

GOVERNMENT OF PUERTO RICO
LA FORTALEZA
SAN JUAN, PUERTO RICO

Administrative Bulletin Number: OE-2020-097

EXECUTIVE ORDER OF THE GOVERNOR OF PUERTO RICO, HON. WANDA VÁZQUEZ-GARCED, FOR THE PURPOSES OF ESTABLISHING THE PUBLIC POLICY FOR THE RECONSTRUCTION OF THE ARECIBO RADIO TELESCOPE AND THE PROMPT RESUMPTION OF WORLD CLASS SCIENCE AND EDUCATION AT THE ARECIBO OBSERVATORY

WHEREAS: The iconic radio telescope at the National Astronomy and Ionosphere Center (NAIC), widely recognized as the Arecibo Observatory, suffered a catastrophic failure on December 1, 2020, when the 900-metric ton platform of scientific instruments suspended by cables 450 feet (137 meters) above a 1,000-foot-wide (305 meters) bowl-shaped reflector, crashed down into the dish.

WHEREAS: The NAIC began operations in 1963 and over the course of 57 years has functioned as a world class National Research Facility with unique capabilities for scientific discoveries and continuous contributions to national security, scientific research, climate understanding and monitoring, STEM education, and informal education. It is a facility of the National Science Foundation (NSF) located on approximately 120 acres of U.S. Federal Government-owned land near Arecibo, Puerto Rico. The facility consists of thirteen buildings used for a variety of purposes: research labs, living quarters, machine shops, recreational facilities, warehouses, a visitor center, a learning center, a library, among others.

WHEREAS: Dr. William E. Gordon, a professor of electrical engineering at Cornell University during the 1950s, conceived the Arecibo radar. Thomas C. Kavanagh, from the New York firm Praeger, Kavanagh and Waterbury created the selected structural design, and the telescope was completed in 1963 under contract with the U.S. Air Force Cambridge Research Laboratories at a total cost of about \$9 million with funds from the Advanced Research Projects Agency of the U.S. Department of Defense.

WHEREAS: During the 1960s, the Government of Puerto Rico made great efforts to facilitate the construction of the Arecibo Observatory including the donation of public land for the site; the use of public resources for the building of roads to the hardly accessible area in the mountain range; special escorts for equipment arriving from the United States to speed-up the delivery process to the construction site; laws to

prohibit the installation near any of the electronic facilities that could interfere with the radar's operation, and other helpful regulations.

WHEREAS:

The Arecibo Radio Telescope was constructed inside a karst sinkhole about 10 miles south of the coastal city of Arecibo, Puerto Rico. Scientists needed a powerful radar located near the equator line on American soil to enable the study of the ionosphere and planetary research. The Arecibo site offered the advantage of being located in karst terrain, with large limestone sinkholes which provided a natural geometry for the construction of the 305-meter reflector.

WHEREAS:

In 2001, the Arecibo Telescope was declared an Electrical Engineering and Computing Milestone by the Institute of Electrical and Electronic Engineers (IEEE) and a Historic Mechanical Engineering Landmark by the American Society of Mechanical Engineers (ASME) in recognition of its significance.

WHEREAS:

The thirteen buildings and the Radio Telescope that make up the Arecibo Observatory were designated as a Historic District included in the U.S. National Register of Historic Places on September 23rd, 2008 for their significant contributions to the advancement of astronomy and radio astronomy in the U.S. and internationally, its engineering landmark status, the high standing recognition of the facility in the international scientific community, the world-wide significance of the discoveries done by the Observatory, and its uniqueness among other radio telescopes throughout the world.

WHEREAS:

In 2018, the National Science Board approved the NSF award of the Cooperative Agreement for management and operation of the NAIC to the University of Central Florida (UCF) in Orlando, Universidad Ana G. Mendez (UAGM) in San Juan, and Yang Enterprises Inc. in Oviedo, FL. UCF manages the overall facility, while UAGM leads on educational outreach and Yang Enterprises leads on operations.

WHEREAS:

The Arecibo Observatory is the site of many key astronomical discoveries, including observations of the highly magnetized, spinning stars known as pulsars that led to the 1993 Nobel Prize in Physics awarded to scientists Russell Hulse and Joseph Taylor for their work in monitoring a pulsar in a binary system, providing a strict test of Einstein's Theory of General Relativity, and the first evidence for the existence of gravitational waves.

WHEREAS:

The Arecibo Observatory is the most sensitive ionospheric radar and has played a key role in monitoring the responses of the upper atmosphere to solar activity, coronal mass ejections, and solar flares that impact the radio wave propagation and adversely affect

communications and geopositioning, with the potential damage to electronics on the ground and satellites as well harm to astronauts in space that these natural phenomena entail.

WHEREAS:

Arecibo Observatory has been collecting high quality ionospheric, thermospheric, and exospheric data since 1963, forming one of the most significant, long-term, ground-based databases in existence with temporal and spatial resolution. The uniqueness of this data set provides the possibility to study anthropogenic impacts on the atmosphere.

WHEREAS:

The Arecibo Radio Telescope remains unmatched worldwide in near-Earth object (NEO) research, thus playing a crucial role in planetary defense. Arecibo has characterized 722 unique near-Earth asteroids since the enactment of Public Law 109–155—Dec. 30, 2005 (National Aeronautics and Space Administration Authorization Act of 2005 42 USC 16601, H.R. 4544), the George E. Brown Near-Earth Object Survey Act, a bill to provide for a NEO survey program to detect, track, catalogue, and characterize certain near-Earth asteroids and comets. The information derived from these Arecibo detections includes the objects' size, shape and velocity, thus allowing them to be tracked for decades or centuries into the future. These data are critical to calculate the observed NEOs' trajectories and determine whether they are on a collision-course with Earth.

WHEREAS:

The Arecibo Observatory is a multidisciplinary research facility of paramount importance to three communities of scientists, to wit: the North America Nanohertz Observatory for gravitational waves (NANOGrav), of the Very Long Baseline Interferometry (VLBI), and of the NASA Planetary Defense Coordination Office (PDCO). It serves these communities in their research efforts in space and atmospheric sciences, radio astronomy, and planetary science, coordinating the efforts to identify Near-Earth Objects and mitigate hazards as a response to the NASA Authorization Act of 2005. Further, it has 150 customers from 25 countries including universities and research institutes.

WHEREAS:

The Arecibo Observatory is a hub for national and international collaborations in science, technology and education that enriches the scientific culture of Puerto Rico and provides STEM training and inspiration for our youth and professional opportunities for our scientists and engineers. The data collected at the Arecibo Observatory has resulted in over 3,500 scientific publications and over 376 graduate theses. It is also an invaluable source of

information for the local, national and international media, which connects the general public with the scientific community.

WHEREAS: The Arecibo Observatory is home to the Angel Ramos Foundation Science and Visitor's Center, a STEM education facility with interactive exhibits that receives 90,000 visitors annually, of which 30,000 are pre-college students.

WHEREAS: The Arecibo Observatory contributes to enhancing the reputation and impact of Puerto Rico in world class science and technology, thereby propelling the knowledge-based economy in Puerto Rico.

WHEREAS: The Arecibo Radio Telescope has become a landmark and cultural symbol for Puerto Rico, similar to what the Golden Gate Bridge represents for San Francisco and what the Empire State Building represents for New York. It has become part of popular culture through Hollywood movies (1995 Golden Eye and 1997 Contact).

THEREFORE: I, **WANDA VÁZQUEZ-GARCED**, Governor of Puerto Rico, by virtue of the powers vested in me by the Constitution and the Laws of the Government of Puerto Rico, hereby declare and order the following:

SECTION 1: The Government of Puerto Rico states, as a matter of public policy, its conviction to the reconstruction of the Arecibo Radio Telescope and the prompt resumption of world class science and education at the Arecibo Observatory.

SECTION 2: The Arecibo Observatory is internationally recognized and declared as a place of high scientific, educational, social, cultural and historical value for Puerto Rico and the United States.

SECTION 3: The collapse of the radio telescope at the Arecibo Observatory brings the opportunity to redesign the whole instrument taking into account the lessons learned over the past 57 years of operation, and the input from the scientific community on what are the new capabilities that the instrument must have to remain relevant for decades to come.

SECTION 4: We envision a newly designed Arecibo Radio Telescope on the same site with a more powerful transmitter for radar astronomy, a wider field of view of the sky, and a larger effective aperture. These capabilities will enable new cutting-edge science and scientific discoveries from the Arecibo Observatory, enhanced national and global security, great professional opportunities for scientists and engineers, and a vigorous STEM education program for future generations.

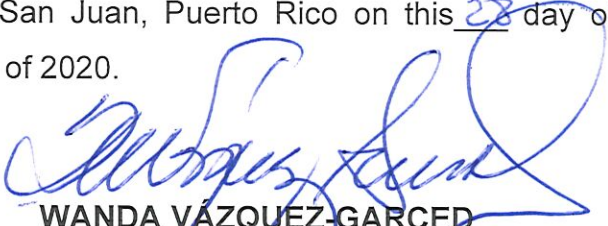
SECTION 5: The environmental remediation of the site, including the removal and safe disposal of all debris from the facility, is of paramount importance. This remediation has already begun under the guidance of the National Science Foundation.

- SECTION 6:** As a step forward in the reconstruction of the Arecibo Radio Telescope and a clear sign of the Government of Puerto Rico's conviction to this National Research Facility, we are assigning and obligating \$8,000,000 for the reconstruction efforts of the Arecibo Radio Telescope.
- SECTION 7:** The reconstruction efforts of the Arecibo Radio Telescope will begin upon authorization by the Federal Government, in collaboration with the University of Central Florida and its partners that operate the facility.
- SECTION 8:** We envision contributions from state, federal and private sources (including public-private partnerships and state-federal partnerships), which will enable the design, construction, and eventual operation of the new Arecibo Radio Telescope.
- SECTION 9:** Recognizing the scientific, social and cultural heritage values of the Arecibo Observatory for the people of Puerto Rico and humanity, the Puerto Rico Planning Board is entrusted with the designation of the area that comprises the Arecibo Observatory and existing properties under the number of cadastre 103-000-010-54 as a Historical Zone in the Puerto Rico Register of Historic Sites and Zones, in accordance with current regulations and following the delimitation established in the designation of the area as a Historic District in the National Register of Historic Places (NRHP). As a property already included in the NRHP, the Puerto Rico State Historic Preservation Office (PRSHPO), under the Office of the Governor, will be in charge of submitting the corresponding documentation to the Puerto Rico Planning Board for such purposes as established in Section 10.1.5.2 of the current *Reglamento Conjunto*. The Institute of Puerto Rican Culture will provide its corresponding endorsement to the Puerto Rico Planning Board in accordance with current regulations.
- SECTION 10:** **DEROGATION.** This Executive Order supersedes any other executive order that may be inconsistent with the provisions herein, to the extent of such inconsistency.
- SECTION 11:** **VALIDITY.** This Executive Order shall enter into force immediately and shall remain in force until it is amended or annulled by a subsequent executive order, or through a state or federal law.
- SECTION 12:** **SEVERABILITY.** The provisions of this Executive Order are separate and independent of each other, and if any part, section, provision, or sentence of this Executive Order is declared unconstitutional, void, or invalid by a court of jurisdiction and venue, such decision shall not affect the validity of the remaining provisions, which shall remain in full force.

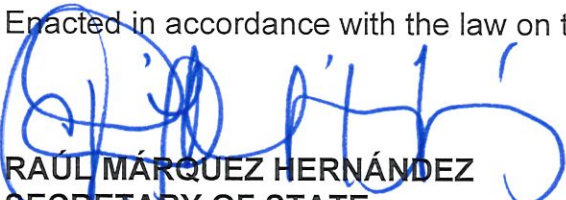
SECTION 13: **PUBLICATION.** This Executive Order must be filed immediately with the Department of State and the widest possible publication is hereby ordered.



IN TESTIMONY WHEREOF, I hereby issue this Executive Order under my signature and cause the Great Seal of the Government of Puerto Rico to be affixed in San Juan, Puerto Rico on this 28 day of December of 2020.


WANDA VÁZQUEZ-GARCED
GOVERNOR

Enacted in accordance with the law on this 28 day of December of 2020.


RAÚL MÁRQUEZ HERNÁNDEZ
SECRETARY OF STATE