



**AUTORIDAD METROPOLITANA DE AUTOBUSES**  
AVENIDA DE DIEGO NÚM. 37  
URB. SAN FRANCISCO  
SAN JUAN, PR 00927

# **SUBASTA FORMAL NÚM. 45-2223-001**

## **RENOVACIÓN Y ROTULACIÓN DE PARADAS**

**FECHA DE EMISIÓN:**  
7 DE MARZO DE 2023

**FECHA DE PRESUBASTA:**  
14 DE MARZO DE 2023  
9:00AM

**FECHA DE ENTREGA DE OFERTA:**  
21 DE MARZO DE 2023  
9:00AM

**FECHA DE APERTURA:**  
21 DE MARZO DE 2023  
9:30AM

Las instrucciones de esta subasta, incluyendo sus anejos, estarán disponibles en:  
[www.dtop.pr.gov](http://www.dtop.pr.gov)

También estarán disponibles en la sede de la Autoridad Metropolitana de Autobuses, en la dirección que aparece en el encabezado, durante el horario regular.

Año Fiscal 2022-2023

- **PREÁMBULO**

- A. LA AUTORIDAD METROPOLITANA DE AUTOBUSES**

La Autoridad Metropolitana de Autobuses (AMA) fue creada al amparo de la Ley Núm. 5 de 11 de mayo de 1959, según enmendada. Entre sus principales funciones está el desarrollar, mejorar, poseer, funcionar, y administrar facilidades de transporte terrestre de pasajeros en el área metropolitana. La AMA está autorizada a adquirir aquellos bienes, servicios, u obras, necesarios para la operación de la entidad. Según el Artículo 4 de la Ley Núm. 73-2019, según enmendada, la AMA está exenta de realizar sus compras a través de la Administración de Servicios Generales (ASG).

- B. BASE LEGAL**

Esta Subasta Formal se realiza a tenor con las disposiciones del Reglamento I-23-01, conocido como Reglamento de Adquisiciones de Bienes, Obras de Construcción, y Servicios no Profesionales de la AMA.

- C. NECESIDAD Y ENTREGABLES**

En la Autoridad Metropolitana de Autobuses existe la necesidad de remodelar las paradas e instalar unos rótulos que detalle la información necesaria para mantener a la ciudadanía que utiliza el servicio de transporte público orientada en cuanto a las rutas, para que puedan alcanzar su destino.

- **INSTRUCCIONES**

- A. FORMULARIO**

Todos los licitadores presentarán su oferta en el formulario provisto para ello, titulado "Hoja de Ofertas". Si fuera necesario, se podrán añadir hojas para aclarar o describir más detalladamente su oferta, pero en este caso tendrán que hacerlo en procesador de palabras y en papel timbrado del licitador. La invitación, instrucciones y formularios relacionados a esta subasta se encuentran en [dtop.pr.gov](http://dtop.pr.gov). También podrá adquirir copia física en:

**AUTORIDAD METROPOLITANA DE AUTOBUSES**

Avenida de Diego Núm. 37  
Urb. San Francisco  
San Juan, Puerto Rico 00927

## B. DEFINICIONES

Días - significará días según el calendario.

## C. ITINERARIO

En la Tabla 1 se presenta un resumen de las principales actividades relacionadas con esta Subasta Formal. Las fechas, horarios y actividades están sujetos a cambios y pueden ser revisados a través de la emisión de Enmiendas presentadas por parte de la AMA.

Tabla 1: Itinerario de la subasta

Evento		Fecha y Hora
Convocatoria (Invitación y publicación)		7 de marzo de 2023
Disponibilidad de pliegos		7 al 13 de marzo de 2023, 8:00AM a 3:00PM
Reunión Presubasta		14 de marzo de 2023, 9:00AM
Fecha límite para enviar preguntas		15 de marzo de 2023
Fecha límite para enviar respuestas		16 de marzo de 2023
Fecha límite para entrega de ofertas	En o antes de:	21 de marzo de 2023, 9:00AM
Acto de Apertura		21 de marzo de 2023, 9:30AM
Período de evaluación de ofertas	De:	21 de marzo de 2023
	Hasta:	24 de marzo de 2023
Aviso de adjudicación*		27 de marzo de 2023
Orden de compra emitida o firma de contrato*		28 de abril de 2023
• Fecha esperada.		1 de mayo de 2023 al 1 de marzo de 2024 (10 meses)

- **FECHA, HORA DE PRESUBASTA:** La reunión presubasta se llevará a cabo el **14 de marzo de 2023, a las 9:00AM**; presencialmente en las Oficinas Centrales de la Autoridad Metropolitana de Autobuses, en 37 Ave. De Diego, Urb. San Francisco, Río Piedras, San Juan, Puerto Rico 00927, y de manera virtual a través de Microsoft Teams, ID de reunión: 236 356 512 963, Código de acceso: PuUgG.
- **FECHA, HORA Y MODO DE ENTREGAR LA OFERTA:** Las ofertas deberán ser presentadas en o antes de las **9:00AM del 21 de marzo de 2023**; presencialmente en la Oficina de Servicios Generales de las Oficinas Centrales de la Autoridad Metropolitana de Autobuses, en 37 Ave. De Diego, Urb. San Francisco, Río Piedras, San Juan, Puerto Rico 00927, y electrónicamente a la siguiente dirección de correo electrónico: [subastas@ama.pr.gov](mailto:subastas@ama.pr.gov). (ambas formas). Todas las ofertas deben incluirse en el formulario AMA-01, titulado "Hoja de Ofertas".
- **FECHA Y HORA DEL ACTO DE APERTURA:** El Acto de Apertura se llevará a cabo el **21 de marzo de 2023, a las 9:30AM**. Toda persona interesada en comparecer al Acto de Apertura, deberá presentarse en la Recepción en las Oficinas Centrales de la Autoridad Metropolitana de Autobuses, Ave. De Diego, Núm. 37, Urb. San Francisco, Río Piedras, San Juan, Puerto Rico 00927.

La Apertura tiene como propósito el que las partes interesadas puedan comprobar que las ofertas se recibieron, y si cumplieron con los requisitos, así como conocer la cuantía de cada oferta. Toda persona que asista tendrá que cumplir con las normas de conducta que establezca la Junta de Subastas a tales efectos.

#### D. ESPECIFICACIONES

Ver Anejo A de estas instrucciones. Se certifica que estas especificaciones cumplen con las disposiciones aplicables de la Ley Núm. 14-2004, según enmendada.

Tabla 2: Descripción.

ARTÍCULO NÚMERO	DESCRIPCIÓN	CANTIDAD SOLICITADA
1	Limpieza de área de paradas	308
2	Remoción y disposición de los rótulos existentes	308
3	Instalación de Rótulos	308
4	Base de Rótulo – Estructura Tipo I	118
5	Base de Rótulo – Estructura Tipo II	4
6	Base de Rótulo – Estructura Tipo III	20
7	Base de Rótulo – Estructura Tipo IV	240
8	Asiento de Parada	14
9	Movilización, desmovilización y manejo de tráfico	1
10	Rótulo de Proyecto	1

#### E. CONDICIONES GENERALES

1. TRANSPORTACIÓN, ACARREO Y ENTREGA: Los precios licitados incluyen los gastos de transportación y acarreo hasta la entrega final de los artículos, equipos o servicios en la AMA, libre de cargo adicional para el gobierno.
2. PRECIOS COTIZADOS: Toda persona cotizará basándose en precios justos por sus bienes o servicios, considerando los aspectos técnicos. Los precios ofrecidos por el licitador se mantendrán fijos durante la vigencia del contrato que se otorgue, y **no estarán sujetos a cambios por aumento en el mercado o de cualquier otra índole**, ya sean previsibles o no.
3. AJUSTE DE PRECIO POR PRONTO PAGO: No se aceptan descuentos por pronto pago en esta subasta; se aceptarán descuentos por pago rápido.



4. MODO DE FACTURAR: El suplidor entregará las facturas en no más de diez (10) días luego de terminado el período o fecha de entrega del bien o servicio. Toda factura para el cobro de bienes o servicios que se presente ante las agencias deberá contener la siguiente certificación:

*"Bajo pena de nulidad absoluta certifico que ningún servidor público del gobierno que emite le orden de compra) es parte o tiene algún interés en las ganancias o beneficios producto del contrato objeto de esta factura y de ser parte o tener interés en las ganancias o beneficios productos del contrato, ha mediado una dispensa previa. La única consideración para suministrar los bienes o servicios objeto del contrato ha sido el pago acordado con el representante autorizado de la (agencia que emite la orden de compras). El importe de esta factura es justo y correcto, los trabajos han sido realizados, los productos han sido entregados y los servicios han sido prestados y no se ha recibido pago por ellos."*

## F. CONDICIONES ESPECIALES

### 1. FIANZAS Y GARANTÍAS

- a) FIANZA DE LICITACIÓN ("Bid Bond"): La fianza de licitación será un respaldo provisional que prestará el licitador o proponente con el propósito de asegurar que habrá de sostener su oferta durante todo el procedimiento de la subasta. La fianza tiene que ser en original, y al ser presentada mediante compañía de Seguro, en cheque certificado o giro postal deberá ser a favor de la Autoridad Metropolitana de Autobuses de Puerto Rico. La fianza de licitación se prestará en el mismo momento de presentar la oferta o anualmente mediante una suma global. Para esta subasta se requiere una Fianza de Licitación de un **cinco por ciento (5%)** del total de la oferta.
- b) FIANZA DE EJECUCIÓN ("Performance Bond"): Garantía monetaria que se requiere a un licitador o proponente para asegurar el cumplimiento de una obligación contraída. Esta fianza la prestará(n) solamente el(los) licitador(es) agraciado(s) con la buena pro de la subasta.

La fianza garantizará que el suplidor cumpla con su obligación de acuerdo con los términos y condiciones de su oferta. De no cumplir y tener que acudir al próximo suplidor, la diferencia en precio será cubierta por esta fianza. La fianza tiene que ser en original, y al ser presentada mediante compañía de Seguro, en cheque certificado o giro postal será a favor de la Autoridad Metropolitana de Autobuses de Puerto Rico. Para esta subasta se requiere una Fianza de Ejecución de un **cien por ciento (100%)** del total de la oferta.

2. **GARANTÍA:** Los artículos o servicios subastados estarán garantizados por el período establecido en las especificaciones de esta Subasta Formal. En aquellas invitaciones a subasta donde no están especificados, indique en días, meses o años el período que los artículos estarán garantizados. Dicho período de garantía podrá ser determinante en la adjudicación de la buena pro de la subasta. En esta subasta se ha determinado una garantía de un año, a partir de la aceptación final del proyecto.
3. **TÉRMINO DE ENTREGA:** Las entregas se efectuarán dentro del término solicitado por la AMA, o en su defecto, por el que haya dispuesto el licitador en la oferta, contando desde el recibo de la orden de compra o firma de contrato. El tiempo más corto de entrega, será un factor determinante para decidir la adjudicación a favor de un postor.
4. **ALMACENAJE:** Se coordinará con el licitador agraciado.
5. **MUESTRAS:** No se requiere entrega en esta subasta.
6. **CANTIDADES PARA COMPRAR:** La orden de compra emitida, o contrato, indicará las unidades específicas o máximas a ser adquiridas.
7. **INSPECCIÓN DE LA MERCANCÍA O DESEMPEÑO DEL SERVICIO:** La firma ENZO Engineering, PSC inspeccionará el desempeño del servicio y validará las certificaciones de inspección del proyecto.

## **G. CRITERIOS DE EVALUACIÓN**

Por tratarse de una subasta formal, los criterios de evaluación serán los de licitador responsable, con licitación (oferta) responsiva, al precio más bajo.

La Junta de Subastas realizará determinaciones de hecho relacionadas a la solvencia moral y financiera, y así poder adjudicar si el licitador es uno responsable. La certificación del RUL puede ser un mecanismo para realizar dicha determinación. Adicionalmente, se podrán solicitar certificaciones de que el licitador, ni sus accionistas u oficiales en caso de ser personas jurídicas, han cometido fraude, abuso o malversación de fondos públicos, así como estados financieros. No cumplir con estos requisitos puede resultar en la descalificación del licitador.

La responsividad de la oferta se determinará cotejando que cada licitador cumple con todos y cada uno de los requisitos (de forma, de contenido, de documentos, de firma, etc.) dispuestos en estas instrucciones. No cumplir con los requisitos de especificaciones, términos y condiciones, fianzas y garantías, puede resultar en descalificación de la oferta.

Criterios Básicos de Evaluación:

1. La exactitud con la cual el licitador ha cumplido con las especificaciones, los términos y las condiciones del pliego de la subasta.
2. La calidad de los bienes, obras y servicios no profesionales ofrecidos y cómo éstos cumplen con las especificaciones y satisfacen las necesidades establecidas.
3. Si el precio es competitivo y comparable con el prevaleciente en el mercado. Además, aplicar el por ciento de preferencia establecido si la persona o la entidad ha presentado una Resolución de la Junta para la Inversión en la Industria Puertorriqueña o cualquier documento acreditativo de preferencia, según dispuesto en leyes preferenciales.
4. La habilidad reconocida del licitador para llevar a cabo trabajos de la naturaleza bajo consideración en obras y servicios no profesionales.
5. La responsabilidad económica del licitador y las experiencias de la autoridad con el cumplimiento de contratos anteriores de naturaleza igual o parecida.
6. El término de entrega más próximo.
7. La capacidad económica y financiera, así como la trayectoria y experiencia previa del licitador para proveer estos servicios o bienes y cumplir con los términos de entrega y garantías del producto o servicio.
8. El periodo específico o los términos aplicables a cada garantía, sus limitaciones y condiciones, los pasos requeridos para reclamar la garantía, qué entidad proveerá el servicio de reemplazo, subsanación, corrección o reparación del bien o el servicio.

9. Si el licitador cualifica como empresa minoritaria o de mujeres, u otra para la cual se deba conceder una preferencia bajo cualquier ley aplicable.
10. Cualquier otro criterio pertinente que represente el mejor valor para el Gobierno de Puerto Rico.

Criterios Mandatorios de Evaluación:

1. El proyecto tiene que ser completado en diez meses.
2. El licitador agraciado tiene que tener la disponibilidad para trabajar AM y PM, días de semana y fines de semana.
3. Experiencia en proyectos similares.
4. Tener al menos tres (3) o más proyectos satisfactoriamente completados con la Autoridad de Carreteras y Transportación (ACT) siguiendo las especificaciones de construcción del Departamento de Transportación y Obras Públicas (DTOP).
5. Contar con personal certificado por OSHA para inspeccionar y supervisar aspectos de salud y seguridad durante la construcción.
6. Contar con personal de experiencia en mantenimiento de tráfico (MOT) durante la construcción.
7. La garantía será de un año o más, luego de la aceptación final del proyecto.

**H. IMPUGNACIÓN A LA INVITACIÓN O A ESTAS INSTRUCCIONES DE SUBASTA FORMAL**

Toda impugnación a la invitación de la Subasta Formal deberá presentarse personalmente ante la Junta de Subastas, dentro de los tres (3) días subsiguientes a la fecha de haberse publicado la invitación en la página cibernética de la AMA o el Registro Único de Subastas (RUS). Luego de dicho término, toda impugnación será rechazada de plano.

Toda impugnación al pliego de la Subasta Formal deberá presentarse personalmente ante la Junta de Subastas, dentro de los tres (3) días subsiguientes a la fecha de la AMA haber hecho disponibles los pliegos de esta subasta formal. Luego de dicho término, toda impugnación será rechazada de plano.



## I. DOCUMENTACIÓN REQUERIDA

1. CONTENIDO DE LA OFERTA: Todo licitador entregará y enviará su oferta personalmente en la sede de la AMA y a través de la siguiente dirección de correo electrónico: [subastas@ama.pr.gov](mailto:subastas@ama.pr.gov). (ambas formas). En el ASUNTO ("SUBJECT") del correo electrónico que contenga la oferta, debe aparecer la siguiente información: **Número de Subasta, Nombre del Licitador y compañía que representa**. Además, deberá adjuntar los siguientes documentos:
  - a) Pliegos debidamente firmados
  - b) Fianza de Licitación ("Bid Bond") debidamente endosada (de ser requerida)
  - c) Hoja de Ofertas en Formato "PDF"
  - d) Literatura de cada producto ofertado identificado con el número de renglón, según aplique
  - e) Enmiendas (de ser aplicable)
  - f) Certificación o Resolución de la Junta de Inversión para la Industria Puertorriqueña, según las disposiciones del Reglamento Núm. 8488.
  - g) Certificación del Registro Único de Licitadores de la Administración de Servicios Generales

**Toda oferta recibida mediante correo electrónico que no contenga en el ASUNTO ("SUBJECT") la información antes señalada, no será considerada.** Bajo esta circunstancia, la Junta de Subastas no será responsable si el remitente pierde su oportunidad de presentar la oferta a tiempo, como tampoco podrá requerir que se tome conocimiento de su oferta o imputar que la oferta haya sido divulgada o abierta antes de tiempo. El licitador **podrá ser descalificado** por no adjuntar a su oferta los documentos arriba mencionados.

La oferta deberá contener la **dirección física y postal** de la oficina principal del negocio, así como también, el nombre y la dirección del agente residente de la corporación, cuando sea el caso. Igualmente, todo licitador habrá de incluir su correo electrónico; las Notificaciones de Adjudicación podrán ser enviadas a dicha dirección electrónica.

El licitador tendrá que indicar en la oferta la marca y modelo del producto, así como incluir literatura técnica del manufacturero, la cual

permita verificar que lo cotizado cumple con las especificaciones requeridas. Dicha literatura u hojas de especificaciones tienen que indicar claramente la partida de la subasta a la que se refiere. Toda vez que lo solicitado es apoyo técnico para servicio y garantía extendida de equipo de sistemas de información previamente adquirido, se justifica la solicitud de una marca en particular.

La oferta deberá estar firmada con bolígrafo de tinta color azul en el espacio provisto para ello, por la persona registrada en el RUL o su representante autorizado. Se autoriza la firma digital del licitador en la oferta presentada. De igual forma, se autoriza la presentación de documentos digitalizados. No cumplir con estos requisitos constituirá el rechazo de la oferta.

2. CERTIFICACIONES ADICIONALES: El licitador incluirá junto con su oferta en el formulario provisto, todas las certificaciones requeridas, además incluirá a éste, las certificaciones especiales solicitadas en este pliego. Se advierte que, entre otros, todo licitador deberá cumplir con lo siguiente:

- a) CÓDIGO DE ÉTICA PARA CONTRATISTAS: Todo licitador deberá cumplir con lo establecido en la Ley Núm. 2 del 4 de julio de 2018, según enmendada, conocida como Código Anti-Corrupción para el Nuevo Puerto Rico, el cual exige a todas las entidades gubernamentales funcionar bajo los estándares de integridad, eficiencia, probidad y transparencia. Este Código de Ética enfatiza la política pública del Gobierno del Puerto Rico en el uso adecuado y eficiente de los recursos públicos y la erradicación de la corrupción gubernamental.

Dicho Código requiere que todos los contratistas, proveedores de bienes o servicios y los solicitantes de incentivos se abstengan de llevar a cabo o participar en conducta que, directa o indirectamente, implique que servidores públicos infrinjan las disposiciones de la Ley de Ética Gubernamental. La aceptación de las normas establecidas en este Código de Ética es una condición esencial e indispensable para que los licitadores o sus representantes puedan efectuar transacciones o establezcan convenios con las agencias ejecutivas.

Toda persona está obligada a denunciar aquellos actos que estén en violación del referido Código que constituyan actos de corrupción, o se configuren en delitos constitutivos de fraude, soborno, malversación, o apropiación ilegal de fondos, y de los que tenga propio y personal conocimiento, que atañen a un contrato,

negocio o transacción entre el gobierno y un contratista, proveedor de bienes o servicios. Los denunciantes estarán protegidos al amparo de la Ley Núm. 2-2018.

- b) CLÁUSULA ANTI-DISCRIMEN: La AMA no discrimina por razón de raza, color, género, origen o condición social, ideas políticas o religiosas, edad, nacionalidad, por ser víctima o ser percibida como víctima de violencia doméstica, agresión sexual o acecho, condición de veterano, identidad u orientación sexual, real o percibida, impedimento físico, mental o sensorial. Cualquier proveedor o contratista de la AMA debe certificar que su entidad no discrimina por razón de raza, color, género, origen o condición social, ideas políticas o religiosas, edad, nacionalidad, por ser víctima o ser percibida como víctima de violencia doméstica, agresión sexual o acecho, servicio militar o condición de veterano, identidad u orientación sexual, real o percibida, impedimento físico, mental o sensorial.
- c) CERTIFICACIONES GUBERNAMENTALES: El licitador agraciado, es responsable por tener al día sus certificaciones de no deuda con entidades gubernamentales tales como el Departamento de Hacienda, el Centro de Recaudaciones de Impuestos Municipales (CRIM), la Administración para el Sustento de Menores (ASUME) y cualquier otra que le sea requerida para poder hacer negocios con el Gobierno de Puerto Rico.

## **J. ANEJOS**

En el caso de que fondos federales sufraguen la totalidad o parte de la adquisición realizada bajo esta Subasta Formal, en los Anejos se encontrarán instrucciones adicionales, requeridas por las autoridades federales, con las que también se tiene que cumplir. Otros anejos provistos son parte de los requisitos mandatorios tales como: Hoja de Oferta; Certificación Ley 2-2018, según enmendada; Certificación de No Deudas con Instrumentalidades Gubernamentales; etc.

## **K. ADVERTENCIAS**

- a) La AMA se reserva el derecho de cancelar parcial o total la Subasta Formal, independientemente de la fase en que se encuentre, siempre que sea antes de formalizar el contrato, o de haber emitido una orden de compra, cuando ello sirva los mejores intereses del Gobierno de Puerto Rico, según los términos del Reglamento Núm. 9415.



- b) La AMA se reserva el derecho de hacer modificaciones en las Instrucciones, Términos, Condiciones y Especificaciones de la subasta antes de la celebración del Acto de Apertura de las ofertas, y de ser así se les notificará por escrito a todos los licitadores. La AMA podrá enmendar cualquier invitación y/o pliego de la Subasta Formal, cuando ello sirva a los mejores intereses del Gobierno de Puerto Rico, según los términos dispuestos en el Reglamento Núm. 9415.
- c) Proveer cualquier tipo de información o documentación falsa o fraudulenta como parte de la oferta presentada para esta subasta, será causa suficiente para descalificar o rechazar la oferta de cualquier licitador; así como para cancelar o resolver cualquier orden de compra o contrato otorgado en virtud de esta.
- d) La AMA no aceptará una fianza por una cantidad menor o a nombre de otra entidad que no sea según el Pliego de Subasta. El incumplimiento con este requisito conllevará el rechazo de la oferta.
- e) La Junta de Subastas de la AMA dará fiel cumplimiento a la política pública de compras preferentes dispuestas en Ley.
- f) Solo se aceptará una oferta por licitador. Empresas, naturales o jurídicas, que tengan socios, miembros o accionistas comunes, serán consideradas como *alter ego* una de las otras, por lo que se considerará un conflicto de intereses que activará la descalificación de los licitadores con intereses en común. Se prohíben prácticas de competencia desleal tal como el contubernio.
- g) Toda persona que en su vínculo con las agencias y demás instrumentalidades del gobierno del Estado Libre Asociado de Puerto Rico, participe de licitaciones en subastas, presente oferta, interese perfeccionar contratos con éstas, tendrá la obligación de divulgar toda la información necesaria para que las agencias puedan evaluar detalladamente las transacciones y efectuar determinaciones correctas e informadas.
- h) La AMA no se responsabiliza por los costos incurridos en la preparación de ofertas para esta Subasta Formal.
- i) La mera participación en esta Subasta Formal no ofrece garantías de que se le ha de adjudicar un contrato u orden de compra. La notificación de adjudicación de la presente subasta no constituirá el



acuerdo formal entre las partes. Será necesario que se suscriba el contrato correspondiente, o que la AMA emita una orden de compra por la persona autorizada.

- j) Una vez se hayan sometido las ofertas, éstas y sus anejos, pasarán a ser propiedad de la AMA y no será devuelta.
- k) Tan pronto se adjudique esta Subasta Formal, el expediente será público, incluyendo las ofertas y sus anejos. Si un licitador no desea que se publique un secreto de negocio, o información protegida, deberá etiquetar dicha información como "Secreto de Negocio e Información Protegida".
- l) Los Documentos o Anejos incluidos en estos pliegos, deben ser completados por los licitadores y tienen que ser sometidos con las ofertas. Los licitadores son responsables de atender cualquier enmienda que surja en el transcurso de esta Subasta Informal.
- m) Los representantes exclusivos de marcas o servicios no profesionales deberán mencionarlo en la oferta y someter certificación del manufacturero a tales efectos.
- n) En el caso de que las ofertas se sometan en sobres abiertos, deteriorados o sin identificación, el Secretario de la Junta de Subastas de la AMA habrá de realizar esfuerzos razonables con el licitador para que este cumpla con el requisito de someterla en un sobre sellado, debidamente identificado.
- o) Es responsabilidad de cada licitador que entregue oferta, cerciorarse que la misma ha sido debidamente registrada.

## **L. POLÍTICAS PREFERENCIALES**

- 1. LEY 14-2004, SEGÚN ENMENDADA: La preferencia se establecerá conforme a las disposiciones de la Ley de Inversión en la Industria Puertorriqueña, Ley Núm. 14-2004, según enmendada.
  - a) **USO DEL POR CIENTO DE PREFERENCIA:** Los licitadores que interesen se les reconozca el por ciento (%) de preferencia asignado, **presentarán la Resolución de la Junta de Inversión en la Industria Puertorriqueña vigente, junto con su oferta.** En la Resolución deberá marcar el renglón o renglones a los cuales se les ha concedido la preferencia que solicita.

- b) **CESIÓN DEL POR CIENTO DE PREFERENCIA:** La empresa que haya obtenido el por ciento de preferencia por concepto de **manufactura** para alguno de sus productos podrá cederlo a sus agentes establecidos en Puerto Rico mediante carta notariada en la que indique expresamente que le está cediendo a cada agente el por ciento de preferencia otorgado por la Junta de Inversión en la Industria Puertorriqueña para dicho producto. Dicha carta deberá estar aprobada y sellada con el sello oficial de la Junta de Inversión en la Industria Puertorriqueña por el Secretario Ejecutivo.
- c) **APLICACIÓN DEL POR CIENTO DE PREFERENCIA:** Si luego de aplicado el por ciento de preferencia los artículos quedan en igualdad de condiciones, la adjudicación se hará en el siguiente orden: (1) Productos de Puerto Rico; (2) Productos de Estados Unidos; (3) Productos de cualquier otro país.
- d) **RESOLUCIÓN EMITIDA ACTUALIZADA:** En toda compra que se realice bajo este contrato, pliego de subasta u orden de compra, todo licitador que haya obtenido un por ciento (%) preferencial para sus productos, deberá presentar al momento de cada compra, la Resolución emitida por la Junta de Inversión en la Industria Puertorriqueña (actualizada), de lo contrario, no podrá disfrutar de los beneficios de dicha Ley.
- 2) 2 CFR 200.321: La AMA exhorta a empresas lideradas por minorías y mujeres, a participar en este proceso, presentando su correspondiente certificación. Igualmente, en caso de la adjudicación de esta subasta formal tenga el efecto de que el contratista tenga a su vez que subcontratar provisión de bienes o servicios, éstos vienen obligados a tomar los pasos afirmativos para la contratación socioeconómica dispuesta en la citada regulación.

#### **M. ALTERACIONES**

Toda oferta deberá presentarse en forma legible, clara, completa y precisa. Ofertas múltiples, variadas o ambiguas no serán consideradas. Todo borrón, tachadura, anotación o cualquier corrección en los pliegos tienen que estar refrendados **por la persona que firme la oferta** e incluya en cada página sus iniciales. De lo contrario quedará invalidada la oferta para la partida o las partidas correspondientes.

El uso de tinta de borrar para correcciones se considerará como una tachadura y para poder salvar la misma, deberá tener las iniciales de la persona que firme la oferta para ser considerado. El uso de papel con pega ("correction paper") para escribirle encima es inaceptable.

#### **N. CORRECCIONES A OFERTAS**

Las correcciones o modificaciones a las subastas están sujetas a las disposiciones del Reglamento 9415, Secciones 4.3.12 y 4.3.13. Nótese que no se aceptan modificaciones luego de fecha y hora límite para someter las ofertas, dispuesto en la Secc. C-1 de estas instrucciones; de hacerlo, serán rechazadas.

#### **O. COMUNICACIONES PROHIBIDAS**

Las comunicaciones verbales entre funcionarios (o empleados) de la AMA y potenciales licitadores, con respecto a esta Subasta Formal, están prohibidas durante los procesos de presentación y selección de ofertas. El incumplimiento de este requisito puede resultar en el rechazo de las ofertas presentadas.

#### **P. CÓMO SOMETER PREGUNTAS**

Los licitadores que deseen solicitar alguna clarificación o someter preguntas sobre el proceso, deben hacerlo en o antes del día dispuesto en la Sección C-1 de estas instrucciones. Dichas preguntas se enviarán por correo electrónico a [subastas@ama.pr.gov](mailto:subastas@ama.pr.gov). La AMA debe responder dichas preguntas en o antes de la fecha dispuesta en la misma sección antes referida. La AMA someterá a todos los participantes una relación de todas las preguntas radicadas, quien la radicó, y la respectiva contestación en el día dispuesto en la Sección C-1.

#### **Q. LICITADORES REGISTRADOS**

A todo licitador que esté registrado en el RUL, que haya presentado oferta para una subasta y que luego del Acto de Apertura no se encuentre elegible, se le concederá un término improrrogable de cinco (5) días calendario, contados a partir del Acto de Apertura, para que someta la información o los documentos correspondientes en el RUL. Durante dicho periodo de cinco (5) días, no se realizará adjudicación alguna de la subasta. Será responsabilidad de la Junta de Subastas comunicarse con el licitador para que éste actualice sus constancias en el RUL en el término provisto.

El licitador deberá someter todos los documentos solicitados y cumplir con todos los requisitos, términos y condiciones establecidos en el pliego de subasta al momento de entregar su oferta, lo cual siempre será antes de la apertura de la subasta. No se aceptará ningún documento por parte del licitador con posterioridad al acto de apertura, a excepción del certificado de elegibilidad del RUL, que estará sujeto a que se presente dentro del término de cinco (5) días calendario antes referido.

#### **R. LICITADORES NO REGISTRADOS**

Cuando un licitador que no esté registrado en el RUL comparece a un proceso de subasta y presenta una cotización u oferta, la Junta de Subastas no deberá rechazar la misma por el hecho de que dicho licitador no esté en el RUL y le dará cinco (5) días calendario, contados a partir del acto de apertura para que someta todos los documentos requeridos ante el RUL.

#### **S. OFERTAS ADMISIBLES E INADMISIBLES**

- a. UNIDAD DE COTIZACIÓN DE PRECIO: La oferta básica deberá hacerse en dólares y centavos. No serán consideradas ofertas que se expresen en términos de por ciento, en referencia a posibles precios indeterminados, cantidad de dinero o por cientos en exceso de ofertas más bajas.
- b. Para esta Subasta Formal, las ofertas admisibles serán todo o nada.
- c. NINGUNA OFERTA: Si el licitador no tiene interés en licitar en dicha subasta, deberá devolver el Anejo I (Oferta del Licitador) de la Invitación a Subasta, con una anotación explicando las razones que tiene para no hacer oferta, así como notificar si tiene o no interés en ser invitado para futuras subastas en esos renglones. La falta de someter oferta sin notificación será informada el RUL.
- d. OFERTAS NO RESPONSIVAS O INACEPTABLES: Al hacer su oferta, el licitador se limitará a ofrecer lo que se le solicita dentro de las especificaciones enmarcadas y las condiciones fijadas. Las especificaciones establecen requisitos mínimos, cualquier oferta que sobrepase las especificaciones solicitadas, podrá ser aceptada siempre y cuando no altere sustancialmente lo solicitado de forma tal que pueda interpretarse como competencia desleal.



- e. No serán consideradas ofertas que hagan de la misma una **ambigua**, en cuanto a su significado, **incompleta** o **indefinida**. También, serán rechazadas ofertas que **alteren, incumplan, varíen o condicionen** los Términos, Condiciones y Especificaciones establecidos por la AMA.
- f. OFERTAS INCOMPLETAS: Ofertas en las que no se completen todos los blancos serán rechazadas. Si un licitador no tiene información que suplir en un blanco deberá anotar "N/A" - (no aplica) o "N/B" – (no bid).
- g. VARIAS OFERTAS POR UN MISMO LICITADOR: Si un licitador presenta varias ofertas para una subasta, ya sea a nombre propio o seudónimos, de alguna de sus subsidiarias o sucursales, de alguno o varios de sus socios, agentes u oficiales, todas serán **rechazadas** y se le podrán imponer las penalidades que establece el Reglamento 9352, *supra*.
- h. OFERTA LIMITADA: Todo licitador que entienda que solamente puede sostener sus precios por un período de tiempo determinado, así lo hará constar en su oferta especificando el término.

#### **T. RETIRO DE OFERTA**

El retiro de una oferta se hará mediante solicitud escrita, dirigida a la Junta de Subastas de la AMA, antes del Acto de Apertura. No se puede volver a presentar una sustitutiva de la que se retiró ni se puede retirar ofertas luego de que se haya realizado el Acto de Apertura.

#### **U. RECHAZO GLOBAL**

La Junta de Subastas podrá rechazar todas las ofertas recibidas si éstas no cumplen con las Instrucciones, Términos, Condiciones y Especificaciones, o si los precios fueran irrazonables, o si existe colusión entre los licitadores comparecientes, o si los mejores intereses económicos del Gobierno de Puerto Rico pudieran verse afectados.

#### **V. CANCELACIÓN DE CONTRATO POR CAUSA: NEGATIVA A ENTREGAR**

Si el licitador se niega a entregar lo ordenado, se podrá cancelar la orden de compra y emitirla a otro licitador. Además, la AMA aplicará las sanciones correspondientes, según en el Reglamento Núm. 9415, así como en y las acordadas en el contrato u orden de compra.

## **W. CANCELACIÓN DE CONTRATO POR CONVENIENCIA**

La AMA podrá dar por terminado cualquier contrato cuando lo estime conveniente, notificando al menos treinta (30) días antes dicha determinación.

## **X. SOLVENCIA MORAL**

La AMA no adjudicará subasta u otorgará contrato alguno para la realización de servicios o la venta o entrega de bienes, a persona natural o jurídica que haya sido convicta o se haya declarado culpable en el foro estatal o federal, en cualquier otra jurisdicción de los Estados Unidos de América o en cualquier otro país, de aquellos delitos constitutivos de fraude, malversación o apropiación ilegal de fondos públicos enumerados en la Ley Núm. 2-2018, según enmendada. Esta prohibición de adjudicar subastas u otorgar contratos, se extiende a aquellas personas jurídicas cuyos presidentes, vicepresidentes, director, director ejecutivo, o miembro de su Junta de Oficiales o Junta de Directores, o persona que desempeñe funciones equivalentes, haya sido convicto o haya sido declarado culpable en el foro estatal o federal, en cualquier otra jurisdicción de los Estados Unidos de América o en cualquier otro país, de aquellos delitos constitutivos de fraude, malversación o apropiación ilegal de fondos públicos, según enumerados en el Artículo 3 de la referida ley.

La prohibición para la contratación, subcontratación o adjudicación de una subasta contenida en la Ley 458, *supra*, tendrá una duración de veinte (20) años, a partir de la convicción correspondiente en casos por delito grave, y una duración de ocho (8) años en casos por delito menos grave.

La convicción o culpabilidad por cualquiera de los delitos enumerados en el Artículo 3 de la ley conllevará, además de cualesquiera otras penalidades, la rescisión automática de todos los contratos vigentes a esa fecha entre la persona convicta o culpable y la AMA. Además de la rescisión del contrato, la AMA tendrá derecho a exigir la devolución de las prestaciones que hubiese efectuado con relación al contrato o contratos afectados directamente por la comisión del delito.

## **Y. INCUMPLIMIENTO**

Si el licitador incumpliera con cualquiera de los términos y condiciones de esta subasta una vez emitida la orden de compra o firmado el contrato, la AMA cancelará el mismo inmediatamente, ejecutará la Fianza de Ejecución ("Performance Bond") y podrá solicitar que se excluya al suplidor del RUL, por un término no menor de un (1) año y no mayor de tres (3) años, conforme según las disposiciones aplicables. Además, la AMA se reserva el derecho de aplicar cualesquiera otras sanciones, según provistas en el Reglamento Núm. 9352, *supra* y las acordadas en el contrato u orden de compra.

Las medidas a tomarse en caso de incumplimiento serán impuestas solamente por la AMA, previa investigación de los hechos, mediando comunicación y dando al licitador la oportunidad de ser escuchado.

## **Z. PENALIDAD POR ENTREGA TARDÍA O INCUMPLIMIENTO**

Todo licitador que incurra en incumplimiento de entrega de mercancía o servicios, se le aplicará un cargo según dispuesto en el Reglamento 9415, Secc. 4.3.20, sobre importe de la orden de compra emitida, o contrato, por cada día que transcurra de atraso, sin que constituya una renuncia a cualquier otro procedimiento que en derecho proceda. Se entiende que ha habido atraso cuando el suplidor no cumpla con la fecha de entrega convenida o no cumpla con la fecha de comienzo de los servicios.

## **AA. RECONSIDERACIÓN Y REVISIÓN JUDICIAL**

Una vez se emita una Notificación de Adjudicación, cualquier persona que haya participado en el proceso de esta Subasta Formal, y haya recibido una determinación adversa, tendrá oportunidad de solicitar una reconsideración o eventual revisión judicial, siguiendo las disposiciones legales aplicables. Según el Art. 4.2 de la Ley Núm. 38-2017, según enmendada, conocida como Ley de Procedimiento Administrativo Uniforme del Gobierno de Puerto Rico, "[l]a mera presentación de una solicitud de revisión al amparo de esta Sección no tendrá el efecto de paralizar la adjudicación de la subasta impugnada".

**Fin de las Instrucciones**

**\*\*\*Pase a los Anejos\*\*\***



**SUBASTA FORMAL NÚM. 45-2223-001**  
**RENOVACIÓN Y ROTULACIÓN DE PARADAS**

**ANEJO A**  
**ESPECIFICACIONES**  
**TÉCNICAS**





AUTORIDAD  
**METROPOLITANA DE  
AUTOBUSES**



**TECHNICAL SPECIFICATIONS  
PRMBA BUS STOPS SIGNING – PHASE I PROJECT  
PUERTO RICO METROPOLITAN BUS AUTHORITY**



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## **SPECIFICATION 151 - MOBILIZATION**

### **151-1 DESCRIPTION**

#### **151-1.01 Scope**

This item shall consist of all preparatory work and operations performed by the Contractor, including, but not limited to, those necessary for the movement of his personnel, equipment, supplies and incidentals to the project site; the establishment of all offices, shop, warehouses and any other buildings and areas required; and for other work and operations which must be performed or costs incurred prior to beginning work on the various items on the project site. Mobilization costs for subcontracted work shall be considered as included in this item.

### **151-2 MATERIALS**

**151-2.01** Such materials as are required for mobilization and that are not to be a part of the completed contract shall be as determined by the Contractor but they shall conform to all applicable Federal, Commonwealth and local laws codes and regulations.

### **151-3 CONSTRUCTION REQUIREMENTS**

**151-3.01** The work and operations required to complete the mobilization shall be performed in a safe and workmanlike manner and shall comply with all applicable Federal. Commonwealth and local laws, codes and regulations.

### **151-4 METHOD OF MEASUREMENT**

**151-4.01** The method of measurement will be a lump sum.

### **151-5 BASIS OF PAYMENT**

**151-5.01** Partial payments will be made as the work progresses in accordance with the following schedule. Percentages shown are accumulated values.

- a. When 2 1/2 percent of the original contract is earned from other bid items, 25 percent of the amount bid for mobilization or 2 1/2 percent of the original contract amount, whichever is lesser, will be paid.
- b. When 5 percent of the original contract amount is earned from other bid items, 50 percent of the amount bid for mobilization or 5 percent of the original contract amount, whichever is lesser, will be paid.
- c. When 10 percent of the original contract amount is earned from other bid items, 100 percent of the amount bid for mobilization or 10 percent of the original contract amount, whichever is lesser, will be paid.

## **SPECIFICATION 201 - CLEARING AND GRUBBING**

### **201-1 DESCRIPTION**

#### **201-1.01 Scope**

This work shall consist of clearing, grubbing, removing and disposing of all vegetation, debris and miscellaneous structures, not covered under other contract items, within the construction area as specified or directed by the Engineer, except for such objects as are designated to remain. The Contractor shall clear and grub such additional areas within the limits of the right-of way and easement line as specified or directed. This work shall also include the preservation from injury or defacement of all vegetation and objects designated to remain.

### **201-2 MATERIALS**

**201-2.01** No materials are specified.

### **201-3 CONSTRUCTION REQUIREMENTS**

#### **201-3.01 General**

- a. Clearing shall consist of the felling and disposition of trees and the removal from the natural around surface and disposal of upturned stumps, stubs, logs, limbs, sticks, vegetation, rubbish, debris and other objectionable matter, including concrete or masonry, occurring within the areas to be cleared.
- b. Grubbing shall consist of the removal from the ground and disposal of roots, stumps, stubs, buried logs, debris and other objectionable materials from within the areas to be grubbed.
- c. Clearing and Grubbing shall consist of performing both clearing and grubbing operations as set forth above.
- d. The Contractor and the Engineer shall make arrangements to take the preconstruction cross sections noted under Specification 150 before the clearing and grubbing is started.

#### **201-3.02 Limits of Work Areas**

- a. Unless otherwise specified in the special provisions or shown on the plans, or otherwise directed by the Engineer, the entire length of the project shall be cleared and grubbed to the limits specified below. No payment shall be made to the Contractor for clearing and grubbing outside these limits, unless such work is specifically authorized by the Engineer
- b. The area above the natural ground surface shall be cleared within the following limits:
  - (1) Highway construction areas including structures, frontage roads or streets, ramps, approaches, ditches and channels and all other accessory roads and connections that are

to be constructed. Such areas shall extend to a width of 1.5 meters outside of structures and excavation and embankment slope lines, except that where slopes are to be rounded the areas shall extend to the outside limits of slope rounding.

(2) Material sites within the right-of-way.

(3) Areas enclosed by interchange loops and ramps.

(4) Where the construction is to be performed through cultivated areas, all vegetable growth is to be cleared from the entire right-of-way area except for such trees as may be designated to remain.

- c. Within the limits of clearing, except in embankment areas where the subgrade surface is to be 1.2 meters or more above the natural ground, the areas below the natural ground surface shall be grubbed to the depth necessary to remove all stumps, roots, buried logs and all other objectionable material. Such removed objectionable material shall not be left in or under embankments or dikes.
- d. All undisturbed stumps, roots and unperishable solid objects within cleared embankment areas where the subgrade surface is to be 1.2 meters or more above the natural ground may remain provided they do not extend more than 0.2 meters above the natural ground at any point and do not extend closer than 0.6 meters to any subgrade or slope line. However, such stumps and roots are to be completely grubbed out where a structure is to be constructed, piles are to be driven, subdrainage trenches are to be excavated unsuitable material is to be removed, or where the embankment construction requires benching under Specification 203.
- e. In cuts, the grubbing of stumps and roots shall be done to such depth that in no case will any portion remaining below grade extend closer than 0.45 meter to any subgrade or slope surface.
- f. In areas marked for clearance outside the road prism where no grubbing is required by the Engineer, all stumps shall be cut flush with or below the ground line and any holes backfilled.
- g. Except in areas to be excavated, stump holes, cuts, depressions and other holes resulting from clearing and grubbing operations shall be backfilled with suitable material and compacted in accordance with the requirements of Specification 203. No direct payment will be made for such backfilling and compaction, nor for the material required which are a subsidiary obligation of the Contractor under this pay item.
- h. Grubbing of pits, channel changes, and ditches will be required only to the depth necessitated by the proposed excavation within such areas.

### **201-3.03 Trees to Remain**

- a. The trees that are to remain shall be pruned of undesirable wood and the resulting crown shaped to the natural form of the kind of tree and as approved. Any and all branches interfering with or hindering the healthy growth of the tree shall be removed. All diseased branches and all dead branches 2.5 centimeters or more in diameter shall be removed. Any branch which may be partly dead yet has a healthy lateral branch at least one-third the diameter of the parent branch shall be removed beyond the healthy branches. All stubs or improper cuts resulting from improper pruning shall be removed. All cuts shall be cleanly made with sharp tools flush with parent trunk or limb, and all large bark wounds shall be scar traced to the satisfaction of the Engineer.
- b. Tree wounds, cuts or scars resulting from the Contractor's operations shall be carefully dressed in accordance with accepted horticultural practice. Dressing for treating tree wounds or cuts shall be any one of the paints listed in Specification 713- Road- side Improvement Materials.
- c. Branches of trees designated to remain which extend over the roadway and which hang within 6 meters of finished grade shall be cut off close to the boles in a workmanlike manner. Other branches of these trees shall also be removed in such manner that the trees present a balanced appearance. All trimming shall be done in accordance with accepted horticultural practices.

### **201-3.04 Felling of Trees**

In order to minimize damage to trees that are to be left standing, trees to be removed shall be felled toward the center of the area being cleared if so required by the Engineer. Then necessary to prevent damage to structures other trees or property or to minimize danger to traffic trees shall be cut in sections from the top downward.

### **201-3.05 Protection and Restoration**

The Contractor shall prevent damage to existing pipes conduits wires, cables or structures above or below ground. No land monuments, property markers, or official datum points shall be damaged or removed until an authorized agent has witnessed or otherwise referenced their location and approved their removal.

### **201-3.06 Disposal**

- a. Unless otherwise set forth in this Specification, the Special provisions or contract plans, or authorized by the Engineer, all wood, brush, grubbed stumps, debris, and other objectionable materials shall be removed from the right-of-way and disposed of by the Contractor at other suitable sites in conformance with the prevailing laws, ordinances, regulations and rules bearing on this matter.
- b. No burning shall be permitted.
- c. Disposal locations outside the right-of-way shall be obtained by the Contractor at his own expense. The Contractor shall make all necessary arrangements and shall present to the



Engineer prior to their use copies of the written agreements with the property owners on whose property the materials and debris are to be placed. The agreements shall be so worded as to save harmless the Authority from responsibility or liability in connection with the placing of the material on said properties.

- d. All merchantable timber in the clearing area which has not been removed from the right-of-way prior to the beginning of construction, shall become the property of the Contractor, unless otherwise provided.
- e. When permitted by the Special provision or the plans, disposable material may be buried at location shown on the plans or approved by the Engineer within the right-of-way but outside of the embankment areas.
- f. When permitted by the Special Provisions or the plans, disposable material may be used to widen embankments and flatten embankment side slopes under conditions and procedures approved by the Engineer. Such disposal requires the breakup of the material into sizes suitable for placing and covering with earth.
- g. Under no circumstances is disposal to be made in swamps or wetlands.
- h. There is to be absolutely no end dumping of disposable material over the side of the embankment.
- i. All disposal areas on the right-of-way, are to be finally covered with a minimum of 0.6 meters of earth and graded to drain properly. The earth for the covering shall be obtained by the Contractor at his own expense with no direct payment to be made. Waste material from project excavations not needed for embankments or other construction may be used provided it is suitable for the purpose and is authorized by the Engineer.

#### **201-4 Method of Measurement**

**201-4.01** Measurement of clearing and grubbing will be by one more , of the following alternative methods as called for in the Proposal Schedule:

- a. Area Basis -The work will be measured by the cuerda, computed to the nearest hundredth, of area of clearing and grubbing completed and accepted. Areas not staked for clearing and grubbing will not be measured for payment. Bare areas and areas occupied by existing roadways not requiring clearing an/or grubbing will be excluded from the measurement. Clearing required for erecting right-of-way fencing will be excluded from measurement and the required clearing for such work shall be a subsidiary obligation of the Contractor under the fencing pay items, except when the clearing of such areas falls within the limits designated on the plans or within the limits indicated in Article 201-3.02 of this specification. Clearing and grubbing of disposal sites or material sites outside the right-of way will not be measured for payment.
- b. Lump Sum Basis -When clearing and grubbing is included in the Proposal Schedule as a lump sum item, no direct measurement of area will be made. . c. Individual Unit Basis -

When the Proposal Schedule calls for selective cutting of trees and removal of stumps by individual unit basis, the units will be designated and measured as stated below.

(1) The diameter of trees will be measured at a height of 1.0 meter above ground. Trees less than 0.30 meters in diameter / will be classed as brush and will not be measured for payment.

(2) Stumps will be measured by taking the average diameter at the cut-off.

(3) Trees will be designated in relation to their diameter at 1.0 meter above ground and stumps by their diameter at cut-off, as follows:

0.30 to 0.60 meter	-	Small
over 0.60 meter	-	Large

## **201-5 Basis of Payment**

**201-5.01** The accepted quantities of clearing and grubbing will be paid for at the corresponding contract unit prices which will constitute full compensation for furnishing all materials, labor, equipment and incidentals necessary to satisfactorily complete the work as specified and as directed by the Engineer, including the removal and disposal of all the resulting material. Payment will be as follows:

- a. Area Basis -The areas measured and approved for payment will be paid for at the contract unit price per "cuerda".
- b. Lump Sum Basis -The lump sum price paid shall constitute full compensation for any estimated quantities shown in the contract documents. Partial payments will be made in proportion to the amount of this work satisfactorily completed and accepted by the Engineer.
- c. Individual Unit Basis -When individual unit quantities of selective cutting of trees and removal of stump are called for in the contract, the accepted quantities will be paid for at the contract unit process for the respective items.

**201-5.02** No separate payment will be maid for any excavation backfill or earth cover necessary to complete the work of disposal outside the embankment area nor for the work in the handling, storing , rehandling and hauling of disposable material within or off the right-of-way.

**201-5.03** When the item of clearing an grubbing is paid for on a lump sum basis, any adjustment in compensation due to an increase in the quantity of work to be performed, which is ordered by the engineer will be computed on the basis of the increase in area cleared and grubbed to the original contract lump sum price.

**201-5.04** When the contract does not include pay items for clearing and grubbing, any clearing and grubbing that may be required shall be performed by the contractor and will not be paid for directly but this work shall be a subsidiary obligation of and its cost included under other contract pays items.

**201-5.05 Payment will be made under:**

<u>PAY ITEM</u>	<u>PAY UNIT</u>
Clearing and Grubbing .....	“Cuerda”
Clearing and Grubbing .....	Lump Sum
Cutting and Removing Trees, Small .....	Each
Cleaning Existing Concrete Gutter .....	Linear Meter
Cleaning Existing Ditch vegetation and debris.....	Cubic Meter

## **SPECIFICATION 202 – REMOVAL OF STRUCTURES AND OBSTRUCTIONS**

### **202-1 DESCRIPTION**

#### **202-1.01 Scope**

- a. This Work shall consist of the removal wholly or in part, and satisfactory disposal of all buildings, building foundations, fences, structures, old pavements, and any other obstruction which are no designated or permitted to remain, except for the obstruction to be removed and disposed of under other items in the contract. It shall also include the salvaging of designated materials and backfilling the resulting trenches, holes, and pits.
- b. When the Contract does not include pay items for removal of structures and obstructions as described in this specification, such work will not be paid for directly, but shall be performed as a subsidiary obligation of the Contractor under other contract items.
- c. Regardless of the pay items included in the proposal schedule and shown in the plans, it is the Contractors responsibility to determine the quantity and nature of structures and obstructions to be removed from within the project and to bid accordingly.

### **202-2 MATERIALS**

#### **202-2.01 No Materials are Specified**

### **203-3 CONSTRUCTION REQUIREMENTS**

#### **203-3.01 General**

- a. The Contractor shall raze, remove and dispose of all buildings and foundations, structures, fences, and other obstructions, any portions of which are the right-of-way, except utilities and those for which other provisions have been for removal. Any salvable material will become the property of the Contractor unless otherwise specified in the Contract Documents. Any salvable material specifically designated to remain the property of the Authority shall be removed without unnecessary damage and transported to the place or places specified in the Contract Documents at the Contractor's expense. The repair to any damage to materials designated to be salvaged for the Authority which is due to negligence by the Contractor will be at the Contractors expense.
- b. Unless Otherwise Specified or authorized, material not salvaged shall be disposed of outside the project right-of-way in areas selected by the Contractor. Copy of the written permissions of the property owners on whose property the material is to be deposited shall be furnished by the Contractor to the Engineer.
- c. Basements or cavities left by structure removal shall be filled with suitable material to the level of the surrounding ground and, if within the prism of the construction, shall be compacted in accordance with Article 203-3.05 of Specification 203 Excavation and Embankment.

## **SPECIFICATION 202 – REMOVAL OF STRUCTURES AND OBSTRUCTIONS**

### **202-3.02 Removal of Bridges, Culverts and Other Drainage Structures**

- a. Bridges, culverts and other drainage structures in use by traffic shall not be removed until satisfactory arrangements have been made to accommodate traffic.
- b. Unless otherwise directed, the substructures of existing structures shall be removed down to the natural stream bottom and those parts outside of the stream removes down to natural ground surface. Where such proportions of existing structures lie wholly or in part within the limits for a new structure, they shall be removed as necessary to accommodate the construction of the proposed structure.
- c. Steel structures that require special dismantling and salvaging procedures are identified in the Contract Documents. All other structures will be dismantled and removed by the Contractor and all salvable material will become the property of the Contractor and shall be removed from the right-of-way or disposed of in a manner approved by the engineer.
- d. Blasting or other operations necessary for the removal of an existing structure , or obstruction, which may damage new construction or adjacent structures to remain, shall be completes prior to placing the new work.

### **202-3.03 Removal of Pavement, Sidewalks, Curbs, etc.**

All pavement, base course, sidewalks, curbs, gutter, etc., designated for removed shall be broken up und disposed of in areas approved by the Engineer.

### **202-3.04 Dust Control**

Provision shall be made at every demolition site to control the amount of airborne dust resulting from demolition operations by wetting the debris and other materials and the immediate work area with appropriate spraying agents or other means acceptable to the Engineer.

### **202-3.05 Rodent Control**

- a. Prior to the demolition of any buildings in projects in urban areas, the Contractor shall exterminate rodents in each of the buildings to be demolished. The extermination shall be performed by an exterminator duly licensed by the Commercial Poison Division of the Puerto Rico Department of Health, and with at least five (5) years of experience in rodent extermination. The exterminator shall, upon request, present to the engineer, evidence of both the license and required experience.
- b. The exterminating work shall be performed in a manner acceptable to the enginner and in accordance with the requirements of the Puerto Rico Deptment of Health. Normally, bait shall be placed at least 14 calendar days and not more than 30 calendar days before actual demolition is started.



## SPECIFICATION 202 – REMOVAL OF STRUCTURES AND OBSTRUCTIONS

### 202-4. METHOD OF MEASUREMENT

#### 202-4.01 Method of Measurement

- a. When the contract stipulates that payment will be made for removal of structures and obstructions on a lump sum basis, the pay item will include all structures and obstructions encountered within the right-of-way in accordance with the provisions of this specification.
- b. Where the proposal stipulates that the payment will be made for the removal of specific items on a unit basis, measurement will be made by the unit stipulated by the contract. Linear, area, and volume measurement will be to the nearest tenth of the pay unit

### 202-5 BASIS OF PAYMENT

202-5.01 The accepted quantities of removal of structure and constructions, determined as provide above, will be paid at the contract unit price or lump sum price as called for in the Contract, which price shall be full compensation for the removal and disposal of all structures and obstructions in for the excavation and backfill incidental to their removal and for dust and rodent control. The price shall also include all costs for the removal and salvage of any material specified to be retained by the Authority, their custody, preservation, storage and disposal as specified in the Contract Documents.

#### 202-5.02 Payment will be made under:

<u>Pay Item</u>	<u>Pay Unit</u>
Removal of Structures and Obstructions	Lump Sum
Removal of	Each
Removal of	Linear Meter
Removal of	Square Meter
Removal of	Cubic Meter

## **SPECIFICATION 203 - EXCAVATION AND EMBANKMENT**

### **203-1 DESCRIPTION**

#### **203-1.01 Scope**

This work shall consist of roadway excavation, borrow excavation, hauling of excavated material, embankment construction, and disposal of material in accordance with these specifications and in conformance with the lines, grades, and dimensions shown on the plans or established by the engineer.

#### **203-1.02 Roadway Excavation**

Roadway excavation will include excavation and grading for roadways, parking areas, intersections, approaches, slope surrounding, benching including that under side hill fills, waterways channel and ditches; removal of unsuitable material from the roadbed and beneath embankment areas, excavating selected material found in the roadway as ordered for specific use in the improvement; and removal excavation, rock excavation, undercut excavation, or muck excavation as hereinafter described.

#### **203-1.03 Unclassified Excavation**

Unclassified excavation shall consist of excavation, utilization or disposal of all material of whatever character encountered in the work, including selected material, which is not classified and included in the contract under the other pay items.

#### **203-1.04 Rock Excavation**

Rock excavation shall consist of excavation, utilization or disposal of igneous, metamorphic material or sedimentary rock which cannot be excavated without drilling, blasting or the use of a ripper driven by a tractor having a flywheel horsepower of no less than 300. It also includes the excavation of all boulders, or other detached stones each having a volume of two (2) cubic meters or more. When the contractor does not include a pay item for Rock Excavation, the excavation of any rock encountered will be considered as Unclassified Excavation for measurement and payment purpose.

#### **203-1.05 Undercut Excavations**

Undercut excavations shall consist of the excavation and disposal of soils considered unsuitable for the foundation of the roadway or embankment as shown on the plans or as ordered by the Engineer. It does not include the excavation of rock below subgrade elevation required by Paragraph 203-3.01b. Undercut Excavation shall be considered for measurement and payment purposes as "unclassified excavation" unless it also meets the definition of "muck excavation" in which case it shall be so classified for measurement and payment purposes.

### **203-1.06 Muck Excavation**

Muck excavation shall consist of the removal and disposal of saturated and unsaturated mixtures of soils and organic matter not suitable for foundation material from below the natural ground level of marshes, swamps and bogs over which embankments are to be constructed, and which can not be excavated using dozers or scrapers but which must be excavated by shove-dipped, clam shell, drag line or other similar earth lifting equipment.

### **203-1.07 Borrow**

Borrow shall consist of approved material from sources approved by the engineer, required for the construction of embankments, replacement of unsuitable materials, or for use in other portions of the work in excess of the quantity of suitable materials is available from the required grading, cuts and excavations. Unless otherwise provided in the contract, the Contractor shall make his own arrangements for obtaining all required borrow material and shall pay all costs involved which shall be included in the contract unit price for borrow.

### **203-1.08 Hauling**

This work shall include the hauling and placing in embankments and miscellaneous backfills all suitable materials obtained from roadway and borrow excavation. It shall also include the hauling and disposal of all surplus and unsuitable materials at the location in the project indicated on the plans or selected by the Engineer, or at approved site outside the project limits provided by the Contractor at his expense.

### **203-1.09 Embankment Construction**

Embankment construction shall consist of construction roadway embankment, including the preparation of dikes within or adjacent to the roadway, the placing of approved material within roadway areas where unsuitable material has been removed and in pits, holes and other depressions within the roadway area. This work also includes the compacting of all placed material to meet the requirements of the plans and these specifications, and proof rolling when called for in the plans.

### **203-1.10 Proof Rolling**

Proof Rolling shall consist of applying test loads over the subgrade surface or the top surface of the subbase, whichever is higher, by means of heavy pneumatic-tired roller to locate and permit the correction of the deficiencies likely to adversely affect the performance of the pavement structure.

### **203-1.11 Clearing and Grubbing**

When the contract does not include a separate pay item for clearing and grubbing, any necessary clearing and grubbing required to complete the excavation and embankment item shall be performed by the Contractor as subsidiary obligation under this item with no additional compensation to be paid to the Contractor.

## **203-2 MATERIALS**

**203-2.01** Material for embankments and roadway foundation shall consist of suitable obtained from the roadway excavation or approved borrow sources. It shall contain no muck, and no trees or tree boles, stumps, standing or matted brush, matted roots or rubbish.

### **203-3.02 Unsuitable Material**

Unsuitable material indicated on the plans or encountered during the roadway excavation shall be disposed of as shown on the plans or as directed by the Engineer. Unsuitable material is defined as:

- a. Material determined by the Engineer to be of such unstable nature as to be incapable of being compacted to specified density using ordinary methods at optimum moisture content; or
- b. Soils that attain their maximum density at optimum moisture content in excess of 30% as determined by AASHTO T-180 Method D; or
- c. Soils that attain maximum dry density of less than 90 pounds per cubic foot as determined by AASHTO T-180 Method D; or
- d. Under Certain conditions, soil classified as A-2-6, A-2-7, A-4, A-5, A-6 or A-7 under AASHTO M-145 may be considered unsuitable for the subgrade as indicated on the plans or as determined by the Engineer.

The removal and disposal of such unsuitable material will be measured and paid for as unclassified excavation except that if it falls under the classification of muck excavation as defined in Article 203-1.06 it will be paid for under muck excavation.

### **203-2.03 Borrow**

Borrow material shall consist of fragments of rock, gravel, sand, silty or clayey sand and gravel, disintegrated rock, caliche or a mixture of these materials, that meet the requirements specified below. It shall be free from vegetable matter and lumps of clay, and of stone or rock fragments larger than specified below. Oversize material shall be removed at the pit or on the road except that if the material is of such nature that it will break down under blading and rolling, the Engineer may permit breaking it down to the required size at the pit or on the road. Borrow material shall meet the following requirements:

- a. Borrow Class A – This is a general purpose borrow material. It shall be a soil or soil aggregate mixture classifiable as A-1, A-2, A-3 or A-4. It shall be capable of meeting the construction requirements for embankment and compaction included in Articles 203-3.03, 203-3.04 and 203-3.05 of this specification including compaction of 95% of the maximum density determined as per AASHTO T-180 Method D. The maximum size of any stone or rock fragment shall not exceed 30 centimeter except that when this material

is used within 60 centimeter of the subgrade elevation, the maximum size shall not exceed 20 centimeters.

- b. Borrow Class B – this borrow material shall be a granular soil classifiable as an A-1, A-3, A-2-4 or A-2-5. It shall be free of stone or rock larger than 30 centimeters in their greatest dimension. When this borrow is used as a fill or backfill where it shall be below ground water elevation, the fraction of the material passing the No. 200 sieve shall not exceed 15%.
- c. Borrow Class B – This borrow material shall consist of any non-organic soil classifiable under any AASHTO M-145 classification groups, excepts A-3 and A-8, which is acceptable to the Engineer, and which can be compacted with normal compaction effort to the approval of the Engineer. The maximum size of any stone or rock fragment shall not exceed 20 centimeters. This borrow is normally intended for use in the flattening of slopes.
- d. Borrow Class D – This borrow material shall consist of a highly impervious clayey soil classifiable as A-6 OR A-7 but with a minimum Plasticity Index (PI) of 25. It is intended for use as an impervious layer under grass medians and outside shoulder areas as indicated on the plans or ordered by the Engineer, to impede the infiltration of rain water into the subgrade.
- e. When borrow is included as a pay item in the contract but the class is not specified, Borrow Class A shall be furnished.
- f. Beach sand will not be accepted as borrow material except from sources authorized by the Department of Natural Resources.

#### **203-2.04 Sampling and Testing**

- a. The contractor shall advise the Engineer as to the exact location of the sources of borrow materials that he proposes to provide, at least four weeks in advance of their actual use, so that samples may be obtained and tested for conformance with this specification. No material shall be deposited on the roadway until the Engineer has approved its source.
- b. Once a source is approved, it shall be the Contractor's responsibility to ascertain that the material from such source continues to meet specification requirements.
- c. Throughout the construction operations, the Engineer will take random samples of the borrow materials in place for the testing. If the random in-place samples fail to meet the specification requirements, additional sampling and testing will be performed as necessary to ascertain the volume of failing borrow material.
- d. For Borrow Class A, the Authority, at its discretion, may allow the deficient in-place material to remain provided it is not classified as unsuitable. If accepted, such deficient material will be subject to a reduction in unit price determined in accordance with the procedure included in Article 203-5.01 of this specification.

- e. For Borrow Class B, in-place material with a PI in Excess of 20 or with a fraction passing the No. 200 Sieve in excess of 15% when used below ground water elevation and 45% in either cases, shall be removed and replaced with material meeting the specification requirements at the Contractor's expense. Deficient in-place material not exceeding these limits may be accepted, at the discretion of the Engineer, but subject to a reduction in unit price determined in accordance with the procedure in Article 203-5.01 of this specification.
- f. For both Borrow Classes A and B, the price reduction requirements will be disregarded when the fraction of the material passing the No. 40 sieve does not exceed 10%.
- g. For Borrow Class D, in-place material with a PI of less than 15 shall be removed and replaced with material meeting the specification requirements at the Contractor's expense. Deficient in place material not exceeding this limitation may be accepted, at the discretion of the Engineer, but subject to a reduction in unit price determined in accordance with the procedure included in Article 203-5.01 of this specification
- h. The Contractor may elect to remove any deficient in-place borrow material and replace it with material meeting the specification requirements at his expense.

#### **203-2.05 Selected Material**

- a. Selected material shall be defined as material which is excavated from a location within the right-of-way or other designated location specified in the special provision or shown on the plans, and the Contractor shall have no choice in such selection. Selected material shall be used as shown on the plans or provided by the special provisions. Topsoil excavated within the limits of the project shall be considered as a selected material unless a separate pay item is provided in the contract for topsoil.
- b. Whenever practicable, selected material shall be hauled directly from excavation to its final position in the roadway prism and compacted in place and such work shall be paid for at the contract price for unclassified excavation. Selected material shall remain in place until it can be placed in final position as provided above. No additional compensation will be allowed for any delay or inconvenience in excavation operation, except that if ordered in writing by the Engineer, selected material may be excavated and stockpiled at locations designated by him, and later placed in final position in the roadway.
- c. Excavating and stockpiling selected material, if required and authorized, will be paid for at the contract price for unclassified excavation. Removing the selected material from stockpiles and placing it in final position in the roadway will be paid for again at the contract price for unclassified excavation except that the quantities to be paid for will be determined from measurements of the material in the stockpiles prior to removal.



## 203-3 CONSTRUCTION REQUIREMENTS

### 203-3.01 General Requirements – Excavation

- a. The excavation shall be finished to reasonably smooth and uniform surfaces and shall be conducted so that the materials outside of the limits of slopes will not be disturbed. Excavated material, regardless of excavation procedure used, shall conform to the size limitations required to comply with paragraph s 203-4.04 c. and d. as applicable. Prior to beginning excavation operations in any area, all necessary clearing and grubbing in that area shall have been performed in accordance with Specification 201 – Clearing and Grubbing. Cross section for the purpose of measuring the amount of excavation will be taken prior to the clearing and grubbing operations.
- b. Unless otherwise specified, material classified as rock shall be excavated to a minimum depth of 15 centimeters below subgrade elevation within the limits of the roadbed between outside edges of shoulders, and the excavation backfilled with an A-1, A-2-4 or A-2-5 material. Care shall be taken that untrained pockets shall not be left on the surface of the rock.
- c. Rock removed to a maximum depth of 30 centimeters below the subgrade elevation will be measured and paid for at the contract unit price for “Rock Elevation” or “Unclassified Excavation”, as the case may be, provided that the rock has been removed sufficiently to permit accurate cross sectioning. Backfilling of this depth in excess of 30 centimeters with an A-1, A-2-4, or A-2-5 material will be at the expense of the Contractor
- d. Excavation of rock by use of explosives shall be done in such a manner as will result in a minimum of breakage outside the neat lines of the typical cross section shown on the plans or as directed by the Engineer. When specified, faces of cut slopes though rock shall be formed by presplitting. Presplitting is defined as establishment of a free surface of shear plane in the rock by the controlled usage of explosives and blasting accessories in appropriately aligned and spaced drill holes.
  - (1) The Engineer reserves the right to steepen any rock slope if, in his opinion, the character of the rock and the blasting techniques employed are capable of producing a stable unshattered slope at a steeper inclination than that shown on the plans. No additional compensation for steepening slopes will be considered.
  - (2) Blasting Operations
    - (a) Primary or core blasting shall be accomplished with suitable explosives and bore hole size and spacing to produce the degree of fragmentation required to comply with paragraph 203-3.04 d. for rockfills.
    - (b) Blasting for rock excavation shall be conducted in accordance with the requirements of Article 107.12 – Use of Explosives, of the General Provisions as specified below.

- (c) The contractor shall assign the necessary flagmen to each road within the danger area to stop traffic at a safe distance during blasting periods. The Contractor shall inspect and clear all roadways being used by traffic of any obstruction caused by his blasting operations. He shall exercise maximum precautions, including the use of mats, to avoid damage to properties and utilities adjacent to the work. The cost of the use of mats, whether ordered by the Engineer or used at the Contractor's discretion, and of all other precautionary measures except those aid for under Specification 638, Maintenance and Protection of Traffic, shall be included in the unit price for "Rock Excavation" or "Unclassified Excavation".
- e. Obliteration of old roadways shall include all grading operations necessary to incorporate the old roadway into the new roadway and surrounding in order to provide a pleasing appearance from the roadway. This shall be included as part of the work under this specification. Obliteration and removal of old pavement and base course, if necessary, will be paid for under the item "Removal of Structures and Obstructions", Specification 202, when such a pay item is included in the contract; otherwise it shall be an obligation of the Contractor included in the unit price for "Unclassified Excavation".
- f. When the Contractor's excavating operations encounter remains of prehistoric people's dwelling sites or artifacts of historical, paleontological or archeological significance, the operation shall be temporarily discontinued. The Engineer will contact the proper authorities to determine the disposition thereof. The Contractor shall excavate the site when directed to do so in a manner acceptable to the Engineer, so as to preserve the artifacts encountered and shall remove them for delivery to the custody of the proper government authorities. Such excavation will be considered and paid for as extra work. However, the Authority may elect to have such excavation performed by other entities.
- g. Where excavation to the finished graded section results in a subgrade or slopes of unsuitable material, the Engineer may require the Contractor to remove the unsuitable material and backfill to the finished graded section with an approved material. The Contractor shall conduct his operations in such a way that the Engineer can take the necessary crosssectional measurements before the backfill is placed. This shall be considered undercut excavation.
- h. When the location of unsuitable material is shown on the plans, the removal and replacement shall be as shown therein. When not shown on the plans the Contractor shall remove all unsuitable material as directed by the Engineer, who shall be the sole judge of what constitute unsuitable material. All unsuitable material shall be disposed of in accordance with Article 203-3.02

#### **203-3.02 Construction Methods – Excavation**

- a. Utilization of Excavated Material.

- (1) All suitable material removed from the excavation shall be used in the formation of the embankment, subgrade, shoulders, sloped, bedding and backfill for structures, and for other purposes shown on the plans or as directed by the Engineer.
- (2) During the progress of the excavation, material encountered in cuts and deemed suitable for placing in the roadbed or for topping or for road finishing shall be saved and utilized for those purpose as directed by the Engineer.
- (3) Unless otherwise shown in the plans or specified I the special provisions, surplus excavated material shall be used to widen embankments uniformly or to flatten slopes, or it shall be disposed of along the roadway or at other location as directed by the Engineer. Hauling and placing will be as indicated in Article 203-1.08. Compaction of this material will be as indicated in Article 203-3.05.
- (4) He quantities of surplus material, if any, shown on the plans or specified in the special provisions are approximately only. The Contractor shall satisfy himself that there is sufficient material available for completion ob the embankment and other project items before disposing of any material inside or outside the right-of-way. Any shortage of material caused by premature disposal of any material by the Contractor shall be replaced by him and no compensation will be allowed the Contractor for such replacement.
- (5) If any surplus material not requires for widening of embankments, flattening of slops or for other purposes directed by the Engineer, is to be disposed of outside the right-of-way, then the contractor shall be responsible for obtaining suitable disposal locations at his expense. All the costs involved shall be in the unit price bid for excavation.
- (6) No surplus material shall be disposed of at elevations above the grade of adjacent roadbed.
- (7) Conservation of Topsoil
  - (a) When a pay item for Placing Loamy Topsoil is not included in the Contract, suitable topsoil encountered in the excavation and on areas where embankments is to be placed will be removed to such extent and to such depth as the Engineer may direct. The removed topsoil shall be transported and deposited in storage piles at locations approved by the Engineer. The topsoil shall be completely removed to the required depth from any designated area prior to the beginning of regular embankment work in the area and shall be kept separate from other excavated materials. Payment for the excavation, stockpiling and placing at final location of topsoil will be as provided for selected materials in Paragraph 203-2.05 c.

(b) When the Contract includes a pay item for Placing Loamy Topsoil and this material is available from within the roadway areas, the Contractor may obtain it from this source. Such case will be handled as provided by Article 104-06 of General Provisions.

(8) All required hauling of all excavated material, including unsuitable and waste material, to its final disposition site shall be an obligation of the Contractor and included in the unit price for excavation.

b. Ditches

(1) Ditches shall include side ditches and gutters, channel changes, irrigation ditches, inlets and outlets ditches, toe ditches, furrow ditches, and such other ditches as may be required for the construction of the project.

(2) All material excavated from ditches shall be utilized or disposed of as provided in Paragraph 203-3.02 a. above.

(3) Ditches shall conform to the slope, grade and shape of the required cross section, with no projections of roots, stumps, rock or similar matter. The Contractor shall maintain and keep open and free from leaves, sticks and other debris all ditches dug by him until final acceptance of the work.

c. Borrow Pits

(1) The contractor must obtain prior approval from the Engineer for the location of all borrow pits. The Contractor shall make his own arrangements for obtaining borrow, shall pay all costs involved and shall obtain all necessary permits.

(2) All test pits and explorations required by the Engineer to evaluate the acceptability of borrow shall be done by the Contractor at his own expense.

(3) The Contractor shall notify the Engineer not less than 28 calendar days in advance of the opening of any borrow pits so that any required test may be made of the material.

d. Presplitting

(1) The Contractor shall first completely remove all overburden soil along the lines of presplitting to expose the rock surface prior to drilling the presplitting holes.

(2) Prior to area drilling and blasting, a break line shall be established along the plane of the staked slope by the presplitting method. This breakline shall be kept ahead of the primary blasting a distance equal to about one half of the length of the primary blast for each lift of bedrock excavate unless otherwise permitted by the Engineer.

- (3) Drill holes for presplitting shall be made along the slope stake lines established by the Engineer, and the Contractor shall exercise sufficient care to insure that the holes conform to the slope as established. Presplitting shall be accomplished by drilling holes not to exceed 10 centimeters (4") in diameter at intervals of approximately 45 to 90 centimeters. The holes shall be drilled to the full depth of the cut or to a predetermined bench elevation, provided that the depth to the ditch or bench does not exceed a safe depth for accurate drilling. Holes for presplitting shall not exceed 8 meters in depth. If the depth of the rock cut or predetermined bench is greater than the maximum permissible depth of holes, the blasting shall be done in two or more lifts. An offset of no more than 30 centimeters will be allowed to accommodate the drill head, and the slope angle and offset shall be so arranged that the toe of the finished rock slope shall coincide with the toe of the slope specified in the plans. No hole shall deviate more than 3 percent of the length of the presplitting hole from the plane of the specified slope, maintaining as nearly as possible the original spacing between holes through the entire depth of the lift.
- (4) The spacing and size of the drill holes may be varied, with the approval or at the direction of the Engineer, to suit the material encountered during construction so long as a smooth face, reasonably free from loose rock is produced. It shall be the Contractor's responsibility to drill as many holes as are required to satisfactorily complete the work.
- (5) No portion of any primary blast hole larger than 7.5 cm. in diameter will be permitted closer than 3.75 meters to the presplit face. No portion of any blast hole will be allowed within 1.20 meter of the presplit face unless otherwise permitted by the Engineer. Before placing the charge, each hole shall be inspected. No loading will be permitted until the hole is free of all obstructions for its entire depth. The holes shall be loaded with an optimum amount of explosives stemmed with suitable material and detonated to produce clean rock walls and to minimize rock overbreak, shattering and ground vibration. The method used shall be according to the instruction of the manufacturer in order to avoid damage to structures near the job site. The annular air space around the explosive charge shall be filled completely with the stemming material. Stemming material shall be reasonably clean stone chips or other approved granular material passing the 3/8" sieve and retained on the No. 10 sieve. A ten percent tolerance on either the maximum or minimum size sieve will be permitted.
- (6) The Contractor shall adjust his blasting operation according to the characteristics and the structure of the bedrock formation so as to obtain the required slope condition without fracturing the rock beyond the presplit face. The firing pattern for the primary blast shall be designed with delays to afford maximum relief to the holes nearest the presplit plane.
- (7) Test section will be required at the outset of presplit drilling and blasting operations for evaluation of the presplit rock slopes by the Engineer. The

Contractor will be required to completely expose the presplit rock face in the test area for evaluation prior to any further presplit drilling.

- (8) Variance from the true plane of the excavated backslope shall not exceed 30 cm.; however, localized irregularities or surface variations that do not constitute a safety hazard or an impairment to drainage courses or facilities may be permitted at the discretion of the Engineer.
- e. Protection of Roadbed During Construction – During the construction of the roadway the roadbed shall be maintained in such condition that it will be drained at all times. Side ditches or gutters emptying from cuts to embankments or otherwise shall be so constructed as to avoid damage to the embankment erosion.
- f. Stream protection and pollution Control.
  - (1) Excavation from the roadway, channel changes, cofferdams, etc., shall not be deposited in or near to rivers, streams or reservoirs that it will be washed away by higher water or runoff.
  - (2) Should the nature of location of the work make it impossible to prevent some material from being deposited temporarily in any stream channel the same shall be removed as soon as possible at the Contractor's expense
  - (3) The Contractor shall take all necessary effective steps, acceptable to the Engineer, to keep the excavated material from reaching or fouling irrigation, water reservoirs, or streams draining into them, that may cause pollution to the water or damage to hydraulic structures. The Contractor shall be liable for all claims of any nature arising from the unauthorized presence in water course of excavated material from his construction operations.
  - (4) If for some reasons it becomes necessary to suspend construction operations for any appreciable length of time, the Contractor shall shape the top of earthwork in such a manner as to permit the runoff of rainwater. In locations where the road is to be constructed in the immediate vicinity of rivers, streams or reservoirs, the Contractor shall provide temporary slope drains to carry runoff from cuts and from embankments. The slope drains shall be located at no more than 150-meter interval and shall be stabilized by paving or covering with waterproof materials. Should such preventive measures fail and appreciable amount of material begins to erode into the river, stream or reservoir, the Contractor shall act immediately to bring the erosion and siltation under control.
- g. Rounding, Warping, and Finishing Slopes
  - (1) Rounding – Except in solid rock, the tops and bottoms of all slopes, including the slopes of drainage ditches, shall be rounded as indicated in the plans. A layer of earth overlaying rock shall be rounded above the rocks as done in earth slopes



- (2) Warping – Adjustments in slopes shall be made to avoid injury to standing tree or marring of weathered rock, or to harmonize with existing landscape features. The transition to such adjusted slopes shall be gradual. At intersections of cuts and fills, slopes shall be adjusted and warped to flow into each other or into the natural ground surface without noticeable break.
- (3) Finishing – All earth slopes shall be finished to reasonably smooth and uniform surfaces without any noticeable break and in substantial accordance with the planes or other surfaces indicated by the lines and cross sections shown in the plans, with no variations therefrom readily discernible as viewed from the road. The degree of finish for grading of slopes shall be that ordinarily obtainable either from blade-grader or dozer back-blading and hand-shovel operations, as the Contractor may elect.
- h. Removal of unsuitable material – When unstable material or other material unsuitable for foundation, roadbed, or other roadway purposes occurs within the limits of the roadway, the Contractor shall undercut such material below the grade as shown on the plans or as directed by the Engineer and shall backfill the area so excavated with suitable material. The resulting excavated areas shall be backfilled with suitable material to the proper grade elevation. All material replacing rock or unsuitable material shall be placed and compacted in accordance with the applicable requirements of Article 203-3.05, Compaction.
- i. Composition of Roadbeds in Cuts – When material, other than solid rock, encountered below subgrade elevation in cuts is satisfactory as to quality and is to be used to form the finished roadbed, it shall be scarified to a depth of 30 cm. And roots, sod, or other deleterious materials or stones that will not pass a 3-inch square opening shall be removed. Then the material shall be shaped and compacted as required for embankments in Article 203-3.05, Compaction.

#### **203-3.03 General Requirements – Embankment**

- a. Borrow material shall not be used until after assuring that all the suitable material from the roadway excavation can be placed in the roadbed. If the Contractor places more borrow material than is required and thereby causes a waste of suitable excavation material, the amount of such waste will be deducted from the borrow volume.
- b. The entire existing ground surface on which an embankment is to be placed shall be cleared and grubbed in accordance with the requirements of Specification 201 – Clearing and Grubbing.
- c. When an embankment is to be placed upon an existing road, the existing surface shall be scarified to such a degree as will provide ample bond between old and new material.

#### **203-3.04 Construction method – Embankment**

- a. Benching – When embankment is to be placed and compacted on hillsides, or when new embankment is to be compacted against an existing embankment, or when and embankment is built one-half (1/2) width at a time, the slopes that are steeper than four to one (4:1) when measured at right angles to the roadway shall be continuously benched over these areas as the work is brought up in layers. Benching shall be of sufficient width to permit operation of placing and compacting equipment. Each horizontal cut shall begin at the intersection of the original ground and the vertical side of the previous cuts. Material thus cut out shall be compacted along with the new embankment material at the Contractors' expense. Benching will not be measured for direct payments but shall be an obligation of the Contractor's subsidiary to build embankments as per paragraph 203-4.01 c.
- b. Base Preparation – Where an embankment of less than 1.2 meters below subgrade is to be made, all sod and vegetable matter shall be removed from the surface upon which embankment is to be placed and the cleared surface shall be completely broken up by plowing, scarifying or stepping to a minimum depth of 15 centimeters. This area shall then be recompacted. Sod not required to be removed shall be thoroughly disced before construction of the embankment. No direct payment will be mad for this work, it shall be an obligation of the Contractor subsidiary to building embankments as per Paragraph 203-4.04 c.
- c. Placing – Roadway embankment shall be placed in horizontal layers not exceeding 30 centimeters (loose measurement) in depth and shall be compacted as specified before the next layer is placed. Effective spreading equipment shall be used on each lift to obtain uniform thickness prior to compacting. As the compacting of each layer progresses, continuous leveling and manipulating shall be performed to assure uniform density. Water shall be added or removed, if necessary, in order to obtain the required density.
- d. Rockfills – Embankments constructed of material consisting predominantly of rock fragments or boulders of such size that the material cannot be placed inlayer of the thickness specified in Paragraph 203-3.04 c. without crushing, pulverizing or further breaking down the pieces resulting from excavation methods shall be considered rockfills. Such materials may be placed in embankments in layers not exceeding 60 cm. In thickness. Even enough the general thickness of layers is limited as provided above, the placing of individual rocks and boulders of a size not exceeding 1.20 meters in its largest dimension will be permitted provided they are carefully distributed and the interstices filled with finer material to from a dense, compact mass. Rock fills shall be constructed in accordance with the following requirements:
  - (1) Layers – Each layer shall be leveled and smoothed before compaction with suitable leveling equipment and by distribution of rock fragments with finer fragments of earth.
  - (2) Height of Rockfill – no Portion of rock fill shall be constructed above an elevation 60 cm. below finished subgrade. The balance of the embankment shall be composed of material meeting the requirements of Borrow Class B as defined in

Paragraph 203-2.03 b., smooth and placed in layers not exceeding 30 cm. in loose thickness and compacted as required for embankments.

- e. Placing over Swampy Ground – Where an embankment is to be constructed across swampy ground that will not support the weight of trucks or other hauling equipment, the lower part of the fill may be constructed by dumping successive loads in a uniformly distributed layer of a thickness not greater than the necessary to support the hauling equipment while placing subsequent layers and not to exceed one meter above ground water level
- f. End Dumping – Where an embankment is to be placed and compacted and end dumping is permitted, the slopes of the original ground or embankment shall be deeply plowed or cut into starting end dumping except when placing over swampy ground.
- g. Backfill – If an embankment can be deposited on one side only of abutments, wing walls, piers or culvert headwalls, care shall be taken that the area immediately adjacent to the structure is not compacted to the extent that it will cause overturning of or excessive pressure against the structure. The fill adjacent to the bent of a bridge shall not be placed higher than the bottom of the bent until the superstructure is in place. When embankment is to be placed on both sides of the concrete wall or box type structure, operations shall be so conducted that the embankment is always at approximately the same elevation on both sides of the structure.
- h. Protection of Embankment – During the construction of the embankment it shall be protected in accordance with Paragraph 203-3.02 e. In addition, at the close of each day's work, smooth steel wheel or pneumatic tired rollers shall be used to roll the entire working area after it has been crowned, sloped, and drained. All material erode or otherwise removed from the embankment shall be replaced by the Contractor at no extra cost to the Highway Authority.
- i. Shrinkage and Settlement – the Contractor shall construct all embankments so that after shrinkage and settlement and at the time of acceptance of the project, they shall have the required grade, width, and cross-section at all points. The Contractor shall be responsible for the stability of all embankments made under the contract until the final acceptance of the work and shall bear the expense of replacing any portions which have become unstable due to carelessness or negligent work on the part of the Contractor.

### **203-3.05 Compaction**

- a. General – All embankments shall be constructed with moisture and density control.
- b. Maximum Density – Maximum density requirements will be determined by AASHTO T 180, Method D. However, the Authority may, at its discretion, use the graph on Modified Family of Compaction Curves for Puerto Rican Soils that it has developed, to assist in the determination of the maximum densities and optimum moisture contents for the soils encountered in the project by the one point method, similar to AASHTO T 272.

Correction for coarse particles in the soil being tested using AASHTO T 224 will be made when appropriate.

c. Embankments and Backfillings

- (1) All earth embankments and backfills in undercut sections shall be compacted to no less than 95% of maximum density. However, in embankments that exceed 1.5 meters in height, the first 30 cm. layer shall be compacted to not less than 90% of maximum density but all material above this initial layer shall be compacted to 95% of maximum density.
- (2) Where the materials in the embankment permit practical density tests, the Engineer will, during the process of the work, make such test as he considers necessary to ascertain the density of each compacted layer. Test will be made in accordance of AASHTO T 191, T204, T 205 or T 238 at the option of the Authority. If the density test indicates that the attained density is less than the required density, additional rolling shall be performed by the Contractor until the specified density is obtained.

d. Moisture Control

- (1) All fill or backfill material to be compacted shall be at a moisture content for proper compaction to specified density. The Contractor shall be responsible for determining the proper moisture content and for controlling it within the proper limits as the work progresses. When water must be added to material, it may be added on the lift or in the excavation or borrow pit. However, when added on the lift, it shall be applied with an approved pressure distributor. Water added shall be thoroughly incorporated into the soil to attain uniform distribution.
  - (2) When the moisture content of material in a lift exceeds the required amount, the compaction shall be deferred until the material has been dried to the required amount. The material shall be aerated and manipulated as may be necessary to attain the required moisture content prior to compaction.
  - (3) When suitable excavation material has excessive moisture content as to make impracticable its compaction to specified density, such material shall not be placed in embankments or backfill until the excess moisture has been removed by aeration, manipulation or other appropriate means at the option of the Contractor.
- e. Compaction and moisture control, whether adding or removing moisture, by whatever method are used shall be a subsidiary obligation of the Contractor under this specification with the cost included in the excavation item.
- f. Surplus Excavation Material – When surplus excavation material is used to widen embankments it shall be placed in layers and compacted as required in Paragraph 203-3.05 c. above. When the surplus material is used to flatten slopes, a definite density

requirement is not specified, but it shall be placed and compacted so as to obtain a smooth and stable condition accountable to the Engineer.

### **203-3.06 Proof Rolling**

- a. When called in the contract and immediately prior to final trimming of the subgrade surface, or top of subbase, all areas within the roadway limits that are indicated on the plans or ordered by the Engineer shall be proof rolled according to the requirements of this specification.
- b. Equipment – The proof roller shall consist of a chariot type rigid steel frame with a box body suitable for ballast loading up to 50 tons gross weight, and mounted on four (4) pneumatic tire wheels acting in a single line across the width of the roller in its traverse load center line. The wheels shall be equipped with 18.00 x 24 or 18.00 x 25, 24-ply tires, and shall be suspended on articulated axles such that all wheels carry approximately equal loads when operating over uneven surfaces.
- c. Roller Stress
  - (1) Initially the gross ballasted weight and tire inflation of the proof roller shall be adjusted to the highest stress shown in Table 203-1 based on the general description of the subgrade soil and its relative support capacity as estimated by the Engineer. The initial roller stress for embankments constructed of rock shall be the maximum level listed in Table 203-1.
  - (2) The roller shall be operated briefly to establish the acceptability of the initial stress level. Proof rolling shall be performed at the next lower stress level whenever operation of the roller at a higher stress level is accompanied by consistent lateral displacement of soil out of the wheel paths.
- d. Procedure – After an acceptable stress level is established, two (2) complete passes of the roller shall be applied over all elements of the area to be proof rolled. Any deficiencies disclosed during the proof rolling operation shall be corrected as follows:
  - (1) In embankment sections, any depression shall be filled with material similar to or better than the subgrade soil or subbase material and compacted in a normal manner. If necessary, the Engineer may order corrective undercut excavation and backfilling with a selected material.
  - (2) In cut sections, where any portion of the subgrade or subbase surface fails to provide satisfactory support for the proof rolling operations, the Engineer may order a corrective undercut excavation and backfilling with a selected material to a depth determined by the Engineer.
  - (3) Backfill material in undercut sections shall be placed in layers and compacted to at least 95% of maximum density.

- (4) After compaction, corrected areas shall be proof rolled again. Corrective work will be judge completed and accepted by the engineer when all elements of the subgrade surface show a satisfactory uniform response to the proof roller.

Relative Subgrade Support	Stress Level	Gross Tons	Tire PSI
POOR	MINIMUM	30	40
FAIR	1	34	50
	2	38	60
	3	42	70
GOOD	4	46	80
	5	50	80
EXCELLENT	MAXIMUM	50	80

- e. Exceptions – Proof rolling of the subgrade or subbase shall not be used where the proof roller will approach a culvert, pipe or other conduit closer than 1.5M in any direction and when due to restriction in available access and/or maneuvering space, use of the proof roller may damage adjacent work. Proof roiling will not be performed in rock cuts nor within 4.5 meter of any bridge abutment or retaining wall.

### 203-3.07 Subgrade Surface Tolerance

After Compaction, and proof rolling when included, the finished subgrade surface shall not vary by more than +/- 1.5 centimeters, when tested with a 3-meter straight edge, from that required by the plans or established by the Engineer. Any variations beyond this tolerance shall be corrected by removing or adding suitable material, trimming and rerolling as necessary until tolerance requirements are met. This corrective work shall be at the Contractor's expense. The Contractor shall furnish the 3-mater aluminum straight edge.

## 203-4 METHOD OF MEASUREMENT

### 203-4.01 Roadway Excavation

The volume of roadway excavation to be paid for will be measured in cubic meters in the original position by the field measurement of cross sections of the area excavated to the lines and grades on the plans or as directed by the Engineer, subject to the conditions specified below. This applies to unclassified excavation, rock excavation, undercut excavation, and muck excavation. The excavation volume will be computed by the average end area method.

- a. The measurement will include the following:
- (1) Overbreakage or slide in unclassified excavation, not attributable to carelessness of the Contractor, and authorized excavations of rock, shale, muck or other unsuitable material below the subgrade in cuts, and excavation of unsuitable material under embankments. Authorized excavation of rock, shale, muck or unsuitable material below the subgrade will consist of that excavation necessary

to provide the required thickness of the backfill or subbase as indicated in the plans or ordered by the Engineer.

- (2) Required rock excavation not exceeding 30 cm. below grade, will be considered as authorized and will be measured for payment. Rock excavation more than 30 cm. below subgrade will not be paid for.
  - (3) Overbreakage in rock excavation from the backslopes, when presplitting is not specified, to an amount no exceed in any half station of 50-meters, 10 percent of the actual quantity required for that half-station. However, no measurement of rock excavation will be made for overbreakage caused by faulty blasting when presplitting is specified.
  - (4) Excavation of all ditches and the excavation and stockpiling of topsoil.
  - (5) The volume of material removed in the rounding and warping of slopes.
  - (6) Any excavated material requiring more than one handling, as shown on the plans or ordered by the Engineer, will be measured separately for each extra handling. No measurement and payment will be made for any extra handling which is performed at the election of the Contractor for his convenience.
- b. The measurement of the roadway excavation will not include the volume of any pavement structure material found in the roadbed and merely scarified in situ or latter replaced in the work entirely by road mixing or similar in situ methods of operations. This work shall be a subsidiary obligation of the Contract under the pay item "Unclassified Excavation".
  - c. Scarifying, stepping, benching, plowing and recompacting to the depth specified or ordered by the Engineer, will not be measured for payment but shall be a subsidiary obligation of the Contractor under the pay item "Unclassified Excavation".
  - d. When called for in the Contract Documents, the excavation for certain specified locations will be measured loaded loose on trucks.
  - e. When it is impractical to measure excavation by the cross-section method, such as may be due to erratic location of isolated deposits or where muck excavation is being simultaneously backfilled with suitable material, acceptable methods involving 3-dimensional measurements, including hauling vehicle measurements, may be used by the Engineer, as provided in Article 109.01 of General Provisions.

#### **203-4.02 Pre-splitting**

Pre-splitting will be measured by the linear meter of presplit holes drills, loaded, stemmed and accepted and detonated, at the specified locations or as directed by the Engineer.



### **203-4.03 Borrow**

Each class of the borrow material will be measured by one of the methods specified below as called for in the contract.

- a. By end area method, in cubic meters, in final position in the completed and accepted embankment or fills. The original ground cross section for this measurement will be taken prior to the clearing and grubbing operations.
- b. By the ton, weighed in the vehicle at the point of delivery utilizing suitable scales furnished by the Contractor and approved by the Engineer. The Weight water in the borrow in excess of the optimum moisture content will be deducted.
- c. Cubic meters measured on trucks at the point of delivery.

### **203-4.04 Embankments**

Embankments and backfills will not be measured directly for payment as such but shall be a subsidiary obligation of the Contractor under the various pay items of this specification.

### **203-4.05 Hauling**

No hauling will be measured for payment as all hauling shall be a subsidiary obligation of the Contractor under the various pay items of this specification.

### **203-4.06 Proof Rolling**

Proof rolling will be measured by the square meter of the areas of all roadway surfaces on which proof rolling is performed as ordered by the Engineer. Proof Rolling for any surface will be measured only once, repetition of proof rolling required after correction of deficiencies will not be measured for payment but shall be a subsidiary obligation under this pay item. The two required passes of the roller are included in one unit of measurement.

## **203-5 BASIS OF PAYMENT**

**203-5.01** The accepted quantities of roadway excavation, presplitting, borrow and proof rolling, determined as provided above, will be paid for at the contract price per unit of measurement for each day of pay items listed in Article 203-5.04 below that is included in the contract. Such price and payment shall be full compensation for furnishing all materials, equipment, tools, labor and incidentals to complete all the work as required by the plans, labor and specifications, provided, however, that deficient borrow material allowed to remain in place under the previous Article 203-3.04 will be paid for at a reduced unit price determined as follows:

- a. Borrow Class A – The unit price will be reduced by the following percentages as applicable:

<u>Classification of In-Place Material as per AASHTO M-145</u>	<u>Percentages reduction in Unit Price</u>
A-5	30
A-6	40
A-7	50

- b. Borrow Class B: The following formula will be applied to compute the price reduction:

$$PR = (PI - 10) 5 + (F - 35) 5$$

Where:

PR = Percentage reduction in unit price.

PI = Plasticity index of the deficient material

F = Percentage by weight of the fraction of the deficient material passing the No. 200 Sieve

The "PI" portion of the above formula will be disregarded when the PI equals or is less than 10. Similarly the "F" portion of the formula will be disregarded when the fraction passing the No. 200 sieve equals or is less than 35%.

- c. Borrow Class D: The following formula will be applied to compute the price reduction:

$$PR = (25 - PI) 10$$

Where:

PR and PI are as defined in paragraph b. above.

- d. In no case will the total price reduction exceed 90%.

**203-5.02** When muck is encountered in the project and the Engineer orders its excavation and disposal, and no pay item has been included in the contract for muck excavation, this work will be paid for at the unit price of two times the contract price for unclassified material excavation.

**203-5.03** No direct payment will be made for the required compacting, benching, watering, drying, and hauling operations which shall be a subsidiary obligations of the Contractor under the various pay items of excavation.

**203-5.04** Payment will be made under:

<u>Pay Item</u>	<u>Pay Unit</u>
Unclassified Excavation	Cubic Meter or Cubic Meter (Truck measure)
Rock excavation	Cubic Meter
Muck Excavation	Cubic Meter or Cubic Meter (Truck measure)
Borrow Class A	Cubic Meter or Ton
Borrow Class B	Cubic Meter or Ton
Borrow Class C	Cubic Meter or Ton, or Cubic Meter (Truck Measure)
Borrow Class D	Cubic Meter or Ton, or Cubic Meter (Truck Measure)
Presplitting Drill Holes	Linear Meter
Proof Rolling	Square Meter

## **SPECIFICATION 206 - EXCAVATION FOR STRUCTURES**

### **206-1 DESCRIPTION**

#### **206-1.01 Scope**

a. This work shall consist of the necessary excavation of all materials, the placing of backfill and the disposal of the surplus excavated material as required for bridge foundations, box culverts, retaining walls and other structures for which excavation is not otherwise provided under other specifications. The work shall be in accordance with these specifications and in reasonably close conformity with the lines, grades, cross sections and dimensions shown on the plans or established by the Engineer.

b. The work includes any necessary diversion of streams, bailing, pumping, draining, Sheet piling, shoring, bracing, safety measures and the construction of any necessary cofferdams, furnishing the materials therefore, their subsequent removal and the placing of all necessary backfill.

c. The Work also includes any clearing and grubbing found necessary within the areas of excavation or within a 1.5 meter strip of land enclosing, and contiguous to, the areas of excavation, except any portions of said areas that are included in the contract for payment under a separate item of Clearing and Grubbing. Specification 201.

**206-1.02** The work under this specification does not cover the excavations for waterways, pipe culverts, storm drains, Utilities, under drains, manholes, catch basins, inlets, and other underground conduits and minor structures which are included under other specifications.

**206-1.03** Excavation for structures will be classified as follows:

a. Unclassified Excavation for Structures -Shall include all structure excavation and the utilization or disposal of all excavated material of whatever character encountered in the work which is not classified and included in the contract under other pay items.

b. Rock Excavation for Structures shall include excavation of igneous, metamorphic or sedimentary rock which cannot be excavated without blasting or the use of pneumatic tools. It shall also include all boulders having a volume of one (1) cubic meter or more and any sound masonry and concrete requiring blasting or the use of pneumatic tools to break up and remove.

### **206-2 MATERIALS**

**206-2.01** Materials for cofferdams and sheet piling shall meet the applicable requirements of Specification 615- Piling. Concrete for foundation beds shall meet the appropriate requirements of Specification 601 -Structural Concrete. Material for foundation fill shall meet the requirements of Specification 207 - Foundation Fill.

## 206-3 CONSTRUCTION REQUIREMENTS

### 206-3.01 Excavation

- a. The Contractor shall notify the Engineer sufficiently in advance of the beginning of any excavation for structures so that the Engineer will have the time to take cross sections and other necessary measurements of the undisturbed ground. The natural ground adjacent to and at the site of the structure shall not be disturbed without the prior authorization of the Engineer.
- b. Prior to starting excavation operations in any area, all necessary clearing and grubbing in that area shall have been performed in accordance with Specification 201.
- c. Trenches or foundation pits for structures or structure footings shall be excavated to the lines and grades or elevations shown on the plans or established by the Engineer. They shall be of sufficient size to permit the placing of the full width and length of the structures or structure footings shown. The elevations of the bottom of footings, as shown on the plans, shall be considered as approximate only and the Engineer may order such changes in dimensions or elevations of footings as may be deemed necessary to secure a satisfactory foundation.
- d. The Contractor shall be responsible at all times for the carrying out of all excavation operations in a safe and prudent manner so that the workmen, the public and adjacent public and private property will be protected from hazard. All applicable local, Commonwealth and Federal laws and requirements shall be observed and the necessary permits acquired by the Contractor.
- e. All substructures, where practicable, shall be constructed in open excavation and, where necessary, the excavation shall be shored, braced or protected by cofferdams or sheet piling in accordance with approved methods to prevent causing subsidence or damage to adjacent ground or structures.
- f. The excavation shall be dewatered when necessary and kept free from water in such manner that the construction of the structure can be performed in reasonably dry materials.
- g. All rock or other hard foundation material shall be freed from loose material, cleaned and cut to a firm surface, either level, stepped, or serrated, as directed by the Engineer. All seams or crevices shall be cleaned out and grouted. All loose and disintegrated rock and thin strata shall be removed.
- h. When the structure is to rest on an excavated surface other than rock, special care shall be taken not to disturb the bottom of the excavation and excavation to final grade shall not be made until just before the footing is to be placed.
- i. After each excavation is complete, the Contractor shall notify the Engineer to that effect and no foundation fill, footing or masonry shall be placed until after the Engineer has approved the depth of the excavation and the character of the foundation material.

j. When the foundation material is sort of mucky or otherwise unsuitable, as indicated in the plans, or determined by the engineer, the Contractor shall remove the unsuitable material and backfill with a foundation fill meeting the requirements of Specification 207- Foundation Fill.

k. When foundation piles are used, the excavation shall be completed before the piles are driven. After the driving is completed all loose and displaced material shall be removed, leaving a smooth bed to receive the footing. Any placing of foundation fill shall be done before the piles are driven.

### **206-3.02 Water Control**

a. The methods to be used to control and remove water from excavations, when not specified in the contract documents, shall be at the option of the Contractor and may include but are not limited to well point systems, Dumping / sumps or concrete seal courses. The successful performance of whatever method is used shall be solely the responsibility of the Contractor.

b. When no piles are used and the structure is to be supported on spread footings the following shall apply:

(1) Care shall be taken during excavation to prevent disturbing the existing foundation material at or below the bottom of the footing elevation. If ground water is encountered during excavation, dewatering shall be commenced and shall proceed in advance of, or concurrently with further excavations. The foundation shall be free of water at the time the footings are placed.

(2) If suitable foundation material has been disturbed by the Contractor's operations, has been damaged by water or has been removed for the Contractor's convenience in dewatering the foundation, the foundation shall be restored by the Contractor, at his expense, to a condition at least equal to the undisturbed foundation as determined by the Engineer. The material used to replace such damaged or removed foundation material shall conform to the requirements of Specification 207- Foundation Fill, and shall be compacted as required.

c. The Contractor shall protect the open excavation from surface water runoff by suitable methods such as dykes, diversion ditches or other methods selected at his option.

### **206-3.03 Protection of Rivers, Streams and Reservoirs**

a. For structures at natural streams and unless otherwise specified, no excavation shall be made outside of caissons, cofferdams, steel piling or sheeting, and the natural stream bed adjacent to the structure shall not be disturbed without authorization from the Engineer. If any excavation or dredging is made at the site of the structure before caissons or cofferdams are sunk in place, the Contractor shall, at his expense, after the foundation base is in place, backfill all such excavation to the original ground surface of stream bed with material satisfactory to the Engineer.

b. Excavated material shall not be deposited near to rivers, streams, or reservoirs where it might be washed away by high water or runoff and result in siltation of the water bodies. Any material

deposited within the stream areas from the excavations or from the filling of cofferdams shall be removed and the stream areas freed from obstruction at the Contractor's expense.

#### **206-3.04 Utilization of Excavated Material -**

a. All suitable excavated material shall be used as backfill. All surplus suitable material shall be utilized or disposed of as provided in Article 203- 3.02 a. of Specification 203, Excavation and Embankment.

b. Unsuitable material shall be disposed of as shown on the plans or as ordered by the Engineer. If unsuitable material is to be disposed of outside the project right-of way, the Contractor shall be responsible for obtaining suitable disposal locations and required permits at his expense. ,

c. No excavated material shall be deposited at any time so as to endanger a partly finished structure, either by direct or indirect pressure.

d. All required handling and hauling of excavation material, including unsuitable and surplus material, to its final utilization or disposition site, shall be an obligation of the Contractor and the cost included in the unit prices for excavation.

#### **206-3.05 Cofferdams and Sheet Piling -**

a. Suitable and practically watertight cofferdams shall be used whenever water-bearing strata are encountered above the elevation of the bottom of the excavation.

b. Cofferdams for foundation construction shall be carried to adequate depths and heights, shall be safely designed and constructed, and shall be made as water-tights as is necessary for the proper performance of the work which must be done inside them. The interior dimensions shall be such as to give sufficient clearance for the construction of forms and the inspection of their exteriors, and to permit pumping outside of the forms. Cofferdams which are tilted or moved laterally during the process of sinking shall be righted or enlarged so as to provide the necessary clearance at the expense of the Contractor.

c. The Contractor shall submit for review and acceptance by the Engineer detailed drawings prepared and certified by a licensed engineer showing the proposed method of cofferdam construction and other pertinent features not shown in detail on the plans, prior to the start of the cofferdam construction. Acceptance of these drawings by the Engineer does not relieve the Contractor of his responsibility for the structural integrity, safety and adequacy of the cofferdam design and construction.

d. When conditions are encountered which, as determined by the Engineer it is impracticable to dewater the foundation before placing the footing, the Engineer may require the construction of a concrete foundation seal of such dimensions as he may consider necessary to resist any possible uplift. Concrete for the foundation seal shall be in accordance with the requirements for depositing concrete under water included in Specification 601 -Structural Concrete. The foundation shall then be dewatered and the footing placed.



e. Cofferdams shall be constructed so as to protect green concrete against damage from a sudden rising of the stream and to prevent damage to the foundation by erosion. No timber or bracing shall be left in cofferdams in such a way as to extend into the substructure masonry without written permission from the Engineer.

f. Any pumping that may be permitted from the interior of any foundation enclosure shall be done in such a manner as to preclude the possibility of any concrete materials being carried away. Any pumping required during the placing of concrete, or for a period of at least 24 hours thereafter, shall be done from a suitable sump located outside the concrete forms. Pumping to dewater a sealed cofferdam shall not commence until the seal has set sufficiently to withstand the hydrostatic pressure.

g. Any sheet piling required to perform the excavation shall be installed in accordance with the applicable requirements of Specification 615- Piling.

h. Unless otherwise provided, cofferdams and sheet piling shall be removed after the completion of the substructure. Removal shall be effected in such manner as not to disturb or otherwise injure the finished masonry. Cofferdam and sheet piling may be left in place, at the Contractor's expense, when authorized but subject to such conditions as ordered by the Engineer.

#### **206-3.06 Backfill**

a. Excavated areas around structures shall be backfilled with suitable material from the original excavations or from the roadway excavation as approved by the Engineer. If sufficient suitable excavation material to complete the backfill is not available, borrow material may be used if available as a pay item in the contract; otherwise, the backfill may be completed as extra work under the provisions of Article 109.04 of the General Provisions.

b. Unless a special method for backfilling is specified, all filling or backfilling material around structures shall be uniformly placed in layers of not more than 20 centimeters in depth and thoroughly compacted by mechanical tampers to 95% of the maximum density as determined by AASHTO T 180, Method D, before successive layers are placed. ,

c. Backfill shall be placed simultaneously, insofar as possible, to approximately the same elevation on both sides of an abutment, pier or wall and behind both abutments of structures held in place by superstructures, and behind both side walls of box culverts.

d. No backfill shall be placed higher against one side of any concrete abutment, wingwall, box culvert and retaining wall until the concrete has been in place 14 days, or until test cylinders show the strength to be twice the working stress used in the design. However, backfill shall be placed around footings to the level of the top of the footings immediately upon removal of the side forms.

e. The backfill in front of abutments, wingwalls and retaining walls shall be placed first to prevent the possibility of forward movement. Special precautions shall be taken to prevent any wedging action against the structure, and the slopes bounding the excavation for abutments

wingwalls and retaining walls be benched or serrated to prevent wedge action. Jetting of the fill behind structures will not be permitted.

f. Adequate provisions shall be made for the thorough drainage of all backfills. Sheathing and weep holes shall be provided as called for in the , plans. 4

## **206-4 METHOD OF MEASUREMENT**

### **206-4.01 Excavation for Structures**

a. The volume to be paid for under unclassified Excavation for Structures or Rock. Excavation for Structures will be the volume in cubic meters, measured in its original position, of material acceptably excavated in conformity with the plans or as directed by the Engineer, but in no case, except as noted, will any of the following volumes be included in the measurement for payment:

(1) The volume outside of vertical planes 45 centimeters outside of and parallel to the neat line of the footings.

(2) The volume of water or other liquid, which can be pumped or drained away.

(3) The volume included within the limits of roadway excavation for which payment is otherwise provided in the contract under Specification 203.

(4) The volume of any material excavated below the bottom elevation of the footing unless otherwise provided in the plans or ordered by the Engineer.

(5) The volume of any excavation performed prior to the taking of elevations and measurements of the undisturbed ground.

(6) The volume of any excavation, which is covered under, or is a subsidiary item of, another specification and pay unit.

b. When the Engineer orders that the excavation be carried below the elevations shown on the plans, the excavation for the first 1.5 meters of additional depth will be included in the quantity for which payment will be made under the contract pay items for excavation for structures. The volume of any excavation ordered at a depth of more than 1.5 meters below the lowest elevation for such footings shown on the plans will not be included in the measurement for payment at contract unit prices but will be measured and paid for separately as extra work under the provisions of Article 109.04 of the General Provisions unless the Contractor accepts payment under the contract unit price for trench excavation.

c. When rock is encountered in the excavation for a structure and the contract does not include a pay item for rock excavation for structures, any required rock excavation ordered by the Engineer will be measured for payment under the provisions of paragraph 206-5.01 b. of this specification.

d. Rehandling of material will not be include in the measurement for payment unless specifically indicated on the plans or directed by the Engineer.

**206-4.02 Foundation Fill** -Foundation fill be measured and paid for separately under pacification 207- Foundation Fill, if the contract does not include a pay item for foundation fill and the Engineer determines that such material is required, it will be covered as extra work under Article 109.04 of the General Provisions.

**206-4.03 Cofferdams and Sheet Piling -**

a. Cofferdams when specifically identified on the plans and included as separate pay items in the contract will be measured as a lump sum price unit. If not included as separate pay items, any cofferdams required shall be an obligation of the Contractor included in the unit prices for excavation for structures.

b. Any required sheet piling will be an obligation of the Contractor included in the unit prices for excavation for structures unless such sheet piling is identified on the plans and a separate pay item under Specification 615- Piling is included in the contract.

**206-4.04 Concrete** -Concrete for foundation seals shall be assured as provided in Specification 601 -Structural Concrete.

**206-5 BASIS OF PAYMENT**

**206-5.01 Excavation for Structures**

a. The quantities of excavation, measured as provided above, will be paid for at the contract unit price per cubic meter for each particular pay item, which prices and payment shall be full compensation for all work necessary to complete the item, including:

(1) The excavating, hauling and disposal of any excavation for footing ordered to a depth not more than 1.5 meters below the elevation for such footings shown on the plans. Excavation below the 1.5 meter limit will paid for as extras.

(2) The placing and compacting of backfill and the hauling and disposal, as ordered by the Engineer, of any material not used for backfill.

(3) The forming and compacting of embankments made with material obtained from structure excavation.

(4) The preparation and completion of subgrade and shoulders, conserving of cushion and topping material, and the finishing, rounding and warping of slopes using surplus material from the excavations.

(5) The installation and removal of any sheet piling, bracing, shoring and cofferdams not included in the contract as separate pay items.

(6) Water control and dewatering of excavations.

b. Any rock excavation ordered by the Engineer and measured for payment under the provisions of paragraph 206-4.01 c. above will be paid for at three (3) times contract unit price for unclassified excavation for structures.

c. When a design and construction of a bridge is going to be developed the measurement of the unclassified excavation for structures will be taken as a Lump Sum for payment purpose.

**206-5.02 Cofferdams and Sheet Piling**

a. Cofferdams, when included as a separate item, will be paid for at the lump sum contract price which price will be full compensation for all the work required including furnishing, constructing, maintaining and removal.

b. Sheet Piling, when included as a separate pay item, will be paid under specification 615-Piling.

**206-5.03 Concrete**

Concrete for foundation seals will be paid for under Specification 601-Structural Concrete.

**206-5.04** Foundation fill Material will be paid for under Specification 207- Foundation fill.

**206-5.05** Payment will be under:

<u>Pay Item</u>	<u>Unit</u>
Unclassified excavation for Structures	Cubic Meter or Lump Sum
Rock excavation for Structures	Cubic Meter
Cofferdams	Lump Sum

## **SPECIFICATION 207- FOUNDATION FILL**

### **207-1 DESCRIPTION**

#### **207-1.01 Scope**

This work shall consist of furnishing, placing and compacting selected backfill material as required to replace unsuitable materials encountered and excavated below the foundation elevations of culverts, bridges, retaining walls and other structures, in accordance with these specifications and where indicated on the plans or ordered by the Engineer.

### **207-2 MATERIALS**

**207-2.01** Material for use as foundation fill shall conform to either of the following:

- a. Crushed stone or gravel, or natural gravel conforming to the requirements for untreated base course material specified in Specification 703-Aggregates.
- b. Borrow material conforming to the characteristics of an A-1 or A-2-4 soil as per AASHTO M 145 except that foundation fill material that will be below ground water table elevations shall contain not more than 15% passing the No. 200 sieve.

### **207-3 CONSTRUCTION REQUIREMENTS**

**207-3.01** Foundation fill shall be placed in layers not exceeding 15 centimeters (loose measurement) in depth unless otherwise authorized by the Engineer. Each layer shall be thoroughly compacted to not less than 95% of maximum density determined as per AASHTO T 180, Method D.

**207-3.02** When the structure is to be supported on piles, the unsuitable material shall be removed and the required foundation fill shall be placed and compacted before the piles are driven.

### **207-4 METHOD OF MEASUREMENT**

**207-4.01** Foundation fill will be measured by the cubic meter of compacted material accepted in final position. Material placed outside of vertical planes 45 centimeters outside of a parallel to the neat line of the footings will not be included in the measurement for payment.

**207-4.02** When a design and construction of a bridge is going to be developed the measurement of the foundation fill will be taken as a Lump Sum for payment purpose.

## **207-5 BASIS OF PAYMENT**

**207-5.01** The accepted quantity of compacted foundation fill, measured as provided above, will be paid for at the contract unit price per cubic meter which payment shall be full compensation for furnishing, placing and compacting the material including all labor, equipment, tools and incidentals necessary to complete the specified work.

**207-5.02** Payment will be made under:

<u>Pay Item Pay</u>	<u>Unit</u>
Foundation Fill	Cubic Meter or Lump Sum

## **SPECIFICATION 210 – SOIL EROSION AND WATER POLLUTION CONTROL**

### **210.01 DESCRIPTION**

#### **210-1.01 Scope**

This work shall consist of providing temporary soil erosion and water pollution control measures as shown on the plans or as ordered by the Engineer. The control measure may include berms, dikes, check dams, silt fences, sediment basins, fiber mats, mulches, grasses, slope drains, temporary waterways and other erosion control devices or methods.

**210-1.02** The contained herein shall be coordinated with the Permanent erosion control features specified elsewhere in the contract, to the extent Practical, to assure economical, effective and continuous erosion control throughout the construction and post construction period. Work under this specification will not be used and paid for in situations where permanent contract items can be practically installed at an early date in final position to provide the necessary erosion control measures.

**210-1.03** This work includes the detailed planning of construction operations necessary for the preparation and submittal by the Contractor of an explicit erosion control plan and schedule to supplement the temporary and permanent erosion control measures shown on the plans which cannot be detailed without knowledge of the Contractor's specific construction operations plan.

#### **210-2 MATERIALS**

**210-2.01** The following materials shall conform to the applicable requirements of the specifications indicated below:

<u>Materials</u>	<u>Specifications</u>
Geotextiles (Filter Fabrics)	712-7
Plastic Liner	712-8
Lime	713-2
Fertilizer	713-3
Seed	713-4
Mulches	713-6
Jute Mesh	713-8

#### **210-2.02 Straw or Hay Bales**

Shall be rectangular, approximately one meter (3-3 feet) in length and weigh approximately 70 pounds.

## **SPECIFICATION 210 – SOIL EROSION AND WATER POLLUTION CONTROL**

### **21-12-03 Sandbags**

Shall be canvas, burlap or other approved material. Sand filler shall be clean, silt free material approved by the Engineer. The sandbags shall contain a minimum of 0.014 cubic meters (0.5 cubic feet) of sand.

### **210-2.04 Riprap**

Shall conform to the applicable requirements of Specification 622 - Riprap

### **210-2.05 Culvert Pipe**

Temporary culvert pipes used for diverting live streams through work areas shall be corrugated metal or plastic, concrete, or other approved material. Temporary pipes placed beneath traveled ways shall be capable of withstanding an H-20 loading on the roadway.

### **210-2-06 Slope Drains**

Temporary slope drains shall be constructed of pipe, fiber mats, rubble, portland cement, concrete, bituminous plant mix, plastic sheeting or other material shown on the plans, on the Contractor's approved erosion control plan, or as ordered by the Engineer.

**210-2.07** Other required materials shall meet the commercial grade standard for the particular product and require the Engineers approval before incorporating into the project.

## **210-3 CONSTRUCTION REQUIREMENTS**

### **210-3.01 General**

- a. In the event of conflict between these specification requirements and any pollution control laws, rules or regulations of other Federal, commonwealth or local agencies, the more restrictive laws, rules or regulations shall apply.
- b. At the preconstruction conference, prior to the start of construction work, the Contractor shall submit to the Engineer for review and approval his proposed plan and schedule for the temporary and permanent erosion control work. The schedule shall detail the proposed coordination for accomplishing the temporary and permanent erosion control work in a timely and appropriate manner. No construction work shall be started until the schedule has been approved and the necessary controls installed as required for the particular operation to be in progress.
- c. The contractor shall incorporate all permanent erosion control into the project at the earliest practical time in order to minimize the need for temporary erosion control measures and this should be reflected in his proposed schedule.



## **SPECIFICATION 210 – SOIL EROSION AND WATER POLLUTION CONTROL**

- d. If the Engineer determine that the Contractor is not in compliance with the approved erosion control schedule or field conditions warrant changes in the plan, the Contractor shall submit a revised schedule for performing erosion control work and no work contingent upon the revised schedule shall be continued or started until the revised plan has been approved.
- e. Clearing and grubbing operations shall be so scheduled and performed that grading operations and permanent erosion control features can follow immediately thereafter if the project conditions permit; otherwise, temporary erosion control measures may be required between successive construction stages. Under no conditions shall the surface of the erodible earth material exposed at one time by clearing and grubbing exceed 70,000 square meters unless such areas are protected by adequate temporary erosion control measures approved by the Engineer.
- f. Excavation, borrow, and embankment operations shall also be scheduled and performed to permit permanent erosion control features to follow immediately thereafter if project conditions permit; otherwise, temporary erosion control measures may be required. Under no conditions shall the surface area of erodible earth material exposed at one time by excavation, borrow or fill exceed 70,000 square meters without the prior installation of adequate erosion control measures approved by the Engineer.
- g. The Engineer has the authority to limit the surface area of erodible earth material exposed by clearing, grubbing, excavation, borrow and embankment construction operations in progress commensurate with the Contractor's capability and progress in keeping temporary erosion control measures and the finish grading, mulching, seeding and other such permanent erosion and pollution control measures current in accordance with the accepted schedule. The Engineer has also the authority to increase or decrease the amount of surface area of erodible earth material to be exposed at any one time by clearing, grubbing, excavation, borrow and embankment construction operations as determined by his analysis and evaluation of existing project conditions.
- h. The Engineer has the authority to direct the Contractor to immediately provide erosion control to prevent soil erosion that will adversely affect construction operations damage adjacent properties, or cause contamination of adjacent streams, other water courses, lakes, ponds or other areas of water impoundment. Such work may involve the construction of temporary berms, dikes, check dams, sediment basins, slope drains and use of temporary mulches, mats, seeding or other control devices or methods as to control erosion.
- i. In the event that temporary erosion and pollution control measures are required due to the Contractor's or negligence, carelessness or failure to install permanent controls as a part of the work as scheduled or as ordered by the Engineer, such work shall be performed by the Contractor at no cost to the Government.

## **SPECIFICATION 210 – SOIL EROSION AND WATER POLLUTION CONTROL**

- j. Temporary erosion and pollution control may include construction work outside the right-of-way where such work is necessary as a result of roadway construction operations. Any such work outside the project right-of-work shall be coordinated with the property owner.
- k. The erosion-control features installed by the Contractor shall be operated and maintained by the Contractor, at his expense, in an acceptable functional condition.

### **210-3.02 Erosion Check Dams**

Erosion checks, constructed with hay or straw bales as specified shall be staked in place as shown on the plans or where ordered installed by the Engineer to act as erosion filters and barriers at the toe of fills, in ditches, at pipe inlets and outlets, or for other uses as directed.

### **210-3.03 Silt Fences**

Silt fences shall be used for silt barriers, and shall be constructed in accordance with the details and at the locations shown on the plans or designated by the Engineer, or as called for in the Contractor's erosion control plan and schedule.

### **210-3.04 Sediment Containment Structures**

- a. Settling ponds, basins, dikes, dams or other such containment structures shall be constructed in accordance with the details shown on the plans, specified in the contract, or as directed by the Engineer.
- b. Sedimentation structures shall remain in service until all disturbed areas draining into these structures have been satisfactorily stabilized. Disturbed areas shall be considered stabilized when all seeding items have been completed and accepted, and all drainage ditches or channels have been paved or satisfactorily lined. When use of temporary sediment is to be discontinued, all sediment accumulation shall be removed and disposed of, all excavations backfilled or otherwise graded and properly compacted and the existing ground restored to its natural or intended final condition in a manner acceptable to the Engineer.

### **210-3.05 Diversion Channels**

Temporary channels for diverting water around an area where a culvert is to be installed shall be lined with plastic film sheeting when so specified in the plans or ordered by the Engineer. The diversion channel shall be excavated to a depth and width adequate to accommodate stream flow during the period of culvert installation. The channel shall be reasonably smooth and free of sharp rocks, stones, roots or other projections that may puncture the plastic liner. No longitudinal seams will be permitted. Transverse seams, if necessary, shall be lapped a minimum of two feet in the direction of

## **SPECIFICATION 210 – SOIL EROSION AND WATER POLLUTION CONTROL**

the flow. The liner shall be anchored in place using clean rock, gravel, or other methods approved by the Engineer.

### **210-3.06 Earth Berms**

Temporary earth berms shall be used for diverting or channeling runoff waters to slope drains, waterways, diversion ditches, sediment traps, or other uses as directed. Earth berms shall be constructed in conformity with the dimensions shown on the plans and at the locations established by the Engineer or called for in the Contractor's erosion control plan. Material shall be reasonably nonporous and shall contain no roots, sod or other deleterious materials.

### **210-3.07 Slope Drains and Waterways**

Temporary slope drains or waterways shall be constructed at the intervals and locations designated by the Engineer, or in the Contractor's erosion control plan for channeling runoff waters down embankment slopes. Slope drains shall be adequately anchored to the slopes and their outlets so placed and constructed as to prevent erosion. Waterways constructed down erodible slopes shall be lined with plastic sheeting. Waterways constructed down slopes composed of rock where erosion will not occur need not be lined with plastic sheeting.

### **210-3.08 Turf Establishment**

When it is not practical or not permitted to perform permanent turf establishment work under Specification 627, temporary seeding, fertilizing, liming and mulching will be applied under this specification. The applicable rates and types of, materials for temporary turf establishment shall be as specified in the contract or as established by the Engineer.

### **210-3.09 Cleanup**

After the temporary erosion and pollution control installations are no longer required, the Contractor shall remove and dispose of all materials and restore the areas to their original or intended final appearance in a manner acceptable to the Engineer.

## **210-4 METHOD OF MEASUREMENT**

**210-4-03** When the following components of temporary soil erosion and water pollution control work are included as separate pay -items in the

Contract, they will be measured as follows:

- a. Straw or hay bales will be measured by the number of individual bales furnished, installed and accepted.
- b. Sand bags will be measured by the number of individual bags filled with sand furnished, installed and accepted.

## **SPECIFICATION 210 – SOIL EROSION AND WATER POLLUTION CONTROL**

- c. Pipe slope drains will be measured by the linear meters of each type of drain pipe furnished, installed and accepted.
- d. Paved or lined slope drains Will be measured by the square meters of each type of paving or lining furnished, installed and accepted.
- e. Earth berms will be measured by the linear meters of berms constructed to the dimensions shown on the plans, on the Contactor's erosion control plan or ordered by the Engineer and accepted.
- f. Silt fences will be measured by the lineal meters of fence furnished, installed, maintained and accepted.
- g. Plastic liners for use in diversion channels, and other soil erosion control structures will be measured by the square meters of liner furnished, installed and accepted.

**210-4.02** Diversion channels will be measured for payment as unclassified excavation by the cubic meter under the pay items and provisions of Specification 203 - Excavation and Embankment.

**210-4.03** Turf establishment including temporary and permanent Seeding, fertilizer, seed, mulch and jute mesh will be measured for payment- under the applicable Pay units and provision of Specification 627 - Turf Establishment.

**21G-4.04** The work and materials required for the Construction of sediment containment structures will be measured for payment under the applicable pay units and provisions of Specification 203 - Excavation and Embankment.

**210-4-05** Riprap will be measured by the cubic meters of each type of specified riprap material furnished, installed and accepted under the pay item and provisions of Specification 622 - Riprap.

**210-4.06** Where a lump sum method of payment for soil erosion and water pollution control work is specified in the contract, no separate measurement for payment will be made of all the soil erosion and water pollution control items shown in the plans or designated in the contract documents and all of this work will be considered as a single unit.

**210-4.07** No direct measurement and payment will be made for furnishing, installing and subsequently removing and disposing of temporary drainage structures, such as culvert pipe, used for diverting of live stream around or through work areas, but such work will be considered a subsidiary obligation of the Contractor.

**210-4.08** Work which is subsidiary to other construction pay items included in the contract under their respective specifications, will not be measured for direct payment under this specification.

## **SPECIFICATION 210 – SOIL EROSION AND WATER POLLUTION CONTROL**

### **210-5 BASIS OF PAYMENT**

**210-5.01** The accepted quantities, determined as provided in Articles 210-4.01 and 210-4.06 above, for the pay item listed in Article 5.05 below which are included in the contract, will be paid for at the contract price per Unit of measurement. Such price and payment shall constitute full compensation for furnishing, installing and maintaining all required materials and for all labor, equipment, tolls and incidentals necessary to complete the work as required by the plans and specifications.

**210-5.02** When the temporary soil erosion and water pollution control work is paid for on a lump sum basis, monthly partial payments will be made for this item on the basis of the amount of work completed as estimated by the Engineer

**210-5.03** No additional payments will be made for any adjustments, Cleanout and disposal of accumulated sediments or other such maintenance work on previously installed erosion and pollution control facilities.

**210-5.04** When the contract not contain an item for any aforementioned soil erosion or pollution control, the work will not be paid for directly but will be considered as a subsidiary obligation of the Contractor under other contract items.

**210-5.01** Payment will be made under:

<u>Pay Item</u>	<u>Pay Unit</u>
Straw Bales	Each
Sand Bags	Each
Pipe Slope Drains _____ (Type)	Linear Meter
Paved or Lined Slope Drains _____ (Type)	Square Meter
Earth Berms	Linear Meter
Silt Fence	Linear Meter
Plastic Liner	Square Meter
Temporary Erosion Control Measures	Lump Sum

## **SPECIFICATION 501 – PORTLAND CEMENT CONCRETE PAVEMENT**

### **501-1.01 Scope**

This work shall consist of the construction of portland cement concrete pavement with or without reinforcement as specified, constructed in accordance with these specifications and in conformity with the lines, grades, thickness and typical cross sections shown on the plans or established by the Engineer.

### **501-2 MATERIALS**

**501-2.01** The following materials shall meet the applicable requirements of the following specifications:

<u>Specification</u>	<u>Material</u>
Portland Cement	701-1
Reinforcing Steel	709-1
Epoxy Coated Reinforcing Steel	709-3
curing materials	711-1
Air-entraining Admixtures	711-2
Chemical Admixtures	711-3
Water	712-1
Geotextiles	712-7

### **501-2.02 Fine Aggregate**

Shall conform to the requirements of Article 703-2 of specification 703 - Aggregates, except that the use of manufactured sand shall not be permitted.

### **501-2.03 Coarse Aggregate**

Shall conform to the requirements of Article 703-2 of Specification 703 Aggregates but provided that:

- a. The grading shall be of the designated size 2" to 1" shown in Table 703-1; however, the grading distribution shown in this table is only suggested and not mandatory provided the limiting maximum and minimum size values are complied with.
- b. The aggregate shall have a minimum Polishing value of 48% as determined by ASTM D 3319.

### **501-2.04 Dowels**

Dowels for all longitudinal and construction joints shall be made of epoxy coated reinforcing steel of the types and sizes shown on the plans.

## **SPECIFICATION 501 – PORTLAND CEMENT CONCRETE PAVEMENT**

### **501-2.05 Joint Fillers**

Shall be of the types specified in the plans and shall conform to the applicable requirements of Article 705-1-01 of Specification 705 - Joint materials. Backer rod material shall meet the requirements specified in Article 507-2.02 of Specification 507.

### **501-2.06 Pavement Drains**

- a. Plastic PVC or corrugated polyethylene pipe for the pavement drains shall be of the size, class and types specified in the plans and shall conform to the applicable requirements of Sections 706-4 and 706-5 of specification 706 – Concrete and Plastic Pipe.
- b. Granular filter material for the drains shall consist of aggregate of the same type, grading and quality as that specified in the plans for the aggregate base course on the shoulders. If none is specified, then the granular filter material shall conform to the requirements Of Aggregate Base Course, Grading Class B, as covered in Article 703-4 of Specification 703 - Aggregates.
- c. Plain concrete for drain outlets shall be Class "B" conforming to the requirements of Specification 601 - Structural Concrete.

### **501-2.07 Proportioning Of Concrete**

- a. The Contractor shall design the concrete mix determining the proportions of portland cement, coarse and fine aggregate, and water necessary to produce a workable concrete meeting the following requirements:
  - (1) A compressive strength of 5000 psi at 28 days.
  - (2) A maximum slump of 3 inches for fixed form paving and 2 ½ inches for slip form paving.
  - (3) If air-entrained concrete is used, the mix shall contain not more than 6 percent entrained air as determined by AASHTO T 152.
- b. The Contractor shall design the mix on the basis of an absolute volume method such as outlined in the American Concrete Institute (ACI) Standard 211.1, "Recommended Practice for selecting Proportions for Normal weight concrete", or Bulletin No. 11, "A Method of Proportioning Concrete for strength, workability, and Durability", published by the National Crushed Stone Association.

## **SPECIFICATION 501 – PORTLAND CEMENT CONCRETE PAVEMENT**

- c. Water reducing, set retarding or superplasticizer chemical admixtures may be used at the option of the Contractor but subject to approval by the Engineer. The contractor shall indicate in advance the particular type and name product of admixture that he proposes to use and only such admixtures approved by the Engineer may be incorporated into the concrete mix. Admixtures selected for use shall be compatible with all other components of the concrete. The use of calcium chloride as an admixture will not be permitted.
- d. The Contractor shall submit for the record, not later than 15 days prior to the start of paving operations, the Proposed mix design including the aggregate gradings to be used. The submission shall be accompanied with certified laboratory reports on the tests performed on the trial mixes. In the event that the concrete mix designed by the Contractor does not produce concrete of the specified strength and workability, the Contractor shall adjust the mix as required to meet the specified requirements at no additional cost to the Authority and shall submit new certified test results.
- e. In the event the Contractor elects to use an air-entraining admixture, he shall determine by trials the amount of the selected admixture that will produce concrete having the desired air content and the amount shall not be varied except as approved by the Engineer. The admixture shall be added during batching at the plant in accordance with the admixture manufacturer's recommendations.
- f. The Contractor shall determine the proportions and batch weights for air-entrained concrete in the same manner as for regular concrete provided, however, that in making such adjustments as may be necessary by reason of air-entrainment, the minimum quantity of fine aggregate and the minimum quantity of water shall be used which will provide concrete of the required workability.
- g. Whenever the Contractor modifies the concrete mix, other than minor adjustments in the relative quantities of fine and coarse aggregates, he shall submit copy of the new mix design, together with certified copies of tests results, to the Engineer.
- h. No change in the sources or character of the materials shall be made without due notice to the Engineer. No new materials shall be used until approved by the Engineer and until new trial mixes have been designed, tested and accepted.



## **SPECIFICATION 501 – PORTLAND CEMENT CONCRETE PAVEMENT**

### **501-2.08 Sampling and Testing**

- a. Compliance with the specification requirements included in the above articles will be determined in accordance with the following AASHTO standard tests:

Sampling Fresh Concrete	T 141
Sieve Analysis of Aggregates	T 27
Consistency (Slump)	T 119
weight per Cu. Ft. and Air Content	T 121
Air Content of Freshly Mixed Concrete (Method)	T 152
Air Content of Freshly Mixed Concrete(Volumetric Air Content of Method)	T 196
Making and Curing of Test Specimens	T 23
Compressive Strength of Cylindrical Concrete Specimens	T 22

- b. Sampling frequency for compressive strength testing shall be one set of six (6) specimens for each 125 square meters of concrete pavement or fraction thereof placed each day for testing at 7 and 28 days. All concrete cylinders will be taken by the Authority.
- c. Additional cylinder sets will be made as needed to determine when a pavement may be put into service.
- d. The Contractor shall furnish, at his expense, all the molds conforming to AASHTO M 205 and T 23 that are necessary to comply with the required frequency of sampling.
- e. Slump tests will be made by the Authority of the concrete from each batch from which test cylinders are taken. Additional slump tests will be made as determined by the Engineer to check the consistency of the concrete.
- f. Samples will be taken at random by the Authority of the fresh mix delivered to the project from which the cement mortar will be washed out and the remaining aggregates recovered for testing for compliance with the requirements of Articles 501-2.02 and 2.03 of this specification as to source, wear and polishing values.
- g. Concrete for test specimens will not be included in the measurement for payment but shall be furnished by the Contractor without additional compensation.

## **SPECIFICATION 501 – PORTLAND CEMENT CONCRETE PAVEMENT**

### **501-2.09 Basis of Acceptance**

- a. In general, the acceptability of the quality of the concrete pavement will be based on slump test, air content test, aggregate test and on the results of standard compressive strength test of representative samples at 28 days as covered by these specifications. However, this does not relieve the Contractor of the responsibility for the concrete during placement, consolidation, finishing, curing or protection prior to final acceptance by the Highway Authority.
- b. Concrete shall be placed at a slump as nearly consistent with the design mix value as is practical. Any batches with slumps varying from the design mix specified value by more than + 1/2 inch will be rejected - for use in the work.
- c. Air content, when specified, shall be within + 2% of the design value. Any batches with air content exceeding this tolerance will be rejected for use in the work.
- d. Concrete pavement found to contain aggregates which fail to meet the polishing value requirements shall be replaced or corrected as directed by the Engineer at no cost to the Authority.
- e. The 28-day compressive strength of the quantity of concrete placed and represented by one set of cylinders shall be determined as the average of the three cylinders comprising the set. If any cylinder shows evidence of improper sampling, molding, handling, curing or testing, the test result of such defective cylinder shall be discarded and the compressive strength of the concrete represented shall be determined from the tests of the remaining cylinders. Low strength shall not be a basis for discarding a cylinder.
- f. The compressive strength level of the concrete pavement will be considered satisfactory if both of the following requirements are met:
  - (1) The average of all sets of six consecutive tests (moving average) equals or exceeds the specified compressive strength of 5000 psi.
  - (2) No individual (average of cylinders set) falls below the specified compressive strength by more than 500 psi.
- g. Should concrete used in the work fail to conform to the requirements in paragraph "f" above, the Contractor shall, at his expense, make corrective changes, subject to the approval of the Engineer, in the material mix proportions or in the concrete fabrication procedures, before shall placing additional concrete. In addition, such corrective at 7 days shall consistently be made when the strength of concrete indicate that the concrete will not attain the specified compressive strength of 5000 psi at 28 days.

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- h. When the moving average fails to meet the compressive strength requirement, the in-place concrete pavement will be considered deficient but will be accepted if the deficiency in the moving average does not exceed 500 psi and if no individual cylinders set is deficient by more than 500 psi, but payment for the concrete represented by the failing averages will be paid for at a reduced unit price as specified in Article 501-5.01.
- i. All concrete pavement represented by cylinders set which indicates a compressive strength falling below the certified value by more than 500 psi will be considered deficient and will be rejected. Such rejection may be reconsidered under the conditions specified in paragraph "j" below when requested by the contractor.
- j. The Contractor may elect to drill core samples of the hardened deficient concrete, at his expense but under the direction and supervision of the Engineer to be tested at the Authority's laboratory. The following criteria shall govern the coring program:
  - (1) The obtaining and testing of drilled cores shall be in accordance with AASHTO T 24 and T 22.
  - (2) Three cores shall be taken for each 125 square meters, or fraction thereof, of concrete pavement classified as deficient as result of the cylinder test, at random locations selected by the Engineer.
  - (3) The cores shall be drilled no earlier than 28 days and no later than 56 days after the pouring of the concrete in question.
  - (4) The core compressive strength shall be the average of all cores tested. The concrete pavement in the area represented by the core tests will be considered acceptable as to strength, with a penalty, if the average of all the cores is at least 4,250 psi and if no single core test value is less than 3,750 psi.
  - (5) Should the first set of cores show deficient strength, the contractor will have the option, at his expense, of obtaining one additional set of cores for further testing. However, the results of all cores tested will be used in determining the average strength.
  - (6) The Contractor shall backfill the core holes with concrete at his expense.
- k. Concrete pavement that fails both the cylinder and core strength test acceptance criteria will be rejected and shall be removed and disposed of at the Contractor's expense.
- l. Test value of cylinders and cores representing rejected concrete pavement which is to be removed will be eliminated from the average strength computations specified in paragraphs "f", "h", and "k" above.

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- m. When the cylinder tests results indicate that the concrete mix meets the specification strength requirements but the Authority has reasonable doubts as to the actual strength of the in-place concrete due to deficiencies in the placing, consolidation, curing or protection of the concrete pavement the Authority may order the Contractor to have cores drilled and tested following the procedure specified in paragraph “j” If these cores meet the acceptance criteria specified in paragraph “j” above, the Authority will bear the cost of the drilling, testing and repair. However, if the, cores fail, the Contractor shall bear the costs, and the deficient concrete pavement may be subject to rejection and removal.

### **501-3 CONSTRUCTION REQUIREMENTS**

#### **501-3.01 General**

- a. The portland cement concrete for the pavement may be produced at the project site or may be supplied by a commercial plant as ready-mixed concrete conforming to the requirements of AASHTO M 157 as modified and supplemented by this specification.
- b. In all portland cement concrete production, the Contractor shall be responsible for the quality control of all materials during the handling, batching, mixing, placement, curing and protection operations.
- c. All equipment and tools necessary for handling materials and performing all parts of the work shall be in good working condition, checked for conformance with the requirements of the specifications and approved by the Engineer as to design, capacity, and mechanical condition.
- d. The Contractor may perform the paving operations either by the fixed form method or the slip form method, at his option, unless otherwise specified in the contract documents. However, the Contractor shall advise the Engineer as to the method he proposes to use at least 60 days in advance of the proposed start of paving operations.

#### **501-3.02 Batching, Mixing and Delivery**

- a. Batching, mixing and delivery equipment and operations shall conform to the requirements of Article 601-3.02 and 601-3.03 of Specification 601 - Structural Concrete.
- b. No concrete shall be mixed, delivered, placed or finished when the natural light is insufficient to Properly Perform and control the paving operations unless an adequate and approved artificial lighting system is provided.

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### **501-3.03 Consistency**

All Concrete delivered for the Pavement Shall show a slump of plus or minus ½” of the slump specified in the approved design MIX. concrete within the permissible slump range shall be available throughout the complete period of discharge except for the first and last 1/4 cubic yard discharged.

### **501-3.04 Paving Equipment**

- a. Paving equipment shall be at the job site sufficiently ahead of the start of paving operations to be thoroughly examined and approved, if satisfactory, by the Engineer.
- b. When the fixed form method is used to construct the pavement, the required equipment includes:
  - (1) Forms - Straight side forms shall be made of metal having a thickness of not less than 0.56 centimeters (7/32 inch) and shall be furnished in sections not less than 3 meters in length. Forms shall have a depth equal to the prescribed edge thickness of the concrete, without horizontal joint, and a base width equal to or greater than the depth of the forms. Flexible or curved form of proper radius shall be used for curves of 30-meter radius or less. Flexible or curved forms shall be of a design acceptable to the Engineer. Forms shall be provided with adequate devices for secure setting so that when in place they will withstand, without visible spring or settlement, the impact and vibration of the spreading, consolidating and finishing equipment. Flange braces shall extend outward on the base not less than 2/3 the height of the form. Forms with battered top surfaces, and bent, twisted or broken forms shall be removed from the work. Repaired forms shall not be used until inspected and approved by the Engineer. Built-up forms shall not be used except where the total area of pavement of any specified thickness on the project is less than 1,500 square meters. The top face of the form shall not vary from a true plane more than 3 mm. in 3 meters. The forms shall contain provisions for locking the ends of abutting form sections together tightly, and for secure setting.
  - (2) Spreading and Finishing Machines - shall be self-Powered and shall be capable of spreading, consolidating and finishing the freshly placed concrete to the required pavement elevation and cross-section within the specified tolerances. In addition:
    - (a) The finishing machine shall be equipped with at least two oscillating type transverse screeds, and a pan float shall be attached to the finishing equipment behind the last screed.
    - (b)

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- (c) Vibrators shall be provided for full width vibration of the concrete pavement slabs. These vibrators may be either of the surface pan type or the internal type with either immersed tube or multiple spuds. They may be attached to the spreader or the finishing machine, or may be mounted on a separate carriage. They shall not come in contact with the joints, load transfer devices, subgrade or side form. The frequency of surface vibrators shall not be less than 3,500 impulses per minute and the frequency of the internal vibrators shall be not less than 5,000 impulses per minute for tube vibrators, and not less than 7,000 impulses per minute for spud vibrators. The Contractor shall have available at the job site a copy of the manufacturer's literature on the vibrators, showing that they comply with the above requirements. Vibrators will not be permitted to operate when the spreaders or finishing machines are stopped.
  - (d) When the spreading and/or finishing machines are operated on an adjacent pavement, the equipment shall be provided with approved rubber tired, flangeless wheels to avoid damage to the adjacent lane.
- c. For slip form paving, the paver shall be self-propelled and shall be capable of spreading, consolidating, screeding and float-finishing the freshly placed concrete in one complete pass of the machine in such a manner that a minimum of hand finishing will be necessary to provide a dense and homogeneous pavement in conformance with the plans and specifications.
  - (1) The paver shall be equipped with electronic controls and sensing device to control line and grade.
  - (2) Sliding forms on the paver shall be rigidly held together laterally to prevent spreading of the forms.
  - (3) Hand floats, 3 meters long, designed to eliminate small surface irregularities may be utilized in the finishing operation.
  - (4) Vibrators as required in paragraph B (2) (b) above shall be provided.
- d. Concrete Saws - The Contractor shall provide sawing equipment adequate in number of units and power to complete the sawing to the required dimensions and at the required rate. The Contractor shall provide at least one stand-by saw in good working order. An ample supply of saw blades shall be maintained at the site of the work at all time during sawing operations. The Contractor shall provide adequate artificial lighting facilities for night sawing. All of this equipment shall be on the job both before and continuously during concrete placement.

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### **501-3.05 Preparation of Grade**

After the subgrade and base course have been placed and compacted, the areas which will support the forms and the paving machine shall be trimmed to the proper elevation, extending the work on each side at least 30 centimeters beyond the outside edge of either (1) the fixed forms Or (2) the slip form paving equipment trackline or wheelpath.

### **501-3.05 Setting Forms**

- a. Base support - The foundation under the forms shall be hard and true to grade so that each form, when set, will be firmly in contact for its whole length and at the specified grade. Any grade which at the form line is found below established grade shall be filled to grade with base material for a distance of 30 centimeters on each side of the base of the form, and thoroughly compacted. Imperfections or variations above grade shall be corrected as necessary.
- b. Form setting - Forms shall be set at least 150 meters in advance of the point where concrete is being placed. Forms shall be staked into place with not less than 3 pins for each 3- meter section. A pin shall be placed at each side of every joint. Form sections shall be tightly locked, free from play or movement in any direction. The forms shall not deviate from true line by more than 5 mm. at any point Forms shall be so set that they will withstand, without visible spring or settlement, the impact and vibration of the paving equipment. Forms shall be cleaned and Coated with a form release agent or oiled prior to the placing of concrete.
- c. Grade and Alignment - The alignment and grade elevations of the forms shall be checked and corrections made by the Contractor immediately before placing the concrete. When any form has been disturbed or any grade has become unstable, the area shall be corrected and the form shall be reset and rechecked.

### **501-3.07 Conditioning Base Course**

- a. When the forms have been securely set to grade, the base course shall be tested for conformity with the crown and elevations Shown On the plans by means of an approved toothed template riding on the side forms. High areas shall be trimmed to proper elevation. Low areas may be filled and compacted to a condition similar to that of surrounding grade, or filled with concrete integral with the pavement. The finished grade shall be maintained in a smooth and compacted condition until the pavement is placed.
- b. When the concrete pavement is placed on a bituminous mix base course, care shall be exercised to insure that the required keyways Indicated on the standard plans have been left in the base course. Providing these keyways is a subsidiary obligation Of the Contractor under the pavement pay items.

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- c. When an untreated aggregate base course is specified, the base course shall be uniformly moist when the concrete is placed. If it subsequently becomes too dry, the base course shall be sprinkled, but the method of sprinkling shall be such as to not form mud or pools of water. During concrete Paving operations, the Contractor shall maintain in readiness a roller weighing not less than 5 tons for use in recompacting the base course in case that, for any reason, it becomes defective or uneven. Soft spots in the base course shall be corrected to meet the requirements of the applicable base course specification Prior to Placing concrete.
- d. Traffic will not be allowed on the finished base unless specifically permitted by the Engineer.

### **501-3.08 Placing Concrete**

- a. The concrete shall be unloaded into an approved spreading device and mechanically spread on the grade in such manner as to prevent segregation of the materials. Placing to the full depth and width shall be continuous between transverse joints without the use of intermediate bulkheads except when a disruption in the Paving operation Occurs. A transverse construction joint meeting the requirements of paragraph 501-3.11 d. shall be formed whenever concrete Paving operations are stopped longer than 30 minutes. If, due to any disruption, concreting must be stopped within 3 meters after forming a transverse joint, the Contractor shall remove the concrete to the joint previously formed and no payment will be made for placing or removing this concrete.
- b. The concrete shall be placed in such a manner as to provide a dense and homogeneous pavement with a minimum of hand finishing. The equipment shall have as nearly a continuous forward movement as Possible and all operations of delivery and spreading of the concrete shall be so coordinated as to provide a uniform progress with stopping and starting of the placing equipment held to a minimum. If, for any reason, it is necessary to stop the forward Movement of the equipment, the vibratory and tamping elements shall also be stopped immediately.
- c. Hand spreading, when necessary, shall be done with shovels, not with rakes. Workmen shall not be permitted to walk on the fresh concrete with boots or coated with earth or other deleterious substances.
- d. Where concrete is to be placed adjoining a previously constructed lane of concrete pavement and mechanical equipment will be operated upon the existing lane of pavement, no paving shall be performed until at least 14 days have elapsed since the existing lane was placed.
- e. Concrete shall be thoroughly consolidated against and along the faces of all forms and along the full length and on both sides of all joint assemblies by means of vibrators. Vibrators shall not be permitted to come in contact with a joint assembly, the grade, or a side form. In no case shall the vibrator be operated longer than 10 seconds in any one location.



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- f. Concrete shall be deposited as near to contraction joints as possible without disturbing them, but shall not be dumped from the discharge bucket, hopper, or chutes from truck mixers or truck agitators onto a joint assembly unless the hopper is well centered on the joint assembly.
- g. Should any concrete materials fall on or be worked into the surface of a completed slab, it shall be removed immediately by approved methods.
- h. In order that the concrete may be properly protected against the adverse effect of rain before it has hardened sufficiently, the Contractor shall have available at all times covering material for the protection of the surface of the unhardened concrete. Such protective materials shall consist of burlap or other material suitable for the purpose. When rain appears imminent, all concrete paving operation shall stop and the Contractor shall cover the surface of the unhardened concrete with the protective material.
- i. In order that the concrete may be properly protected against the adverse effects of high concrete temperature, high air temperature high wind, and low humidity, or combinations thereof, the contractor shall take all the necessary precautions to insure that these hazards are reduced to the minimum practical level. These precautions shall consist of, but not be limited to, dampening subgrade and forms, placing concrete at the lowest practicable temperature, using water-reducing and retarding admixtures erecting windbreaks and sunshades, and reducing time between the placement of concrete and start of curing.

### **501-3.09 Strike-off of Concrete and Placement of Reinforcement -**

- a. Following the placing of the concrete, it shall be struck-off to conform to the cross section shown on the plans and to an elevation such that when the concrete is properly consolidated and finished, the surface of the pavement will be at the elevation shown on the plans.
- b. When reinforced concrete pavement is specified, the reinforcement shall be positioned and supported on chains in advance of concrete placement. The reinforcing steel shall be free from dirt, oil, paint, grease, mill, scale, and loose or thick rust which could impair the bond of the steel with the concrete.

### **501-3.10 Slip Form Paving**

If the Contractor is required to or elects to use the slip form method of paving, the following applies to the placing, strike-off and initial finishing of the concrete.

- a. The completed base course shall extend ahead at least 300 meters prior to beginning paving operations. The surface over which the tracks of the slip form paver will travel shall not vary more than + 0.5 centimeters from the established grade.

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- b. Concrete for slip form paving shall be produced at a uniform consistency with a slump not exceeding  $2\frac{1}{2} + \frac{1}{2}$  inches.
- c. The paving machine shall be equipped to vibrate the concrete for the full width and depth of the pavement being placed. The sliding forms shall be rigidly held together laterally to prevent spreading of the forms. The forms shall trail behind the paver for such a distance that no appreciable slumping of the concrete will occur, and that necessary strike-off and finishing can be accomplished while the concrete is still within the forms. If the edges of the completed pavement tend to slump, the Contractor will be required to use a lower slump as necessary to prevent this condition.
- d. The slip-form paver shall be operated with a continuous forward movement and all operations of mixing, delivering and spreading concrete shall be so coordinated as to provide uniform progress with stopping and starting of the paver held to a minimum. If, for any reason, it is necessary to stop the forward movement of the paver, the vibratory and tamping elements shall also be stopped immediately. No tractive force shall be applied to the machine, except that which is controlled from the machine.
- e. Steel tie bars shall not be inserted into the unsupported side of the freshly formed concrete slab. Bars shall be placed by a method, subject to approval by the Engineer, that shall result in the placement of the tie bars at the specified locations with no damage or disruption to the concrete.
- f. Strike-off and placing of the reinforcement shall be as provided in Article 501--3.09 above.

### **501-3.11 Joints**

- a. Joints shall be constructed of the type, dimensions and other details shown on the plans. All joints, except construction joints, shall be sawed and shall be protected from the intrusion of injurious foreign material until sealed.
- b. Longitudinal Joints
  - (1) Deformed, epoxy coated steel tie bars of the length, size and spacing specified on the plans shall be placed perpendicular to the longitudinal joints. They shall be placed by approved mechanical equipment or rigidly secured by chairs or other approved supports to prevent displacement.
  - (2) Tie bars shall not be painted or coated with any material, or enclosed in tubes or sleeves. When adjacent lanes of pavement are constructed separately, side forms shall be used which will form a keyway along the construction joint. Tie bars may be bent at right angles against the form of the first lane constructed and straightened into final position before the

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concrete of the adjacent lane is placed. In lieu of bent tie bars, approved two-piece epoxy coated connectors may be used.

- (3) Longitudinal joints shall be sawed to the depth, width and line shown on the plans. Suitable guide lines or devices shall be used to assure cutting the longitudinal joint on the true line as shown on the plans. The longitudinal joint shall be sawed before the end of the curing period but not later than three (3) days after the pavement has been placed. All joints shall be sawed before equipment or vehicles are allowed on the pavement. The sawed area shall be thoroughly cleaned and, if required, the joint shall immediately be filled with sealer.

### **c. Transverse Contraction Joints**

- (1) Transverse Contraction joints shall consist of planes of weakness created by sawing grooves in the surface of the concrete pavement of the dimensions and at the locations and spacing shown on the plans.
- (2) Sawing of the joints shall commence as soon as the concrete has hardened sufficiently to permit sawing without excessive ravelling, usually 4 to 8 hours. All joints shall be sawed before uncontrolled shrinkage cracking place. The sawing operations shall be carried on, both during the day and night, and regardless of weather conditions, until the sawing is completed within the Prescribed time lapse. The sawing of any joint shall be omitted if a crack occurs at or near the joint location prior to the time of sawing. Sawing shall be discontinued when a crack develops ahead of the saw and the crack shall be refaced and sealed in accordance with the requirements of Specification 507 - Joint and Crack Sealing in Portland Cement Concrete pavement, at the Contractor's expense.
- (3) In general, all joints should be sawed in sequence. All contraction joints in lanes adjacent to previously constructed lanes shall be sawed before uncontrolled cracking occurs.
- (4) After each joint is sawed, the cut and the adjacent concrete surface shall be thoroughly cleaned.

- d. Transverse Construction Joints - Transverse construction joints shall be constructed when there is an interruption of more than 30 minutes in the concreting operations. No transverse joint shall be constructed within 3 meters of a contraction joint, or plane of weakness. If sufficient concrete has not been mixed at the time of interruption to form a slab at least 3 meters long, the excess concrete back to the last preceding joint shall be removed and disposed of as directed.

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### **e. Load Transfer Dowels**

- (1) Load transfer dowels shall be installed at all transverse construction joints and, unless otherwise shown on the plans, at transverse contraction joints.
- (2) Load transfer dowels shall be held securely in position parallel to the surface and center line of the slab by an approved metal device that is left in the pavement or they may be implanted in the fresh concrete by a mechanical device provided the placing tolerances are met.
- (3) Load transfer dowels shall be epoxy coated, plain steel bars of the type, length, size and spacing specified on the plans. One half of each of these dowels shall be thoroughly coated with an approved bituminous material or heavy lubricant to prevent the concrete from binding to that portion of the dowel, or they shall be provided with a metal sleeve conforming to Article 709-1.04 of Specification 709.

f. Joints with Existing pavements - Where a new concrete pavement abuts an existing P.C. concrete pavement, as in widening projects, deformed, epoxy coated, steel tie bars of the length, size and spacing specified on the plans shall be installed at the joints between the new and the existing pavements. These tie bars shall be installed in accordance with the requirements of Article 503-3-07 of Specification 503 – Removal and Replacement of Portland Cement Concrete Pavement, Full Depth.

g. Special Joints - Special joints shall be constructed as shown on the plans, or as ordered by the Engineer, around drainage, utility and other structures located within the concrete pavement boundaries.

### **501-3.12 Surface Finishing and Texturing**

The concrete shall be screeded and finished in accordance with these specifications. All equipment operators shall be qualified and the concrete finishers shall be competent.

#### **a. Mechanical Finishing**

- (1) Pavement finishing equipment shall maintain a uniform height of concrete ahead of the main transverse screed and along its entire length. The number of transverse screeds shall be the number required to produce the specified smoothness, but not less than two for a paving method using side forms. No backing up of any transverse screeding equipment will be permitted. The finishing equipment shall have as nearly a with continuous forward movement as possible to provide uniform progress stopping and starting of the finishing equipment held to a minimum.

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- (2) When paving equipment utilizing tracks for mobility is used, the area on the prepared base course in the trackline shall be kept free from concrete or other debris that would affect the finished pavement surface. When fixed form paving is used, the tops of the forms shall be kept clean by a device attached to the machines and the travel of the machines on the forms shall be maintained true without lift, wobble, or other variations tending to affect the screeding operation.
- (3) Any edge slump of the pavement, resulting from slipform paving operations, exclusive of edge rounding, in excess of 1/4 inch shall be corrected before the concrete has hardened.
- (4) In general, the addition of superficial water to the surface of the concrete to assist in finishing operations will not be permitted. Where application of water to the surface is permitted by the Engineer, it shall be applied as a fog spray by means of approved spray equipment.

### **b. Hand Finishing**

- (1) After the mechanical finishing operations have been completed for either slipform or fixed form paving, hand-operated smoothing lutes approved by the Engineer shall, if needed, be used to smooth out irregularities in the surface. The cutting edge of the lute shall be kept parallel to the centerline of the pavement at all times as it is moved transversely over the surface of the concrete. Excess thin mortar accumulated ahead of the lutes shall be removed from the surface of the pavement and shall not be used in filling the depressions.
- (2) All hand finishing of joints and surface irregularities, when necessary, shall be performed from a bridge which shall not rest on any part of the unhardened concrete.
- (3) Except on irregular or small areas, or in the case of breakdown of the finishing machine, hand screeding and finishing of the pavement will not be permitted. When hand finishing is used, the surface shall be struck off by means of a manual operated transverse screed. The screed shall be moved forward with a longitudinal and crosswise movement. After the above screeding has been completed, approved hand Operated smoothing lutes shall be used.

### **c. Surface Testing and Correcting**

- (1) After the screeding and floating has been completed but before the initial set of the concrete occurs, the pavement surface shall be tested with a 3-meter straightedge laid in contact with the surface in successive positions parallel to and transverse to the center line of the pavement.

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- (2) Any depressions found which are in excess of 0. 3 mm. in 3 meters shall be immediately filled with freshly mixed concrete, struck off, consolidated, and refinished. High areas shall be cut down and refinished. Special attention shall be given to assure that the surface across joints meets the requirements for smoothness. Straightedge testing and surface corrections shall continue until the entire surface is found to be free from observable departures from the straightedge and the slab conforms to the required grade and across sections.
- (3) For this testing, the Contractor shall provide a 3-meter aluminum straightedge swung from light aluminum handles at least one meter longer than 1/2 the width of the slab.

### **d. Edging at Forms and Joints**

- (1) After the final finish, but before the concrete has taken its initial set, the edges of the pavement along each side of the slab, and on each side of transverse construction joints and emergency construction joints shall be worked with an approved tool and rounded to a ¼ inch radius. A well-defined and continuous radius shall be produced and a smooth dense mortar finish obtained. The surface of the slab shall not be unduly disturbed by tilting of the tool during use.
- (2) As part of the edging operation on fixed form pavements, a trowel shall be inserted between the form and the concrete for a depth of approximately 7.6 cm. (3") along the entire length of the slab before the edging tool is used.
- (3) All joints shall be tested with a straightedge before the concrete has set, and correction made if one side of the joint is higher than the other or if they are higher or lower than the adjacent slabs.

### **e. Texturing**

- (1) Following the surface testing and correction, and after all excess moisture has disappeared, but before the application of curing compound, the concrete pavement surface shall be given a grooved texture with a set of spring steel tines. The grooves shall be perpendicular to the center line of the pavement unless otherwise shown on the plans. Down pressure on the pavement surface shall be maintained at all times during texturing so as to obtain uniform texturing of.

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- (2) The spring steel tines the grooving device shall be rectangular in cross section, approximately 0.32 cm. (1/8") wide and Placed on 1.9 cm. (3/4") centers. The tines shall be of sufficient length, and resilience to form grooves not less than 0.48 cm. (3/16") deep in concrete surface in one pass. Final texture shall be uniform in appearance with substantially all grooves having a depth of 0.48 cm. (3/16").
- (3) More than one pass over the same area will not be permitted unless the surface has first been refinished. The capability of the tines to provide an acceptable texture shall be demonstrated to the Engineer prior to approval for use.
- (4) The tine head Pay be operated by hand or mechanically. In either case, concrete texturing shall take place with the longitudinal axis of the tines as nearly at an angle of 45° to the concrete surface as is practicable to eliminate the dragging of mortar by the tines. The tines shall be kept free of hardened concrete particles.
- (5) On 7.30 meter wide Pavements, the texturing shall be accomplished by a single continuous Pass Of the steel tines aver the full width of the pavement.

### **501-3.13 Surface**

- a. As soon as the concrete has hardened sufficiently, the pavement surface shall be tested with an approved 3-meter straightedge furnished by the Contractor. All testing will be done longitudinally and transversely for the full length of each traffic lane.
- b. All areas showing high spots of more than 3 mm. in 3 meters shall be marked and immediately ground, at the contractor's expense, to within the 3 mm. tolerance in accordance with the requirements of Specification 506 - Grinding Portland Cement Concrete Pavement.
- c. Areas showing low spots in excess of 7 mm. in 3 meters shall be removed and replaced, at the Contractor's expense in accordance with the requirements of specification 503 - Removal and Replacement of Portland Cement Concrete Pavement, Full Depth. Any area so removed shall be not less than 2 meters in length nor less than the full width of the lane involved. When it is necessary to remove and replace a section of pavement, any remaining portion of the slab adjacent to the joints that is less than 1.5 meters in length shall also be removed and replaced. The Engineer may, at his discretion, authorize the correction of low spots by partial depth patching in accordance with Specification 504, at the Contractor's expense in lieu of full depth replacement.

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### **501-3.14 Curing**

Immediately after the finishing operations have been completed and as soon as marring of the concrete will not occur, the entire surface of the newly placed concrete shall be covered and cured in accordance with one of the following methods. In all cases in which curing requires the use of water, the curing shall have prior right to all water supply. Failure to provide sufficient cover material of whatever kind the Contractor may elect to use, or lack of water to adequately take care of both curing and other requirements, shall be cause for immediate suspension of concreting operations. The concrete shall not be left exposed for more than 1/2 hour between stages of curing or during the curing period.

- a. Burlap mats method - The surface of the pavement shall be entirely covered with mats. The mats used shall be of such length (or width) that as laid they will extend at least twice the thickness of the pavement beyond the edges of the slab. The mat shall be placed so that the entire surface and both edges of the slab are completely covered. Prior to being placed, the mats shall be saturated thoroughly with water. The mats shall be so placed and weighted down as to cause them to remain in intimate contact with the surface covered and the covering shall be maintained fully wetted and in position for at least 72 hours after the concrete has been placed unless otherwise specified.
- b. Impervious Membrane Method
  - (1) The entire surface of the pavement shall be sprayed uniformly with white pigment curing compound immediately after the finishing and texturing of the surface or, if the pavement is cured initially with burlap mats, it may be applied upon removal of the mats. The curing compound shall not be applied during rainfall.
  - (2) Curing compound shall be applied by self-propelled mechanical sprayers to the top surface of the pavement under pressure at a rate of not more than one gallon per 15 square meters of area. The spraying equipment shall be of the fully atomizing type, equipped with tank agitator and with a wind guard.
  - (3) At the time of use, the curing compound shall be in a thoroughly mixed condition with the pigment uniformly dispersed throughout the vehicle. During application the compound shall be stirred continuously by effective mechanical means. Hand spraying of odd widths or shapes and vertical exposed concrete surfaces will be permitted. Curing compound shall not be applied to the inside faces of joints to be sealed.
  - (4) Should the curing compound film become damaged from any cause within the required curing period of 72 hours, the damaged portions shall be repaired immediately with additional compound.



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- (5) The Contractor shall provide on the project a sufficient quantity of approved coverings for protection of the pavement In case Of rain, or when there is breakdown of the spray equipment and no other mechanical sprayers are available. In the event rain damages the curing compound film before it hardens, the Contractor shall apply, after the surface water leaves the pavement, a new coat to the affected areas at the maximum coverage rate of 15 square meters per gallon.
- (6) Upon removal of the forms, the exposed sides if the slabs shall be protected immediately to provide a curing treatment equal to that provided for the top surface. On slip-form paving, the curing compound shall be applied to the sides of the slab at the time the top surface is treated.

### **501-3.15 Removing Forms (Fixed Form Paving)**

- a. Unless otherwise provided, form shall not be removed from freshly placed concrete until it has set for at least 12 hours. Forms shall be removed carefully so as to avoid damage to the pavement.
- b. After the forms have been removed, the sides of the slab shall be cured as outlined in one of the methods indicated in Article 3.14 above. where the Engineer considers that a major degree Of honeycombing is Present, the work will be considered defective and shall be removed and replaced. Any area or section so removed shall not be less than 2 meters in length nor less than the full width of the lane involved. When it is necessary to remove and replace a section of pavement, any remaining portion of the slab adjacent to the joints that is less than 1.5 meters in length shall also be removed and replaced. Minor honeycombing shall be pointed up with mortar composed of one part cement and two parts of fine aggregate by weight.

### **501-3.16 Pavement Drains**

- a. Pavement drains shall be installed under the shoulders and median at the locations indicated on the plans, or as ordered by the Engineer, and in accordance with the details shown on the plans.
- b. The construction of the pavement drains and outlets shall be made in accordance with all the applicable provisions Of Specification 605 - Underdrains.

### **501-3.17 Geotextile**

Geotextile of the type indicated on the plans shall be installed at the edge of the concrete pavement on the median side at the locations and in accordance with the details, shown on the plans or ordered by the Engineer. The geotextile shall be bonded to the concrete pavement edge using an emulsified asphalt meeting the requirements for a tack coat as described in section 407-2 of Specification 407 – Bituminous Tack Coat.

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### **501-3.18 Sealing Joints and Cracks**

- a. All joints and cracks shall be sealed before the pavement is opened to traffic and as soon after completion Of the curing period as is feasible.
- b. Joints shall be sealed with backer rods and sealants of the types specified in the plans. Unless otherwise indicated on the plans, AASHTO M 173 hot-poured elastic type sealant shall be used at the joints between concrete pavements and bituminous mix shoulders, and silicone joint sealant conforming to the requirements of Article 705-1.01 of Specification 705 - Joint Materials, shall be used at joints in the concrete pavement. Just prior to sealing, each joint shall be thoroughly cleaned of all foreign mater-,al, including membrane curing compound, and the joint faces shall be clean and surface dry when the seal is applied.
- c. The sealing material shall be applied to each joint opening to conform to the details shown on the plans or as directed by the Engineer.
- d. Silicone -joint sealant shall be applied directly from, the Original container into the joint using an air-pumped pump and in accordance with the manufacturer's recommendations. Immediately after placement and before a skin forms', the silicone sealant shall be tooled to force it against the joint faces and to recess the bend to the required depth.
- e. Hot poured elastic type sealant shall be stirred during heating so that localized Overheating does riot occur. The pouring shall be done in such a manner that the material will not be spilled on the exposed surface of the concrete. Any ex material on the surfaces of the concrete pavement shall be removed immediately and the pavement surfaces cleaned. The use of sand or similar material as a cover for the seal will not be permitted.
- f. Preformed elastomeric gaskets for sealing joints, when specified or authorized, shall be of the cross sectional dimensions shown on the plans. seals shall be installed and anchored as shown on the plans with suitable tools without elongation, and secured in place with an approved lubricant adhesive which shall cover both sides of the concrete joints. The seals shall be installed in a compressed condition and shall at time of placement be below the level of the pavement surface by approximately 6 mm. The seals shall be in one piece for the full width of each transverse joint.
- g. Cracks that occur in the concrete pavement prior to its acceptance shall be led in accordance with all the applicable requirements of Specification 507 - Joint and Crack Sealing in Portland Cement Concrete Pavement, at the contractor's expense.

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### **501-3.19 Protection of Pavement**

- a. The Contractor shall protect the pavement and its appurtenances against damage caused by both public traffic and traffic from his own operations. This protection shall include watchmen to direct traffic and the erection and maintenance of warning signs, lights, pavement bridges, crossovers, or any other protective devices required by Part VI of the MDUCT of the Department of Transportation and Public Works. This work shall be performed in accordance with the requirements of Specification 638 – Maintenance and Protection of Traffic. However, unless specifically provided in the contract documents, no direct payment will be made for this work and it shall be a subsidiary obligation of the Contractor with its cost included in the pay item for Portland cement concrete pavement.
- b. Any damage to the pavement due to lack of protection or negligence On the Part of the Contractor, occurring prior to acceptance, shall be repaired or the pavement replaced at the expense of the Contractor.

### **501-3.20 Opening to Traffic**

- a. The Engineer will decide when the pavement will be opened to traffic- The Pavement will not be opened to traffic until test specimens conforming to the requirements of Article 50i-2.08 have attained a compressive strength of 5,000 pounds per square inch, unless otherwise authorized by the Engineer.
- b. Prior to opening to traffic, the joint and crack sealing shall have been completed and the pavement shall have been thoroughly cleaned.
- c. Unless specifically authorized by the Engineer, the Contractor's equipment will not be Permitted on or allowed to use the pavement until the above requirements are met.

### **501-3.21 Tolerance in Pavement Thickness**

- a. The thickness of the Pavement will be determined by average caliper measurement of cores tested in accordance with AASHTO T 148.
- b. For the purpose of establishing an adjusted unit price for pavement, units to be considered separately are defined as 300 linear meters of pavement in each traffic lam starting at the end of the pavement bearing the smaller station number. The last unit in each lane shall be 300 meters Plus the fractional part of 300 meters remaining. One core will be taken at random by the Engineer in each unit. When the measurement of the core from a unit is not deficient by more than 5 mm. from the plan thickness, full payment will be made. When such measurement is deficient by more than 5 mm. but not more than 25 mm. from the plan thickness, two additional cores at intervals not less than 100 meters will be taken from the unit and the average thickness of the three cores determined. If the average of the

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three cores is not deficient by more than 5 mm. from plan thickness, full payment will be made. However, if the average thickness of the three cores is deficient, by more than 5, mm but not more than 25 mm from the plan thickness, an adjusted unit price as provided in Paragraph 501-5.01 a. will be paid for the area represented by these cores.

- c. Other areas such as intersections, entrances-, crossovers, ramps, etc. will be considered as individual units, and the thickness of each unit will be determined separately small irregular unit areas may be included as part of another unit. At such points as the Engineer may select in each unit, one core will be taken for each 300 square meters of pavement, or fraction thereof in the unit. If the core so taken is not deficient by more than 5 mm. from the plan thickness. Full payment will be made. If the core is deficient in thickness by more than 5 mm, but not more than 25 mm, than plan thickness, two additional cored will be taken from the area represented and the average of the three cores determined. If the average measurement of these three cores is not deficient by more than 5 mm. from the plan thickness, full payment will be made. However, if the average thickness of the three cores is deficient by more than 5 mm, but not more than 25 mm. from the plan thickness, an adjusted unit price as provided in paragraph 501-5.01 a. will be Paid for the area represented by cores.
- d. In calculating the, average thickness of pavement, measurements which are in excess of the specified thickness by more than 5 mm. will be considered as the specified thickness plus 5 mm., and measurements which are less than the specified thickness by more than 25 mm. will not be included in the average.
- e. When the measurement of any core is less than the specified thickness by more than 25 mm., the actual thickness of the pavement in this area will be determined by taking additional cores at not less than 3-meter intervals parallel to the center line in each direction from the affected location until-in each direction a core is found which is not deficient by more than 25 mm. Areas found deficient in thickness by more than 25 mm. shall be evaluated by the Engineer and if, in his judgment, the deficient areas warrant removal, they shall be removed and replaced with concrete of the thickness shown on the plans. Exploratory cores for deficient thickness will not be used in average for adjusted unit price.
- f. The contractor shall backfill at his expense all the core holes with an approved P.C. concrete mixture after removing dirt, water or other foreign material. from the hole.

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### **501-4 METHOD OF MEASUREMENT**

#### **501-4.01**

- a. Concrete pavement will be measured by the square meter complete in place and accepted. The width for measurement will be the width of the pavement shown on the typical cross section of the plans, and any additional widening where called for, or as otherwise directed in writing by the Engineer- The length will be measured horizontally along the center line of each roadway or ramp. The measurement will not include bridge approach slabs which are included under specification 601 - Structural Concrete.
- b. Pavement drains will be measured by the linear meter of length along the top of the drain pipe completed and accepted.
- c. The furnishing and installation of all dowels and tie bars, joint sawing, joint and crack fillers and sealing, geotextiles, curing and all other miscellaneous materials and operations required to complete the Pavement will not be measured for direct payment but shall be a subsidiary obligation Of the contractor with their cost included in the pay item for P.C. concrete pavements.

#### **501-5 BASIS OF PAYMENT**

**501-5.01** The accepted quantities of concrete pavement measured as provided in paragraph 501-4.01 a. above will be paid for at the contract unit Price Per square meter. Such price and payment shall be full compensation for furnishing, placing, finishing and curing the concrete and for all materials, equipment, tools, labor, and incidentals necessary to complete the pavement as required by the plans and specifications, provided however, that pavement found to be deficient in thickness and/or strength and allowed to remain in place will be paid for at a reduced unit price determined as follows:

- a. Where the average thickness of the pavement, determined as provided in Article 3.19 above, is deficient by more than 5 mm. but not more than 25 mm. the reduction in unit prices will be computed in accordance with the following formula:

$$R = 3.6D$$

Where: R = Percentage reduction in unit price.

D = Deficiency in mm. in the thickness of the concrete pavement in excess of 5 mm.

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- b. Item the compressive strength of the concrete is deficient but the Pavement is allowed to remain under the provisions of Article 501-2.09, the reduction in unit price will be completed in accordance with the Provisions Of Article 601-5.05 Of Specification 601- Structural Concrete, except that the moving average shall consist of six cylinders sets instead of three sets.
- c. The percentage reductions in unit price for thickness and compressive strength deficiencies will be cumulative but will not exceed 90 percent of the contract unit price for any deficient concrete allowed to remain place.
- d. Where the deficiency in thickness of the pavement is in amass of 25 mm. but it is allowed to remain in lieu of removal arid replacement, payment for such deficient area retained will be limited to 10 percent of the contract unit price.
- e. No additional payment over the contract unit Price will be made for any pavement which has an average thickness in excess of that shown on the plans or a strength in excess of that specified.

**501-5.02** The accepted quantity of pavement drains measured as provided in paragraph 501-4.02 b. above will be paid for at the contract unit Price per linear meter. Such price and payment shall be full compensation for all required excavations, furnishing and placing of drain pipe, granular filter material and concrete for outlet, slabs, and for all materials, equipment, tools, labor and incidentals necessary to complete the drains as required by the plans and specifications.

**501-5.03** Payment will be measured under:

Pay Unit

Pay Item

Portland Cement Concrete Pavement

Square Meters

Pavement Drains

Linear Mister

**SPECIFICATION 601 - STRUCTURAL CONCRETE****601-1 DESCRIPTION****601-1.01 Scope**

a. This work shall consist of furnishing, placing, finishing and curing portland cement concrete in bridges, culverts, retaining walks and other structures in accordance with these specifications and in conformity with the lines, grades and dimensions shown on the plans or established by the Engineer, Concrete in bridge approach slabs is included in this work.

b. Portland cement concrete shall consist of a homogeneous mixture of portland cement, fine aggregate, coarse aggregate, water and admixtures, if required, proportioned and mixed according to these specifications.

**601-2 MATERIALS**

**601-2.01** The following materials shall meet the applicable requirements specified in the following specifications:

<u>Material</u>	<u>Specification</u>
Portland Cement	701-1
Joint fillers	705-1
Copper Water Stops or Flashing	705-5
Rubber and Neoprene Water Stops	705-6
Curing Materials	711-1
Air-entraining Admixtures	711-2
Chemical Admixtures	711-3
Water	712-1
Bearings and Expansion Plates, Bronze and Copper Alloy	715-7
Other Metallic Materials	715
Elastomeric Bearing	717
Rubble Stone	718-2

**601-2.02 Fine Aggregate**

Shall meet the requirements of Article 703-1 of Specification 703, Aggregates, except that manufactured sand shall not be used as fine aggregate for concrete which will serve as the travel surface for vehicular traffic such as bridge decks and bridge approach slabs. the same source of sand shall be used for all faces of a concrete structure exposed to view.

**601-2.03 Coarse Aggregate**

Shall meet the requirements specified in Article 703-2 of Specification 703, Aggregates, except that the gradings given in Table 703-2 are only suggested and not mandatory, provided the size limitations included in Table 601-1 of this specification are complied with. In addition, for concrete that is to serve as the travel way for vehicular traffic, such as bridge decks and

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bridge approach slabs, the coarse aggregate shall have a minimum polishing value of 48% as determined by ASTM D 3319.

### 601-2.04 Cement Requirements

- a. Cement used shall be Type I unless otherwise specified in the contract documents or authorized by the Engineer.
- b. The Contractor shall furnish mill certificates of compliance of the cement with the requirements of these specifications. Cement may also be accepted from pre-tested and approved bins. However, the Authority may sample and test the cement at any time, at its discretion.
- c. Cement shall be protected from rain and moisture by storing in suitable weatherproof bins or buildings. Any cement damaged by moisture or which fails to meet any of the specified requirements will be rejected and shall be removed from the work site.
- d. Cement stored by the Contractor for a period longer than 60 days shall require the Engineer's approval before being used in the work. Stored cement shall meet the specification requirements at any time after storage when retesting is ordered by the Engineer.
- e. Cement of different brands, types, or from different mills shall be stored separately.

601-2.05 Classes of Concrete - Four classes of concrete are provided for in these specifications, based on their specified compressive strength at 28 days. The various classes and their basic requirements are indicated in Table 601-1. Each class for in the plans and other contract documents, or ordered by the Engineer.

TABLE 601-1

PORTLAND CEMENT CONCRETE MIXTURES

Class of Concrete	Specified Compressive Strength at 28 days (psi)	Max. Coarse Aggregate Size (sq. openings)	Design Slump Rang* (inches)
A	3,000	1" with 5% max. passing No.8	2-4
B	2,200	2" with 5% max. passing No.4	1-4
D	5,000	1" with 5% max. passing No.8	1-3
A-4	4,000	1" with 5% max. passing No.8	2-4

\* These slump ranges may be modified for air-entertained concrete, slimform concrete, and for following concrete, subject to approval by the Engineer.



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### **601-2.06 Proportioning of Concrete**

a. The Contractor shall design the concrete mixes determining the proportions of portland cement, coarse and fine aggregate, and water necessary to conform to these specifications and to obtain concrete having not less than the strength specified for each class in Table 601-1. The volumetric proportioning methods such as outlined in the American Concrete Institute (ACI) Standard 211.1, "Recommended practice for Selecting Proportions for Normal Weight Concrete", or other approved volumetric proportioning methods, shall be employed in the design of mixes. Separate mix designs shall be submitted for each mix to be used such as for travel way and otherwise, and whenever a change in fine or coarse aggregates is necessary.

b. The Contractor shall submit for the record, prior to the start of concreting operations, the proposed mix, including the aggregate gradings to be used, with certified laboratory reports on the tests performed on trial mixes. In the event that the proportions of concrete mixture designed by the Contractor do not produce concrete of the specified strength, the Contractor shall adjust the mix accordingly in order to obtain the required strength, at no additional cost to the Authority, and shall submit new certified test results.

c. Whenever the Contractor modifies the concrete mix, other than minor adjustment in the relative quantities of fine and coarse aggregates, he shall submit copy of the new mix design to the Engineer together with copies of test results of the new mix..

d. In the event ready mixed concrete from a commercial plant is used by the Contractor, such concrete and plant shall meet the requirements of AASHTO M-157 except as modified by these specifications and shall have been inspected and approved by the Authority for use on its projects within the last six months.

### **601-2.07 Air-entrained Concrete**

a. Air-entrained concrete shall be used in structures or parts of structures wherever indicated on the plans. Air-entrained concrete, at the option of the Contractor, may be concrete containing an air-entraining admixture or an air-entraining portland cement.

b. In the event the Contractor elects to use an air-entraining admixture, he shall determine by trial the amount of the particular admixture that will produce concrete having the specified air content and this amount shall not be varied except as approved by the Engineer. The admixture shall be added during batching at the plant.

c. The contractor shall determine the proportions and batch weights for air-entrained concrete in the manner prescribed for regular concrete provided, however, that in making such adjustments as may be necessary by reason of air-entrainment the minimum quantity of fine aggregate and the minimum quantity of water shall be used which will produce concrete of the required workability.

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d. Air entrained concrete, in addition to conforming to the master limits shown in Table 601-1 for the class or classes specified, shall contain not less than 4 nor more than 6 percent entrained air determined by means of the test for air content, AASHTO T 152 (pressure Method) or AASHTO T196 (Volumetric Method). The Contractor shall provide the necessary testing equipment, as a subsidiary obligation under the concrete pay items, for testing by the Authority during placement.

**601-2.08 Chemical Admixtures**

a. Water reducing, set retarding, or superplasticizers chemical admixtures may be used at the option of the Contractor but subject to approval by the Engineer. The Contractor shall designate in advance the particular types, trade names and manufacturers of admixtures that he proposes to use and only such admixtures as are approved by the Engineer shall be incorporated into the concrete. Admixtures selected for use shall be compatible with all other component of the concrete.

b. Retarding admixtures may be used when the setting time of concrete must be retarded for proper placement. The quantity of admixture added to the mix shall be the minimum required for minimum retardation consist with placing conditions. Retarding admixtures, when used, shall be added at the plant.

c. The use of calcium chloride as an admixture will not be permitted.

**601-2.09 Sampling and Testing**

a. Compliance with the applicable requirements included in the adobe articles will be determined in accordance with the following AASHTO standards:

Sampling Fresh Concrete	T 41
Size of Aggregates	T 27
Consistency (Slump)	T 119
Weight per Cu. FT. and Air Concrete	T 121
Air Content of Freshly Mixed Concrete	T 152 (Pressure Method) T 196 (Volumetric Method)
Making and Curing Concrete Test Specimens in the Field	T 23
Compressive Strength of Cylindrical Concrete Specimens	T 22
Sampling and Testing for Total Chloride Ion in Concrete and Concrete Raw Materials	T 260

b. Sampling frequency for compressive strength tests of concrete will be as follows:

- (1) One set of six cylinders shall be obtained for each 25 cubic meters of concrete or fraction thereof placed each day for testing at 7 and 28 days.

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(2) For Class D concrete, additional sets of 3 cylinders each will be obtained as required to determine when the load transfer can be made on prestressed units or the tensioning of the steel initiated on post-tensioned units.

(3) Additional sets of specimens will be made as needed to determine when forms may be removed or when a structure may be put into service, or if the Engineer deems it necessary to determine the acceptability of concrete.

(4) The Contractor shall furnish at his expense all the molds, conforming to AASHTO M 205 and T 23, that are necessary to comply with the required frequency of sampling.

(5) The concrete for the test specimens will not be measured for payment but shall be furnished by the Contractor without additional compensation.

c. Clump tests, and air content tests when applicable, shall be made of the concrete from each batch from which test cylinders are taken. Additional slump tests will be made as determined by the engineer to check the consistency of the concrete.

d. For concrete intended for use on the travel way for vehicular travel, samples will be taken of the fresh mix, the mortar will be washed out and the remaining aggregates will be tested for compliance with the requirements of Articles 601-2.02 and 601-1.03 of this specification as to manufactured sands and polishing value of the coarse aggregate.

### **601-2.10 Basis of Acceptance**

a. In general, the acceptability of the quality of the concrete delivered to or made at the jobsite will be based on slump tests, air content test, aggregate tests and on the results of standard compressive strength tests of representative samples at 28 days as covered by these specifications. However, this does not relieve the responsibility of the Contractor for the concrete during placement, consolidation, finishing, curing and protection prior to final acceptance by the Highway Authority.

b. Failure of the fine and coarse aggregate to meet the polishing value requirements may be cause for the rejection and removal of concrete for use on vehicular travel ways.

c. Concrete shall be placed at a slump as nearly consistent with the design mix value as is practical. Any batches with slumps varying from the design mix specified values by more than the tolerances shown below will be rejected for use in the work.

Specified Slump	Tolerance
3 in. or less	+ 1/2 in.
Greater than 3 in.	+ 1 in.

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d. Air content, when specified, shall be within +2% of the design value. Any batches with air content exceeding this tolerance will be rejected for use in the work.

e. The compressive strength of the quantity of concrete placed and represented by one set of cylinders shall be determined as the average of the three cylinders comprising the set. If any cylinder shows evidence of improper sampling, molding, handling, curing or testing, the test result of such defective cylinder, shall be discarded and the compressive strength of the concrete represented shall be determined from the test results of the remaining cylinders. Low strength shall not be a basis for discarding a cylinder test result.

f. The compressive strength level of an individual class of concrete will be considered satisfactory if both of the following requirements are met:

(1) The moving average of all sets of three strength tests equals or exceeds the specified compressive strength. The following applies to the computation of the moving average:

(a) The first moving average value shall be computed by averaging the test results of the first three sets of cylinders. Subsequent moving average values shall be computed by dropping the test result of the first cylinder set in the previous average, adding the test results of the next cylinder set and computing a new average.

(b) The cylinder strength test values shall be entered into the moving average computations in the same chronological order that the concrete is delivered and sampled.

(c) Test values of cylinder sets representative of concrete that fails to meet the acceptance criteria and is rejected and removed will be eliminated from the moving average computation.

(2) No individual strength test (average of cylinders set) falls below the specified compressive strength by more than 500 psi.

g. Should concrete used in the work fail to conform to the requirements in paragraph "f" above, the Contractor shall, at his expense, make corrective changes, subject to the approval of the Engineer, in the material mix proportions or in the concrete fabrication procedures, before placing additional concrete. In addition, such corrective changes shall be made when the compressive strength of concrete tested at 7 days consistently indicates that the concrete will not attain the specified compressive strength at 28 days.

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h. When the moving average fails to meet the compressive strength requirement, the in-place concrete will be considered deficient but will be accepted, if the deficiency in the moving average does not exceed 300 psi and if no individual cylinders set is deficient by more than 500 psi, but payment for the concrete represented by the failing averages will be at a reduced unit price as specified in Article 601-5.05. When the moving average is deficient by more than 300 but not over 500 psi and no individual cylinder set is deficient by more than 500 psi, the deficient concrete may be accepted, at the discretion of the Authority, subject to a satisfactory structural analysis at the Contractor's expense and to applicable unit price reduction as per Article 601-5.05

i. All concrete represented by a cylinder set which shows a strength falling below the specified value by more than 500 psi will be considered deficient and will be rejected.

j. The Contractor may let to drill core samples of the hardened concrete classified as deficient under paragraphs "h" and "i" above, at his expense but under the direction and supervision of the Engineer, to be tested at the Authority's laboratory. The following criteria shall govern the coming program:

(1) The obtaining and testing of drilled cores shall be in accordance with AASHTO T 24 and T 22. Moisture conditioning shall be in accordance with paragraph 6.3 of T 24.

(2) The cores shall be drilled no earlier than 28 days and no later than 56 days after the pouring of the concrete in question.

(3) A minimum of three cores shall be taken for each 25 cubic meters, or fraction thereof, of concrete classified as deficient as a result of the cylinder tests, at random locations selected by the Engineer.

(4) The core strength shall be the average of all cores tested. The concrete represented by the core tests will be considered acceptable with no penalty if the average of the cores is equal to at least 85 percent of the specified compressive strength and if no single core test is less than 75 percent of the specified compressive strength.

(5) Should the first set of cores show deficient strength, the Contractor will have the option, at his expense, of obtaining one additional set of cores for further testing. These additional cores shall be drilled not later than 84 days after the pouring of the concrete in question shall not exceed the number drilled for the first set and shall be subject to the criteria in paragraphs (1), (3) and (4) above. However, the results of all cores tested will be used in determining the average strength of the questioned concrete.

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(6) The Contractor shall repair at his expense the core holes.

k. Concrete that fails both the cylinder and core strength tests acceptance criteria will be rejected and shall be removed and disposed of at the Contractor's expense. In Borne cases, the location of rejected concrete may be such as to require the removal, at the Contractor's expense, of otherwise satisfactory concrete. The removal shall be performed in such a manner as will not cause damage to the remaining concrete or to other units of the structure.

l. When the cylinder tests results indicate that the concrete mix meets the specified strength but the Authority has reasonable doubts as to the actual strength of the in-place concrete due to deficiencies in the placing, consolidation, curing or protection of the concrete, the Authority may order the Contractor to have cores drilled following the procedures specified in paragraph "j" above.

If these cores meet the acceptance criteria specified in "j" above, the Authority will bear the cost of the drilling, testing and repair. However, if the cores fail, the Contractor shall bear the cost and the concrete represented by the failing cores will be subject to rejection and removal as determined by the Authority.

### **601- 3 CONSTRUCTION REQUIREMENTS**

#### **601-3.01 General**

Portland cement concrete may be produced at the project site or may be supplied by a commercial plant as ready-mixed concrete.

#### **601-3.02 Measuring and Batching**

Measuring and batching of materials shall be done at a batching plant. The measuring equipment and batching plant and the measuring and batching procedures followed shall be in accordance with the requirements of AASHTO M 157.

#### **601-3.03 Mixing and Delivery**

Concrete may be mixed at a central plant, in truck mixers or at the Site as described in these specifications. The mixing and delivery of concrete shall be in accordance with the requirement of AASHTO M 157 as modified and supplemented by the following paragraphs of this article.

a. The Contractor shall supply concrete at a rate consistent with placement operations as determined by the Engineer. The intervals between delivery of batches shall not be so great as to allow the concrete in place to harden partially.

b. The Engineer may order discontinuing the use of any type of concrete mixing or transporting units that fail to meet the specification requirements.

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c. Volumetric batching and continuous mixing mobile equipment may be used if approved by the Engineer. In such case, the batching and mixing shall be in accordance with AASHTO M 241.

d. When an approved retardant admixture is authorized, the 1-hour limitation between the introduction of the cement to the aggregates and discharge at the Bite may be increased by 30 minutes.

e. Concrete for bridge decks or for pavement which is to be delivered at an ambient temperature above 85 F shall be designed to include an approved retardant admixture.

f. The entire contents of the mixer shall be removed from the drum before materials for another batch are placed therein. Upon cessation of mixing for a period exceeding one hour the mixer shall be thoroughly cleaned. The delivery unit shall also be completely emptied, cleaned and free from concrete and wash water before receiving the next load of concrete.

g. When a truck mixer or agitator is approved for mixing or delivery of concrete, no water from the truck water system or elsewhere shall be added after the initial introduction of mixing water for the batch except when on arrival at the job site the slump of the concrete is less than that specified. In such case, water may be added once at the jobsite to bring the slump within the required limits. Water shall not be added to the batch at any later time.

h. Certification of Batches - Before unloading at the site of delivery, the concrete supplier shall furnish to the Engineer delivery tickets containing the following information concerning the concrete in the truck. The tickets shall be issued to the truck operator at the proportioning plant for each load.

- (1) Name and number of batch plant.
- (2) Serial number of ticket.
- (3) Date and truck number.
- (4) Name of Contractor.
- (5) Specific designation of job (name and location).
- (6) Specific class of concrete in conformance with job specifications.
- (7) Volume of concrete (cubic yards).
- (8) For central mixed concrete, time when first mixing was completed at the central mix plant.
- (9) For transit mixed concrete and truck-mixed concrete, time when the cement was introduced to the aggregates
- (10) Name of admixture, if any.
- (11) Spaces to indicate time when discharge commenced and when completed.

i. Small Construction Mixers - In miscellaneous work involving small quantities of concrete, the Engineer may permit the use of small construction mixers. Any concrete produced under such conditions shall be mixed not less than 90 seconds after all the materials are in the mixer drum and until a satisfactory consistency of the concrete is obtained.

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j. Hand Mixing - Hand mixing may be authorized by the Engineer for miscellaneous work involving a very small quantity of concrete. In such case, the mixing shall be done on a clean and watertight platform and in such manner as to insure a uniform mixture of satisfactory consistency.

k. Delivery - The organization supplying concrete shall have sufficient plant capacity and transporting equipment to insure continuous delivery at the rate required. The rate of delivery of concrete during concreting operations shall be such as to provide for the proper handling, placing, and finishing of the concrete. The methods of delivering and handling the concrete shall be such as will facilitate placing with the minimum of rehandling and without damage to the structure or the concrete.

l. Retempering - The concrete shall be mixed only in such quantities as are required for immediate use and any concrete which has developed initial set shall not be used. Retempering concrete by adding water or by other means will not be permitted.

### **601-3.04 Consistency**

a. All concrete delivered or made at the job site shall show a slump within the tolerance limits specified in paragraph 601-2.20b.

b. Concrete shall be of such consistency and plasticity, and show the necessary cohesiveness that it will flow around reinforcing steel and that individual particles of the coarse aggregate when isolated shall show a coating of mortar containing its proportional amount of sand.

### **601-3.05 Falsework**

a. The Contractor shall be responsible for designing and constructing safe and adequate falsework which provides the necessary rigidity, supports the loads imposed, and produces in the finished structure the lines and grades indicated on the plans.

b. The Contractor shall furnish, upon request of the Engineer, detailed working drawings and design calculations of the falsework for bridges. The acceptance of such drawings and the falsework inspection by the Engineer will in no way relieve the Contractor of full responsibility for the adequacy and safety of the falsework.

c. Falsework which cannot be founded upon a solid footing shall be supported by falsework piling which shall be spaced, driven and removed in a manner approved by the Engineer. No additional compensation will be paid for the use and removal of falsework piling.

d. Falsework shall be set to give the finished structure the specified camber plus an allowance for shrinkage and settlement. The weight of the finishing screed for bridge docks and other construction loads and their effect on the required camber shall be considered by the Contractor in the design of the falsework.



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e. Suitable screw jacks or hardwood wedges shall be incorporated into the falsework and adjusted to take up any settlement in the formwork either before or during the placing of concrete.

### **601-3.06 Forms**

a. Forms for all exposed concrete surfaces shall be made from one or more of the following materials:

- (1) Face with exterior type plywood.
- (2) Lumber dressed at least on one side and two edges.
- (3) Metal.
- (4) Plastic.
- (5) Fiberglass

b. All forms shall be well constructed, carefully aligned, substantial and firm, securely based and fastened together in final position. They shall be strong enough to prevent the plastic concrete from bulging the forms between supports and to withstand the action of mechanical vibrators. They shall be so constructed as to produce mortar-tight joints and smooth, even concrete surfaces.

c. Forms shall be designed to resist the pressure resulting from plastic concrete weighing 150 pounds per cubic foot, a live load allowance of 50 pound per square foot on horizontal surfaces, and other live loads incidental to the construction operations. Concrete misshapen by bulges or deformations caused by inadequate forms shall be removed or corrected as ordered by the Engineer at the Contractor's expense.

d. Forms shall be filleted and chamfered as shown on plans, and shall be given a bevel or draft in the case of all projections, such as girders and copings, to assure easy removal.

e. Metal ties or anchorages within the forms shall be so constructed as to permit their removal to a depth of at least 2.5 centimeters from the face without injury to concrete. In case wire ties are permitted, suitable canes shall be provided. The cavities shall be filled with cement mortar and the surface left sound, smooth, even and uniform in color.

f. Where the bottom of the forms is inaccessible, the lower form boards shall be left loose or other provisions made so that extraneous material may be removed from the forms immediately before placing the concrete.

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g. All forma shall be treated with an approved form coating prior to placing reinforcement and wood forms shall be saturated with water immediately before placing the concrete. The form coating to be used can be of any acceptable commercial quality which permit the ready release of the forma and will not discolor or stain the concrete.

h. The specifications for forma, as regards design, mortar tightness, filleted corners, beveled projections, bracing, alignment removal, reuse and coating, al so apply to metal forms. The metal used for forms shall be of such thickness that the forms will remain true to shape. All bolt and rivet, heads shall be countersunk. Clamps, pins or other connecting devices shall be designed to hold the forms rigidly together and to allow removal without injury to the concrete. Metal forms which do not present a smooth surface or do not line up properly shall not be used. Care shall be exercised to keep metal forms free from rust, grease or other foreign matter.

i. Stay-in-place metal forms will not be permitted unless specifically shown on the plans. In such case, the Contractor shall submit detailed shop drawings, samples, specifications and any other information complying with Specification 715.

j. All forms shall be set and maintained true to the line designated until the concrete is sufficiently hardened. Forms shall remain in place for periods which shall be determined as specified in Article 601-3.13. When forms appear to be unsatisfactory in any way, either before or during the placing of concrete, the Engineer will order the work stopped until the defects have been corrected.

k. Forms to be re-used shall be maintained in good conditions as to tightness and surface smoothness at all time. Any warped or bulged lumber shall be resized before being used. Unsatisfactory forms shall not be used and shall be removed immediately from the site of the work.

### **601-3.07 Handling and Placing Concrete**

a. General - Concrete shall not be placed until the forms and reinforcing steel have been checked and approved by the Engineer.

(1) In preparation for the placing of concrete, all saw dust, chips, and other construction debris and extraneous matter shall be removed from the interior of forms. Struts, stays and braces, serving temporarily to hold the forms in correct shape and alignments, pending the placing of concrete at their locations, shall be removed when the concrete placing has reached an elevation rendering their service unnecessary. These temporary members, shall be entirely removed from the forms and not buried in concrete.

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(2) Concrete shall be placed so as to avoid segregation of material and the displacement of reinforcement. All equipment used for conveying the concrete mix shall be capable of meeting this requirement and is subject to approval by the Engineer. In case any conveyance equipment results in an inferior quality of concrete, the Engineer may order discontinuance of its use and its substitution by a satisfactory method of placing. Concrete shall not come in contact with aluminum during conveyance and placing operations.

(3) Open troughs and shuts shall be of metal or metal lined, except aluminum. Where steep slopes are required, the chutes shall be equipped with baffles or be in short lengths that reverse the direction of movement. All chutes troughs and pipes shall be kept clean and free from coating or hardened concrete by thoroughly flushing with water.

(4) Dropping concrete a distance of more than 1.5 meters or depositing a large quantity at any point and running or working it along the form shall not be permitted.

(5) Special care shall be taken to fill each part of the form by depositing concrete directly into the forms at or as near to its final position as possible, to work the coarser aggregates back from the face of the concrete and to force the concrete under and around the reinforcement without displacing the reinforcement. After the concrete has taken its initial set, care shall be exercised to avoid jarring the forms or placing strain near the ends of reinforcement projecting out of the concrete.

(6) Concrete, during and immediately after depositing, shall be thoroughly compacted. The compaction shall be done by mechanical vibration subject to the following provisions:

(a) The vibration shall be internal unless special authorization of other method is given by the Engineer.

(b) Vibrators shall be of a type and design approved by the Engineer. They shall be capable of transmitting vibrations to the concrete at frequencies of not less than 4,500 impulses per minute. The Contractor shall have available at the job site a copy of the manufacturer's literature on the vibrators, showing that they comply with the above requirements.

(c) Application of vibrators shall be at points uniformly spaced and not farther apart than twice the radius over which the vibration is visibly effective.

(d) The Contractor shall provide a sufficient number of vibrators to properly compact each batch immediately after it is placed in the forms. Extra vibrators shall be on hand for emergency use and for use when other vibrators are being serviced. All vibrators shall be in satisfactory working conditions.

(e) Vibrators shall be manipulated so as to thoroughly work the concrete around the reinforcement and imbedded fixtures and in to corners and angles to the forms but with care not to cause segregation.

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- (f) Vibration shall be applied at the point of deposit and in the areas of freshly deposited concrete. The vibrators shall be inserted and withdrawn out of the concrete slowly. The vibration shall be of sufficient duration and intensity to thoroughly compact the concrete but shall not be continued at any one point to the extent that localized areas of grout or segregation of aggregates are created.
  - (g) Vibration shall not be applied directly or through the reinforcement to the sections or layers of concrete which have hardened to the degree that the concrete ceases to be plastic under vibration. It shall not be used to make concrete flow in the forms over distances so great as to cause segregation and vibrators shall not be used to push or distribute concrete laterally in the forms. The vibrating element shall be inserted in the concrete mass a sufficient depth to vibrate the bottom of each layer effectively, in as nearly a vertical position as practicable. It shall be withdrawn completely from the concrete before being advanced to the next point of application.
  - (h) To secure even and dense surfaces free from aggregate pockets or honeycombing, vibration shall be supplemented by such spading as is necessary to insure smooth surface and dense concrete along form surfaces and in corners and locations impossible to reach with vibrators while the concrete is plastic.
  - (i) External vibration methods will be permitted by the Engineer when satisfactory results are demonstrated.
  - (j) The provisions of this paragraph shall apply to precast piling, concrete cribbing and other precast members except that if approved by the Engineer, the manufacturer's methods of vibration may be used.
- (7) When the placing of concrete is temporarily discontinued, the concrete, after becoming firm enough to retain its form, shall be cleaned of laitance and other objectionable material to a sufficient depth to expose sound concrete. To avoid visible joints as far as possible on exposed faces, the top surface of the concrete adjacent to the forms shall be smoothed and leveled whenever concreting is discontinued. Where a "feather edge" might be produced at a construction joint, as in the sloped top surface of a wing wall, an inset form shall be used to produce a blocked out portion in the preceding layer which shall produce an edge thickness of not less than 15 centimeters in the succeeding layer. Work shall not be discontinued within 45 centimeters of the top of any face, unless provision has been made for a coping less than 45 centimeters thick, in which case, if permitted by the Engineer, the construction joint may be made at the under side of the coping.

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(8) Immediately following the discontinuance of placing concrete, all accumulation of mortar splashed upon the reinforcing steel and the surfaces of forms shall be removed. Dried mortar chips and dust shall not be puddled into the used concrete. If, the accumulations are not removed prior to the concrete becoming set, care shall be exercised not to injure or break the concrete-steel bond at and near the surface of the concrete, while cleaning the reinforcing steel.

(9) The Contractor shall protect the concrete from the adverse effect of rain at all times during and immediately after placement. He shall have available adequate covering material to protect the exposed surfaces of unhardened concrete.

### **b. Culverts-**

(1) The base slab or footing of box culverts shall be placed and allowed to set before the remainder of the culvert is constructed.

(2) In the construction of box culverts 1.5 meters or less in height, the sidewalls and top may be constructed as a monolith.

(3) In the construction of box culverts more than 1.5 meters in height, the concrete in the walls shall be placed and allowed to set before the top slab is placed.

(4) Each wing wall shall be constructed, if possible, as a monolith. Construction joints, where unavoidable, shall be as shown on plans or approved by the Engineer.

### **c. Girders, Slab, and Column. -**

(1) For simple spans, concrete shall be deposited by beginning at the center of the span and working from the center toward the ends unless otherwise directed by the Engineer. Concrete in girders shall be deposited uniformly for the full length of the girder.

(2) Concrete in slab spans shall be placed in one continuous operation for each span unless otherwise provided for in the contract documents.

(3) The floors and girders of through girder superstructures shall be placed in one continuous operation unless otherwise specified, in which case special shear anchorage shall be provided to insure monolithic action between girder and floor.

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(4) Concrete in T-beam or deck girder spans may be placed in one continuous operation or may be placed in two separate operations, each of which shall be continuous; first to the top of the girder stems, and second, to completion. In the latter case, the bond between stem and slab shall be positive and mechanical, and shall be secured by means of suitable shear keys on the top of the girder stem. The size and location of these keys shall be as shown on the plans. The period between the girder stem pour and the slab pour shall be at least 24 hours. Before the second pour, the Contractor shall check the falsework for shrinkage and settlement and shall tighten wedges or screws to insure minimum deflections of stems when slab is poured.

(5) Concrete in columns shall be placed in one continuous operation, unless otherwise directed. The concrete shall be allowed to set at least 12 hours before the caps are placed unless otherwise shown on the plans.

(6) Unless otherwise permitted by the Engineer, no concrete shall be placed in the superstructure until the column forms have been stripped sufficiently to determine the character of the concrete in the columns. The load of the superstructure shall not be allowed to come upon the bents until they have been in place at least 14 days, unless otherwise permitted by the Engineer.

### **601-3.08 Adverse Hot Weather Conditions**

a. Concrete shall be properly protected from adverse hot weather conditions before, during and after placement. The initial concrete placement temperature shall not exceed 100°F (38°C). All necessary precautions shall be taken to see that the concrete is promptly placed on arrival at the job and immediately vibrated after placement. The concrete shall be protected from excessive drying during finishing and curing operations which shall be performed without delay as soon as the concrete is ready for them.

b. Concrete shall not be placed in bridge decks and other exposed slabs when any combination of air temperature, relative humidity, concrete temperature and wind speed is expected to result in an evaporation rate in excess of 0.2 pound per square foot per hour. Table 601-2 may be used as a guide to determine concrete temperatures and relative humidity combination at which evaporation rates in excess of 0.2 lb/ft<sup>2</sup>/hr. Such procedures shall include one or more of the following:

- (1) Shading and cooling aggregates and other components at the batching plant.
- (2) Dampening subgrade and forms.
- (3) Erecting windbreaks to effectively reduce the wind speeds throughout the placement area.
- (4) Placing concrete at the lowest possible temperature by reducing the time between mixing and placing.

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(5) Fog spraying throughout the placement area to effectively increase the relative humidity.

(6) Placing concrete at lower ambient temperature such as early morning, late afternoon or at night.

d. Water reducing and retarding admixtures may be used to offset the undesirable effects of placing concrete at high temperatures provided the design mix requirements for the specified strength are met.

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TYPICAL CRITICAL CONCRETE TEMPERATURES FOR VARIOUS WIND SPEEDS AND RELATIVE HUMIDITIES (1)

Concrete Temperature °F	Wind Speed - mph			
	10	15	20	25
	Relative Humidity %			
100	80	95	(2)	(2)
95	65	80	85	90
90	45	60	70	75
85	30	45	55	60
80	20	35	40	45
75	10	20	30	35

(1) Maximum concrete temperatures at an ambient- temperature of 90 F for different wind speeds and relative humidities to limit to rate of evaporation to about 0.2 lb/ft<sup>2</sup>/hr.

(2) Required relative humidities in excess of 100%.

### 601-3.09 Pneumatic Placing of Concrete

a. Pneumatic placing of concrete will be permitted only if specified in the contract documents or if authorized by the Engineer. The equipment shall be so arranged that no vibrations result which might damage freshly placed concrete. The use of aluminum and magnesium alloys pipes for placing concrete will not be allowed.

b. Where concrete is conveyed and placed by pneumatic means the equipment shall be suitable in kind and adequate in capacity for the work.

The machine shall be located as close and practicable to the place of deposit. The position of the discharge end of the line shall not be more than 1.5 meters from the point of deposit. The discharge lines shall be horizontal or inclined upwards from the machine.

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### **601-3.10 Pumping Concrete**

a. Placement of concrete by pumping will be permitted only if specified in the contract documents or if authorized by the Engineer. The equipment shall be so arranged that no vibrations result which might damage freshly placed concrete. Equipment having components of aluminum and magnesium alloys in contact with the concrete shall not be permitted.

b. Where concrete is conveyed and placed by mechanically applied pressure, the equipment shall be suitable in kind and adequate in capacity for the work. The operation of the pump shall be such that a continuous stream of concrete without air pockets is produced. When pumping is completed, the concrete remaining in the pipeline, if it is to be used, shall be ejected in such a manner that there will be no contamination of the concrete or separation of the ingredients.

c. An admixture to aid in pumping the concrete may be used provided it has no deleterious effect on the concrete and subject to previous approval by the Engineer.

### **601-3.11 Construction Joints**

a. Construction joints shall be shear key type and shall be made only where shown on the plans or in the pouring schedule, unless otherwise approved by the Engineer. If not detailed on the plans, or in the case of emergency, construction joints shall be placed as directed by the Engineer. Joints shall be perpendicular to the principal lines of stress and, in general, shall be located at points of minimum shear. Necessary dowels, load transfer bars and bonding devices shall be placed as shown on the plans or directed by the Engineer.

b. Before depositing new concrete on or against concrete which has hardened, the forms shall be retightened. The surface of the hardened concrete shall be roughened in a manner that will not leave loosened particles of aggregate or damaged concrete at the surface. It shall be thoroughly cleaned of foreign matter and laitance, and saturated with water. To insure an excess of mortar at the juncture of the hardened and the newly deposited concrete, the cleaned and saturated surface, including vertical and inclined surfaces, shall first be thoroughly covered with a thin coating of mortar or neat cement grout against which the new concrete shall be placed before the grout has attained its initial set.

c. The placing of concrete shall be carried continuously from joint to joint. The face edges of all joints which are exposed to view shall be carefully finished true to line and elevation. At horizontal construction joints, gage strips 4 centimeters thick shall be placed inside the forms along all exposed faces to give the joints straight lines.



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### **601-3.12 Expansion Joints**

a. All expansion joints shall be located and constructed according to the details shown on the plans.

b. Open joints shall be placed at the locations shown on the plans and shall be constructed by the insertion and subsequent removal of a wood strip, metal or other approved material. The insertion and removal of the template shall be accomplished without chipping or breaking the corners of the concrete. Reinforcement shall not extend across an open joint unless so specified on the plans. Concrete corners shall be chamfered 2.5 centimeters or as shown on the plans.

c. Filled expansion joints shall be constructed similar to open joints. When premolded types are specified, the filler shall be placed correct position as the concrete on one side of the joints is placed. When the form is removed, the concrete on the other side shall be placed Water stops shall be carefully placed as shown on the plans. When during construction, an opening of 0.3 cm. or more appears in any joint over which traffic will occur, the opening shall be completely filled with hot tar or asphalt as directed by the Engineer.

d. Premolded expansion joint fillers shall be used where called for on the plans or as authorized by the Engineer. The filler for each joint shall be, furnished in a single piece for the full depth and width required for the joint unless other wise authorized by the Engineer. When the use of more than one piece is authorized for a joint, the abutting ends shall be fastened securely, and held accurately to shape by stapling or other positive fastening satisfactory to the Engineer.,

e. The places, angle or other structural shapes for steel joints shall be accurately shaped at the shop to conform to the section of the concrete floor.

### **601-3.12 Expansion Joints**

The fabrication and painting shall conform to the requirements of the specifications covering those items. When called for in the contract documents the material shall be galvanized in accordance with Specification 715 in lieu of painting. Care shall be taken to insure that the surface in the finished plane is true and free of warping. Positive methods shall be employed in placing the joints to keep them in correct position during the placing of the concrete. The opening at expansion joints shall be that designated on the plans at normal temperature, and care shall be taken to avoid impairment of the clearance in any manner.

f. Water stops shall be furnished and placed as provided on the plans. They shall be spliced, welded, or soldered, to form continuous watertight joints.

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### **601-3.13 Anchor Bolts and Bearing Devices**

a. All necessary anchor bolts in piers, abutments or pedestals shall be accurately set either in the concrete as it is being placed or in holes formed while the concrete is being placed, or in holes drilled after the concrete has set. Performed holes and drilled holes shall be at least 2.5 cm. in diameter larger than the bolts used. Bolts set in holes shall be permanently fixed with a non-shrink grout completely filling the holes.

b. Bearing plates, rockers and other expansion devices shall be constructed according to details shown on the plans. Unless set in plastic concrete or as otherwise specified, they shall be set in grout to insure uniform bearing.

c. The anchor bolts, rockers or other expansion devices shall be set to conform to the temperature at the time of erection.

d. When called for in the contract documents these materials shall be galvanized in lieu of painting.

### **601-3.14 Removal of Falsework and Forms**

a. Falsework and forms shall not be removed without the consent of the Engineer, however, the Engineer's consent shall not relieve the contractor of responsibility for the safety of the work.

b. When concrete strength test are used for controlling the removal of forms and supports, such removal shall not begin until the concrete has attained the percentage of the design strength specified in the contract documents. Concrete strength tests used for this purpose may include, in addition to test cylinders, Penetration Resistance of Hardened Concrete (ASTM C 803), Rebound Number of Hardened Concrete (ASTM C 803) and Pullout Strength of Hardened Concrete (ASTM C 900) subject to approval by the Engineer.

c. If falsework and forms removal is not controlled by cylinder tests, the falsework and forms for the various parts of the structure shall not normally be removed before the time indicated below has elapsed after placing the concrete, unless otherwise specified in the contract documents or authorized by the Engineer. The exact number of days shall be determined by the Engineer and will be dependent on the class of concrete, curing conditions and other factors.

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Mass piers except pier caps, mass abutments, columns and wall faces (not supporting loads)	1 day
Traffic railing and median barriers	1 day
Pier caps continuously supported	7 days
Slabs supported on stringers or prestressed concrete girders	7 days
Box girders, continuous slabs, box culvert top slabs, centering under girders, beams and arches	14 days

d. Items (3) I (4) and (5) above apply to falsework and forms supporting the full load of the concrete. Site forms and forms not supporting any loads may be removed after 12 hours to facilitate the finishing of exposed faces.

e. The above periods may be reduced as directed by the Engineer when early strength concrete is used.

f. Methods of form removal likely to cause overstressing of the concrete shall not be used. Supports shall be removed in such manner as to permit the concrete to uniformly and gradually take the stress due to its own weight.

g. Centers shall be gradually and uniformly lowered in such manner as to avoid injurious stresses in any part of the structure. In arch structures of two or more spans, the sequence of striking centers shall be specified or approved by the Engineer.

### 601-3.15 Depositing Concrete Under Water

a. Concrete, except for cofferdam seals, shall not be deposited under water except with the approval of the Engineer and under his immediate supervision. The method of placing concrete under water shall be as hereinafter described.

b. Concrete deposited under water shall be Class A concrete with 10 per cent excess cement. No extra payment will be allowed for the excess cement used. To prevent segregation, the concrete shall be carefully placed in a compact mass, in its final position, by means of a tremie, a bottom dump bucket or other approved method, and shall not be disturbed after being deposited. Still water shall be maintained at the point of deposit. Pumping shall be discontinued while depositing foundation concrete if it results in a flow of water inside the forms. The Contractor may submit for consideration the use of an appropriate additive to reduce the need for the excess cement.

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c. Care shall be exercised to prevent the formation of laitance. Concrete shall not be deposited until any laitance which may have formed on concrete previously placed has been removed. The use of aluminum pipes for depositing concrete will not be allowed.

d. For parts of structures under water, concrete seals shall be placed continuously from start to finish. As many tremies or dump buckets shall be provided and used as needed to insure that the work progresses without interruption until complete. The surface of the concrete shall be kept as nearly horizontal as practicable at all times. To insure thorough bonding, each succeeding layer of a seal shall be placed before the preceding layer has taken initial set.

e. A tremie shall consist of a tube having a diameter of not less than 25 centimeters and constructed in sections having flanged couplings fitted with gaskets. The tremie shall be supported so as to permit free movement of the discharge end over the entire top surface of the work and so as to permit rapid lowering when necessary to retard or stop the flow of concrete. The discharge end shall be closed at the start of work so as to prevent water entering the tube and shall be entirely sealed at all times; the tremie tube shall be kept full to the bottom of the hopper. When a batch is dumped into the hopper, the flow of concrete shall be induced by slightly raising the discharge end, always keeping it submerged in the deposited concrete. The flow shall be continuous until the work is completed.

f. In depositing concrete by a bottom dump bucket, the top of the bucket shall be open. The bottom doors shall open freely downward and outward when tripped. The bucket shall be completely filled and slowly lowered to avoid backwash.

It shall not be dumped until it rests on the surface upon which the concrete as to be deposited and when discharged shall be withdrawn slowly until well above the concrete. The mound of concrete shall be maintained between 10 and 20 centimeters.

g. Dewatering may proceed when the concrete seal is sufficiently hard and strong. All laitance or other unsatisfactory material shall be removed from the exposed surface by scraping, chipping, or other means which will not injure the surface of the concrete.

h. Tremie concrete used for dridge foundations shall be cored at the Contractor's expense for testing for compressive strength and for quality of the concrete. Coring shall be as specified in Article 601-2.10 j.

### **601-3.16 Rubble Concrete**

a. Rubble Concrete shall consist of Class B concrete containing large embedded stones. It shall be used only where shown on the plans or directed by the Engineer in massive piers, gravity abutments, and heavy footings. One-man and derrick stone used in rubble concrete shall consist of tough, sound, and durable rock. The stone shall be free from coating, seams or flaws of any characters. The stone shall be angular in shape and shall have a rough surface which will thoroughly bond with the surrounding mortar.

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b. The stone shall be carefully placed, not dropped or cast, so as to avoid injury to the forms or to the partially set adjacent masonry. Stratified stone shall be placed upon its natural bed. All stone shall be washed and saturated with water before placing.

c. The total volume of the stone shall not be greater than one third of the total volume of the portion of the work in which it is placed. For walls or piers greater than 60 centimeters but not over 1.2 meters in thickness, one-man stone shall be used with each stone surrounded by at least 15 cm. of concrete and no stone closer than 30 cm. to any top surface nor any closer than 15 cm. to any coping. For walls or piers greater than 1.20 meters in thickness, derrick stone may be used with each stone surrounded by at least 30 cm. of concrete and no stone shall be closer than 60 centimeters to any top surface nor closer than 20 centimeters to any coping.

d. Unless prohibited in the contract documents, the Contractor may supply all class B concrete in lieu of rubble concrete.

### **601-3.17 Concrete Exposed to Marine Environment**

a. Unless otherwise specifically provided in the contract documents, all concrete for structures exposed to a marine environment shall be Class A or Class A-4 concrete as shown on the plans and the water content shall be carefully controlled so as to produce concrete of maximum impermeability. The mixing time shall be not less than 2 minutes.

b. The concrete shall have a total water soluble chloride ion content not exceeding 0.15 percent by weight of cement.

c. Reinforcing steel shall normally be epoxy coated reinforcing steel conforming to the requirements of Specification 709-3.

d. The clear distance from the face of the concrete to the nearest face of uncoated reinforcement steel shall be as shown on the plans but not less than 10 centimeters and 7.5 centimeter for epoxy coated reinforcing steel.

e. The concrete shall be thoroughly compacted and stone pockets shall be avoided. No construction joints shall be formed and no form ties shall be used between levels of extreme low water and extreme high water as determined by the Engineer. Between these levels sea water shall not come in direct contact with the concrete for a period of not less than 30 days. The original surface, as the concrete comes from the forms shall be left undisturbed.

### **601-3.18 Concrete Exposed to Alkali Soil or Alkali Water**

Where concrete may be exposed to the action of alkaline water or soils air-entrained Class A concrete will be used, unless otherwise specified, and special care shall be taken to place it in accordance with the placing specifications included herein. Whenever possible, placing shall be continuous until completion of the section or until the concrete is at least 45 cm. above ground or water level. Alkaline waters or soils shall be kept from contact with the concrete during placement and for a period of at least 72 hours thereafter.

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### 601-3.19 Finishing Concrete Surfaces

#### a. General -

(1) Concrete surface finishes, except for bridge decks, sidewalks, and concrete pavements, shall be classified as follows:

Class 1 .....	Ordinary
Class 2 .....	Rubbed Finish
Class 3 .....	Float Finish

(2) All concrete, except bridge decks, sidewalks and concrete pavements, shall be given Class 1, Ordinary Finish, and in addition, such, other type of finish as specified in the plans or special provisions, if not otherwise specified the following surfaces shall be given a Class 2, Rubbed Finish. '

(a) The exposed faces of piers, abutments, wing walls and retaining walls. The surface finish on piers and abutments shall be limited to all exposed surfaces below bridge seats to 30 cm. below low water elevation, or 60 cm. below finished ground line when such ground line is above the water surface. Wing walls shall be finished from the top to 60 cm. below the finished slope lines on the outside face, and shall be finished on top and for a depth of 30 cm below the top on the back sides.

(b) The outside faces of fascia girders, beams, slabs, columns, brackets, curbs, headwalls, railings, arch wings, spandrel walls and parapets.

(3) The bottoms of deck slabs, bottoms of beams and girders, sides of interior beams and girders, backwalls above bridge seats and the underside of copings require only a Class 1 finish.

(4) Unless otherwise specified, concrete floors of minor structures shall be given a Class 3, Float Finish.

(5) Finish for concrete pavements shall be in accordance with the provisions of Specification 501 and for sidewalks in accordance with Specification 608.

(6) Bridge decks shall be finished in accordance with Article 601-3.19 e of this specification

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### **b. Class 1 - Ordinary Finish**

(1) Immediately following the removal of forms, all fins and irregular projections shall be removed from all surfaces except from those which are not to be exposed or are not to be waterproofed. On all surfaces, the cavities produced by form ties and all other holes, honeycomb spots, broken corners or edges and other defects shall be thoroughly cleaned, saturated with water, and shall be carefully pointed and trued with a mortar of cement and fine aggregate mixed in the proportions used in the grade of the concrete being finished. Mortar used in pointing shall be not more than one hour old. The mortar patches shall be cured as specified under Curing Concrete. All construction and expansion joints in the completed Work shall be left carefully tooled and free of mortar and concrete. The joint filler shall be left exposed for its full length with clean and true edges.

(2) The resulting surface shall be true and uniform. All surfaces which cannot be repaired to the satisfaction of the Engineer shall be rubbed as specified for Class 2, Rubbed Finish.

### **c. Class 2 - Rubbed Finish -**

(1) After removal of forms the rubbing of concrete shall be started as soon as its condition will permit. Immediately before starting this work, the concrete shall be kept thoroughly saturated with water. Sufficient time shall have elapsed before wetting down to allow the mortar used in the pointing of holes and defects to thoroughly set. Surfaces to be finished shall be rubbed with a medium coarse carborundum stone, using a small amount of mortar on its face. The mortar shall be composed of cement and fine sand mixed in the proportions used in the concrete being finished. Rubbing shall be continued until all form marks, projections, and irregularities have been removed, all voids filled and a uniform surface has been obtained. The paste produced by this rubbing shall be left in place at this time.

(2) After all concrete above the surface being treated has been cast, the final finish shall be obtained by rubbing with a fine carborundum stone and water. This rubbing shall be continued until the entire surface is of a smooth texture and uniform color.

### **d. Class 3 - Float Finish –**

The finish for horizontal surfaces, except for bridge decks, concrete pavements and sidewalks, shall be achieved by placing an excess of material in the form and removing or striking off the excess with a template, forcing the coarse aggregate below the mortar surface. Creation of concave surfaces shall be avoided. After the concrete has been struck off the surface shall be thoroughly worked and floated with a suitable floating tool. Before the finish has set, the surface cement film shall be removed with a fine brush in order to have a fine grained, smooth but sanded texture.

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e. Finishing bridge deck and other concrete surface. intended to be used as traveled way.

### **(1) General-**

(a) Unless otherwise specified, machine finishing shall be used on all bridge decks with the exception of small irregular areas.

(b) Screed supports shall be accurately set and of substantial construction, so that the finished roadway surface will conform to the profile and transverse sections shown on the plan. Screed supports shall be placed and adjusted to properly allow for the deflection of forms, falsework and structural supporting members which will occur during the placement of concrete.

(c) The bridge deck surface shall be uniformly smooth, dense and even. Variation in the pavement surface in excess of 7 mm. above or below the elevations required by the plans, or pavement surface irregularities of more than 3 mm. in 3 meters will not be accepted. The 3-meter straight edge shall be furnished by the Contractor and maintained in good condition at the paving site at all times.

(d) Surface irregularities in excess of the above stated limits shall be corrected as the Engineer may direct or approve. Surface irregularities shall be filled, while the pavement concrete is still plastic, with concrete of the same consistency, as specified for the paving operation. Excess thin mortar and laitance accumulating a head of the finishing screeds or lutes shall be removed and not used in filling depressions.

(e) Any addition of water to the concrete surface to assist in the finish operations shall be prohibited. When conditions are such that unusual rapid drying is occurring, an atomized mist shall be sprayed over the concrete surface by power-operated atomizing equipment to prevent rapid evaporation of water. The Engineer will monitor the use of the fine mist and will stop this practice at his discretion.

### **(2) Machine Finishing -**

(a) Machine finishing shall be accomplished with power driven transverse finishing machines. The specific method and equipment that the Contractor proposes to use shall be subject to the approval of the Engineer. Approval of the method and equipment will not relieve the Contractor of full responsibility for obtaining the required finished surface.

(b) Finishing machine shall be equipped with adjustable strike-off and finishing screeds, the bottom surface of which shall be adjusted to produce the required contour of the finished surface. Machine shall be kept in true adjustment. Machines out of adjustment shall not be used until proper adjustments have been approved by the Engineer.

(c) Just prior to beginning concreting operation, the finishing machine shall be operated over the full length of the bridge segment to be paved. This test run shall be made with the screed adjusted to its finishing position. While operating the finishing machine in this, test the screed



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rails shall be checked for deflection and proper adjustment, the cover on slab reinforcement measured and the controlling dimension~ of slab reinforcement and forms checked. All necessary corrections shall be made before concreting is begun.

(d) After the concrete has been placed, spread and consolidated to provide a uniformly dense structural slab, the surface shall be struck off immediately by the passage of the finishing machine. The finishing machine shall carry sufficient concrete in front of the screed to fill low places. This operation shall be repeated as may be necessary to produce uniformly consolidated dense smooth surface of the required contour. The first passages of the finishing machine shall provide a concrete surface slightly above grade so that after settlement, if any, and the disappearance of excess water from the surface, a final passage or passages of the finishing machine will result in a uniform surface at the required grade and contour over its entire area.

### (3) Hand Finishing –

Hand finishing, where permitted, shall be performed in such a manner as to produce the same wearing surface quality and uniformity as that produced by machine finishing. Finishing screeds shall be 25 centimeters or more in width and the contacting surfaces shall be steel. Hand operated screeds shall be used in such a manner as to duplicate the action of a transverse finishing machine. Hand finishing shall be performed in the same sequence and manner as machine finishing unless otherwise directed by the Engineer.

### (4) Final Finish -

(a) After the floating of the plastic concrete has been completed and the excess moisture has disappeared, but while the concrete is still fresh, the concrete surface shall be tested for trueness with a 3-meter straightedge. The Contractor shall provide and use a 3-meter straightedge swung from handles at least one meter longer than one-half of the deck width.

(b) The straightedge shall be held in a position parallel to the centerline of the roadway. The advance of this straightedge along the concrete surface shall be in successive locations of not more than one-half of its length.

(c) Any depressions found in excess of 3 mm in 3 meters shall be immediately filled with freshly mixed concrete, struck off, consolidated, and refinished. High areas shall be cut down and refinished. Special attention shall be given to assure that the surface across the expansion joints meets the requirements for smoothness. Straightedge testing and surface corrections shall be continue until the entire concrete surface is found to be free from observable departures from the straightedge and the slab conforms to the required grade and cross section.

(d) Following the completion of the straight edge operations, the surface shall be given a grooved texture with a set of spring steel tines. The grooves shall be perpendicular to the centerline of the concrete deck. Down pressure on the concrete surface shall be maintained at all times during texturing so as to obtain uniform texturing.

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(e) The spring steel tines of the grooving device shall be rectangular in cross section, approximately 0.32 cm. (1/8") wide and on 1.9 cm. (3/4") centers. The tines shall be of sufficient length, thickness and resilience to form grooves approximately 0.48 cm. (3/16") deep in the fresh concrete surface. Final texture shall be uniform in appearance with substantially all grooves having a depth of 0.48 cm (3/16") = 0.16 cm. (1/16"). Grooving will be terminated a distance of 2.5 cm on either side of the transverse contraction or construction joints. To facilitate drainage, 0.3 meter adjacent to the curbside shall not be textured.

(f) The time head may be operated by hand or mechanically. In any case, the tines shall be operated with their longitudinal axis at an approximate angle of 45 degrees to the concrete surface to eliminate dragging of mortar by the tines. The tines shall be kept free of hardened concrete particles. All grooved texture shall be accomplished with single pass of the tool.

### **601-3.20 Curing of Concrete**

#### **a. General-**

(1) All-newly placed concrete, except for concrete deck, shall be cured in accordance with one of the methods described below. Unless the contract documents require a specific method, the Contractor may use either method at his discretion. Curing shall be initiated immediately after placing and finishing. Curing shall be done so that moisture is always present and shall be an integral part of the concreting operations. Improperly cured concrete will be considered defective and the Engineer will stop all the Contractor's concrete placing operations until proper curing procedures are put into effect.

(2) Concrete surface which call for a Class 2, Rubbed Finish, shall be kept moist before and during the rubbing, and the wet curing shall be initiated immediately following the first rub while the concrete is still moist.

(3) Bridge decks shall be cured in accordance with Article 601-3.21

#### **b. Water Method -**

(1) This method includes supplying additional moisture to the concrete by sprinkly or fogging. All surfaces other than slabs shall be kept wet for at least 7 days and shall be protected from the sun by using coverings such as burlap, which retain the additional water supplied. Surfaces requiring a Class 2, Rubbed Finish, may have the cover temporarily removed while finishing but the cover shall be restored as soon as the finishing is completed.

(2) Concrete slabs shall be covered after finishing with burlap, cotton mats or other suitable moisture-retaining material and kept thoroughly wet for at least seven days.

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(3) Coverings which cause unsightly discoloration or staining of the concrete shall not be used. Any method which results in the concrete being alternately wet and dry will be considered improper curing procedure.

### c. Membrane Curing Compound -

(1) This method shall consist of preventing moisture loss from the concrete by the use of a membrane forming, white pigmented, curing compound, approved by the Engineer, which will retard the loss of water during the early hardening period and which will, because of its white pigment, reduce the temperature rise in the concrete exposed to the sun's radiation.

(2) All surface shall be given the required surface finish prior to application of the curing compound. During the finishing period, the concrete shall be protected by the water method of curing.

(3) The curing compound shall be applied with equipment that will produce a fine spray. The surface shall be sprayed in one direction and then followed immediately with a second application sprayed at right angles to the first one.

(4) The rate of application of curing compound will be as prescribed by the Engineer with a minimum spreading rate per application of one gallon of liquid coating for each 15 square meters of concrete surface.

The coat shall be applied immediately after stripping of forms and acceptance of the concrete finish. If the surface is dry, the concrete shall be thoroughly wetted with water and the curing compound applied just as the surface film of water disappears. During curing operations, any unsprayed surface shall be kept wet with water.

(5) The coating shall be protected against marring for a period of at least 7 days after application. Any coating marred or otherwise disturbed shall be given an additional coating. Should the surface coating be subjected continuously to injury, the Engineer will require that the water curing method be applied at once and continuously until the membrane curing compound can be reapplied over the affected areas.

(6) The curing compound shall be thoroughly mixed within an hour before use. It shall be of such character that the film will harden within 30 minutes after application.

(7) If the use of a curing compound results in a streaked or blotchy appearance, the method shall be stopped and water curing applied until the cause of the defective appearance is corrected.

(8) Any curing compound adhering to a surface to which new concrete is to be bonded shall be completely removed by sand blasting, powered steel brush or grinder, or other approved means.

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(9) If the Contractor cannot obtain a uniform curing compound membrane throughout the entire surface by means of spraying equipment, then the membrane shall be applied by brush or roller.

### **601-3.21 Curing Bridge Deck Slabs**

#### **a. General -**

(1) The top surface of all-newly placed concrete deck shall be cured by a combination of the liquid membrane curing and water curing hereinafter described. Curing shall be initiated immediately after the completion and acceptance of finishing operation on each section of the deck. Curing shall be done so that moisture is always present and shall be an integral part of the concreting operations. Failure to provide sufficient curing materials or improperly cured concrete will be cause for immediate suspension of the Contractor's concreting operations until those deficiencies are corrected.

(2) Membrane curing consist of preventing moisture loss from the concrete by the use of Type 2 Class A, white pigmented, curing compound, approved by the Engineer, which will retard the loss of water during the early hardening period and which will, because of its white pigment, reduce the temperature rise in the concrete exposed to the sun's radiation.

(3) Water curing shall consist of providing satisfactory moisture content to the concrete by spraying or fogging continuously water to the concrete surface for a period of at least 7 days. Deck surface shall be protected from weather condition by using coverings such as burlap, rug or cotton mats that keep the moisture content in concrete surface to ensure the continuity of concrete hydration at the optimum rate. Plastic sheets shall be used to cover the water-saturated coverings to prevent moisture loss.

(4) All exposed reinforcing steel shall be covered before curing compound is applied. Any curing compound adhering to a surface to which new concrete is to be bonded shall be completely removed by sand blasting, powered steel brush, grinder, or other approved means.

(5) The concrete shall not be left exposed for more than 30 minutes between stages of curing or during the curing period.

(6) Parapets surface, sidewalk, and horizontal and vertical faces of curbs may be cured in accordance with Article 601-3.20.

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### b. Curing Procedure -

(1) Type 2 Class A, white pigmented, curing compound shall be applied by power-operated atomizing spray equipment to obtain a uniform coating. The curing compound shall be applied uniformly to the concrete surface in two separated applications to prevent streaking. The second coating shall follow the first application within 30 minutes, and it shall be applied at right angles to the first one. The solution shall be applied at a minimum rate of one gallon of liquid coating per 15 square meters of concrete surface.

(2) If the surface is dry, the concrete shall be thoroughly wetted with water and the curing compound applied just as the surface film of water disappears. During curing operations, any unsprayed surface shall be kept wet with water.

(3) The curing compound shall be thoroughly mixed within an hour before use. It shall be of such a consistency that the film can be readily applied by power-operated and harden within 30 minutes after application.

(4) The liquid membrane-forming compound shall be delivered in the manufacturer original, clean, sealed containers. No liquid membrane-curing compound shall be accepted in containers other than manufacturer's original.

(5) The water curing shall be applied after the applications of curing compound have set, but not later than 4 hours after completion and acceptance of finishing operations.

(6) The concrete surface shall be covered with the moisture-retaining materials. After satisfactorily placing of mats, they shall be thoroughly saturated with water. The mats shall maintain fully contact with the surface covered and shall be maintained continuously wetted for a period of at least 7 days.

(7) The moisture-retaining material shall be saturated with water at the time the plastic sheets are installed. The sheets shall be of the widest practicable width and shall extend at least 0.3 meter beyond both ends of the deck. Adjacent sheets shall overlap a minimum of 0.3 meter. -The sheets shall be weighted down to avoid any displacement

(8) Any portion of the bridge deck subjected to walking, wheeling or other approval construction operation within curing period, the plastic sheets shall be protected from damage by placing wooden sheeting, plywood or other approved protective materials. Should any portion of the sheets be damaged, the damaged portion shall be immediately repaired.

## **SPECIFICATION 601 - STRUCTURAL CONCRETE**

### **601- 4 METHOD OF MEASUREMENT**

**601-4.01** - Structural concrete of each class included in the contract will be measured by the cubic meter in accordance with the dimensions shown on the plans or ordered by the Engineer. The measurement will not include concrete used in the construction of cofferdams or falsework. No deductions in volume will be made for the volume of reinforcing steel, drainage holes, weep holes, timber dumpers, pipes and conduits less than 30 cm. in diameter, or pile heads embedded in the concrete.

**601-4.02** - Concrete in reinforced bridge approach slabs and concrete pedestals for lighting standards on structures will be measured for payments under structural concrete of the class specified in accordance with the dimensions shown on the plans or ordered by the Engineer.

**601-4.03** - The volume obtained as stated above will not include any concrete required under any other item of work included under other specifications, when such other item provides that payment for the same includes payment for any concrete which forms part of it.

**601-4.04** - Reinforcing steel and other contract items which are included in the completed and accepted structure will be measured for payment in the manner prescribed in their respective specifications.

### **601- 5 BASIS OF PAYMENT**

**601-5.01** The completed and accepted quantities of each class of structural concrete will be paid for at the contract unit price per cubic meter except as specified in Article 601-5.05 below. Such prices and payment shall constitute full compensation for furnishing, placing, finishing and curing the concrete and for all materials, equipment, tools, labor and incidentals necessary to complete each item as required by the plans and specifications.

**601-5.02** The unit prices include full compensation for furnishing and placing all subsidiary items necessary to complete the structure such as joint fillers, flashing, metal drains, expansion joints, bearings and miscellaneous materials called for in the contract documents unless they constitute or are specifically covered by other pay items included in the contract.

**601-5.03** No separate pay allowance will be made for any increased cement content, for any admixtures, nor for any finishing of any description for concrete surfaces indicated on the plans or required by the specifications.

**601-5.04** No additional payment will be made for any concrete over dimensions stipulated in the contract documents nor for strength in excess of that specified. No payment will be made for the removal and disposal of any concrete found deficient and not accepted.

**601-5.05** Concrete found deficient in strength but which is accepted by the Authority under the provision of Article 601- 2.10 of this specification will be paid for at a reduced unit price.

a. The reduction in unit price will be computed in accordance with the following formula:  
 $R = 0.05D$

where: R= percentage reduction in unit price of the concrete.

D= Deficiency in psi of the moving average value from the specified strength.

## SPECIFICATION 601 - STRUCTURAL CONCRETE

b. The price reduction will be applied to all the volume of concrete represented by the three cylinder sets in a moving average subject to the following:

(1) No price reduction will be applied when the deficiency "D" in the moving average does not exceed 100 psi.

(2) The price reduction will be applied to any given volume of concrete only once. It will be applied on the basis of the value of the first deficient moving average of which it is a component.

(3) When the Contractor opts for drilling and testing cores as per paragraph 601-2.10 j. in lieu of accepting unit price reductions based on the cylinder tests, and the core strength values fail to meet the acceptance with no penalty criteria specified in paragraph 601-2.10j. (4), the core strength values will be divided 0.85 and the resulting values will be substituted in the moving average computations for computing the deficiency "D" and the applicable price reductions.

(4) The cylinder seta values and the core values of concrete which is classified as deficient, is rejected and ordered removed, as per paragraph 601-2.10 k will be omitted from the moving average and price reduction computations.

**601-5.06** Payment will be made under:

<u>Pay Item</u>	<u>Pay Unit</u>
Class A Concrete	Cubic Meter
Class A Concrete (Marine)	Cubic Meter
Class A-4 Concrete	Cubic Meter
Class A-4 Concrete (Marine)	Cubic Meter
Class B Concrete	Cubic Meter
Class D Concrete	Cubic Meter
Rubble Concrete	Cubic Meter

## **SPECIFICATION 602 - REINFORCING STEEL**

### **602-1 DESCRIPTION**

#### **60-1.01 Scope**

This work shall consist of furnishing and placing reinforcing steel in accordance with these specifications and in conformity with the plans or as established by the Engineer.

### **602-2 MATERIALS**

**602-2.01** Reinforcing steel shall be of the grade and class called for in the plans and meet the requirements of Article 109-1 of Specification 709. When the grade of the reinforcing steel is not specified in the plans, Grade 60 shall be provided.

**602-2.02** Prestressing Reinforcing Steel meet the requirements of the plans and of Article 709-2 of Specification 709.

**602-2.03** Epoxy Coated Reinforcing Steel shall meet the requirements of the plans and of Article 709-3 of Specification 709.

**602-2.04** -The Contractor shall submit to the Engineer manufacturer's certificates of compliance with the applicable specifications for the prestressing steel and the epoxy coated reinforcing steel. The Engineer may, at his discretion, also require such compliance certificates for the reinforcing steel.

**602-2.05** The Engineer will select for testing by the Authority such samples as may be deemed necessary in line with the Highway Authority's Construction Manual.

### **602-3 CONSTRUCTION REQUIREMENTS**

#### **602-3.01 Bar List and Bending Diagram**

a. Before ordering the reinforcing steel, bar lists and bending diagrams shall be furnished by the Contractor to the Engineer for approval, and no materials shall be fabricated until such lists and bending diagrams have been approved. The approval of bar lists and bending diagrams shall in no way relieve the Contractor of his responsibility for their correctness.



Any revision of materials furnished in accordance with such list and diagrams that may be required to comply with the design drawings shall be at the Contractor's expense..

b. Vertical reinforcement in columns, walls, piers and shafts shall not be fabricated until footing elevations are established in the field.

c. Reinforcement bars shall be shipped in standard bundles tagged and marked. Each bundle shall have a tag attached identifying the purchaser by name and address or by order number. In addition, each bundle of bars, whether straight or bent, shall be identified with the number of pieces, size, length, and mark number as shown on the structure drawings and schedules.

d. Substitution of different size bars will be permitted only upon written authorization of the Engineer. The substituted bars shall have an area equivalent to the design area, or larger, and shall conform to the AASHTO requirements for distribution of flexural reinforcement.

#### **602-3.02 Protection of Materials**

a. Steel reinforcement shall be stored above the surface of the ground upon platforms, skids or other supports and shall be protected as far as practicable from mechanical injury, and surface deterioration caused by exposure to conditions producing rust.

b. When placed in the work, the reinforcing steel shall be free from dirt, detrimental rust, loose scale, paint, grease, oil or other foreign materials. The steel shall also be free from injurious defects such as cracks and laminations. Rust, surface seams, surface irregularities, or mill scale will not be cause for rejection, provided the minimum dimensions, cross section area, and tensile properties of a hand wire brushed specimen meets the physical requirements for the size and grade of steel specified.

#### **602-3.03 Bending**

a. All steel reinforcing bars requiring bending shall be bent cold to the required shapes. Unless otherwise shown on the plans or authorized by the Engineer, the minimum diameter of bends for Grades 40 and 60 steel, measured on the inside of the bar, shall be as indicated below, except as provided in subsequent paragraphs b, c, and d.

<u>Bar Size No.</u>	<u>Minimum Diameter</u>
3 through 8	6 bar diameters
9,10 and 11	8 bar diameters
14 and 18	10 bar diameters

b. Bends in stirrups and tie bars of No. 5 or smaller size and shall have an inside diameter of not less than 4 bar diameters.

c. For bends not exceeding 180 degrees in Grade 40 bars sizes No. 3 to 11 inclusive, the minimum diameter shall not be less than 5 bar diameters.

d. The inside diameter of bends in smooth or deformed welded wire Fabric for stirrups and ties shall be not less than 4 wire diameters for deformed wire larger than 0-6 and 2-wire diameters for all other wires. Bends which inside diameter of less than 8-wire diameters shall not be less than 4-wire diameters from the nearest welded intersection.

e. Bars partially embedded in the concrete shall not be field bent except as shown on the plans or specifically authorized by the Engineer.

f. Epoxy coated reinforcement bars on which the coating is damaged by the bending work shall be evaluated by the Engineer who will decide whether they shall be repaired or replaced. Material used for coating repair shall be that provided by the coating applicator.

g. Cutting and bending, whether done at a shop or in the field, shall be performed by qualified operators using the proper appliances.

#### **602-3.04 Placing and Fastening-**

a. All reinforcing steel shall be accurately placed in the positions shown on the plans and firmly held during the placing and setting of concrete. Bars shall be tied at all intersections except where the spacing is less than 30 centimeters in each direction, in which case alternate intersections shall be tied.

b. Distance from the forms shall be maintained by means of approved supports. Blocks for holding reinforcement from contact with the forms shall be precast mortar blocks of approved shape and dimensions or approved metal chairs. Metal chairs which are in contact with the exterior surface of the concrete shall be galvanized. Layers of bars shall be separated by precast mortar blocks or by other equally suitable devices. The use of pebbles, pieces of broken scone or brick, metal pipe and wooden blocks will not be permitted. The spacing of bars shall be as shown on the drawing or as directed by the Engineer.

c. The supports for reinforcement steel shall not be spaced more than 1.10 meters apart transversely or longitudinally. The placement of deck reinforcing shall not deviate more than  $\pm 0.63$  centimeters ( $1/4$ ") in the vertical direction. The horizontal spacing of parallel bars shall not vary by more than  $\pm 2$  centimeters, but the average of any two adjacent spaces shall not exceed the plan spacing.

d. Placing bars in layers of fresh concrete as the work progresses and adjusting bars during the placing of concrete will not be permitted except where specifically required as part of the construction process.

e. Wire mesh reinforcement which is received in rolls shall be straightened out into flat sheets prior to placing.

f. All reinforcement shall be furnished in the full length indicated on the plans. Splicing, except where shown on the plans, will not be permitted without the approval of the Engineer and shall comply with the following:

(1) Splices shall be staggered as far as practicable and shall be located at points of low tensile stress.

(2) Lap splices shall not be used for bars Larger than No. 11 except as provided in the AASHTO Standard Specifications for Highway bridges.

(3) Splices shall not be permitted unless a minimum of 5 centimeters can be provided between the spliced bar and the nearest adjacent bar or concrete surface.

(4) Unless otherwise shown on the plans, all bars No. 11 or smaller be spliced by tapping 40 diameters and wiring together the full length of the lap.

(5) Reinforcing bars larger than No. 11 size, the bars shall be spliced in accordance with the requirements of the AASHTO Standard Specification for Highway Bridges.

(6) Wire mesh or bar mat reinforcement shall be spliced by overlapping sufficiently to maintain uniform strength and shall be securely fastened at the edge and end laps. The edge lap shall be not less than one full mesh in width.

(7) Welding of reinforcing steel shall be done only if detailed on the plans or authorized in writing by the Engineer. Welding shall conform to the latest edition of the American Welding Society publication "Structural Welding Code, Reinforcing Steel".

#### **602-3.05 Epoxy Coated Reinforcing Bars**

The handling, fabrication and installation of epoxy coated reinforcing bars shall be in accordance with the requirements specified in AASHTO M 284.

#### **602-3.06 Inspection**

No concrete shall be placed until the completed reinforcing steel has been inspected and permission for placing concrete granted by the Engineer. Concrete placed in violation of this provision may be rejected and, if ordered by the Engineer, shall be removed by the Contractor at his expense.

### **602-4 METHOD OF MEASUREMENT**

#### **602-4.01 Reinforcing Steel**

a. Steel reinforcement incorporated in the concrete will be measured in pounds based on The total computed weight for the sizes and length of bars, mesh or mats shown on the plans or authorized by the Engineer.

b. The weight of round bars will be computed on the basis of the nominal weights in pounds per foot specified in Table I of AASHTO M 31 for bar sizes No. 3 to No. 18 inclusive. For No. 2 (1/4") bars a weight of 0.167 lbs./ft will be used.

c. The weight of wire mesh reinforcement will be computed from the theoretical weight of plain wire. If the weight per square foot is given on the plans, that weight shall be used.

d. The weight of reinforcement used in railings, when railings are paid for on a linear meter basis, and of reinforcement steel in prestressed units, precast piles, reinforced concrete pipes and other items where the reinforcement is included in the contract price for the item will not be measured for payment.

e. No allowance will be made for clips, wire, separators, wire chairs, and other material used in fastening the reinforcement in place of bar sizes are substituted at the Contractor's request and result in more steel being used than specified, only the amount specified on the plans will be included in the measurement for payment.

f. When laps are made for splices, other than those shown on the plans, for the convenience of the Contractor, the extra reinforcing steel will not be included in the measurement for payment.

g. Whenever there are no bid items for reinforcing steel included in the contract, the required reinforcing steel shall be considered a subsidiary obligation of the Contractor with its cost included in the contract price for the concrete items, and no separate measurement for payment will be made.

**602-4.02** Epoxy Coated reinforcing Steel - Will be measured as provided under Article 602-4.01 above for uncoated reinforcing steel, using the same nominal weights per foot. When no separate pay item is provided in the contract, any epoxy coated reinforcement steel required by the plans will be measured for payment as uncoated reinforcing steel under the same conditions provided in Article 602-4.01 above.

**602-4.03** Prestressing reinforcing Steel - Will not be measured for direct payment. The cost of this material is included in the unit cost of the respective prestressed units.

## **602-5 BASIS OF PAYMENT**

**602-5.01** The completed and accepted quantities of reinforcing steel determined as provided above, will be paid for at the contract unit price per pound. Such prices and payment shall constitute full compensation for furnishing, fabricating, and placing the reinforcing steel and all materials, labor, equipment, tools and incidentals necessary to complete this work as required by the contract documents, or ordered by the Engineer.

**602-5.02 Payment will be made under:**

<u>Pay Unit</u>	<u>Pay Item</u>
Reinforcing Steel	Pound
Epoxy Coated Reinforcing Steel	Pound

## **SPECIFICATION 613 – TRAFFIC SIGNS**

### **613-1 DESCRIPCION**

#### **613-1.01 Scope**

- a. This work shall consist of erecting traffic signs, including sign structures, in accordance with this specifications and in conformity with the locations and details shown on the plans or as directed by the Engineer.
- b. Traffic sign support details not shown on the plans shall conform to the “Manual de Señales de Tránsito para las Vías Públicas de Puerto Rico”, hereinafter referred to as the MST of Department of Transportation and Public Works (DTPW), The “Manual de Dispositivos Uniformes para el Control de Tránsito en las Vías Públicas de Puerto Rico” (MDUCT) of the DTPW, and the standard drawings of the Highway Authority which provides details for the fabrication and erection of traffic signs and sign supports.
- c. The designation Roadside Traffic Signs applies to all signs erected on the shoulders, slopes, medians, gores, or sidewalks which do not extend over the traveled roadway.

### **613-2 MATERIALS**

#### **613-2.01 Sign Support**

When no specific design or design criteria is shown on the plans, the design of the sign support shall follow the AASHTO “Standard Specification for structural Support for Highway Signs, Luminaries and Traffic Signs”, except that:

- a. Wind loads of 150 mph for roadside signs.

#### **613-2.02 Roadside Sign Post**

Posts used for supporting roadside signs may be either galvanized steel or aluminum alloy at the Contractor’s option unless otherwise provided in the plans.

- a. Size and shape of posts shall be as indicated on the standard drawing or shown in the plans.
- b. Steel post shall conform to the requirement of AASHTO M 183 (ASTM A 36) – Structural Steel. AASHTO M 161, M 188, M 222, M223 – Grade 50 may also be used for posts and slip-impacted bases. All steel posts shall be galvanized in accordance with AASHTO M 111 (ASTM A 23) after fabrication (punching, drilling, etc.)
- c. Aluminum posts shall be of aluminum alloy conforming to ASTM B 221, Alloys 6061-T6, 6351-T5, 6063-T6 or 6005-T5, or ASTM B 308, Alloy 6061-T6.
- d. The length of posts to be installed shall be computed by the Contractor for each specific sign location based on the signs dimension, footing requirements and the required vertical and lateral clearances specified in the MST and the Standard

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Drawings, or as shown on the plans. For signs to be erected on two or more posts on a cut or file slope, the length of each post shall be varied as requires to conform the site conditions but maintaining the required footing depth and height and lateral clearances.

### **613-2.03 Fittings**

Assembly and stringer bars, stiffeners, wind beams, screws, washers, clamps, bolts, nuts, and other fasteners and fittings shall be of galvanized steel or aluminum alloy as shown on the standard drawings and the plans or specified by the Engineer. Structural steel assembly bars shall conform to the same requirements as for the steel posts included in Paragraph 613-2.05 b. above. Galvanization of steel hardware shall be in accordance with AASHTO M232 (ASTM 153). High strength steel bolts, nuts and washers shall conform to AASHTO M 164 (ASTM A 325), Aluminum alloy structural members shall conform to the same requirements as for aluminum posts included in Paragraph 613-2.05 c. above.

### **613-2.04 Concrete**

Portland Cement concrete for foundations and bases of sign posts shall conform to the applicable requirements of specification 601 – Structural Concrete, for the classes of the concrete specified in the standard drawings and project plans. When not specified, Class B for roadside signs.

### **613-2.05 Reinforcing Steel**

Shall conform to the requirements of Specification 602 – Reinforcing Steel.

## **613-3 CONSTRUCTION REQUIREMENTS**

### **613-3.01 Footing**

- a. The excavation and backfill for the footing of the sign post and support structures shall be performed in accordance with Specification 206 – Excavation of Structures.
- b. The contraction of concrete footing shall be in accordance with the details and dimension shown on the standard drawings or the project plans, or as designed by the Contractor and approved by the Authority, and in conformance with the applicable requirements of specification 601 – Structural Concrete.



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### **613-3.02 Erecting of Sign and Support**

- a. Signs and Sign support structures shall be erected at the locations shown on the plans, or selected by the Engineer, and in accordance with the details shown on the standard drawings, the MST, the MDUCT and the project plans.
- b. Erection of steel sign support structure shall conform to the applicable requirements of specification 616- Steel structures.
- c. Sign support and stub post shall be erected at a true vertical. Where two or more posts are required to support a sign, the posts shall be oriented and positioned so that no twist or warp will be imparted to the sign panels.
- d. All posts, shall be erected so that the signs are mounted approximately at right angles to the direction of, and facing, the traffic that they are intended to serve.
- e. To eliminate mirror reflection from sign faces, the sign edge furthest from the travel lanes shall be rotated 3 degrees away from the direction of approaching traffic. At curved alignments the angle of placement shall be determined by the estimate course of approaching traffic rather than by the roadway edge at the point where the sign is to be located. Sign faces are normally vertical but on grades it may be desirable to tilt a sign forward or backwards from the vertical to improve the viewing angle.
- f. Breakaway features for sign support requiring such features shall be fabricated and erected in accordance with the details specified in the standard drawings or as shown on the plans. The Contractor shall be responsible for providing a bolt tension calibrating device and for applying the proper torque to obtain the required residual bolt tension as specified in the standard models or project plans as soon as the sign support structure is erected. A written certificate to this effect shall be submitted to the Contractor for each sign structure completed.

### **613-3.03 Field Inspection**

- a. All material and workmanship will be inspected in the field unless it has been previously inspected. Immediately prior to erection, all material shall be inspected for damage which is attributable to improper transportation, handling or storage procedure and any damaged material shall be repaired or replaced by the Contractor at his expense.
- b. An inspection of the completely erected signs shall be made in the daylight for proper location, line and grade of signs and sign supports, appearance and visibility. The signs shall also be inspected at night by the Engineer to check for orientation, specular reflection and possible defect that may be more conspicuous at night.
- c. All apparent defects disclosed by the day and night inspections shall be corrected by the Contractor, at his expense, to the satisfaction of the Engineer.

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### **613-4 METHOD OF MEASUREMENT**

**613-4.01** Roadside traffic signs will be measured for payment by the unit with each individual sign assembly, whether consisting of a single sign or multiple signs, counted as a unit. The sign assemblies are designated by identification code numbers on the plans and contract schedule.

**613-4.03** For the purpose of payment each sign assembly unit shall consist of all the signs mounted on a single structure which may consist of one or more posts. The unit includes all the components necessary to complete the assembly as called for in the plans and specification including excavation, backfill, footing, supports, breakaway features, sign panels, brackets, hardware and other special features indicated.

### **613-5 BASIS OF PAYMENT**

**613-5.01** The contract unit price for each sign assembly shall be full compensation for the design, shop drawings, fabricating, furnishing and erecting the complete sign assembly and support structures including excavation, backfill, concrete footings, reinforcing steel, posts, structural members, brackets, fittings, hardware, sign panels, sign facings, breakaway features , sign illumination system and all other materials, equipment and labor necessary to complete each unit in accordance with the plans and specifications

**613-5.02** Payment will be made under:

<u>Pay Item</u>	<u>Pay Unit</u>
Traffic Sign Assembly – Mounting Type _____	Each

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**638-1 DESCRIPTION**

**638-1.01 Scope**

- a. This work shall consist of maintaining traffic and protecting the public from damage to person and property throughout the project contraction area from the duration of the contract. The Contractor shall be required to maintain and protect through and local traffic within the limits of the project, including traffic on all existing roads and streets which intersect the project within the project limits, and access driveways, except as otherwise provided on the plans or other contract documents. Traffic shall be maintained from the time the Contractor begins work at the project site until the final acceptance of the project.
- b. All work to be performed shall be as shown on the plans and Contract Documents, as specifies herein and as directed by the Engineer.
- c. The work includes furnishing, installing, moving, removing, and maintaining temporary construction sign, drums, pavement markings, concrete barriers and other control devices as may be requires for the maintenance and protection of traffic and pedestrian flow. It includes providing the necessary flag person with appropriate equipment for adequate traffic control on the traveled ways during construction operations. It also includes making any necessary repairs and maintaining the existing and temporary roadways within the project limits as required to provide a reasonably safe and smooth traveled way.
- d. All traffic control devices and traffic control operations shall be in accordance with the Manual on Uniform Traffic Control Devices for Streets and Highways, 2003 Edition adopted by the Puerto Rico Department of Transportation and Public Works (DPTW) and in particular with Part 6 – Temporary Traffic Control of this manual.
- e. The Contractor is placed on notice and that maintenance and protection of traffic over a highway during construction is considered as important as the construction itself. The Contractor shall at all times conduct his observations in manner to insure the convenience and safety of all travelers and abutting properly owners as well as the safety of his own employees.
- f. The Contractor is also put on notice that he has the primary responsibility for providing the necessary traffic control devices and taking other appropriate measures for the protection of the public and his personnel. The fact that provisions may be included in the plans ant other contract documents, or may be ordered by the Engineer, for the maintenance and protection of the traffic during construction, including the payment for certain items under this specification, does not relieve the Contractor of his responsibilities under the Technical Specifications or the General Conditions. In the absence of specific provisions in

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the contract plans and specification, or instruction from the Engineer, the Contractor shall provide at his expense such additional devices and operational measures as may be considered necessary for the protection of the public and his employees.

**638-2 MATERIALS**

**638-2.01 General**

- a. All traffic control devices shall conform to the design, dimensions, materials, color fabrication and installation requirements specified on the plans, the Manual on Uniform Traffic Control Devices for Streets and Highways (2003 Ed.) the Standard Drawings of the Highway Authority, and the applicable standard specifications as may be modified by this specification.
- b. All traffic control devices, whether new or used, shall be in good working condition and shall be subject to approval by the Engineer.
- c. Reflective sheeting of the high intensity type, shall be used on all devices requiring reflectorization.
- d. All other materials whether paid under this specification or under contract items , shall meet the requirements of their respective specifications

**638-2.02 Construction Signs**

Signs panel may be made of aluminum, galvanized steel or marine plywood. Wood supports may be used but shall be so designed as to yield if impacted by a moving vehicle. Nothing larger than 2"x2" nominal size timber shall be used except that 2"x4" may be used with be used with a 2" bored drilled 4" above ground level and the 4" side.

**638-2.03 Drums**

Drums shall be of plastic material and reflectorized in accordance with the requirements of Part 6 of the MUTCD, 2003 Ed.

**6382.04 Temporary Pavement Markings**

Temporary pavement markings shall comply with the following requirements:

- a. When placed on temporary pavement surface or on a layer of the pavement which is to be subsequently covered by another layer, reflectorized traffic paint or removable reflectorized traffic tape shall be used at the option of the Contractor.
- b. When placed on the final finished pavement surface, only removable reflectorized traffic tape shall be used.

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- c. Removable reflectorized traffic paint shall consist of glass spheres of a high optical quality embedded into a polymeric binder film on a suitable backing that is precoated with a pressure sensitive adhesive and conforming to the following requirements:
- (1) The glass spheres shall be of uniform gradation and distributed evenly over surface of the tape. The spheres adhesion shall be such that the spheres are not easily removed when the tape surface is scratched with a thumbnail.
  - (2) The color of the tape shall conform to standards highway colors for traffic marking paint and shall be readily visible when viewed under vehicular headlights at night
  - (3) The tape shall be precoated with a pressure sensitive adhesive and shall be capable of being adhered to asphalt concrete or portland cement concrete pavement surfaces without the use of the heat, solvents or other additional adhesive means. It shall be immediately readily for traffic after application and shall be capable of being removed intact or in large pieces either manually or with a recommended roll up device upon completion of service. A non-metallic medium shall be incorporated to facilitate removal.
  - (4) The tape, when applied in accordance with the manufacturer's recommended procedure, shall be of good appearance, free of cracks, and edges shall be true, straight and unbroken. The tape shall be weather resistant, and shall show no appreciable fading, lifting, or shrinkage during its useful life.

**638-2.06 Temporary Concrete Barrier**

Temporary concrete barrier sections shall be portable, shall be not less than 3.05 meters in length, and shall conform to shape and dimension shown on the plans and appropriate requirements of the Highway Authority specification for Concrete Median Barrier Lifting device shall not protrude from the sides of the barrier.

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**638-2.10 Roadway Maintenance**

Existing and temporary pavement shall be kept free of trash and debris and in good repair using materials compatible with the pavement. In general, plant-mixed bituminous concrete is suitable for all pavement surfaces. Other suitable material may be used if approved by the Engineer.

**638-3 CONSTRUCTION REQUIREMENTS**

**638-3.01 General**

- a. The Contractor shall notify the Engineer before starting any work that might inconvenience or endanger traffic. Arrangements shall be made by the Contractor for closing the road, if required, and providing detours, signs, barricades and other necessary appurtenances for the maintenance and protection of traffic prior to beginning the work.
- b. The Contractor shall follow the provisions for traffic maintenance indicated in the plans or ordered by the Engineer. The Contractor may submit alternative traffic maintenance plans for approval by the Engineer.
- c. The Contractor shall provide a traveled way suitable for two lanes of moving traffic, or more lanes when specified in the Contract Documents. The traveled way shall be kept reasonably smooth and hard at all times, and shall be well drained and free of potholes, bumps, irregularities and depressions that hold or retain water. The Contractor shall devote particular attention to all drainage facilities, keeping them fully operative at all times. This work will be paid for as maintenance as per paragraph 638-5.01 g. except for damage caused by the Contractor.
- d. Construction operations shall be conducted in such way as to insure a minimum of delay to traffic. Construction operations in high volume highways may be restricted to off-peak periods of the day. Stopping traffic for more than five minutes shall not be permitted unless specifically authorized by the Engineer.
- e. The Contractor shall keep the traveled way free of foreign objects such as spilled earth, rocks, timber, and other items that may fall from transporting vehicles. Material spilled by or dropped from any vehicle used in the Contractors' hauling operations along or across any public traveled way, both within and outside the project limits, shall be removed immediately. This work shall be at the Contractor's expense.
- f. Dusty conditions resulting from the Contractors operation shall be corrected by the use of calcium chloride, water, or other means acceptable to the Engineer, at the Contractor's expense.

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- g. The Contractor shall provide and maintain at all times, safe and adequate pedestrian and vehicular ingress and egress to and from intersecting highway, houses, business, and other establishments at existing or new access points, consistent with the work, unless otherwise shown in the plans or authorized by the Engineer. This work shall be at the Contractor's Expense.
- h. Existing traffic signs and other traffic control devices within the project limits which are to remain shall be protected from damage by construction operations. Any such item lost or damaged because of negligence on the part of the Contractor shall be replaced at the Contractor's expense. Should temporary relocation of any such items be required because of construction operations, they shall be placed as directed by the Engineer at the contractor expense.
- i. In the event of an unauthorized suspension of the work by the Contractor or when a temporary suspension of work is ordered by the Engineer because of failure of the Contractor to comply with any of the contract provisions or to carry out any legitimate order of the Engineer, it shall be the Contractor's responsibility to maintain the traffic in accordance with the requirements of this specification. During the days on which such suspension is in effect, the cost of maintenance of traffic will be borne by the Contractor at no extra cost to the Highway Authority. Maintenance of traffic during an authorized suspension of work for reasons not attributable to the Contractor's fault or negligence will be paid for in accordance with this specification.
- j. The Contractor shall not permit his employees to park their vehicle nor shall he store equipment or materials adjacent to the traveled way where it may be a hazard to traffic. A clear distance from the edge of the pavement consistent with the type of highway and space available shall be kept free of any such obstacles.
- k. Whenever construction operations near the traveled way result in a hazardous condition to the traveled public, such as excavation and replacement of shoulders, the extent of such operations should be limited to work that can be replaced within a reasonable period of time. Once started, such work should progress continuously to completion within a reasonable extent of time.
- l. Temporary traffic control devices shall remain in operation only as long as they are needed for traffic guidance and safety. Only those devices shall be in place as apply to conditions and operations in existence at a particular time.
- m. All traffic control devices shall be cleaned, repainted, reflectorized or replaced as necessary to provide adequate visibility and legibility at all times. This work shall be at the Contractor's expense.
- n. Any material in good condition covered from existing or temporary installation of guard rail, impact attenuators, traffic signal and highway lighting within the project limits may be incorporated into the final project location by the Contractor

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as called for in the plans and the Contractor will be compensated under the corresponding pay item. The use of such material shall be subject to approval by the Engineer.

**638-3.02 Construction Signs**

- a. The Contractor shall furnish, erect, maintain, move and remove construction signs as required and as directed by the Engineer to adequately and safely inform and direct the traveling public.
- b. The number of signs indicated in the MUTCD and the plans are a minimum and the Engineer may require additional signs. The Contractor shall have an adequate quantity of these signs and hand prior to starting construction operations for use as required.
- c. All signs and markers shall be appropriate for actual existing conditions and shall be covered, moved, removed, relocated or change as requires by changed conditions or as directed by the Engineer.
- d. All signs shall be kept clean and in good conditions for the duration of the Contract. They shall be mounted at the required height on adequate support and placed in proper position and alignment so as to give maximum visibility both day and night.
- e. During non-working hours and following the completion of a particular construction operation, all warning signs, except those required to remain for the safety of the public, shall be removed or covered.



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**638-3.03 Drums**

- a. The Contractor shall Furnish, erect, maintain, move, replace and remove construction drums where and as indicated on the plans, in the MUTCD Part 6, or as directed by the Engineer.

**638-3.04 Temporary Pavement Marking**

- a. The Contractor shall furnish, apply and, when so ordered, remove temporary pavement markings when shown on the plans or as ordered by the Engineer. Unless otherwise indicated in the Contract Documents, or ordered by the Engineer, any course of asphaltic concrete, including base course, upon which traffic will be maintained shall be properly delineated as soon as completed. Concrete surfaces shall be marked prior to opening to traffic.
- b. Paint used for pavement delineation shall be applied. Traffic tape shall be applied in accordance with the manufacturers' recommendations. Any tape that fails to adhere to the pavement surface during the period of use shall be replaced by the Contractor at no additional cost to the Highway Authority.

**638-3.05 Removal of Pavement Markings**

- a. The contractor shall remove existing and temporary pavement marking as shown on the plans or ordered by the Engineer. The existing pavement markings may be removed by grinding, sandblasting, scraping or any other method approved by the Engineer provided that it is conducted in such a manner that the pavement surface is not damaged or left in a patterns that will mislead or misdirect the motorist. Painting out pavement marking is not an acceptable method.

**638-3.06 Temporary Concrete Barrier**

- a. The Contractor shall furnish, install and maintain temporary concrete barriers at the location shown on the plans or ordered by the Engineer prior to beginning the construction work necessitating the use of such barriers.
- b. Temporary concrete barriers shall be used when it is necessary to provide a barrier that will deflect or stop an impacting vehicle. They shall be moved and relocated as required by the construction operations and shall be removed when ordered by the Engineer. The sequence of removal shall be in the direction opposite to the flow.

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**638-3.10 Flag Persons**

- a. The Contractor shall provide a sufficient number of competent flag persons in areas where construction equipment is operating in potential conflict with public traffic, regardless of the volume of the traffic and the sight distance.
- b. Whenever it becomes necessary to maintain traffic in two directions alerting in only one lane, the Contractor shall provide a sufficient number of flag persons to continuously control the alternating traffic.
- c. Flag persons shall wear orange helmets and vests and operate in conformance with the procedures and requirements of Part 6 of the MUTCD.
- d. Flag person shall be assigned normal work shifts. Any overtime hours will be paid to the Contractor at the contract unit price and the Contractors shall bear the cost of any required additional compensation for these hours.

**638-4 METHOD OF MEASUREMENT**

**638-4.01 Individual Basis**

The various devices required for the maintenance and protection of traffic will be measured as follows:

- a. Construction signs will be measured by the square meter area, computed to the nearest hundredth, for signs furnished, installed and accepted by the Engineer. Both fixed and portable signs will be measured for payment one time only, at the time of initial installation, except as provided under basis payment. The relocation, removal, reinstallation and maintenance of temporary signs required for the maintenance of traffic during construction shall be a subsidiary obligation of the Contractor included in the contract unit price for this item.
- b. Drums will be measured by the unit of the actual quantity furnished and installed as accepted by the Engineer. They will be measured one time only except as provided under the basis of payment. Their relocation, removal, reinstallation and maintenance as required for the maintenance of the traffic shall be a subsidiary obligation of the Contractor included in the contract unit price for this item.
- c. Each construction sign, drum and concrete barriers accepted and certified for payment by the Engineer shall be identified as directed by the Engineer for inventory and control purpose.

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- d. The quantity of temporary pavement markings to be paid for will be the actual markings placed as shown on the plans or ordered by the Engineer, measured as follows:
  - (1) Pavement lines of stripes will be measured in the linear meters to the nearest tenth of a meter, along their center line and shall be based on a 4-inch width. The linear measurement of lined of stripes specifies to be wider than 4-inches shall be adjusted in the ratio of the specified width to 4-inches.
  - (2) For dashed lines, the skip or open space between dashes will not be measured for payment.
  - (3) Double lines will be measured separately as for single lines
  - (4) Symbols and letters will be measured by each unit applied. A unit will consist of one letter or one symbol.
  - (5) The maintenance of temporary pavement markings throughout their period of need and use shall be an obligation of the Contractor included in the contract unit price for this item.
  - (6) The removal of temporary pavement markings will be an obligation of the Contractor under this pay item and no separate measurement and payment will be made.
- e. The pay item of removal of pavement markings applies only to the removal of permanent marking existing prior to construction. The quantity to be paid for will be measured to the nearest tenth of a lineal meter. Measurement will be made as provided for temporary pavement markings in paragraph “d” above except that symbols and letters will be also measured linearly along their longest dimension and no as units.
- f. The quantity of temporary concrete barrier to be paid for will be the linear meters, measures to the nearest tenth of a meter, of barrier installed as shown on the plans or ordered by the Engineer. Required temporary and sections will be included in the linear measurement. Temporary concrete barrier will be measured for payment only once, at the tome of initial installation, except under basis of payment. The relocation, removal and reinstallation of temporary concrete barriers as may be required during construction shall be a subsidiary obligation of the Contractor included in the contract unit price fro this item.
- g. The quantity of Flag persons to be paid for will be the actual number of man-hours for which Flag persons are furnished by the Contractor and accepted by the

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Engineer. Only Flag persons actually needed for the safe conduct of traffic will be considered for payment.

- h. Roadway maintenance items not covered by the contract unit prices will be measured as requires for force account work under the specifications.

**638-5 BASIS OF PAYMENT**

**638-5.01 Payment**

- a. The quantities determined as provided above for the construction signs, drums, temporary pavement markings, removal of pavement markings, temporary concrete barrier, will be paid for at the contract price per unit of measurement, respectively, for each of the particular by items included in the bid schedule. The unit price shall be full compensation for all material, equipment and labor necessary to complete each item as required by the pans and specifications, or ordered by the Engineer, including erection relocation, maintenance, operating cost, electric power cost, storage and removal.
- b. Traffic control devices required for the maintenance of the traffic which is removed from the project without the prior approval of the Engineer will not be considered fro payment.
- c. Any traffic control device that is damaged by the traffic, vandalism or other cause not attributable to negligence on the part of the Contractor will be repaired by the force account or by agreed unit price or will be replaced at the contract unit price when o ordered by the Engineer. However, no payment will be made for required repair or replacement of traffic control devices damaged by the Contractor's personnel or equipment, or as a result of negligence on his part, or for normal maintenance.
- d. No payment will be made for the repair and maintenance of temporary traffic signals and highway lighting requires because of malfunctioning, normal wear and tear, or damages caused by the Contractor's personnel or equipment. However, repairs to these items required by damage due to traffic accidents or other cause not attributable to the Contractor will be paid for on a force account or agreed price basis as may be agreed upon with the Engineer.
- e. Flag persons will be paid for at the contract unit price per hour for flag person furnished and accepted by the Engineer.
- f. Items necessary for the construction of temporary detours shown on the plans or ordered by the Engineer will be paid for on the basis of the contract unit price of the appropriate items included in the contract.
- g. Roadway maintenance items ordered and accepted by Engineer as paragraph 638-3.01 c will be paid for in accordance with the previsions of the specifications.

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However roadway maintenance required because of construction deficiencies, or because of damage caused by the contractor's operation or equipment, shall be undertaken by the contractor at his expense.

- h. In the event that contractor fails to maintain traffic in a satisfactory manner in accordance with the requirement of the specifications and of his specification he will be assessed liquidated damages at the rates specified in the specifications for each day of such failure. The engineer will notify the Contractor in writing of the effective date of application of this penalty. This is in addition of non- payment for items that the Contractor failed to provide and maintain under the requirement of this specification.
- i. If the Contractor fails to maintain and protect traffic adequately and safely for a period of 24 hours or more, the Engineer will correct the adverse condition by any means he deems appropriate and will deduct the cost of such corrective work from any monies due the Contractor. The cost of this work shall be in addition to the liquidated damages and non-payment for items specified above.
- j. When a design and construction of a bridge is going to be developed the measurement of maintenance of traffic will be taken as a Lump Sum for payment purpose.

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**638-5.02** Pay Items -payment will be made under:

<u>Pay Items</u>	<u>Pay Unit</u>
Construction Signs	SM
Drums	Each
Temporary Pavement Markings-Stripes	LM
Removal of Pavement Markings	LM
Temporary Concrete Barrier	LM
Flag Persons	Hour

## **SPECIFICATION 712 - MISCELLANEOUS MATERIALS**

### **712-1 Water**

**712-1.01** Water used in mixing or curing concrete shall be reasonably clean and free of oil, salt, acid, alkali, sugar, vegetable, or other substance injurious to the finished product. Water will be tested in accordance with and shall meet the suggested requirements of AASHTO T 26. Water known to be of potable quality may be used without testing. Where the source of water is relatively shallow the intake shall be so enclosed as to exclude silt, mud, grass or other deleterious substances.

### **712-2 Calcium chloride**

**712-2.01** Calcium chloride shall conform to the requirements of AASHTO M 144.

### **712-3 Hydrated Lime**

**712-3.01** Hydrated lime shall conform to the requirements of ASTM C 207, Type N.

### **712-4 Precast Concrete Curbing**

**712-4.01** Precast concrete curbing shall consist of precast portland cement concrete curb units constructed to the lengths, shapes, and other details shown on the plans. These units shall be constructed of the class of concrete, indicated on the plans and conforming to the requirements of Specification 601- Structural Concrete.

**712-4.02** The curbing units shall be reinforced as shown on the plans with reinforcing steel conforming to the requirements of Specification 602- Reinforcing Steel. .

**712-4.03** When required for driveways, crossings, closures, or for other reasons, and a depressed or modified section of curb is indicated on the plans or ordered by the Engineer the Contractor shall furnish curbing with the required modification.

### **712-5 Precast Concrete Unit**

**712-5.01** Precast portland cement concrete units shall be constructed to the shapes dimensions and other details shown on the plans and shall be cast in substantial permanent steel forms unless otherwise authorized by the Engineer.

**712-5.02** The portland cement concrete shall be of the class indicated on the plans and shall be manufactured, handled, cast, finished and cured in conformance with the applicable provisions of Specification 601 -Structural Concrete and Specification 602 -Reinforcing Steel. Precast prestressed concrete units shall conform to the applicable requirements of Specification 630 - Prestressed Concrete Structures.

**712-5.03** A sufficient number of cylinders shall be cast from each batch, or truck mixer load, of concrete to permit compression tests at 7, 14 and 28 days, and to allow for at least three cylinders for each test. If the strength requirement is met at 7 or 14 days, the units will be certified for use

14 days from the date of casting. If the strength requirement is not met at 28 days, all units made from that batch or load will be rejected unless, they are determined to be acceptable by the Authority on the basis of further testing and structural analysis.

**712-5.04** Cracks in units, honeycombed or patched areas in excess of 200 sq. cm's and failure to meet strength requirements will be causes for rejection.

**712-5.05** Precast reinforced concrete manhole base sections, riser sections and tops shall conform to the requirements. of AASHTO M 199 except as may be modified by details on the plans.

#### **712-6 Frames, Grates, Covers and Ladder Rungs**

**712-6.01** Metal units shall conform to the plan dimensions and details, and to the following specification requirements for the designated materials:

- a. Gray iron castings shall conform to the requirements of AASHTO M 105 (ASTM A 48). Strength class shall be optional unless otherwise specified in the plans.
- b. Carbon-steel castings shall conform to the requirements of AASHTO M 103 (ASTM A 27). Grade shall be optional unless otherwise specified in the plans.
- c. Structural steel shall conform to the requirements of AASHTO M 183 (ASTM A 36).
- d. Galvanizing, where specified for the above units, shall conform to the requirements of AASHTO M 111.
- e. Malleable iron castings, shall conform to the requirements of ASTM A 47. Grade will be optional unless otherwise specified.
- f. Aluminum alloy ladder rung material shall conform to the requirements of ASTM B 221, alloy 6061-T6 or 6005-T5.
- g. Aluminum castings shall conform to ASTM B 26, alloy 356- T6.

**712-6.02** Metal grates and covers, which are to rest on frames, shall bear on them evenly. They shall be assembled and tested before shipment and so marked that the same pieces may be reassembled readily in the same position when installed. Inaccuracy of bearings shall be corrected by machining, if necessary.

#### **712- 7 Plastic Filter Cloth**

**712-7.01** Plastic filter cloth shall consist of linear propylene, polyester or nylon fiber woven into pervious sheets of a uniform pattern with distinct openings and of no less than 25 mils thickness. The length and width of sheets may be varied to suit the manufacturers standards. Seams meeting the strength requirements of the plastic cloth will be permitted.



**712-7.02** Fibers of other composition or steel wire may, be woven into the cloth for reinforcing purposes. The durability of these fibers must be equivalent to that of the plastic filter cloth.

**712-7.03** The plastic filter cloth shall meet the following requirements:

<u>Physical Property</u>	<u>Test Method</u>	<u>Requirement</u>
Equivalent Opening Size (EOS)	*	70-100
Grab Tensile Strength Min.	ASTM D 1682	140 Lbs.
Grab Elongation	ASTM D 1682	25% Min. - 70% Max
Propylene, Polyester or Nylon Content	-	85% Min.

\* EOS is defined as the number of the US Standard Sieve having openings closest in size to the filter fabric openings. The cloth shall be tested using specially screened sand on a shaker for 20 minutes.

**712-7.04** The filter cloth shall contain stabilizers and/or inhibitors added to the base plastic to make the filament resistant to deterioration due to ultra-violet and heat exposure.

#### **712-7.05 Test Report**

The Contractor shall furnish to the Engineer copies of certified test reports from the manufacturer or from an independent laboratory showing all the data required to ascertain compliance with these specifications, and certification that the material meets the requirements of these specifications.



Anejo B

### Firma Autorizada

Fecha: \_\_\_\_\_

\_\_\_\_\_  
Nombre Compañía / No. Licitador

[ ] Negocio privado [ ] Corporación, o [ ] Asociación por la presente somete su oferta.

Seguro Social Patronal: \_\_\_\_\_

Hacemos constar que hemos leído todas las instrucciones, términos, condiciones y cláusulas del pliego de subastas; que entendemos y aceptamos cumplir con todas las cláusulas contenidas en la Subasta o el contrato.

La dirección sometida con esta oferta es la dirección donde recibimos nuestra correspondencia.

Yo, el firmante, CERTIFICO que estoy autorizado a firmar esta oferta y mi nombre y firma constan registradas en el Registro de Licitadores.

_____ Nombre en letra de molde	_____ Firma	_____ Puesto o cargo que ocupa
Dirección Postal: _____		
Dirección Física: _____		
_____ No. Teléfono y Fax: _____		

### Corporación Foránea

_____ Nombre del Agente Residente	_____ Dirección	_____ Teléfonos / Fax
--------------------------------------	--------------------	--------------------------



Anejo C

## AUTORIZACIÓN DE DUEÑO O SOCIO PRINCIPAL DE NEGOCIO NO INCORPORADO

ESTE FORMULARIO LO CUMPLIMENTARÁN LOS DUEÑOS DE NEGOCIOS NO REGISTRADOS O PARA CAMBIARLA PERSONA AUTORIZADA EN EL REGISTRO ÚNICO DE LICITADORES A FIRMAR OFERTAS

YO, \_\_\_\_\_ mayor de edad, \_\_\_\_\_, vecino de \_\_\_\_\_,  
Puerto Rico con Seguro Social Patronal \_\_\_\_\_ - \_\_\_\_\_ y dueño/socio principal de la empresa  
\_\_\_\_\_ que no es una corporación, por la presente AUTORIZO a comparecer en mi  
representación y la del negocio en las subastad del gobierno del Estado Libre Asociado de Puerto Rico, y me  
comprometo a honrar los precios ofrecidos por él en estas subastas.

Dado hoy \_\_ de \_\_\_\_\_ de 20\_\_, en \_\_\_\_\_, Puerto Rico.

\_\_\_\_\_

Nombre en letra de molde

\_\_\_\_\_

Firma

\_\_\_\_\_  
Jurada y suscrita ante mí, la "Autorización para Comparecer en Subastas del gobierno del Estado Libre Asociado de Puerto Rico", expedida por el declarante cuyas señas han sido mencionadas y a quien doy fe de conocer ( ) personalmente ( ) por dichos, y lo he identificado mediante \_\_\_\_\_.

En \_\_\_\_\_, Puerto Rico, a \_\_\_\_\_ de \_\_\_\_\_ de 20\_\_.

Abogado-Notario



Anejo D

## RESOLUCIÓN CORPORATIVA

Yo \_\_\_\_\_, mayor de edad, (estado civil) \_\_\_\_\_, (profesión) \_\_\_\_\_, y vecino de \_\_\_\_\_, en calidad de Secretario de la Corporación \_\_\_\_\_, certifico:

Que la Junta de Directores se reunió en sesión ordinaria celebrada el día \_\_\_\_\_ de \_\_\_\_\_ de 20\_\_\_\_, a la cual asistió el quórum reglamentario y resolvió autorizar a los oficiales nombrados a continuación, para que cualquiera de ellos, a nombre y en representación de esta corporación, puedan comparecer a los procesos de compra de bienes y servicios no profesionales realizados por las agencias de la Rama Ejecutiva del Estado Libre Asociado de Puerto Rico, corporaciones públicas y municipios, así como firmar ofertas y suscribir todo tipo de descuento requerido como parte de dicha comparecencia, por lo que sus firmas, las cuales se hacen constar en este documento, obligan a esta Corporación.

\_\_\_\_\_, Nombre, firma  
y posición de  
persona autorizada a firmar ofertas  
\_\_\_\_\_, Nombre,  
firma y posición de persona autorizada a firmar ofertas  
\_\_\_\_\_, Nombre, firma y posición de persona autorizada a firmar ofertas

Y PARA QUE ASÍ CONSTE, firmo y sello esta Certificación con el sello de la Corporación, en San Juan, Puerto Rico, hoy \_\_\_\_\_ de \_\_\_\_\_ de 20\_\_\_\_\_.

Secretario de la Corporación

Testimonio Número: \_\_\_\_\_

JURADA Y SUSCRITA ante mí por \_\_\_\_\_, mayor de edad, \_\_\_\_\_  
y vecino(a) de \_\_\_\_\_, en su carácter de Secretario de la Corporación y a quien identifiqué mediante  
\_\_\_\_\_ en \_\_\_\_\_, Puerto Rico, hoy \_\_\_\_\_ de  
\_\_\_\_\_ de 20\_\_\_\_\_.

\_\_\_\_\_  
NOTARIO PÚBLICO



## Anejo E

### DECLARACIÓN JURADA PARA NEGOCIOS DE TIPO INDIVIDUAL

Yo \_\_\_\_\_, en mi carácter personal, mayor de edad, (estado civil) \_\_\_\_\_ (profesión) \_\_\_\_\_, y vecino de \_\_\_\_\_, bajo el más solemne Juramento, DECLARO LO SIGUIENTE:

1. Que mi nombre y demás circunstancias personales son las anteriormente expresadas.
2. Que comparezco como dueño de negocio de tipo individual.
3. Que el nombre comercial de mi negocio (DBA) (si aplica), es el siguiente, \_\_\_\_\_
4. Que el propósito del negocio individual que represento es proveer los siguientes bienes, obras y/o servicios a las distintas agencias gubernamentales, corporaciones públicas y municipios que lleven a cabo procesos de compra de bienes y servicios no profesionales.  
\_\_\_\_\_  
\_\_\_\_\_.
5. Que las siguientes personas, cuyas firmas aparecen en el presente documento, están autorizadas a nombre y en representación del negocio, a firmar las ofertas que se sometan como parte de los procesos de compra de bienes y servicios no profesionales que se lleven a cabo por las distintas agencias, corporaciones públicas y municipios del Estado Libre Asociado de Puerto Rico.
6. Que las firmas de las personas que constan en el presente documento obligan al negocio que represento en todos los procesos de compra de bienes y servicios no profesionales realizados por las agencias de la Rama Ejecutiva del Estado Libre Asociado de Puerto Rico, corporaciones públicas y municipios. De igual forma, dichas personas están autorizadas a firmar ofertas y suscribir todo tipo de documento requerido como parte de dicha comparecencia.

\_\_\_\_\_  
Nombre, firma y posición de persona autorizada a firmar ofertas

\_\_\_\_\_  
Nombre, firma y posición de persona autorizada a firmar ofertas

\_\_\_\_\_  
Nombre, firma y posición de persona autorizada a firmar ofertas

7. Que suscribo la presente Declaración Jurada con el propósito de cumplir con uno de los requisitos para ingresar al Registro Único de Licitadores y para cualquier otro propósito administrativo y/o legal pertinente.

Y PARA QUE ASÍ CONSTE, juro y firmo la presente declaración en \_\_\_\_\_ a \_\_\_\_\_ de \_\_\_\_\_ de 20\_\_\_\_.

\_\_\_\_\_  
DECLARANTE

Testimonio Número: \_\_\_\_\_

JURADO Y SUSCRITO ante mí por \_\_\_\_\_, de las circunstancias personales anteriormente mencionadas y a quien identifico mediante \_\_\_\_\_, en \_\_\_\_\_, hoy \_\_\_\_\_ de \_\_\_\_\_ de 20\_\_\_\_.

NOTARIO PÚBLICO





ANEJO F  
CERTIFICACIÓN DE AUSENCIA DE CONFLICTO DE INTERÉS

Subasta Núm.: \_\_\_\_\_  
PARA LA ADQUISICIÓN DE \_\_\_\_\_

Yo, \_\_\_\_\_, de edad legal, de estado civil (casado/soltero), y residente de \_\_\_\_\_, he sido designado como representante autorizado de \_\_\_\_\_ ("el proponente") para el proceso de subasta en referencia, de la Autoridad Metropolitana de Autobuses (AMA). En virtud del interés de participar en la subasta en referencia, y consciente de que la AMA está altamente comprometida con lograr una administración de excelencia y promover el uso efectivo de los recursos del gobierno en beneficio de Puerto Rico, y por consiguiente apoyar y cumplir con la Ley 2-2018, conocida como el Código Anti-Corrupción para el Nuevo Puerto Rico, según enmendada, incluyendo el Título III, Código de Ética para Contratistas, Suplidores y Solicitantes de Incentivos Económicos del Gobierno de Puerto Rico, certifico que:

1. Ningún servidor público o empleado de la OIG tiene un interés pecuniario con alguno de los Proponentes que participan en este Proceso de Adquisición, ni lo han tenido -directa o indirectamente- en los últimos cuatro (4) años.
2. Ningún servidor público o empleado de la OIG ha solicitado o aceptado, directa o indirectamente, por parte de cualquier persona o entidad con interés en este Proceso de Adquisición, incluyendo al Proponente, bienes de cualquier valor económico -incluyendo regalos, propinas, favores, servicios, donativos, préstamos y/o cualquier otra cosa de valor monetario- para sí y/o para algún miembro de su familia inmediata y/o familiares y/o para cualquier otra persona, como mecanismo de pago por llevar a cabo los deberes y responsabilidades de su posición relacionado a este Proceso de Adquisición.
3. Ningún servidor público o empleado de la OIG ha solicitado o aceptado, directa o indirectamente, por parte de cualquier persona o entidad, incluyendo al Proponente, bienes de cualquier valor económico -incluyendo regalos, propinas, favores, servicios, donativos, préstamos y/o cualquier otra cosa de valor monetario- para sí y/o para algún miembro de su familia inmediata y/o familiares y/o para cualquier otra persona, a cambio de que su actuación influya el resultado final de este Proceso de Adquisición.

Iniciales del Proponente: \_\_\_\_\_

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4. No tengo una relación de parentesco dentro del cuarto (4to) grado de consanguinidad y/o segundo (2do) de afinidad, con algún servidor público o empleado de la OIG que participe o influyente -o tenga la capacidad para hacerlo- en las decisiones institucionales de la OIG.
5. En el caso de que el Proponente revele a la OIG un conflicto de intereses aparente, potencial o real, la OIG tomará las medidas apropiadas para abordar la divulgación tomando las siguientes medidas, que incluyen, entre otras, eliminar, mitigar o neutralizar el conflicto aparente, potencial o real, cuando corresponda, a través de medios tales como garantizar un equilibrio de puntos de vista, divulgación con los descargos de responsabilidad apropiados, restringiendo o modificando el trabajo a realizar para evitar o reducir el conflicto aparente, potencial o real.
6. Si el Proponente descubre un conflicto de intereses aparente, potencial o real después de que concluya el Proceso de Adquisición, hará una divulgación completa por escrito a la OIG. Esta divulgación incluirá una descripción de las acciones que el Proponente ha tomado o se propone tomar para evitar, mitigar o neutralizar el conflicto de intereses aparente, potencial o real.
7. El Proponente no tiene intereses presentes o actualmente planificados (financieros, contractuales, organizativos o de otro tipo) relacionados con el contrato o la orden de tarea que puedan resultar de este Proceso de Adquisición que crearía cualquier conflicto de intereses aparente, real o potencial (incluidos los conflictos de intereses para los miembros de la familia inmediata: cónyuges, padres, hijos) que afectaría su capacidad de ser imparcial, asistencia o asesoramiento técnicamente sólidos y objetivos, o que den lugar a que se le otorgue una ventaja competitiva desleal.
8. El Proponente ha ejercido, y continuará ejerciendo, la debida diligencia para evitar, identificar, eliminar o mitigar cualquier conflicto de intereses aparente, potencial o real a satisfacción de la OIG.
9. El proponente hace constar que su oferta es genuina y no colusoria o falsa; y que no ha conspirado, hecho contubernio, o acordado, directa o indirectamente, con ningún otro licitador o persona, presentar una oferta falsa, o abstenerse de licitar y no ha buscado en ningún asunto, directa o indirectamente, por acuerdo o contubernio, comunicación o conferencia, con cualquier persona, para fijar el precio de oferta del declarante o de cualquier otro licitador, o para fijar cualquier elemento general, de ganancia o costo de dicho precio de oferta, o del de cualquier otro postor, o para asegurar cualquier ventaja contra la OIG.

En virtud de lo anterior, yo, el/la Representante Autorizado(a) del Proponente, también, certifico que:

Iniciales del proponente: \_\_\_\_\_

Pág. 2 de 3





Tengo el compromiso de cumplir con las disposiciones aplicables de la Ley 2-2018, conocida como el Código Anti-Corrupción para el Nuevo Puerto Rico, según enmendada, incluyendo el Título III, Código de Ética para Contratistas, Suplidores y Solicitantes de Incentivos Económicos del Gobierno de Puerto Rico y reconocemos que esta aceptación es una condición esencial e indispensable para que se puedan efectuar transacciones o que se establezcan acuerdos con la OIG.

Muy en especial, certificamos que la persona natural o jurídica, que aquí desea participar de la adjudicación de una subasta o en el otorgamiento de algún contrato, con la AMA, para la realización de servicios o la venta o entrega de bienes, que ni la persona natural o jurídica, o cualquier presidente, vicepresidente, director, director ejecutivo, o miembro de una junta de oficiales o junta de directores, o personas que desempeñen funciones equivalentes para la persona jurídica, ha sido convicta o se ha declarado culpable de cualquiera de los delitos enumerados en la Sección 6.8 de la [Ley 8-2017](#), según enmendada, conocida como "Ley Administración y Transformación de los Recursos Humanos en el Gobierno de Puerto Rico", o por cualquiera de los delitos contenidos en el referido Código.

En \_\_\_\_\_, Puerto Rico, hoy, \_\_\_\_\_.

Firma:

Nombre en letra de molde:

Número de seguro social:

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Jurada y suscrita ante mí, la "Autorización para Comparecer en Subastas del gobierno del Estado Libre Asociado de Puerto Rico", expedida por el declarante cuyas señas han sido mencionadas y a quien doy fe de conocer ( ) personalmente ( ) por dichos, y lo he identificado mediante \_\_\_\_\_.

En \_\_\_\_\_, Puerto Rico, a \_\_\_\_ de \_\_\_\_ de 20\_\_.

Abogado-Notario

Iniciales del proponente: \_\_\_\_\_

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**SUBASTA FORMAL NÚM. 45-2223-001**  
**RENOVACIÓN Y ROTULACIÓN DE PARADAS**

**HOJA DE OFERTAS**  
**FORMULARIO AMA-01**

AMA-01

## HOJA DE OFERTAS

### Subasta Formal Núm. 45-2223-001

Nombre de la Empresa:  
Nombre del Representante Autorizado:  
Dirección Postal:  
Teléfono:  
Correo Electrónico:  
Número de Licitador (RUL)\*:

PARTIDA	DESCRIPCIÓN	UNIDAD	CANTIDAD	COSTO UNITARIO	COSTO POR PARTIDA
1	Limpieza de área de parada	EA	308		\$ -
	Especificaciones:				
	Términos y Condiciones:				
	Garantía:				
	Término de Entrega:				
	Ley Núm 14-2004, según enmendada:				\$ -
2	Remoción y disposición de rótulos existentes	EA	308		\$ -
	Especificaciones:				
	Términos y Condiciones:				
	Garantía:				
	Término de Entrega:				
	Ley Núm 14-2004, según enmendada:				\$ -
3	Instalación de Rótulos	EA	308		\$ -
	Especificaciones:				
	Términos y Condiciones:				
	Garantía:				
	Término de Entrega:				
	Ley Núm 14-2004, según enmendada:				\$ -
4	Base de Parada-Estructura Tipo I	EA	118		\$ -
	Especificaciones:				
	Términos y Condiciones:				
	Garantía:				
	Término de Entrega:				
	Ley Núm 14-2004, según enmendada:				\$ -
5	Base de Parada-Estructura Tipo II	EA	4		\$ -
	Especificaciones:				
	Términos y Condiciones:				
	Garantía:				
	Término de Entrega:				
	Ley Núm 14-2004, según enmendada:				\$ -

PARTIDA	DESCRIPCIÓN	UNIDAD	CANTIDAD	COSTO UNITARIO	COSTO POR PARTIDA
6	Base de Parada-Estructura Tipo III	EA	20		\$ -
	Especificaciones:				
	Términos y Condiciones:				
	Garantía:				
	Término de Entrega:				
	Ley Núm 14-2004, según enmendada:				\$ -
7	Base de Parada-Estructura Tipo IV	EA	240		\$ -
	Especificaciones:				
	Términos y Condiciones:				
	Garantía:				
	Término de Entrega:				
	Ley Núm 14-2004, según enmendada:				\$ -
8	Asientos de Paradas	EA	14		\$ -
	Especificaciones:				
	Términos y Condiciones:				
	Garantía:				
	Término de Entrega:				
	Ley Núm 14-2004, según enmendada:				\$ -
9	Movilización, Desmovilización y Mantenimiento de Tráfico	LS	1		\$ -
	Especificaciones:				
	Términos y Condiciones:				
	Garantía:				
	Término de Entrega:				
	Ley Núm 14-2004, según enmendada:				\$ -
10	Rótulo de Proyecto	EA	1		\$ -
	Especificaciones:				
	Términos y Condiciones:				
	Garantía:				
	Término de Entrega:				
	Ley Núm 14-2004, según enmendada:				\$ -
	Oferta			\$	\$
	Oferta Ajustada por Preferencia en Compras				\$
	Precio Adjudicación				\$

Si opta por no someter oferta, indique la justificación si desea ser considerado en futuras ocasiones.



Instrucciones:

- 1 Para cada partida, incluya una breve descripción del bien (incluyendo marca) o servicio solicitado por la AMA para el cual desea someter oferta.
- 2 Indique la unidad y la cantidad ofrecida, así como el costo unitario y el costo unitario en los respo
- 3 Multiplique el costo unitario por la cantidad ofrecida y colóquelo en la columna de "costo por pa
- 4 En la línea de "Especificaciones", describa las características de forma, función o utilidad del bien ofrecido, o alcance de trabajo del servicio no profesional ofrecido. Añada páginas adicionales de ser necesario.
- 5 En la Línea de "Términos y Condiciones", indique si acepta aquellos establecidos en las intrucciones de esta subasta formal. Añada páginas adicionales de ser necesario.
- 6 Coloque el término de cobertura de "Garantía". En la columna de unidad, indique si son meses o años, y en la columna de cantidad, el número.
- 7 En la línea de "Término de Entrega", exprese la unidad (horas, días, meses) y el número bajo la columna de cantidad.
- 8 Si va a reclamar el por ciento de preferencia de la referida Ley Núm. 14 - 2004, coloque el número del por ciento bajo la columna de cantidad, tal y como aparece en la Resolución emitida por la Junta de Inversión para la Industria Puertorriqueña. Luego, indique los valores ajustados bajo la columna de "costo por partida".
- 9 En la línea de "oferta" incluya los valores antes de aplicar el por ciento de preferencia.
- 10 En la línea de "oferta ajustada", incluya la oferta luego de aplicar los porcientos preferenciales que concede la Ley Núm. 14 - 2004, supra.
- 11 Recuerde indicar si existe alguna información confidencial o que deba permanecer protegida.
- 12 Al firmar este documento, y someterlo ante la consideración de la AMA, el representante autorizado de la empresa certifica que esta oferta es final y firme.
- 13 Recuerde proveer certificación en caso de reclamar exclusividad de un bien o servicio no profesional.

Firma:



Indique si esta es una oferta que enmienda alguna otra sometida previamente.

- \* En caso de no poseer certificación del RUL, siga las instrucciones dispuestas en la Sección II-R de las instrucciones de la subasta.