create an access the way they do it many times in the States, where there is a bike lane?

MR. PÉREZ:

Yes, good evening. For the record, Miguel Pérez once again. As mentioned in the project, there is a series of lanes for bicycles, right, mountain bikes; and as part of the development of the project, we tried

to minimize the impact on these.

As I mentioned, there are a series of land clearances or cutting... on the road, where in some of those pathways that were built by residents or by others, they would be affected. But we believe that once the project is completed, the continuity of those pathways can be reopened. We are leaving some accesses or some strategic points to which continuity can be given.

The Puerto Rico Highway Authority can acquire land, but their purpose is to build roads, right; it is not to... and try to maintain, right? And during our title assessment, we were unable to identify ownership of those pathways. Therefore, as government agencies, they cannot go in and work on that; but as part of their conscience, we try to minimize them and maintain them and affect as little as possible.

MR. RICKY MARTÍNEZ:

No, but...

MR. PÉREZ:

But yes, some access points remain, especially under the bridge and all that, you know.

MR. RICKY MARTÍNEZ:

No, I understand the trails...

I, Juan E. Segarra, USCCI #06-067/translator, certify that the foregoing is a true and accurate translation, to the best of my abilities, of the document in Spanish which I have seen.

MR. PÉREZ:

Yes.

MR. RICKY MARTÍNEZ:

... that are not on the road.

MR. PÉREZ:

No, the...

MR. RICKY MARTÍNEZ:

It is a bike lane on the road, like they do...

MR. PÉREZ:

Oh, no, pardon me, no. Engineer Miguel Pérez. No, the road is not being considered as a full road, right? We are simply providing lanes for... for vehicles, right? It does not consider a bike lane parallel to... to the road. We are trying to maintain the same road section it originally had, and see that what we would like to create is like an artery between PR-2, Municipality of Lajas and San Germán.

Perhaps the use of vehicles throughout the road makes the road unsafe for that sense, but for the time being, it is not being considered. It does not mean no right? It is a suggestion we can take, but as a technical piece of information, at least the vision at this time, for it to be a collector, right...

MR. RICKY MARTÍNEZ:

Okay.

MR. PÉREZ:

... in that sense.

MR. RICKY MARTÍNEZ:

Then thank you very much.

MR. PÉREZ:

Our pleasure.

MR. ADALBERTO VILLAFLORES:

Yes, good evening to everyone. My name is Adalberto Villaflores. I am the president of San Germán's Municipal Legislature I believe it is a favorable project for both towns, Lajas and San Germán, and it is because of its accessibility. Many people from Lajas come to receive medical services in San Germán. Likewise, San Germán can easily move to Lajas.

I have witnessed being in the town of San Germán, and for a... for a car, and someone tells me, "How do I get to Lajas?", and you have to tell them, "Go this way, then go up to the left, then right." I mean, it would be easy through this avenue. "Look, take this avenue, and you'll get straight to Lajas."

In other words, it is beneficial for tourists who come from Lajas to San Germán, and for tourists from San Germán to go to Lajas. It helps businesses. So that is

all. Thank you.

MR. PÉREZ:

Thank you very much.

MR. JAIME CAMACHO:

Jaime Camacho Román, once again, for the record. Do you know what the total cost of the project is?

MR. PÉREZ:

Yes, good evening. For the record, Engineer Miguel Pérez. Yes, we started the project at around forty-something, forty-something million dollars, with the changes we have had to make. At the present time, the Puerto Rico Highway Authority is experiencing an increase in construction and labor costs. We are currently estimating that at the end of the completion of the studies, we will be making an investment of about 60, approximately $60,000,000.

MR. JAIME CAMACHO:

Thank you.

MR. PÉREZ:

Thank you.

MR. JOSHUA CORDERO:

Good evening, Joshua Cordero, resident from 321. My property is the one located at the exit that comes from San Germán towards 321, the one on the very

corner. With regard to the distance from the exit to the property, do you have more or less an approximation of how far it would be? And if there is any safety measure as to... as to the safety barriers.

MR. PÉREZ:

Allow me, allow me to look for it. You said 321?

MR. JOSHUA CORDERO:

Correct.

MR. PÉREZ:

There?

MR. JOSHUA CORDERO:

It's in the previous photo.

MR. PÉREZ:

Can you tell me more or less where your property is located?

MR. JOSHUA CORDERO:

The property is the one located, when you have the exit coming down from San Germán towards 321. That one here.

MR. PÉREZ:

Over here?

MR. JOSHUA CORDERO:

That one there.

MR. PÉREZ:

That one here?

MR. JOSHUA CORDERO:

Yes.

MR. PÉREZ:

Look, from here to this... to this distance... Let me see. Engineer Miguel Pérez, for the record. As part of the consults we place with the Puerto Rico Highway Authority and Access Control, right, based on safety measures, they recommend that from the entrance or the exit up to a certain point, we have a minimum distance. That distance will vary depending on the zone and the type of road.

For this type of road, we are talking about between ten... between 15 and 25 meters. We're talking about 30 meters here. In other words, you should not have any problem in that sense, in terms of safety. Safety barriers, at that time, I believe I don't have that project, because we did not see the need, but if there is any concern in that sense, we will take it and evaluate it.

MR. JOSHUA CORDERO:

Okay.

MR. PÉREZ:

Alright.

MR. JOSHUA CORDERO:

Thank you very much, then.

MRS. DORA MARRERO:

My name is Dora Marrero. I am a resident of the

Christian sector, in the Las Piedras sector. One question. Given that you're protecting fauna, I'd like to ask: Did you find caves in that zone?

MR. PÉREZ:

At least the geotechnical studies we carried out within the study corridor did not identify caves. As I mentioned, in terms of the environment, we went to a wider corridor, but the geotechnical study is limited more to the area of impact. At least no caves were identified in the project's area of impact. If any cave were to exist, it would be outside of the project's construction limit, and a drain inlet would not be affected by the project because they were unable to identify one.

MRS. DORA MARRERO:

Yes, well I know about the drain...

MR. PÉREZ:

Um-hmm.

MRS. DORA MARRERO:

... because I live in the Las Piedras sector, and we would walk along Medina creek...

MR. PÉREZ:

Yes.

MRS. DORA MARRERO:

... and we would find drain inlets. They are

the ones that would feed Maresúa creek. In other words, Maresúa creek would feed from uphill. Perhaps some of the hills that are there are caves, because those are underground waters that go down to the drain and continue there...

MR. PÉREZ:

Sure.

MRS. DORA MARRERO:

... through a rock and stay in Maresúa.

MR. PÉREZ:

No, excellent comment, right? Engineer Pérez again. Precisely, that is what we wish to find out in these hearings, right? We cannot be familiar with the whole area. If you already walk around there and see them...

MRS. DORA MARRERO:

Yes.

MR. PÉREZ:

... and you identify those areas, then I will take that concern and we will verify, right? If we were to have to implement something, we would then take it into consideration.

MRS. DORA MARRERO:

That creek has many ceiba trees.

MR. PÉREZ:

Um-hmm.

MRS. DORA MARRERO:

They are home to many endemic birds.

MR. PÉREZ:

Okay.

MRS. DORA MARRERO:

And there are wells as well.

MR. PÉREZ:

Okay. And just to get my bearings, we are talking about, I believe the path is through here, a bit further down here, right?

MRS. DORA MARRERO:

No, that is... That flows out to Maresúa, the part where...

MR. PÉREZ:

Yes, I see it here. Yes, it would be more or less around this point here. We'd be talking about here. If I'm not mistaken, the creek you mentioned is one that comes out of here, coming from...

MRS. DORA MARRERO:

The one that flows out through Chorro de Colí.

MR. PÉREZ:

Correct.

MRS. DORA MARRERO:

It is the one that flows out to Chorro de Colí, which comes from a very big mountain there. The stream

of water comes out and...

MR. PÉREZ:

Oh, okay.

MRS. DORA MARRERO:

... and goes straight down.

MR. PÉREZ:

I understand. Thank you very much.

MRS. DORA MARRERO:

Okay. So then I was going to say, I am very happy about this span, firstly because of safety. Because those of us who live there, have to go around the hill or through the other Maresúa zone. And in terms of... in an emergency, that is life or death. Because during a storm, we were left deprived of communication because of the trees. It would be an advantage there because that's a very short span.

Secondly. Excellent for tourism. San Germán benefits a lot because you may place signs on all of those historic zones. They come there from all over Puerto Rico, and economically, there is progress, business. In other words, this is a spectacular project.

MR. PÉREZ:

Thank you very much.

MRS. DORA MARRERO:

Secondly. I suppose you will put up signs for those tourist zones so that people from other towns

can come see it, people can come see it from other countries as well. You explained that they will be putting illumination. Signage, then, for safety.

MR. PÉREZ:

Yes.

MRS. DORA MARRERO:

Because they say, "How do I get to Lajas? How do I get to San Germán?" Then placing giant signs, because sometimes signs are very small, someone comes and knocks them down and they're left and not put back up, and you have to tell people how to get to places, and sometimes they don't even get there.

So then, let me see, one more thing. Okay. Signage for orientation and tourism. So then, conservation... conservation of endangered birds by the Department of Natural Resources. But I am concerned about this area... the wells located over there, because one time I went down through that cre3ek, and we found the lever that they use to retrieve water was still existing. They are covered with bamboo leaves.

MR. PÉREZ:

Okay.

MRS. DORA MARRERO:

Because many, many years ago, someone was going to build a church around there. The Department of Natural

Resources asked them for a space that there needs to be between the construction and the creeks. The person did not want to admit that they had to do it under the law. Therefore, they did not grant permission to build.

But the important thing is that this creek that runs through Las Piedras, which I walk around it and come out to where the Elderly Center is located here in San Germán. The Elderly Center, there is a connector you walk through, because that is a municipal road and it takes you directly to the curve... That's the dog curve.

MR. PÉREZ:

Okay.

MRS. DORA MARRERO:

And that there is a short path to be able to get there.

MR. PÉREZ:

Okay.

MRS. DORA MARRERO:

But I am very happy with this project.

MR. PÉREZ:

Thank you.

MRS. DORA MARRERO:

It is a one hundred percent advancement, because minutes count during an emergency. And I think that you all, like they say, you hit it out of the ballpark.

MR. PÉREZ:

Thank you very much, thank you very much.

MR. JAIME CAMACHO:

Jaime Camacho once again, for the record. You said, Pérez, that finishing the project will be around $60,000,000. Okay. Are those funds already allocated? Is it known from where they will be taken?

MR. RODRÍGUEZ:

As I said... Luis Rodríguez, for the record, once again. As I said in the beginning of the greeting, this project has several funds. It has funds from the US Highway Administration, but the main fund is from the US Department of Housing and Urban Development, HUD, for its English acronym. HUD is sponsoring this project. There are $3,000,000 from the US Highway Administration.

That is money which was obtained when the governor was resident commissioner, right? They are there, and we spoke with the Federal Administration to join them with this project. So all the money related to this project has been separated for its construction.

MR. JAIME CAMACHO:

In other words, based on your knowledge, it should not surpass $60,000,000?

I, Juan E. Segarra, USCCI #06-067/translator, certify that the foregoing is a true and accurate translation, to the best of my abilities, of the document in Spanish which I have seen.

MR. RODRÍGUEZ:

Pardon me?

MR. JAIME CAMACHO:

As far as you all know, it should not surpass the $60,000,000?

MR. RODRÍGUEZ:

If it did, then an amendment would need to be made for the money, the funds from US Housing, and they would consider it and then provide us with the rest. So it works that way. So far, it is $60,000,000.

MR. JAIME CAMACHO:

Okay. Thank you.

MRS. MARÍA C. GARCÍA:

Good evening. For the record, my name is María Cristina García, municipal legislator for the PIP in San Germán. I have several concerns, but I wanted to point out that I am pleased that this project is not directly affecting the residences of the community, the El Retiro ward.

That is a community that has been there since 1898, and generation after generation, and through different administrations, they have been able to obtain ownership of their properties in that ward. So the ward has resisted and they have continued to fight to remain there, and I am extremely pleased for them to continue there.

With regard to the entrances, I wanted to confirm the information: Will they stay with one single entrance, which was the one you showed earlier with the wide lane at the point of where the community bleachers are right now?

MR. PÉREZ:

Yes, for the record, Engineer Miguel Pérez. And that's correct, they will keep that entrance.

MRS. MARÍA C. GARCÍA:

The entrance they habitually have, right, or the one they currently have, that one would be closed?

MR. PÉREZ:

That one would be closed. Correct.

MRS. MARÍA C. GARCÍA:

Okay. You mentioned earlier that there will be an expropriation of three plots of land, right, three parcels, to put it that way. One of them was the one we know as "los potreros." So it would not have a direct impact on families. But presently, there are two families that are living, so to speak at the end, where it would connect to the bridge, which is what I understood earlier.

MR. PÉREZ:

Um-hmm. That one over here.

MRS. MARÍA C. GARCÍA:

Those families, as far as I know, they do not have the property title. They, specifically, don't.

The ones further inward, to the... to the residences that are adjacent, those do.

MR. PÉREZ:

Okay.

MRS. MARÍA C. GARCÍA:

What housing options, for rehousing, relocation, would be offered to those families? Would it be in that same community, or will get be provided another alternative?

MR. RODRÍGUEZ:

Pardon me. The thing is there is a division we have, the Property Acquisition Division, and those are the ones in charge of this entire process, right? They always meet with the individuals affected; they look for different options that will fit their...

MR. PÉREZ:

Their needs.

MR. RODRÍGUEZ:

... the needs of the... the families. They are very professional. They always, they are always the ones in charge of that whole process. We do not have a representative for them right now, right?

MRS. MARÍA C. GARCÍA:

Okay.

I, Juan E. Segarra, USCCI #06-067/translator, certify that the foregoing is a true and accurate translation, to the best of my abilities, of the document in Spanish which I have seen.

MR. RODRÍGUEZ:

But when we enter the stage for property acquisition, they will contact all of them. During the next public hearing, right, because this is an informative workshop.

MRS. MARÍA C. GARCÍA:

I understand.

MR. RODRÍGUEZ:

Who? Oh, sorry, I didn't see you. Geez, I was wrong. The young woman is here.

MRS. MARÍA C. GARCÍA:

Go ahead.

MR. RODRÍGUEZ:

Perhaps she can answer your question. Go ahead.

MRS. JANIRA VÁZQUEZ:

Good evening. For the record, Janira Vázquez, from the area... from the Puerto Rico Highway Authority Property Acquisition Division.

MRS. MARÍA C. GARCÍA:

Good evening.

MRS. JANIRA VÁZQUEZ:

As he was explaining from our area and other... other rehousing coordinators, they will be specifically contacting families that have those properties that will be impacted directly.

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MRS. MARÍA C. GARCÍA:

Um-hmm.

MRS. JANIRA VÁZQUEZ:

I will not be able to give you specific details on these specific families, because they are individual cases...

MRS. MARÍA C. GARCÍA:

Of course.

MRS. JANIRA VÁZQUEZ:

... and they have to be handled individually...

MRS. MARÍA C. GARCÍA:

Of course.

MRS. JANIRA VÁZQUEZ:

... but yes, they will... at some... whenever the time comes, they will meet with the families, we will call them and will explain to them all the benefits they may have the right to receive. But yes, there are some requirements that need to be met, but like I said, that would be when we meet with the family, that we may be able to identify what options they have.

MRS. MARÍA C. GARCÍA:

Okay. And in general terms, like there is no margin of possibilities that could be published, for example, relocating them to the public housing project or right there in a lot that is identified?

MRS. JANIRA VÁZQUEZ:

Yes, but it will all depend on the families meeting the requirements that they need to meet. That is why it is important to wait for us to be able to meet with them, and see that they meet the requirements and that they can present a series of documents that will be asked of them; but yes, there are available rehousing alternatives.

MRS. MARÍA C. GARCÍA:

Okay. My second concern is with regard to the mitigation of the environmental impact related to the endangered species. I am particularly concerned about the "Guabairo," which perhaps you may not have the answer, but what real mitigation options? In other words, for us to leave here with possibilities of mitigation for these species. Is there a possible answer?

MR. PÉREZ:

Yes, the mitigation is the transfer of land.

MR. RODRÍGUEZ:

And biological monitoring.

MR. PÉREZ:

And biological monitoring.

MR. RODRÍGUEZ:

Well, like we pointed out in the presentation, right? Luis Rodríguez once again, for the record.

The project has some arrangements with the Department of Natural Resources and with the... with the US Fish and Wildlife Service, right? As part of that whole process, some land transfers need to be carried out. Well, purchases of land for wildlife habitats.

During the construction stage of the project, there will be some requirements for biological monitoring that will be met. And for that, a biologist or a biology firm, so to speak, will be retained; they will be there during the construction stage, monitoring that the Guabairo not be in the project area.

That happened to us in another project, right, and we did it that way. It was in Peñuelas, Peñuelas. So the agency has a lot of experience in this kind of project, right, which includes biological monitoring during the construction stage.

MRS. MARÍA C. GARCÍA:

Yes, so I should understand that perhaps a census is done...

MR. RODRÍGUEZ:

Well...

MRS. MARÍA C. GARCÍA:

... about what could perhaps be found around there.

MR. RODRÍGUEZ:

Well, not really a census. The thing is during the construction phase, the biologist will be going ahead of time to look at the areas where work will be done, and will make a decision jointly with the contractor. If the area appears... an area appears where the species is nesting...

MRS. MARÍA C. GARCÍA:

Um-hmm.

MR. RODRÍGUEZ:

... they stop the work around that area...

MRS. MARÍA C. GARCÍA:

Okay.

MR. RODRÍGUEZ:

... and they will not give the go-ahead for them to come into that area until the species leaves.

MRS. MARÍA C. GARCÍA:

Okay.

MR. RODRÍGUEZ:

The archaeological monitoring is the same. The project will have archaeological monitoring, and it is the same way.

MRS. MARÍA C. GARCÍA:

Okay.

MR. RODRÍGUEZ:

It's different here, because the archaeologist is the one who will monitor the archaeological areas, and other

areas that perhaps were not seen superficially, and he'll...

MRS. MARÍA C. GARCÍA:

Um-hmm.

MR. RODRÍGUEZ:

... prepare monthly reports, submitting them to the agency, and we will submit them to state and federal agencies.

MRS. MARÍA C. GARCÍA:

Okay. As part of this project, as you are the Puerto Rico Highway Authority, or representatives for that department, the El Retiro creek was identified, it is not registe3red. Could that be worked on during the process? Could it be registered? Because the thing is that it appears in the plan as No-name creek.

MR. PÉREZ:

That classification... Engineer Miguel Pérez, for the record. The classification of the creeks is defined by the very US Army Corps of Engineers. We could talk to them, if they are the ones that can give it the name, right? Usually that their responsibility, right?

MRS. MARÍA C. GARCÍA:

Okay.

MR. PÉREZ:

In other words, that is not the Puerto Rico Highway

Authority's matter, but it is something that can be presented as part of the conversations and meetings we will be having with them.

MRS. MARÍA C. GARCÍA:

Okay.

MR. PÉREZ:

Um-hmm.

MRS. MARÍA C. GARCÍA:

And lastly, in terms of the...

MR. PÉREZ:

But if you'd like, I...

MRS. MARÍA C. GARCÍA:

Uh-huh.

MR. PÉREZ:

... and pardon me, I will already write down "El Retiro creek." So don't worry.

MRS. MARÍA C. GARCÍA:

No, no, just to be clear that it is El Retiro.

MR. PÉREZ:

I was corrected, and it is El Retiro creek.

MRS. MARÍA C. GARCÍA:

Here, over there, and the one further down as well.

MR. PÉREZ:

There's no problem with that.

MRS. MARÍA C. GARCÍA:

Okay. So lastly, in terms of the plots of land

adjacent to the proposed project, will it depreciate or increase? I am not clear as to that.

MR. PÉREZ:

Okay. Could you repeat the question?

MRS. MARÍA C. GARCÍA:

Yes. The adjoining plots of land, let's suppose that the project is done, will the cost decrease or increase?

MR. PÉREZ:

That is a good question. It is not my expertise, right? I am not an appraiser.

MR. RODRÍGUEZ:

The thing is that will depend on accessibility.

MR. PÉREZ:

Accessibility. Um-hmm.

MR. RODRÍGUEZ:

The project has accessibility in certain points, right?

MR. PÉREZ:

In certain controlled points, yes.

MR. RODRÍGUEZ:

Controlled, right? No, we do not know how to answer that question at this time, honestly.

MRS. MARÍA C. GARCÍA:

Okay. Thank you.

I, Juan E. Segarra, USCCI #06-067/translator, certify that the foregoing is a true and accurate translation, to the best of my abilities, of the document in Spanish which I have seen.

MR. RODRÍGUEZ:

That is an issue of the market, and I don't know.

MR. PÉREZ:

Yes.

MRS. MARÍA C. GARCÍA:

I understand. Thank you.

MADAM MODERATOR:

Olga Pagani, for the record. Any additional question? So then, as there are no additional questions or comments, we conclude this Citizen Participation meeting at 8:05 in the evening, not before thanking everyone for their appearance. Have a good night.

* * *

THE CITIZEN PARTICIPATION MEETING

IS CONCLUDED

* * *

I, Juan E. Segarra, USCCI #06-067/translator, certify that the foregoing is a true and accurate translation, to the best of my abilities, of the document in Spanish which I have seen.

CERTIFIED TRANSLATION

CERTIFICATE OF THE COURT REPORTER

I CERTIFY that the foregoing is a true and correct transcript of the proceedings which took place during this meeting, recorded by the undersigned.

In San Juan, Puerto Rico, on February 12, 2026.

[Signed]

JASMINE CARRERAS

COURT REPORTER

I, Juan E. Segarra, USCCI #06-067/translator, certify that the foregoing is a true and accurate translation, to the best of my abilities, of the document in Spanish which I have seen.

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**martes, 7 de abril de 2026**











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## San Germán – Lajas, Puerto Rico
## AC-012201
## martes, 7 de abril de 2026

NOMBRE: Juan C. Horta

RESIDENTE: X INQUILINO: ___ COMERCIO: ___ INSTITUCIÓN: ___ OTROS: ___

LUGAR QUE REPRESENTA: _____

CARGO QUE EJERCE: _____

DIRECCIÓN POSTAL: _____

TELÉFONO: 939 257 9727

COMENTARIOS: Preocupación de los residentes del Bo. El Retiro en los rangos de viraje en carr. actual en el Barrio

**Ing. Alexandra Velázquez Delgado, PE**
**Directora, Oficina de Pre-Construcción**
**Autoridad de Carreteras y Transportación**
**PO Box 42007, San Juan, Puerto Rico 00940-2007**

**Re: Extensión de la Carretera PR-122 desde la PR-321 hasta la PR-166**
**San Germán-Lajas, PR**
**AC-012201**

Los comentarios se recibirán dentro de los próximos treinta días calendario a partir de la fecha de la celebración de la Reunión de Participación Ciudadana.

AUTORIDAD DE CARRETERAS
Y TRANSPORTACIÓN

ACT

GOBIERNO DE PUERTO RICO

# REUNIÓN PARTICIPACIÓN CIUDADANA
## Extensión de la Carretera PR-122 desde la PR-321 hasta la PR-166
## San Germán – Lajas, Puerto Rico
## AC-012201
## martes, 7 de abril de 2026

NOMBRE: José David Ortiz Cruz

RESIDENTE: ___ INQUILINO: ___ COMERCIO: X INSTITUCIÓN: ___ OTROS: ___

LUGAR QUE REPRESENTA: Bo. Retiro - Urb. La Salamanca

CARGO QUE EJERCE: Colindante - Proyectos

DIRECCIÓN POSTAL: Urb. Santa Marta - G-16 San Germán, P.R 00683

TELÉFONO: 787-608-2284

COMENTARIOS: Este Proyecto es muy indispensable debido a las facilidades de (dos) 2 Pueblos como Lajas y San Germán.

Mucho Exito y los deseos:

"Q. D. B." Gracias


**Ing. Alexandra Velázquez Delgado, PE**
**Directora, Oficina de Pre-Construcción**
**Autoridad de Carreteras y Transportación**
**PO Box 42007, San Juan, Puerto Rico 00940-2007**


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# REUNIÓN PARTICIPACIÓN CIUDADANA
## Extensión de la Carretera PR-122 desde la PR-321 hasta la PR-166
## San Germán – Lajas, Puerto Rico
## AC-012201
## martes, 7 de abril de 2026

NOMBRE: Angel A Ruiz

RESIDENTE: ___ INQUILINO: ___ COMERCIO: ___ INSTITUCIÓN: ___ OTROS: ___

LUGAR QUE REPRESENTA: _____

CARGO QUE EJERCE: _____

DIRECCIÓN POSTAL: Barrio Rafael

TELÉFONO: _____

COMENTARIOS: Muy buen proyecto y esperamos que se efectue lo mas pronto posible.

**Ing. Alexandra Velázquez Delgado, PE**
**Directora, Oficina de Pre-Construcción**
**Autoridad de Carreteras y Transportación**
**PO Box 42007, San Juan, Puerto Rico 00940-2007**

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AUTORIDAD DE CARRETERAS
Y TRANSPORTACIÓN

ACT

GOBIERNO DE PUERTO RICO

# REUNIÓN PARTICIPACIÓN CIUDADANA
## Extensión de la Carretera PR-122 desde la PR-321 hasta la PR-166
## San Germán – Lajas, Puerto Rico
## AC-012201
## martes, 7 de abril de 2026

NOMBRE: Ramón L. Irizarry Lugo

RESIDENTE: ✓ INQUILINO: ___ COMERCIO: ___ INSTITUCIÓN: ___ OTROS: ___

LUGAR QUE REPRESENTA: _____

CARGO QUE EJERCE: Retirado

DIRECCIÓN POSTAL: Urb. El Retiro Calle Rosa esquina Calle Santiago San Germán P.R. 00683

TELÉFONO: 787-949-4668

COMENTARIOS: ¿ Cuando se estima el comienzo del Proyecto y el termino de Finalizar el Proyecto en el Area de la urb. El Retiro ?


**Ing. Alexandra Velázquez Delgado, PE**
**Directora, Oficina de Pre-Construcción**
**Autoridad de Carreteras y Transportación**
**PO Box 42007, San Juan, Puerto Rico 00940-2007**


**Re: Extensión de la Carretera PR-122 desde la PR-321 hasta la PR-166**
**San Germán-Lajas, PR**
**AC-012201**

Los comentarios se recibirán dentro de los próximos treinta días calendario a partir de la fecha de la celebración de la Reunión de Participación Ciudadana.

BYA BEHAR-YBARRA AND ASSOCIATES LLC
ENGINEERING • ARCHITECTURE • ENVIRONMENTAL • PROJECT MANAGEMENT
554 Calle Perseo, Suite J-3, San Juan, P.R. 00920 Tel.(787)783-0290



# Citizen Participation Meeting

## Centro de Convenciones Santiago R. Palmer, San Germán, Puerto Rico

## April 7, 2026

## Spanish Transcription

AUTORIDAD DE CARRETERAS Y TRANSPORTACIÓN
DE PUERTO RICO
SAN JUAN, PUERTO RICO

RE:

REUNIÓN DE PARTICIPACIÓN CIUDADANA

**********

FECHA : 7 de abril de 2026

HORA : 5:40 p.m.

CLIENTE : AUTORIDAD DE CARRETERAS Y TRANSPORTACIÓN

DIRECCIÓN : Oficina de Preconstrucción
Piso 15, Centro Gubernamental Minillas Sur
San Juan, Puerto Rico

CELEBRADA EN : Centro de Convenciones Santiago R. Palmer
PR-102 K.M. 34
Intersección Avenida Central
San Germán, Puerto Rico

COMPARECIENTES

MAESTRA CEREMONIA:

Sra. Olga Pagani Candelario - Moderadora

POR BYA BEHAR-YBARRA AND ASSOCIATES:

Ing. Miguel Pérez Correa
Ing. Adolfo Hernández Santiago
Ing. Yazmín Acevedo

POR EL MUNICIPIO DE SAN GERMÁN:

Hon. Virgilio Olivera - Alcalde
Hon. Ivonne Irizarry - Vicealcaldesa
Sr. Adalberto Villa - Presidente de la Legislatura Municipal

Sra. Madelyn Vázquez - Representante de Hon. Emilio Carlo Acosta Representante de la Cámara de Puerto

POR LA AUTORIDAD DE CARRETERAS:

Ing. Luis E. Rodríguez Rosa - Ayudante Ejecutivo Senior y Gerente Principal Interino

POR ADKINSRÉALIS:

Ing. Erick Torres

TAQUÍGRAFA DE RÉCORD:

Sra. Jasmine Marie Carreras

TÉCNICO DE SONIDO:

Sra. Yanira Rodríguez Ortega

* * *

Los procedimientos se llevaron a cabo según surgen de la siguiente transcripción.

* * *

ING. MARTÍNEZ:

Todos, saludos. ¿Me escuchan? Buenas tardes. Siendo las 5:40 de la tarde, vamos a comenzar este taller informativo dentro de veinte minutos. Gracias.

(FUERA DE RÉCORD)

SRA. PAGANI:

Buenas tardes. Para efectos de récord, mi nombre es

Olga Pagani. Trabajo en la Oficina de Preconstrucción de la Autoridad de Carreteras y Transportación. Bienvenidos al Centro de Convenciones Santiago R. Palmer, en el Municipio de San Germán. Esta noche vamos a estar celebrando una reunión de participación ciudadana para el proyecto número AC012201, Extensión de la carretera PR-122, desde la PR-321 hasta la PR-166, San Germán y Lajas. Damos comienzo con esta reunión a las 6 p.m. hoy martes 7 de abril del 2026. Queremos informarles que esta reunión está siendo grabada con el propósito de documentar el trabajo. Le vamos a solicitar, que toda persona que quiera dirigirse a algún funcionario o consultor de la Autoridad de Carreteras, exprese y nos indique su nombre y apellido.

Antes de comenzar, vamos a reconocer la presencia del Honorable Alcalde de San Germán, Virgilio Olivera Olivera, que en estos momentos no se encuentra, pero en cualquier momento se va a reincorporar a la reunión. Y en su representación tenemos a la señora Ivonne Irizarry, vicealcaldesa, y al señor Adalberto Villa, presidente de la Legislatura Municipal. Contamos con la presencia de la señora Madelyn Vázquez en representación del Honorable Emilio Carlos Acosta, representante de la Cámara de Representantes de Puerto Rico. Por la Autoridad de Carreteras, Ingeniero Luis E. Rodríguez Rosa, ayudante

ejecutivo 'senior' y gerente principal interino de la División de Desarrollo de Programas. Diseñadores del proyecto y consultores de la Autoridad de Carreteras y Transportación de Behar-Ybarra & Associates, Ingeniero Miguel Pérez Correa, Ingeniera Yazmín Acevedo, Ingeniero Adolfo Hernández. Gerente del proyecto y consultor de la Autoridad de Carreteras de AtkinsRéalis, Ingeniero Erick Torres. Presento ante ustedes al Ingeniero Luis E. Rodríguez para un saludo.

ING. RODRÍGUEZ:

Buenas tardes a todos. Se dirige para récord Luis E. Rodríguez Rosa. Le damos la más expresiva bienvenida y gracias por estar presente en este taller informativo. A nombre del director ejecutivo y secretario del Departamento de Transportación y Obras Públicas, el doctor Edwin González, que no pudo estar presente, verdad, por compromisos previos, pues nuevamente le damos la bienvenida. En esta tarde y noche, verdad, vamos a estar discutiendo un proyecto sumamente importante para la comunidad de Lajas y San Germán, que es el conector de la PR-122 desde la 321 a la PR-166, cuyo número de identificación es el AC012201. Este proyecto, la primera fase, se construyó como para el año 2012 aproximadamente, ¿verdad? Y falta construir la segunda fase, que es la terminación del conector completo.

Actualmente, verdad, y para que ustedes sepan, se están utilizando fondos de mitigación de Vivienda, HUD Vivienda, para este proyecto en aproximadamente 70 millones de dólares. No tengo más que decir por ahora. Tengo a nuestros consultores y personal de diferentes oficinas de la agencia, que los van a estar ayudando durante todo este taller informativo. Si tienen dudas, al final, verdad, las pueden hacer. Si no se atreven a hacer las preguntas, pues nosotros vamos a estar aquí presentes para ayudarlos y contestarles aquellas que conocemos; aquellas que no podemos contestarles, pues nos llevamos la asignación para podérselas contestar posteriormente. Así que, gracias y nuevamente, pues, les doy la más cordial bienvenida.

SRA. PAGANI:

Gracias, Ingeniero Rodríguez. La reunión se va a desarrollar de la siguiente forma: Primero, vamos a dar lectura del aviso público que se publicó, valga la redundancia, en el periódico Primera Hora. Segundo, se va a ofrecer una presentación de forma ininterrumpida. Vamos a solicitar que, por favor, coloquen sus celulares en modo de vibración y aquella persona que tenga que atender alguna llamada, pues, puede salir del salón. Una vez finaliza la presentación, es en ese momento que cualquiera de ustedes puede entonces hacer la pregunta y podrá ser de

forma ordenada. Vamos a dar entonces lectura al aviso público y los dejo con la señora Tatiana Farinacci.

SRA. FARINACCI:

Gracias. Buenas tardes. "Aviso público, reunión, participación ciudadana, extensión de la carretera PR-122 desde la PR-321 hasta la PR-166, San Germán, Lajas, Puerto Rico, proyecto AC012201. El Departamento de Transportación y Obras Públicas, la Autoridad de Carreteras y Transportación y la Administración Federal de Carreteras desean informar a las organizaciones privadas, agencias gubernamentales, estatales y federales, entidades municipales y al público en general que se estará llevando a cabo una reunión de participación ciudadana para presentar el proyecto de la extensión de la PR-122 desde la PR-321 hasta la PR-166 en los Municipios de San Germán y Lajas. El proyecto consiste en la extensión de la carretera PR-122 desde el área urbana en el barrio El Retiro en el punto de intersección de la PR-166 con la avenida Ángel Castro Pérez en San Germán hasta el punto de intersección con la PR-116, aproximadamente a 1.5 kilómetros del centro urbano del Municipio de Lajas.

La reunión de participación ciudadana se llevará a cabo el martes 7 de abril 2026 a partir de las 5:30 en el Centro de Convenciones Santiago R. Palmer, PR-102, kilómetro 34, intersección a Avenida Central, San Germán,

Puerto Rico. Cualquier ciudadano que desee someter comentarios sobre aspectos relevantes al proyecto, puedes enviarlo al oea@actpr.gov o dirigirlos por correo postal dirigido a la ingeniera Alexandra Velázquez, directora de la Oficina de Preconstrucción de la Autoridad de Carreteras y Transportación, PO Box 42007, San Juan, Puerto Rico, 'zip code' 00940-2007. Los comentarios se recibirán dentro de los próximos 30 días calendario a partir de la fecha de celebración de la reunión de participación ciudadana. El aviso público fue firmado por la ingeniera Ana L. Torres Santana, subdirectora ejecutiva de la ACT. Este aviso cumple con las leyes y procedimientos relacionados con impacto ambiental 23 CFR parte 771, sección 106 de la Administración Federal de Carreteras". Buenas tardes.

SRA. PAGANI:

Presento ante ustedes al ingeniero Miguel Pérez de Behar-Ybarra & Associates, quien dará comienzo con la presentación.

ING. PÉREZ:

Buenas tardes. Para efectos de récord, el ingeniero Miguel Pérez. Como comentó el compañero Luis Rodríguez, hoy durante la tarde estaríamos realizando una presentación, verdad, donde se estarán discutiendo varios aspectos del proyecto, los cuales incluyen una

localización general, el trasfondo de este proyecto, su propósito, necesidades existentes, descripción de los datos del proyecto, consideraciones ambientales, descripción de alternativas consideradas en el proyecto, comparación y resultados de estas alternativas seleccionadas preliminarmente, el itinerario del proyecto y el plan de trabajo para la fase 1 y los próximos pasos. Localización del proyecto: La Autoridad de Carreteras y Transportación de Puerto Rico y el Departamento de Transportación de Estados Unidos a través de la Administración Federal de Carreteras propone la extensión de la avenida Ángel Castro Pérez, la conocida como la PR-122, desde la carretera PR-321 hasta la carretera PR-166 en San Germán, dentro de los límites del Municipio San Germán y Lajas, valga la redundancia, ¿verdad?

El proyecto tiene un largo aproximado de 2.7 kilómetros. Queremos aclarar aquí, verdad, déjame ir un poquito... Aunque también se está trabajando la agencia federal como parte inicial del proyecto, como mencionó Luis recién, verdad, el proyecto se está... los fondos se están solicitando a través de la oficina de HUD, como él mencionó anteriormente. Al final de la presentación, les damos un poquito más de detalle de ese dato. En la imagen de la derecha se muestra la ubicación del proyecto. En la imagen de la izquierda se muestran los límites de este

mismo proyecto. En el 'background' verde, verdad, es el tramo del proyecto que se encuentra en San Germán, el lado anaranjado es el tramito que nos encontramos en Lajas, que ese proyecto pues fue construido como mencionó Luis, en el 2012, ¿verdad?

Para que tengan una idea del trasfondo del proyecto, este proyecto se planificó desde el 1968, donde se identificó la necesidad de una ruta alterna a la PR-101, verdad. En el 2002 se realizó, la Autoridad de Carreteras recibió un estudio de ruta analizando el ambiente, topografía, aspectos socioeconómicos en términos de tráfico y seguridad. De estas cuatro alternativas, se selecciona una y se presenta un documento ambiental en el 2003. En este mismo año, 2003, se presenta este documento ambiental ante la Junta de Planificación, en la cual emite un endoso de una determinación de no impacto significativo. No obstante, hasta el 2014, verdad, por una situación la ACT decide incluir este proyecto en el STIP 2016-17 para reevaluar el proyecto a nivel de preingeniería y en un cumplimiento ambiental siguiendo los procedimientos de NEPA.

El documento ambiental que se había aprobado en el 2003 era a nivel local, verdad, y entonces, tratando de conseguir fondos para el proyecto, pues en el 2014 se decide ponerlo y trabajar esa reevaluación de este

proyecto. Datos de diseño y construcción, para ponerlos en perspectiva, en 1995 es que comienzan los planos finales de la fase 1 y fase 2. En el 2008 comienza la construcción de la fase 2, que es la ruta actual que ustedes tienen, que más adelante la estaríamos dialogando. No obstante, en el 2010 se detiene la construcción de la fase 1, que es el tramito que estamos dialogando en el día de hoy. En el 2012 se completa lo que es la fase 2 en términos de construcción para el abril, el mes de abril, y como se mencionó anteriormente, pues en el 2019 vuelve de nuevo a trabajarse la segunda fase, la fase 1, perdón, en términos de evaluación de alternativas y rediseño de esta.

Propósito del proyecto: En términos de obra, proveer un ensanche y una extensión para un aumento de capacidad vehicular en la región, mejorar la movilidad de transporte y conectividad del área con mejores accesos, servir como una ruta alterna a la PR-101 y de acceso directo a la PR-2 a través del Municipio de San Juan, conectando con la zona turística de Lajas. En términos de planificación, el proyecto está acorde con el plan de transporte multimodal de largo alcance del 2040, el cual busca mejorar el desempeño del sistema de transporte y rehabilitación económica, proveyéndole una sustentabilidad ambiental en la región. En términos legales, busca cumplir con la resolución 488 del 10 de septiembre del 2001 de la Cámara

de Representantes de Puerto Rico, la cual solicitó realizar un estudio de factibilidad para extender la PR-116 en Lajas a la PR-122 en San Germán. En términos de ambiente, el proyecto estará en cumplimiento y en conforme con la política pública ambiental establecida por la Ley 9 del 1970, según enmendada, el plan vial para la región oeste de Puerto Rico y los mapas de extensión urbana de los Municipios involucrados, San Germán y Lajas.

En términos de movilidad, el propósito principal es aumentar las opciones de viaje para los residentes, visitantes y trabajadores, crear oportunidades para mejorar los modos de transporte no motorizados mediante el desarrollo de sus redes y mejores conexiones a destinos claves en el área. En términos de seguridad, mejorar la protección del sistema de transporte y la capacidad para respaldar la emergencia con una ruta más efectiva, proporcionar inversiones para mejorar el entorno de viaje de los usuarios con instalaciones seguras que sean capaces de recuperarse para hacer frente a emergencias. En términos de rendimiento, mantener y operar las instalaciones y servicios de transporte de Puerto Rico de manera proactiva para una mejor economía y eficiencia, aprovechando la capacidad disponible con seguridad y protecciones adecuadas.

En términos económicos, mejorar la competitividad

global y económica de la región, facilitando el movimiento eficiente de las actividades de transporte, negocios y turismo en esta. Descripción de las 100 propuestas: Como se le había indicado, verdad, la PR-122 existente sirve de acceso al Municipio de San Germán conectando la PR-2, ubicada a la parte de arriba, con la PR-166 existente. En el 2003, verdad, como se le había mencionado anteriormente, la evaluación ambiental de este proyecto se realizó, se aprobó a nivel local y con ese documento ambiental se construyó lo que se conoció, la fase 2, que es la que conocemos actualmente que llega hasta la intersección con la PR-321. Y se quedó pendiente el tramito que estamos dialogando y estamos tratando de obtener fondos federales para la construcción del mismo, que sería la fase 2. Descripción de las 100 propuestas: La construcción de la fase 2 finalizó en abril del 2012. El 17 de septiembre del 2014 se aprobó el proyecto de la fase 1, como se ha mencionado anteriormente, para comenzar la revisión ambiental en cumplimiento con el proceso NEPA federal, en este caso, verdad, a nivel de NEPA, la agencia HUD.

La fase 2 ya, como se mencionó, está construida, pero tratamos de mantener para este proyecto la misma sección típica, que es la que se muestra en la imagen, a la mano derecha de ustedes. Sí, derecha. El proyecto lo que

consiste es en dos carriles, verdad, de 3.65 metros de ancho, verdad, con un paseo de 240. Dependiendo del tramo del proyecto, tendrá una sección mediana o isleta central de 6 metros, o estaría dividida mediante un New Jersey Barrier o un 'concrete barrier', una barrera de concreto, con un ancho aproximado de 2 metros y medio, bastante similar a la construida actualmente. El propósito de esta sección está en cumplimiento con las directrices de diseño de la carretera como una clasificación R5 y estaría en total cumplimiento con esos parámetros.

En términos de consideraciones ambientales, el área de estudio se extiende de aproximadamente 1.71 millas, alrededor de 2.75 kilómetros, comenzando en la cercanía del Municipio de Lajas, específicamente en el punto de intersección con la PR-321 y se dirige hacia el norte, hacia la carretera PR-166 en el Municipio de San Germán conectando a la carretera PR-122, la cual me da acceso a la PR-2.

En términos de inundabilidad, el proyecto se encuentra en una zona X, verdad; no se identificó dentro del proyecto una área inundable. No obstante, existen dos quebradas, verdad, principales. Una de ellas es la quebrada Meresúa y una quebrada sin nombre que va paralela con el proyecto. Dentro del área de estudio, se identificaron especies en peligro de extinción, verdad,

según el sitio web de IPaC de la USA Fish and Wildlife Service. Las siguientes especies en peligro o amenazadas tienen el potencial de estar presentes en el área de estudio. Como parte de estas especies en términos de reptiles, la boa puertorriqueña; en términos de aves, el Puerto Rico 'nightjar' y el 'yellow-shouldered'. Según el U.S.A Fish and Wildlife Service, se identificó un área de hábitat crítico para la mariquita. Se realizó un estudio para determinar la presencia de la mariquita en la zona; no se observó esta especie durante el estudio. Sin embargo, se observó la boa y al guabairo.

Para aquellos que no lo conozcan, verdad, en la imagen a la derecha se identifican estas especies. Esta sería la boa puertorriqueña, este es el 'yellow-shouldered' y este sería el guabairo, ¿no? Aquí este sería, aquí se identifica el área de la especie crítica, verdad, recientemente, U.S.A Fish and Wildlife revisó esta área y para beneficio del proyecto, esta área fue reducida. 'So' que estamos revisando en este momento esos mapas.

En términos arqueológicos, San Germán cuenta con una gran historia, verdad. Como parte del proyecto, se estableció dentro del proyecto aproximadamente a 500 metros del estudio, verdad. Tenemos varios sitios históricos que se encuentran ubicados y que están

publicados dentro del registro nacional, verdad, del Municipio de San Juan.

No obstante, dentro del área del proyecto, en términos de registro no se identificó ninguno, pero como parte del estudio arqueológico que se realizó para el proyecto, se identificaron una serie de atarjeas, verdad, que pertenecían al antiguo ferrocarril de circunvalación de la American Railroad Company de Puerto Rico. Ya este documento ambiental fue circulado a las agencias pertinentes, verdad. En estudios anteriores se identificaron estos recursos y actualmente pues estamos llevan... o se llevó, verdad, una documentación y un plan de conservación de estas estructuras. También se preparó un plan de monitoría el cual las agencias evaluaron y se están tomando en consideración para tratar de mantener estas estructuras con la construcción del proyecto. En la figura a la derecha se muestra una imagen de las 17 estructuras que se encontraban en el proyecto.

De esas 17 estructuras, 5 estructuras luego de revisiones y cambios en las alineaciones, tendrían un impacto adverso, verdad, pero toda esa documentación se preparó y se llegaron a unos acuerdos para tratar de mantener dos de ellas y tratar de relocalizar una de ellas que eso lo explicaré un poquito más adelante en términos del proyecto. Como parte de infraestructura complementaria

en el proyecto también se identificó en el área de San Germán unos caminos, verdad, en términos de 'mountain biking' utilizados para bicicletas, verdad, o 'hiking'. Como parte del proyecto se hicieron los ajustes necesarios para tratar de mantener esos caminos y no se vieran afectados con el proyecto. Como les mencioné ahorita, verdad, para llegar a la alternativa o la alternativa preferida, verdad, o seleccionada a ser presentada ante ustedes se hizo un estudio, verdad, donde se evaluaron distintas alternativas, verdad, tratando de mantenernos conectando lo que era el punto A y el punto B que era la intersección de la PR-321 con la 122, verdad.

Todas estas alternativas que se estudiaron, verdad, eran con el propósito de minimizar todos estos recursos ambientales que los identifiqué hace un rato, verdad, en términos arqueológicos, en términos del hábitat crítico de las especies y se estudiaron alrededor de unas tres alternativas, verdad. Estas tres alternativas se evaluaron entre ellas o se compararon, perdón, cuatro alternativas, disculpen, incluyendo la alternativa original.

Se evaluaron entre ellas para comparar su efectividad en el cumplimiento de las necesidades del proyecto, verdad. Esta necesidad, verdad, se describen en la tabla a continuación en términos de cuál era el tipo de estructura que se propone para estas alternativas, si

mejoraba la movilidad del área, en términos de constructividad y diseño, un aspecto bien importante en términos de medio ambiente, qué impacto tenía, en términos de mantenimiento y rehabilitación. Otros puntos, verdad, no tan importantes pero no tan relevantes, derechos de vía, comodidad del usuario, términos de seguridad, inspección y otro punto importante, verdad, serían los costos de construcción, especialmente los costos de ciclo de vida o costos de mantenimiento, sabes, en términos de rehabilitación y los costos de demora para los usuarios, verdad, en este sentido.

Como les mencioné, se evaluaron cuatro alternativas considerando la alternativa original presentada en el documento ambiental del 2003. Como parte de este esfuerzo se estudiaron tres posibles alineamientos adicionales en lo que se está incluyendo, verdad, como les mencioné, en el documento del 2003. Debido a las condiciones topográficas y los alineamientos propuestos, tuvimos que limitarnos, verdad, a lo que fue el valle de lo que es la conexión de San Germán, o sea, que estuvimos trabajando en esta área, verdad. Ya en documentos anteriores o en planificaciones anteriores, estas alternativas se habían estudiado por otros puntos, verdad, más allá de estas conexiones, verdad, y nada. Y, importante señalar, verdad, que el propósito era tratar de completar la conexión de la

PR-122 con la PR-122 existente. La primera alternativa A es la alternativa previamente estudiada en el documento ambiental del 2003. Esta alternativa comienza, como se mencionó, en la PR-121 en el punto de intersección de la 321 y continúa hacia el norte a la PR-166 en San Germán.

Aquí en esta alternativa el largo aproximado es 2.77 kilómetros y prácticamente la incluimos, verdad, tomando en consideración los elementos de planificación del 2003, verdad, y poder estudiarlos y buscar de qué forma podíamos mejorar esta alternativa para completar el proyecto. La alternativa B, siendo similar a la alternativa E en términos de alineación, lo que se hicieron fueron unos cambios o modificaciones a lo que se conoce el perfil para reducir los impactos por movimiento de tierra, o sea, reducir lo que serían las colas que afectarían los terrenos aledaños, verdad, reduciendo el área a lo que sería el terreno y así minimizando posibles impactos a lo que sería el medio ambiente. Se queda más o menos con el mismo largo, verdad, 2.77 kilómetros.

En la alternativa C, aquí se hicieron cambios de alineaciones leves en términos de la geometría de la carretera. Dentro de estos cambios se utilizó la alternativa de puentes y muros de retención para mitigar los impactos a las atarjeas del tren de circunvalación, verdad, que como les mencioné anteriormente, es una

situación que a nivel histórico, pues las agencias estaban pidiendo que se trataran de conservar.

Aquí el largo del proyecto varía un poquito, pero en términos comparativos, verdad, que los vamos a ver un poquito más adelante, son bastante similares. En la alternativa D, toma en consideración la variación, otra variación en alineación y a los perfiles anteriores, es un poquito más refinada. Se modificó la alineación horizontal para minimizar o evitar cortar entre las montañas en el corredor de estudio. Esta sí aumentó un poquito más del largo, alrededor de 2.8 kilómetros, verdad, en ese sentido. También con esta alternativa se logró minimizar los impactos a lo que serían las áreas de las atarjeas, verdad.

En la siguiente 'slide' se presentan una comparación, verdad, de los parámetros que mencionamos de cada una de las alternativas y se presenta un resumen, verdad, de las alternativas A, B, C y D, estudiadas, mostrando las diferencias en cada uno de sus aspectos en términos largos del proyecto, cantidad de puentes, verdad, especialmente su costo estimado entre cada una de las alternativas, verdad, y de las alternativas consideradas. Sus costos varían en este momento, verdad, en ese momento cuando se hizo el estudio, de 24 millones a 47 millones.

Según hemos refinado en el proyecto, estos costos han

seguido aumentando, verdad, pero para términos comparativos, en aquel momento, verdad, estos eran los costos que se estaban utilizando. Otra diferencia que se puede observar aquí, verdad, además de la diferencia en los costos eran los impactos en términos de recursos arqueológicos. La alternativa A, desde un principio, afectaba alrededor de nueve recursos arqueológicos. Mientras seguían moviendo en cada una de las alternativas, se iba minimizando, verdad. Todo esto era con el propósito de llegar al balance perfecto, verdad, en términos de costo de efectividad y en términos de ambiente.

Todos estos datos presentados anteriormente pues se presentaron en una matriz comparativa, verdad, para obtener una clasificación en la cual aquella alternativa que terminara en la posición número uno, y basado en los objetivos del proyecto, era la alternativa que técnicamente era la mejor para atender el proyecto, verdad, luego de hacer esos análisis, verdad. Y se prepara un, se hicieron esos análisis comparativos, cuantitativos y cualitativos. Para el proyecto, verdad, surge que la alternativa B tiene la mejor 'ranking' o la mejor posición, con un valor de 4 a 11, verdad ya una vez establecida esa comparación de alternativas, ¿verdad?

Como les he mencionado, pues se comenzó a desarrollar esta alternativa B, y es la que vamos a estar tocando con

un poquito más de detalle, ahora en adelante, verdad, y es la que estuvieron viendo y se presenta en la parte posterior del salón. Okey. Como se ha mencionado anteriormente, no cambió, verdad, simplemente se extendió el límite del proyecto un poquito más hacia el lado de Lajas, verdad. Todo esto es para que eventualmente la salida que ustedes utilizan a la 321, esa salida se eliminaría, verdad, y entonces se continuaría directo desde la 122 desde Lajas hacia San Germán, hasta conectar hasta la 122. Esta rampita al ser eliminada se introduce en una nueva intersección, en la cual se construye un nuevo puente que estaría sobre la PR-321. Esta intersección se conoce como una intersección tipo trébol, verdad, porque entonces tendría dos tipos de entrada y salida en cada uno de los puntos de la 321, la cual más adelante se presenta con un poquito más de detalle.

Una vez continuamos hacia el norte, hacia el Municipio de San Juan, como parte del proyecto se propone una construcción de un puente número 2. Este puente número 2 surge, verdad, aquí en este punto. Existen dos quebradas importantes del tren de circulación, verdad, que para poder lograr los acuerdos con las agencias federales, se propuso este puente para no tener que afectarla. Una vez continuamos hacia el norte, llegamos hasta el puente número 3. Ese puente número 3 estaría sobre el camino

existente que da acceso de la Comunidad de Retiro hacia unas residencias que quedan pegaditas a lo que sería la quebrada sin nombre, que continúa hacia el sur del proyecto; hay como 4 o 5 residencias en esa área, si no me equivoco. Una vez salgo del puente número 3, se encuentra una segunda intersección.

Esa es una intersección nueva, en la cual permitiría el acceso a todos los residentes de la Comunidad de Retiro. De ahí continuamos, llegamos a la PR-166, donde hago conexión a la PR-122. Aquí en esta imagen, pues se muestra un alzado, verdad, de lo que sería la primera intersección del proyecto. Esto sería la PR-321, esta es la dirección. Esta es la PR-122. Desde aquí hacia Cabo y hacia San Germán, desde este punto hacia el sur, estaría dirigiéndome hacia Lajas. Como les mencioné, este camino de acceso que es el que ustedes actualmente utilizan, se estaría cerrando y se crean dos intersecciones, verdad, o una intersección tipo trébol que tienen dos puntos de acceso en la PR-321. Si ustedes como usuarios están utilizando la PR-321 y quisieran ir hacia el Municipio de Lajas, estarían entrando por esta rampita de acceso y continúan su movimiento hacia Lajas.

En el caso que vengan de San Germán u otras residencias, si quisieran bajar a la PR-321, bajan en este punto en dirección, verdad, de San Germán hacia Lajas y

quisieran bajar a la PR-321, pueden utilizar esta rampa de acceso. Y, entonces ya aquí en este punto hacen un pare y si quieren irse hacia la PR-101, hacen la derecha; si quieren continuar hacia la 321, continúan hacia la izquierda. En el caso que venga de dirección de Lajas hacia la 122 y quisiera accesar la 321, utilizo esta rampa ubicada en el extremo este del proyecto la cual me conectaría a la 321. Si de la 321 quisiera llegar hacia San Germán, utilizo esta rampa que quedaría aquí en este punto. Y viceversa, si vengo de la 321 y quiero ir hacia San Germán, utilizo esa misma rampa. Y si quisiera ir hacia Lajas, tengo que pasar por debajo del puente, verdad, y utilizar esta rampa para entonces llegar a lo que sería Lajas, verdad. Esos son los movimientos que se proponen como parte de la intersección.

Ninguna de estas dos intersecciones al momento, verdad, necesitan semáforo o no se está considerando semáforo. Aquí se le presenta una perspectiva visual para que tengan una idea de cuál sería el comportamiento de la intersección en términos visuales, verdad. Este sería el puente número 1, esta sería la PR-321, sus accesos correspondientes. Estas son las rampas de acceso que se les mencionaron, esta sería la que me lleva hacia Lajas, esta de San Germán hacia la 321, por aquí de la 321, que diga, de la 122 de Lajas hacia la 321 y de la 321 hacia

San Germán.

Aquí se, como les mencioné hace un rato, verdad, aquí se ubica el puente número 3. En estos dos puntos, estas son las dos atarjeas, verdad, que se trataron de salvar y entonces para poder hacer el proyecto más viable en términos de impactos ambientales, se introduce el diseño de este puente. Este puente tiene alrededor de 6 "espanes", verdad, y entonces evita, verdad, que durante la construcción tenga un impacto directo, verdad, o adverso a estas dos estructuras que se ubican en ese punto. Esto también, verdad, pues me va a permitir que los accesos existentes que utilizan como 'hiking' y bicicletas, pues se puedan mantener, verdad, creando un punto visual un poquito más agradable, verdad, en ese sentido también y que ambos proyectos pues puedan mantenerse funcionando. Esto sería una perspectiva de cómo sería el puente en esa ubicación más o menos. Aquí tienen una idea de la atarjea. Aquí en esta figura, voy a regresar un poquito para atrás, esto es otra alternativa que se tuvo que hacer para evitar, luego de este punto existían como tres estructuras adicionales arqueológicas que estaban cerca del proyecto. Para evitar su impacto, se introdujo un muro de contención en este punto, que fueron las que vieron en la imagen anterior, para tratar de salvar estas dos atarjeas y mantener ese camino. Y

entonces, esa sería la perspectiva...

PERSONA SIN IDENTIFICAR:

Saludos.

ING. PÉREZ:

Un placer. Esta sería la perspectiva de cómo quedaría el proyecto en ese punto. Este sería el muro de retención manteniendo el camino y las dos atarjeas estarían ubicadas en este punto. Aquí en esta imagen se presenta un alzado, verdad, de la intersección número 2. Este es el puente número 2 que les mencioné ahorita. Y este puente, el propósito es para que el acceso existente, verdad, de la Comunidad de Retiro hacia unas residencias que están un poquito más hacia el sur del proyecto se mantengan. Y ese acceso no se reubica, pero se mantiene. No se ve afectado, verdad. En este punto se crea una nueva intersección, verdad, la cual va a permitir un acceso directo a lo que sería la Comunidad de Retiro. Se conectaría más o menos por el área donde está el área de los 'bleachers' de la comunidad. Por ahí en ese punto, para que tengan una idea y se puedan ubicar mejor.

El propósito de esta intersección es que existen proyectos de planificación para una futura extensión eventualmente, verdad, y una conexión a posibles carreteras, pero eso es otro proyecto. La última intersección, pues ya es la intersección existente con la

PR-166. Esta intersección se quedaría en una tipo cruceta, verdad, en donde se mantiene el acceso de la PR-166, se mantiene el acceso de la carretera municipal y se continúa, verdad, con el acceso lo que sería ahora el acceso principal de la PR-122. Como parte de las medidas de seguridad, se propone un pare en la PR-166. El acceso hacia esta carretera se mantiene, pero en una sola dirección, entrando. No se permite la salida por este punto. Tampoco en ninguna de estas intersecciones al momento se está considerando semáforos.

En este 'slide' aquí le presentamos como les mencionó, como les mencioné hace un rato atrás, como parte del proyecto se impactan una serie de estructuras, verdad, de este tren. Entonces, como parte de la iniciativa de la Autoridad de Carreteras y de los acuerdos con las agencias, una de estas atarjeas se está tratando de preservar y tratar de relocalizarla a un punto estratégico en el proyecto, cerquita de la intersección, incluyendo su rotulación, verdad, identificando la importancia histórica de estas atarjeas, verdad, para que no sólo se reconozca y también fomente, verdad, de que existe una serie de elementos a lo largo de la ruta, verdad, de interés o un valor histórico.

Estas son unas ideas, verdad, que se están presentando, se están dialogando como parte de los

acuerdos que tenemos con el proyecto. Esto sería cerquita de la intersección del Retiro, verdad. Estos terrenos, verdad, como parte del proyecto se estarían adquiriendo, verdad, y en ese punto, pues se estarían ubicando. Itinerario del proyecto. Actualmente, verdad, estamos todavía en la parte de aprobación del documento ambiental. Nuestra meta era haberlo terminado ahora este tercer trimestre. Tenemos este segundo taller, verdad, ahí todavía nos queda un poquito del camino, pero entendemos que ya muy pronto vamos a estar terminando este proceso. Ya en el cuarto trimestre del 2026 sería empezar lo que sería el proceso de diseño y construcción. Este proyecto se piensa subastar en ese tipo de formato en el cual nosotros completamos el 35%, se subasta, y un contratista tiene, y una combinación de contratista y diseñador termina el 100% y lo construyen, verdad, en ese sentido. Ya una vez completemos el proceso de documento ambiental y un punto a favor que nos ayuda a acelerar el proceso de construcción, las agencias nos han permitido de que ambos proyectos se puedan llevar a la vez, verdad. Esto nos va a ayudar a acelerar un poquito ese proceso. Estamos en diálogo, pero entiendo que ya es algo positivo que se logró.

La idea es que una vez completemos el proceso de documentación ambiental en donde se incorporen los

comentarios que nosotros recibimos en estos talleres informativos, tanto como de la agencia, verdad, que firma o documenta el proyecto, terminar ese proceso y empezar el proceso de adquisición. Nosotros no podemos, las agencias, no pueden empezar el proceso de adquisición hasta que no tenga el documento ambiental aprobado, verdad. Nuestra meta es para que el primer trimestre del 2028 o antes pueda tenerlo obtenido, verdad, como les mencioné ahorita. Esto se ve el 2028, pero con lo que se logró de que podríamos empezar, es posible que allá el 2027 algunos tramos se puedan empezar a construir, en la cual ya no se requiere adquisición de terreno en el proyecto. La idea es que para el tercer trimestre del 2029, completemos la construcción de este proyecto. Esos son los planes que tenemos, verdad, hasta el momento. Voy a irme por aquí. Otra cosa que estamos planificando es, para acelerar este proceso de construcción es ver si podemos dividir el proyecto en tres pedazos, verdad, cosa de aumentar la participación de contratistas locales y poder acelerar o reducir ese tiempo.

Esas son alternativas que se están considerando en el documento ambiental. La idea es que el primer proyecto sea la parte de comenzando en la 321 hasta llegar hasta el puente número 2. El segundo proyecto sea el puente número 2 y el tercer proyecto, el número 3. Esto no quiere decir

que la agencia va a estar subastando un proyecto primero, un segundo y tercero. La idea es tratar de subastar los tres y tener tres contratistas trabajando para poder acelerar el proceso de construcción. Importante, y como se ha mencionado, "Este proyecto se encuentra en una etapa de evaluación y planificación bajo el programa del CDBG-MIT, del Departamento de la Vivienda de Puerto Rico. Está sujeto a la revisión ambiental conforme al 24 CFR parte 58 y la aprobación del Departamento de la Vivienda y del HUD. No se ha tomado ni se tomará ninguna acción que limite la consideración de alternativa antes de completar el proceso. La información presentada es preliminar y está sujeta a cambios conforme a los resultados de la evaluación ambiental, comentarios del público y determinaciones regulatorias aplicables de agencias federales y locales.

Cualquiera que desea someter comentarios sobre aspectos relevantes al proyecto puede enviarlo a la siguiente dirección del correo electrónico: oea@act.pr.gov o dirigirlo a la siguiente dirección: Ingeniera Alexandra Velázquez Delgado, Directora de la Oficina de Preconstrucción, Autoridad de Carreteras y Transportación, PO Box 42007 San Juan, Puerto Rico, 00940- 2007. Los comentarios se recibirán dentro de los próximos 30 días calendario a partir de la fecha de celebración de la

reunión de esta participación ciudadana". Eso sería todo.

SRA. PAGANI:

Sí, buenas tardes. Antes de comenzar con las dudas y preguntas, vamos a dar la oportunidad al honorable alcalde Virgilio Olivera Olivera para dirigirse a ustedes.

SR. ALCALDE:

Muy buenas tardes a todos. Gracias por estar aquí. Quiero agradecer a la Autoridad de Carreteras, al secretario de DTOP y a todo su personal por estar aquí en esta reunión tan importante en este proyecto que sin duda alguna va a trascender lo que es San Germán. Desde nuestra perspectiva como municipio, como alcalde, hemos endosado este tipo de proyecto porque no tan solo representa un avance a nuestra ciudad de San Germán, sino que ayudamos a Lajas, ya que este conector sería una ruta de desalojo del Municipio de Lajas y uno de los accesos directos a Lajas, uniendo ambas ciudades. El proyecto ha tenido el aval de la señora gobernadora y ese ha sido uno de los puntos que nosotros hemos traído, pero para nosotros es importante escuchar sus comentarios, aclarar sus dudas y todo dentro del marco de las leyes y reglamentos que aplican para este tipo de construcción que es grande.

Aquí yo veo muchos residentes de la comunidad El Retiro y comunidades aledañas al proyecto, que es importante que en este tipo de reunión ciudadana traigan

sus dudas. Como parte también de los requisitos para la construcción de este proyecto es precisamente que se haga este tipo de reunión. Así que, agradecemos a la Autoridad de Carreteras, al secretario y a todo el personal por estar aquí en esta tarde y, sin duda alguna, a cada uno de ustedes para conocer de este proyecto y que pueda traer esa información, esas dudas, esos comentarios que se puedan establecer en este tipo de proyectos. Así que, muchas gracias y nuevamente entiendo que los micrófonos van a estar abiertos ¿verdad? En los próximos minutos...

SRA. PAGANI:

Sí.

SR. ALCALDE:

... para la participación ciudadana. Excelente noche para todos.

SRA. PAGANI:

Muchas gracias, alcalde. Vamos a dar entonces comienzo con las preguntas o dudas que tengan. Vamos a solicitarles que sean concisos para darle oportunidad a todo el mundo y recuerden que para poder documentar este trabajo tenemos que ustedes identificarse con nombre y apellido completo. Y aquella persona que desee entregar la hoja que se le entregó cuando se registraron, pueden hacerla llegar a la mesa que se encuentra al fondo y nosotros, pues, la vamos a recibir. Así que los micrófonos

están abiertos. Buenas tardes. Olga Pagani para récord, recuerden que este es el momento de dudas y preguntas. Tenemos el micrófono abierto y pueden dirigirse al frente para expresarse.

SRA. MIRNA RIVERA:

Muy buenas tardes, Mirna Rivera Rodríguez de la urbanización El Retiro aquí en San Germán por los últimos 22 años. Mi pregunta va dirigida al tránsito. Si ustedes han contemplado cómo va a ser el tránsito, ya que, verdad, nuestra, esa calle Santiago que conecta con el Barrio Retiro, se había hecho vistas públicas y todo porque solamente es una vía, aunque sabemos que no siguen las reglas de transportación. Pero bueno, lo que me gustaría que nos expliquen es eso. ¿Cuál va a ser la ruta? ¿Cuál va a ser? Si ellos, verdad, porque yo sé que ellos es construcción del proyecto, pero necesitamos saber esa información, si la tienen. Gracias.

SR. ALCALDE:

Muchas gracias. Esa pregunta va dirigida a la Urbanización El Retiro, verdad. Para clarificar la duda, estamos hablando de la carretera que conecta en la misma 1-22, allí mismo donde está el cursor que conecta hacia la urbanización. Hay un proyecto que se está trabajando en la legislatura municipal que va a correr separado a este proceso del posible cierre de esa calle. Actualmente,

esa carretera aunque tiene el espacio para ambos carriles ha presentado un elemento de seguridad donde los vehículos que transcurren desde la 166 bajan sin hacer el pare y así mismo siguen directo hacia la urbanización y ha creado una situación de seguridad en la urbanización dado que allí la mayoría ya de residentes son adultos mayores, pueden haber niños, etcétera. Así que, sí hay un proyecto que lo tiene la legislatura municipal para la evaluación del cierre completo.

Es decir, que no necesariamente está como ahora que debe ser una sola dirección, sino el cierre completo de ese carril cuestión de que nadie podría ni subir ni bajar por ahí. Eso está en evaluación en la legislatura municipal y en algún momento, ya se hizo una vista pública, posiblemente se hagan otras vistas públicas para que entonces se puedan expresar y se va a estar tomando la decisión en la legislatura municipal. Es importante que nosotros vamos a estar haciendo los anuncios de las próximas vistas que se puedan llevar a cabo para ese proceso y que tenga participación ciudadana y de ahí entonces se continuarán los trabajos. Pero sí, ya es algo que está en la evaluación y no afectaría este proyecto porque precisamente como está en la fase de diseño todavía está de forma preliminar, está comenzando, estamos en la etapa uno; no afectaría este proyecto.

Lo que, si el municipio decide de forma, por ordenanza, en el escenario, de cerrar esa calle, lo que estaríamos hablando con la Autoridad es que ese diseño de la, de esa entrada, lo elimine. Eso allí. Pero eso está todavía en discusión pero no afectaría este proyecto. Mi nombre es Virgilio Olivera, Alcalde de San Germán. Para efectos de récord, quiero que el presidente de la legislatura municipal también pueda añadir un poco en este comentario.

SR. VILLA:

Sí, buenas noches a todos. Adalberto Villa, presidente de la legislatura municipal. Ya hemos celebrado anteriormente, hace yo creo como un año, una vistas públicas en el salón de la legislatura donde los residentes de esa área pues expresaron su sentir sobre esa salida. Luego, la Comisión de Obras Públicas y Tránsito, ya hemos visitado en dos ocasiones el lugar donde hemos hablado con los residentes pero tenemos una controversia porque los residentes de la urbanización El Retiro quieren que se cierre, pero los residentes de la otra parte no quieren que se cierre, así que, de la comunidad, verdad, y luego cuando se presentó este proyecto que estuvimos en Lajas y explicaron pues, más o menos cómo iba a funcionar esa intersección pues dejamos pendiente mientras tanto esos procesos para que eventualmente podamos tomar una

decisión.

SR. ALCALDE:

Este cuatrienio vamos a tomar esa decisión. Así que, vamos a estar claros con eso, este cuatrienio tomaremos esa decisión en cuestión de que este proyecto no interfiera con nada de eso. Más adelante hay otra entrada. Que lo que va a transcurrir es que la Urbanización El Retiro va a quedar un poco más privada. Quiero hacer una pregunta también, nuevamente, para efectos de récord. Para mí es importante como alcalde la preservación histórica que hay aquí en este proyecto y uno de los elementos que siempre hemos estado pendientes y que se están tomando medidas para la preservación de las estructuras históricas que hay aquí que entonces se pueda contemplar en el proyecto esa preservación y ese elemento de que se pueda mover una de las áreas a la parte de la entrada, ¿no? Que sea visible. Pues, me parece que es interesante porque también atrae lo que es la historia de nuestra ciudad.

ING. RODRÍGUEZ:

Para récord, Luis Rodríguez, ayudante del director ejecutivo de la Autoridad de Carreteras. Alcalde, bien importante la preservación histórica este proyecto ha contado con estudios arqueológicos bien detallados fase 1, fase 1a, fase 1b, fase 2, investigaciones arqueológicas, evaluaciones arqueológicas, excavaciones

y hemos "mapeado" detenidamente toda el área. El proyecto toma en consideración todos esos aspectos arqueológicos e históricos de lo que era el tren de circunvalación y lo estamos integrando como parte del proyecto.

SRA. ROSA RIVERA:

Buenas tardes a todos, mi nombre es Rosa Rivera, residente del Barrio Retiro. Mi pregunta es, no sé si el alcalde vaya a poder contestar, que hubo algo a base de la canalización que iban a arreglar los gaviones de la quebrada del Retiro. ¿Si eso es parte del proyecto interfería con el proyecto o es primero que el proyecto? Los gaviones de la canalización.

SR. ALCALDE:

Virgilio Olivera Olivera, alcalde de San Germán. Esta pregunta va dirigida a un proyecto que tiene el municipio actualmente. Es aparte a este proyecto, ese proyecto que usted menciona es a raíz de los daños que sufrió el muro de gaviones tras el Huracán Fiona que recurre por la comunidad del, de la comunidad del Retiro, la Urbanización El Retiro, el Residencial El Recreo, toda esa área que esa canalización con el muro de gaviones. Actualmente es uno de los proyectos más grandes bajo FEMA, Fiona en Puerto Rico. Un proyecto de más de 40 millones de dólares y está actualmente, salió la subasta del diseño de ese proyecto pero es un proyecto que está trabajando el municipio que

no interfiere con este proyecto que está trabajando el gobierno de Puerto Rico.

SRA. ANETTE RIVERA:

Sí, buenas noches, Anette Rivera de la Urbanización El Retiro. Me preocupa por la congestión de, vehicular, que va a haber ahora en esa área, por ejemplo, en el pedacito que queda frente al centro comercial, que se supone que haya dos carriles disponibles para el flujo vehicular. Y hay los dos, solamente hay uno porque se estacionan en ambos lados, o sea, que entonces ahí va a ser un poco más difícil el tapón que se va a formar allí, a ver si ustedes han tomado alguna consideración para prohibir entonces a las personas que se estacionen en esos lados de la carretera para que pueda fluir el tráfico mejor.

SR. ALCALDE:

Virgilio Olivera Olivera, alcalde de San Germán para efectos de récord. ¿Entiendo que su pregunta va dirigida a la entrada de la urbanización?

SRA. ANETTE RIVERA:

El centro comercial Antongiorgi y frente a la farmacia Mayi, en esas dos aceras.

SR. ALCALDE:

Sí, correcto. Estamos hablando de que esa sigue siendo la 122. Está fuera de la jurisdicción de este

proyecto pero sí es algo que estaremos tomando en consideración y que lo podemos evaluar. Es una carretera estatal, entiendo allí que se están estacionando en lo que viene siendo el equivalente al paseo que entonces interfiere... Sí, eso sin duda alguna que se estará tomando acción para evitar entonces esa práctica que no debe de ocurrir al día de hoy. La realidad es que sí, no debe de ocurrir porque ese es el paseo de la carretera estatal de la 122.

ING. PÉREZ:

Sí, Miguel Pérez de la firma Behar-Ybarra & Asociados. Adelantando ese proyecto, actualmente la Autoridad de Carreteras tiene planificado en los próximos meses trabajar un proyecto de mejora de mercado tanto a la PR-122 existente como a la PR... en el lado de San Germán, como a la PR-122 en el área de Lajas, que como parte de ese proyecto se podría de alguna manera reforzar en términos de rotulación y marcado de pavimento para que ese estacionamiento indebido, pues no se permita. Eso lo podríamos tomar en consideración en ese proyecto.

SRA. PAGANI:

¿Cierro? Olga Pagani, para récord. ¿Alguna otra duda o pregunta? Esta es la oportunidad para todos.

ING. RODRÍGUEZ:

Buenas noches, nuevamente, Luis Rodríguez para

efectos de récord. Yo sé que muchas personas a veces le da un poquito de temor a hablar, por levantarse y hablar por el micrófono, verdad, así que nosotros vamos a estar por aquí tan pronto termine el taller informativo y todos aquellos que tengan alguna duda, preguntas, comentarios sugerencias o recomendaciones las pueden hacer con nosotros que vamos a tomarlas en consideración.

PERSONA SIN IDENTIFICAR (FUERA DE MICRÓFONO):

Y que la...

ING. RODRÍGUEZ:

Sí, sí, también se están recogiendo los comentarios escritos, verdad, en la mesa. Aquellos que tampoco quieran, que tengan un poquito de prisa o no quieran hablar al respecto, pues, lo pueden entregar en forma escrita en la mesa.

SR. ALCALDE:

Yo quiero añadir algo más. Virgilio Olivera Olivera, alcalde. Esta oportunidad es bien importante, compañeros. Ninguna pregunta está de más, ningún comentario está de más. Fíjense como en este tipo de conversación podemos traer asuntos que no necesariamente estén aquí pero que puedan mejorar el proyecto. Así que, si usted tiene un comentario, una duda, algo que usted entienda que puede visualizar, mejorar el proyecto o de las comunidades aledañas, tráiganosla porque así nosotros podemos

visualizarlo tanto en el gobierno estatal como a nivel municipal. Tiene la oportunidad de hacerlo ahora, si no también tiene 30 días. Recuerde que tiene 30 días para someter cualquier comentario sobre este proyecto a partir del día de hoy.

Tiene 30 días para someter también cualquier comentario a partir del día de hoy en ese correo electrónico que está allí o dirigido a la ingeniera Alexandra Velázquez Delgado para que pueda entonces tomarse en consideración. En la parte de atrás también hay una foto del proyecto que es importante, la comunidad del Retiro. Toda la comunidad del Retiro, la zona urbana. Este proyecto impacta el tránsito, impacta la zona comercial, así que es importante que esos comentarios nos los hagan llegar o los hagan llegar a la Autoridad para que se puedan tomar en cuenta las horas del diseño de la construcción de este proyecto.

SRA. PAGANI:

Olga Pagani, para récord. Pues no habiendo más preguntas hasta el momento, vamos a dar por terminada esta reunión a las 7:05 de la noche, hoy 7 de abril del 2026. No sin antes agradecer su presencia, buenas noches.

* * *

SE DIO POR TERMINADA ESTA REUNIÓN

* * *

FECHA : 7 de abril de 2026

HORA : 5:40 p.m.

ASUNTO : Reunión de Participación Ciudadana

CERTIFICACIÓN DE LA TAQUÍGRAFA

CERTIFICO que la que antecede es la transcripción fiel y correcta del récord tomado por el suscribiente de los procedimientos habidos durante esta asamblea.

En San Juan, Puerto Rico, a 28 de abril de 2026.



JASMINE MARIE CARRERAS

TAQUÍGRAFA

BYA BEHAR-YBARRA AND ASSOCIATES LLC
ENGINEERING • ARCHITECTURE • ENVIRONMENTAL • PROJECT MANAGEMENT
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# Citizen Participation Meeting

**Centro de Convenciones Santiago R. Palmer, San Germán, Puerto Rico**

**April 7, 2026**

**English Transcription**

**PUERTO RICO HIGHWAY**
**AND TRANSPORTATION AUTHORITY**
**SAN JUAN, PUERTO RICO**

RE:

CITIZEN PARTICIPATION
MEETING

DATE : April 7, 2026

TIME : 4:40 p.m.

CLIENT : PUERTO RICO HIGHWAY
AND TRANSPORTATION AUTHORITY

ADDRESS : Preconstruction Office
15th Floor
Centro Gubernamental Minillas Sur
San Juan, Puerto Rico

HELD AT : Santiago R. Palmer Convention Center
PR-102, Km. 34
Central Avenue Intersection
San Germán, Puerto Rico

APPEARANCES

MASTER OF CEREMONIES:

Ms. Olga Pagani Candelario - Moderator

FOR BEHAR-YBARRA & ASSOCIATES:

Engineer Miguel Pérez Correa
Engineer Adolfo Hernández Santiago
Engineer Yazmín Acevedo

FOR THE MUNICIPALITY OF SAN GERMÁN:

The Honorable Virgilio Olivera - Mayor
The Honorable Ivonne Irizarry - Vice mayor
Mr. Adalberto Villa - Speaker of Municipal Legislature



I, Juan E. Segarra, USCCI #06-067/translator, certify that the foregoing is a true and accurate translation, to the best of my abilities, of the document in Spanish which I have seen.

Ms. Madelyn Vázquez - Representative for the Hon. Emilio Carlo Acosta, Puerto Rico House of Representatives

FOR THE PR HIGHWAY AUTHORITY:

Engineer Luis E. Rodríguez Rosa - Senior Executive Aide and Acting Principal Manager

FOR ADKINSRÉALIS:

Engineer Erick Torres

COURT REPORTER:

Mrs. Jasmine Marie Carreras

SOUND TECHNICIAN:

Mrs. Yanira Rodríguez Ortega

* * *

The proceedings developed as follows in this transcript.

* * *

MR. MARTÍNEZ:

Greetings, everyone. Can you hear me? Good afternoon. It is 5:40 in the afternoon; we will begin this informational workshop in 20 minutes. Thank you.

(OFF THE RECORD)

MS. PAGANI:

Good afternoon. For the record, my name is Olga

I, Juan E. Segarra, USCCI #06-067/translator, certify that the foregoing is a true and accurate translation, to the best of my abilities, of the document in Spanish which I have seen.

Pagani. I work for the Puerto Rico Highway and Transportation Authority Preconstruction Office. Welcome to the Santiago R. Palmer Convention Center in the Municipality of San Germán. This evening we will be holding a Citizen Participation Meeting for Project Number AC012201, the extension of Road PR-122, from PR-321 to PR-166, in San Germán and Lajas. We are commencing this meeting at 6:00 p.m., today, Tuesday, April 7, 2026. We would like to inform you that this meeting is being recorded for the purpose of documenting the work. We will request that anyone who wishes to address any officer or consultant for the Puerto Rico Highway Authority, to speak and tell us your name and last name.

Before we begin, we will acknowledge the presence of the Honorable Mayor of San Germán, Virgilio Olivera Olivera, who is not here right now, but will join the meeting at any moment. And on his behalf, we have Ms. Ivonne Irixarry, Vice mayor; and Mr. Adalberto Villa, the Speaker of the Municipal Legislature. Present also is Ms. Madelyn Vázquez, on behalf of the Honorable Emilio Carlos Acosta, a representative from the Puerto Rico House of Representatives. For the Puerto Rico Highway Authority, Engineer Luis E. Rodríguez Rosa, senior

executive aide and acting principal manager for the Program Development Division. The designers of the project and consultants for the Puerto Rico Highway Authority from Behar-Ybarra & Associates, Engineer Miguel Pérez Correa, Engineer Jazmín Acevedo, Engineer Adolfo Hernández. Project manager and consultant for the Puerto Rico Highway Authority, from AtkinsRéalis, Engineer Erick Torres. I present to you Engineer Luis Rodríguez for a greeting.

MR. RODRÍGUEZ:

Good evening, everyone. For the record, I am Luis E. Rodríguez Rosa. We would like to extend the warmest welcome and thank you for being present in this informational workshop. On behalf of the Executive Director and Secretary of the Puerto Rico Department of Transportation and Public Works, Dr. Edwin González, who was unable to be here due to prior engagements, well, we once again welcome you. This afternoon and evening, we will discuss an extremely important project for the communities of Lajas and San Germán, which is the connector for PR-122 from 321 up to PR-166, identified with project number AC012201. This project, the first phase, was built back around the year 2012, approximately. And we have yet to build the second phase, which is the conclusion of the complete corridor.

At the present time, and just so you know, we are using mitigation funds from Housing, HUD, Federal Housing, for this project, approximately $70,000,000.00. I have nothing further to say for now. I have our consultants and staff from several agency offices who will be assisting you throughout this entire informational workshop. If you have questions in the end, then you may ask them. If you are afraid to ask questions, we will be here to assist you and to answer those we know about; those we cannot answer for you, we will take that as homework in order to be able to answer them later on. So thank you; and once again, our warmest welcome.

MS. PAGANI:

Thank you, Mr. Rodríguez. The meeting will be held in the following manner: We will first read the public notice that was posted, pardon the redundance; in the Primera Hora newspaper. Secondly, we will provide a presentation with no interruptions. We will ask that everyone please place their cellphones in vibrating mode; and if anyone needs to answer a call, they may step out of the room. Once the presentation is finished, at that point anyone with questions will have a chance to ask them; it may be done in an orderly

manner. Let's then read the public notice. I leave you with Ms. Tatiana Farinacci.

MS. FARINACCI:

Thank you. Good evening. "Public notice, Citizen Participation Meeting, extension of Road PR-122 from PR-321 up to PR-166, San Germán and Lajas, Puerto Rico. Project number is AC012201. The Department of Transportation and Public Works, The Puerto Rico Highway and Transportation Authority and the US Highway Administration wish to inform private organizations, federal and state government agencies, municipal entities and the general public that a citizen participation meeting will be held to present the project for the extension of PR-122, from PR-321 up to PR-166, in the Municipalities of San Germán and Lajas. The project consists of the extension of Road PR-122 from the urban area of Barrio El Retiro [Ward], at the point of the intersection of PR-166 on Ángel Castro Pérez Avenue in San Germán, up to the point of the intersection with PR-116, approximately 1.5 kilometers from the Municipality of Lajas' urban center.

"The citizen participation meeting will be held on Tuesday, April 7, 2026, starting at 5:30, at the Santiago R. Palmer Convention Center, PR-102, Km. 34, intersection of Central Avenue, San Germán, Puerto

Rico. Any citizen who wishes to submit comments regarding aspects relevant to the project may send them to oea@act.pr.gov, or send them in the mail, addressed to engineer Alexandra Velázquez Delgado, Director of the Preconstruction Office, Puerto Rico Highway and transportation Authority, P.O. Box 42007, San Juan, Puerto Rico 00940-2007. Comments will be received within 30 calendar days from the date of the citizen participation meeting." The public notice was signed by Engineer Ana L. Torres Santana, Deputy Executive Director of the Puerto Rico Highway and Transportation Authority. This notice complies with the laws and procedures related to environmental impact 23 CFR part 771, section 106 from the US Highway Administration. Good evening.

MS. PAGANI:

I present to you Engineer Miguel Pérez, from Behar-Ybarra & Associates, who will begin the presentation.

MR. PÉREZ:

Good evening. For the record, Engineer Miguel Pérez. As my colleague Luis Rodríguez mentioned, this evening we will be making a presentation in which we will discuss several aspects of the project, which include a general location, background on this

project, its purpose, existing needs, a description of the project's details, environmental considerations, a description of alternatives that are considered in the project, a comparison and results of these alternatives which were selected preliminarily, the project itinerary and the working plan for Phase 1 and next steps. Location of the project: The Puerto Rico Highway and Transportation Authority and the United States Transportation Department, by way of the Federal Highway Administration, propose the extension of Ángel Castro Pérez Avenue, known as PR-122, from Road PR-321 up to Road PR-166, within the boundaries of the Municipalities of San German and Lajas in Puerto Rico, pardon the redundance.

The project has an approximate length of 2.7 kilometers. We would like to clarify here, right, allow me to a bit... Although we are working on the federal agency as the initial part of the project, as Luis just mentioned, the project is... the funds are being requested through the HUD office, as he stated earlier. At the end of the presentation, we will provide a little more detail as to that piece of information. The image on the right shows the location of the project. On the left, the image shoes the

limits of this same project. The green background is the span of the project that is located in San Germán, the orange side is the span that is located in Lajas, which, as Luis mentioned, that project was built in 2012, right?

Just so you have an idea of the background of the project, this project was planned starting in 1968, where the need for an alternate route to PR-101 was identified. In 2002, they conducted, the Puerto Rico Highway Authority received a route study studying the environment, topography, socioeconomic aspects in terms of traffic and safety. Of these four alternatives, one was selected and an environmental document was presented in 2003. That same year, 2003, this environmental document was presented before the Planning Board, which issued an endorsement of a determination of no significant impact. Nevertheless, because of a situation, until 2014, the ACT decided to include this project in the 2016-17 STIP to reassess the project at a pre-engineering level and in environmental compliance, following the NEPA procedures.

The environmental document that had been approved in 2003 was at a local level; so then, in an effort to obtain funds for the project, it was decided in 2014 to put it and work on the reassessment of this

project. Details of the design and construction, to put it in perspective, it was in 1995 that the final plans for phase 1 and phase 2 began. In 2008, construction of phase 2 started, which is the current route you have, which we will talk about later on. Nevertheless, construction of phase 1 was stopped in 2010, which is the stretch we are discussing today. In 2012, phase 2 was completed in terms of construction, back in April, the month of April; and as mentioned earlier, it was in 2019 that once again work started on the second phase, phase 1, pardon me, in terms of evaluating alternatives and its redesign.

Purpose of the project: In terms of the work, to provide a widening and an extension for an increase of vehicular capacity in the region, to improve movement of transportation and connectivity in the area with better access, to serve as an alternate route to PR-101, and for direct access to PR-2 through the Municipality of San Juan, connecting with the Lajas tourist zone. In terms of planning, the project is in accordance with the long-range multimodal transportation plan of 2040, which seeks to improve the performance of the transportation system and financial rehabilitation, providing environmental sustainability to the region. In legal terms, it seeks to comply with Puerto Rico House of Representatives'

Resolution 488 of September 10, 2001, which asked to conduct a feasibility study to extend PR-116 in Lajas to PR-122 in San Germán. In terms of the environment, the project will be in compliance and accordance with the environmental public policy set forty through Act 9 of 1970, as amended, the traffic plan for Puerto Rico's western region and urban extension maps for the municipalities involved, San Germán and Lajas.

In terms of mobility, the main purpose is to increase travel options for residents, visitors and workers, to create opportunities to improve non-motorized transportation means through the development of networks and improved connections to key destinations in the area. In terms of safety, to improve the transportation system protection and the ability to support emergencies with a more effective route, to provide investments to improve the travel environment for users with safe facilities that will be able to recover in the face of emergencies. In terms of performance, to maintain and operate Puerto Rico's transportation facilities and services in a proactive manner to obtain better economy and efficiency, while taking advantage of the available capacity safely and with adequate protection.

In financial terms, to improve the region's

global and economical competitiveness, facilitating efficient movement of transportation, business and tourism activities therein. A description of the one hundred proposals: As it had been stated, right, the existing PR-122 serves as access to the Municipality of San Germán, connecting PR-2, located on the top area, with the existing PR-166. In 2003, as mentioned earlier, this project's environmental assessment was conducted, it was approved at the local level, and with that environmental document, phase 2, which is what we currently know as the road that reaches the intersection with PR-321, was built. And then the small stretch we are discussing and for which we are trying to obtain federal funds, was left pending; that would be phase 2. A description of the one hundred proposals: Construction of phase 2 ended in April of 2012. On September 17, 2014, the phase 1 project was approved, as was stated earlier, to begin the environmental assessment in compliance with the federal NEPA process; in this case, right, at the NEPA level, the HUD [agency].

Phase 2 has, as we mentioned, already been built; but for this project, we tried to maintain the same typical section, which is the one shown in the image, to your right-hand side. Yes, your right. What the

project consists of is two lanes that are 3.65 wide, with a breakdown lane of 240. Depending on the stretch pf the project, it will have a 6-meter median or center island, or it would be divided by a New Jersey barrier or a concrete barrier, with an approximate length of two and a half meters, quite similar to the one that is currently built. The purpose of this section is in compliance with the directives for road design as a class R-5, and would be in full compliance with those parameters.

In terms of environmental considerations, the area of study spans for approximately 1.71 miles, around 2.75 kilometers, beginning near the Municipality of Lajas, specifically at the point of the intersection with PR-321 and is northbound, heading toward road PR-166 in the Municipality of San Germán, connecting to PR-122, which provides access to PR-2.

In terms of likelihood for flooding, the project is located in an "X" zone, right; no flood-prone areas were identified within the project. Nevertheless, there are two main creeks. One of them is the Maresúa creek, and a no-name creek that flows parallel to the project. Within the area of study, endangered species were identified according to IPaC's website from the

USA Fish and Wildlife Service. The following endangered or threatened species have the potential to be present in the area of study. As part of these species, in terms of reptiles, the Puerto Rican boa; in terms of birds, the Puerto Rico nightjar and the yellow-shouldered. According to the USA Fish and Wildlife Service, an area of critical habitat was identified for the "Mariquita." A study was conducted to determine the presence of the "Mariquita" in the zone; this species was not observed during the study. However, they observed the boa and the "Guabairo."

For those of you who are not familiar with them, the image on the right identifies these species. This one would be the Puerto Rican boa, this one is the yellow-shouldered, and this is the "Guabairo," right? Here is, this is where the critical area for the species is identified; the USA Fish and Wildlife Service recently examined the area and the area was reduced in size for the benefit of the project. So we are currently revising those maps.

In archaeological terms, San Germán has great history. As part of the project, the project was established approximately 500 meters away from the study. We have several historic sites that are located [therein] and which are

published in our National Registry in the Municipality of San Juan.

Nevertheless, within the area of the project, in terms of the registry, none were identified, but as part of the archaeological study that was carried out for the project, a series of culverts were identified as belonging to the American Railroad Company of Puerto Rico's old circling railroad. This environmental document was distributed to the corresponding agencies. In previous studies, these resources had been identified, and we are currently... or we provided documentation and a conservation plan for these structures. We also prepared a monitoring plan which the agencies reviewed and are being taken into consideration to attempt to maintain these structures with the project's construction. On the image on the right, we are showing an image of the 17 structures that were located in the project.

Of those 17 structures, after revisions and changes in the alignment, five of them would have an adverse impact, but all of

As part of the background of the documentation was prepared and agreements were reached to try to maintain two of them and try to relocate one of them, which is something I will explain later on in terms of the

project. As part of the complementary infrastructure of the project, we also identified in the area of San Germán some trails, right, in terms of mountain biking, used for bikes or for hiking. As part of the project, the necessary adjustments were made to try to maintain those trails, and for them not to be affected by the project. As I mentioned earlier, in order to get to the preferred alternative, or the alternative that was selected to be presented to you, a study was conducted wherein several alternatives were assessed, attempting to continue connecting point "A" to point "B," which was intersection of PR-321 with 122.

All of these alternatives were examined for the purpose of minimizing these environmental resources which I identified earlier, in archaeological terms, in terms of the critical habitat for the species, and three alternatives were considered. These three alternatives were evaluated or compared, excuse me, four alternatives, sorry, including the original alternative.

They were evaluated in order to compare their effectiveness in terms of compliance with the needs of the project. This need is described in the following chart, in terms of what was the type of structure proposed for these alternatives, whether it improved

movement in the area; in terms of constructiveness and design, a very important aspect in terms of the environment, what impact it would have, in terms of maintenance and rehabilitation. Other, not so important but not so relevant points, rights of way, comfort for the user, terms of safety, inspection, and another important point, would be cost of construction, especially cost of the life cycle or maintenance costs, you know, in terms of rehabilitation and costs of delay to the users, in that sense.

As I mentioned, we evaluated four alternatives, considering the original alternative presented in the 2003 environmental document. As part of these efforts, we studied three possible additional alignments in the information included in the 2003 document. Given the topographical conditions and proposed alignments, we had to be limited to the valley of the San Germán connection; in other words, we were working in this area. In prior documents or previous planning, these alternatives had been studied on other points beyond these connections, and nothing. And it is important to point out that the purpose was to attempt to complete the connection between PR-122 and the existing PR-122. The first alternative, "A," was the

alternative that had been previously examined in the 2003 environmental document. This alternative begins, as we said, on PR-121 at the point of the intersection with 321, and continues northbound toward PR-166 in San Germán.

In this alternative here, the approximate length is 2.77 kilometers, and we pretty much included it taking into account the planning elements of 2003, and being able to evaluate them and look for how we could improve that alternative in order to complete the project. Alternative "B," being similar to alternative "E" in terms of alignment, what was done were some changes or modifications to the profile in order to reduce impact as a result of land movement, that is, to reduce the tailings that would affect neighboring plots of land, right, reducing the area of the land and thereby minimizing possible impact on the environment. It will have more or less the same length, right, 2.77 kilometers.

For alternative "C," here, there were some changes in mild alignments in terms of the road geometry. Among those changes, we used the alternative of bridges and retention walls to mitigate the impact on the culverts from the circling train, which, as I stated earlier, is a situation which, at a historic

level, agencies were asking that we try to conserve them.

In here the length of the project changes slightly, but in comparative terms, which we will see later on, they are quite similar. Alternative "D" takes variation into consideration, another variation in the alignment and from the previous profiles; it is a bit more refined. The horizontal alignment was modified in order to minimize or try to cut through the mountains in the study corridor. This did increase the length a little, about 2.8 kilometers, in that sense. With this alternative, we were also able to minimize the impact to the culvert areas.

The next slide shoes a comparison between the parameters we mentioned for each of the alternatives, and a summary is provided for alternatives "A," "B," "C" and "D," as studied, showing the differences in each of the aspects in terms of the length of the project, the number of bridges, especially the estimated costs for each alternative, and the alternatives that were considered. Costs vary at this time, right, at the time the study was done, from 24 million to 47 million.

As we have refined the project, these costs have

continued to increase, but in comparative terms, back then, these were the costs that were being used. Another difference that you can see here, in addition to the cost difference, is the impact in terms of archaeological resources. Alternative "A" from the very beginning affected around nine archaeological resources. As we continued moving down each alternative, we would keep minimizing them. All of this waws for the purpose of reaching the perfect balance, right, in terms of cost-effectiveness and in terms of the environment.

All of this information presented here were presented in a comparative matrix, right, to obtain a classification in which the alternative that ended up in the first position, and based on the project's objectives, would be the alternative that would technically be the best to work with the project after conducting those analyses. And we prepared, we did these comparative analyses, quantitative and qualitative analyses. For the project, it shows that alternative "B" has the best ranking or the best position, with a value of 4 to 11, once the comparison of alternatives was set.

As I mentioned, we began to develop this alternative "B," and it is the one on which we will

be going into further detail from now on, and it is the one you saw and is presented in the back of the room. Okay. As we have said before, it did not change; it simply extended the limit of the project a bit more toward Lajas. All of this is so that eventually, the exit you use to 321, that exit will be eliminated, and then one will continue straight from 122 from Lajas to San Germán, until the connection to 122. Once that ramp is eliminated, it is introduced in a new intersection, on which a new bridge will be built that will be over PR-321. This intersection will be known as a cloverleaf intersection, because then it will have two kinds of entry and exit points in each of the points from 321, which will be shown a bit more in detail later on.

Once we continue heading north toward the Municipality of San Juan, included in the project is a proposal for a bridge number 2. This bridge number 2 starts here at this point. There are two important creeks from the circling train, which in order to reach agreements with federal agencies, this bridge was suggested so as not to affect it. Once we continue heading north, we reach bridge number 3. This bridge number 3 will be above the existing road that provides

access to the El Retiro Community towards some residences that are adjacent to the no-name creek, which continues to the south of the project. There are about four or five residences in that area, if I'm not mistaken. Once one gets off bridge number 3, there is a second intersection.

It is a new intersection, which will allow access to all residents from the El Retiro Community. From there, it continues, reaches PR-166, where there is a connection to PR-122. In this image, you see an elevation of the first intersection in the project. This would be PR-321, this is the direction. This is PR-122. From here to Cabo and to San Germán, from this point on heading south, this will be heading toward Lajas. As I stated, this access road is the one you currently use, we will close it and create two intersections, or a cloverleaf intersection that has two access points on PR-321. If you, as users, are using PR-321 and wish to head to the Municipality of Lajas, you will enter through this access ramp and continue traveling toward Lajas.

If you were coming from San Germán or other residences, if you wanted to go down to PR-321, you would go down at this point, heading from San Germán

toward Lajas, and wanted to go down to PR-321, you may use this access ramp. And then, at this point, there is a stop sign, and if you wish to go to PR-101, you make a right; if you want to continue to 321, you continue to the left. If you are coming from Lajas toward 122 and wanted to access 321, you use that ramp located on this end of the project, which connects to 321. If from 321 you wanted to go to San Germán, you use this ramp that would be located at this point. And vice-versa. If you come from 321 and want to go to San Germán, you use that same ramp. And if you wanted to go to Lajas, you have to go underneath the bridge, and use this ramp to then get to Lajas. These are the movements proposed as part of the intersection.

At the present time, neither of these intersections need a traffic light, or a traffic light is not being considered. Here we show you a visual perspective so you can have an idea of what the behavior of the intersection would be in visual terms. This would be bridge number 1, this would be PR-321, its corresponding access points. These are the access ramps we mentioned. This would be the one that takes you to Lajas; this one, from San Germán to 321; over here, from 321, I mean, 122 in Lajas toward 321; and

from 321 towards San Germán.

As I mentioned a while ago, here we have bridge number 3. In these two points, these are the two culverts that we tried to save; and then, in order to make the project more viable in terms of environmental impact, we presented the design of this bridge. This bridge has about six spans, and then it prevents, right, a direct or adverse impact during construction on these two structures located here. This will also allow for the existing access points that are used for hiking and bikes will remain, creating a more pleasing visual point in that sense, and for both projects to be able to keep functioning. This will be a perspective as to how the bridge will look in this location more or less. Here you have an idea on the culvert. In this figure, I am going to go back a little bit, this is another alternative that had to be done to avoid, after this point there were about three additional archaeological structures that were close to the project. In order to avoid impact to them, a retaining wall was introduced at this point, which is what you saw in the previous image, to try to save these two culverts and keep this pathway. And so that

would be the perspective...

UNIDENTIFIED SPEAKER:

Greetings.

MR. PÉREZ:

A pleasure. This would be the perspective as to what the project would look like at this point. This will be the retention wall maintaining the pathway and the two culverts located at this point. In this image we show an elevation on intersection number 2. This is bridge number 2 I mentioned earlier. And this bridge, its purpose is so that the existing access from the El Retiro Community to residences that are a bit further south in the project to remain. And that access is not relocated, rather it is maintained. It is not affected. At this point, a new intersection is created, which will allow a direct access to the El Retiro Community. It will connect more or less in the area where the bleachers are in the community. Around that point, so you can have an idea and be able to find your location better.

The purpose of this intersection is for there to exist planning projects for a future extension eventually, and a connection to possible roads; but that is another project. The last intersection is the existing intersection with PR-166. This

intersection will stay in sort of a crosspiece, right, where access from PR-166 will remain, access from the municipal road will be kept, and continue with access to what will now be the main access from PR-122. As part of the safety measures, a stop sign is proposed on PR-166. Access to this road will remain, but only in one direction, coming in. The exit will not be allowed through this point. Also, no traffic lights are being considered in any of these intersections at this time.

In this slide here, we are showing you, as I mentioned earlier, as part of the project, there are some impacts on some structures from this train. So as part of the Puerto Rico Highway Authority's initiative and the agreements with the agencies, we are trying to preserve one of these culverts and try to relocate to a strategic spot within the project, near the intersection, including signage to identify the historical importance of these culverts, so that it is not just recognized but also to encourage it, the existence of a series of interesting elements throughout the route with historic value.

These are some ideas that are being presented; they are being discussed as part of the agreements

with have related to the project. This would be near the intersection to El Retiro. These plots of land, right, as part of the project, they would be purchased, and then would be located at that point.

Project schedule. We are currently still in the approval stage of the environmental document. Our goal was to have finished it during this third quarter. We are having this second workshop; we still have some ways to go, but we believe that very soon we will be finishing this process. By the fourth quarter of 2026, we would be starting the design and construction process. This project is expected to be auctioned in this kind of format in which we complete 35 percent, it is auctioned, and a contractor will have, a combination of a contractor and a designer will finish one hundred percent and they will build it, right, in that sense. Once we complete the process of the environmental document, and one thing in our favor that helps us speed up the construction process, the agencies have allowed us for both projects to be able to happen at the same time. This will help us speed the process up a bit. We are in conversations, but I believe that this is a positive thing that we already accomplished.

The idea is that once we finish the process of the environmental document in which we incorporate the

comments we receive in these informational workshops, as well as from the agency that signs or documents the project, to finish that process and start the acquisition process. We cannot, the agencies, cannot begin the acquisition process until the environmental document is approved. Our goal is that by the first quarter of 2028 or earlier, we can have it, as I stated earlier. We see this in 2028, but based on what we accomplished in being able to begin, it is possible that by 2027, some stretches may be able to begin construction, in which there is no requirement of land acquisition in the project. The idea is for us to complete construction in this project by the third quarter of 2029. Those are the plans we have so far. I am going to leave here. Another thing we are planning is, in order to accelerate this construction process, is to see if we can divide the project into three pieces, so as to increase participation from local contractors and be able to speed things or shorten that time.

These are the alternatives being considered in the environmental document. The idea is that the first project will be the part that starts on 321 up to bridge number 2. The second project will be bridge number 2; and the third project, bridge number 3. This does not

mean that the agency will be auctioning one project first, then the second and the third. The idea is to try to auction the three and have three contractors working to be able to speed the construction process. An important thing, and as we've mentioned, "This project is in an evaluation and planning stage under the CDBG-MIT program from the Puerto Rico Housing Department. It is subject to an environmental review pursuant to 24 CFR part 58, and the approval from the Housing Department and HUD. No action has been taken nor will be taken that will limit the consideration of alternatives prior to completing the process. The information presented is preliminary and is subject to changes pursuant to the results of the environmental assessment, comments from the public and applicable regulatory decisions from local and federal agencies.

Anyone who wishes to submit comments regarding aspects that are relevant to the project may send them to the following e-mail address: oea@act.pr.gov, or send them to the following mailing address: Engineer Alexandra Velázquez Delgado, Director of the Preconstruction Office, Puerto Rico Highway and transportation Authority, P.O. Box 42007, San Juan, Puerto Rico 00940-2007. Comments will be received within 30 calendar days from the date of this citizen

participation meeting." That will be all.

MS. PAGANI:

Yes, good evening. Before we start with the questions, let us give the Honorable Mayor Virgilio Olivera Olivera an opportunity to address you.

HON. MAYOR:

Good evening, everyone. Thank you for being here. I would like to thank the Puerto Rico Highway Authority, the Secretary of the Department of Transportation and Public Works and all its staff for being here in such an important meeting in this project which undoubtedly will transcend beyond San Germán. From our standpoint as a municipality, as a mayor, we have endorsed this kind of project because not only does it represent an advancement in our city of San Germán, but we also help Lajas, given that this connector will be an evacuation route for the Municipality of Lajas and one of the direct accesses to Lajas, joining both cities. The project has been backed by madam governor and that has been one of the points we have brought up, but it is important for us to listen to your comments, clarify your questions, and everything within the boundaries of the laws and regulations that apply for his kind of construction, which is large.

I see many residents from the El Retiro community and from communities neighboring the project, and it is important for you to bring your questions to this

kind of citizen meeting. It is also part of the requirements for this project's construction that we hold this kind of meeting. So we thank the Puerto Rico Highway Authority, the secretary and the entire staff for being here this evening; and without a doubt, each one of you, to learn about this project and be able to bring this information, these questions, these comments so that this kind of project can be done. So thank you very much and once again, I believe the microphones are open, right? In the next few minutes...

MS. PAGANI:

Yes.

HON. MAYOR:

... for citizen participation. An excellent evening to everyone.

MS. PAGANI:

Thank you very much, Mr. Mayor. Let's then begin with questions you may have. We will ask you to be specific so that you everyone can have an opportunity; and remember, in order to be able to document this work, we have to have you identify yourselves with your full name. And anyone who wishes to submit the paper that was provided when you registered, you may provide it to the table in the back, and we will receive it. So the microphones are

open. Good evening. Olga Pagani, for the record, remember this is the moment for questions. The microphone is open, and you can head over to the front so you may speak.

MS. MIRNA RIVERA:

Good evening, Mirna Rivera Rodríguez, from the El Retiro urbanization here in San Germán for the past 22 years. My question is with regard to traffic. Have you examined what traffic is going to be like? Given that our, this Santiago Street which connects with the El Retiro ward, some public hearings have been held, and everything because it is one single road, even though we know they do not follow traffic rules. But well, what I'd like is for you to explain that to us. What is the route going to be? What is it? If they, because I know that they are the project construction, but we need to have that information, if you have it. Thank you.

HON. MAYOR:

Thank you very much. That question is for the El Retiro urbanization. Just to clarify the question, we are talking about the road that connects on the same 1-22, right there where the cursor is, connecting to the urbanization. There is a project being worked on in the municipal legislature which will run separate from this project, for the possible closing of that

street. At the present time, although that street has enough space for both lanes, that road has presented a safety element whereby vehicles that travel from 166 come down without making a stop, and continue straight into the urbanization, and that has created a safety problem for the urbanization, as most residents there are elderly adults, there may be children, etcetera. So yes, there is a project on the municipal legislature for assessing a full closure.

That is to say, that it is not the way it is now, which should be in one single direction, rather the full closing of that lane so that nobody can go up or down. That is being evaluated in the municipal legislature, and at some point, a public hearing was already held; perhaps other public hearings will be held so that you can then speak and the municipal legislator will make a decision. It is important that we will make the announcements for the next hearings that may be held for that process, and for there to be citizen participation, and then the work will continue. But yes, that is already being evaluated, and it will not affect this project, because since it is still in the design phase, it is still preliminary, it is beginning, we are on stage one; it will not affect this project.

Now, if the municipality decides, through an ordinance, in that scenario, to close that street, we will have a conversation with the Puerto Rico Highway Authority so that the design of that entrance to be eliminated. That there. But that is still in discussion, but it will not affect this project. My name is Virgilio Olivera, mayor of San Germán. For the record, I would like the speaker of the municipal legislature to also be able to add to this comment.

MR. VILLA:

Yes, good evening to everyone. Adalberto Villa, speaker of the municipal legislature. We have already held, I believe about a year ago, public hearings in the legislature room, in which residents of that area spoke about their opinions as to that exit. Afterward, the Public Works and Traffic Committee, we have visited the site on two occasions wherein we have spoken with residents, but there is a controversy because residents from the El Retiro urbanization want for it to be closed, but residents from the other area do not want it to be closed. So within the community, right, and then when this project was presented, and we were in Lajas, and they explained more or less how that intersection was going to work, it was left pending while those processes so that we can eventually make

a decision.

HON. MAYOR:

We will make that decision during this four-year term. So we will be clear on that, we will make that decision during this four-year term in terms of this project not interfering with any of that. There is another entrance up ahead. So what will happen is that the El Retiro urbanization will be a bit more private. I want to also ask a question once again, for the record. Historic preservation in this project is important for me as mayor, and one of the elements we are always watching out for and for which measures are being taken is the preservation of historic structures that exist here, so that that preservation can be considered in the project, and the element of being able to move one of the areas to the entrance portion, right? For it to be visible. It seems to me to be interesting because it also attracts to the history of our city.

MR. RODRÍGUEZ:

For the record, Luis Rodríguez, Aide to the Puerto Rico Highway Authority's Executive Director. Mr. Mayor, historic preservation is very important. This project has carried out very detailed archaeological studies in phase 1, phase 1-A, phase 1-B, phase 2, archaeological investigations, archaeological evaluations, excavations,

and we have thoroughly mapped the entire area. The project takes into account all of those archaeological and historic aspects related to the circling train and we are incorporating it as part of the project.

MS. ROSA RIVERA:

Good evening, everyone. My name is Rosa Rivera, a resident of the El Retiro ward. My question is, I don't know if the mayor will be able to answer, there was something based on the channel that they were going to fix the gabions in the El Retiro creek. Is that part of the project, would it interfere with the project, or does that come before the project? The channel sieges.

HON. MAYOR:

Virgilio Olivera Olivera, Mayor of San Germán. That question is related to a project the municipality has at the present time. It is separate from this project. That project you mentioned is as a result of the damages that the siege wall suffered following Hurricane Fiona, which goes through the El Retiro community, the El Retiro urbanization, the El Recreo Public Housing Project, that entire area in the channel with the gabion wall. It is currently one of the biggest projects under FEMA, Fiona in Puerto Rico. A project involving over 40 million dollars, and it is currently, the design for the project is in auction. But it is a project that the municipality is

working, which does not interfere with this project that the Government of Puerto Rico is working on.

MS. ANETTE RIVERA:

Yes, good evening. Anette Rivera, from the El Retiro urbanization. I am concerned about the traffic jam that will happen now in that area, for example, in the portion that is across from the shopping center, as there are supposed to be two lanes available for traffic. And there are two, only that there is one because there are parked cars on both sides; therefore, traffic jams will be a bit more difficult. To see if you have taken any consideration to prohibit people from parking on those sides of the street so that traffic can flow better.

HON. MAYOR:

Virgilio Olivera Olivera, mayor of San Germán, for the record. Am I to understand that your question is related to the entrance of the urbanization?

MS. ANETTE RIVERA:

The Antongiorgi Shopping Center and across from Mayi Pharmacy, those two sidewalks.

HON. MAYOR:

Yes, correct. We are talking about that continuing to be 122. That is outside of the jurisdiction of this

project, but it is something we will be taking into consideration and which we can evaluate. That is a state road, I believe there are parking there in what is supposed to be equivalent to the breakdown lane, which then interferes... Yes, that is undoubtedly about which action will be taken so that we can avoid that line of action that should not be happening at the present time. The fact is that it shouldn't happen, because that is the breakdown lane for State Road in 122.

MR. PÉREZ:

Yes, Miguel Pérez, from the firm Behar-Ybarra & Associates. Moving forward in this project, at the present time, the Puerto Rico Highway Authority is planning to work on a market improvement project in the next few months, for both the existing PR-122 and Puerto Rico... on the San Germán side, and PR-122 on the Lajas side, which as part of that project, we could somehow reinforce in terms of signage and curb marking so that unlawful parking is not allowed. We could take that into consideration in that project.

MRS. PAGANI:

Should I close? Olga Pagani, for the record. Any further questions? This is everyone's chance.

MR. RODRÍGUEZ:

Good evening, once again. Luis Rodríguez, for

the record. I know that many people are sometimes afraid to speak, of standing up and speaking into the microphone, so we will be around here once the informational workshop concludes, and anyone who has a question, comment, suggestion or recommendation, may do so with us, and we will take them into account.

UNIDENTIFIED SPEAKER (OFF MICROPHONE):

And the...

MR. RODRÍGUEZ:

Yes, yes, we are also collecting the written comments on the table. Those of you who don't want to, who may be in a bit of a hurry or do not wish to talk about it, you may do so in written form at the table.

HON. MAYOR:

I would like to add something. Virgilio Olivera Olivera, mayor. This is a very important opportunity, folks. No question is unnecessary; no comment is unnecessary. You see how in this kind of conversation, we can bring up matters that are not necessarily here, but which can improve the project. So if you have a comment, a question, something you believe you can visualize, improve the project or the neighboring communities, bring it up, because that way we can also

look at it at the state government [level] as well as in the municipal [level]. You have an opportunity to do so now, otherwise you also have 30 days. Remember you have 30 days to submit any comment regarding this project, starting today.

You also have 30 days to submit any comment, starting today, in the e-mail address there or mailing it to Engineer Alexandra Velázquez Delgado so that it can also be taken into consideration. In the back there is also a photograph of the project, which is important, the El Retiro community. The entire El Retiro community, the urban zone. This project affects traffic, it affects the business zone, so it is important for you to get those comments to us or to the Puerto Rico Highway Authority so that they can be taken into account when the time comes for this project's construction design.

MS. PAGANI:

Olga Pagani, for the record. As there are no further questions at this time, we conclude this meeting at 7:05 in the evening, today, April 7, 2026. Not before thanking everyone for their appearance. Have a good night.

* * *

THE MEETING IS CONCLUDED

* * *

DATE : April 7, 2026

TIME : 5:40 p.m.

SUBJECT : Citizen Participation Meeting

CERTIFICATE OF THE COURT REPORTER

I CERTIFY that the foregoing is a true and correct transcript of the proceedings which took place during this meeting, recorded by the undersigned.

In San Juan, Puerto Rico, on April 28, 2026.

[Signed]

JASMINE CARRERAS

COURT REPORTER

I, Juan E. Segarra, USCCI #06-067/translator, certify that the foregoing is a true and accurate translation, to the best of my abilities, of the document in Spanish which I have seen.