



April 26, 2021

Mr. Jamie Christian
Division Administrator
Federal Highway Administration
350 Torre Chardón, Suite 210
San Juan, Puerto Rico 00918

**CATEGORICAL EXCLUSION REEVALUATION
EMERGENCY RELIEF PROGRAM FOR LANDSLIDE
REPAIR OF PR-722, KM. 5.70
AIBONITO, PUERTO RICO
ER-HWY-410
AC-811544/AC-841579**

Dear Mr. Christian:

We are submitting for your review and concurrence, the Categorical Exclusion Reevaluation prepared for the above reference project.

If you have any comments, please contact me the telephone number (787) 721-8787, extensions 1008.

Cordially yours,


Luis E. Rodríguez Rosa
Deputy Executive Director

Enclosure

Environmental Document Reevaluation

Conducted Pursuant to 23 CFR 771.129(c)

PROJECT INFORMATION

Project Name	Emergency Relief Program-Landslide Correction Project PR-722, Aibonito			AC Code	AC-811544 AC-841579
City	Aibonito, Puerto Rico			Federal Number	ER-9999(320)
Route Number	PR-722	From	KM. 5.70	To	KM. 5.70
Description	<p>On September 20, 2017, Puerto Rico was hit by the winds and rains of a catastrophic category 5 called Maria. Maria, left the island of Puerto Rico devastated, causing great damages in the highways. Multiple landslides have affected roads causing roadblocks and ground instabilities. Keeping roads and bridges in good condition is critical to the safety of the nation’s transportation system including Puerto Rico.</p> <p>The proposed Emergency Relief Program for Landslide project is located at the kilometer 5.7 of state road PR-722 in the Municipality of Aibonito. PR-722 is part of the Island’s secondary road network and Panoramic Route. The road traverses through mountainous terrain corresponding to the Central Mountain Range of Puerto Rico. The typical section of the proposed project will accommodate two (2) 3.65-meter wide lanes for bi-directional traffic. PRHTA proposes the reconstruction of 177 meters of PR-722 to repair the landslide that occurred during the passing of Hurricane María.</p> <p>The following work is included as part of the proposed project:</p> <ol style="list-style-type: none"> 1. Construction of a 163-meter long cantilever retaining wall. 2. Construction of curbs and drainage structures to channelize storm water runoff away from the embankment slope. 3. Partial demolition of the existing 24" diameter pre-cast concrete storm sewer pipe to discharge at the new retaining wall. 4. Installation of rip-rap at storm sewer discharge points to dissipate energy and minimize erosion. 5. Installation of a concrete barrier on top of the new retaining wall and w-beam guardrails at both approaches. 6. Cold milling and resurfacing of existing asphalt pavement to remain. 7. Installation of signs, pavement markings, raised pavement markers, and centerline rumble strip. 8. Other miscellaneous work. 				

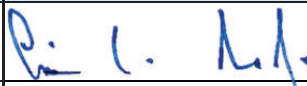

	<p>The construction will be done mostly within the existing Right-of-Way, except for an area of approximately 86 square meters of land to the north of the site will have to be acquired to accommodate the rip-rap at the discharge point of the storm sewer system. A temporary construction easement of approximately 2,143 square meters will be required to complete the proposed repairs. The proposed repairs are necessary to provide mobility, accessibility, and safety to highway users. PRHTA would provide compensation for landowners under laws of the Commonwealth of Puerto Rico, and the FHWA Uniform Relocation Assistance and Real Property Acquisition Policies Act (Uniform Act). The estimated construction cost is \$595,500.</p> <p>On December 6, 2019, PRHTA submit a Categorical Exclusion to Federal Highway Administration (FHWA) for the reference project, and it was concurred on December 9, 2019. For the project, A Phase IA Archaeological Study was completed, and no archaeological remains were identified in the area. Therefore, a determination of no historic properties was concluded. However, road PR-722 is a property eligible for listing on the National Register of Historic Places. PRHTA understand that the proposed repairs will not adversely affect the characteristic that make this structure potentially historic. A consultation to SHPO was performed on April 5, 2021 and they concurred with our determination of no adverse effect on historic properties on April 23, 2021. Copy of the documents are enclosed.</p> <p>The purpose of this reevaluation is to update the cultural resources coordination with SHPO.</p>
--	--

REEVALUATION QUESTIONS

NEPA Document Type	CE	NEPA Document Approval Date	CE-December 9, 2019	
1. Is the current project design, right of way limits and/or scope within the study area evaluated in the most recently approved environmental document?			YES	NO
			X	
Comments:	The current project design, right of way limits and scope is within the study area evaluated in the most recently approved environmental document.			
2. Has the project design complied with all environmental commitments or conditions identified during project development?			YES	
			X	
Comments:	The environmental commitments or conditions identified during project development remains the same as the previous indicated in the Categorical Exclusion approved. The purpose of this reevaluation is to update the cultural resources coordination with SHPO.			

3. Projects limits in environmental document:			
From:	PR-722 KM. 5.70	To:	PR-722 KM. 5.70
Project limits proposed on current plan:			
From:	PR-722 KM. 5.70	To:	PR-722 KM. 5.70
Are the project limits consistent?			YES
			NO
			X
Comments:	The proposed project limits do not changes.		
4. Have any project design or scope changes outside the original project extent or limits been added or removed from the project?			YES
			NO
			X
Description:	The current project design, scope and limits does not change.		

REVIEWERS

CONTACT	NAME	SIGN	DATE
Authorized Representative	Luis E. Rodríguez Rosa		April 26, 2021
FHWA Contact			

ANDRES
ALVAREZ-
IBANEZ
-IBANEZ
Digitally signed
by ANDRES
Date: 2021.04.27
21:01:56 -04'00'

EMERGENCY RELIEF PROGRAM
LANDSLIDE CORRECTION PROJECT
AC-811544

CATEGORICAL EXCLUSION

ER-HWY-410
PR-722, KM. 5.7, AIBONITO, PR
DDIR-PR-722-S-001

Puerto Rico Highway and Transportation Authority
Environmental Studies Office
PO Box 42007
San Juan, PR 00940-2007

November 2019



**Categorical Exclusion
Emergency Relief Program-Landslide Correction
Project ER-HWY-410, PR-722, km-5.7, Albonito, P.R.**

Table of Contents

Page

Puerto Rico Highway and Transportation Authority Categorical Exclusion Action Classification Form

I. General Information	3
II. Project Description	4
III. Purpose and Need	5
IV. Planning Consistency:	5
V. Proposed Improvements	6
VI. Environmental Issues Evaluated for the Proposed Action	10
VII. Environmental Commitments required for the proposed project	17

APPENDIXES

Appendix A	Emergency Declaration Documents
Appendix B	Figures and Project Design Plan
Appendix C	Detailed Damage Inspection Report (DDIR)
Appendix D	USFWLS Coordination
Appendix E	SHPO Coordination
Appendix F	Categorical Exclusion Checklist



**Puerto Rico Highway and Transportation Authority
 Categorical Exclusion Action Classification Form**

I. General Information			
State Project No.:	AC-811544	Federal Project:	ER-HWY-410
Project Name:	Emergency Relief Projects Landslide Correction Project Road PR-722, Km. 5.7	Route No:	PR-722
From Milepost:	Km. 5.7	To Milepost:	Km. 5.7
Municipality:	Aibonito	Length:	177 mts.
ROW Cost	\$30,000.00	Construction	\$595,500.00

Existing Facility	
ROW Width:	
No. Lanes & Width:	Bi-directional travel way with a total width of 6.8 meters, marked by solid white edge lines at both edges.
Shoulder Width:	0.0 mts.
Median:	0.0 mts.
Overall Roadway Width:	6.8 mts.

Proposed Facility	
ROW Width:	
No. Lanes & Width:	Two (2) 3.65-meter wide lanes.
Shoulder Width:	0.0 mts.
Median:	0.0 mts.
Overall Roadway Width:	8.20 mts.

II. Project Description (Included project scope and location and refer to the attached project location map)

The Puerto Rico Highway and Transportation Authority (PRHTA) plan to perform emergency repairs to various roadways due to damages caused by the passing of hurricanes Irma and María, in September, 2017. As a consequence of the mentioned damages, President Donald J. Trump and Governor Ricardo Rosselló declared a state of emergency in Puerto Rico. Appendix A includes reference documents of the emergency declaration for Puerto Rico. See copy of declaration documents in **Appendix A**.

PRHTA personnel conducted field visits to determine the damages in the Island's roadways. The project consists of the evaluation and reconstruction of landslides; i.e., slope instability, washouts and rock fall on several highway segments due to the impacts associated with hurricanes Irma and María. The highway segments are located within Puerto Rico's Federal Aid Highway System, and other highways and roads under the Department of Transportation and Public Works (DTPW) jurisdiction. Completed work consisted of site reconnaissance, investigations, monitoring and studies, which were necessary to provide appropriate recommendations to reconstruct the highway to its previous condition.

The landslide identified as ER-HWY-410 impacted State Road PR-722, at Km. 5.7, which is part of the Island's secondary road network and Panoramic Route. The road traverses through mountainous terrain corresponding to the Central Mountain Range of Puerto Rico. PRHTA proposes the reconstruction of 177 meters of PR-722 to repair the landslide that occurred during the passing of Hurricane María. The typical section of the proposed project will accommodate two (2) 3.65-meter wide lanes for bi-directional traffic. **Appendix B** includes the project's location map, aerial photograph, and proposed plan.

The following work is included as part of the proposed project:

1. Construction of a 163-meter long cantilever retaining wall.
2. Construction of curbs and drainage structures to channelize storm water runoff away from the embankment slope.
3. Partial demolition of the existing 24" diameter pre-cast concrete storm sewer pipe to discharge at the new retaining wall.
4. Installation of rip-rap at storm sewer discharge points to dissipate energy and minimize erosion.
5. Installation of a concrete barrier on top of the new retaining wall and w-beam guardrails at both approaches.
6. Cold milling and resurfacing of existing asphalt pavement to remain.
7. Installation of signs, pavement markings, raised pavement markers, and centerline rumble strip.
8. Other miscellaneous work.

The construction will be done mostly within the existing Right-of-Way, except for an area of approximately 86 square meters of land to the north of the site will have to be acquired to accommodate the rip-rap at the discharge point of the storm sewer system. A temporary construction easement of approximately 2,143 square meters will be required to complete the proposed repairs. The proposed repairs are necessary to provide mobility, accessibility, and safety to highway users.



**Categorical Exclusion
 Emergency Relief Program-Landslide Correction
 Project ER-HWY-410, PR-722, km-5.7, Aibonito, P.R.**

III. Purpose and Need	
<p>The landslide impacted State Road PR-722, which is part of the Island's secondary road network and Panoramic Route. According to PRHTA, PR-722 spans 7.8 kilometers and starts at PR-14, Km. 51.3, in the Municipality of Aibonito, heading Southerly, following Preventorio Road of Aibonito to Preventorio Insular de Niños, Southeast of the same Municipality.</p> <p>PRHTA records show that PR-722, Km. 5.55, had an Annual Average Annual Daily Traffic (AADT) of 2,259 vehicles in 2010. Due to the passing of Hurricane Maria in September, 2017, the road suffered damages due to a landslide that reduced the roadway's width by approximately 2.6 meters, affecting traffic and safety in the area.</p> <p>The Detailed Damage Inspection Report (DDIR) included in Appendix C identifies the site as part of the emergency relief program. This proposed project will stabilize the roadway slopes and allow highway users of the complete roadway section safely.</p>	
IV. Planning Consistency:	
Estimated Construction Time:	6 months
Estimated Construction Cost:	\$595,500.00
Estimated Date for ROW:	First semester of 2020
Estimated Date for PS&E:	Second semester of 2019
Estimated Date Construction Phase Begins:	Second semester of 2020
Project STIP Consistency:	This project will be financed with funds from the Emergency Relief Program associated to hurricanes Irma and Maria. The corresponding DDIR is included in Appendix C.

V. Proposed Improvements

- 771.115 Classes of Actions

(b) Class II (CESs). Actions that do not individually or cumulatively have a significant environmental effect are excluded from the requirement to prepare an EA or EIS. A specific list of CEs normally not requiring NEPA documentation is set forth in § 771.117(c) for FHWA actions or pursuant to § 771.118(c) for FTA actions. When appropriately documented, additional projects may also qualify as CEs pursuant to § 771.117(d) for FHWA actions or pursuant to § 771.118(d) for FTA actions.

771.117 FHWA Categorical Exclusions

(a) Categorical exclusions (CEs) are actions which meet the definition contained in 40 CFR 1508.4, and, based on past experience with similar actions; do not involve significant environmental impacts. They are actions which: do not induce significant impacts to planned growth or land use for the area; do not require the relocation of significant numbers of people; do not have a significant impact on any natural, cultural, recreational, historic or other resource; do not involve significant air, noise, or water quality impacts; do not have significant impacts on travel patterns; or do not otherwise, either individually or cumulatively, have any significant environmental impacts.

(b) The following actions meet the criteria for CEs in the CEQ regulations (40 CFR 1508.4) and 771.117(a) and normally do not require any further NEPA approvals by the FHWA:

Check one or more of the following improvements which apply to the project:

- (1) Activities which do not involve or lead directly to construction, such as planning and research activities; grants for training; engineering to define the elements of a proposed action or alternatives so that social, economic, and environmental effects can be assessed; and Federal-aid system revisions which establish classes of highways on the Federal-aid highway system.
- (2) Approval of utility installations along or across a transportation facility.
- (3) Construction of bicycle and pedestrian lanes, paths, and facilities.
- (4) Activities included in the State's highway safety plan under 23 U.S.C. 402.
- (5) Transfer of Federal lands pursuant to 23 U.S.C. 107(d) and/or 23 U.S.C. 317 when the land transfer is in support of an action that is not otherwise subject to FHWA review under NEPA.
- (6) The installation of noise barriers or alterations to existing publicly owned buildings to provide for noise reduction.
- (7) Landscaping.
- (8) Installation of fencing, signs, pavement markings, small passenger shelters, traffic signals, and railroad warning devices where no substantial land acquisition or traffic disruption would occur.
- (9) The following actions for transportation facilities damaged by an incident resulting in an emergency declared by the Governor of the State and concurred in by the Secretary, or a

**Categorical Exclusion
Emergency Relief Program-Landslide Correction
Project ER-HWY-410, PR-722, km-5.7, Albonito, P.R.**

disaster or emergency declared by the President pursuant to the Robert T. Stafford Act (42 USC 5121):

- (i) Emergency repairs under 23 U.S.C. 125; and
- (ii) The repair, reconstruction, restoration, retrofitting, or replacement of any road, highway, bridge, tunnel, or transit facility (such as a ferry dock or bus transfer station), including ancillary transportation facilities (such as pedestrian/bicycle paths and bike lanes), that is in operation or under construction when damaged and the action:
 - (A) Occurs within the existing right-of-way and in a manner, that substantially conforms to the preexisting design, function, and location as the original (which may include upgrades to meet existing codes and standards as well as upgrades warranted to address conditions that have changed since the original construction); and
 - (B) Is commenced within a 2-year period beginning on the date of the declaration.
- (10) Acquisition of scenic easements.
- (11) Determination of payback under 23 U.S.C. 156 for property previously acquired with Federal-aid participation.
- (12) Improvements to existing rest areas and truck weigh stations.
- (13) Ridesharing activities.
- (14) Bus and rail car rehabilitation.
- (15) Alterations to facilities or vehicles in order to make them accessible for elderly and handicapped persons.
- (16) Program administration, technical assistance activities, and operating assistance to transit authorities to continue existing service or increase service to meet routine changes in demand.
- (17) The purchase of vehicles by the applicant where the use of these vehicles can be accommodated by existing facilities or by new facilities which themselves are within a CE.
- (18) Track and rail bed maintenance and improvements when carried out within the existing right-of-way.
- (19) Purchase and installation of operating or maintenance equipment to be located within the transit facility and with no significant impacts off the site.
- (20) Promulgation of rules, regulations, and directives.
- (21) Deployment of electronics, photonics, communications, or information processing used singly or in combination, or as components of a fully integrated system, to improve the efficiency or safety of a surface transportation system or to enhance security or passenger convenience. Examples include, but are not limited to, traffic control and detector devices, lane management systems, electronic payment equipment, automatic vehicle locaters, automated passenger counters, computer-aided dispatching systems, radio communications systems, dynamic message signs, and security equipment including surveillance and detection cameras on roadways and in transit facilities and on buses.

**Categorical Exclusion
Emergency Relief Program-Landslide Correction
Project ER-HWY-410, PR-722, km-5.7, Albonito, P.R.**

(22) Projects, as defined in 23 U.S.C. 101, that would take place entirely within the existing operational right-of-way. Existing operational right-of-way refers to right-of-way that has been disturbed for an existing transportation facility or is maintained for a transportation purpose. This area includes the features associated with the physical footprint of the transportation facility (including the roadway, bridges, interchanges, culverts, drainage, fixed guideways, mitigation areas, etc.) and other areas maintained for transportation purposes such as clear zone, traffic control signage, landscaping, any rest areas with direct access to a controlled access highway, areas maintained for safety and security of a transportation facility, parking facilities with direct access to an existing transportation facility, transit power substations, transit venting structures, and transit maintenance facilities. Portions of the right-of-way that have not been disturbed or that are not maintained for transportation purposes are not in the existing operational right-of-way.

(23) Federally-funded projects:

(i) That receive less than \$5,000,000 (as adjusted annually by the Secretary to reflect any increases in the Consumer Price Index prepared by the Department of Labor, see www.fhwa.dot.gov or www.fta.dot.gov) of Federal funds; or

(ii) With a total estimated cost of not more than \$30,000,000 (as adjusted annually by the Secretary to reflect any increases in the Consumer Price Index prepared by the Department of Labor, see www.fhwa.dot.gov or www.fta.dot.gov) and Federal funds comprising less than 15 percent of the total estimated project cost

(24) Localized geotechnical and other investigation to provide information for preliminary design and for environmental analyses and permitting purposes, such as drilling test bores for soil sampling; archeological investigations for archeology resources assessment or similar survey; and wetland surveys.

(25) Environmental restoration and pollution abatement actions to minimize or mitigate the impacts of any existing transportation facility (including retrofitting and construction of stormwater treatment systems to meet Federal and State requirements under sections 401 and 402 of the Federal Water Pollution Control Act (33 U.S.C. 1341; 1342)) carried out to address water pollution or environmental degradation.

(26) Modernization of a highway by resurfacing, restoration, rehabilitation, reconstruction, adding shoulders, or adding auxiliary lanes (including parking, weaving, turning, and climbing lanes), if the action meets the constraints in paragraph (e) of this section.

(27) Highway safety or traffic operations improvement projects, including the installation of ramp metering control devices and lighting, if the project meets the constraints in paragraph (e) of this section.

(28) Bridge rehabilitation, reconstruction, or replacement or the construction of grade separation to replace existing at-grade railroad crossings, if the actions meet the constraints in paragraph (e) of this section.

(29) Purchase, construction, replacement, or rehabilitation of ferry vessels (including improvements to ferry vessel safety, navigation, and security systems) that would not require a change in the function of the ferry terminals and can be accommodated by existing facilities or by new facilities which themselves are within a CE.

**Categorical Exclusion
Emergency Relief Program-Landslide Correction
Project ER-HWY-410, PR-722, km-5.7, Albonito, P.R.**

(30) Rehabilitation or reconstruction of existing ferry facilities that occupy substantially the same geographic footprint, do not result in a change in their functional use, and do not result in a substantial increase in the existing facility's capacity. Example actions include work on pedestrian and vehicle transfer structures and associated utilities, buildings, and terminals.

(e) Actions described in (c)(26), (c)(27), and (c)(28) of this section may not be processed as CEs under paragraph (c) if they involve:

- (1) An acquisition of more than a minor amount of right-of-way or that would result in any residential or nonresidential displacements;
- (2) An action that needs a bridge permit from the U.S. Coast Guard, or an action that does not meet the terms and conditions of a U.S. Army Corps of Engineers nationwide or general permit under section 404 of the Clean Water Act and/or section 10 of the Rivers and Harbors Act of 1899;
- (3) A finding of "adverse effect" to historic properties under the National Historic Preservation Act, the use of a resource protected under 23 U.S.C. 138 or 49 U.S.C. 303 (section 4(f)) except for actions resulting in de minimis impacts, or a finding of "may affect, likely to adversely affect" threatened or endangered species or critical habitat under the Endangered Species Act;
- (4) Construction of temporary access, or the closure of existing road, bridge, or ramps, that would result in major traffic disruptions;
- (5) Changes in access control;
- (6) A floodplain encroachment other than functionally dependent uses (e.g., bridges, wetlands) or actions that facilitate open space use (e.g., recreational trails, bicycle and pedestrian paths); or construction activities in, across or adjacent to a river component designated or proposed for inclusion in the National System of Wild and Scenic Rivers.

VI. Environmental Issues Evaluated for the Proposed Action

Ecological

1. Would the project have a substantial impact on any unique or important natural resource?

YES NO

Additional Comments:

The project's scope is not expected to have substantial impact on any uniquely sensitive natural resources.

2. Does the project involve habitat where federally listed endangered or threatened species may occur?

YES NO

Additional Comments:

According to the U.S. Fish & Wildlife Service IPaC webpage, the project's location is not a critical habitat for the Puerto Rican Boa (Epicrates inornatus). Conservation protocol of the species would be implemented during construction.

3. Does the project qualify as a minor action that may be conducted within a blanket clearance (Self-Certification Endangered Species Act Certification) without adversely affecting the recovery and survival of listed endangered or threatened species?

YES NO

Additional Comments:

According to the U.S. Fish & Wildlife Service IPaC webpage, the project's location is not a critical habitat for the Puerto Rican Boa (Epicrates inornatus). Conservation protocol of the species would be implemented during construction.

4. The project affects USACE jurisdictional areas?

YES NO

Additional Comments:

The project would not affect any USACE jurisdictional area

5. If the project involves wetlands, is the amount of permanent and/or temporary wetland taking less than one-tenth (1/10) of an acre and have all practicable measures to avoid and minimize wetland takings been evaluated?

YES NO

Additional Comments:

Not wetlands are in the project area.



**Categorical Exclusion
Emergency Relief Program-Landslide Correction
Project ER-HWY-410, PR-722, km-5.7, Aibonito, P.R.**

6. Does the project affect areas cover under Section 404 of the Clean Water Act?

YES NO

Additional Comments:

The project would not affect any USACE jurisdictional area.

7. Does the project involve any known underground storage tanks (UST's) or hazardous material sites?

YES NO

Additional Comments:

The project does not affect any UST or hazardous materials sites.

8. Would a US Coast Guard Permit be required?

YES NO

Additional Comments:

A U.S. Coast Guard permit would not be required because the project is located in the central mountains of the Island and no water bodies would be affected by it.

9. Is the project located within a floodplain zone?

YES NO

Additional Comments:

The project is not located within a floodplain zone. See Appendix A.

10. Would the project affect water bodies?

YES NO

Additional Comments:

No water bodies would be affected by the project. The Aibonito River is located to the southwest of the site, at an approximate horizontal distance of 200 meters.

11. Would the project require the preparation of a Hydrologic-Hydraulic Study?

YES NO

Additional Comments:

No Hydrologic-Hydraulic Study is required for the proposed project.

12. Would the project affect Wild and Scenic Rivers?

YES NO

Additional Comments:

The proposed project would not affect any designated Wild and Scenic Rivers of Puerto Rico.

Categorical Exclusion
Emergency Relief Program-Landslide Correction
Project ER-HWY-410, PR-722, km-5.7, Aibonito, P.R.

13. Would the project may adversely affect Essential Fish Habitat?

YES NO

Additional Comments:

The proposed project would not affect any Essential Fish Habitat.

14. Does the project affect coastal municipalities?

YES NO

Additional Comments:

The project is located in the Municipality of Aibonito, with no coastline nearby.

15. Would the project result in the modification of any existing floodway?

YES NO

Additional Comments:

The project would not require the modification of any existing floodway.

16. Would the project require any stream relocations or channel changes?

YES NO

Additional Comments:

The proposed project would not require any stream or channel relocations or changes.

17. Would the project affect trees?

YES NO

Additional Comments:

The proposed project would affect five (5) trees and twelve (12) bamboo grass. According to the "Reglamento Conjunto para la Evaluación y Expedición de Permisos Relacionados al Desarrollo, Uso de Terrenos y Operación de Negocios" issued on June 7, 2019", a mitigation plan will be necessary to mitigate the tree impacts. Nevertheless, an Administrative Order Number 2019-01 was issued by Permit Management Office on January 8, 2019 to extend the streamline permit process for the projects related to the emergency. The Order authorize the cut of trees without the request of a permit. The Administrative Order is effective until the declaration of state of emergency by the Governor of PR is valid

Social, Economic and Cultural Resources

18. Would the project induce substantial impacts to planned growth or land use of the area?

YES NO

Additional Comments:

The proposed project would not induce substantial impacts to planned growth or land use for the area.

**Categorical Exclusion
Emergency Relief Program-Landslide Correction
Project ER-HWY-410, PR-722, km-5.7, Aibonito, P.R.**

19. Would the project require the relocation of any family or business?

YES NO

Additional Comments:

The proposed project would not require the relocation of families or businesses.

20. Would the project have a disproportionately high and adverse human health and environmental effect on any minority or low-income population?

YES NO

Additional Comments:

The proposed project would not have a disproportionately high and adverse human health and environmental effect on any minority or low-income population.

21. If the project involves the acquisition of a right-of-way, is the amount of right-of-way acquisition considered minor?

YES NO

Additional Comments:

The proposed project would require the acquisition of approximately 86 square meters of additional right of way to accommodate the rip-rap at the storm sewer system's discharge point.

22. Does the project have any impact in the community cohesion of the adjacent project's neighborhoods?

YES NO

Additional Comments:

The proposed project would not have any adverse impacts in the community cohesion of the adjacent neighborhood.

23. Would the project affect community services?

YES NO

Additional Comments:

The proposed project would not affect the community's services.

24. Does the project consider non-discrimination issues?

YES NO

Additional Comments:

The proposed project considers the non-discrimination issues.

**Categorical Exclusion
Emergency Relief Program-Landslide Correction
Project ER-HWY-410, PR-722, km-5.7, Albonito, P.R.**

25. Would the project have any impacts on existing noise levels?

YES NO

Additional Comments:

Due to the scope of the proposed project, no impact in the existing noise levels would be expected. A temporary increase in noise levels may result from construction work.

26. Does the project comply with attaining air quality standards (NAAQS)?

YES NO

Additional Comments:

The proposed project complies with the national air quality standards (NAAQS).

27. Would the project have any impacts in existing air quality levels?

YES NO

Additional Comments:

The proposed project is not expected to have an impact on existing air quality levels. A temporary degradation of existing air quality levels may be expected during construction.

28. Would the project affect farmland areas?

YES NO

Additional Comments:

The proposed project is bounded to the north by a poultry farm. However, the farm building where the animals are is significantly distant from the site.

29. Would the project entail any significant aesthetic effects?

YES NO

Additional Comments:

The proposed project would not have significant aesthetic effects.

30. Would the project affect recreational areas?

YES NO

Additional Comments:

The proposed project would not affect recreational areas.

31. Would the project involve any changes in access control?

YES NO

Additional Comments:

The proposed project would not involve any changes in the highway's access control.

**Categorical Exclusion
Emergency Relief Program-Landslide Correction
Project ER-HWY-410, PR-722, km-5.7, Albonifo, P.R.**

32. Would the project have an adverse effect on permanent local traffic patterns or community cohesiveness?

YES NO

Additional Comments:

The proposed project would not have an adverse effect on permanent local traffic patterns or community cohesiveness.

33. Would traffic be maintained during construction using existing roads, staged construction, or on-site detours?

YES NO

Additional Comments:

The proposed project would require full road closure to complete the landslide repairs due to horizontal alignment. Traffic would be rerouted through PR-162. A MOT has been prepared for the project and community outreach would be required to inform the community of temporary traffic patterns during construction.

34. If the project is a bridge replacement project, would the bridge be replaced at this existing location (along the existing facility) and, would all construction proposed in association with the bridge replacement project be contained within the existing facility?

YES NO

Additional Comments:

The proposed project does not require a bridge replacement.

35. Would the project affect a bridge or a culvert?

YES NO

Additional Comments:

The proposed project would partially demolish a 24" diameter pre-cast concrete culvert at its discharge point, where the new retaining wall would be built.

36. Is the bridge or culvert considered a historical structure?

YES NO

Additional Comments:

No historic structure would be affected by the proposed project.

37. Is there substantial controversy on social, economic, or environmental grounds concerning the project?

YES NO

Additional Comments:

No controversy on social, economic, or environmental grounds is expected with regards to the proposed project.

**Categorical Exclusion
Emergency Relief Program-Landslide Correction
Project ER-HWY-410, PR-722, km-5.7, Albonito, P.R.**

38. Would the project have an effect on social, economic, or environmental grounds concerning the project?

YES NO

Additional Comments:

The proposed project would not have an adverse effect on social, economic, or environmental grounds.

39. Would the project affect any archaeological remains which are important to history or pre-history?

YES NO

Additional Comments:

A Phase IA Archaeological Study was completed for the proposed project and no archaeological remains were identified in the area.

40. Would the project affect any historic property?

YES NO

Additional Comments:

A Phase IA Archaeological Study was completed for the proposed project and no archaeological remains were identified in the area.

41. Would the project require the use of resources from Section 6(f) of the Land and Water Conservation Fund Act?

YES NO

Additional Comments:

The proposed project would not cause impacts to recreational properties acquired with LWCF funds.

42. Would the project require the use of Section 4 (f) resources (public, parks, recreation lands, wildlife, historic sites, or historic bridges) as defined in Section 4 (f) of the U.S. Department of Transportation Act of 1966?

YES NO

Additional Comments:

The proposed project would not affect any publicly owned parks, recreational area, wildlife and waterflow refuges, or public and private historical sites.

43. Would the project require the relocation of utilities or construction of new facilities?

YES NO

Additional Comments:

The proposed project would require the realignment of a segment of a water distribution line that is located in the project area.

**Categorical Exclusion
Emergency Relief Program-Landslide Correction
Project ER-HWY-410, PR-722, km-5.7, Albonito, P.R.**

44. Would the project affect any airport clearance?

YES NO

Additional Comments:

The proposed project does not affect airport clearance.

45. Would the project consider the accommodation of pedestrian and bicycle facilities as part of its scope?

YES NO

Additional Comments:

The proposed project does not consider the accommodation of pedestrian and bicycle facilities. The limited existing PR-722 right of way cannot accommodate such facilities.

46. Would the project require public involvement activities?

YES NO

Additional Comments:

The proposed project would require notification to communities and the poultry farm in the area for coordination due to the road closure. Temporary traffic control measures and detour will be implemented to control the traffic. Information would be made publicly available through newspapers, flyers, social media, and others.

47. Would the project have any potential for controversy?

YES NO

Additional Comments:

No controversy is expected for the proposed project.

VII. Environmental Commitments required for the proposed project

1. The construction will be performed mostly within the existing ROW except for an additional area of approximately 86 square meters to be acquired for the installation of the rip-rap in the outfall of the culvert. Also, approximately 2,143 square meters of temporary construction easement will be necessary for construction activities.
2. The proposed project will not affect historic properties. If unexpected cultural resources are encountered at any time within the project area, work shall cease immediately in the vicinity of such discoveries and SHPO shall be notified. After such notification, work shall not resume until written approval has been received from SHPO.
3. The project is not likely to adversely affect federally-listed species or their critical habitats. The implementation of PRHTA's Best Management Practices (BMP) for Puerto Rican Boa (*Epicrates inornatus*) will be performed.
4. For erosion and sediment control in the project area, our Agency will require the authorization to prepare and implement an Incidental Unique Permit (PUI, for its Spanish acronym) and National Pollutant Discharge Elimination System (NPDES) permit, if required. The project's Contractor will also be

Appendix A – Emergency Declared Documents



GOBIERNO DE PUERTO RICO
Departamento de Transportación y Obras Públicas

RESOLUCIÓN NÚM. 2017-27

PARA DECLARAR ESTADO DE EMERGENCIA EN LAS CARRETERAS Y PUENTES ESTATALES DE PUERTO RICO

YO, CARLOS M. CONTRERAS APONTE, Secretario del Departamento de Transportación y Obras Públicas, (DTOP) en el ejercicio de las facultades y poderes que me confiere la Ley Núm. 6 del 24 de Julio de 1952, según enmendada, el Plan de Reorganización Número 6 de 1971, efectivo el 2 de enero de 1973 y las reglas, reglamentos y resoluciones aprobadas al amparo de las mismas, por la presente

EXPONGO:

POR CUANTO: El 17 de septiembre de 2017, el Servicio Nacional de Meteorología informó que existe una gran posibilidad de que Puerto Rico sea objeto de fuertes vientos y lluvias, con la capacidad de ocasionar fuertes inundaciones, comenzando en algún momento durante las próximas 48 horas como consecuencia del paso del Huracán María.

POR CUANTO: El paso de este fenómeno atmosférico amenaza con ocasionar cuantiosos daños y ha creado una situación de emergencia que atenta contra la seguridad pública, los servicios básicos a la ciudadanía, la actividad económica y el bienestar social de Puerto Rico. La situación se torna aún más apremiante dado a que hace solo diez (10) días del huracán Irma pasó por nuestra región, haciendo más vulnerable nuestra ya débil infraestructura ante el paso de un fenómeno atmosférico.

POR CUANTO: Lo más recomendable, basado en lo antes expuesto, es declarar en estado de emergencia las carreteras y puentes estatales de Puerto Rico, acorde a la declaración de estado de emergencia emitida por el Gobernador de Puerto Rico, Hon. Ricardo Rosselló Nevares, mediante la Orden Ejecutiva Número 047 de 17 de septiembre de 2017, Boletín Administrativo Número OE-2017-047.

POR TANTO: Yo, CARLOS M. CONTRERAS APONTE, Secretario del Departamento de Transportación y Obras Públicas, RESUELVO:

1. Declarar en estado de emergencia las carreteras y puentes estatales de Puerto Rico, acorde a la declaración de estado de emergencia emitida por el Gobernador de Puerto Rico, Hon. Ricardo Rosselló Nevares, mediante la Orden Ejecutiva Número 047 de 17 de septiembre de 2017, Boletín Administrativo Número OE-2017-047.
2. Autorizar a los funcionarios y directivos del Departamento de Transportación y Obras Públicas, a óvlar los trámites de subastas para realizar los trabajos

necesarios para la construcción y/o reconstrucción de las carreteras y puentes estatales de Puerto Rico.

3. Autorizar a los funcionarios del Departamento de Transportación y Obras Públicas a entrar en los acuerdos necesarios con las firmas y entidades que puedan llevar a cabo los trabajos y gestionar el otorgamiento de los correspondientes contratos.
4. Esta resolución se hace extensiva a las agencias adscritas del DTOP, entendiéndose, Autoridad Metropolitana de Autobuses (AMA), Autoridad de Transporte Marítimo (ATM) y Autoridad de Transporte Integrado (ATI) y la Autoridad de Carreteras y Transportación (ACT)
5. Autorizar a los funcionarios y/o directivos de las Agencias adscritas a obviar los trámites de subastas y contratación para realizar los trabajos necesarios en caso que medié una situación de emergencia (riesgo inminente de salud, seguridad y bienestar de la ciudadanía) durante la eventualidad.
6. Esta resolución entrará en vigor inmediatamente.

En San Juan, Puerto Rico a 18 de septiembre de 2017.



Carlos M. Contreras Aponte
Secretario
Departamento de Transportación y Obras Públicas

CERTIFICO:



Juan M. Maldonado De Jesús
Asesor Legal

GOBIERNO DE PUERTO RICO
LA FORTALEZA
SAN JUAN, PUERTO RICO

Boletín Administrativo Número: OE-2017-047

ORDEN EJECUTIVA DEL GOBERNADOR DE PUERTO RICO, HON. RICARDO ROSSELLÓ NEVARES, DECLARANDO ESTADO DE EMERGENCIA A CONSECUENCIA DEL INMINENTE PASO DEL HURACÁN MARÍA Y ACTIVANDO LA GUARDIA NACIONAL PARA QUE PROVEA APOYO DURANTE ESTA EMERGENCIA

POR CUANTO: Este Gobierno tomará todas las medidas necesarias para salvaguardar el orden público y proteger la vida, seguridad y propiedad de los ciudadanos y del Gobierno.

POR CUANTO: El 17 de septiembre de 2017, el Servicio Nacional de Meteorología indicó que existe una gran posibilidad de que Puerto Rico sea objeto de fuertes vientos y lluvias, con la capacidad de ocasionar fuertes inundaciones, comenzando en algún momento durante las próximas 48 horas como consecuencia del paso del huracán María.

POR CUANTO: El paso de este fenómeno atmosférico amenaza con ocasionar cuantiosos daños y ha creado una situación de emergencia que afecta contra la seguridad pública, los servicios básicos a la ciudadanía, la actividad económica y el bienestar social de Puerto Rico. La situación se torna aún más apremiante dado a que hace solo 10 días el huracán Irma pasó por nuestra región, haciendo más vulnerable nuestra ya débil infraestructura ante el paso de un fenómeno atmosférico.

POR CUANTO: La Ley Número 211-1999, según enmendada (Ley Núm. 211) faculta al Gobernador a declarar un estado de emergencia cuando esté presente cualquier situación o circunstancia para la cual sean necesarios los esfuerzos estatales o municipales encaminados a minimizar el riesgo de un desastre, salvar vidas, proteger las propiedades, la salud y la seguridad.

POR CUANTO: La Sección 207 y la Sección 226 de la Ley Número 62 de 23 de junio de 1989, según enmendada (Código Militar de Puerto Rico), facultan al Gobernador a activar a la Guardia Nacional para atender situaciones de seguridad pública.

POR TANTO: YO, RICARDO A. ROSSELLÓ NEVARES, Gobernador de Puerto Rico, en virtud de los poderes que me confieren la Constitución y las leyes de Puerto Rico, por la presente decreto y ordeno lo siguiente:

SECCIÓN 1ra. Se decreta un estado de emergencia en todo Puerto Rico a consecuencia del inminente paso del huracán María y el impacto que el mismo pueda ocasionar.

#2
LGR

SECCIÓN 2da. Esta declaración de emergencia cumple con los requisitos para que todas las agencias y municipios puedan activar los procedimientos especiales de "compra de emergencia" para adquirir los materiales y servicios que resulten esenciales para responder a la emergencia. El Director de la Oficina de Gerencia y Presupuesto valorará por el ejercicio responsable de estas adquisiciones por las agencias de la Rama Ejecutiva y podrá requerir aquellos informes y establecer aquellos controles presupuestarios que estime necesarios para descargar esta responsabilidad.

SECCIÓN 3ra. La Agencia Estatal para el Manejo de Emergencia y Administración de Desastres (AEMEAD) preparará y presentará al Gobernador, al Director de la Oficina de Gerencia y Presupuesto y al Secretario de Hacienda un estimado de los fondos requeridos para realizar las labores de desalojo, rescate, respuesta y recuperación de las regiones afectadas.

SECCIÓN 4ta. Basado en el estimado que someta la AEMEAD y el Ayudante General de la Guardia Nacional, el Secretario del Departamento de Hacienda y el Director de la Oficina de Gerencia y Presupuesto asignarán al Director Ejecutivo de la AEMEAD y demás Agencias involucradas (según identificadas por el Secretario del Departamento de Hacienda y el Director de la Oficina de Gerencia y Presupuesto) los fondos disponibles para cumplir con lo dispuesto en esta Orden Ejecutiva. Se autoriza al Secretario de Hacienda y al Director la Oficina de Gerencia y Presupuesto a establecer, de cualesquiera fondos disponibles, incluyendo el Fondo de Emergencia, un presupuesto especial para cubrir aquellos gastos necesarios para efectuar las labores de desalojo, rescate, respuesta y recuperación de conformidad con esta Orden Ejecutiva.

SECCIÓN 5ta. La AEMEAD y demás agencias involucradas deberán rendir al Secretario del Departamento de Hacienda y al Director de la Oficina de Gerencia y Presupuesto un informe detallado sobre los gastos incurridos al cierre de las labores realizadas de conformidad con esta Orden Ejecutiva.

SECCIÓN 6ta. En virtud de las facultades que me confiere el Código Militar, activo la Guardia Nacional para asistir al Estado en la preparación y atención del estado de emergencia declarado en este Orden Ejecutiva.

SECCIÓN 7ma. Delego en el Ayudante General de la Guardia Nacional la facultad para que determine la identidad de las unidades y efectivos que se habrán de activar al Servicio Militar Activo Estatal según la ayuda que le sea solicitada durante esta emergencia.

SECCIÓN 8va. Se designa a los oficiales y alistados de las Fuerzas Militares de Puerto Rico activados en el Servicio Militar Activo Estatal en cumplimiento con este Orden Ejecutiva el carácter de funcionarios del orden público, con todas las poderes y obligaciones inherentes a tal carácter.

SECCIÓN 9na. Autorizo al Ayudante General de la Guardia Nacional a incurrir en aquellos gastos razonables inherentes a la activación de tropas y equipo de las Fuerzas Militares de Puerto Rico en los renglones indicados a continuación:

- A. Compensación al personal de las Fuerzas Militares de Puerto Rico llamado al Servicio Militar Activo Estatal bajo esta Orden Ejecutiva en conformidad con el Código Militar.
- B. Comestibles y provisiones para el personal militar activado.
- C. Materiales y otros artículos necesarios para la realización de las funciones aquí asignadas a las Fuerzas Militares de Puerto Rico.
- D. Primas de seguros necesarias para efectuar las funciones que aquí se autorizan.
- E. Combustibles, lubricantes y aceites necesarios para transporte terrestre, aérea y marítima de las Fuerzas Militares de Puerto Rico que se utilicen durante la operación autorizada.
- F. Gastos de alquiler de vehículos para la transportación del personal activado.
- G. Gastos de hospitalización y médicos que se incurran por razón de lesión o enfermedad de los miembros de las Fuerzas Militares de Puerto Rico sufridos mientras estén en el desempeño de sus deberes bajo la movilización que aquí se autoriza y hasta que sean dados de alta por autoridades médicas competentes.
- H. Cualesquiera otros gastos incurridos necesarios para desempeñar la misión aquí asignada a las Fuerzas Militares de Puerto Rico.

SECCIÓN 10ma. Se ordena al Director de la Oficina de Gerencia y Presupuesto y al Secretario de Hacienda a que autoricen el desembolso y se libere el Fondo de Emergencia o cualesquiera fondos disponibles, según identificados, para reembolsar y sufragar los gastos relacionados con la operación que aquí se autoriza.

SECCIÓN 11ma. El Ayudante General de la Guardia Nacional deberá rendir al Secretario del Departamento de Hacienda y al Director de la Oficina de Gerencia y Presupuesto informes detallados sobre los gastos incurridos al cierre de la operación realizada en ejercicio de los deberes y facultades delegados mediante esta Orden Ejecutiva.

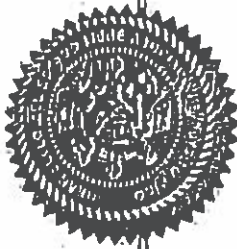
SECCIÓN 12ma. **DEFINICIÓN DEL TÉRMINO AGENCIA.** El término *agencia*, según se utiliza en esta Orden Ejecutiva, se refiere a toda agencia, instrumentalidad, oficina, o dependencia de la Rama Ejecutiva del Gobierno de Puerto Rico, incluyendo a las corporaciones públicas, independientemente de su nombre.

SECCIÓN 13ra. **NÓ CREACIÓN DE DERECHOS EXIGIBLES.** Esta Orden Ejecutiva no tiene como propósito crear derechos sustantivos o procesales a favor de terceros, exigibles ante foros judiciales, administrativos o de cualquier otra índole, contra el Gobierno de Puerto Rico o sus agencias, sus oficiales, empleados o cualquiera otra persona.

SECCIÓN 14ta. **VIGENCIA.** Esta Orden Ejecutiva entrará en vigor inmediatamente.

SECCIÓN 15ta. **PUBLICACIÓN.** Esta Orden Ejecutiva debe ser presentada inmediatamente en el Departamento de Estado y se ordena su más amplia publicación.

EN TESTIMONIO DE LO CUAL, expido la presente Orden Ejecutiva bajo mi firma y hago estampar el gran sello del Gobierno de Puerto Rico, en San Juan, Puerto Rico, hoy 17 de septiembre de 2017.




RICARDO ROSSELLO NEVARES
GOBERNADOR

Promulgada de conformidad con la ley, hoy día 17 de septiembre de 2017.


LUIS GERARDO RIVERA MARÍN
SECRETARIO DE ESTADO

affected by the event declared a major disaster by the President in his declaration of September 10, 2017.

Brevard, Orange, Pasco, and St. Lucie Counties for Individual Assistance (already designated for debris removal and emergency protective measures (Categories A and B), including direct federal assistance, under the Public Assistance program).

The following Catalog of Federal Domestic Assistance Numbers (CFDA) are to be used for reporting and drawing funds: 97.030, Community Disaster Loans; 97.031, Cora Brown Fund; 97.032, Crisis Counseling; 97.033, Disaster Legal Services; 97.034, Disaster Unemployment Assistance (DUA); 97.046, Fire Management Assistance Grant; 97.048, Disaster Housing Assistance to Individuals and Households In Presidentially Declared Disaster Areas; 97.049, Presidentially Declared Disaster Assistance—Disaster Housing Operations for Individuals and Households; 97.050 Presidentially Declared Disaster Assistance to Individuals and Households—Other Needs; 97.036, Disaster Grants—Public Assistance (Presidentially Declared Disasters); 97.039, Hazard Mitigation Grant.

Brock Long,

Administrator, Federal Emergency Management Agency.

[FR Doc. 2017–21645 Filed 10–5–17; 8 45 am]

BILLING CODE 9111–15–P

DEPARTMENT OF HOMELAND SECURITY

Federal Emergency Management Agency

[Internal Agency Docket No. FEMA–4329–DR; Docket ID FEMA–2017–0001]

New Hampshire; Amendment No. 2 to Notice of a Major Disaster Declaration

AGENCY: Federal Emergency Management Agency, DHS.

ACTION: Notice.

SUMMARY: This notice amends the notice of a major disaster declaration for the State of New Hampshire (FEMA–4329–DR), dated August 9 2017, and related determinations.

DATES: The amendment was issued on September 21, 2017.

FOR FURTHER INFORMATION CONTACT: Dean Webster, Office of Response and Recovery, Federal Emergency Management Agency, 500 C Street SW., Washington, DC 20472, (202) 646–2833.

SUPPLEMENTARY INFORMATION: The Federal Emergency Management Agency (FEMA) hereby gives notice that pursuant to the authority vested in the Administrator, under Executive Order 12148, as amended, James N. Russo, of FEMA is appointed to act as the Federal Coordinating Officer for this disaster.

This action terminates the appointment of Albert Lewis as Federal Coordinating Officer for this disaster.

The following Catalog of Federal Domestic Assistance Numbers (CFDA) are to be used for reporting and drawing funds: 97.030, Community Disaster Loans; 97.031, Cora Brown Fund; 97.032, Crisis Counseling; 97.033, Disaster Legal Services; 97.034, Disaster Unemployment Assistance (DUA); 97.046, Fire Management Assistance Grant; 97.048, Disaster Housing Assistance to Individuals and Households In Presidentially Declared Disaster Areas; 97.049, Presidentially Declared Disaster Assistance—Disaster Housing Operations for Individuals and Households; 97.050, Presidentially Declared Disaster Assistance to Individuals and Households—Other Needs; 97.036, Disaster Grants—Public Assistance (Presidentially Declared Disasters); 97.039, Hazard Mitigation Grant.

Brock Long,

Administrator, Federal Emergency Management Agency.

[FR Doc. 2017–21642 Filed 10–5–17; 8 45 am]

BILLING CODE 9111–23–P

DEPARTMENT OF HOMELAND SECURITY

Federal Emergency Management Agency

[Internal Agency Docket No. FEMA–4339–DR; Docket ID FEMA–2017–0001]

Puerto Rico; Major Disaster and Related Determinations

AGENCY: Federal Emergency Management Agency, DHS.

ACTION: Notice.

SUMMARY: This is a notice of the Presidential declaration of a major disaster for the Commonwealth of Puerto Rico (FEMA–4339–DR), dated September 20, 2017, and related determinations.

DATES: The declaration was issued September 20, 2017.

FOR FURTHER INFORMATION CONTACT: Dean Webster, Office of Response and Recovery, Federal Emergency Management Agency, 500 C Street SW., Washington, DC 20472, (202) 646–2833.

SUPPLEMENTARY INFORMATION: Notice is hereby given that, in a letter dated September 20, 2017, the President issued a major disaster declaration under the authority of the Robert T. Stafford Disaster Relief and Emergency Assistance Act, 42 U.S.C. 5121 *et seq.* (the “Stafford Act”), as follows:

I have determined that the damage in certain areas of the Commonwealth of Puerto Rico resulting from Hurricane Maria beginning on September 17, 2017, and

continuing, is of sufficient severity and magnitude to warrant a major disaster declaration under the Robert T. Stafford Disaster Relief and Emergency Assistance Act, 42 U.S.C. 5121 *et seq.* (the “Stafford Act”). Therefore, I declare that such a major disaster exists in the Commonwealth of Puerto Rico.

In order to provide Federal assistance, you are hereby authorized to allocate from funds available for these purposes such amounts as you find necessary for Federal disaster assistance and administrative expenses.

You are authorized to provide Individual Assistance and assistance for debris removal and emergency protective measures (Categories A and B) under the Public Assistance program in the designated areas, Hazard Mitigation throughout the Commonwealth, and any other forms of assistance under the Stafford Act that you deem appropriate subject to completion of Preliminary Damage Assessments (PDAs). Direct Federal assistance is authorized.

Consistent with the requirement that Federal assistance be supplemental, any Federal funds provided under the Stafford Act for Hazard Mitigation and Other Needs Assistance will be limited to 75 percent of the total eligible costs. Federal funds provided under the Stafford Act for Public Assistance also will be limited to 75 percent of the total eligible costs, with the exception of projects that meet the eligibility criteria for a higher Federal cost-sharing percentage under the Public Assistance Alternative Procedures Pilot Program for Debris Removal implemented pursuant to section 428 of the Stafford Act.

Further, you are authorized to make changes to this declaration for the approved assistance to the extent allowable under the Stafford Act.

The time period prescribed for the implementation of section 310(a), Priority to Certain Applications for Public Facility and Public Housing Assistance, 42 U.S.C. 5153, shall be for a period not to exceed six months after the date of this declaration.

The Federal Emergency Management Agency (FEMA) hereby gives notice that pursuant to the authority vested in the Administrator, under Executive Order 12148, as amended, Alejandro DeLaCampa, of FEMA is appointed to act as the Federal Coordinating Officer for this major disaster.

The following areas of the Commonwealth of Puerto Rico have been designated as adversely affected by this major disaster:

The municipalities of Aguas Buenas, Aibonito, Arecibo, Arroyo, Barceloneta, Barranquitas, Bayamón, Caguas, Canóvanas, Carolina, Cataño, Cayey, Ceiba, Ciales, Cidra, Coamo, Comerio, Corozal, Culebra, Dorado, Fajardo, Florida, Guayama, Guaynabo, Gurabo, Humacao, Jayuya, Juana Díaz, Juncos, Las Piedras, Loíza, Luquillo, Manati, Maunabo, Morovis, Naguabo, Naranjito, Orocovis, Patillas, Ponce, Rio Grande, Salinas, San Juan, San Lorenzo, Santa Isabel,

Toa Baja, Toa Alta, Trujillo Alto, Utuado, Vega Alta, Vega Baja, Vieques, Villalba, and Yabucoa for Individual Assistance.

All municipalities in the Commonwealth of Puerto Rico for debris removal and emergency protective measures (Categories A and B), including direct federal assistance, under the Public Assistance program.

All areas within the Commonwealth of Puerto Rico are eligible for assistance under the Hazard Mitigation Grant Program.

The following Catalog of Federal Domestic Assistance Numbers (CFDA) are to be used for reporting and drawing funds: 97.030, Community Disaster Loans; 97.031, Cora Brown Fund; 97.032, Crisis Counseling; 97.033, Disaster Legal Services; 97.034, Disaster Unemployment Assistance (DUA); 97.046, Fire Management Assistance Grant; 97.048, Disaster Housing Assistance to Individuals and Households In Presidentially Declared Disaster Areas; 97.049, Presidentially Declared Disaster Assistance—Disaster Housing Operations for Individuals and Households; 97.050, Presidentially Declared Disaster Assistance to Individuals and Households—Other Needs; 97.036, Disaster Grants—Public Assistance (Presidentially Declared Disasters); 97.039, Hazard Mitigation Grant.

Brock Long,

Administrator, Federal Emergency Management Agency.

[FR Doc. 2017–21649 Filed 10–5–17; 8:45 am]

BILLING CODE 9111–23–P

DEPARTMENT OF HOMELAND SECURITY

Federal Emergency Management Agency

[Internal Agency Docket No. FEMA–4338–DR; Docket ID FEMA–2017–0001]

Georgia; Amendment No. 3 to Notice of a Major Disaster Declaration

AGENCY: Federal Emergency Management Agency, DHS.

ACTION: Notice.

SUMMARY: This notice amends the notice of a major disaster declaration for the State of Georgia (FEMA–4338–DR), dated September 15, 2017, and related determinations.

DATES: This amendment was issued September 26, 2017.

FOR FURTHER INFORMATION CONTACT: Dean Webster, Office of Response and Recovery, Federal Emergency Management Agency, 500 C Street SW., Washington, DC 20472, (202) 646–2833.

SUPPLEMENTARY INFORMATION: Notice is hereby given that the incident period for this disaster is closed effective September 20, 2017.

The following Catalog of Federal Domestic Assistance Numbers (CFDA) are to be used for reporting and drawing funds: 97.030,

Community Disaster Loans; 97.031, Cora Brown Fund; 97.032, Crisis Counseling; 97.033, Disaster Legal Services; 97.034, Disaster Unemployment Assistance (DUA); 97.046, Fire Management Assistance Grant; 97.048, Disaster Housing Assistance to Individuals and Households In Presidentially Declared Disaster Areas; 97.049, Presidentially Declared Disaster Assistance—Disaster Housing Operations for Individuals and Households; 97.050, Presidentially Declared Disaster Assistance to Individuals and Households—Other Needs; 97.036, Disaster Grants—Public Assistance (Presidentially Declared Disasters); 97.039, Hazard Mitigation Grant.

Brock Long,

Administrator, Federal Emergency Management Agency.

[FR Doc. 2017–21646 Filed 10–5–17; 8:45 am]

BILLING CODE 9111–23–P

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT

[Docket No. FR–6050–N–01]

Relief From HUD Requirements Available to PHAs To Assist With Recovery and Relief Efforts on Behalf of Families Affected by Hurricanes Harvey, Irma, Maria and Future Natural Disasters Where Major Disaster Declarations Might Be Issued in 2017

AGENCY: Office of the Assistant Secretary for Public and Indian Housing, HUD.

ACTION: Notice.

SUMMARY: This notice advises the public that HUD, as a result of Presidentially declared Major Disaster Declarations (MDD) following Hurricanes Harvey, Irma and Maria has established an expedited process for the review of requests for relief from HUD regulatory and/or administrative requirements (“HUD requirements”) for public housing agencies (PHAs) and Tribes or tribally designated housing entities (TDHEs) that are located in Texas, U.S. Virgin Islands, Puerto Rico, Florida, and Georgia. The notice covers MDDs DR–4332, issued on August 25, 2017, DR–4335, issued on September 7, 2017, DR–4336, issued on September 10, 2017, DR–4337, issued on September 10, 2017, DR–4338, issued on September 15, 2017, DR–4339 issued on September 20, 2017 and DR–4340 issued on September 20, 2017. Specifically, these PHAs and Tribes/TDHEs may request waivers of HUD requirements and receive expedited review of such requests. In addition, this notice advises that PHAs, Tribes and TDHEs located in areas covered by MDDs issued during the remainder of 2017 may utilize the

flexibilities and expedited waiver process set out by this notice.

DATES: *Applicable Date:* October 6, 2017.

FOR FURTHER INFORMATION CONTACT: Shelia Bethea, Office of Field Operations, Office of Public and Indian Housing, Department of Housing and Urban Development, 451 Seventh Street SW., Room 4112, Washington, DC 20410–5000, telephone number (202) 402–8120. Persons with hearing or speech impairments may access this number via TTY by calling the Federal Information Relay Service at (800) 877–8339.

SUPPLEMENTARY INFORMATION:

I. Background Information

From a period beginning on August 23, 2017, areas in Texas, U.S. Virgin Islands, Puerto Rico, Florida and Georgia experienced severe storms and flooding from Hurricanes Harvey, Irma and Maria. MDDs covering these areas were issued on August 25, 2017, DR–4332,¹ DR–4335,² September 7, 2017, DR–4336,³ September 10, 2017, DR–4337,⁴ September 10, 2017, DR–4338,⁵ September 15, 2017, DR–4339,⁶

¹ <https://www.fema.gov/disaster/4332>, designating Aransas, Bee, Brazoria, Calhoun, Chambers, Colorado, Fayette, Fort Bend, Galveston, Goliad, Hardin, Harris, Jackson, Jasper, Jefferson, Kleberg, Liberty, Matagorda, Montgomery, Newton, Nueces, Orange, Refugio, Sabine, San Jacinto, San Patricio, Victoria, Waller, Wharton Counties in Texas.

² <https://www.fema.gov/disaster/4335>, designating St. John (Island) (County-equivalent) St. Thomas (Island) (County-equivalent) in U.S. Virgin Islands for Hurricane Irma and St. Croix for Hurricane Maria.

³ <https://www.fema.gov/disaster/4336>, designating Canóvanas (Municipio), Culebra (Municipio), Loiza (Municipio), Vieques (Municipio) in Puerto Rico for Hurricane Irma and Aguas Buenas, Aibonito, Arecibo, Arroyo, Barceloneta, Barranquitas, Bayamón, Caguas, Canóvanas, Carolina, Cataño, Cayey, Ceiba, Ciales, Cidra, Coamo, Comerio, Corozal, Culebra, Dorado, Fajardo, Florida, Guayama, Guaynabo, Gurabo, Humacao, Jayuya, Juana Díaz, Juncos, Las Piedras, Loiza, Luquillo, Manatí, Maunabo, Morovis, Naguabo, Naranjito, Orocovis, Patillas, Ponce, Rio Grande, Salinas, San Juan, San Lorenzo, Santa Isabel, Toa Baja, Toa Alta, Trujillo Alto, Utuado, Vega Alta, Vega Baja, Vieques, Villalba, and Yabucoa for Hurricane Maria.

⁴ <https://www.fema.gov/disaster/4337>, designating Alachua, Baker, Bradford, Brevard, Broward, Charlotte, Citrus, Clay, Collier, Columbia, DeSoto, Dixie, Duval, Flagler, Gilchrist, Glades, Hardee, Hendry, Hernando, Highlands, Hillsborough, Indian River, Lafayette, Lake, Lee, Levy, Manatee, Marion, Martin, Miami-Dade, Monroe, Nassau, Okeechobee, Orange, Osceola, Palm Beach, Pasco, Pinellas, Polk, Putnam, Sarasota, Seminole, St. Johns, St. Lucie, Sumter, Suwannee, Union, Volusia in Florida.

⁵ <https://www.fema.gov/disaster/4338>, designating Camden, Chatham, Coffee, Glynn, Liberty and McIntosh in Georgia.

⁶ <https://www.fema.gov/disaster/4339>, designating Puerto Rico.

Brown Fund; 97.032, Crisis Counseling; 97.033, Disaster Legal Services; 97.034, Disaster Unemployment Assistance (DUA); 97.046, Fire Management Assistance Grant; 97.048, Disaster Housing Assistance to Individuals and Households In Presidentially Declared Disaster Areas; 97.049, Presidentially Declared Disaster Assistance—Disaster Housing Operations for Individuals and Households; 97.050 Presidentially Declared Disaster Assistance to Individuals and Households—Other Needs; 97.036, Disaster Grants—Public Assistance (Presidentially Declared Disasters); 97.039, Hazard Mitigation Grant.

Brock Long,

Administrator, Federal Emergency Management Agency.

[FR Doc. 2017-20439 Filed 9-22-17; 8:45 am]

BILLING CODE 9111-23-P

DEPARTMENT OF HOMELAND SECURITY

Federal Emergency Management Agency

[Internal Agency Docket No. FEMA-3384-EM; Docket ID FEMA-2017-0001]

Puerto Rico; Emergency and Related Determinations

AGENCY: Federal Emergency Management Agency, DHS.

ACTION: Notice.

SUMMARY: This is a notice of the Presidential declaration of an emergency for the Commonwealth of Puerto Rico (FEMA-3384-EM), dated September 5, 2017, and related determinations.

DATES: The declaration was issued September 5, 2017.

FOR FURTHER INFORMATION CONTACT: Dean Webster, Office of Response and Recovery, Federal Emergency Management Agency, 500 C Street SW., Washington, DC 20472, (202) 646-2833.

SUPPLEMENTARY INFORMATION: Notice is hereby given that, in a letter dated September 5, 2017, the President issued an emergency declaration under the authority of the Robert T. Stafford Disaster Relief and Emergency Assistance Act, 42 U.S.C. 5121-5207 (the Stafford Act), as follows:

I have determined that the emergency conditions in certain areas of the Commonwealth of Puerto Rico resulting from Hurricane Irma beginning on September 5, 2017, and continuing, are of sufficient severity and magnitude to warrant an emergency declaration under the Robert T. Stafford Disaster Relief and Emergency Assistance Act, 42 U.S.C. 5121 *et seq.* ("the Stafford Act"). Therefore, I declare that such an emergency exists in the Commonwealth of Puerto Rico.

You are authorized to provide appropriate assistance for required emergency measures, authorized under Title V of the Stafford Act, to save lives and to protect property and public health and safety, and to lessen or avert the threat of a catastrophe in the designated areas. Specifically, you are authorized to provide assistance for debris removal and emergency protective measures (Categories A and B), including direct Federal assistance, under the Public Assistance program.

Consistent with the requirement that Federal assistance is supplemental, any Federal funds provided under the Stafford Act for Public Assistance will be limited to 75 percent of the total eligible costs. In order to provide Federal assistance, you are hereby authorized to allocate from funds available for these purposes such amounts as you find necessary for Federal emergency assistance and administrative expenses.

Further, you are authorized to make changes to this declaration for the approved assistance to the extent allowable under the Stafford Act.

The Federal Emergency Management Agency (FEMA) hereby gives notice that pursuant to the authority vested in the Administrator, Department of Homeland Security, under Executive Order 12148, as amended, Alejandro DeLaCampa, of FEMA is appointed to act as the Federal Coordinating Officer for this declared emergency.

The following areas of the Commonwealth of Puerto Rico have been designated as adversely affected by this declared emergency:

All 78 municipalities in the Commonwealth of Puerto Rico for debris removal and emergency protective measures (Categories A and B), including direct federal assistance, under the Public Assistance program.

The following Catalog of Federal Domestic Assistance Numbers (CFDA) are to be used for reporting and drawing funds: 97.030, Community Disaster Loans; 97.031, Cora Brown Fund; 97.032, Crisis Counseling; 97.033, Disaster Legal Services; 97.034, Disaster Unemployment Assistance (DUA); 97.046, Fire Management Assistance Grant; 97.048, Disaster Housing Assistance to Individuals and Households In Presidentially Declared Disaster Areas; 97.049, Presidentially Declared Disaster Assistance—Disaster Housing Operations for Individuals and Households; 97.050, Presidentially Declared Disaster Assistance to Individuals and Households—Other Needs; 97.036, Disaster Grants—Public Assistance (Presidentially Declared Disasters); 97.039, Hazard Mitigation Grant.

Brock Long,

Administrator, Federal Emergency Management Agency.

[FR Doc. 2017-20451 Filed 9-22-17; 8:45 am]

BILLING CODE 9111-23-P

DEPARTMENT OF HOMELAND SECURITY

Federal Emergency Management Agency

[Internal Agency Docket No. FEMA-4325-DR; Docket ID FEMA-2017-0001]

Nebraska; Amendment No. 2 to Notice of a Major Disaster Declaration

AGENCY: Federal Emergency Management Agency, DHS.

ACTION: Notice.

SUMMARY: This notice amends the notice of a major disaster declaration for the State of Nebraska (FEMA-4325-DR), dated August 1, 2017, and related determinations.

DATES: The amendment was issued on September 8, 2017.

FOR FURTHER INFORMATION CONTACT: Dean Webster, Office of Response and Recovery, Federal Emergency Management Agency, 500 C Street SW., Washington, DC 20472, (202) 646-2833.

SUPPLEMENTARY INFORMATION: The Federal Emergency Management Agency (FEMA) hereby gives notice that pursuant to the authority vested in the Administrator, under Executive Order 12148, as amended, Michael R. Scott, of FEMA is appointed to act as the Federal Coordinating Officer for this disaster.

This action terminates the appointment of Dolph A. Diemont as Federal Coordinating Officer for this disaster.

The following Catalog of Federal Domestic Assistance Numbers (CFDA) are to be used for reporting and drawing funds: 97.030, Community Disaster Loans; 97.031, Cora Brown Fund; 97.032, Crisis Counseling; 97.033, Disaster Legal Services; 97.034, Disaster Unemployment Assistance (DUA); 97.046, Fire Management Assistance Grant; 97.048, Disaster Housing Assistance to Individuals and Households In Presidentially Declared Disaster Areas; 97.049, Presidentially Declared Disaster Assistance—Disaster Housing Operations for Individuals and Households; 97.050, Presidentially Declared Disaster Assistance to Individuals and Households—Other Needs; 97.036, Disaster Grants—Public Assistance (Presidentially Declared Disasters); 97.039, Hazard Mitigation Grant.

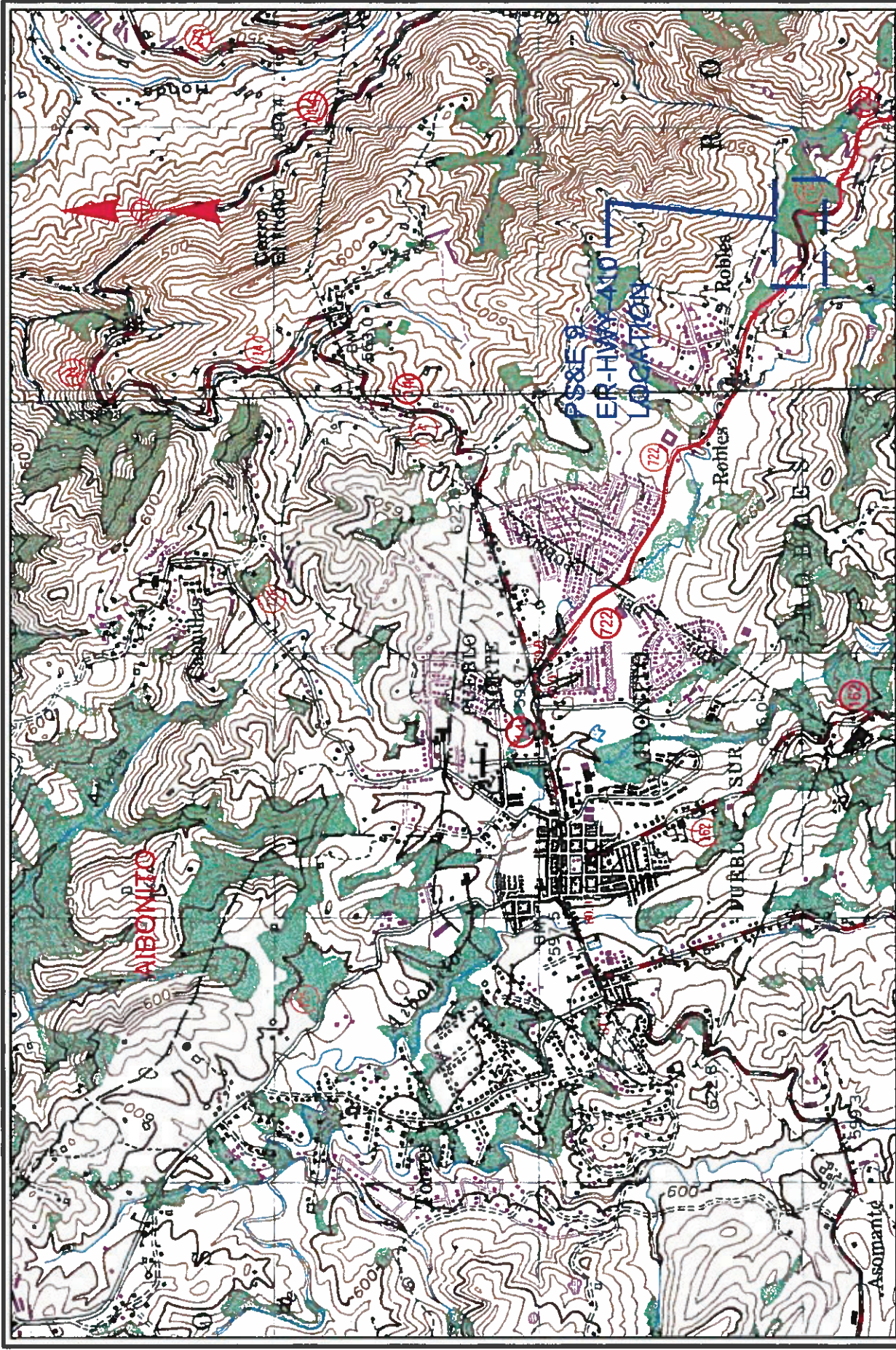
Brock Long,

Administrator, Federal Emergency Management Agency.

[FR Doc. 2017-20454 Filed 9-22-17, 8:45 am]

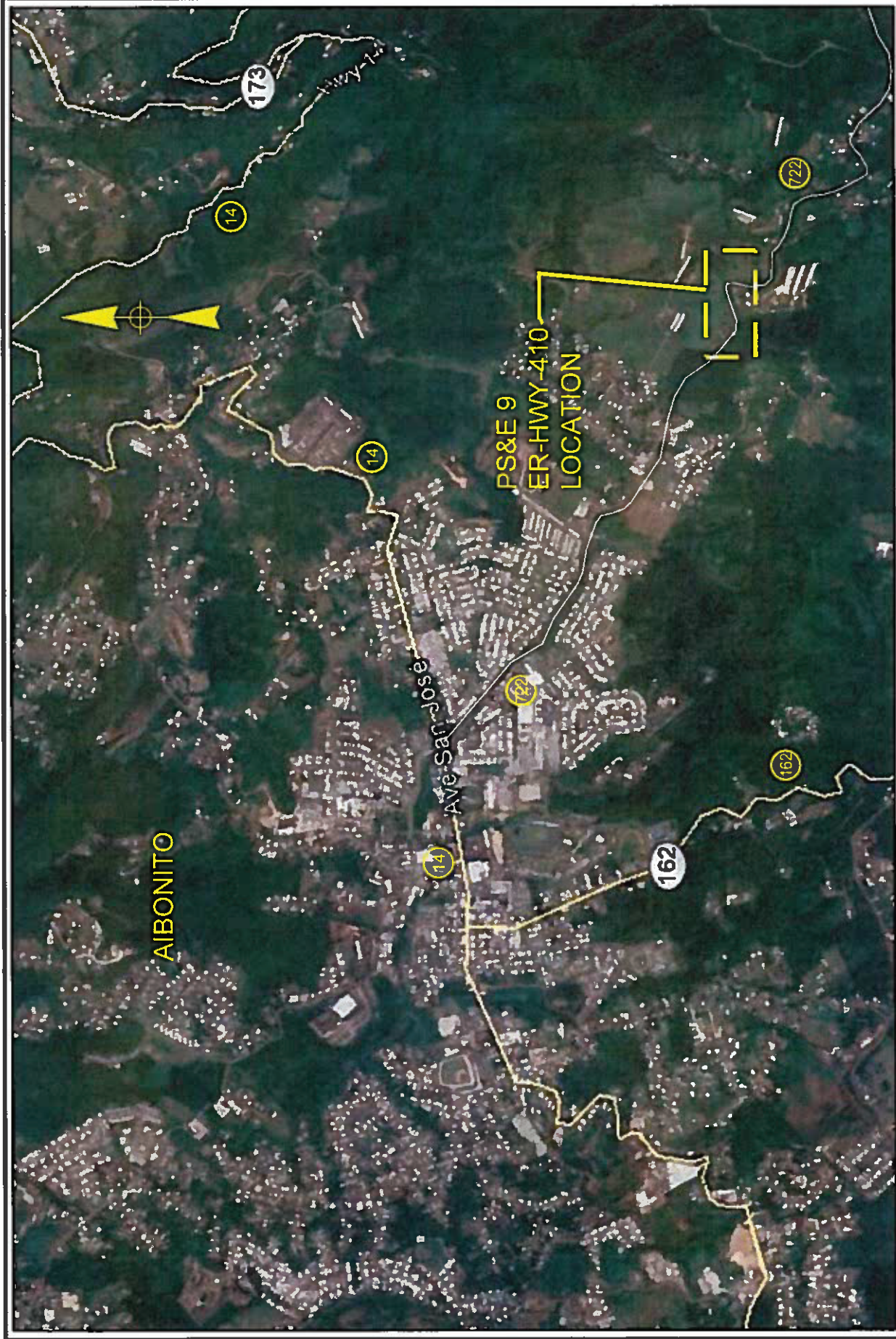
BILLING CODE 9111-23-P

Appendix B – Figures and Plans



ER-HWY-410 (PR-722)
FIGURE 1

LOCATION PLAN
SCALE = 1:20,000



AIBONITO

PS&E 9
ER-HWY-410
LOCATION

Ave. San José

ER-HWY-410 (PR-722)
FIGURE 2

AERIAL PHOTO
SCALE = 1:20,000

Appendix C – Detailed Damage Inspection Report (DDIR)

PR-722 Km. 5.7 Aibonito



Appendix D – State Historic Preservation Office – Programmatic Agreement - Certification



GOVERNMENT OF PUERTO RICO
Puerto Rico Highway and Transportation Authority



November 15, 2019

Arch. Carlos A. Rubio Cancela
Executive Director
State Historic Preservation Office
PO Box 9066581
San Juan, Puerto Rico 00906-6581

**EMERGENCY WORKS ON VARIOUS ROADWAYS
IN THE ISLAND OF PUERTO RICO DUE TO HURRICANES IRMA AND MARIA
AC-805544, AC-806544, AC-809544, AC-817544, AC-819544, AC-821544,
AC-827544, AC-801544, AC-816544 AND AC-812544
SHPO-10-03-17-20**

Dear architect Rubio:

We would like to update the information about emergency works which was provided in our last letter dated July 17, 2019. As mentioned in the missive, the magnitude of the Hurricanes events caused approximately 400 landslides in the state roadways around the Island.

As indicated in our last letter, PRHTA contract various design firms to recommend the permanent repairs for the damages. The repairs will consist of roadway rehabilitation, reconstruction of sidewalks, repairs of storm sewers, landslides corrections, construction of concrete curbs and gutters, and others miscellaneous works. All works to be performed are necessary to provide highway user safety. The repairs will be performed with Federal Emergency Relief funds.

From the group of 45 projects identified as priority for construction another group of sixty-four (64) sites were evaluated by a qualified archeologist. For those projects, no effect due to the undertaking was determined and no further studies were recommended. To facilitate your evaluation process, a table with project's information including the Section 106 determination is enclosed. Attached you will find the studies and assessment realized by a qualified archeologist to each site to support our determination.

Some of this project require a permit of the US Army Corps of Engineers due to slope stabilization adjacent to the water body or road crossing. If a protection measure or repair is not performed soon, user safety will continue compromised and in risk if another event impact the Island. For that reason, it is of extreme urgency your help in order to protect life and properties.



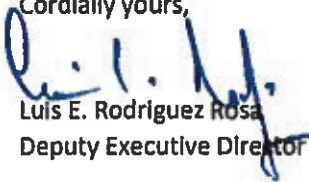
Arch. Carlos A. Rublo Cancela
Emergency Works for various Roadways
AC-805544, AC-806544, AC-809544, AC-817544, AC-819544,
AC-821544, AC-827544, AC-801544, AC-816544 and AC-812544
Page 2

For your reference, a copy of the letter from the Federal Highway Administration directed to SHPO authorizing PRHTA to initiate consultation with your Agency in accordance with 36 CFR Part 800.2 (c)(4) is included.

PRHTA and archeologist will continue to conduct the evaluation and identification of historic properties in other sites to determine the effect due to the undertaking. As soon as we finish with the next round of projects, we will inform you.

If you have any questions or need additional information, please contact me or Eng. Alexandra Velazquez Delgado from our Programming and Special Studies Area at the telephone number 787-721-8787 extensions 1006 and 1501, respectively.

Cordially yours,



Luis E. Rodriguez Rosa
Deputy Executive Director

Enclosures

C: Luis D. López, Senior Environmental Specialist, Federal Highway Administration

**PUERTO RICO HIGHWAY AND TRANSPORTATION AUTHORITY
EMERGENCY RELIEF PROGRAM- LANDSLIDES AND ROAD DAMAGES
(AC-805544, 806544, 809544, 817544, 819544, 821544, 822544, 827544, 801544 AND 812544)
TABLE 1 – SECTION 106 DETERMINATION – NO EFFECT ON HISTORIC PROPERTIES**

	AC Number	Road	Km	Municipality	ER-HWY	Section 106 Determination	Archaeologists
1	805544	PR-1	44.06	CAGUAS	1	No effect on historic properties	Anabel Arana Lanzas and Marisol Martínez Garayalde
2	805544	PR-3	107.80	YABUCCA	338	No effect on historic properties	Anabel Arana Lanzas and Marisol Martínez Garayalde
3	805544	PR-3	103.10	MAUNABO	339	No effect on historic properties	Anabel Arana Lanzas and Marisol Martínez Garayalde
4	805544	PR-3	103.40	MAUNABO	340	No effect on historic properties	Anabel Arana Lanzas and Marisol Martínez Garayalde
5	805544	PR-3	103.60	MAUNABO	341	No effect on historic properties	Anabel Arana Lanzas and Marisol Martínez Garayalde
6	805544	PR-3	104.30	MAUNABO	342	No effect on historic properties	Anabel Arana Lanzas and Marisol Martínez Garayalde
7	805544	PR-991B	0.20	YABUCCA	471	No effect on historic properties	Anabel Arana Lanzas and Marisol Martínez Garayalde
8	806544	PR-796	4.4	CAGUAS	424	No effect on historic properties	Sharon Melendez Ortiz

**PUERTO RICO HIGHWAY AND TRANSPORTATION AUTHORITY
EMERGENCY RELIEF PROGRAM- LANDSLIDES AND ROAD DAMAGES
(AC-805544, 806544, 809544, 817544, 819544, 821544, 822544, 827544, 801544 AND 812544)
TABLE 1 – SECTION 106 DETERMINATION – NO EFFECT ON HISTORIC PROPERTIES**

	AC Number	Road	Km	Municipality	ER-HWY	Section 106 Determination	Archaeologists
9	806544	PR-182	11.5	YABUCCA	313	No effect on historic properties	Sharon Melendez Ortiz
10	806544	PR-182	11.9	YABUCCA	314	No effect on historic properties	Sharon Melendez Ortiz
11	806544	PR-715	4.4	CAVEY	407	No effect on historic properties	Sharon Melendez Ortiz
12	806544	PR-748	1.4	GUAYAMA	412	No effect on historic properties	Sharon Melendez Ortiz
13	806544	PR-748	4.0	GUAYAMA	413	No effect on historic properties	Sharon Melendez Ortiz
14	806544	PR-971	6.30	NAGUABO	470	No effect on historic properties	Sharon Melendez Ortiz
15	809544	PR-124	16.0	LAS MARIAS	104	No effect on historic properties	Sharon Melendez Ortiz
16	817544	PR-816	0.7	BAYAMON	438	No effect on historic properties	Alda Belen Rivera Ruiz

**PUERTO RICO HIGHWAY AND TRANSPORTATION AUTHORITY
EMERGENCY RELIEF PROGRAM- LANDSLIDES AND ROAD DAMAGES
(AC-805544, 806544, 809544, 817544, 819544, 821544, 822544, 827544, 801544 AND 812544)
TABLE 1 – SECTION 106 DETERMINATION – NO EFFECT ON HISTORIC PROPERTIES**

	AC Number	Road	Km	Municipality	ER-HWY	Section 106 Determination	Archaeologists
17	817544	PR-816	2.6	BAYAMON	439	No effect on historic properties	Aida Belen Rivera Ruiz
18	817544	PR-816	2.8	BAYAMON	440	No effect on historic properties	Aida Belen Rivera Ruiz
19	817544	PR-816	4.5	BAYAMON	441	No effect on historic properties	Aida Belen Rivera Ruiz
20	817544	PR-816	5.1	BAYAMON	442	No effect on historic properties	Aida Belen Rivera Ruiz
21	817544	PR-816	6.4	BAYAMON	443	No effect on historic properties	Aida Belen Rivera Ruiz
22	817544	PR-816	6.7	BAYAMON	444	No effect on historic properties	Aida Belen Rivera Ruiz
23	817544	PR-140	14.15	UTUADO	158	No effect on historic properties	Aida Belen Rivera Ruiz
24	817544	PR-140	14.9	UTUADO	160	No effect on historic properties	Aida Belen Rivera Ruiz

**PUERTO RICO HIGHWAY AND TRANSPORTATION AUTHORITY
EMERGENCY RELIEF PROGRAM- LANDSLIDES AND ROAD DAMAGES
(AC-805544, 806544, 809544, 817544, 819544, 821544, 822544, 827544, 801544 AND 812544)
TABLE 1 – SECTION 106 DETERMINATION – NO EFFECT ON HISTORIC PROPERTIES**

	AC Number	Road	Km	Municipality	ER-HWY	Section 106 Determination	Archaeologists
25	817544	PR-140	15.2	UTUADO	162	No effect on historic properties	Aida Belen Rivera Ruiz
26	817544	PR-140	19.1	UTUADO	166	No effect on historic properties	Aida Belen Rivera Ruiz
27	817544	PR-812	4.3	BAYAMON	431	No effect on historic properties	Aida Belen Rivera Ruiz
28	817544	PR-812	4.9	BAYAMON	432	No effect on historic properties	Aida Belen Rivera Ruiz
29	817544	PR-812	8.1	BAYAMON	433	No effect on historic properties	Aida Belen Rivera Ruiz
30	819544	PR-5141	0.3	JAYUYA	373	No effect on historic properties	Jaqueline Lopez Melendez
			0.35		374		
			0.6		375		
43	821544	PR-144	6.3	JAYUYA-CALES	206	No effects on historic properties	Marlene Ramos Velez
			6.8		207	No effects on historic properties	
			7.25		208	No effects on historic properties	
			10.8		209	No effects on historic properties	
			11.35		210	No effects on historic properties	
			12.1		216	No effects on historic properties	
			12.6		212	No effects on historic properties	
			12.7		213	No adverse effects on historic properties, requires a protection plan	
			13.6		214	No effects on historic properties	

**PUERTO RICO HIGHWAY AND TRANSPORTATION AUTHORITY
EMERGENCY RELIEF PROGRAM- LANDSLIDES AND ROAD DAMAGES
(AC-805544, 806544, 809544, 817544, 819544, 821544, 822544, 827544, 801544 AND 812544)
TABLE 1 -- SECTION 106 DETERMINATION -- NO EFFECT ON HISTORIC PROPERTIES**

AC Number	Road	Km	Municipality	ER-HWY	Section 106 Determination		Archaeologists	
					No effects on historic properties	No effects on historic properties		
A	PR-146	14.35	CIALES	213, Ciales	No effect on historic properties	No effect on historic properties	Marilyne Ramos Velez	
		18.2		214, Ciales				
		9.8		218				
		16.4		220				
B	PR-951	5.0	CANOVANAS	469	No effect on historic properties	No effect on historic properties	Marilyne Ramos Velez	
		14.1		224				
C	PR-7750	1.7	AGUAS BUENAS	421	No effect on historic properties	No effect on historic properties	Aramis Font Negron	
D	PR-795	8.0	AGUAS BUENAS	422	No effect on historic properties	No effect on historic properties	Aramis Font Negron	
E	PR-411	4.9-5.0	AGUADA	351	No effect on historic properties	No effect on historic properties	Sharon Melendez Ortiz	
F	PR-635	11.7	HATILLO	396	No effect on historic properties	No effect on historic properties	Sharon Melendez Ortiz	
								479
								480
G	PR-1	23.0	GUAYNABO	481	No effect on historic properties	No effect on historic properties	Arqueologia Maura's Inc.	
		23.7						
H	PR-1	116-118	JUANA DIAZ	3	No effect on historic properties	No effect on historic properties	Arqueologia Maura's Inc.	
		25.4						

**PUERTO RICO HIGHWAY AND TRANSPORTATION AUTHORITY
EMERGENCY RELIEF PROGRAM- LANDSLIDES AND ROAD DAMAGES
(AC-805544, 806544, 809544, 817544, 819544, 821544, 822544, 827544, 801544 AND 812544)
TABLE 1 -- SECTION 106 DETERMINATION -- NO EFFECT ON HISTORIC PROPERTIES**

	AC Number	Road	Km	Municipality	ER-HWY	Section 106 Determination	Archaeologists
I	827544	PR-155	45.5	MOROVIS	264	No effect on historic properties	Arqueología Mauras Inc.
J	877544	PR-143	34.1	OROCOVIS	200	No effect on historic properties	Arqueología Mauras Inc.
K	803544	PR-157	0.4	GALES	278	No effect on historic properties	Jaqueline Lopez Melendez
L	803544	PR-157	1.2	GALES	281	No effect on historic properties	Jaqueline Lopez Melendez
M	803544	PR-157	10.4	OROCOVIS	282	No effect on historic properties	Jaqueline Lopez Melendez
N	803544	PR-157	16.4	OROCOVIS	283	No effect on historic properties	Jaqueline Lopez Melendez
O	811544	PR-179	13.25	GUAYAMA	308	No effect on historic properties	Fernando Alvarado Muñoz
P	811544	PR-722	5.7	AIBONITO	410	No effect on historic properties	Fernando Alvarado Muñoz
Q	811544	PR-149	42.8	GALES	227	No effect on historic properties	Fernando Alvarado Muñoz

**PUERTO RICO HIGHWAY AND TRANSPORTATION AUTHORITY
EMERGENCY RELIEF PROGRAM- LANDSLIDES AND ROAD DAMAGES
(AC-805544, 806544, 809544, 817544, 819544, 821544, 822544, 827544, 801544 AND 812544)
TABLE 1 – SECTION 106 DETERMINATION – NO EFFECT ON HISTORIC PROPERTIES**

	AC Number	Road	Km	Municipality	ER-HWY	Section 106 Determination	Archaeologists
			42.9		228		
R	811544	PR-805	0.9	TOA BAJA	452	No effect on historic properties	Fernando Alvarado Muñoz
S	811544	PR-146	19.3	CIALES	221	No effect on historic properties	Fernando Alvarado Muñoz
T	811524	PR-524	0.70	ADIUNTAS	380	No effect on historic properties	Fernando Alvarado Muñoz
U	818544	PR-10	52.3	ARECIBO	11	No effect on historic properties	Oswaldo Torres
V	816544	PR-135	37.00	MOROVIS	258	No effects on historic properties	Marisol Martinez Garayalbe
W	816544	PR-135	38.35	MOROVIS	259	No effects on historic properties	Marisol Martinez Garayalbe
X	816544	PR-135	39.10	MOROVIS	260	No effects on historic properties	Marisol Martinez Garayalbe
Y	816544	PR-135	40.30	MOROVIS	261	No effects on historic properties	Marisol Martinez Garayalbe

**PUERTO RICO HIGHWAY AND TRANSPORTATION AUTHORITY
EMERGENCY RELIEF PROGRAM- LANDSLIDES AND ROAD DAMAGES
(AC-805544, 806544, 809544, 817544, 819544, 821544, 822544, 827544, 801544 AND 812544)
TABLE 1 – SECTION 106 DETERMINATION – NO EFFECT ON HISTORIC PROPERTIES**

	AC Number	Road	Km	Municipality	ER-HWY	Section 106 Determination	Archaeologists
2	816544	PR-155	43.00	MOROVIS	262	No effects on historic properties	Marisol Martinez Garayalbe
1	816544	PR-155	43.25	MOROVIS	263	No effects on historic properties	Marisol Martinez Garayalbe
2	816544	PR-155	56.70	MOROVIS	265	No effects on historic properties	Marisol Martinez Garayalbe
3	816544	PR-155	30.10-30.20	OROCOVIS	267	No effects on historic properties	Marisol Martinez Garayalbe
4	816544	PR-156	3.60	OROCOVIS	270	No effects on historic properties	Marisol Martinez Garayalbe
5	816544	PR-156	4.40	OROCOVIS	271	No effects on historic properties	Marisol Martinez Garayalbe
6	816544	PR-156	6.30-6.40	OROCOVIS	273	No effects on historic properties	Marisol Martinez Garayalbe
7	816544	PR-156	3.70-3.80	OROCOVIS	275	No effects on historic properties	Marisol Martinez Garayalbe

Reconstruction of Landside
ER-HWY-410

PR 722 KM. 5.7 Robles Ward, Aibonito PR
Archaeological Survey Stage IA

AC-811544

Submitted to:



Realized by:



AM GROUP

SERVICIOS DE CONSULTORIA ARQUEOLOGICA

Arql. Fernando Alvarado Muñoz

HC 3 Box 10608

Juana Díaz, PR 00795-9501

Celular: 787-637-9807

arqueologoalvarado@hotmail.com

amgrouppr@gmail.com

August 8, 2019



Reconstruction of Landside ER-HWY-410

PR 722 KM. 5.7 Robles Ward, Aibonito PR
Archaeological Survey Stage IA

AC-811544

Submitted to:



Realized by:



AM GROUP

SERVICIOS DE CONSULTORIA ARQUEOLOGICA



Arq. Fernando Alvarado Muñoz
Principal Archaeologist, Co-Author

Eduardo Questell Rodríguez
Archaeologist, Co Author



August 8, 2019

Table of Contents	Page
Executive Summary	1
I. Introduction	3
II. Project Description and Scope of Work	3
a. Legal Framework	3
b. Description and Actual Conditions of the Areas	5
III. Environmental Framework	7
a. Topography	7
b. Geology and Soils	9
c. Climate	9
d. Hydrography	12
e. Flora and Fauna	13
IV. Synthesis of Cultural Development	13
a. Classification Scheme	14
b. Prehistory of Aibonito	20
c. Analysis of Archaeological Reports Near the Project	25
d. Archaeological Reports of Aibonito	27
V. Historical Cultural Context	31
a. The Beginning	32
b. The 19 th Century	34
c. Road in Aibonito	35
VI. Economic Development	36
a. 20th Century: The Central Highway and the Beginning of the PR- 722	40

b.	Data of the Central Highway in Aibonito and the Beginning of PR-722	40
c.	Other Maps, Figures, Historical Structures and Resources	44
VII.	Aerial Photos of Aibonito	46
VIII.	Fieldwork	49
IX.	Conclusion and Recommendations	52
a.	Proposed Actions	53
X.	Bibliography	64
XI.	Annexes	60
a.	“As Built Plan” with the Surface Inspection Made	
b.	Development Proposed Plan	

Figures

Figure 1	Project Location ER-HWY-410 USGS 1: 20,000	6
Figure 2	Location of the Municipality of Aibonito	7
Figure 3	Location of Aibonito and its Neighborhoods	8
Figure 4	Location of the project. Aerial Photo by Google Earth	8
Figure 5	Fragment of the Geology of the Comerío Quadrangle	10
Figure 6	Fragment of the Soil Survey of the San Juan Area	11
Figure 7	Archaeological Sites Near Undertaking in CAT	23
Figure 8	Archaeological Sites of Aibonito in SHPO Archives	24
Figure 9	Detail, “Puerto Rico 1775” Juan de Surville	33
Figure 10	Detail, “Puerto Rico 1791”, Tomás López	34
Figure 11	Part of the 6 th Leaf of the Road Itinerary Plans	42

Figure 12 Part of the Plan Around Aibonito, 1885	43
Figure 13 Part of the 6 th Leaf of the Road Itinerary Plans,	43
Figure 14 Croquis of Aibonito, 1884	44
Figure 15 Atarjea in the PR 14 KM. 51.7	45
Figure 16 Casillas de Camineros in Street PR 14 Km. 51.8	45
Figure 17 Aerial Photo of Aibonito, 1937	46
Figure 18 Aerial Photo of Aibonito, 1964	47
Figure 19 Aerial Photo of Aibonito, 1977	48
Figure 20 Photo 1	49
Figure 21 Photo 2	50
Figure 22 Photo 3	50
Figure 23 Photo 4	51
Figure 24 Photo 5	51
Figure 25 Photo 6	52

Tables

Table 1 Archaeological Sites in the Municipality of Aibonito in the ICP	22
Table 2 Archaeological Sites in the Municipality of Aibonito in SHPO	23
Table 3 Archaeological studies in the Municipality of Aibonito	27

LIST OF ABBREVIATIONS

ACHP	Advisory Council for Historic Preservation
ACT	Autoridad de Carreteras y Transportación
ADA	American Disabilities Act
AGP	Archivo General de Puerto Rico (Puerto Rico General Archive)
APE	Area of Potential Effect
CAT	Consejo de Arqueología Terrestre (Terrestrial Archaeology Council)
CBC	Construction Building Codes
DTOP	Departamento de Transportación y Obras Públicas (Public Transportation and Works Department)
EA	Environmental Assessment
ELA	Estado Libre Asociado de Puerto Rico (Commonwealth of Puerto Rico)
FEMA	Federal Emergency Management Agency
ICP	Instituto de Cultura Puertorriqueña (Puerto Rican Culture Institute)
JP	Junta de Planificación (Puerto Rico Planning Board)
MARAD	Maritime Administration
NHPA	National Historic Preservation Act
NRHP	National Register of Historic Places
NOAA	National Oceanic and Atmospheric Administration
OECH	Oficina Estatal de Conservación Histórica (State Historic Preservation Office acting as SHPO)
PRPA	Puerto Rico Port Authority
PRHTA	Puerto Rico Highway and Transportation Authority
USGS	United States Geological Survey

Executive Summary

The Puerto Rico Highway and Transportation Authority (PRHTA) is requesting technical and financial proposals from qualified engineering consultants to provide support in their Emergency Relief Program. The project consists of the evaluation and reconstruction of landslides on several highways segments due to impacts associated with Hurricanes Irma and Maria. Those highways segments are located within the Puerto Rico's Federal Aid Highways System, and other highways and roads under the jurisdiction of the Department of Transportation and Public Works (DTPW). The Consultant will execute the site reconnaissance, investigations, monitoring and studies, necessary to provide appropriate recommendations to reconstruct the highway to its previous conditions. The sites were identified after a site inspection performed by a multidisciplinary team.

The proposed Project design shall include all proposals needed for work (to be provided by sub-consulting firms), that may include Surveying, Geotechnical Studies, Property Registration Studies, Archaeological Studies, Presence of Asbestos and Lead Studies, Environmental Studies, etc. The Project designs shall comply with the PRHTA's Design Manual (HDM), and with any other manual that applies.

The following report presents the results of the archaeological assessment for the Task ER-HWY-410 (Group A) site, that is in the Robles Ward, PR-722, km 5.7, in Aibonito, Puerto Rico. The Puerto Rico Highway and Transportation Authority (PRHTA), in agreement with the Federal Emergency Management Agency (FEMA) requires an archaeological Assessment for the Project (Task ER-HWY-410 (Group A)). This is required under Section 106 of the National Historic Preservation Act (NHPA) and its implementing regulation 36 CFR part 800. This archaeological assessment reviews the archaeological and historical information available for the location within the undertaking to provide tools to the regulatory agencies to make the appropriate decisions under the applicable laws.

The project site was visited (which is about 50 meters long). The investigators took photographs and obtained, from the archeological point, the environmental data of the place, which, as indicated, is located at the kilometer 5.7 of the road PR-722, in Robles of Aibonito. After, the land in the topographic maps of the Agencies that regulate the archaeological aspects in our country was located. In addition, the sites with archaeological value (prehistoric or historical) closest to the project were also located, as well as the places for Aibonito in the National Registry of Historic Places. Finally, the archaeological reports for Aibonito established different locations that were close to the project under investigation.

Reconstruction of Landside ER-HWY-410 Project, Aibonito PR

The information obtained allowed to the conclusion that the realization of the project (to evaluate and reconstruct the landslide that occurred in the indicated place), will not have any effect on the archaeological resources known near the place, also there are at a considerable distance.

Reconstruction of Landside ER-HWY-410 Project, Aibonito PR**I. Introduction**

The Puerto Rico Highway and Transportation Authority (PRHTA), acting in accordance with the Federal Emergency Management Agency (FEMA) acting as soliciting agencies requires an archaeological Assessment for the Project (Task ER-HWY-410 (Group A)). This is required under Section 106 of the National Historic Preservation Act (NHPA) and its implementing regulation 36 CFR part 800. This archaeological assessment reviews the archaeological and historical information available for the location within the undertaking to provide tools to the regulatory agencies to make the appropriate decisions under the applicable laws.

As required by the mentioned federal regulations, the undertaking must comply with the state and local regulations. This report complies with the regulations contained in the Regulation 8932 of February of 2017 known as Regulation for Filling and Archeological Evaluation of Development and Construction Projects of the Terrestrial Archaeology Council (CAT) under Law 112 of July 20 of 1988 as amended. It also complies with the “*Guía Oficial para la Investigación de Recursos Culturales (ICP)*”.

The research was conducted in November 2018 by the archaeologist Fernando Alvarado as Principal Investigator, the archeologist Eduardo Questell Rodríguez as co-investigator and author. In addition, Eduardo Luis Questell served as technician. Also, as the main reference for the format and other data, the investigators used *The Fajardo Ferry Terminal Assesment* (F. Alvarado y Marisol Rodríguez, 2018).

II. Project Description and Scope of Work**a. Legal Framework**

To comply with regulations, this report does an analysis of documentation to include an archaeological assessment and conform to local, state, and federal requirements.

As indicated, this investigation was conducted to comply with Section 106 of the National Historic Preservation Act of 1966 (NHPA) (PL 89-665) as amended and it's implementing regulation 36 CFR Part 800 (Protection of Historic Properties), the Archaeological and Historic Preservation Act of 1974 (PL 93-291) as amended and the National Environmental Policy Act of 1969.

Section 106 of the NHPA requires Federal agencies to consider the effects of their undertakings on historic properties and afford the Advisory Council on Historic Preservation (ACHP) a reasonable opportunity to comment. (<http://www.achp.gov/106summary.html>)

Reconstruction of Landside ER-HWY-410 Project, Aibonito PR

First, the responsible Federal agency determines whether it has an undertaking that is a type of activity that could affect historic properties. Historic properties are the properties that are included in the National Register of Historic Places (NRHP) or that meet the criteria for it. It should plan to involve the public and identify other potential consulting parties. If it determines that it has no undertaking, or that its undertaking is a type of activity that has no potential to affect historic properties, the agency has no further Section 106 obligations.

This report also complies with the Puerto Rican Commonwealth (ELA) Law 112 of June 28, 1992 as amended that creates de Council for the Protection of the Terrestrial Archaeological Patrimony of Puerto Rico, known as the Terrestrial Archaeology Council (CAT). The content of this report is guided by what is stipulated in the Regulation 8932 of February 8, 2017: “Regulation for the Filing and Archaeological Evaluation of Project of Construction and Development”.

The Secretary of the Interior’s Standards for Identification (National Park Service, 1983) defined two categories of archaeological survey aimed at gathering field information: Reconnaissance and Intensive Surveys. These categories are defined based on the objectives of the survey, the results of the survey, and the historic preservation management needs.

Phase IA reconnaissance surveys results in the characterization of a region's archaeological sites. These surveys generally involve extensive background research with limited field investigations, often focused on soil and preservation conditions rather than systematic archaeological site discovery.

Reconnaissance surveys may serve a variety of functions. They may be applied for administrative, planning, or management purposes. However, it should be noted that reconnaissance surveys are very general in scope and do not normally make determinations of significance or NRHP eligibility.

Phase IA reconnaissance surveys can indicate that a portion or the totality of a project area lacks the potential to contain intact archaeological deposits, and therefore no further archaeological work is warranted in these areas. However, in most instances, reconnaissance surveys may not contain enough information with which to support an agency’s determination of effect in fulfillment of mandated compliance.

The primary goal of doing the Phase I: Cultural Resource Investigation is to identify archaeologically sensitive and cultural/sacred areas to identify standing structures that are at least 50 years old, that may be affected by a proposed project. Secondly, to locate all prehistoric and historic cultural/archaeological resources that may exist within the proposed project area are intended to gather information concerning the environmental/physical setting of a specific project area as well as its cultural setting.

Reconstruction of Landside ER-HWY-410 Project, Aibonito PR

It is the interrelationship of the physical environment and the cultural, historical setting that provide the basis for the sensitivity assessment. This research should include a consideration of relevant geomorphology and soils information, culture history, and previous archaeological research to provide for the development of explicit expectations or predictions regarding the nature and locations of sites. Regardless of the project size, archaeologists should consider all relevant data in developing these expectations.

To complete the section 106 process, investigations should be conducted in an Area of Potential Effect. (APE) According to the ACHP, the APE is the geographic area(s) within which an undertaking may directly or indirectly cause alterations in the character or use of historic properties, if any such properties exist.

The APE is influenced by the scale and nature of the undertaking and may be different for other kinds of effects caused by the undertaking [36 CFR § 800.16(d)]. Because the APE defines the geographic limits of federal agency responsibility for purposes of Section 106, is necessary to review the archaeological survey necessary to identify and evaluate historic properties is carried out within its boundaries. However, within the APE, the level of effort may vary considerably depending on such factors as anticipated effects and prior ground disturbance. (ACHP Archaeology Guidance.pdf). Because the APE involves the federal agencies responsibility it must be defined by them in consultation with SHPO prior to initiating identification efforts.

b. Description and Actual Conditions of the Areas

The route of the PR-722 road in question begins on highway PR-14, east of the town of Aibonito, and crosses the Robles neighborhood until it reaches highway PR-1.

As observed in the visit, the site corresponds to a stretch of about 50 meters long on Highway PR-722, in the neighborhood Robles, near the kilometer 5.7. The project site, which is a landslide to the northwest that affected the width of the road, is bounded by concrete barriers for protection. The section of the road is in a semi-curve, rising moderately and immediately to an access road to residences. Then, there is a more marked and prolonged curve. In the place a culvert of the pluvial drainage that runs towards the northwest was visible. The landslide affected the concrete curb on all that northwest side of the stretch.

The scope of the evaluation includes the indicated section of Highway PR-722 and its surroundings next to kilometer 5.7 of said road (See Figure No. 1).

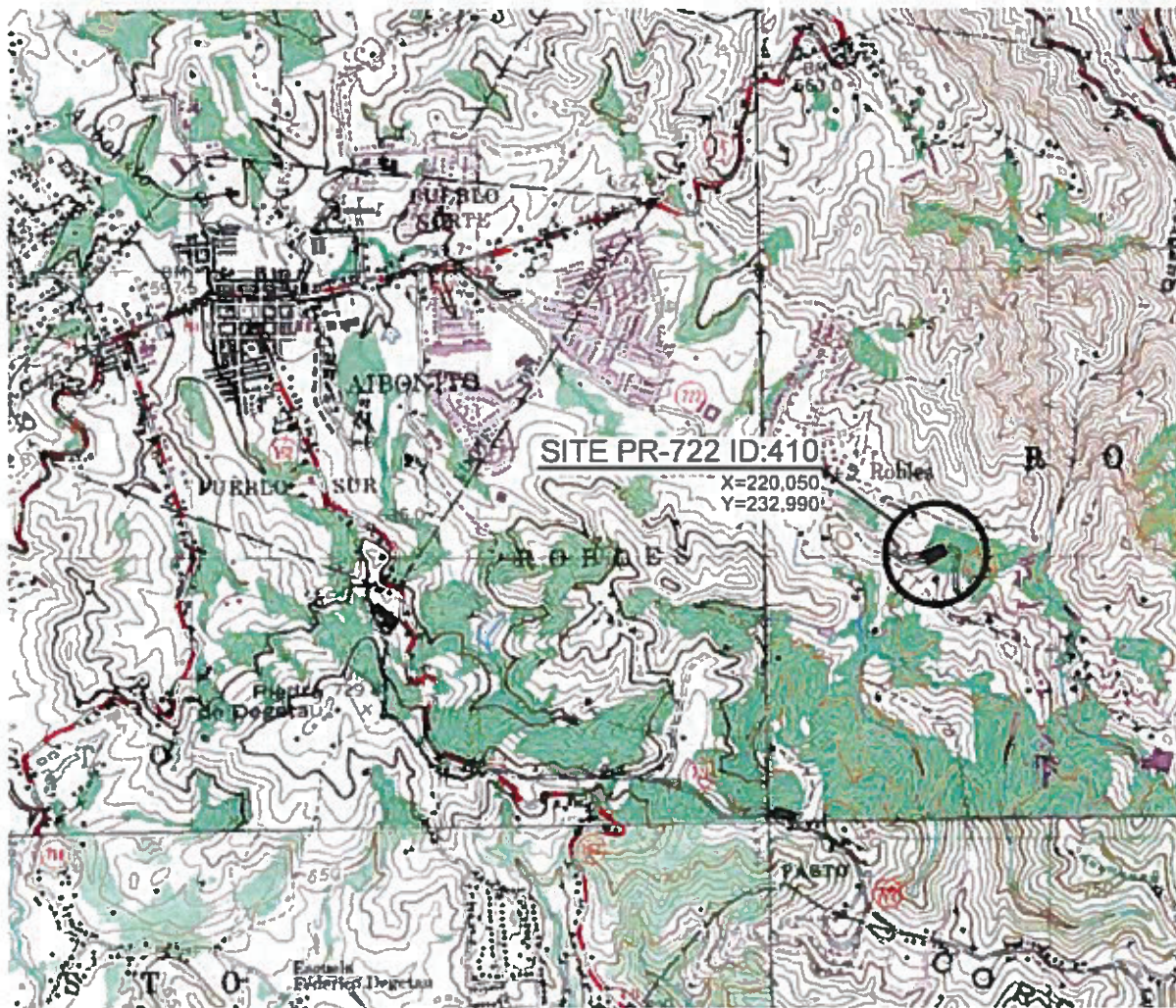


Figure 1: Image Showing Location of the Project ER-HWY-410 (USGS 1:20,000)

c. Proposed Action

As previously established, the rehabilitation will consist of the evaluation and reconstruction of the landslide, and one of the aspects of such evaluation is the preparation of this archaeological Assessment for the Project (Task ER-HWY-410 (Group A)).

III. Environmental Framework

As part of the process to document the general sensitivity of the area for the presence or absence of archaeological resources, is necessary to conceptualize the property inside the widest frame that represents the geographical and environmental characteristics in general. The zone of Aibonito has been widely studied, thus an exhaustive revision on this matter will not be repeated in this document. The general trend for Puerto Rico and the Caribbean is to use the presence of environmental or ecological variables as a factor to predict the existence of pre-Columbian settlements. So, it is logical to conclude that the present territory of the municipality discussed presents a high degree of sensitivity and archaeological potential. Among these variables stand out: the basins of the rivers La Plata, Cuyón, Aibonito and Usabón, with the valleys and plains. Other existing variables could be constituted by fertile lands suitable for agriculture, abundant rainfall, mountainous areas with wooded areas, freshwater streams such as rivers. Moreover, to provide water, resources, and tributaries. The rivers must have been channels of communication, also favoring the creation of settlements bordering their banks.

The municipality of Aibonito is in the humid mountains of central east, near the geographic center of the island in pure Puerto Rican mountains. (José A. Toro Sagrañes, 1995, p.33). On the north, it borders the municipality of Barranquitas, on the northwest with Cidra, on the east with Cayey, on the south it has Salinas and on the southwest on Coamo (*Ibid*).

Its area that is mostly mountainous, covers about 33.3 square miles, or 20,627 *cuerdas*. Its population, according to the Census of 1990, was 25,551 inhabitants, which classified it then as number 52 among the municipalities of Puerto Rico (*Ibid*, p.35).

The municipality of Aibonito is divided in: Pueblo, Asomante, Algarrobo, Cuyón, Llanos, Plata, Pasto, and Robles Wards (Fig. 3).



Figure 2: Location of Aibonito Within the Island of Puerto Rico



Figure 3: Wards of the Municipality of Aibonito



Figure 4: Location of the Project. Aerial Photo by Google Earth

a. Topography:

Topographically, Puerto Rico is a steep island, with surface covered in most cases by hills and mountains. It has been anticipated that not more of the third part of Puerto Rico can qualify as flat or undulating.

In terms of slopes, almost the fourth part of Puerto Rico consists of very steep slopes of 45 or more grades of inclination degrees which is almost the half of the entire area. It can be estimated that 40 % of the island is covered by mountains, with 35% of hills and 25% of flats. (Rafael Picó, *Nueva Geografía de Puerto Rico, física, económica y social*. Río Piedras, Puerto Rico, Editorial Universitaria, 1969).

In his work, the geomorphologist Watson Monroe, indicated that: "There are three major geomorphic provinces in Puerto Rico: The Central Interior Mountainous Province, the Northern Karst Province, and the Coastal Plains Province. Each of these provinces has its own characteristics both in terms of relieve and in terms of form. The Province of the Central Interior Mountainous shows, predominantly, the effects of the erosion of a structurally complex succession of many kinds of igneous and sedimentary rocks. Additionally, the Province of Karst illustrates the effects of the solution processes on the limestones. On the other hand, the Province of the Coastal Plains presents areas of deposition. (Watson Monroe, "Las divisiones geomórficas de Puerto Rico", publicado en María Teresa B. de Galiñanes (ed.), *Geovisión de Puerto Rico*. (Río Piedras, Puerto Rico, Editorial Universitaria).

As indicated, the municipality of Aibonito is in the humid mountains of the central east of the Island. The topography of the land is seed with a slope to the west and northwest. The highest point of the terrain is about 640 meters above sea level, near its eastern limit of the section studied. The major rivers such as La Plata, Cuyón, Aibonito and Usabón formed alluvial valleys.

Aibonito shares with Barranquitas the San Cristóbal Canyon, a phenomenon of nature, which with nine kilometers in length and with a maximum depth of about 700 feet offers us one of the most important and interesting ecosystems in the country (Toro Sugrañes, Op. Cit., p.33).

b. Geology and Soils

Adding to the geographic factors, regarding the possibility of the presence of archaeological resources and the sensitivity of the area it must be considered the geology and the composition of the soils, which present characteristics of fertility, compaction, and water access, among others factors that favor its use by human groups. The area has been intensely documented. Correspondingly, the analysis was limited.

Nevertheless, the geology of the Comerío Quadrangle, which is the quadrangle where the project land is located, was made by the American geologists Maurice H. Pease, Jr. and Reginald P. Briggs, in 1960. These two geologists indicate that the only rock on the site is part of the **Robles Formation**, chiefly of thinly stratified fine-grained sedimentary rocks (Kr), but includes fine-grained volcanic breccia (Krb), and lava flows (Krf). They also indicated that these rocks are medium dark gray to medium bluish gray when fresh, but weather to pale shades of brown and to reddish-brown soil.

Observing the geological map of the site prepared by the geologists (See Figure No. 5) it can be seen that the layers of rocks near the project site have an inclination (dip) of more than 30 degrees to the southeast and that about 220 meters south-southeast of the precise place of the slip defines the center of a small syncline, so is understandable that the type of rock is not responsible for the landslide.

On the other hand, the soils of the municipality of Aibonito were studied by Rafael A. Boccheciamp, in 1978 (Soil Survey of San Juan Area of Puerto Rico). This indicates that the predominant soil in the project lands (leaf No. 48) is the Humatas clay, with 40 to 60 percent slopes (HtF). The figure no. 6 illustrates the soils in the area.

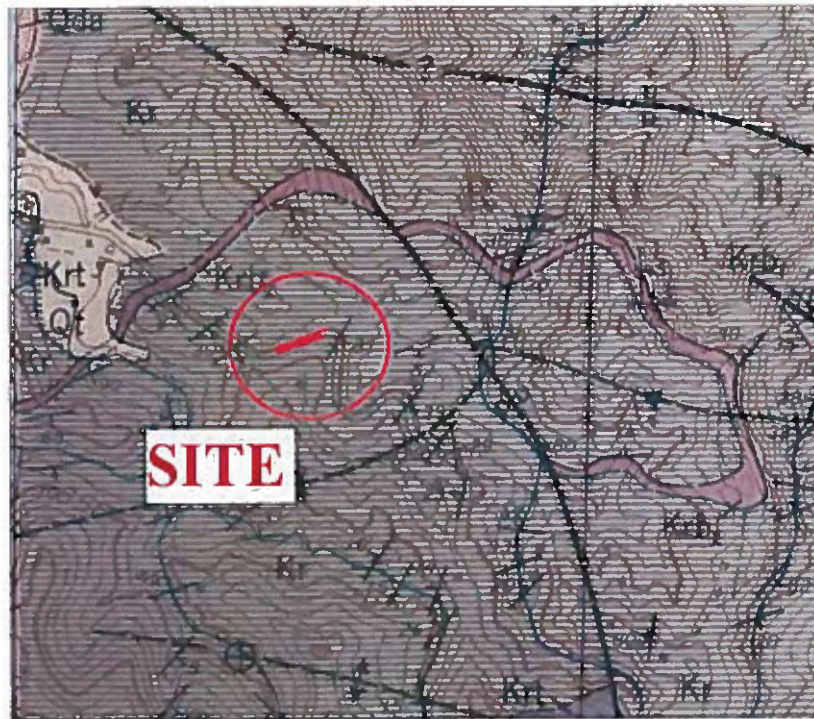


Figure 5: Fragment of the Geology of the Comerío Quadrangle, Puerto Rico.



Figure 6: Fragment of the Soil Survey of the San Juan Area of Puerto Rico.

The Humatas series (*Ibid*, p. 53) consist of clayey, kaolinitic, isohyperthermic Typic Tropohumults. These soils are deep, are well drained, and have a B2 horizon of red clay. They formed in residuum of basic volcanic rocks. The Humatas soils are on narrow ridgetops and side slopes. Slopes range from 20 to 60 percent but are dominantly 40 to 60 percent. The mean annual precipitation is 86 inches, and the mean annual temperature is 76 degrees F.

Specifically, the Humatas Clay, 40 to 60 percent slopes is a very steep, well-drained soil on side slopes and ridgetops of strongly dissected humid uplands (*Ibid*, p. 17). Slopes are convex and are 200 to 1000 feet long. The areas range from 10 to 500 acres. Typically, the surface layer is dark brown, friable clay about 5 inches thick. The subsoil is about 29 inches thick; it is a red friable clay and yellowish red, friable silty clay. The substratum, beginning at a depth of 34 inches, is red, dark red, yellowish red, strong brown, and olive yellow, friable silty clay saprolite.

Permeability and the available water capacity are moderate. Runoff is rapid, and erosion is a hazard. Slippage is common in roadbanks, ditches, and drainageways. This soil is difficult to work because it is very steep and because of the stickiness and plasticity of the clay. Hill-side ditches and diversions are difficult to lay out, establish, and maintain. The root zone is deep. Natural fertility is medium. Crops respond well to heavy applications of lime and fertilizers. Also, controlling erosion is the major concern of management.

Reconstruction of Landside ER-HWY-410 Project, Aibonito PR

This soil is limited for most urban uses because it is very steep and subject to landslides. If the soil is used as construction sites, development should be on the contour. Removal of vegetation should be held to a minimum, and temporary plant cover established quickly in denuded areas.

c. Climate

Climate is the generalized state of the atmosphere in a given area. The elements of climate are temperature, wind, precipitation and the seasons of the year. In Puerto Rico, there are two zones of temperature differentiated by height: the "hot earth" (tropical), in the low plains and hills, and the "temperate earth" (subtropical), towards the high part of the mountains. The area under evaluation is located on the boundary between the tropical zone and the temperate zone. This limit is represented by an isotherm of 74 degrees Fahrenheit, and approximately coincides with the level curve of 1,000 feet of altitude (300 meters) (Rafael Picó, 1969, p. 159). The prevailing winds that pass through the island are the so-called trade winds, which blow fifty percent of the time in the East-West direction. The other wind regimes identified for the island are sea and land breezes, mountain and valley breezes and hurricanes. (*Ibid.*, p. 162)

Climate can be adjoined as a factor to identify the archaeological sensitivity of areas on the island of Puerto Rico resulting with a somewhat lesser relative importance, due to the few climatic fluctuations that the island has in general. Perhaps, it is the pluvial precipitation one of the factors that can better modify the presence or absence and the type of anthropogenic activities in specific areas.

In general, the lands of the municipality of Aibonito enjoy a very pleasant climate, with an annual average temperature of between 71- and 72-degrees F (R. Picó, 1964, page 5, figure 3). The average rainfall for the area is about 60 inches per year (*Ibid*, page 6, figure 4), with Aibonito being in the so-called "Humid Mountains of the East" (*Ibid*, p.10, figure 7).

d. Hydrography

In general terms, it can be affirmed that the topographic of the island forms four main slopes through which the rainwater flows towards the sea. These slopes are the north or Atlantic slope; the southern slope or the Caribbean Sea; the eastern slope, or the Passage and the Vieques Sound; and the western slope, or Paso de la Mona.

As previously indicated, the town is irrigated by the rivers: La Plata, Cuyón, Aibonito and Usabón. These form valleys and plains. Therefore, their lands are irrigated by the rivers Cuyón, Aibonito, which crosses it diagonally, the Usabon and La Plata that passes through its northeast side, making it collide with Cidra (Toro Sugrañes, Op. Cit., P.33), and numerous perpetuals or intermittent streams that cross it everywhere.

e. Flora and Fauna

The predominant flora in the area consisted of bamboo, African tulip, guamá, guinea grass, moriviví and coitre. The fauna was represented by the following animals: reinita, pitirre, rolita, cattle heron, dogs and lizards.

IV. Synthesis of Cultural Development

In the following chapter it will be discussed the chronological aspects of Puerto Rico and Aibonito. In addition, what regards to the archaeology near the undertaking will be discussed more precisely. Also, the report entitled *Fajardo Ferry Terminal Assesment* (F. Alvarado y Marisol Rodríguez, 2018) was used as a main reference for this part of the research.

First, when the Spaniards arrived on the island, the inhabitants of the island, called by them, Taínos, had the means to rescue and reproduce their historical memories, customs and traditions through oral tradition. However, there is minimal information about this oral tradition. Historical written sources are classified based on the degree of knowledge of the chronicler. It is known as primary sources when is the person who collects the information, either by direct observation or by narration. Also, the other sources are classified as secondary and are almost always collections of narrations told by people who were at the sites and which the chroniclers consider to be their own.

Aibonito has the distinction of having several archaeological sites that have been used for development of the societies that inhabited our archipelago. Consequently, the definition of this development is relatively well presented.

Nevertheless, for Puerto Rico, these historical sources are limited. However, it includes Fray Ramón Pané, the chronicler who collected the only source considered as primary. It is a short text that tells mostly mythological aspects of this society. As secondary sources, there are several chroniclers such as Gonzalo Fernández de Oviedo and Fray Bartolomé de las Casas who rescued memories of ceremonies and aspects of daily life, but especially on the island of Hispaniola. Later, monks or envoys of the crown had the task of narrating about everything concerning the economy and development of the people they encountered. As time has progressed, and with the facilities that globalization has given us, first hand data has been made available that researchers have been collecting and analyzing in the Spanish and island archives. Which many of them are available on the net, because of the generosity of the authors.

a. Classificatory Scheme

Early, in the study of Puerto Rico, inhabitant's, schemes were established for their study. During the Spanish colonization, many creole investigators known as dilettantes because of the various aspects that they studied including flora and fauna, poetry and archaeology, produced a lot of information about the sites that they found on the island. As primarily examples of dilettantes there are Dr. Cayetano Coll y Toste, Dr. Salvador Brau and Dr. Adolfo de Hostos among others.

Early, during the North American invasion, the new owners of the island sent their experts to study the different aspects of the society. In the case of archaeology, the task was put in hands of the Smithsonian Institute. The first researchers were Jesse Water Fewkes and Aldon Mason. But it's with the visit of Dr. Irving Rouse that the schemes took their final shape. Yet, with certain changes among the decades is still used today.

The classification scheme and the temporal spatial framework that includes the archaeological periods and series for Puerto Rico and the Caribbean established by Dr. Irving Rouse (1964-1986-1992), will be taking in to account because is what the agencies present as the official classification. However, some other investigations that have shed light on this period of historical social development of the island, including our own in some cases will be taken into consideration.

Period I (3,000 - 2,000 b.C.)

Both el Consejo de Arqueología Terrestre (CAT) and la Oficina de Conservación Histórica (OECH) present this scheme in their descriptions of site. (for more information refer to *oech.gov.pr*)

This period is characterized by bands of marine collectors, pre-ceramics linked to coastal environments, mangrove areas and the resources of caves and rock shelters. This population groups belong to the Lithic Era and is characterized by producing lithic instruments using the stone process.

Although is dated by Rouse on 3,000-2,000 b.C., the dates of Angostura place these societies in the 6000 b.C. This date has been confirmed by recent studies in Corozo, Cabo Rojo. During the IB Period (2,000 b.C. - 100 A.D.), the so-called Archaic Era was developed (Rouse 1986). This group practiced small-scale farming, fishing and the collection of wild plants and seeds. The lithic instruments were produced using the polished stone method. (Carlos Ayes, Carso 2001 Inv. ArqI Fase III Angostura, Barceloneta, CAT).

The Archaic society is characterized primarily by being gatherers and hunters. The difference is the minimal existence of animals for hunting, so the subsistence fell on the collection of both fruits and aquatic species. Aquatic species were collected both at sea and in the rivers. First, in the ocean there were collected in the *Thalasia* prairies and in the mangroves. On the other hand, in the river, there were collected both in the current itself, and under the stones. It is characterized for producing lithics instruments using in process of the flaked stone. (Ayes, 1996). There is evidence that made simple ornaments in stone, shell, bone and other materials, as well as the practice of human burials. (Ayes, 1991). The indigenous of the archaic culture could have arrived at the island in migrations from South America. Some researchers have postulated possible migrations from North America, but it has not yet been evidenced in the archaeological record. Likewise, the mitochondrial DNA investigations that have been carried out on the island appear to three different migrations of South American tribes, which curiously coincides with the archaeological expositions. (Martínez Cruzado et al, 2001)

In addition, during this period, two phases were differentiated. Ayes on his investigations on Angostura and other archaic sites suggested the existence of two periods differentiated by a flake industry and another of knives. Although at first it was believed that they lacked ceramics, because of the research and being able to identify the production of ceramics in this period in what have been identified as a late period. (Marisol Rodríguez Miranda, 1997)

The investigators had the opportunity to observe this pottery in the archaic site of Angostura in Barceloneta. In addition, to describe it on an unpublished document and have observed it in excavations carried out in an archaic site of Cabo Rojo excavated by José Ortiz for a treatment plant. Few researchers have taken up this research, although we have seen with pleasure how it has been cited in publications outside the island. Likewise, Dr. Reniel Rodríguez studies endorse these findings and define the period. (Rodríguez, Reniel, et. al, 2008). Also, this is an ongoing investigation.

Recent investigations produce data that will allow us to define accurately this period of occupation. Some of this information came from the sites of Yanuel 9 and Puerto Ferro on Vieques. The earliest date come from the site of Angostura, which produced a 4900 b.C. radiocarbon date (Ayes, 1993). The site of Maruca, located on the south-central coast, dates to ca. 3000 b.C. These 4th -millennium settlement dates are supported by additional studies on the island that have evidence for early landscape modifications through intentional burning and clearing of forested areas. Evidence from Cueva María de la Cruz, Paso del Indio, and Yanuel 9 on the island of Vieques (Tronolone et al, 1984) showed that Archaic populations existed at least through the 1st century A.D. and interacted with the Saladoid populations. (Reniel Rodríguez, 2010)

There are many sites representing this period on the Vieques Island. In fact, almost half of the sites Rouse identifies in his visit are from this period. The most known are Caño Hondo, Laguna Jalova and Puerto Ferro. This last, studied by Luis Chanlatte of the Center of Archaeological Investigations of the University of Puerto Rico is a base site for the study of this period. Results of these investigations are still contributing to the knowledge of the early human occupation in the Caribbean. Reniel Rodríguez in base of this new information about dates and the use of ceramic proposed the term Pre-Arawak for this period. (*Ibid*)

Period II

During Period II, after Rouse the ceramic series known as Saladoide were developed in Puerto Rico. Especially the Sub-Series "Cedrosan Saladoids" (Rouse, 1986) In this scheme is considered that these groups introduced for the first time in the Lesser Antilles, Puerto Rico and Hispaniola rudiments in the manufacture of ceramics, agriculture and sedentary life.

Evidence of Saladoid pottery was first documented by Froelich Rainey with Dr. J. L. Montalvo Guenard at the site of Cañas [Ponce] in the early 1930's on the south-central coast of the island. Rainey documented red-painted pottery in the lower stratigraphic levels of this site in association with a high volume of crab claws, leading him to call this materialization the "Crab Culture" (Rainey, 1940). Rouse (1952) called this tradition "Cuevas" [for a site in Trujillo Alto] and later subdivided the series into two styles: Hacienda Grande (early component) and Cuevas (later component). The tradition was eventually renamed as the Saladoid series after the type site of Saladero in the middle Orinoco of Venezuela (Rouse 1964) and the subseries Cedrosan for the type site of Cedros on the island of Trinidad. Evidence seems to indicate that the Cedrosan Saladoids Series (100 - 400 A.D.) originated in the middle Orinoco, subsequently moving towards the lower Orinoco, the north-eastern coast of Venezuela, the Guyanas coast, the Lesser Antilles, Puerto Rico and Spain.

These settlers are carriers of an excellent ceramic tradition, highlighting its ceramics by a decoration painted white on red, incisions filled with paint and crisscrossed in area as one of the earliest stylistic elements. Its main site in Puerto Rico was in the Hacienda Grande de Loíza neighborhood (Period IIA). Its later stylistic manifestations are located under the Cuevas style of Period IIB (400-600 A.D.). Its economy was based on the cultivation of cassava and the exploitation of the resources of the marine littoral where they obtained mollusks, crabs and fish. They supplemented their diet with the hunting of small rodents.

During the years, specifically in the beginning on 1977, Luis A. Chanlatte carried out field work in the archaeological sector of Sorcé, in La Hueca, Vieques, as part of a research program developed by the Archaeological Research Center of the University of Puerto Rico, Río Piedras. In this archaeological sector, this researcher defined a cultural complex which he called: La Hueca Cultural Complex or Agro I, according to his own classification. This complex is considered as a new agro pottery culture, with unpainted pottery, limiting its expressive and descriptive elements to the pottery technique of the incised model. This pottery was accompanied by an extraordinary lapidary industry that marveled, not only for the quality of its size and raw material, but for the overwhelming number of lithic amulets and body ornaments made of mother-of-pearl shell. Chanlatte obtained dates of C-14 for La Hueca, which places it around 5 b.C. According to Chanlatte, La Hueca cultural complex precedes the Sorcé complex.

In the light of these investigations, Rouse later added a second early subseries named Huecan, which contains one pottery style La Hueca. The addition of this subseries was to accommodate the presence of early, unpainted ceramics on the island of Vieques. This classification caused substantial debate as the artifact assemblages recovered from the site of La Hueca-Sorcé and later at the Punta Candalero site in eastern Puerto Rico, Hope Estate and other sites in St. Martin, and Morel I in Guadeloupe suggested a distinct cultural group from the previously defined Saladoid (Oliver 1999). Considering recent archaeological discussions regarding La Hueca (see Oliver 1999; Rodríguez Ramos 2010; Rodríguez Ramos et al., 2010), it is assumed here that the Saladoid series and La Hueca complex are two distinct cultural groups that migrated to the region at approximately the same time (Curet, 2005; Oliver, 2009; Rodríguez Ramos, 2010; Torres, 2009).

Period III

Around the 5th century A.D., new social developments are registered within the island of Puerto Rico. It is believed that these developments are based on the interactions of pre-Arawak, Saladoid, and Huecoid social groups, emerged in a social landscape characterized by cultural and social plurality rather than homogeneity (Chanlatte Baik 1990; Rodríguez Ramos 2010). The historical outcome of this diverse cultural landscape is documented by an increase of ceramic styles, but also by shifts in settlement patterns, domestic architecture, and the emergence of ceremonial structures. This was a time when village missioning of settlements on the coastal plains intensified, and new settlements formed in the interior valleys of the foothills and mountainous uplands of the island. (Curet, 2005; Oliver, 2009). These changes are accompanied by material and social transformations considered to entail the development of regionally distinct identities, increased sociopolitical organization, and economic diversity. (Search, 2011).

During Period III (600-1,200 A.D.); the Sub-series "Elenan Ostionoids" was developed in Puerto Rico in the Passage area of Vieques. On the other hand, the Sub-series "Ostionan Ostionoids" developed in the Passage area of the Mona. Both Sub-series are developed stylistically from the ceramic style Cuevas of the series "Cedrosan Saladoids". These post-saladoid stylistic manifestations have been placed under the archaeological series "Ostionoids" which in turn have been subdivided into four sub-series "Elenan Ostionoids, Meillacan Ostionoids, Ostionan Ostionoids and Chican Ostionoids" (Rouse, 1986).

Both, new sub-series retained the technology and shapes of the final Cedrosan pottery, as well as its tabular lugs, on which the earlier has been placed, and its red painted areas, on which the earlier potter has painted white designs.

The Elenan Ostionoids artisan gradually made their pottery thicker, coarser and rougher and simplified its shape. The Ostionoid potters were more conservative. They continued to produce relatively thin, fine and smooth pottery and retained all the previous shapes.

The settlement pattern data for this period showed a dramatic increase in the distribution of sites, with the highest density of settlements situated on the coastal plains and foothill regions of the island. (Antonio Curet et al, 2004). Settlements appear to possess considerable variation regarding size and function, indicating an observable diversity in site types ranging from villages, small villages, or hamlets to farmsteads and specialized activity areas. (Search, 2009). Francisco Moscoso suggested in terms of the economic production and organization, that this was a time of social transition from a strategy of communal production to one characterized by a hierarchical, tribute-based system.

The moment of the appearance of the first ball court in Puerto Rico, found in Tibes, the south-central region of the island (González-Colón, 1984), El Bronce, and Las Flores (Wilson, 1991). In addition to ball court structures, there are centralized spaces delineated by large stones that form communal plazas (Alegría, 1983). At the regional level, the number and elaborateness of monumental architectural features are interpreted as centers of political power, and an increase in territoriality (Search, 2011).

Period IV

On the 12th century A.D., the entire archipelago of Puerto Rico appeared to be occupied. Throughout all the territory it can be found all sort of settlements ranging in size from a single domestic structure to sites with multiple ball court and plazas. (Oliver, 2007)

Moreover, agriculture reached its maximum expression, with terraces, irrigation systems and drainage channels. In addition to the Hoyada, several planting techniques have been identified, namely terraces, ridges and piles. The latter, along with the development of the Montones Farming, have been worked by the author and the results are going to be presented (Marisol Rodríguez, 2017).

Researchers have defined that their political development is represented in the system known as cacicazgo, which was constituted as a regional political center with power over a group of small villages. Although the investigators concur with the development of society, its preferable to think of a society in which a system of incipient social classes is developed (Initial classist society as defined by Felipe Bate Petersen in 1980s). The conquerors in their writings describe villages with chiefs throughout the island. The same for the surrounding islands. Likewise, this points more towards the approach.

However, Spain found a society divided between the elite *nitainos* and the *naborias*, or commoners (Moscoso, 1981). Ceremonial architecture during this time is at its highest frequency, and recent work by José Oliver suggested that most *bate* sites were occupied, although nonresidential *batey* sites have also been identified. The large, complex ceremonial/residential sites of Caruana and Viví reflect group-oriented ritual activity in the constitution of social and political life. (José Oliver and Juan Rivera, 2007)

At the time of the Spanish invasion of Puerto Rico is noted as being composed of approximately 18 political territories (Coll y Toste 1907; Oliver 1999; Rouse 1952). This is particularly intriguing because the size of Hispaniola is eight times the size of Puerto Rico. Oliver notes were sent to King Phillip III by Juan Melgarejo, governor of San Juan, which stated that: "In this island there was no cacique that lorded over all of it, except that in each valley or principle river there was a cacique that had other captains as their lutenists who served him and who were called in their language *nitainos*" (Oliver, 2009, p. 199).

Ceremonial artifacts known from this period include highly elaborate three-pointed stones or *cemís*, carved masks and figurines, wood or stone *duhos* and elbow stones and stone collars, all of which suggested an intensification of ritual practices over the previous period and the personification of chiefly power manifested in material objects (*Ibid*).

As in the preceding period, Chican Ostionoid assemblages are regionally variable based on an east-west trend in distribution. The Capá style is considered more common in western Puerto Rico and in the mountainous interior of the island. In the eastern portion of the island, the Esperanza style is predominant. Boca Chica is a rare trade ware originating in eastern Hispaniola and distributed through several outposts in south-central Puerto Rico.

Reconstruction of Landside ER-HWY-410 Project, Aibonito PR

All the Chican Ostionoid pottery is elaborate in its decorative style with complex incised designs and modeled lugs or adornos. Of the Chican ostionoid sub series, the one related directly to Vieques is the Esperanza series which was first identified by Rouse at the type site of Esperanza on the island of Vieques (Rouse, 1952).

Esperanza-style pottery (1200–1500 A.D.) surface and paste characteristics resembles Santa Elena pottery, with coarse to very coarse paste with aplastic inclusions ranging from approximately 0.5 to 2 mm. Vessels are characteristically thick (~7–8 mm) and light brown to medium reddish-brown in color. Handles are absent in this style, although structural decorations can include tabs, lugs, and elaborately modeled anthropomorphic adornos often on globular bowls with restricted openings and a sharp carina (called *cazuelas*). Esperanza vessels are very rarely red slipped or painted, and surface treatment mainly consists of smoothing. The Esperanza decoration is characterized by broad, deep, and widely spaced incisions, and the design elements are limited to the upper portion of the vessel between the rim and shoulder. Diagnostic design motifs are sets of double or triple lines, either straight, curvilinear, or parallel/oblique. A wide, downward-facing curvilinear arched set of lines is a characteristic motif, as is a single horizontal line under the exterior rim. Moreover, punctuation is also present but in a low frequency, typically consisting of small dots imitating stippling.

b. Municipality Prehistory

Through a written communication dated to September 10, 2004 between Isabel Rivera Collazo (the Technician in Archeology) and the Arql. Marisol Rodríguez (Director of the Office of the Terrestrial Archaeological Council) they included an Analysis Report Archaeological Sites, Municipality of Aibonito, where it was stated that: "The inventory of archaeological sites for the municipality of Aibonito consists of 10 chips, 9 of them coded AI-001-009 and the last without official code assigned. The analysis of the Municipality of Aibonito has already been completed. "The indicated communication also indicated that:

En el cuadrángulo topográfico se observan 10 marcas dentro de los límites municipales del municipio de Aibonito, identificadas de la siguiente manera: AI-1 con un signo de interrogación; AI-3; AI-5; AI-2 y 7 unidos en un círculo; un círculo que delimita todo el Cañón de San Cristóbal; un círculo alrededor de palabras "Jobo Dulce" en el cuadrángulo; un círculo con cruzado interior con nota que lee "existían bateyes, hay cerámica prehistórica. H. Moya y J. González informan petroglifo aislado"; letras A y B con nota que lee "informe Marisol Meléndez El Fresal"; y un círculo amplio con nota que lee "Cueva del Indio Aibonito, C. Solís 10/87. Identificamos 2 lugares incluidos en el Registro Nacional de Lugares Históricos para este municipio.

Reconstruction of Landside ER-HWY-410 Project, Aibonito PR

Also, he added that:

“En total se identificaron 21 sitios arqueológicos, 11 más de los registrados oficialmente (210% de aumento), registrando sitios prehistóricos e históricos. Durante el análisis de la bibliografía se encontró que un mismo sitio tenía dos fichas, AI-1 y AI-8, por lo que se eliminó el número 8. No se pudo encontrar información sobre 8 de los sitios previamente registrados. Sobre el sitio ahora registrado como AI-13, se revisó el expediente del caso y se pudo ver que hay querellas sobre saqueo donde se intervino en para [r, detener] el proyecto. La última comunicación data de 1992, cuando se le solicitó a la compañía que indicara qué ha hecho para proteger el sitio, como se le requirió con el endoso del proyecto. Esta carta nunca se contestó. Posteriormente, un proyecto de 1998 reporta que el sitio sigue siendo intensamente saqueado.”

The attached list includes the final list of the sites registered for Aibonito.

Archaeological Sites Identified for the Municipality of Aibonito [2004]

- AI-1 Asomante, Las Abejas
- AI-2
- AI-3 Usabón I
- AI-4 La Vega del Seboruco
- AI-5 Los Burgos
- AI-6 Jobo Dulce
- AI-7 La Cuchilla
- Entrada repetida
- AI-9 El Cañón
- AI-10 Piedra Pintada
- AI-11 Iglesia San José de Aibonito
- AI-12 Villa Julita
- AI-13 Fomento
- AI-14 Puente 175, Puente de Quebrada Honda
- AI-15 Casilla de Caminero [PR-14] km. 60.1
- AI-16 Casilla de Caminero [PR-14] km. 51.8

- AI-17 Almacén de tabaco y antiguo despalillado
- AI-18 Atarjea
- AI-19 Residencia de verano, Serrallés
- Doesn't say anything [but is AI-20 El Fresal]
- AI-21 Finca [cafetalera] Ceiba-Mattei

Another list of archeological sites for Aibonito is in the Council of Terrestrial Archeology and contains the same places above, with additional data from each site, including the AI-20 (El Fresal), and information about a site with no assigned number, which they call Lime Kilns, studied by the archaeologist Marisol Meléndez Maíz in 1988 as part of the El Fresal site.

Table 1: Archaeological Sites in the Municipality of Aibonito in the ICP

Site	Name
AI00001	Asomante, Las Abejas
AI00002	Posible abrigo rocoso en barrio Plata
AI00003	Usabón I
AI00004	La Vega del Seboruco
AI00005	Los Burgos
AI00006	Jobo Dulce
AI00007	La Cuchilla
AI00008	Repetido
AI00009	El Cañón
AI00010	Piedra Pintada
AI00011	Iglesia San José de Aibonito
AI00012	Villa Julita
AI00013	Fomento
AI00014	Puente 175, Puente de Quebrada Honda
AI00015	Casilla de Caminero, km. 60.1
AI00016	Casilla de Caminero, km. 51.8
AI00017	Almacén de tabaco y antiguo despalillado
AI00018	Atarjea
AI00019	Residencia de Verano, Serrallés
AI00020	El Fresal
AI00021	Finca Ceiba-Mattei



Figure 7: Archaeological Sites Near Undertaking in CAT

Table 2: Archaeological Sites in the Municipality of Aibonito in SHPO

TAG*	Site Name
AI0100001	Las Abejas (before Asomante)
AI0100002	AI-2 / Aibonito 2
AI0100003	AI-3 / Aibonito 3
AI0100004	Vega del Seboruco
AI0100005	Los Burgos
AI0100006	Yacimiento Algarrobo
AI0100007	Batey del Barrio Llanos
AI0200001	Iglesia San José
AI0200002	Antigua Ferretería Mendoza (c. 1900)
AI0200003	Residencia Suarez de Bruno (c. 1918)
AI0200004	Residencia Martínez-Berrios (c.1910)
AI0200005	Antiguo Teatro Encantos (c. 1930)
AI0200006	Antigua Farmacia Moscoso (c. 1910)

AI0200007	Edificio Gil Ramón González (c. 1909)
AI0200008	Residencia y Comercio (c. 1913)
AI0200009	Antiguo Colmado
AI0200010	Edificio Aibonito Trading (c. 1916)
AI0200011	Edificio Comercial (c. 1916)
AI0200012	Anigua Residencia Don Leopoldo Mercado (c. 1900)
AI0200013	Villa Julita (c. 1915) / Casa Ulrish
AI0200014	Casa Museo Federico Degetau / Quinta Rosacruz
AI0200015	Casa de Caminero #1
AI0200016	Casa de Caminero #2
AI0200017	Casa de Caminero #3
AI0200018	Casa de Caminero #4
AI0200019	Puente de Quebrada Honda / Puente #176
AI0200020	La Piedra Degetau

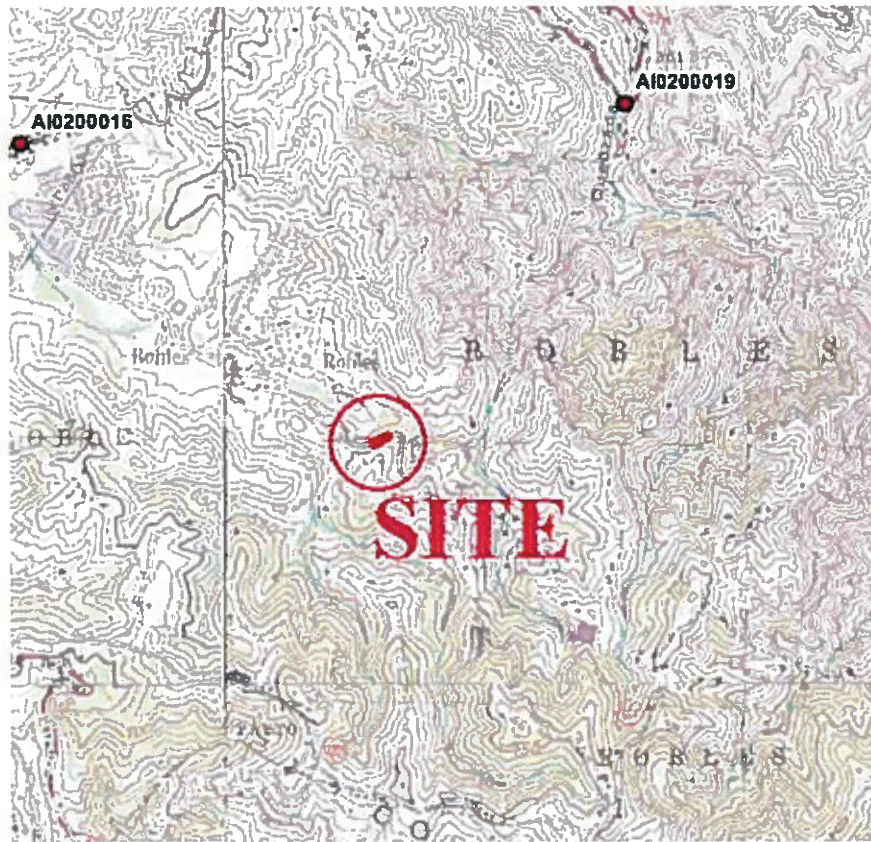


Figure 8: Archaeological Sites of Aibonito in SHPO Archives

Reconstruction of Landside ER-HWY-410 Project, Aibonito PR

Regarding the properties of Aibonito in the National Register of Historic Places, we know that there are two registered sites: The San José de Aibonito Church - on the street Ramón Emeterio Betances attached to the Town Square (10 / dec / 84) 84000451 and Villa Julita - on Avenida San José # 401 (19 / dec / 86) 86003491.

c. Archaeological Investigations Near the Project Area

In the archives of the Consejo de Arqueología Terrestre (CAT) there are no less of 63 archaeological investigations on the Aibonito Municipality between 1979 and 2016, but the ones corresponding to the barrio Robles, that is where the project that occupies us is located, they are possibly limited to seven, and none is truly located nearby. In addition, in 2005, researchers Marisol J. Meléndez Maíz, Sharon Meléndez, Hernán Bustello, Liza Colón, Hugh Tosteson and Jorge Lizardi worked on the study: *Identificación de Indicadores arqueológicos para los establecimientos comerciales y públicos en los centros urbanos del siglo XIX en Puerto Rico. Caso de Aibonito*, whose report was submitted to the State Office of Historic Conservation (SHPO).

In May of 1989, the archaeologist Marlene Ramos Vélez worked in an archaeological investigation Phase IA-IB in the lands of the project Improvements to the system of aqueducts in the neighborhoods Pueblo and Robles de Aibonito (AI-89-01-05). The southernmost sections of her project are in Robles, about 1.0 kilometers, at its closest point, west-northwest of the area of the current project under investigation. In the Final Conclusions and Recommendations of her project, the archaeologist Ramos Vélez pointed out that: "In general terms, the route to be followed by the 16" pipeline located along roads and streets and the access road to the tanks are already areas impacted ... The most sensitive area seems to be the section of highway PR-14 where residences are still being observed that date from the beginning of the century [XX] ... No cutting, well of sounding and inspection of the surface yielded positive results to cultural resources. In view of the foregoing, we recommend that PRASA [Aqueduct and Sewer Authority] be granted permission to carry out the construction of the project "(page 14 of its report).

In April 1991, the archaeologist Iván F. Méndez Bonilla studied, in a Phase IA, the lands of the Bella Vista project, in the Robles neighborhood of the Municipality of Aibonito (AI-91-02-04). This place is located about 1.7 kilometers north-northwest of the project now studied. Because of his study Méndez found that "... the site is a highly impacted site where soil had previously been removed from the site to be used as a filler in the works of the Reparto Buena Vista project and subsequent removals. During the visit and inspection of the site, the investigators did not find any cultural evidence in the surroundings. As can be seen from the documentary study that was conducted, there are no archaeological and historical sites in the evaluated area. The documents, reports, maps and inventory of archaeological sites were consulted in the Research Center of the Instituto de Cultura Puertorriqueña and they do not identify any archaeological or historical site in the area near the project "(page 20 of the Méndez report).

Reconstruction of Landside ER-HWY-410 Project, Aibonito PR

In March 1996, the archaeologist Juan González worked on a Phase IB for *the Aibonito Shopping Center* project (AI-96-04-02), located at kilometer 6.7 of the PR-722 highway in the Robles de Aibonito neighborhood. The project is located about 1.0 kilometers west of the area now under investigation. He pointed out (1996) the archaeologist González that: "For this evaluation of cultural resources, as far as the field work is concerned, the profiles and the surface of the lands were tracked / inspected (until [where] the vegetation and the topography allowed) that they will be intervened; In addition, fifteen (15) test probes were excavated manually, no pre-Columbian or historical resources were located "(page 8 of his report). In addition, Gonzalez said: "The work done has indicated that there are no pre-Columbian or historical cultural resources in the property that will be intervened by the planned construction."

In December 1996, the archaeologist Carlos M. Ayes Suárez worked an IA-IB Phase for the *Aibonito Plaza Shopping Center* project (AI-96-04-05), which was located between kilometers 52.7 and 53.0 of highway PR-14 in the Robles neighborhood, about 1.7 kilometers north of the area now studied. In his research, Ayes identified a fragment of pottery, possibly pre-Columbian, but in the Recommendations of his report (p.34) he indicates that: "Whenever the results of our archaeological prospecting of the project show that there is no archaeological site in place I did not begin [sic] the isolated discovery of a pre-Columbian ceramics, we understand that the development of it will not have any archaeological impact. For this reason, we would like to recommend to the Archeology Program of the Institute of Puerto Rican Culture that it grant the requested endorsement to the proposing party".

On the other hand, in 1999, the archaeologist Harry Alemán Crespo worked on a Phase I project for the Construction of the Aged Center and/or Specialized Housing (Aurora Home), in the Robles of Aibonito (AI-99-05-01). The report was submitted to Mennonite General Hospital (SHPO # 11-08-96-02). The researcher carried out a historical study, intensive recognition and excavation of 4 wells in a 5-string property with negative results. The location of the project places it more than 2.0 kilometers northwest of the current site studied, so is understandable that the place is in the Caonillas neighborhood.

Meanwhile, the archaeologist Norma Medina Carrillo carried out for the years 2002 and 2003, a Phase IA (AI-02 -05-06) and a Phase IB (AI-03-05-06) for the project Improvements for Ensanche, lane of rise in PR-7722, from PR-1, Aibonito-Cayey. The closest place of this project, in the Robles neighborhood, to the land of our interest is located about 1.6 kilometers to the southeast. First, the archaeologist recommended a Phase IB and this last report, in February 2003, produced negative results for cultural resources.

Reconstruction of Landside ER-HWY-410 Project, Aibonito PR

Later, in 2007, the archaeologist Harry Alemán Crespo worked on a research phase IA-IB project *Desarrollo de 23 solares en 25.1331 cuerdas por la Corp. de Desarrollo e Inversiones de la Montaña, PR-14 km. 51.8 (Interior)*. The project was in the neighborhoods: Robles and Caonillas (AI-07-07-03), about 1.9 kilometers to the northwest of the current study. The researcher conducted a historical investigation, a surface survey and the excavation of 50 cuts with negative results.

Finally, in December of 2011, the archaeologist Ethel V. Schlafer worked in archaeological research Phase IA for the project *Walgreens de Aibonito*, located on the PR-14 road, supposedly in the Robles neighborhood. After carefully checking the location of the project, that it is in the Pueblo. However, the site is located about 1.8 kilometers northwest of the section now under investigation and the archaeologist indicates that: "The results of the archaeological survey were negative and sterile to the presence of visible cultural resources in the field."

d. Aibonito's Archaeological Reports (CAT)

Table 3: Archaeological Studies in the Municipality of Aibonito

Project	Neighborhood	Phase and code	Archaeologist	Results	Material
Brisas de Aibonito SHPO #11-05-79-01		Phase IA? 1979	Antonio Daubon y Miguel Rodríguez	Negative	Sociedad Espeleo- Arqueológica de Puerto Rico
Sanitary Sewer System	San Luis Community	Phase IB AI-85-01-01	Antonio Daubon	Negative	
Improvements to the Aqueduct System	Pasto and Asomante	Phase IB AI-87-01-02	Antonio Daubon	Positive	An aboriginal ball court, Phase II is recommended
Segregación de Solares	Asomante	Phase IA-IB AI-87-01-03	Juan González	Negative	
Franja del Yacimiento Área B Proyecto El Fresal	Cuyón	Mitigación AI-88-01-04	Marisol J. Meléndez	Positive	Área habitacional con estructuras, fogones, cerámica y lítica
Improvements to the Aqueduct System	Pueblo and Robles	Phase IA-IB AI-89-01-05	Marlene Ramos	Negative	

Project	Neighborhood	Phase and code	Archaeologist	Results	Material
Las Abejas: A Ceremonial Ball Court	Asomante	Phase II AI-89-01-06	Carlos M. Ayes	Positive	Ceremonial ball court
Colinas de San Francisco	Llanos	Phase IA-IB AI-91-02-01	Antonio Daubon	Negative	
Paseo Montecarlos	Pueblo	Phase IA-IB AI-91-02-02	Antonio Daubon	Negative	
Escuela Intermedia Urbana	Pueblo	Phase IA-IB AI-91-02-03	Juan González	Negative	
Bella Vista	Robles	Phase IA AI-91-02-04	Iván F. Méndez	Negative	
Urbanización Industrial	Llanos	Phase IA-IB AI-91-02-05	J. González y H. Moya	Positive	Rock with petroglyph. Phase II is recommended
Las Margaritas Apartments	Llanos	Phase IA-IB AI-92-02-06	Juan González	Negative	
Buena Vista	Pueblo	Phase IA-IB AI-92-02-07	Juan González	Negative	
Hacienda El Polluelo	Pasto	Phase IA-IB AI-93-03-01	Iván F. Méndez	Negative	
Praderas de Aibonito	Asomante	Phase IA-IB AI-93-03-02	Iván F. Méndez	Negative	
Cementerio La Paz del Señor	Llanos	Phase IA-IB AI-94-03-03	Iván F. Méndez	Negative	
Desarrollo de Solares	Pasto	Phase IA-IB AI-94-03-04	Marlene Ramos	Negative	
Área de Descanso Carr. Panorámica	Pasto	Phase IA-IB AI-95-03-05	Jesús Vega	Negative	
Paseo Las Delicias	Llanos	Phase IA-IB AI-95-03-06	Juan González	Negative	
Rancho G	Llanos	Phase IA AI-95-03-07	Armando J. Martí	Negative	
Complejo Deportivo de Aibonito	Pueblo	Phase IA AI-95-03-08	Armando J. Martí	Negative	

Project	Neighborhood	Phase and code	Archaeologist	Results	Material
Hotel La Piedra	Pasto	Phase IA AI-95-03-09	Jesús Vega	Negative	
Segregación de Solares	Caonillas	Phase IA AI-95-03-10	Armando J. Martí	Negative	
Extension of the Sanitary Sewer System, Road 162	Pueblo	Phase IA-IB AI-96-04-01	Juan González	Negative	
Aibonito Shopping Center	Robles	Phase IB AI-96-04-02	Juan González	Negative	
Puente sobre Río La Plata, PR-173	Plata	Phase IA-IB AI-96-04-03	José Rivera Meléndez	Negative	
Segregación de Solares	Asomante	Phase IA-IB AI-96-04-04	Miguel Rodríguez	Negative	
Centro Comercial Aibonito Plaza	Robles	Phase IA-IB AI-96-04-05	Carlos M. Ayes	Negative	
Desarrollo de 21 solares residenciales Asomante II	Asomante	Phase IA-IB AI-96-04-06	José Rivera Meléndez	Negative	
Aibonito Shopping Center	Llanos	Phase IA-IB AI-97-04-07	Ether V. Schlafer	Negative	
Desarrollo de 90 solares residenciales	Llanos	Phase IA-IB AI-98-04-08	José Rivera Meléndez	Negative	
Hacienda La Montaña	Pasto	Phase IA-IB AI-98-04-09	Juan González	Negative	
Centro de Envejecientes	Caonillas	Phase IA-IB AI-99-05-01	Harry Alemán	Negative	
Escuela Segunda Unidad Llanos	Llanos	Phase IA-IB AI-00-05-02	Harry Alemán	Negative	
Paseo Reina de las Flores	Pasto	Phase IA-IB AI-02-05-03	Antonio Daubon	Negative	
Segregación 8 solares	Asomante	Phase IA-IB AI-02-05-04	José Rivera Meléndez	Negative	
Mejoras para ensanche de carril PR-7722	Robles	Phase IA AI-02-05-05	Norma Medina	Negative	Phase IB is recommended

Project	Neighborhood	Phase and code	Archaeologist	Results	Material
Mejoras para ensanche de carril PR-7722	Robles	Phase IB AI-03-05-06	Norma Medina	Negative	
Extensión de las calles Betances y Vizcarrondo	Pueblo	Phase IA-IB AI-03-05-07	Jaqueline López	Positive	Phase II is recommended
Colinas del Paraiso	Llanos	Phase AI-03-05-08	Ethel Schlafer	Negative	
Residencial Asomante Bonito	Asomante	Phase IA AI-03-06-01	Marisol Martínez	Negative	
Parque de Bombas	Pueblo	Phase IA AI-05-06-04	Iván F. Méndez	Negative	
Lotificación de 13 solares	Asomante	Phase IA-IB AI-06-07-01	Eduardo Questell	Negative	
Construcción de 32 solares		Phase IA AI-00-06-05	Marlene Ramos	Negative	
Desarrollo de 23 solares	Caonillas	Phase IA-IB AI-07-07-03	Harry Alemán	Negative	
Desarrollo de 18 solares residenciales		Phase IA-IB AI-04-06-03	José Rivera Meléndez	Negative	
Conector entre la PR-14 y calle Julio Cintrón	Pueblo	Phase IA-IB AI-11-08-01	Jaqueline López	Positive	Atarjeas históricas
Walgreens de Aibonito	Pueblo	Phase IA AI-11-08-02	Norma Medina	Negative	Recomienda monitoría
Centro Judicial de Aibonito	Pueblo	Phase IA AI-12-08-03	Jaqueline López	Negative	
Los Dardanelos Shopping Court	Pueblo	Phase IA-IB AI-08-09-01	Harry Alemán	Negative	
Eligibility Determination Aibonito Flowers	Asomante	Eligibility AI-16-09-02	J.W. Joseph y Sharon Meléndez	Positive	Presence of precolonial, colonial and modern artifacts.
Edificio para Estacionamiento	Pueblo and Llanos	Phase IA AI-07-09-03	Lydia I. Ortiz	Negative	

In addition to the previous projects, other studies have been carried out in Aibonito which includes at least the following:

1986 - *Adquisición de terrenos facilidades recreativas, Bos. Caonillas y Pasto*, Phase IA-IB, Sibancacán (Harry Alemán, Edgar J. Maíz y Eduardo Questell Rodríguez), negative results.

1987 – *Aibonito Filter Plant Expansion, Barrio La Plata*, Phase IA, Daniel Molina y Diana López, negative results.

1991 – *Distribución Sanitaria al Sector Las Mercedes, Barrio Llanos*, Phase IA-IB, Sibancacán (Harry Alemán, Edgar J. Maíz y Eduardo Questell Rodríguez), SHPO #03-20-91-06, negative results.

1991 - *Proyecto Villa de la Rosa*, Phase I, Barrio Llanos, Antonio Ramos (Mao). negative

1994 - *Improvements to the Water Supply System of Algarrobo, Coamo-Aibonito*, Phase I, Juan Rivera Fontán. negative

1996 - *Instalación de Sistemas Sanitarios Comunidades Jatibonico y Cristián Belén*, Jesús Vega, SHPO #12-12-94-02, negative results.

2007 – *Hacienda Las Abejas*, Phase IA, Raquel Camacho, (AI-07-07-04), negative results.

2007 – *Mejoras a la Planta de Filtración, Barrio La Plata*, Jaqueline López (AI-07-07-02), negative results.

2008 – *Conector entre la PR-14 y la Interior PR-725*, Phase IA-IB, José Rivera Meléndez (AI-08-07-06), negative results

2010 – *Proyecto Recreativo Comunal, Barrio La Plata*, Harry Alemán (AI-10-07-07), with negative results.

V. Historical Context

Much of the following information is about the history of the Municipality of Aibonito and was taken from the Report titled: *Archaeological Survey and National Register of Historic Places Eligibility Determination at the Aibonito Flowers Inventory Property, Asomante, Aibonito, Puerto Rico*, prepared in 2016 by New South Associates, Inc., J.W. Joseph and Sharon Meléndez (pp. 36-43). However, when another reference is going to be used during this part of the report, it will be indicated.

a. The Beginning

The earliest mention of the word “Aibonito”, or any derivatives of that name (eg., *Laybonito*, *Ay Bonito*) was in the sources consulted relate to a cattle ranch/holding (*hato ganadero*) within the boundaries of the early Coamo jurisdiction (*partido de Coamo*). Santiago González’s work on landholding patterns in Aibonito from the mid-18th century up to 1898, mentioned uncorroborated oral traditions affirming there was a group of cattle-ranchers within the jurisdiction of the future municipality of Aibonito since 1630, founded by the Spaniard Diego Zoroascochea.

This “*hato de Laybonito*” appear to have existed until the mid-18th century, like many others, with cattle-ranching for beef production as its oldest and primary economic activity. The dissolution of the “*hato de Laybonito*” as part of land reforms in Puerto Rico was initiated in 1751, but it was not until 1753 that this process really took hold. The intensifying establishment of farms (*estancias*) focused on agricultural crops stimulated land segregation, as opposed to the previous pattern which favored large landholdings for cattle ranching as a principal economic activity. This process would continue until the end of the eighteenth century and beginning of the 19th century and established the basis for the establishment of the future township (Santiago González 1988: 20-21; Morales Cassagné 1948:6; Santiago and Cardona 1985:16-18).

Miyare’s description in 1775, stated that the jurisdiction of Aibonito “... has some planted portions that abundantly produce whatever crops are on the island, with the rest occupied by trees of disproportionate magnitude...” (Fernández Méndez 1995: 299).

A map dated that same year (figure 9) shows the location of “Aybonito” identified with a symbol for a mill (*ingenio*, as per the map legend), and surrounded by what appear to be cultivated areas. Speaking of Coamo, one of the earliest settled areas on the island. Spanish friar Abbad y Lasierra (1781) stated that a portion of its inhabitants, which at the time were 480 families totaling 4,317 inhabitants, “... had their haciendas on the mountain of Laibonito (*emphasis ours*); the other three [parts] live in Salinas, Juana Díaz and Coamo de Abajo [the future Santa Isabel] on the seashore ...” (Abbad, 1979:114).



*Figure 9: Detail "Puerto Rico 1775", Juan de Surville
(Anibal Sepúlveda Rivera, 2004, Tomo 1, pp. 28-29)
Noted what appear to be cultivated areas (squares) and the symbol for "mill"
(ingenio) just below "Aibonito", also note inverted North.*

The next reference found concerning Aibonito is another map, dated 1791 (Figure 10), showing the location of "Aybonito" and two roads leading from it toward Coamo and Caguas (off map), the latter presumably passing through Cayey; however, no further information can be derived from this image.

Reconstruction of Landside ER-HWY-410 Project, Aibonito PR

Aibonito's founding process was completed between 1822 and 1824, by separating itself from the jurisdiction of Coamo. Santiago González told that, at the time, the municipality "... constituted a little developed community of farmers, whose lifestyle was centered on producing basic crops such as rice, sweet potatoes, yams, corn, bananas and plantains, and to a lesser degree raising livestock both for their own consumption as well as to supply local markets and maybe to sell in the larger town markets in the South ..." (Santiago González 1988:25).

Returning to Córdoba, he informed that the 1828 census reported a total of nine houses and 11 thatch huts (*bohíos*) in town, while the rural areas had a total of 80 houses, 220 *bohíos* and three stores (*ventorrillos*). The passage of a hurricane in 1829 motivated a letter from the mayor describing the great losses suffered by the coffee, plantain, sugar cane and other crops, which were destroyed. In addition, he requested permission to obtain food supplies (*viveres*) through the port of Salinas, "... which is so close to this town" (*Letter about hurricane, AGPR, Spanish Government Collection, Aibonito, Box #397, August 6, 1829*). Recovery from this event was prompt, since on his visit to the town at the beginning of the 1830, then-Governor de la Torres expressed satisfaction with the good conditions of the church, the *Casa del Rey* and the roadways (Morales Cassagné 1948: 15).

c. Roads in Aibonito

The earliest documentary reference found on roads in Aibonito is dated 1826, when a total of six were identified crossing the municipal jurisdiction, as follows:

- 1) Royal road or highway crossing the island from north to south, from San Juan to Ponce, which passed through the town core from east to west, leading to Cayey and Cidra;
- 2) Road to Barranquitas to the north, identified as the old mail route;
- 3) Road to Guayama, heading south;
- 4) Road to Salinas to the southwest;
- 5) Road to Sabana del Palmar (the future Comerío) to the northeast; and
- 6) Rural road (*camino vecinal*) to Coamo, traveling from north to south and passing by the town of Aibonito at a distance of three quarters of a league ("Descr. Topográfica del pueblo de Aybonito y su división, 18 Nov. 1826", AGPR, FOP, SOM, Caja #183).

Mayor Pablo Rivera reported that construction of the "road to the capital" began in November of 1828, with a segment already open to traffic by 1831 ("Expediente sobre relación de obras públicas, 1829-31", AGPR, FOP, SCV, Aibonito, Caja #1378, Legajo #5; see also Santiago and Cardona 1985:37; and Córdoba 1968:367). By 1829, all roads were functional, and additional construction had begun on a hillside known as Quebrada Honda (*La Gaceta del Gobierno de Puerto Rico*, 29 de junio de 1830, in Santiago and Cardona 1985:37).

Reconstruction of Landside ER-HWY-410 Project, Aibonito PR

The roadways were opened by the local inhabitants the following year, as instructed by the government, and construction was carried out on the road to Coamo, including drainage gutters on each side (*La Gaceta del Gobierno de Puerto Rico*, 4 de septiembre de 1832, in Santiago and Cardona 1985:37).

By 1842, work had been carried out on the “royal roads”, with no specific details of the work or which road in particular (Minutes of meeting between the mayor and assemblymen <Jan. 15, 1842>, AGPR, FGE, Aibonito, Caja #398). However, by 1853, five roads identified in Aibonito, leading to Cidra, Coamo, Barranquitas, Salinas/Guayama, and Sabana del Palmar (the future Comerío). These appear to correspond to the roads identified in 1826 (see above), except for the road from Barranquitas to Coamo. The description adds that all these roads were in bad conditions and almost impassable during the rains. Concerning the one to Coamo, the source indicates it was under construction at that time and was expected to be one of the best in its class. Finally, there was only one wooden bridge over the Piedras creek, immediately west of the town (Document ca. 1853 <as per date referenced in the text>, AGPR, FOP, SOM, Aibonito, Caja #183).

VI. Economic Development

Despite its origins as a cattle-ranching and subsistence agriculture zone, Aibonito’s development was furthered by coffee and tobacco cultivation. Tobacco, which is native for the New World, has been documented in the Antilles since the earliest discovery and colonization periods, and its importance as a crop in Puerto Rico has been known as early as the 17th century (Aguayo 1876:11-14; Fernández Méndez 1995:79-80, 178, 217 and 1997:9, 11-12, 17-18, 42; Hawks 1970:1-2). On the other hand, coffee which originated in eastern Africa, was introduced in Puerto Rico by 1736, arriving from Arabia through Europe, then the French islands, Cuba and Santo Domingo. Both crops (coffee and tobacco) were important features in the development of subsistence agriculture since their introduction on the island, as elements of contraband trade and later as crops favored when the larger-scale cattle landholdings were dissolved, starting in the mid-18th century, followed by the development of agriculture for exportation as a fundamental economic activity in Puerto Rico (Pumarada 1990:5, 11-15). The report of Marshall Alejandro O’Reilly’s visit to Puerto Rico in 1765 commented that at that time only tobacco, coffee and sugar cane were grown, while other crops grew in the wild (Fernández Méndez 1995:240, 256, 258, 260).

However, the relatively late founding date for Aibonito (1824) inserts this municipality as such in the agricultural economic cycles of the 19th and 20th centuries, when the coffee and tobacco crops, respectively, acquired greater economic importance throughout the island.

According to Santiago González, the level of agricultural production in Aibonito prior to, as well as after, its founding suggested the existence of a natural subsistence economy. This is more explicitly evident when one observes that only 2.18 percent of the municipality's lands were under cultivation. This relative lack of development meant that Aibonito did not experience the same economic expansion seen in other coffee-producing municipalities such as Utuado, Lares or Yauco, as well as sugar-producing municipalities. While it is true that Aibonito saw coffee production, by the 1840's, production levels suggested that they were oriented towards satisfying local demand rather than commercial export. By 1845, the territorial distribution of each agricultural product was as follows: sugar cane, 19 *cuerdas*; coffee, 305 *cuerdas*; lesser crops (*frutos menores*), 691 *cuerdas*; and uncultivated lands in grasses, etc., 16,791 *cuerdas*. While lands dedicated to coffee cultivation had increased, coffee production sometimes exceeded local demand, and the excess was sold to trading firms established in the southern ports, particularly Salinas, Guayama or Santa Isabel de Coamo (Santiago González 1988:27-30, 35-37).

At that same time, Santiago González pointed out that coffee production during this period declined, relative to the growing population in Aibonito (close to 80%, probably due to local and foreign immigration), and the subsequent rise in acreage dedicated to subsistence crops. This suggested that the demand for foodstuffs affected the balance of these product's crops (Santiago González 1988:31-32). However, as Pumarada pointed out, this trend would be reversed by the greater coffee boom of the second half of the 19th century, which in many areas of the interior that did not produce top-shelf crops, tended to favor the continuity of small and medium landowners (Pumadara 1990:35).

Just as in other coffee-producing municipalities, coffee production in Aibonito registered significant growth during the 1870's, but the failure of the local trading firms countered this impulse, leaving the commercial trade for this product in the hands of those in other municipalities (Santiago González 1988:47-48). However, coffee production in Puerto Rico peaked during the 1880's and 1890's, and by 1890, the island was Latin America's fourth largest coffee exporter (Pumarada 1890:36-37). By 1894, over 2,500 *cuerdas* of land in Aibonito were dedicated to coffee cultivation, while lesser food crops occupied some 1,300 *cuerdas* (Santiago González 1988:49). By the end of the nineteenth century, Aibonito's coffee production was marketed principally by trading firms from Coamo (eg., J. Picó & Co., Aguilú & Co., Antonio Acosta Palmieri) and Barranquitas (eg., José Monserrate Santiago, Nicolás Santini y Gerónimo Colón) (Santiago González 1988:50).

There were other crops in Aibonito besides coffee, of which Santiago González highlights tobacco, since it would be of fundamental importance in the economic future of the municipality, especially after the great coffee crash (*la quiebra del café*) during the first decades of the 20th century.

Santiago González points out that the tendency to switch over to tobacco as a crop was a common tendency in most of the coffee-producing areas in Puerto Rico (Santiago González 1988:51). The gradual increase of tobacco acreage in Aibonito can be seen from even before the 1870's, reaching a total of 293 *cuerdas* by 1894. The implication is that this increase promoted a lesser acreage dedicated to other crops grown in the shade, such as coffee, plantains and bananas, which was the setting for the change of sovereignty in 1898 due to the Spanish-American War, as well as the destruction caused by Hurricane San Ciriaco in 1899 (Santiago González 1988:52-54).

The earliest mention found on tobacco as a crop in Aibonito is from 1842, when sources indicates there were eight *cuerdas* planted in tobacco (Santiago González 1988). At the time, close to 97.5 percent of the land in Aibonito were grasses and wild vegetation, whereas close to 1.5 percent were dedicated to coffee crops and less than one percent to sugar cane and other lesser crops (probably including tobacco), which echoes Spanish chronicler Miyares' description in 1775 (see above) (Santiago González 1988:31-32, 36). During the 1840's is when farmers began organizing agricultural and trading firms to take advantage of these crops (that is, coffee and tobacco) for exportation. Although tobacco continued gaining importance, coffee was the primary crop during the time and until the end of the nineteenth century as mentioned above (Santiago González 1988:47-50). Despite this growth, the coffee industry would ultimately fail, making way for the development of tobacco during the first decades of the 20th century.

In Aibonito, various local inhabitants were attracted to tobacco cultivation as a commercial enterprise, whom requested permission to clear their own lands to plant tobacco for market export. As previously stated, this led to over 237 *cuerdas* being planted in tobacco by 1894, and possibly more. One advantage was that tobacco was a crop whose season was different from many other crops, allowing alternate planting with yam, bean, and corn crops, among others (Santiago González 1988:51-54).

The establishment of *La Colectiva* in Cayey marked the entry of the U.S. capital into the tobacco market of the sector that included Aibonito (Morales Cassagné 1948:58). Focused on planting and buying tobacco, this was the popular name given to the *Porto Rico Leaf Tobacco Company*, a local subsidiary of the *American Tobacco Company*, the great U.S. tobacco trust that was legally dissolved in 1911 (Baldrich 1988:21-22, 41).

The importance of tobacco in the daily life and economy of Aibonito during the first decades of the 20th century cannot be understated. Morales Cassagné offers us a brief image of the time, as follows:

“... in the morning, towards seven, and in the afternoon at about one, during workdays, you can see hundreds of female workers (despalilladoras) and seamstresses walking along the main street. They were headed to the two tobacco cleaning shops, and also an undergarment and glove shop that exited in town.

At the end of the day, the female workers, many of which are graceful younger women living in town and the surrounding countryside, leave the shops in a hurry, and walk hurriedly, headed for their homes” (Morales Cassagné 1948:41-42).

Fernández Méndez stated that by the 1930's there were large warehouses for tobacco processing, fermenting and packaging in Aibonito, Cayey, Caguas, Ciales, Comerío, Utuado and San Lorenzo, amongst others (Fernández Méndez 1997:34). By 1935, there were 17,600 tobacco farms (a third of all existing farms), 13,000 of which derived the greater part of their income from growing tobacco, and thus classified as tobacco farms.

By 1878, the agricultural wealth of Aibonito was calculated in 34,619 pesos, in 4,105 the urban one, and in 6,507 the livestock, paying the total of them 2261.50 of contribution to the treasure (M. Úbeda and Delgado, 1878, p 229). The public buildings for that year were: the wooden church; the house-Town Hall, also of wood, of two floors; the cemetery, of masonry; the butcher shop, made of wood; the parish house, also made of wood; and the barracks of the Civil Guard (Ibid, p.230).

The construction of the Central Highway (current PR-14), which was completed in 1886, gave the municipality a lot of life and prosperity (Ortiz Archilla, 2007, page 38). In 1887, the Governor of the Island, Captain General Romualdo Palacios González went to reside in Aibonito, and for a time the town was considered as the capital to make provision. Palace, of sad remembrance in the Island as initiator of the "componetes" against the autonomists, however, was very interested in making Aibonito one of the main towns of the Island (Ibid, pp. 38 and 39). On May 12, 1888, Aibonito was granted the title of Villa due to the efforts of the ex-Governor General of Puerto Rico.

In 1898, the agricultural wealth consisted on: 456 ropes of cane, 2,618 ropes of coffee, 331 ropes of tobacco, 8,760 of pastures, and 1,562 of smaller fruits, with 7,953 of mountains and weeds (J. Santiago and WA Cardona, Op. Cit., P.64). The urban wealth varied in the following way: houses of housing 153; stores 30; coffee establishments 5; bohíos 145; masonry buildings 8; masonry and wood buildings 4; wooden buildings 189; buildings of straw and yaguas 147.

a. 20th Century: The Central Highway and the Beginning of the PR-722

At the beginning of the 20th century, coffee remained the main agricultural product of the region, but, as already mentioned, it was replaced by tobacco by the early 1930's. However, the planting of tobacco in many places, such as for example: La Plata neighborhood gave way to livestock development, particularly the production of poultry meat (Ibid, p.99). By 1963, Aibonito had the most important poultry industry on the island (Ibid).

In 1960, the population of Aibonito was then 18,360 inhabitants. By the 1980 census of the population indicated that this had ascended to 22,163 people. In addition, in the Census of 1990, the population had increased to 25,551, which ranked it number 52 among the municipalities of Puerto Rico.

In 1898, when the change of sovereignty happened, the municipality of Aibonito appeared constituted by the same neighborhoods as in 1878, that were: Caonillas, Llanos, Plata, Robles, Algarrobo, Cuyón, Pasto and Asomante. In 1910, the Pueblo neighborhood is subdivided into Pueblo Norte and Pueblo Sur. Since then, the territorial organization of Aibonito did not change until 1948, when the Maps of Municipalities and Districts of Puerto Rico prepared by the Planning Board of Puerto Rico and following instructions from the municipal authorities, the urban area of the municipality of Aibonito was expanded to include parts of the Caonillas, Llanos, Pasto and Robles neighborhoods (Ortiz Archilla, *Op. cit.*, p. 39).

b. Data of the Central Highway in Aibonito and the Beginning of PR-722.

Due to its importance for the project in question, now will be presented some additional data to those already mentioned on the construction of the Central Highway in Aibonito, which was later No. 1 and is currently the PR-14, especially the stretch East of said Villa. Most of the data was taken from the IA-IB Phase Report of the archaeologist Jaqueline López Meléndez entitled Connector between PR-14 and Julio Cintrón Street, Aibonito, Puerto Rico (AI-11-08-01), held in November 2011 for the Highway Authority.

Next, the origin of the PR-722 road will be discussed. This is where the project is located, with figures illustrating its development from its beginning as a dirt road to nowadays, as an asphalt road.

Reconstruction of Landside ER-HWY-410 Project, Aibonito PR

By 1843, the Public Works Board of the Spanish government in Puerto Rico propelled the development and construction of new roads, abandoning those of difficult passage or with high maintenance costs. Within this new plan, began to construction of the 1851 Highway No. 1 from San Juan to Ponce Beach, passing through Caguas, [Cayey], Aibonito and Coamo. This new road would shorten the time of crossing between San Juan and Ponce and would facilitate the transport of fruits and merchandise from Aibonito to Coamo and Ponce, which was done in ox carts or horses. Although the construction of the section of the Central Highway between Aibonito and Juana Díaz was approved by 1862 and it was not until 1872 that the budget for its execution was approved. By 1875, the section of Juana Díaz to Coamo was already being used, while the works of Coamo to Aibonito continued.

The section 4 of the Central Highway included the construction of said highway between Cayey and Aibonito. This is the section of the most rugged road, with numerous slopes, the most notable being the La Plata slope, or the climb to Aibonito. Between the two towns (Cayey and Aibonito) there was a difference of 320 meters in height, so joining them was the reason for a careful study to make a project well laid out and as economical as possible. Mr. Don Manuel López Bayo, designed the project.

The construction of this section of the Central Highway was divided into four parts, the fourth being from the so-called Quebrada Tronco to the town of Aibonito (about 5,320.87 meters), the part that concerned the investigators. By 1886, a good part of the project had been completed except for the pontoons on the Quebradas Toíta and Honda, as well as on the Rabanal Ravine at Km. 79.85, where a sewer had been designed and a pontoon was built.

The figure 11, taken from a CD of the book Documentation of Puerto Rico in the Cartographic Archive and Geographical Studies of the Army Geographical Center that was published by the Ministry of Defense of the Spanish Government in 2007, illustrates part of the Descriptive Itinerary of the San Juan Highway from Puerto Rico to Ponce Beach [entry 147, sheet 6 of the plans, year 1884]. On page 105 of the text, [at entry 147], there is information specific to the site where the crossing of the indicated road over the Rabanal (or Tendal) Ravine that was at the then kilometer 79,915 is located. At kilometer 79,925 there was the house of one Don Hilario Rivera. Immediately at that intersection, the then dirt road began toward the Robles neighborhood (to the southeast), which would later become the PR-722 highway. The crossing is indicated with a black circle.



*Figure 11: Part of the 6th Leaf of the Road Itinerary Plans
from San Juan to Ponce, 1884
(CD del libro Documentación de Puerto Rico...)*

The archaeologist López Meléndez indicated that in the search for documents for her project (Connector between the PR-14 ...) in the General Archive of Puerto Rico she found the plans of the junctions of this part of the Central Highway section and that these dated between 1887 and 1888 (page 49 of his report). The archaeologist added that: “La atarjea localizada en la intersección con la [actual] carretera PR-722 donde comienza nuestro proyecto, podría ser la atarjea o pontón Quiles”. Its understandable that after the figure 13, that it must be the Atarjea del Tendal.

The figure 12 which was taken from the CD of the book Documentation of Puerto Rico ... (entry 32, year 1885) it illustrates the area east of the town of Aibonito, where the dirt road to the southeast that led to the neighborhood of Oak is visible. Above all, it can be seen that there was indeed a brick track on one of the sections of the road (which at first was divided into two) and that east of the indicated track, on the other side of the Rabinal Ravine had an area called "quarry". Undoubtedly both places were source of materials for the construction of the indicated Central Highway. The two sites with sources of materials are indicated by us with black circles.



*Figure 12: Part of the Plan Around Aibonito, 1885.
(Cuerpo del E.M. del Ejército, CD del libro Documentación de Puerto Rico...)*

The figure 13 illustrates the same area above, at a slightly later date (entry 88, Sheet 6, year 1887), where the beginning of the dirt road to the neighborhood of El Roble (marked by us with a black circle) is clearly visible. The road continued of land at least until 1946.



*Figure 13: Part of the 6th Leaf of the Road Itinerary Plans
from San Juan to Ponce, 1887 (CD del libro Documentación de Puerto Rico...)*

c. Other Maps, Figures, Photos, Historical Structures and Resources.

The figure 14 is a copy of the excellent Crocus de Aibonito that was originally prepared by the Spanish Commander: Francisco Larrea and Captain Manuel Moriano (entry 178, year 1884, book Documentation of Puerto Rico ...), and was took from Anibal Sepúlveda Rivera: Puerto Rico Urbano, Volume 3, p. 74

Now, as seen, one of the possible archaeological sites near the place of the current study, which is a historic junction on the highway PR-14, Km. 50.4, it could be the AI00018, but the file indicated that it is on a Quebrada. The Figure 15 is a copy of a photograph of the archaeologist J. López (Photo 26, page 24, of the report Phase IA-IB of the Connector between PR-14 and Julio Cintrón de Aibonito Street) where a connection is illustrated in the highway PR. 14, but it was located at the kilometer 51.7. On the other hand, the figure 9 of the report by J. López located the junction on the Rabanal Ravine, at the beginning of the PR-722 road at its northwest end, which is why the question arises: Are they two ties? One at kilometer 50.4, and another at 51.7? In addition, the Figure 14 of the report by the archaeologist López identified the junction of kilometer 50.4 at the entrance to the town of Aibonito from Coamo, so it would be much further away.

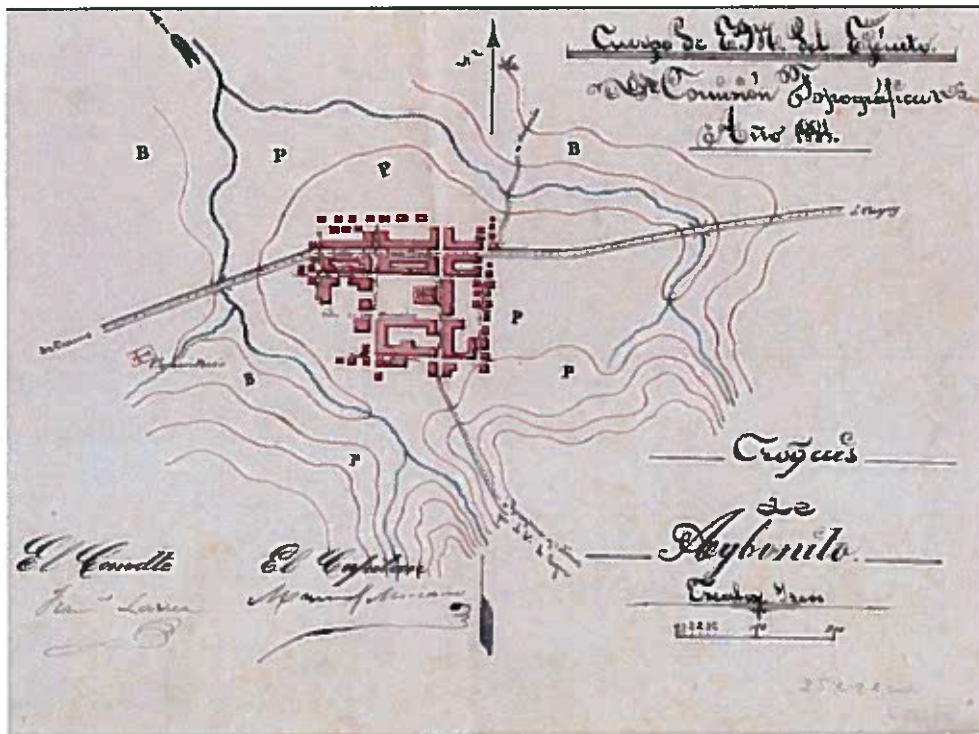


Figure 14: Croquis of Aibonito, 1884
(Anibal Sepúlveda Rivera, 2004, Tomo 3, p. 74)



Foto 26 Atarjea en la carretera PR-14 Km. 51.7.

*Figure 15: Atarjea in the PR-14, km. 51.7
(Jaqueline López, 2011, p. 24)*

The Figure 16 illustrates in a copy of a photograph of the archaeologist Jaqueline López, another Phase IA report entitled Judicial Center of Aibonito (AI-12-08-03, Photo 9, page 12), the archaeological-historical site in the area closest to the project, which is the road box at kilometer 51.8 of highway PR-14. This, as indicated, is located about 1.55 kilometers northwest of the land of our project. Immediate to the previous site, is the structure or Historical Place known as Villa Julita and nearby is the chapel of Doña Mercedes Pérez de Serrallés. All located in Pueblo Norte.



*Figure 16: Casilla de Camineros in Street PR-14, Km. 51.8
(Jaqueline López, 2012, p. 12)*

VII. Aerial Photographs:

The route of the old dirt road that crossed from PR-1 (current (PR-14) to the neighborhood of El Roble, Aibonito) it's clearly visible. To the northeast of the road has been located (marked in red) the place of the slide. It was covered by vegetation in 1937. In the aerial photograph, the absence of structures and residences trough the route of the PR-7722 road in the project land is noted.



Figure 17: 1937 Aerial Photo of Aibonito (source: ACT Photogrammetry Office)

Nowadays, the PR-722 road was already built and the area where the landslide occurred (2017) is visible. The area southeast of the place where the landslide occurred is covered with protective vegetation. The new road was built on the site about 100 meters to the northwest of the old road.



Figure 18: 1964 Aerial Photo of Aibonito

The buildings around the PR-722 road and the changes made by the urban development in that rural area of Aibonito can be observed. Some protective vegetation southeast of the site where the landslide occurred can be seen. The route of the ancient road cannot be distinguished, although in the quadrangles the trajectory is still illustrated as a path or dirt road.



Figure 19: 1977 Aerial Photo of Aibonito

Reconstruction of Landside ER-HWY-410 Project, Aibonito PR**VIII. Fieldwork**

As previously indicated, the project site was visited, and photographs were taken. In addition, it was obtained, from an archeology point of view, the environmental data of the place, which was located at kilometer 5.7 of the PR-722 road, in the neighborhood Oaks of Aibonito. The research was conducted in November 2018 by the archeologist Fernando Alvarado as Principal Investigator, the archaeologist Eduardo Questell Rodríguez as co-investigator and author. In addition, Eduardo Luis Questell served as technician.

The route of the PR-722 road in question begins on highway PR-14, east of the town of Aibonito, and crosses the Robles neighborhood until it reaches highway PR-1. The scope of the evaluation includes only the indicated section of Highway PR-722 and it's near the kilometer 5.7 of the mentioned highway (See Figure No. 1).

As observed in the visit, the site corresponds to a stretch of about 50 meters long on Highway PR-722, in the neighborhood Robles, near the kilometer 5.7 (see photo # 1). The project site, which is a landslide to the northwest that affected the width of the road, is delimited by concrete barriers for protection (see photo # 2). The section of the road is in a semi-curve, rising moderately and immediately to an access road to residences (see photos No. 2 and 3). Then there is a more marked and prolonged curve. In the place a culvert of the storm drain that runs towards the northwest was visible (see photos # 4 and 5). The sewer is indicated by an arrow in the photo #5. The landslide affected the concrete curb on the entire northwest side of the stretch (see photo # 6). No evidence of cultural activity was observed in the surveyed areas.



*Figure 20: Photo 1
View Towards the Northeast Showing the Project.*



*Figure 21: Photo 2
Concrete Barriers of Protection in the Project.*



*Figure 22: Photo 3
View Towards the Northwest Showing the Access Road to Residences.*



*Figure 23: Photo 4
Culvert on the Southeast Side of the Section.*



*Figure 24: Photo 5
View Towards the Southwest of the Project. The Arrow Indicates the Place of the Storm Drain.*



*Figure 25: Photo 6
It Illustrates the Damage of the Collapse to the Curb of the Road.*

IX. Conclusions and Recommendations

One of the main goals of the assessment is to establish the potential adverse effect that an undertaking can cause to known and unknown archaeological features. To establish it, the historical data and investigations recollected must be analyzed.

The site, as previously indicated, is a small section (about 50 meters long) of the PR-722 road at kilometer 5.7. All archival research made it clear that there is no prehistoric or historical archaeological site in the specific areas of the project or in its vicinity. The nearest archeological (historical) site is a road box on the PR-14 highway about 1.55 kilometers to the northwest.

During the visit to the lands, there wasn't any evidence of cultural activity in the place under investigation apart from the road itself, which was built after 1946. From the data obtained, it was concluded that the project has a very low archaeological sensitivity and additional studies aren't recommended.

a. Proposed Actions

The regulation requires the proposal of alternatives actions for the undertaking. The first is to consider that there is no action required because based on the information recorded, the analysis and discussion is not recommended. The landslide must be corrected, and the appropriate measures must be taken in that direction.

The agency can also consider monitoring any work that involves scraping, digging or any kind of subsoil intervention. In this case, it must be part of the document established by the Memorandum of Agreement (MOA). Also, and a contract establishing that the archaeologist can stop the digging at any moment, but in this case is not consider necessary.

X. Bibliography

Abbad y Lasiera Fray Inigo

1788 historia Geográfica, civil y Natural de la Isla de San Juan de Puerto Rico. Imprenta y Librería Acosta 1866 prólogo de José Julián Acosta consulted of 2018
cervantesvirtual.com

Alegría, Ricardo

1951 The Ball Game Played by the Aborigines of the Antilles. American Antiquity 16:348-352.

1955 The Archaic Tradition in Puerto Rico. American Antiquity 21(2):113-121.

1975 "Los dibujos del naturalista francés Augusto Plee (1821-1823) in Revista del Instituto de Cultura Puertorriqueña, Primera serie número 68, julio - septiembre de 1975. San Juan, Puerto Rico

1978 Apuntes en torno a la mitología de los indios taínos de las Antillas Mayores y sus orígenes suramericanos. Centro de Estudios Avanzados de Puerto Rico y el Caribe: San Juan.

1983^a Historia de nuestros indios: Versión elemental. Colección de Estudios Puertorriqueños, San Juan.

1983^b Ball Courts and Ceremonial Plazas in the West Indies. Yale University Publications in Anthropology Number 79, New Haven.

Alegría, Ricardo E., H. B. Nicholson, and Gordon R. Willey

1955 The Archaic Tradition of Puerto Rico. American Antiquity 21(2):113-121.

Ayes Suarez, Carlos

1989 "Angostura. Un Yacimiento Arcaico Temprano del Valle del Manatuabon", en Revista Universidad de América 1(2) 24-37

1991 "Un ídolo zoomórfico arcaico descubierto en el Barrio Pesas de Ciales" en Ecos de Plazuela 3 págs. 13-14

1996 La Cueva del Cupey. Serie Investigación Arqueológica. Publicación Ocasional 1. Centro Grafico Grafito, Vega Baja

Bate, Luis F.

2001 Propuestas para la Arqueología Recopilación de artículos y ensayos. Drake & Morgan Editores, México

Boccheciamp, Rafael A.

1969 Soil Survey of Humacao Area of Eastern Puerto Rico. (United States Department of Agriculture Soil Conservation Service, in cooperation with University of Puerto Rico, College of Agricultural Sciences.

Callaghan, Richard T.

1993 Passages to the Greater Antilles: An Analysis of Watercraft and the Marine Environment. In Proceedings of the XIV International Congress for Caribbean Archaeology, edited by A. Cummins and P. King, pp. 64–72. International Association for Caribbean Archaeology, Bridgetown, Barbados.

1995 Antillean Cultural Contacts with Mainland Regions as a Navigation Problem. In Proceedings of the Fifteenth International Congress for Caribbean Archaeology, edited by R. E. Alegría and M. Rodríguez, pp. 181–190. Centro de Estudios Avanzados de Puerto Rico y el Caribe, San Juan.

1999 Computer Simulations of Ancient Voyaging. *Northern Mariner/Le Marin du Nord* 1:24–33.

2001 Analysis of Ceramic Age Seafaring and Interaction Potential in the Antilles. *Current Anthropology* 42:308–313.

2003 Comments on the Mainland Origins of the Preceramic Cultures of the Greater Antilles. *Latin American Antiquity* 14(3):323–338.

Caro Costas, Aida

Antología de lecturas de historia de Puerto Rico (siglos XV-XVIII). (Río Piedras, Puerto Rico, Editorial Universitaria, Universidad de Puerto Rico, 1977)

Chanlatte Baik, Luis

1981 La Hueca y Sorcé (Vieques, Puerto Rico): Primeras migraciones agroalfareros antillanas. Nuevo esquema para los procesos culturales de la arqueología antillana. Published by the author, Santo Domingo, Dominican Republic.

1995 Los arcaicos y el formativo antillano (6000 AC–1492 DC). Proceedings of the Sixteenth International Congress for Caribbean Archaeology, edited by G. Richard, pp. 267–275. International Association for Caribbean Archaeology, Martinique.

2003 Cuál fue el destino final de las poblaciones arcaicas Antillanas? In Proceedings of the Twentieth International Congress for Caribbean Archaeology, edited by G. Tavares María and M. García Arévalo, pp. 317–322. Museo del Hombre Dominicano, Santo Domingo.

Chanlatte Baik, Luis A., and Yvonne M. Narganes Stordes

1983 Vieques, Puerto Rico: Asiento de una nueva cultura aborigen antillana. Impresora Corporán, Santo Domingo.

1985 Asentamiento poblacional Agro- I, complejo cultural La Hueca, Vieques, Puerto Rico. In Proceedings of the Tenth International Congress for the Study of the Pre- Columbian Cultures of the Lesser Antilles, edited by L. Allaire, pp. 225–250. Centre de Reserches Caraïbes, Université de Montréal, Montreal.

1986 Proceso y desarrollo de los primeros pobladores de Puerto Rico y las Antillas. Published by the authors, Santo Domingo, Dominican Republic.

Reconstruction of Landside ER-HWY-410 Project, Aibonito PR

2005 Cultura La Hueca. Museo de Historia, Antropología y Arte, Universidad de Puerto Rico, Río Piedras.

Comisión Topográfica de 1885

1886 Croquis y Datos Estadísticos del Pueblo de Fajardo. Mapa Militar de la isla no. 47. Cuerpo del E.M. De Ejecito Sección de Puerto Rico Secured
https://www.ecured.cu/R%C3%ADo_Herrera

Curet, L. Antonio, Joshua Torres, and Miguel Rodríguez

2004 Political and Social History of Eastern Puerto Rico: The Ceramic Age. In Late Ceramic Age Societies in the Eastern Caribbean, edited by A. Delpuech and C. L. Hofman, pp. 59–85. British Archaeological Reports, International Series 1273. British Archaeological Reports, Oxford.

Enciclopedia de Puerto Rico

<https://enciclopediapr.org/enciclopedia/municipio-de-rio-grande/>

Ferrerías Pagán, Jaime

1902 Biografía de las riquezas de Puerto Rico disponible en
<https://bibliotecavirtualpr.wordpress.com/2015/09/14/biografia-de-las-riquezas-de-puerto-rico-1902/>

Gierbolini, Roberto E.,

1975 Soil Survey of Mayagüez Area of Western Puerto Rico. (Mayagüez, Puerto Rico, United States Department of Agriculture, Soil Conservation Service, in cooperation with the University of Puerto Rico, College of Agricultural Sciences,)

Junta de Planificación de Puerto Rico

1952 municipio de Fajardo memoria suplementaria y mapa de límites jurisdiccionales de barrios en Archivo Nacional de Puerto Rico

Gifford, Jhon C

1905 The Luquillo Forest Reserve, Porto Rico (PDF). *Washington, D.C.: U.S. Department of Agriculture.*

Hernández Méndez, Eugenio

1969 Crónicas de Puerto Rico. Editorial UPR. Río Piedras.

Hostos, Adolfo de

1976 Diccionario Histórico Bibliográfico Comentado de Puerto Rico. Academia Puertorriqueña de La Historia, San Juan.

Reconstruction of Landside ER-HWY-410 Project, Aibonito PR**Interamerican University**

Centrales Azucareras de Puerto Rico -1873 2007.

<http://www.metro.inter.edu/facultad/esthumanisticos/ciho/centrales/centralfajardo.asp>,

consulted August 2018

López Marrero, T., M.A. Lorenzo Pérez, C.F. Rivera Lopez, A.C. González Toro, D. Rivera Santiago, H.I Nieves Crespo and P.N. Hernández González.

2017. Porto Rico 1930 Georeferenced: A Coastal Mosaic. Interdisciplinary Center for Coastal Studies. Mayagüez, PR: University of Puerto Rico, Mayagüez Campus. 15 p consulted July 2018)

Library of Congress

Map Collection

<http://lcweb4.loc.gov/service/gdc/lhbpr/06061/06061.pdf>

Mallen Sean Thomas

2016 REASSESSING CONSENSUS: ALEJANDRO O'REILLY'S 1765 VISITA AND PUERTO RICAN HISTORY, Master Thesis, Florida Atlantic University, College of Arts and Letters on PDF

Marín, Héctor y Joseph Harrison

1988 ARQUEOLOGIA Documental DEL SISTEMA DE FORTIFICACIONES COSTANERAS DE PUERTO RICO EN EL SIGLO manuscrito para Asociación de Amigos de los Castillos.

Martínez-Cruzado JC, Toro-Labrador G, Ho-Fung V, Estévez-Montero MA, Lobaina-Manzanet A, Padovani-Claudio DA, Sánchez-Cruz H, Ortíz-Bermúdez P, Sánchez-Crespo A

2001 Mitochondrial DNA analysis reveals substantial Native American ancestry in Puerto Rico. Hum Biol 73: 491-511.

2002 "El uso del ADN mitocondrial para descubrir las migraciones precolombinas al Caribe: Resultados para Puerto Rico y expectativas para la República Dominicana."

KACIKE: Revista de la historia y antropología de los indígenas del Caribe [Revista electrónica], Edición Especial, Lynne Guitar, redactora. Disponible en: <http://www.kacike.org/MartinezEspanol.pdf>

Medina, Norma y Marisol Rodríguez

2009 Fase IB Planta de tratamiento Canóvanas. Informe presentado al ICP

Melgarejo, Juan

1582 Memoria y Descripción de la isla de Puerto Rico en Biblioteca de Puerto Rico, Coll y Toste disponible en:

<http://edicionesdigitales.info/biblioteca/memoriamelgarejo.pdf>

Montilla Jaime

2015 Puerto Rico Sugar Mill Project <http://jaimemontilla.com/pr-sugar-mills-project>

Morales Muñoz, Generoso

1949 La Fundación del pueblo de Fajardo.

Moscoso, Francisco

1999 Sociedad y economía de los taínos. Editorial Edil, Río Piedras, Puerto Rico

O reilly, Alejandro

1765 Circunstancia del actual estado de la población, frutos y proporciones para fomento que tiene la isla de San Juan de Puerto-Rico, con algunas ocurrencias sobre los medios conducentes a ello, formada para noticia de S. M. y de sus Ministros, por el Mariscal de Campo D. Alejandro O'Reylly, y de resulta de la visita general que acaba de hacer en la expresada Isla, para evacuar las comisiones que se ha dignado fiar a su celo la piedad del Rey. Río Piedras, Puerto Rico, Editorial Universitaria 1980. (consulted on line on scribbr.com)

Oliver, José

1999 The "La Hueca Problem" in Puerto Rico and the Caribbean: Old Problems, New Perspectives, Possible Solutions. In *Archaeological Investigations on St. Martin (Lesser Antilles)*, edited by Corinne L. Hofman and Menno L. P. Hoogland, pp. 253–297. Faculty of Archaeology, Leiden University, Leiden, The Netherlands.

2009 Caciques and Cemi Idols: The Web Spun by Taino Rulers between Hispaniola and Puerto Rico. The University of Alabama Press, Tuscaloosa.

Oliver, José R., Juan Rivera Fontán, and Lee A. Newsom

1999 Arqueología del Barrio Caguana, Puerto Rico: Resultados preliminares de las temporadas, 1996–1997. In *Trabajos de investigación arqueológica en Puerto Rico: Tercer encuentro de investigadores*, edited by J. Rivera Fontan, pp. 7–26. Publicación Ocasional de la División de Arqueología, Instituto de Cultura Puertorriqueña, San Juan.

O reilly, Alejandro

1765 Circunstancia del actual estado de la población, frutos y proporciones para fomento que tiene la isla de San Juan de Puerto-Rico, con algunas ocurrencias sobre los medios conducentes a ello, formada para noticia de S. M. y de sus Ministros, por el Mariscal de Campo D. Alejandro O'Reylly, y de resulta de la visita general que acaba de hacer en la expresada Isla, para evacuar las comisiones que se ha dignado fiar a su celo la piedad del Rey. Río Piedras, Puerto Rico, Editorial Universitaria 1980. (consulted on line on scribbr.com)

Oficina Estatal de Conservación Histórica OECH)

2016 informe Arqueológico del Municipio de Fajardo.

<http://www2.pr.gov/oech/oech/Documents/ActualizacionDatosMunicipales/Municipios/Informe%20Arqueol%C3%B3gico%20del%20Municipio%20de%20Fajardo.pdf>

Pagán Jiménez, Jaime R.

VIII. Antropología en Puerto Rico: Dicotomía de Centro y Periferia. Boletín de Antropología Americana 36:193–202.

Picó, Rafael

1969 Nueva geografía de Puerto Rico, física, económica y social. (Río Piedras, Puerto Rico, Editorial Universitaria,

Recursos de agua de Puerto Rico

2017 <http://www.recursosaguapuertorico.com/Cuencas-Principales-en-PR.html>

Rodríguez Miranda, Marisol

1997 El Pulguero, Puerto Rico, Hallazgo de Cerámica en el periodo Arcaico. Ponencia presentada en el 16 Congreso Internacional de Arqueología del Caribe. Bahamas.

2017 La siembra en montones y el montón de siembra. Ponencia presentada en el Tercer Foro de la Ruralia. Asociación Puertorriqueña de Estudios Rurales, Caguas, Puerto Rico

2018 Natpro, Fase IA Rio Grande, Puerto Rico

Rodríguez Vázquez, Luis Antonio

2013 Las fichas y riles de las haciendas de Puerto Rico. Ed. Lulú.

Sepúlveda Rivera, Aníbal

2004 Puerto Rico Urbano. Carimar, San Juan, Puerto Rico.

Sociedad Amigos de la Historia

“Los incidentes de Fajardo 3 al 7 d agosto de 1998” en 1898 The Hispanoamerican Dar in Puerto Rico. Consulte on line 2018

Tomas de Córdova, Pedro

Memorias geográficas, históricas y estadísticas de la Isla de Puerto Rico.

Toro Sugrañes, José A.

1997 Historia de los pueblos de Puerto Rico, Editorial Edil, Rio Piedras.

US Census Bureau

<https://www.census.gov/geo/maps-data/data/gazetteer.html>

USDA

2017 Soil Survey of Humacao Area of Eastern Puerto Rico
https://www.nrcs.usda.gov/Internet/FSE_MANUSCRIPTS/puerto_rico/PR689/0/Humacao.pdf

USGS

2017 USGS Topographic
https://geonames.usgs.gov/apex/f?p=262:18:0::NO:RP:P18_STATE%2CP18_SCALE%2CP18_MAP_NAME%2CP18_MAP_TYPE:PR%2CALL%2C%5Crio+grande%5C%2CAll

Watson Monroe,

1971 Las divisiones geomórficas de Puerto Rico, en Geovisión de Puerto Rico, en María Teresa B. De Galiñanes (ed. Editorial Río Piedras, Puerto Rico)

Wilson, Samuel M.

1990 Hispaniola: Caribbean Chiefdoms in the Age of Columbus. The University of Alabama Press, Tuscaloosa.

1991 Current Research. *American Antiquity* 56(1):143–160.

1993 The Cultural Mosaic of the Indigenous Caribbean. *Proceedings of the British Academy* 81:37–66.

2001 Cultural Pluralism and the Emergence of Complex Society in the Greater Antilles. In *Proceedings of the Eighteenth International Congress for Caribbean References / 299 Archaeology*, vol. 2, edited by G. Richard, pp. 7–12. International Association for Caribbean Archaeology, Guadeloupe.

2007 *The Archaeology of the Caribbean*. Cambridge University Press, New York.

XI. Annexes

A.

“As Built” Plan with the surface inspection made

B.

Development Proposed Plan

Appendix E – US Fish and Wildlife Service – Blanket Letter Self Certification



GOVERNMENT OF PUERTO RICO
Puerto Rico Highway and Transportation Authority

November 26, 2019

RECEIVED

DEC 04 2019

U.S. Fish & Wildlife Service

Mr. Edwin Muñiz
Field Supervisor
Fish and Wildlife Service
Caribbean Ecological Services- Field Office
PO Box 491
Boquerón, Puerto Rico 00622

**CONSULTATION LETTER FOR EMERGENCY WORKS ON VARIOUS ROADWAYS IN THE ISLAND
DUE TO HURRICANES IRMA AND MARIA – LANDSLIDE AND ROAD DAMAGE PROGRAM
ER-HWY-308, ER-HWY-410 AND ER-HWY-452 (AC-811544)**

Dear Mr. Muñiz:

The Puerto Rico Highway and Transportation Authority (PRHTA) remains engaged on emergency works to repair the landslides that occurred in the state roadways as result of the 2017 hurricane events. Proposed and current repairs have been performed by using Federal Relief funds. As referred in our previous consultation letters (dated July 8, July 19 and November 6, 2019, respectively) the proposed repairs work, necessary to provide highway users safety, include:

- Roadway rehabilitation
- Reconstruction of sidewalks
- Repair of storm sewers
- Landslides corrections
- Construction of concrete curbs and gutters
- Other miscellaneous works

A fourth group of three projects from the Landslide and Road Damages Program are included in this consultation letter. As with the previous consultation presented by PRHTA, a preliminary identification was conducted using the ECOS-IPaC website tool to identify threatened and/or endangered species that may occur within proposed project areas. On this occasion, the website was experiencing issues with document generation, however, the website provided an informal consultation document, known as a Resource List, which was used for the preliminary analysis. Copies of these documents are included with this communication.

Table 1 includes the proposed projects location. The AC code, ER-HWY identification numbers, the proposed works, and if the projects requires the preparation of a US Army Corps of Engineers (USACE) permit. According to the National Wetland Inventory data, one of the sites (ER-HWY-452) has been



identified with wetlands or USACE jurisdictional areas within the study area. Depending on proposed activities, an USACE consultation process might be required due to works adjacent or within water body road crossing. The PRHTA will evaluate the project to comply with Clean Water Act requirements. Regarding critical habitat designation, no critical habitat was identified within the project study areas according with the IPaC tool information. The Table 1 also includes the list of threatened and endangered species that may occur in the proposed project areas according to the IPaC tool. The following bullets summarize the contents of the table:

Table 1. The List of Threatened and Endangered Species

Sites	Specie	Scientiffo Name	Status
ER-HWY-410	Reptile	<i>Epicrates inornatus</i>	Endangered
ER-HWY-308	Reptile	<i>Epicrates Inornatus</i>	Endangered
	Bird	<i>Buteo platypteru</i>	Endangered
	Bird	<i>Accipiter striatus venator</i>	Endangered
ER-HWY-452	Reptile	<i>Epicrates inornatus</i>	Endangered
	Plant	<i>Daphnopsis helleriana</i>	Endangered
	Plant	<i>Ottoschulzia rhodoxylon)</i>	Endangered

To avoid and minimize harm to any of the aforementioned species that could be encountered within areas affected by the proposed landslide correction projects, the conservation measures included in the USFWS-Endangered Species Act Emergency Section 7 Consultation Best Management Practices (BMPs) for Federally Listed Species in Relation to Emergency Works on Various Roadways in Puerto Rico due to Hurricanes Irma and Maria communication would be incorporated in the contract documents for each sites. If any threatened and/or endangered species of plants that are indicated in the Table 1 are identified within the boundaries of a proposed project, it would be protected to avoid any damages.

The proposed projects are located within areas that have been previously affected by the hurricane events, as has been indicated in our previous communications related to this important relief project. Our Agency requests assistance from the US Fish and Wildlife Service in accordance to the Fish and Wildlife Coordination Act and the Endangered Species Act for the evaluation of the proposed permanent works for the landslide and road damage repairs of the aforementioned projects.

We hope that the information provided can be useful in the evaluation of our request. For additional information, please contact me or Alexandra Velazquez from our Programming and Special Studies Area Director at telephone number 787-721-8787, extensions 1008 and 1502, respectively.

Cordially yours,


 Luis E. Rodriguez Rosa
 Deputy Executive Director

Enclosures:

EMERGENCY RELIEF PROGRAM- LANDSLIDE AND ROAD DAMAGES
TABLE 1- PROJECTS INFORMATION

AC Number	Road	Km	Municipality	ER-HWY- ID	Reptiles	Plants	Amphibians	Birds	Proposed Works
1	811544 PR-865	0.9	Toa Alta	462	<i>Epicrates inornatus</i>	<i>Daphnopsis heileriana</i> , <i>Otostichuzia</i> <i>rhodoxylon</i>	None	None	Construction of pre-cast bridge over Campanero Creek; Installation of rip-rap revetment along the surface of Campanero Creek; Cold milling
2	811544 PR-722	5.7	Albonito	410	<i>Epicrates inornatus</i>	None	None	None	Construction of cantilever retaining wall; Construction of new curbs and drainage structures; Demolition of pre-cast concrete storm sewer pipe; Installation of new rip-rap; Cold milling
3	811544 PR-179	13.8	Guayama	308	<i>Epicrates inornatus</i>	None	None	<i>Buteo platypterus brunescens</i> , <i>Accipiter striatus venator</i>	Construction of a sheet pile with cap beam retaining wall; Construction of new curbs and drainage structures; Partial abandonment and realignment of the existing pre-cast concrete storm sewer pipe; Installation of a rip-rap and gabion mattress; Cold milling

IPaC resource list

This report is an automatically generated list of species and other resources such as critical habitat (collectively referred to as *trust resources*) under the U.S. Fish and Wildlife Service's (USFWS) jurisdiction that are known or expected to be on or near the project area referenced below. The list may also include trust resources that occur outside of the project area, but that could potentially be directly or indirectly affected by activities in the project area. However, determining the likelihood and extent of effects a project may have on trust resources typically requires gathering additional site-specific (e.g., vegetation/species surveys) and project-specific (e.g., magnitude and timing of proposed activities) information.

Below is a summary of the project information you provided and contact information for the USFWS office(s) with jurisdiction in the defined project area. Please read the introduction to each section that follows (Endangered Species, Migratory Birds, USFWS Facilities, and NWI Wetlands) for additional information applicable to the trust resources addressed in that section.

Location

Toa Baja County, Puerto Rico



Local office

Caribbean Ecological Services Field Office

☎ (787) 851-7297

📠 (787) 851-7440

MAILING ADDRESS

Post Office Box 491

Boqueron, PR 00622-0491

PHYSICAL ADDRESS

Carr 301, Km 5.1, Bq. Corozo

Boqueron, PR 00622-0510

<http://www.fws.gov/caribbean/es>

Endangered species

This resource list is for informational purposes only and does not constitute an analysis of project level impacts.

The primary information used to generate this list is the known or expected range of each species. Additional areas of influence (AOI) for species are also considered. An AOI includes areas outside of the species range if the species could be indirectly affected by activities in that area (e.g., placing a dam upstream of a fish population, even if that fish does not occur at the dam site, may indirectly impact the species by reducing or eliminating water flow downstream). Because species can move, and site conditions can change, the species on this list are not guaranteed to be found on or near the project area. To fully determine any potential effects to species, additional site-specific and project-specific information is often required.

Section 7 of the Endangered Species Act requires Federal agencies to "request of the Secretary information whether any species which is listed or proposed to be listed may be present in the area of such proposed action" for any project that is conducted, permitted, funded, or licensed by any Federal agency. A letter from the local office and a species list which fulfills this requirement can only be obtained by requesting an official species list from either the Regulatory Review section in IPaC (see directions below) or from the local field office directly.

For project evaluations that require USFWS concurrence/review, please return to the IPaC website and request an official species list by doing the following:

1. Draw the project location and click CONTINUE.
2. Click DEFINE PROJECT.
3. Log in (if directed to do so).
4. Provide a name and description for your project.
5. Click REQUEST SPECIES LIST.

Listed species¹ and their critical habitats are managed by the Ecological Services Program of the U.S. Fish and Wildlife Service (USFWS) and the fisheries division of the National Oceanic and Atmospheric Administration (NOAA Fisheries²).

Species and critical habitats under the sole responsibility of NOAA Fisheries are not shown on this list. Please contact NOAA Fisheries for species under their jurisdiction.

1. Species listed under the Endangered Species Act are threatened or endangered; IPaC also shows species that are candidates, or proposed, for listing. See the listing status page for more information.
2. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

The following species are potentially affected by activities in this location:

Reptiles

NAME	STATUS
Puerto Rican Boa <i>Epicrates inornatus</i> No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/6628	Endangered

Flowering Plants

NAME	STATUS
Daphnopsis helleriana No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/6802	Endangered
Palo De Rosa <i>Ortoschulzia rhodoxylon</i> No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/5741	Endangered

Critical habitats

Potential effects to critical habitat(s) in this location must be analyzed along with the endangered species themselves.

THERE ARE NO CRITICAL HABITATS AT THIS LOCATION.

Migratory birds

Certain birds are protected under the Migratory Bird Treaty Act¹ and the Bald and Golden Eagle Protection Act².

Any person or organization who plans or conducts activities that may result in impacts to migratory birds, eagles, and their habitats should follow appropriate regulations and consider implementing appropriate conservation measures, as described below.

1. The [Migratory Birds Treaty Act of 1918](#).
2. The [Bald and Golden Eagle Protection Act of 1940](#).

Additional information can be found using the following links:

- Birds of Conservation Concern <http://www.fws.gov/birds/management/managed-species/birds-of-conservation-concern.php>
- Measures for avoiding and minimizing impacts to birds <http://www.fws.gov/birds/management/project-assessment-tools-and-guidance/conservation-measures.php>
- Nationwide conservation measures for birds <http://www.fws.gov/migratorybirds/pdf/management/nationwidestandardconservationmeasures.pdf>

The birds listed below are birds of particular concern either because they occur on the [USFWS Birds of Conservation Concern \(BCC\)](#) list or warrant special attention in your project location. To learn more about the levels of concern for birds on your list and how this list is generated, see the [FAQ below](#). This is not a list of every bird you may find in this location, nor a guarantee that every bird on this list will be found in your project area. To see exact locations of where birders and the general public have sighted birds in and around your project area, visit the [E-bird data mapping tool](#) (Tip: enter your location, desired date range and a species on your list). For projects that occur off the Atlantic Coast, additional maps and models detailing the relative occurrence and abundance of bird species on your list are available. Links to additional information about Atlantic Coast birds, and other important information about your migratory bird list, including how to properly interpret and use your migratory bird report, can be found [below](#).

For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to migratory birds on your list, click on the **PROBABILITY OF PRESENCE SUMMARY** at the top of your list to see when these birds are most likely to be present and breeding in your project area.

NAME

BREEDING SEASON (IF A BREEDING SEASON IS INDICATED FOR A BIRD ON YOUR LIST, THE BIRD MAY BREED IN YOUR PROJECT AREA SOMETIME WITHIN THE TIMEFRAME SPECIFIED, WHICH IS A VERY LIBERAL ESTIMATE OF THE DATES INSIDE WHICH THE BIRD BREEDS ACROSS ITS ENTIRE RANGE. "BREEDS ELSEWHERE" INDICATES THAT THE BIRD DOES NOT LIKELY BREED IN YOUR PROJECT AREA.)

American Coot *Fulica americana americana*

This is a Bird of Conservation Concern (BCC) throughout its range in Puerto Rico and the Virgin Islands.

Breeds May 1 to Sep 15

Antillean Mango *Anthracothorax dominicus*

This is a Bird of Conservation Concern (BCC) throughout its range in Puerto Rico and the Virgin Islands.

Breeds Mar 1 to Aug 20

Mangrove Cuckoo *Coccyzus minor*

This is a Bird of Conservation Concern (BCC) throughout its range in Puerto Rico and the Virgin Islands.

Breeds Apr 20 to Aug 20

Puerto Rican Screech-owl *Megascops nudipes newtoni*

This is a Bird of Conservation Concern (BCC) throughout its range in Puerto Rico and the Virgin Islands.

Breeds Apr 1 to Jun 30

Puerto Rican Vireo *Vireo latimeri*

This is a Bird of Conservation Concern (BCC) throughout its range in Puerto Rico and the Virgin Islands.

Breeds Apr 8 to Aug 1

White-crowned Pigeon *Patagioenas leucocephala*

This is a Bird of Conservation Concern (BCC) throughout its range in Puerto Rico and the Virgin Islands.

<https://ecps.fws.gov/ecp/species/4047>

Breeds May 1 to Sep 30

Willet *Tringa semipalmata*

This is a Bird of Conservation Concern (BCC) throughout its range in Puerto Rico and the Virgin Islands.

Breeds Apr 20 to Aug 5

Probability of Presence Summary

The graphs below provide our best understanding of when birds of concern are most likely to be present in your project area. This information can be used to tailor and schedule your project activities to avoid or minimize impacts to birds. Please make sure you read and understand the [FAQ "Proper Interpretation and Use of Your Migratory Bird Report"](#) before using or attempting to interpret this report.

Probability of Presence (■)

Each green bar represents the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during a particular week of the year. (A year is represented as 12 4-week months.) A taller bar indicates a higher probability of species presence. The survey effort (see below) can be used to establish a level of confidence in the presence score. One can have higher confidence in the presence score if the corresponding survey effort is also high.

How is the probability of presence score calculated? The calculation is done in three steps:

1. The probability of presence for each week is calculated as the number of survey events in the week where the species was detected divided by the total number of survey events for that week. For example, if in week 12 there were 20 survey events and the Spotted Towhee was found in 5 of them, the probability of presence of the Spotted Towhee in week 12 is 0.25.
2. To properly present the pattern of presence across the year, the relative probability of presence is calculated. This is the probability of presence divided by the maximum probability of presence across all weeks. For example, imagine the probability of presence in week 20 for the Spotted Towhee is 0.05, and that the probability of presence at week 12 (0.25) is the maximum of any week of the year. The relative probability of presence on week 12 is $0.25/0.25 = 1$; at week 20 it is $0.05/0.25 = 0.2$.
3. The relative probability of presence calculated in the previous step undergoes a statistical conversion so that all possible values fall between 0 and 10, inclusive. This is the probability of presence score.

To see a bar's probability of presence score, simply hover your mouse cursor over the bar.

Breeding Season (B)

Yellow bars denote a very liberal estimate of the time-frame inside which the bird breeds across its entire range. If there are no yellow bars shown for a bird, it does not breed in your project area.

Survey Effort (E)

Vertical black lines superimposed on probability of presence bars indicate the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps. The number of surveys is expressed as a range, for example, 33 to 64 surveys.

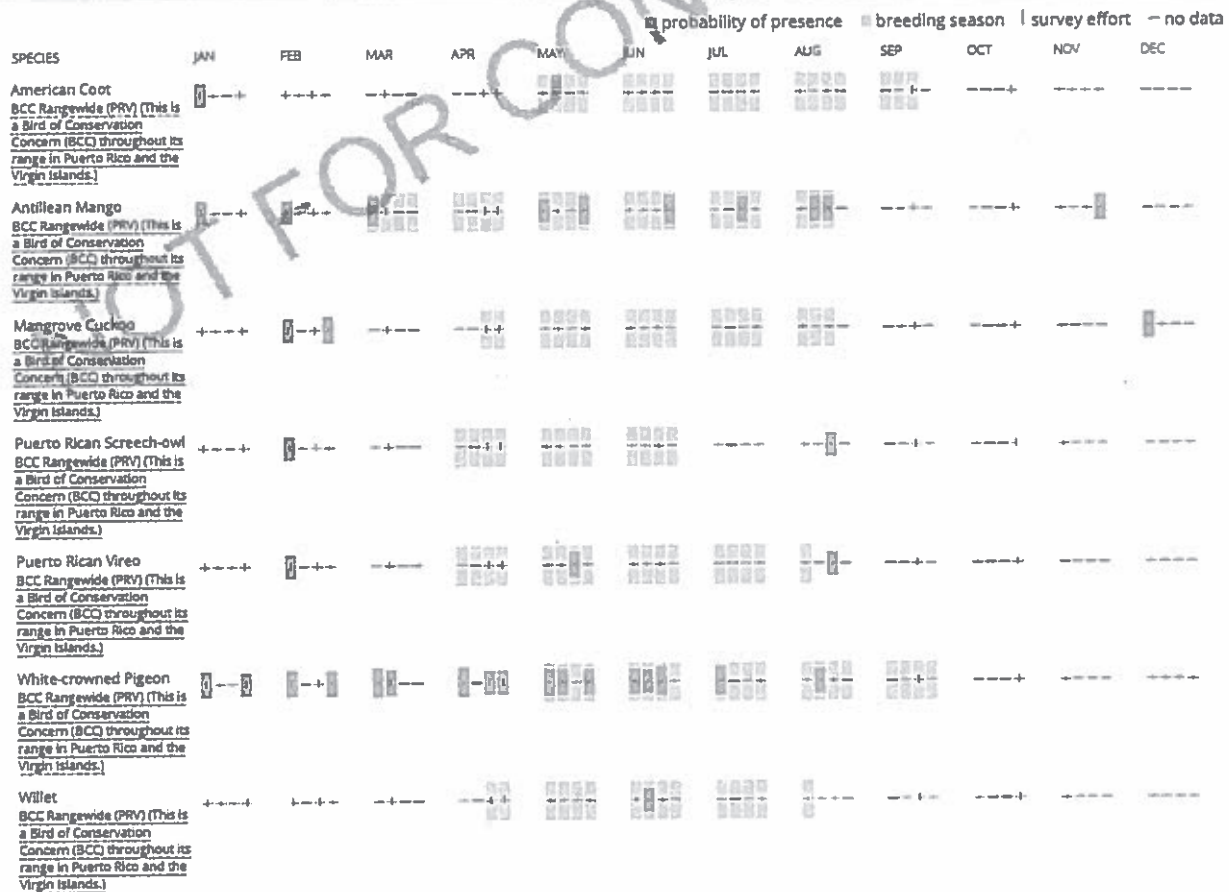
To see a bar's survey effort range, simply hover your mouse cursor over the bar.

No Data (-)

A week is marked as having no data if there were no survey events for that week.

Survey Timeframe

Surveys from only the last 10 years are used in order to ensure delivery of currently relevant information. The exception to this is areas off the Atlantic coast, where bird returns are based on all years of available data, since data in these areas is currently much more sparse.



Tell me more about conservation measures I can implement to avoid or minimize impacts to migratory birds.

[Nationwide Conservation Measures](#) describes measures that can help avoid and minimize impacts to all birds at any location year round. Implementation of these measures is particularly important when birds are most likely to occur in the project area. When birds may be breeding in the area, identifying the locations of any active nests and avoiding their destruction is a very helpful impact minimization measure. To see when birds are most likely to occur and

be breeding in your project area, view the Probability of Presence Summary. Additional measures and/or permits may be advisable depending on the type of activity you are conducting and the type of infrastructure or bird species present on your project site.

What does IPaC use to generate the migratory birds potentially occurring in my specified location?

The Migratory Bird Resource List is comprised of USFWS Birds of Conservation Concern (BCC) and other species that may warrant special attention in your project location.

The migratory bird list generated for your project is derived from data provided by the Avian Knowledge Network (AKN). The AKN data is based on a growing collection of survey, banding, and citizen science datasets and is queried and filtered to return a list of those birds reported as occurring in the 10km grid cell(s) which your project intersects, and that have been identified as warranting special attention because they are a BCC species in that area, an eagle (Eagle Act requirements may apply), or a species that has a particular vulnerability to offshore activities or development.

Again, the Migratory Bird Resource list includes only a subset of birds that may occur in your project area. It is not representative of all birds that may occur in your project area. To get a list of all birds potentially present in your project area, please visit the AKN Phenology Tool.

What does IPaC use to generate the probability of presence graphs for the migratory birds potentially occurring in my specified location?

The probability of presence graphs associated with your migratory bird list are based on data provided by the Avian Knowledge Network (AKN). This data is derived from a growing collection of survey, banding, and citizen science datasets.

Probability of presence data is continuously being updated as new and better information becomes available. To learn more about how the probability of presence graphs are produced and how to interpret them, go to the Probability of Presence Summary and then click on the "Tell me about these graphs" link.

How do I know if a bird is breeding, wintering, migrating or present year-round in my project area?

To see what part of a particular bird's range your project area falls within (i.e. breeding, wintering, migrating or year-round), you may refer to the following resources: The Cornell Lab of Ornithology All About Birds Bird Guide, or (if you are unsuccessful in locating the bird of interest there), the Cornell Lab of Ornithology Neotropical Birds guide. If a bird on your migratory bird species list has a breeding season associated with it, if that bird does occur in your project area, there may be nests present at some point within the timeframe specified. If "Breeds elsewhere" is indicated, then the bird likely does not breed in your project area.

What are the levels of concern for migratory birds?

Migratory birds delivered through IPaC fall into the following distinct categories of concern:

1. "BCC Rangewide" birds are Birds of Conservation Concern (BCC) that are of concern throughout their range anywhere within the USA (including Hawaii, the Pacific Islands, Puerto Rico, and the Virgin Islands);
2. "BCC - BCR" birds are BCCs that are of concern only in particular Bird Conservation Regions (BCRs) in the continental USA; and
3. "Non-BCC - Vulnerable" birds are not BCC species in your project area, but appear on your list either because of the Eagle Act requirements (for eagles) or (for non-eagles) potential susceptibilities in offshore areas from certain types of development or activities (e.g. offshore energy development or longline fishing).

Although it is important to try to avoid and minimize impacts to all birds, efforts should be made, in particular, to avoid and minimize impacts to the birds on this list, especially eagles and BCC species of rangewide concern. For more information on conservation measures you can implement to help avoid and minimize migratory bird impacts and requirements for eagles, please see the FAQs for these topics.

Details about birds that are potentially affected by offshore projects

For additional details about the relative occurrence and abundance of both individual bird species and groups of bird species within your project area off the Atlantic Coast, please visit the Northeast Ocean Data Portal. The Portal also offers data and information about other taxa besides birds that may be helpful to you in your project review. Alternately, you may download the bird model results files underlying the portal maps through the NOAA NCCOS Integrative Statistical Modeling and Predictive Mapping of Marine Bird Distributions and Abundance on the Atlantic Outer Continental Shelf project webpage.

Bird tracking data can also provide additional details about occurrence and habitat use throughout the year, including migration. Models relying on survey data may not include this information. For additional information on marine bird tracking data, see the Diving Bird Study and the nanotag studies or contact Caleb Spiegel or Pam Loring.

What if I have eagles on my list?

If your project has the potential to disturb or kill eagles, you may need to obtain a permit to avoid violating the Eagle Act should such impacts occur.

Proper Interpretation and Use of Your Migratory Bird Report

The migratory bird list generated is not a list of all birds in your project area, only a subset of birds of priority concern. To learn more about how your list is generated, and see options for identifying what other birds may be in your project area, please see the FAQ "What does IPaC use to generate the migratory birds potentially occurring in my specified location". Please be aware this report provides the "probability of presence" of birds within the 10 km grid cell(s) that overlap your project, not your exact project footprint. On the graphs provided, please also look carefully at the survey effort (indicated by the black vertical bar) and for the existence of the "no data" indicator (a red horizontal bar). A high survey effort is the key component. If the survey effort is high, then the probability of presence score can be viewed as more dependable. In contrast, a low survey effort bar or no data bar means a lack of data and, therefore, a lack of certainty about presence of the species. This list is not perfect; it is simply a starting point for identifying what birds of concern have the potential to be in your project area, when they might be there, and if they might be breeding (which means nests might be present). The list helps you know what to look for to confirm presence, and helps guide you in knowing when to implement conservation measures to avoid or minimize potential impacts from your project activities, should presence be confirmed. To learn more about conservation measures, visit the FAQ "Tell me about conservation measures I can implement to avoid or minimize impacts to migratory birds" at the bottom of your migratory bird trust resources page.

Facilities

National Wildlife Refuge lands

Any activity proposed on lands managed by the National Wildlife Refuge system must undergo a 'Compatibility Determination' conducted by the Refuge. Please contact the individual Refuges to discuss any questions or concerns.

THERE ARE NO REFUGE LANDS AT THIS LOCATION.

Fish hatcheries

THERE ARE NO FISH HATCHERIES AT THIS LOCATION.

Wetlands in the National Wetlands Inventory

Impacts to NWI wetlands and other aquatic habitats may be subject to regulation under Section 404 of the Clean Water Act, or other State/Federal statutes.

For more information please contact the Regulatory Program of the local U.S. Army Corps of Engineers District.

Please note that the NWI data being shown may be out of date. We are currently working to update our NWI data set. We recommend you verify these results with a site visit to determine the actual extent of wetlands on site.

This location overlaps the following wetlands:

FRESHWATER EMERGENT WETLAND

PEM1A

RIVERINE

RSUBH

A full description for each wetland code can be found at the National Wetlands Inventory website

Data limitations

The Service's objective of mapping wetlands and deepwater habitats is to produce reconnaissance level information on the location, type and size of these resources. The maps are prepared from the analysis of high altitude imagery. Wetlands are identified based on vegetation, visible hydrology and geography. A margin of error is inherent in the use of imagery; thus, detailed on-the-ground inspection of any particular site may result in revision of the wetland boundaries or classification established through image analysis.

The accuracy of image interpretation depends on the quality of the imagery, the experience of the image analysts, the amount and quality of the collateral data and the amount of ground truth verification work conducted. Metadata should be consulted to determine the date of the source imagery used and any mapping problems.

Wetlands or other mapped features may have changed since the date of the imagery or field work. There may be occasional differences in polygon boundaries or classifications between the information depicted on the map and the actual conditions on site.

Data exclusions

Certain wetland habitats are excluded from the National mapping program because of the limitations of aerial imagery as the primary data source used to detect wetlands. These habitats include seagrasses or submerged aquatic vegetation that are found in the intertidal and subtidal zones of estuaries and nearshore coastal waters. Some deepwater reef communities (coral or tubercid worm reefs) have also been excluded from the inventory. These habitats, because of their depth, go undetected by aerial imagery.

Data precautions

Federal, state, and local regulatory agencies with jurisdiction over wetlands may define and describe wetlands in a different manner than that used in this inventory. There is no attempt, in either the design or products of this inventory, to define the limits of proprietary jurisdiction of any Federal, state, or local government or to establish the geographical scope of the regulatory programs of government agencies. Persons intending to engage in activities involving modifications within or adjacent to wetland areas should seek the advice of appropriate federal, state, or local agencies concerning specified agency regulatory programs and proprietary jurisdictions that may affect such activities.

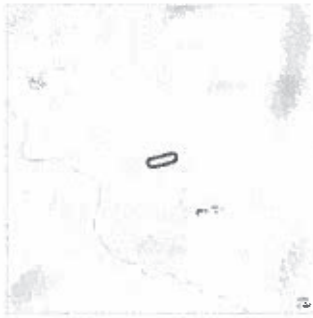
IPaC resource list

This report is an automatically generated list of species and other resources such as critical habitat (collectively referred to as *trust resources*) under the U.S. Fish and Wildlife Service's (USFWS) jurisdiction that are known or expected to be on or near the project area referenced below. The list may also include trust resources that occur outside of the project area, but that could potentially be directly or indirectly affected by activities in the project area. However, determining the likelihood and extent of effects a project may have on trust resources typically requires gathering additional site-specific (e.g., vegetation/species surveys) and project-specific (e.g., magnitude and timing of proposed activities) information.

Below is a summary of the project information you provided and contact information for the USFWS office(s) with jurisdiction in the defined project area. Please read the introduction to each section that follows (Endangered Species, Migratory Birds, USFWS Facilities, and NWI Wetlands) for additional information applicable to the trust resources addressed in that section.

Location

Aibonito County, Puerto Rico



Local office

Caribbean Ecological Services Field Office

(787) 851-7297

(787) 851-7440

MAILING ADDRESS

Post Office Box 491
Boqueron, PR 00622-0491

PHYSICAL ADDRESS

Carr 301, Km 5.1, Bo Corozo
Boqueron, PR 00622-0510

<http://www.fws.gov/caribbean/es>

Endangered species

This resource list is for informational purposes only and does not constitute an analysis of project level impacts.

The primary information used to generate this list is the known or expected range of each species. Additional areas of influence (AOI) for species are also considered. An AOI includes areas outside of the species range if the species could be indirectly affected by activities in that area (e.g., placing a dam upstream of a fish population, even if that fish does not occur at the dam site, may indirectly impact the species by reducing or eliminating water flow downstream). Because species can move, and site conditions can change, the species on this list are not guaranteed to be found on or near the project area. To fully determine any potential effects to species, additional site-specific and project-specific information is often required.

Section 7 of the Endangered Species Act requires Federal agencies to "request of the Secretary information whether any species which is listed or proposed to be listed may be present in the area of such proposed action" for any project that is conducted, permitted, funded, or licensed by any Federal agency. A letter from the local office and a species list which fulfills this requirement can only be obtained by requesting an official species list from either the Regulatory Review section in IPaC (see directions below) or from the local field office directly.

For project evaluations that require USFWS concurrence/review, please return to the IPaC website and request an official species list by doing the following:

1. Draw the project location and click CONTINUE.
2. Click DEFINE PROJECT.
3. Log in (if directed to do so).
4. Provide a name and description for your project.
5. Click REQUEST SPECIES LIST.

Listed species¹ and their critical habitats are managed by the Ecological Services Program of the U.S. Fish and Wildlife Service (USFWS) and the fisheries division of the National Oceanic and Atmospheric Administration (NOAA Fisheries²).

Species and critical habitats under the sole responsibility of NOAA Fisheries are not shown on this list. Please contact NOAA Fisheries for species under their jurisdiction.

1. Species listed under the Endangered Species Act are threatened or endangered; IPaC also shows species that are candidates, or proposed, for listing. See the listing status page for more information.
2. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

The following species are potentially affected by activities in this location:

Reptiles

NAME	STATUS
Puerto Rican Boa <i>Epicrates inornatus</i> No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/6628	Endangered

Critical habitats

Potential effects to critical habitat(s) in this location must be analyzed along with the endangered species themselves.

THERE ARE NO CRITICAL HABITATS AT THIS LOCATION.

Migratory birds

Certain birds are protected under the Migratory Bird Treaty Act¹ and the Bald and Golden Eagle Protection Act².

Any person or organization who plans or conducts activities that may result in impacts to migratory birds, eagles, and their habitats should follow appropriate regulations and consider implementing appropriate conservation measures, as described below.

1. The Migratory Birds Treaty Act of 1918.
2. The Bald and Golden Eagle Protection Act of 1940.

Additional information can be found using the following links:

- Birds of Conservation Concern <http://www.fws.gov/birds/management/managed-species/birds-of-conservation-concern.php>
- Measures for avoiding and minimizing impacts to birds <http://www.fws.gov/birds/management/project-assessment-tools-and-guidance/conservation-measures.php>
- Nationwide conservation measures for birds <http://www.fws.gov/migratorybirds/pdf/management/nationwidestandardconservationmeasures.pdf>

The birds listed below are birds of particular concern either because they occur on the [USFWS Birds of Conservation Concern \(BCC\)](#) list or warrant special attention in your project location. To learn more about the levels of concern for birds on your list and how this list is generated, see the [FAQ below](#). This is not a list of every bird you may find in this location, nor a guarantee that every bird on this list will be found in your project area. To see exact locations of where birders and the general public have sighted birds in and around your project area, visit the [E-bird data mapping tool](#) (Tip: enter your location, desired date range and a species on your list). For projects that occur off the Atlantic Coast, additional maps and models detailing the relative occurrence and abundance of bird species on your list are available. Links to additional information about Atlantic Coast birds, and other important information about your migratory bird list, including how to properly interpret and use your migratory bird report, can be found [below](#).

For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to migratory birds on your list, click on the **PROBABILITY OF PRESENCE SUMMARY** at the top of your list to see when these birds are most likely to be present and breeding in your project area.

NAME	BREEDING SEASON (IF A BREEDING SEASON IS INDICATED FOR A BIRD ON YOUR LIST, THE BIRD MAY BREED IN YOUR PROJECT AREA SOMETIME WITHIN THE TIMEFRAME SPECIFIED, WHICH IS A VERY LIBERAL ESTIMATE OF THE DATES INSIDE WHICH THE BIRD BREEDS ACROSS ITS ENTIRE RANGE. "BREEDS ELSEWHERE" INDICATES THAT THE BIRD DOES NOT LIKELY BREED IN YOUR PROJECT AREA.)
Antillean Mango <i>Anthracoceros dominicus</i> This is a Bird of Conservation Concern (BCC) throughout its range in Puerto Rico and the Virgin Islands.	Breeds Mar 1 to Aug 20
Mangrove Cuckoo <i>Coccyzus minor</i> This is a Bird of Conservation Concern (BCC) throughout its range in Puerto Rico and the Virgin Islands.	Breeds Apr 20 to Aug 20
Puerto Rican Screech-owl <i>Megascops nudipes newtoni</i> This is a Bird of Conservation Concern (BCC) throughout its range in Puerto Rico and the Virgin Islands.	Breeds Apr 1 to Jun 30
Puerto Rican Vireo <i>Vireo latimeri</i> This is a Bird of Conservation Concern (BCC) throughout its range in Puerto Rico and the Virgin Islands.	Breeds Apr 8 to Aug 1
Short-billed Dowitcher <i>Limnodromus griseus</i> This is a Bird of Conservation Concern (BCC) throughout its range in Puerto Rico and the Virgin Islands. https://ecos.fws.gov/ecp/species/9480	Breeds elsewhere
White-crowned Pigeon , <i>Patagioenas leucocephala</i> This is a Bird of Conservation Concern (BCC) throughout its range in Puerto Rico and the Virgin Islands. https://ecos.fws.gov/ecp/species/4047	Breeds May 1 to Sep 30

Probability of Presence Summary

The graphs below provide our best understanding of when birds of concern are most likely to be present in your project area. This information can be used to tailor and schedule your project activities to avoid or minimize impacts to birds. Please make sure you read and understand the [FAQ "Proper Interpretation and Use of Your Migratory Bird Report"](#) before using or attempting to interpret this report.

Probability of Presence (☺)

Each green bar represents the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during a particular week of the year. (A year is represented as 12 4-week months.) A taller bar indicates a higher probability of species presence. The survey effort (see below) can be used to establish a level of confidence in the presence score. One can have higher confidence in the presence score if the corresponding survey effort is also high.

How is the probability of presence score calculated? The calculation is done in three steps:

1. The probability of presence for each week is calculated as the number of survey events in the week where the species was detected divided by the total number of survey events for that week. For example, if in week 12 there were 20 survey events and the Spotted Towhee was found in 5 of them, the probability of presence of the Spotted Towhee in week 12 is 0.25.
2. To properly present the pattern of presence across the year, the relative probability of presence is calculated. This is the probability of presence divided by the maximum probability of presence across all weeks. For example, imagine the probability of presence in week 20 for the Spotted Towhee is 0.05, and that the probability of presence at week 12 (0.25) is the maximum of any week of the year. The relative probability of presence on week 12 is $0.25/0.25 = 1$; at week 20 it is $0.05/0.25 = 0.2$.
3. The relative probability of presence calculated in the previous step undergoes a statistical conversion so that all possible values fall between 0 and 10, inclusive. This is the probability of presence score.

To see a bar's probability of presence score, simply hover your mouse cursor over the bar.

Breeding Season (🌱)

Yellow bars denote a very liberal estimate of the time-frame inside which the bird breeds across its entire range. If there are no yellow bars shown for a bird, it does not breed in your project area.

Survey Effort (📊)

Vertical black lines superimposed on probability of presence bars indicate the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps. The number of surveys is expressed as a range, for example, 33 to 64 surveys.

To see a bar's survey effort range, simply hover your mouse cursor over the bar.

No Data (—)

A week is marked as having no data if there were no survey events for that week.

Survey Timeframe

Surveys from only the last 10 years are used in order to ensure delivery of currently relevant information. The exception to this is areas off the Atlantic coast, where bird returns are based on all years of available data, since data in these areas is currently much more sparse.



Tell me more about conservation measures I can implement to avoid or minimize impacts to migratory birds.

Nationwide Conservation Measures describes measures that can help avoid and minimize impacts to all birds at any location year round. Implementation of these measures is particularly important when birds are most likely to occur in the project area. When birds may be breeding in the area, identifying the locations of any active nests and avoiding their destruction is a very helpful impact minimization measure. To see when birds are most likely to occur and be breeding in your project area, view the Probability of Presence Summary. Additional measures and/or permits may be advisable depending on the type of activity you are conducting and the type of infrastructure or bird species present on your project site.

What does IPaC use to generate the migratory birds potentially occurring in my specified location?

The Migratory Bird Resource List is comprised of USFWS Birds of Conservation Concern (BCC) and other species that may warrant special attention in your project location.

The migratory bird list generated for your project is derived from data provided by the Avian Knowledge Network (AKN). The AKN data is based on a growing collection of survey, banding, and citizen science datasets and is queried and filtered to return a list of those birds reported as occurring in the 10km grid cell(s) which your project intersects, and that have been identified as warranting special attention because they are a BCC species in that area, an eagle (Eagle Act requirements may apply), or a species that has a particular vulnerability to offshore activities or development.

Again, the Migratory Bird Resource list includes only a subset of birds that may occur in your project area. It is not representative of all birds that may occur in your project area. To get a list of all birds potentially present in your project area, please visit the AKN Phenology Tool.

What does IPaC use to generate the probability of presence graphs for the migratory birds potentially occurring in my specified location?

The probability of presence graphs associated with your migratory bird list are based on data provided by the Avian Knowledge Network (AKN). This data is derived from a growing collection of survey, banding, and citizen science datasets.

Probability of presence data is continuously being updated as new and better information becomes available. To learn more about how the probability of presence graphs are produced and how to interpret them, go the Probability of Presence Summary and then click on the "Tell me about these graphs" link.

How do I know if a bird is breeding, wintering, migrating or present year-round in my project area?

To see what part of a particular bird's range your project area falls within (i.e. breeding, wintering, migrating or year-round), you may refer to the following resources: [The Cornell Lab of Ornithology All About Birds Bird Guide](#), or (if you are unsuccessful in locating the bird of interest there), the [Cornell Lab of Ornithology Neotropical Birds guide](#). If a bird on your migratory bird species list has a breeding season associated with it, if that bird does occur in your project area, there may be nests present at some point within the timeframe specified. If "Breeds elsewhere" is indicated, then the bird likely does not breed in your project area.

What are the levels of concern for migratory birds?

Migratory birds delivered through IPaC fall into the following distinct categories of concern:

1. "BCC Rangewide" birds are [Birds of Conservation Concern](#) (BCC) that are of concern throughout their range anywhere within the USA (including Hawaii, the Pacific Islands, Puerto Rico, and the Virgin Islands);
2. "BCC - BCR" birds are BCCs that are of concern only in particular Bird Conservation Regions (BCRs) in the continental USA; and
3. "Non-BCC - Vulnerable" birds are not BCC species in your project area, but appear on your list either because of the [Eagle Act](#) requirements (for eagles) or (for non-eagles) potential susceptibilities in offshore areas from certain types of development or activities (e.g. offshore energy development or longline fishing).

Although it is important to try to avoid and minimize impacts to all birds, efforts should be made, in particular, to avoid and minimize impacts to the birds on this list, especially eagles and BCC species of rangewide concern. For more information on conservation measures you can implement to help avoid and minimize migratory bird impacts and requirements for eagles, please see the FAQs for these topics.

Details about birds that are potentially affected by offshore projects

For additional details about the relative occurrence and abundance of both individual bird species and groups of bird species within your project area off the Atlantic Coast, please visit the [Northeast Ocean Data Portal](#). The Portal also offers data and information about other taxa besides birds that may be helpful to you in your project review. Alternately, you may download the bird model results files underlying the portal maps through the [NOAA NCCOS Integrative Statistical Modelling and Predictive Mapping of Marine Bird Distributions and Abundance on the Atlantic Outer Continental Shelf](#) project webpage.

Bird tracking data can also provide additional details about occurrence and habitat use throughout the year, including migration. Models relying on survey data may not include this information. For additional information on marine bird tracking data, see the [Diving Bird Study](#) and the [nanotag studies](#) or contact [Caleb Spiegel](#) or [Pam Loring](#).

What if I have eagles on my list?

If your project has the potential to disturb or kill eagles, you may need to [obtain a permit](#) to avoid violating the Eagle Act should such impacts occur.

Proper Interpretation and Use of Your Migratory Bird Report

The migratory bird list generated is not a list of all birds in your project area, only a subset of birds of priority concern. To learn more about how your list is generated, and see options for identifying what other birds may be in your project area, please see the FAQ "What does IPaC use to generate the migratory birds potentially occurring in my specified location". Please be aware this report provides the "probability of presence" of birds within the 10 km grid cell(s) that overlap your project, not your exact project footprint. On the graphs provided, please also look carefully at the survey effort (indicated by the black vertical bar) and for the existence of the "no data" indicator (a red horizontal bar). A high survey effort is the key component. If the survey effort is high, then the probability of presence score can be viewed as more dependable. In contrast, a low survey effort bar or no data bar means a lack of data and, therefore, a lack of certainty about presence of the species. This list is not perfect; it is simply a starting point for identifying what birds of concern have the potential to be in your project area, when they might be there, and if they might be breeding (which means nests might be present). The list helps you know what to look for to confirm presence, and helps guide you in knowing when to implement conservation measures to avoid or minimize potential impacts from your project activities, should presence be confirmed. To learn more about conservation measures, visit the FAQ "Tell me about conservation measures I can implement to avoid or minimize impacts to migratory birds" at the bottom of your migratory bird trust resources page.

Facilities

National Wildlife Refuge lands

Any activity proposed on lands managed by the [National Wildlife Refuge](#) system must undergo a 'Compatibility Determination' conducted by the Refuge. Please contact the individual Refuges to discuss any questions or concerns.

THERE ARE NO REFUGE LANDS AT THIS LOCATION.

Fish hatcheries

THERE ARE NO FISH HATCHERIES AT THIS LOCATION.

Wetlands in the National Wetlands Inventory

Impacts to [NWI wetlands](#) and other aquatic habitats may be subject to regulation under Section 404 of the Clean Water Act, or other State/Federal statutes.

For more information please contact the Regulatory Program of the local [U.S. Army Corps of Engineers District](#).

THERE ARE NO KNOWN WETLANDS AT THIS LOCATION.

Data limitations

The Service's objective of mapping wetlands and deepwater habitats is to produce reconnaissance level information on the location, type and size of these resources. The maps are prepared from the analysis of high altitude imagery. Wetlands are identified based on vegetation, visible hydrology and geography. A margin of error is inherent in the use of imagery; thus, detailed on-the-ground inspection of any particular site may result in revision of the wetland boundaries or classification established through image analysis.

The accuracy of Image Interpretation depends on the quality of the imagery, the experience of the image analysts, the amount and quality of the collateral data and the amount of ground truth verification work conducted. Metadata should be consulted to determine the date of the source imagery used and any mapping problems.

Wetlands or other mapped features may have changed since the date of the imagery or field work. There may be occasional differences in polygon boundaries or classifications between the information depicted on the map and the actual conditions on site.

Data exclusions

Certain wetland habitats are excluded from the National mapping program because of the limitations of aerial imagery as the primary data source used to detect wetlands. These habitats include seagrasses or submerged aquatic vegetation that are found in the intertidal and subtidal zones of estuaries and nearshore coastal waters. Some deepwater reef communities (coral or tubercid worm reefs) have also been excluded from the inventory. These habitats, because of their depth, go undetected by aerial imagery.

Data precautions

Federal, state, and local regulatory agencies with jurisdiction over wetlands may define and describe wetlands in a different manner than that used in this inventory. There is no attempt, in either the design or products of this inventory, to define the limits of proprietary jurisdiction of any Federal, state, or local government or to establish the geographical scope of the regulatory programs of government agencies. Persons intending to engage in activities involving modifications within or adjacent to wetland areas should seek the advice of appropriate federal, state, or local agencies concerning specified agency regulatory programs and proprietary jurisdictions that may affect such activities.

NOT FOR CONSULTATION

IPaC resource list

This report is an automatically generated list of species and other resources such as critical habitat (collectively referred to as *trust resources*) under the U.S. Fish and Wildlife Service's (USFWS) jurisdiction that are known or expected to be on or near the project area referenced below. The list may also include trust resources that occur outside of the project area, but that could potentially be directly or indirectly affected by activities in the project area. However, determining the likelihood and extent of effects a project may have on trust resources typically requires gathering additional site-specific (e.g., vegetation/species surveys) and project-specific (e.g., magnitude and timing of proposed activities) information.

Below is a summary of the project information you provided and contact information for the USFWS office(s) with jurisdiction in the defined project area. Please read the introduction to each section that follows (Endangered Species, Migratory Birds, USFWS Facilities, and NWI Wetlands) for additional information applicable to the trust resources addressed in that section.

Location

Guayama County, Puerto Rico



Local office

Caribbean Ecological Services Field Office

☎ (787) 851-7297

📠 (787) 851-7440

MAILING ADDRESS

Post Office Box 491,
Boqueron, PR 00622-0491

PHYSICAL ADDRESS

Carr. 301, Km 5.1, Bo Corozo
Boqueron, PR 00622-0510

<http://www.fws.gov/caribbean/es>

Endangered species

This resource list is for informational purposes only and does not constitute an analysis of project level impacts.

The primary information used to generate this list is the known or expected range of each species. Additional areas of influence (AOI) for species are also considered. An AOI includes areas outside of the species range if the species could be indirectly affected by activities in that area (e.g., placing a dam upstream of a fish population, even if that fish does not occur at the dam site, may indirectly impact the species by reducing or eliminating water flow downstream). Because species can move, and site conditions can change, the species on this list are not guaranteed to be found on or near the project area. To fully determine any potential effects to species, additional site-specific and project-specific information is often required.

Section 7 of the Endangered Species Act requires Federal agencies to "request of the Secretary information whether any species which is listed or proposed to be listed may be present in the area of such proposed action" for any project that is conducted, permitted, funded, or licensed by any Federal agency. A letter from the local office and a species list which fulfills this requirement can only be obtained by requesting an official species list from either the Regulatory Review section in IPaC (see directions below) or from the local field office directly.

For project evaluations that require USFWS concurrence/review, please return to the IPaC website and request an official species list by doing the following:

1. Draw the project location and click CONTINUE.
2. Click DEFINE PROJECT.
3. Log in (if directed to do so).
4. Provide a name and description for your project.
5. Click REQUEST SPECIES LIST.

Listed species¹ and their critical habitats are managed by the Ecological Services Program of the U.S. Fish and Wildlife Service (USFWS) and the fisheries division of the National Oceanic and Atmospheric Administration (NOAA Fisheries²).

Species and critical habitats under the sole responsibility of NOAA Fisheries are not shown on this list. Please contact NOAA Fisheries for species under their jurisdiction.

1. Species listed under the Endangered Species Act are threatened or endangered; IPaC also shows species that are candidates, or proposed, for listing. See the listing status page for more information.
2. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

The following species are potentially affected by activities in this location:

Birds

NAME	STATUS
Puerto Rican Broad-winged Hawk <i>Buteo platypterus brunnescens</i> No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/5512	Endangered
Puerto Rican Sharp-shinned Hawk <i>Accipiter striatus venator</i> No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/604	Endangered

Reptiles

NAME	STATUS
Puerto Rican Boa <i>Epicrates inornatus</i> No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/6628	Endangered

Critical habitats

Potential effects to critical habitat(s) in this location must be analyzed along with the endangered species themselves.

THERE ARE NO CRITICAL HABITATS AT THIS LOCATION.

Migratory birds

Certain birds are protected under the Migratory Bird Treaty Act¹ and the Bald and Golden Eagle Protection Act².

Any person or organization who plans or conducts activities that may result in impacts to migratory birds, eagles, and their habitats should follow appropriate regulations and consider implementing appropriate conservation measures, as described below.

1. The [Migratory Birds Treaty Act](#) of 1918.
2. The [Bald and Golden Eagle Protection Act](#) of 1940.

Additional information can be found using the following links:

- Birds of Conservation Concern <http://www.fws.gov/birds/management/managed-species/birds-of-conservation-concern.php>
- Measures for avoiding and minimizing impacts to birds <http://www.fws.gov/birds/management/project-assessment-tools-and-guidance/conservation-measures.php>
- Nationwide conservation measures for birds <http://www.fws.gov/migratorybirds/pdf/management/nationwidestandardconservationmeasures.pdf>

The birds listed below are birds of particular concern either because they occur on the [USFWS Birds of Conservation Concern \(BCC\)](#) list or warrant special attention in your project location. To learn more about the levels of concern for birds on your list and how this list is generated, see the [FAQ below](#). This is not a list of every bird you may find in this location, nor a guarantee that every bird on this list will be found in your project area. To see exact locations of where birders and the general public have sighted birds in and around your project area, visit the [E-bird data mapping tool](#) (Tip: enter your location, desired date range and a species on your list). For projects that occur off the Atlantic Coast, additional maps and models detailing the relative occurrence and abundance of bird species on your list are available. Links to additional information about Atlantic Coast birds, and other important information about your migratory bird list, including how to properly interpret and use your migratory bird report, can be found [below](#).

For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to migratory birds on your list, click on the [PROBABILITY OF PRESENCE SUMMARY](#) at the top of your list to see when these birds are most likely to be present and breeding in your project area.

NAME	BREEDING SEASON (IF A BREEDING SEASON IS INDICATED FOR A BIRD ON YOUR LIST, THE BIRD MAY BREED IN YOUR PROJECT AREA SOMETIME WITHIN THE TIMEFRAME SPECIFIED, WHICH IS A VERY LIBERAL ESTIMATE OF THE DATES INSIDE WHICH THE BIRD BREEDS ACROSS ITS ENTIRE RANGE. "BREEDS ELSEWHERE" INDICATES THAT THE BIRD DOES NOT LIKELY BREED IN YOUR PROJECT AREA.)
Antillean Mango <i>Anthracothorax dominicus</i> This is a Bird of Conservation Concern (BCC) throughout its range in Puerto Rico and the Virgin Islands.	Breeds Mar 1 to Aug 20
Cape May Warbler <i>Setophaga tigrina</i> This is a Bird of Conservation Concern (BCC) throughout its range in Puerto Rico and the Virgin Islands.	Breeds elsewhere
Mangrove Cuckoo <i>Coccyzus minor</i> This is a Bird of Conservation Concern (BCC) throughout its range in Puerto Rico and the Virgin Islands.	Breeds Apr 20 to Aug 20
Puerto Rican Screech-owl <i>Megascops nudipes newtoni</i> This is a Bird of Conservation Concern (BCC) throughout its range in Puerto Rico and the Virgin Islands.	Breeds Apr 1 to Jun 30
Puerto Rican Vireo <i>Vireo latimeri</i> This is a Bird of Conservation Concern (BCC) throughout its range in Puerto Rico and the Virgin Islands.	Breeds Apr 8 to Aug 1

Probability of Presence Summary

The graphs below provide our best understanding of when birds of concern are most likely to be present in your project area. This information can be used to tailor and schedule your project activities to avoid or minimize impacts to birds. Please make sure you read and understand the [FAQ "Proper Interpretation and Use of Your Migratory Bird Report"](#) before using or attempting to interpret this report.

Probability of Presence (■)

Each green bar represents the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during a particular week of the year. (A year is represented as 12 4-week months.) A taller bar indicates a higher probability of species presence. The survey effort (see below) can be used to establish a level of confidence in the presence score. One can have higher confidence in the presence score if the corresponding survey effort is also high.

How is the probability of presence score calculated? The calculation is done in three steps:

1. The probability of presence for each week is calculated as the number of survey events in the week where the species was detected divided by the total number of survey events for that week. For example, if in week 12 there were 20 survey events and the Spotted Towhee was found in 5 of them, the probability of presence of the Spotted Towhee in week 12 is 0.25.

- To properly present the pattern of presence across the year, the relative probability of presence is calculated. This is the probability of presence divided by the maximum probability of presence across all weeks. For example, imagine the probability of presence in week 20 for the Spotted Towhee is 0.05, and that the probability of presence at week 12 (0.25) is the maximum of any week of the year. The relative probability of presence on week 12 is $0.25/0.25 = 1$; at week 20 it is $0.05/0.25 = 0.2$.
- The relative probability of presence calculated in the previous step undergoes a statistical conversion so that all possible values fall between 0 and 10, inclusive. This is the probability of presence score.

To see a bar's probability of presence score, simply hover your mouse cursor over the bar.

Breeding Season (■)

Yellow bars denote a very liberal estimate of the time-frame inside which the bird breeds across its entire range. If there are no yellow bars shown for a bird, it does not breed in your project area.

Survey Effort (|)

Vertical black lines superimposed on probability of presence bars indicate the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps. The number of surveys is expressed as a range, for example, 33 to 64 surveys.

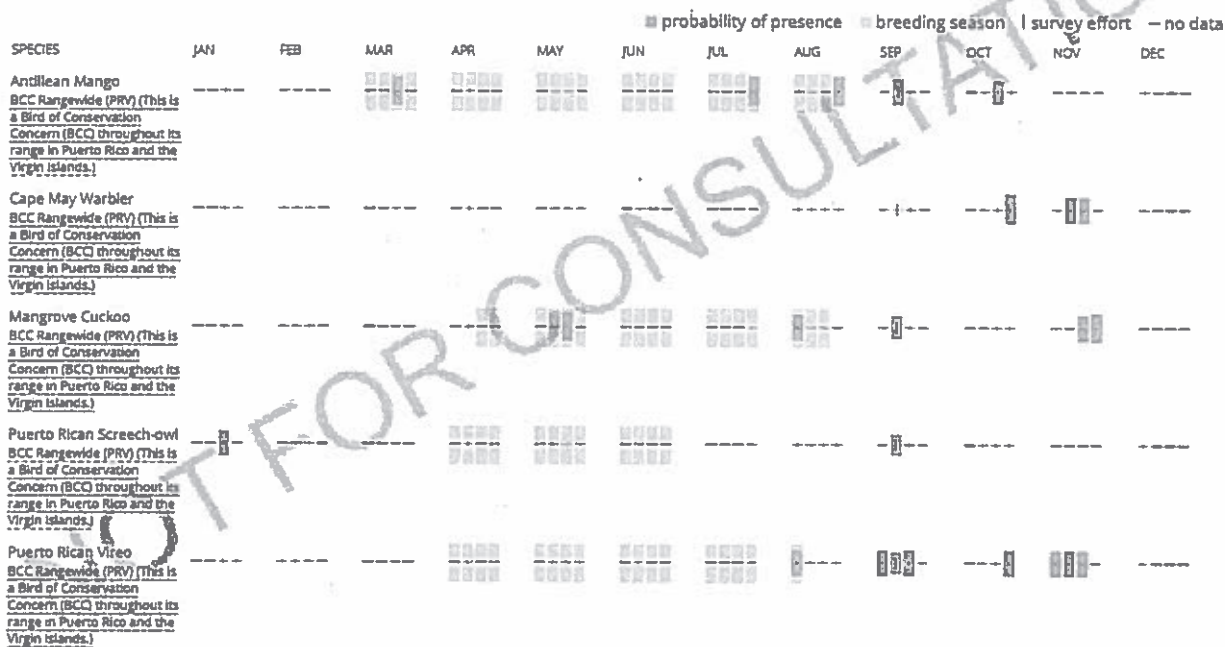
To see a bar's survey effort range, simply hover your mouse cursor over the bar.

No Data (—)

A week is marked as having no data if there were no survey events for that week.

Survey Timeframe

Surveys from only the last 10 years are used in order to ensure delivery of currently relevant information. The exception to this is areas off the Atlantic coast, where bird returns are based on all years of available data, since data in these areas is currently much more sparse.



Tell me more about conservation measures I can implement to avoid or minimize impacts to migratory birds.

[Nationwide Conservation Measures](#) describes measures that can help avoid and minimize impacts to all birds at any location year round. Implementation of these measures is particularly important when birds are most likely to occur in the project area. When birds may be breeding in the area, identifying the locations of any active nests and avoiding their destruction is a very helpful impact minimization measure. To see when birds are most likely to occur and be breeding in your project area, view the [Probability of Presence Summary](#). [Additional measures](#) and/or [permits](#) may be advisable depending on the type of activity you are conducting and the type of infrastructure or bird species present on your project site.

What does iPaC use to generate the migratory birds potentially occurring in my specified location?

The Migratory Bird Resource List is comprised of USFWS [Birds of Conservation Concern \(BCC\)](#) and other species that may warrant special attention in your project location.

The migratory bird list generated for your project is derived from data provided by the [Avian Knowledge Network \(AKN\)](#). The AKN data is based on a growing collection of [survey, banding, and citizen science datasets](#) and is queried and filtered to return a list of those birds reported as occurring in the 10km grid cell(s) which your project intersects, and that have been identified as warranting special attention because they are a BCC species in that area, an eagle ([Eagle Act](#) requirements may apply), or a species that has a particular vulnerability to offshore activities or development.

Again, the Migratory Bird Resource list includes only a subset of birds that may occur in your project area. It is not representative of all birds that may occur in your project area. To get a list of all birds potentially present in your project area, please visit the [AKN Phenology Tool](#).

What does iPaC use to generate the probability of presence graphs for the migratory birds potentially occurring in my specified location?

The probability of presence graphs associated with your migratory bird list are based on data provided by the [Avian Knowledge Network \(AKN\)](#). This data is derived from a growing collection of [survey, banding, and citizen science datasets](#).

Probability of presence data is continuously being updated as new and better information becomes available. To learn more about how the probability of presence graphs are produced and how to interpret them, go the [Probability of Presence Summary](#) and then click on the "Tell me about these graphs" link.

How do I know if a bird is breeding, wintering, migrating or present year-round in my project area?

To see what part of a particular bird's range your project area falls within (i.e. breeding, wintering, migrating or year-round), you may refer to the following resources: [The Cornell Lab of Ornithology All About Birds Bird Guide](#), or (if you are unsuccessful in locating the bird of interest there), the [Cornell Lab of Ornithology Neotropical Birds guide](#). If a bird on your migratory bird species list has a breeding season associated with it, if that bird does occur in your project area, there may be nests present at some point within the timeframe specified. If "Breeds elsewhere" is indicated, then the bird likely does not breed in your project area.

What are the levels of concern for migratory birds?

Migratory birds delivered through IPaC fall into the following distinct categories of concern:

1. "BCC Rangewide" birds are [Birds of Conservation Concern](#) (BCC) that are of concern throughout their range anywhere within the USA (including Hawaii, the Pacific Islands, Puerto Rico, and the Virgin Islands);
2. "BCC - BCR" birds are BCCs that are of concern only in particular Bird Conservation Regions (BCRs) in the continental USA; and
3. "Non-BCC - Vulnerable" birds are not BCC species in your project area, but appear on your list either because of the [Eagle Act](#) requirements (for eagles) or (for non-eagles) potential susceptibilities in offshore areas from certain types of development or activities (e.g. offshore energy development or longline fishing).

Although it is important to try to avoid and minimize impacts to all birds, efforts should be made, in particular, to avoid and minimize impacts to the birds on this list, especially eagles and BCC species of rangewide concern. For more information on conservation measures you can implement to help avoid and minimize migratory bird impacts and requirements for eagles, please see the FAQs for these topics.

Details about birds that are potentially affected by offshore projects

For additional details about the relative occurrence and abundance of both individual bird species and groups of bird species within your project area off the Atlantic Coast, please visit the [Northeast Ocean Data Portal](#). The Portal also offers data and information about other taxa besides birds that may be helpful to you in your project review. Alternately, you may download the bird model results files underlying the portal maps through the [NOAA NCCOS Integrative Statistical Modeling and Predictive Mapping of Marine Bird Distributions and Abundance on the Atlantic Outer Continental Shelf](#) project webpage.

Bird tracking data can also provide additional details about occurrence and habitat use throughout the year, including migration. Models relying on survey data may not include this information. For additional information on marine bird tracking data, see the [Diving Bird Study](#) and the [nanotag studies](#) or contact [Caleb Spiegel](#) or [Pam Loring](#).

What if I have eagles on my list?

If your project has the potential to disturb or kill eagles, you may need to [obtain a permit](#) to avoid violating the Eagle Act should such impacts occur.

Proper Interpretation and Use of Your Migratory Bird Report

The migratory bird list generated is not a list of all birds in your project area, only a subset of birds of priority concern. To learn more about how your list is generated, and see options for identifying what other birds may be in your project area, please see the FAQ "What does IPaC use to generate the migratory birds potentially occurring in my specified location". Please be aware this report provides the "probability of presence" of birds within the 10 km grid cell(s) that overlap your project; not your exact project footprint. On the graphs provided, please also look carefully at the survey effort (indicated by the black vertical bar) and for the existence of the "no data" indicator (a red horizontal bar). A high survey effort is the key component. If the survey effort is high, then the probability of presence score can be viewed as more dependable. In contrast, a low survey effort bar or no data bar means a lack of data and, therefore, a lack of certainty about presence of the species. This list is not perfect; it is simply a starting point for identifying what birds of concern have the potential to be in your project area, when they might be there, and if they might be breeding (which means nests might be present). The list helps you know what to look for to confirm presence, and helps guide you in knowing when to implement conservation measures to avoid or minimize potential impacts from your project activities, should presence be confirmed. To learn more about conservation measures, visit the FAQ "Tell me about conservation measures I can implement to avoid or minimize impacts to migratory birds" at the bottom of your migratory bird trust resources page.

Facilities

National Wildlife Refuge lands

Any activity proposed on lands managed by the [National Wildlife Refuge](#) system must undergo a "Compatibility Determination" conducted by the Refuge. Please contact the individual Refuges to discuss any questions or concerns.

THERE ARE NO REFUGE LANDS AT THIS LOCATION.

Fish hatcheries

THERE ARE NO FISH HATCHERIES AT THIS LOCATION.

Wetlands in the National Wetlands Inventory

Impacts to [NWI wetlands](#) and other aquatic habitats may be subject to regulation under Section 404 of the Clean Water Act, or other State/Federal statutes.

For more information please contact the Regulatory Program of the local [U.S. Army Corps of Engineers District](#).

THERE ARE NO KNOWN WETLANDS AT THIS LOCATION.

Data limitations

The Service's objective of mapping wetlands and deepwater habitats is to produce reconnaissance level information on the location, type and size of these resources. The maps are prepared from the analysis of high altitude imagery. Wetlands are identified based on vegetation, visible hydrology and geography. A margin of error is inherent in the use of imagery; thus, detailed on-the-ground inspection of any particular site may result in revision of the wetland boundaries or classification established through image analysis.

The accuracy of image interpretation depends on the quality of the imagery, the experience of the image analysts, the amount and quality of the collateral data and the amount of ground truth verification work conducted. Metadata should be consulted to determine the date of the source imagery used and any mapping problems.

Wetlands or other mapped features may have changed since the date of the imagery or field work. There may be occasional differences in polygon boundaries or classifications between the information depicted on the map and the actual conditions on site.

Data exclusions

Certain wetland habitats are excluded from the National mapping program because of the limitations of aerial imagery as the primary data source used to detect wetlands. These habitats include seagrasses or submerged aquatic vegetation that are found in the intertidal and subtidal zones of estuaries and nearshore coastal waters. Some deepwater reef communities (coral or tubercled worm reefs) have also been excluded from the inventory. These habitats, because of their depth, go undetected by aerial imagery.

Data precautions

Federal, state, and local regulatory agencies with jurisdiction over wetlands may define and describe wetlands in a different manner than that used in this inventory. There is no attempt, in either the design or products of this inventory, to define the limits of proprietary jurisdiction of any Federal, state, or local government or to establish the geographical scope of the regulatory programs of government agencies. Persons intending to engage in activities involving modifications within or adjacent to wetland areas should seek the advice of appropriate federal, state, or local agencies concerning specified agency regulatory programs and proprietary jurisdictions that may affect such activities.

NOT FOR CONSULTATION

Appendix F – Categorical Exclusion Checklist

PUERTO RICO DEPARTMENT OF TRANSPORTATION AND PUBLIC WORKS

PUERTO RICO HIGHWAY AND TRANSPORTATION AUTHORITY
 ENVIRONMENTAL STUDIES OFFICE
 Categorical Exclusion Check List

Description: Emergency Relief Program
 Project No.: AC-811544

Route No.: PR-722, Km. 5.7
 Location: Aibonito

Study Areas	Effect		Comments / Environmental Commitments
	None	Possible	
1. Aesthetics	X		The proposed project will have no impact on the site's aesthetics.
2. Air Quality		X	The proposed project is not expected to have an impact on existing air quality levels. A temporary degradation of existing air quality levels may be expected during construction.
3. Alternative Routes		X	The proposed project will require full road closure to complete the landslide repairs due to horizontal alignment. Traffic will be rerouted through PR-162. A MOT has been prepared for the project. Farmer and community outreaches will be required to inform the community of temporary traffic patterns during construction.
4. Channel Works	X		There are no channel works as part of the proposed project.
5. Economic Activity		X	No negative impact to the economic activity along the corridor is expected. Positive impacts are expected due to the creation of direct and indirect jobs during the construction of the proposed project.
6. Prime and Unique Farmland		X	The site is bounded to the north by a poultry farm. The buildings where the animals are is distant to the working area.
7. Fish and Wildlife		X	According to the U.S. Fish & Wildlife Service IPaC webpage, the project's location is not a critical habitat for the Puerto Rican Boa (<i>Epicrates inornatus</i>). Conservation protocol of the species would be implemented during construction.

Emergency Relief Program
 Project: ER-HWY-452
 PR-865, Km. 0.9
 Toa Baja, PR

8. Historic and Archaeological (Section 106 Concurrence)	X		A Phase IA Archaeological Study was completed for the project and no historic properties or archaeological sites were found. If unexpected cultural resources are encountered at any within the project area, work shall cease in the immediate vicinity of such discoveries and SHPO shall be notified.
9. Joint Development	X		Not applicable.
10. Multiple Use of Space	X		Not applicable.
11. Community Cohesion	X		The proposed project will not have any impact in the community cohesion of the adjacent neighborhoods.
12. Environmental Justice	X		The proposed project will not have a disproportionately high and adverse human health and environmental effect on any minority or low-income population.
13. Relocation of Families, Businesses, and Non-Profit Organizations	X		The proposed project will not require the relocation of families, businesses, or non-profit organizations.
14. Right-of-Way Acquisition		X	The proposed project will require the acquisition of approximately 86 square meters of additional right of way for the installation of a rip-rap at the storm sewer's discharge point.
15. Noise Impact		X	The proposed project is not expected to have any impacts in existing noise levels during operation. A temporary increase in noise levels may result from construction work.
16. Public Health and Safety		X	The proposed project will positively impact public health and safety.
17. Public Involvement		X	Community outreach will be performed to inform communities and farmers of the closure of PR-722 at the site's location during construction. The public will be notified through newspapers, flyers, social media, PRHTA's webpage, radio, and others.

Emergency Relief Program
 Project: ER-HWY-452
 PR-865, Km. 0.9
 Toa Baja, PR

18. Public Transportation and Other Modes		X	The proposed project will require full road closure to complete the landslide repairs due to horizontal alignment. Traffic will be rerouted through PR-162. A MOT has been prepared for the project. Coordination with the farmers, public and agencies will be required to inform them of temporary traffic patterns during construction.
19. Recreational and 4(f) Lands	X		The proposed project will not negatively affect any publicly owned parks, recreational areas, wildlife and waterfowl refuges, or public and private historical sites.
20. School Areas	X		No school areas will be affected by the proposed project.
21. Tax Base Effects and Property Values	X		The proposed project is not expected to have a negative effect in the tax base and property values.
22. Water Quality		X	No water bodies will be affected by the project. The Aibonito River is located to the southwest of the site, at an approximate horizontal distance of 200 meters. For erosion and sediment control (E&SC) in the project area, our Agency will require the authorization to prepare and implement an Incidental Unique Permit (PUI, for its Spanish acronym) and National Pollutant Discharge Elimination System (NPDES) permit, if required. The project's Contractor will also be required to comply the E&SC plans and specifications prepared for the project, and any other applicable regulations
23. Wetlands	X		Not wetlands are in the project area.
24. Coastal Zone	X		The project is located in the central mountains of the Island and no water bodies will be affected by it.
25. Flood Plains	X		The proposed project will not require the modification of any existing floodway and is not located within any floodplain.

Emergency Relief Program
 Project: ER-HWY-452
 PR-865, Km. 0.9
 Toa Baja, PR

26. Sole Source Aquifer	X		No aquifer will be negatively affected.
27. Energy	X		Not applicable.
28. Hazardous Waste	X		There are no hazardous wastes within the project or sites listed on the EPA's National Priorities List (NPL). Our Agency will require the project's Contractor to prepare the Solid Wastes Generated Permit (DS-3).
29. Cumulative Impacts	X		No cumulative impacts are expected due to the proposed projects.
30. 30. USGS Permit and other permits required	X		No USGS permit will be required for the proposed project.

Other Comments:



GOVERNMENT OF PUERTO RICO
STATE HISTORIC PRESERVATION OFFICE

Executive Director | Carlos A. Rubio-Cancela | carubio@prshpo.pr.gov

April 23, 2021

Luis E. Rodríguez Rosa

Deputy Executive Director
Puerto Rico Highway and Transportation Authority
PO Box 42007
San Juan, PR 00940-2007

SHPO: 06-20-19-03 EMERGENCY WORKS ON VARIOUS ROADWAYS DUE TO HURRICANES IRMA AND MARÍA, LANDSLIDE REPAIR PR-179, KM 13.25, CARITE WARD, GUAYAMA & PR-722, KM 5.7, ROBLES WARD, AIBONITO, PUERTO RICO

Dear Mr. Rodríguez Rosa,

Our Office has received and reviewed the above referenced project in accordance with 54 USC 306108 (commonly known as Section 106 of the *National Historic Preservation Act, as amended*) and 36 CFR Part 800: *Protection of Historic Properties* from the Advisory Council on Historic Preservation.

Highway PR-722 and PR-179 are properties potentially eligible for listing on the National Register of Historic Places. However, we believe the proposed repairs will not adversely affect the characteristics that make this structures potentially historic. We, therefore, believe a finding of **no adverse effect** would be appropriate for this undertaking.

Please note that should the Agency discover other historic properties at any point during project implementation, you should notify the SHPO immediately. If you have any questions concerning our comments, do not hesitate to contact our Office.

Sincerely,

Carlos A. Rubio-Cancela
State Historic Preservation Officer

CARC/GMO/LGC





April 5, 2021

Arch. Carlos A. Rubio Cancela
Executive Director
State Historic Preservation Office
PO Box 9066581
San Juan, Puerto Rico 00906-6581

**EMERGENCY WORKS ON VARIOUS ROADWAYS
IN THE ISLAND OF PUERTO RICO DUE TO HURRICANES IRMA AND MARIA
PR-179 KM 13.25 GUATAMA (ER-HWY-308)
PR-722 KM 5.7 AIBONITO (ER-HWY-410)
AC-811544
SHPO-06-20-19-03**

Dear architect Rubio:

We referred to the letter dated February 10, 2021 regarding to your comments for the above referenced project. Enclosed please find the revised documents by the archeologist Fernando Alvarado in responds to your comments. For your review and concurrence, with our determination of no effect to historic properties for this undertaking is concluded.

PRHTA and archeologist will continue to conduct the evaluation and identification of historic properties in other sites to determine the effect due to the undertaking. As soon as we finish with the next round of projects, we will inform you.

If you have any questions, please contact me at the telephone number (787) 721-8787, extension 1008.

Cordially yours,


Luis E. Rodríguez Rosa
Deputy Executive Director



GOBIERNO DE PUERTO RICO

Oficina Estatal de Conservación Histórica

Wednesday, February 10, 2021

Eng. Luis Rodríguez Rosa

Deputy Executive Director
PR Highway and Transportation Authority
PO Box 42007
San Juan, Puerto Rico 00940-1269

SHPO: 06-20-19-03 EMERGENCY WORKS ON VARIOUS ROADWAYS DUE TO HURRICANES IRMA AND MARÍA: PR-179, KM 13.25, CARITE WARD, GUAYAMA & PR-722, KM 5.7, ROBLES WARD, AIBONITO, ISLANDWIDE, PUERTO RICO

Dear engineer Rodríguez Rosa,

We acknowledge the receipt of additional information related to the above referenced projects in two documents titled: "Reconstruction of Landslide ER-HWY-308 PR 179 Km. 13.25 Carite Ward, Guayama, PR Archaeological Survey Stage IA-IB AC-811544" and "Reconstruction of Landslide ER-HWY-410 PR 722 Km. 5.7 Robles Ward, Aibonito PR Archaeological Survey Stage IA AC-811544" both dated August 8, 2019/Rev January 28, 2020 and prepared by AM Group. After a review of said documentation we believe efforts to identify historic properties are insufficient.

According to available primary sources, certain sections of road PR-179 run parallel (East) of PR-15 [listed in the National Register of Historic Places (NRHP)] and since the 19th century, *caminos carreteros* and *caminos de herraduras* followed the alignment of PR-179 from Guayama to Caguas. On the other hand, road PR-722 connects at the beginning with PR-14 (listed in the NRHP), in the traditional urban center of Aibonito, and when it runs through rural areas becomes part of the Panoramic Route. The Panoramic Route, even though it is from the 1970's decade, is a potential historic property. Therefore we believe roads PR-179 and PR-722, in Guayama and Aibonito respectively, are potential historic properties.

While the information included in the submitted document reveals that PR-179 has "... large number of water courses that have to pass ...", it lacks an analysis on the possible existence of associated historic structures to manage water (e.g., culverts, bridges, etc.), nor how the proposed reconstruction project could affect them. Moreover, in the document prepared for PR-722 it is mentioned that a "... culvert of the pluvial drainage that runs towards the northwest was visible...", and even photographs are included, without adding an analysis of how the reconstruction project as proposed could affect it.



Eng. Luis Rodríguez Rosa
Wednesday, February 10, 2021
Page 2

SHPO: 06-20-19-03 EMERGENCY WORKS ON VARIOUS ROADWAYS DUE TO HURRICANES IRMA AND MARÍA: PR-179, KM 13.25, CARITE WARD, GUAYAMA & PR-722, KM 5.7, ROBLES WARD, AIBONITO, ISLANDWIDE, PUERTO RICO

In light of the above comments, we believe both documents should be revised. As soon as we receive the revised documentation, we will continue with our review of this undertaking. If you have any questions, please do not hesitate to contact our Office.

Sincerely,



Carlos A. Rubio-Cancela
State Historic Preservation Officer

CARC/GMO/MC

c Eng. Luis D. López, Senior Environmental Project Manager, PR and USVI Division, Federal Highway Administration, US Department of Transportation

Reconstruction of Landslide **ER-HWY-308**

PR 179 Km. 13.25 Carite Ward, Guayama PR
Archaeological Survey Stage IA-IB
AC-811544
Federal #: ER-9999 (320)

Submitted to:

**Puerto Rico Highway and
Transportation Authority**

Realized by:



AM GROUP

SERVICIOS DE CONSULTORIA ARQUEOLOGICA

Arql. Fernando Alvarado Muñoz

HC 3 Box 10608

Juana Díaz, PR 00795-9501

Celular: 787-637-9807

arqueologoalvarado@hotmail.com

amgrouppr@gmail.com

February 18, 2021

Reconstruction of Landslide **ER-HWY-308**

PR 179 Km. 13.25 Carite Ward, Guayama PR
Archaeological Survey Stage IA-IB

AC-811544

Federal #: ER-9999 (320)

Submitted to:

**Puerto Rico Highway and
Transportation Authority**

Realized by:



AM GROUP

SERVICIOS DE CONSULTORIA ARQUEOLOGICA

A handwritten signature in blue ink, appearing to read 'F. Alvarado', is positioned above a horizontal line.

Arql. Fernando Alvarado Muñoz
Principal Archaeologist

Arqla. Marisol Rodríguez Miranda
Co-Principal Researcher and autor

February 18, 2021

Table of Contents.....	i
Executive Summary	1
1 Introduction.....	3
2. Project Description and Scope of Work.....	3
2.1 Legal Framework	3
2.2 Description and Actual Conditions of the Area	6
2.3 Proposed Action	9
3. Environmental Framework	9
3.1 Location.....	9
3.2 Topography:	11
3.3 Geology and Soils	12
LOS GUINEOS SERIES	13
3.4 Climate	15
3.5 Hydrography.....	16
4. Synthesis of Cultural Development	19
4.1 Classificatory Scheme	20
Period I (3,000 - 2,000 B.C.)	20
Period II	22
Period III	24
Period IV	26
4.2 Municipality Prehistory.....	29
4.3 Historical Sites of Guayama.....	37
4.3.1 Places Registered in the National Inventory of Historic Places Historical Zone of Guayama JPH-4	37
4.4 Guayama Archaeological Reports.....	39
4.5 Archaeological Investigations Near the Project Area	39
5. Brief Historical Context.....	51
5.1 The Town	51

5.2	The Road	61
6.	Fieldwork	72
6.1	Methodology	72
7.	Conclusions and Recommendations	81
7.1	Conclusions.....	81
7.2	Proposed Actions.....	81
8.	Bibliography	82
9.	Annexes.....	89
Figure 1 USGS Quadrangle Showing Location of the Undertaking.....		6
Figure 2 Aerial View of the Community. The Lines Marks the Approximate Area of theLandslides		7
Figure 3 View of the Landslide at PR 179 Km 13.0 Approx..		7
Figure 4 Top View of the Landslide Located at PR 179 Km 12.5 (photo Supplied)		8
Figure 5 Location of Guayama Municipality Within the Puerto Rico Archipelago.....		9
Figure 6 Guayama Municipality Ward. The Undertaking is Located at the Northern, Carite.		10
Figure 7 Project Location in MIPR System of the PRPB With the Road Layer. To the Left is the Carite Lake. (source; JP, mipr.gov Consulted November 2018).....		10
Figure 8 Fragment of the Soil Map of Cayey Sierra Area Where the Project is Located		12
Figure 9 Fragment of the Map Showing the Hydrology of Guayama Area (source:recursosdeaguadepuertorico. Online. Consulted, November 2018)		18
Figure 10 Archaeological Sites in the Carite Ward on OECH Archives		35
Figure 11 Vives Sugar Mill.....		38
Figure 12 Image of the OECH System Showing the Location of the Investigation of Jesús Figueroa on 1993.		40
Figure 13 Fragment of a 1600s Map Showing at the South the “Pto de Guayama”.(Description Distrito Isla Espanola (Source : bibliotecadigitalhispanica. Consulted 2018).....		52
Figure 14 Map of Guayama I 1940 on the US National Archives (Consulted Online 2018).....		60
Figure 15 Route from Cayey to Guayama Through Carite. (Source :AGPR).....		62

Figure 16 Fragment of the Croquis from 1884 Showing the Area of the Undertaking. It is Named Cerros del Chivo. The Characteristic Curve Can Be Seen Below.....	63
Figure 17 Other of the Maps in the Itinerario from Guamana to Cayey to Carite 1884 File	64
Figure 18 Map of Roads Built by the Spanish Government 1898. Only the Main Roads Area Marked in this Map. The Road Shown Between Cayey and Guayama is the PR 4	65
Figure 19 1898 Blueprint Named Isla de Puerto Rico. The Two Roads from Guayama to Cayey Can Be Observed.	66
Figure 20 Fragment of the Railroad and Rodas Blueprint from 1898..	67
Figure 21 Photo of the Construction of the Road from Guayama to Carite, Source (ROP VI:20 October 1929 :280).....	68
Figure 22 Road from Guayama through Carite (Source ROP VII:3 (1930) 82).....	68
Figure 23 1937 Aerial Photo.....	69
Figure 24 Aerial Photo of 1951	70
Figure 25 Plan for the Road 1957	71
Figure 26 Aerial Photo from 1977	72
Figure 27 Image of PR 179 to the South at the km 13.3 Aprox.	73
Figure 28 Area at the Side of the Road at Km. 13. 35 Aprox. This Elevation is a Fill.	73
Figure 29 View of the Landslide from the 13.3 Mark.	74
Figure 30 View of the Landslide at 13.25 from the South.....	74
Figure 31 View to the Area Across the Road in the Landslide at Km. 13.25.....	75
Figure 32 Aerial View of the Landslide at Km. 13.25 from the East (Image Supplied).....	75
Figure 33 Shovel Testing at Km 13.2	76
Figure 34 Shovel Test Showing the Stratigraphy	77
Figure 35 Other Shovel Test Showing the First Layer of Brownish Clay Followed by a Reddish Rocky clay.	77
Figure 36 View of the Gap at Km 13.0 Below the Asphalt it's the Brownish Layer Followed by the Reddish Clay.....	78
Figure 37 View of the Side of the Road with the Characteristic Stratigraphy	78
Figure 38 View of the Stratigraphy at the West side of the Road	79

Figure 39 View of the Topography.....	79
Figure 40 View of One of the Areas Cleaned to Observe the Stratigraphy.....	80
Figure 41 View of Another Area Cleaned to Observed the Stratigraphy Near km.13.25.....	80

Tables

Table 1 Archaeological Sites in the Municipality of Guayama (OECH Archives).....	31
Table 2 Archaeological Sites in the Municipality of Guayama 31-60. (OECH Archives).....	32
Table 3 Archaeological Sites in the Municipality of Guayama 61-87 (OECH Archives).....	33
Table 4 Archaeological Sites in the Municipality of Guayama 88-103 OECH Archives).....	34
Table 5 Guayama Archaeological Sites (Source: CAT Archives).....	36
Table 6 Archaeological Investigation in the Guayama Municipality from 1981-1988 (CAT and OECH Archives).....	41
Table 7 Archaeological Investigation in the Guayama Municipality from 1988 (CAT and OECH Archives).....	42
Table 8 Archaeological Investigation in the Guayama Municipality from 1991-1994 (CAT and OECH Archives).....	43
Table 9 Archaeological Investigation in the Guayama Municipality from 1994-1996 (CAT and OECH Archives).....	44
Table 10 Archaeological Investigation in the Guayama Municipality from 1996-1998 (CAT and OECH Archives).....	45
Table 11 Archaeological Investigation in the Guayama Municipality from 1998-2000.....	46
Table 12 Archaeological Investigation in the Guayama Municipality from 2000-2004 (Source CAT-OECH Archives).....	47
Table 13 Archaeological Investigation in the Guayama Municipality from 2004-2007(Source CAT-OECH Archives.....	48
Table 14 Archaeological Investigation in the Guayama Municipality from 2007-2011(Source CAT-OECH Archives.....	49
Table 15 Archaeological Investigation in the Guayama Municipality from 2011-2015(Source CAT-OECH Archives).....	50
Table 16 Archaeological investigation in the Guayama Municipality from 2011-2015(Source CAT-OECH Archives).....	51

LIST OF ABBREVIATIONS

ACHP	Advisory Council for Historic Preservation
ACT	Autoridad de Carreteras y Transportación
ADA	American Deshabilites Act
AGP	Archivo General de Puerto Rico (Puerto Rico General Archive)
APE	Area of Potential Effect
CAT	Consejo de Arqueología Terrestre (Terrestrial Archaeology Council)
CBC	Construction Building Codes
DTPW	Department of Transportation and Public Works (DTOP)
EA	Environmental Assessment
ELA	Estado Libre Asociado de Puerto Rico (Commonwealth of Puerto Rico)
ERP	Emergency Relief Program
FHWA	Federal Highway Administration
FWAD	Federal Highway Aid System
FEMA	Federal Emergency Management Agency
ICP	Instituto de Cultura Puertorriqueña (Puerto Rican Culture Institute)
JP	Junta de Planificación (Puerto Rico Planning Board)
LOC	Library of Congress
MARAD	Maritime Administration
NHPA	National Historic Preservation Act
NRHP	National Register of Historic Places
NOAA	National Oceanic and Atmospheric Administration
OECH	Oficina Estatal de Conservación Histórica (Puerto Rico State Historic Preservation Office acting as SHPO)
PRPA	Puerto Rico Port Authority (Autoridad de Puertos)
PREPA	Puerto Rico Energy and Power Authority (Autoridad de Energía Eléctrica)
PRHTA	Puerto Rico Highway and Transportaion Authority (Autoridad de Carreteras y Transportación)
PRPB	Puerto Rico Planning Board (Junta de Planificación)
TR	Technical Report
USGS	United States Geological Survey

Executive Summary

The following report presents the results of the archaeological assessment for the ER-HWY-308 Landslide project of the Puerto Rico Highway and Transportation Authority. It intends the repair of landslides in the PR 179 road from Guayama to Carite in the kilometer 13.25 at Guayama with the construction of Sheets Piles with Cap Beam.

To comply with local, state and federal regulations, the federal agencies must initiate a consulting process for Section 106. This archaeological assessment reviews the archaeological and historical information available for the locations within the undertaking to provide the regulatory agencies toward tools to make the appropriate decisions under the applicable laws. It is also necessary to comply with the Puerto Rican Commonwealth (ELA) Law 112 of June 28, 1992 as amended, that creates the Council for the Protection of the Terrestrial Archaeological Patrimony of Puerto Rico, known as the Terrestrial Archaeology Council (CAT). The content of this report is guided by what is stipulated in the Regulation 8932 of February 8, 2017: “Regulation for the Filing and Archaeological Evaluation of Project of Construction and Development”.

Using the graphic documentation available in the government, regional, and private archives is viable the presentation of an archaeological description and brief historical development of the municipality. It serves as a frame for the history of the road as mentioned in historical and government archives. In this case it was able to present the historic depictions, plans and photos of the road.

The project is limited only to the area where the landslide occurred, and we are improving the existing storm system to prevent the slope from failing again in a future event. The project is an improvement for an existing road, where the landslide will be repaired to provide safe conditions for traffic. The hydraulic structure that crosses the PR-179 and that will be replaced is a reinforced concrete pipe. PR-15 (listed in the National Register of Historic Places (NRHP)) and since the 19th century, roadways and bridle paths, is located more than 5 km in a straight line to the west of the project, and the landslide occurred on the slope east of PR-179. Finally, a Phase IA-IB survey was conducted, and no evidence of historic and cultural resources was found in the work area.

The proposed project will not limit the possibility of data collection, its integrity, location, design, environment, materials, workmanship, feeling or association of any adjacent resources and cultural vestiges, including the PR #15.

The field assessment was conducted along the road where the landslide occurs. No archaeological remains were detected. No further action is recommended.

1. Introduction

The State Historic Conservation Office (OECH) acting as SHPO for Puerto Rico, in accordance with the Federal Highway Authority (FHWA) and the Puerto Rico Highway and Transportation Authority (PRHTA) acting as soliciting agencies requires an archaeological Assessment for the PR 179 Km. 13.25 (ER-HWY-308) Landslide project. This is required under Section 106 of the National Historic Preservation Act (NHPA) and its implementing regulation 36 CFR part 800. Section 106 of the NHPA and its implementing regulation 36 CFR that requires that the agency responsible for the undertaking must establish an Area of Potential Effects (APE). OECH participates in the process of identifying, assessing and resolving adverse effects.

As required by the mentioned federal regulations, the undertaking must comply with the state and local regulations. This report complies with the regulations contained in the Regulation 8932 of February of 2017 known as Regulation for Filing and Archeological Evaluation of Development and Construction Projects of the Terrestrial Archaeology Council (CAT) under Law 112 of July 20 of 1988 as amended. It also complies with the “*Guía Oficial para la Investigación de Recursos Culturales (OECH)*”.

The research was conducted in November 2018 by the archaeologist Fernando Alvarado as Principal Investigator, the archeologist Marisol Rodríguez Miranda as co-investigator and author. In addition, Gerardo Rodríguez and Gerardo Torres served as technicians.

2. Project Description and Scope of Work

2.1 Legal Framework

To comply with regulations, this report does an analysis of documentation to include an archaeological assessment and conform to local, state, and federal requirements.

This investigation was conducted to comply with Section 106 of the National Historic Preservation Act of 1966 (NHPA) (PL 89-665) as amended and its implementing regulation 36 CFR Part 800 (Protection of Historic Properties), the Archaeological and Historic Preservation Act of 1974 (PL 93-291) as amended and the National Environmental Policy Act of 1969.

Reconstruction of Landslide ER-HWY-308 Project, Guayama PR

Section 106 of the NHPA requires Federal agencies to consider the effects of their undertakings on historic properties and afford the Advisory Council on Historic Preservation (ACHP) a reasonable opportunity to comment. (<http://www.achp.gov/106summary.html>)

First, the responsible Federal agency determines whether it has an undertaking that is a type of activity that could affect historic properties. Historic properties are the properties that are included in the National Register of Historic Places (NRHP) or that meet the criteria for it. If so, it must identify the appropriate State Historic Preservation Officer (SHPO) to consult with during the process. It should also plan to involve the public and identify other potential consulting parties. If it determines that it has no undertaking, or that its undertaking is a type of activity that has no potential to affect historic properties, the agency has no further Section 106 obligations.

This report also complies with the Puerto Rican Commonwealth (ELA) Law 112 of June 28, 1992 as amended that creates de Council for the Protection of the Terrestrial Archaeological Patrimony of Puerto Rico, known as the Terrestrial Archaeology Council (CAT). The content of this report is guided by what is stipulated in the Regulation 8932 of February 8, 2017: “Regulation for the Filing and Archaeological Evaluation of Project of Construction and Development”.

The Secretary of the Interior’s Standards for Identification (National Park Service, 1983) defined two categories of archaeological survey aimed at gathering field information: Reconnaissance and Intensive Surveys. These categories are defined based on the objectives of the survey, the results of the survey, and the historic preservation management needs.

Phase IA reconnaissance surveys results in the characterization of a region's archaeological sites. These surveys generally involve extensive background research with limited field investigations, often focused on soil and preservation conditions rather than systematic archaeological site discovery.

Reconnaissance surveys may serve a variety of functions. They may be applied for administrative, planning, or management purposes. However, it should be noted that reconnaissance surveys are very general in scope and do not normally make determinations of significance or NRHP eligibility.

Phase IA reconnaissance surveys can indicate if a portion or all of a project area lacks the potential to contain intact archaeological deposits, and therefore no further archaeological work is warranted in these areas. However, in most instances, reconnaissance surveys may not contain enough information with which to support an agency's determination of effect in fulfillment of mandated compliance.

The primary goal of a Phase I Cultural Resource Investigation is to identify archaeologically sensitive and cultural/sacred areas; to identify standing structures that are at least 50 years old, that may be affected by a proposed project and to locate all prehistoric and historic cultural/archaeological resources that may exist within the proposed project area are intended to gather information concerning the environmental/physical setting of a specific project area as well as its cultural setting. It is the interrelationship of the physical environment and the cultural, historical setting that provide the basis for the sensitivity assessment. This research should include a consideration of relevant geomorphology and soils information, culture history, and previous archaeological research to provide for the development of explicit expectations or predictions regarding the nature and locations of sites. Regardless of the project size, archaeologists should consider all relevant data in developing these expectations.

To complete the section 106 process, investigations should be conducted in an Area of Potential Effect. (APE) According to the ACHP, the APE is the geographic area(s) within which an undertaking may directly or indirectly cause alterations in the character or use of historic properties, if any such properties exist.

The APE is influenced by the scale and nature of the undertaking and may be different for other kinds of effects caused by the undertaking [36 CFR § 800.16(d)]. Because the APE defines the geographic limits of federal agency responsibility for purposes of Section 106 review the archaeological survey necessary to identify and evaluate historic properties is carried out within its boundaries.

However, within the APE, the level of effort may vary considerably depending on such factors as anticipated effects and prior ground disturbance. (ACHP Archaeology Guidance.pdf). Because the APE involves the federal agencies responsibility it must be defined by them in consultation with SHPO prior to initiating identification efforts.

2.2 Description and Actual Conditions of the Area

The site investigated consisted of two landslides located on PR 179, in the Chivos sector of Carite Ward of the Guayama municipality. (Fig .1) The sites were identified after an inspection performed by a multidisciplinary team. Some of the graphic material supplied by the consulting firm for description purposes are going to be used. At the time of the visit, the vegetation had grown, and some areas were not visible.

Although the project is located at the KM 13. 25. (Fig 2) The landslide where almost all the road slide. (Fig.3) One neighbor explained that it's more recent and that it was closed at midnight because the road continued to slid. Almost all the road slid. (Fig 4). The road is closed at km. 13.25 and a detour is signaled at approx.

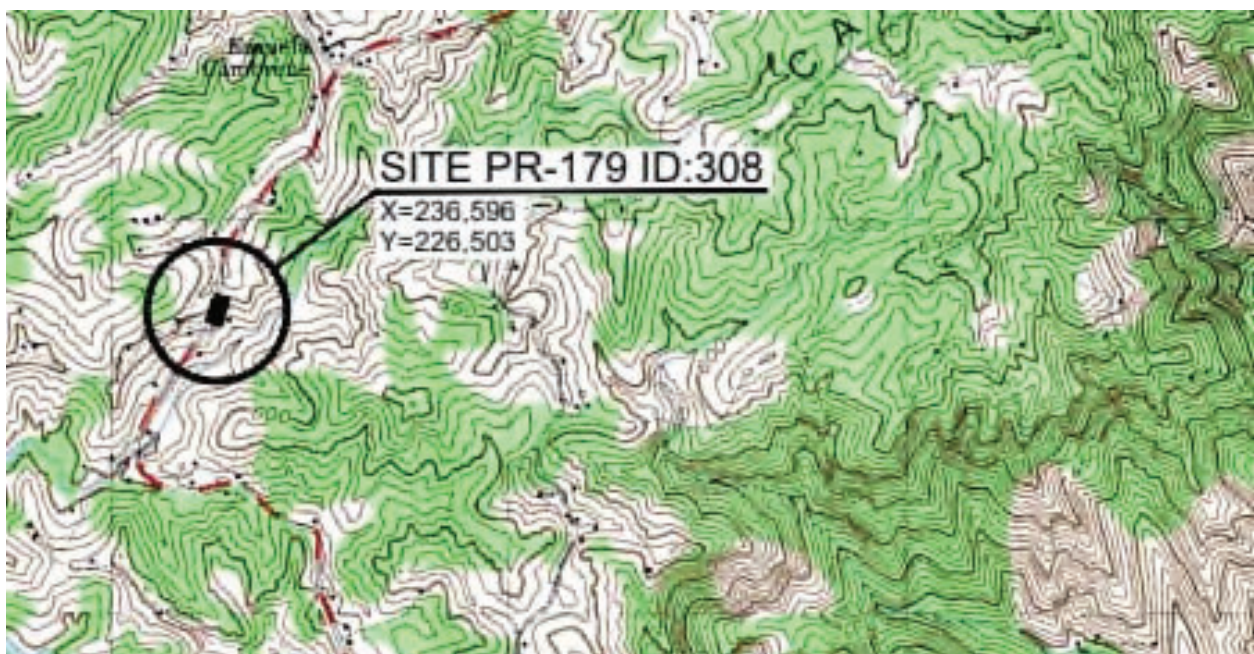


Figure 1: USGS Quadrangle Showing Location of the Undertaking



Figure 2: Aerial View of the Community. The Lines Marks the Approximate Area of the Landslides



Figure 3: View of the Landslide at PR 179 Km 13.25 Approx.



Figure 4: Top View of the Landslide Located at PR 179 Km 13.25 (Photo Supplied)

2.3 Proposed Action

The project consists of the evaluation and reconstruction of landslides; i.e., slope instability, washouts and rock fall on several highway segments due to the impacts associated with Hurricanes Irma and María. Those highway segments are located within the Puerto Rico's Federal Aid Highway System, and other highways and roads under the Department of Transportation and Public Works (DTPW) jurisdiction. The Consultant will execute the site reconnaissance, investigations, monitoring and studies necessary to provide appropriate recommendations to reconstruct the highway to its previous condition. Highway improvements shall comply with existing codes, regulations, standards and directives (Except as specified herein). Consultant shall also prepare Plans, Specifications and Estimate (PS&E).; ¹ The scope of the evaluation includes the area of the landslide and its surroundings.

¹ Description provided by PRHTA

3. Environmental Framework

As part of the process to document the general sensitivity of the area for the presence or absence of archaeological resources, is necessary to conceptualize the property inside the widest frame that represents the geographical and environmental characteristics in general. The zone of Guayama has been widely studied, thus an exhaustive revision on this matter will not be repeated in this document.

3.1 Location

The Municipality of Guayama is located on the southern coast of Puerto Rico. It limits with the municipalities of Salinas to the West, Cayey to the North, Arroyo to the East, Patillas to the Northeast and the Caribbean Sea to the South. (Fig.5). Guayama is part of the Southern Region, as defined by the Puerto Rico Planning Board (PRPB). The Southern Region is in the south-central part of the Island, and consists of 10 municipalities that includes: Arroyo, Coamo, Guayama, Juana Diaz, Peñuelas, Ponce, Salinas, Santa Isabel and Yauco.



Figure 5: Location of Guayama Municipality Within the Puerto Rico Archipelago

Guayama has a surface of 169.7 square kilometers or 65 square miles. It's divided into Guayama Pueblo, Algarrobo, Pozo Hondo, Caimital, Carite, Carmen, Guamaní, Jobos, Machete and Palma wards. (Fig. 6)



Figure 6: Guayama Municipality Ward. The Undertaking is Located at the Northern One, Carite.

The site of this undertaking is at the PR 179 Km 13.25, in the Carite Ward, with coordinates of 18° 04'24.94"N Lat, - 66° 05'15.12"W Lon. (Fig. 7)

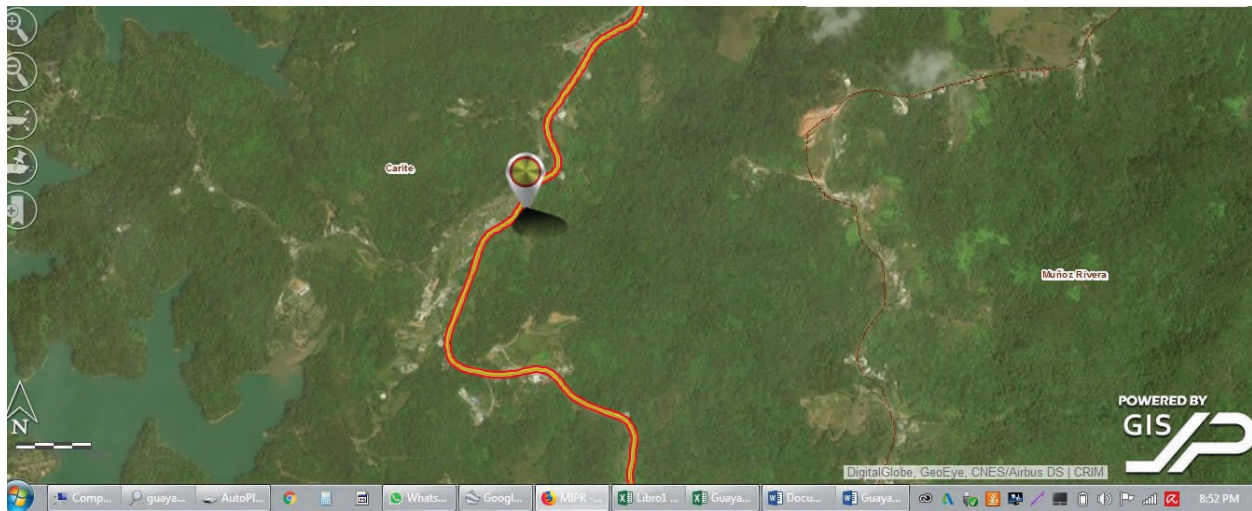


Figure 7: Project Location in MIPR System of the PRPB with the Road Layer. Also, to the Left is the Carite Lake. (source; JP, mipr.gov consulted November 2018)

3.2 Topography:

Topographically, Puerto Rico is a steep island, with a surface covered in most cases by hills and mountains. It has been anticipated that not more of the third part of Puerto Rico can qualify as flat or undulating. In terms of slopes, almost the fourth part of Puerto Rico consists of very steep slopes, of 45 or more degrees of inclination. Almost the half of the entire area is more than 500 meters, on the sea level. It can be estimated that 40 % of the island is covered by mountains, with 35% of hills and 25% of flats. (Rafael Picó, Nueva geografía de Puerto Rico, física, económica y social. (Río Piedras, Puerto Rico, Editorial Universitaria, 1969)

The geomorphologist Watson Monroe, in his work, indicated that "There are three major geomorphic provinces in Puerto Rico: The Central Interior Mountainous Province, the Northern Karst Province, and the Coastal Plains Province. Each of these provinces has its own characteristics both in terms of contour and in terms of form. The Province of the Central Interior Mountainous shows, predominantly, the effects of the erosion of a structurally complex succession of many kinds of igneous and sedimentary rocks. Additionally, the Province of Karst illustrates the effects of the solution processes on the limestones. On the other hand, the Province of the Coastal Plains presents areas of deposition. ²

Guayama is in the southeast region of Puerto Rico. Its territory lies within the Geological Provinces of the Central Mountainous Interior and the South Coastal Plains. The topography of the municipality is steep in the north and flat in the south, close to the coast. The mountainous area to the north is formed mainly by volcanic rocks. The hills towards the center are formed of limestone of marine origin, of tufa and of breccia. The coastal valley to the south, consists of deposits of alluvium on Cretaceous rock. The semiarid hills of the south, in the center, constitutes twenty-nine percent (29%) of its surface and the mountains of the east, in the north, occupy twenty-seven percent (27%) of the total area of the Municipality. The remaining percent (44%) are the flat and semi-flat lands in the coastal valley³

² Watson Monroe 1971

³ DIAE Municipality of Guayama. PRPB consulted 2018

The site under study represents the mountain region to the north of the municipality. This part of the Sierra de Cayey is a very steep zone.

3.3 Geology and soils

In addition to the geographic factors, regarding the possibility of the presence of archaeological resources and the sensitivity of the area it must be considered the composition of the soils, which present characteristics of fertility, compaction, and water access, among other factors that favor its use by human groups. The area has been intensely documented. Correspondingly, the analysis was limited.

The soils are described in the soil survey of the USDA as Los Guineos Series (From Soil Survey of Humacao Area of Eastern Puerto Rico. USDA) (Fig. 8)

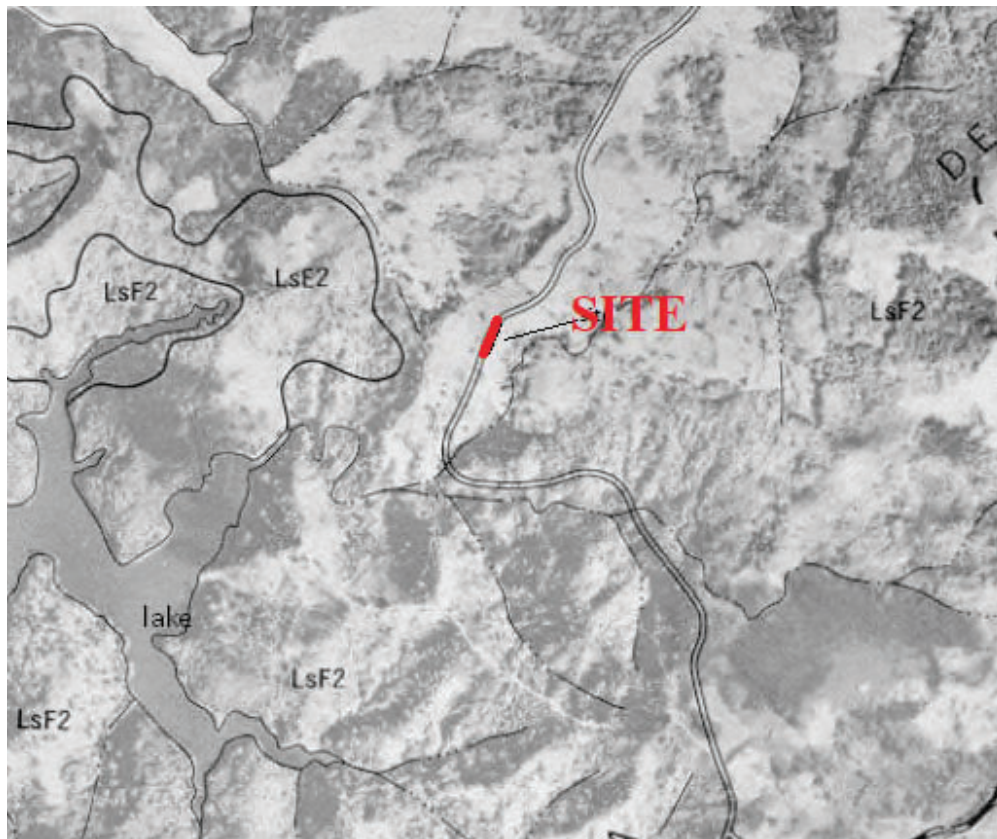


Figure 8: Fragment of the Soil Map of Cayey Sierra Area Where the Project is Located

LOS GUINEOS SERIES⁴

The Los Guineos series consists of very deep, well drained soils on side slopes of mountains. They are formed as a residuum from sandstone material. The mean annual precipitation is about 120 inches and the average annual temperature is 68 degrees F. Slopes range from 5 to 60 percent.

TAXONOMIC CLASS: Very-fine, kaolinitic, isothermic Humic Hapludox

TYPICAL PEDON: Los Guineos clay - forest. (Colors are for moist conditions.)

A--0 to 1 inch; dark yellowish brown (10YR 4/4) clay; moderate medium granular structure parting to moderate fine granular; firm; sticky, plastic; common very fine roots, many fine roots; few fine discontinuous tubular pores; many faint organic coats on vertical and horizontal faces of peds; extremely acid; clear smooth boundary. (1 to 5 inches thick).

Bt1--1 to 3 inches; yellowish brown (10YR 5/4) clay; moderate fine subangular blocky structure; firm; very sticky, very plastic; very few coarse, common fine and medium roots throughout; common very fine discontinuous tubular pores; few faint clay films on vertical and horizontal faces of peds; few worm casts; extremely acid; clear smooth boundary.

Bt2--3 to 9 inches; yellowish brown (10YR 5/6) clay; moderate medium subangular blocky structure parting to moderate coarse subangular blocky; firm; very sticky, very plastic; common fine and medium roots; common fine and medium discontinuous tubular pores; many distinct clay films on vertical and horizontal faces of peds; few worm casts; extremely acid; clear smooth boundary.

Bt3--9 to 18 inches; brownish yellow (10YR 6/6) clay; moderate coarse subangular blocky structure; firm; very sticky, very plastic; common fine and medium roots; few fine discontinuous tubular pores; many distinct clay films on vertical and horizontal faces of peds; few worm casts; common fine distinct red (2.5YR 4/6) masses of iron accumulation; extremely acid; clear wavy boundary.

⁴ Official Series Descriptions, USDA, https://soilseries.sc.egov.usda.gov/OSD_Docs/L/LOS_GUINEOS.html

Bt4--18 to 31 inches; red (2.5YR 4/6) clay; moderate coarse subangular blocky structure parting to moderate medium subangular blocky; firm; very sticky, very plastic; few fine roots; few medium discontinuous tubular pores; many distinct clay films on vertical and horizontal faces of peds; few worm casts; many coarse distinct yellowish brown (10YR 5/6) masses of iron accumulation; very strongly acid; gradual smooth boundary. (Combined thickness of the Bt horizons range from 25 to 50 inches)

Bw1--31 to 43 inches; red (2.5YR 4/6) clay; weak coarse subangular blocky structure; firm; very sticky; very plastic; few fine roots; few medium discontinuous tubular pores; common distinct films on vertical faces of peds; common medium distinct yellowish brown (10YR 5/6) masses of iron accumulation; very strongly acid; gradual smooth boundary.

Bw2--43 to 61 inches; strong brown (7.5YR 5/6) clay; weak very coarse subangular blocky structure; firm; sticky, plastic; few fine roots; few medium discontinuous tubular pores; common faint films on vertical faces of peds; many medium distinct yellowish red (5YR 4/6) and few medium distinct yellowish brown (10YR 5/6) masses of iron accumulation; very strongly acid; clear smooth boundary.

Bw3--61 to 74 inches; strong brown (7.5YR 5/6) clay; weak very coarse subangular blocky structure; firm; sticky, plastic; few medium discontinuous tubular pores; common distinct coatings in root channels and/or pores; about 10 percent, by volume, saprolite; many medium distinct yellowish red (5YR 4/6) masses of iron accumulation; very strongly acid; gradual smooth boundary.

Bw4--74 to 93 inches; yellowish red (5YR 4/6) clay; weak very coarse subangular blocky structure; firm; sticky, plastic; few medium discontinuous tubular pores; about 10 percent, by volume, saprolite; very strongly acid. (Thickness of the Bw horizon is 50 to 80 inches).

3.4 Climate

Climate is the generalized state of the atmosphere in a given area. The elements of climate are temperature, wind, precipitation and the seasons of the year. In Puerto Rico, there are two zones of temperature differentiated by height: the "hot earth" (tropical), in the low plains and hills, and the "temperate earth" (subtropical), towards the high part of the mountains. The area under evaluation is located on the boundary between the tropical zone and the temperate zone. This limit is represented by an isotherm of 74 degrees Fahrenheit, and approximately coincides with the level curve of 1,000 feet of altitude (300 meters) (Rafael Picó, op. cit., page. 159). The prevailing winds that pass through the island are the so-called trade winds, which blow fifty percent of the time in the East-West direction. The other wind regimes identified for the island are sea and land breezes, mountain and valley breezes and hurricanes. (Ibid., pag. 162)

Climate can be adjoined as a factor to identify the archaeological sensitivity of areas on the island of Puerto Rico resulting with a somewhat lesser relative importance, due to the few climatic fluctuations that the island has in general. Perhaps, it is the pluvial precipitation one of the factors that can modify the presence or absence and the type of anthropogenic activities in specific areas.

The climate of this area includes the six natural life zones existing in Puerto Rico. Most of the area is classified in two climatic zones: humid subtropical and very humid subtropical. However, to the west are areas classified as rainy subtropical, rainy montane and very humid low montane predominate. In the eastern part of the basin, a smaller area was identified within the dry subtropical climate classification.

In general, the climate is dominated by abundant rainfall in the Sierra de Luquillo. In this area of the basin, wet eastern winds that ascend the slopes of the Sierra de Luquillo induce almost daily downpours in the peaks. This positive effect on rainfall on the slopes of the Sierra de Luquillo causes a shadow of rain on the coast, which is evidenced by a significantly lower average rainfall on the coast than in the upper reaches of the basin.

The average annual rainfall is 97 inches, ranging from 145 inches in El Yunque to 61 inches in the coast. Rainfall patterns are similar to the rest of the island, with alternating periods of drought and rainfall throughout the year. However, the fluctuations in the year are less pronounced than in other regions due to the orographic effect described. (Recursos de agua de Puerto Rico. Consulted 2018)

3.5 Hydrography

In general terms, it can be affirmed that the topographic relief of the island forms four main slopes through which the rainwater flows towards the sea. These slopes are the north or Atlantic slope; the southern slope or the Caribbean Sea; the eastern slope, or the Passage and the Vieques Sound; and the western slope, or Paso de la Mona.

The municipal territory can be subdivided into several hydrologic basins. To the North part of the territory is the highest portion of the La Plata River basin, the largest river in Puerto Rico. Currently, it is dammed to the height of Carite. Another important river is the Guamaní River, which covers a length of 15 kilometers and receives water from Quebrada Palmas Reyes and Culebra. This river born in the mountains of Carite, on the site known as the Victorinos, and ends at a short distance from the Punta del Rodeo, in the Barrancas sector. It flows in a southerly direction and has the same characteristics as the rivers in the southern part of the Island: mountains in the beginning and wide valleys near the coast. The Guamaní River, however, is not dammed, although it receives water from Lake Carite through a tunnel. On the other hand, the Seco River is born in the Barrio Pozo Hondo and has an extension of 13.5 kilometers.⁵

There are many creeks in the municipality. The ones in Guamaní are: Yautías, de la Cueva, Marcelos, Aguas Limpias, Tayotales, Ausubal, Magueyes, Curet, Pablo Colón, Antonio González, Los Cedros, Farallón, and Barros. From Palmas Ward, flow down to the Guamaní: Quebrada de los Cielos, Bañaderas, Hojas anchas, Piedra Blanca and Las Palmas. In Río Seco are the streams Honduras, The Charcas, the Naranjos, the Bebedero, Cimarrona and Quebrada Tonta.

⁵ DIAE Municipality of Guayama, consulted 2018

There are other streams that die in the plains: Piedra Gorda in the Caimital Ward, which at its source is called Quebrada Arriba and when it reaches the sea by Algarrobos it is called Boca de Mangle. The one of el Corazón, Arrancaencinas that ends at Piedra Gorda; the one of Quebrada Honda that born in the hill of La Tuna in Pozo Hondo, and the Barros Blancos or Guayabo Dulce, that divides the districts of Algarrobos and Machete, the one of Matías Hernández and the one of the el Ingles⁶ that maintained water in some wells near the town. The Salada, Corazón and Branderí streams flow directly into the sea.

Within this hydrographic system there's also Lake Melania, Laguna Las Mareas and finally the Carite Reservoir, located at a height of 1,783 feet above sea level. This Reservoir has a capacity of 17.310 acres per foot, this is about 14 million cubic meters of water, with a drain of 2 kilometers, it is used to produce electric energy, potable water and water for irrigation. This reservoir belongs to the Puerto Rico Electric Power Authority (PREPA). (Fig. 9)

Another important hydrographic resource is the Irrigation Channels of Guamaní and Patillas, both essential to maintain agricultural activity. A part of its flow is also used for industrial purposes as it is diverted for the cooling of the power generation plant of AES (private energy generation company), located in Guayama.

The Great Southern Aquifer is another important resource, especially because it serves as a source of drinking water for most of the inhabitants of several municipalities in the south. Its extension is based on the extension of the alluvial deposits.

The lands near rivers and streams are susceptible to flooding. The coast also suffers the onslaught of storm surges. The low slopes of the land near the coast sometimes produce floods, although these are not reflected in the official maps of the PRPB.

⁶ Sued 1983: 12-13.



*Figure 9: Fragment of the Map Showing the Hydrology of Guayama Area
(source:recursosdeaguadepuertorico. Online. Consulted, November 2018)⁷*

⁷ http://www.recursosaguadepuertorico.com/Cap_tulo_6_Parte_2_Hidrografia_de_Puerto_Rico.pdf

4. Synthesis of Cultural Development

In the following chapter it will be resumed and discussed the chronological aspects of Puerto Rico and this municipality. Also, the chronological aspects of Puerto Rico and this municipality will also be discussed. Moreover, the archaeology near the undertaking, will be discussed more specifically.

First, when the Spaniards arrived on the island, the inhabitants of the island, called by them, Taínos, had the means to rescue and reproduce their historical memories, customs and traditions through oral tradition. However, there is minimal information about this oral tradition.

Historical written sources are classified based on the degree of knowledge of the chronicler. It is known as primary sources when is the person who collects the information, either by direct observation or by narration. Also, the other sources are classified as secondary and are almost always collections of narrations told by people who were at the sites and which the chroniclers consider to be their own.

Guayama has the distinction of having several well-known archaeological sites that have been used for the description of the development of the societies that inhabited the archipelago. Consequently, the definition of this development is well presented.

Nevertheless, for Puerto Rico, these historical sources are limited. However, it includes Fray Ramón Pané, the chronicler who collected the only source considered as primary. It is a short text that explains mostly mythological aspects of this society. As secondary sources, there are several chroniclers such as Gonzalo Fernández de Oviedo and Fray Bartolomé de las Casas who rescued memories of ceremonies and aspects of daily life, but especially on the island of Hispaniola. Later in time, monks or envoys of the crown had the task of narrating about everything concerning the economy and development of the people they encountered. As time has progressed, and with the facilities that globalization has given us, first hand data has been made available that researchers have been collecting and analyzing in Spain and island archives. Which many of them are available on the net because of the generosity of the authors.

4.1 Classificatory Scheme

Early in the study of Puerto Rico, inhabitant's schemes were established for their study. During the Spanish colonization, many creole investigators known as dilettantes, for the various aspects that they studied, from flora and fauna to poetry, including archaeology, produce a lot of information about the sites that they found on the island. Some of these dilettantes are Dr. Cayetano Coll y Toste, Dr. Salvador Brau and Dr. Adolfo de Hostos among others.

Early, during the North American invasion, the new owners of the island, sent their experts to study the different aspects of the society. In the case of archaeology, the task was put in hands of the Smithsonian Institute. The first researchers were Jesse Water Fewkes and Aldon Mason. But it's with the visit of Dr. Irving Rouse that the schemes took their final shape. Yet, with certain changes among the decades is still used today.

The classification scheme and the temporal spatial framework that includes the archaeological periods and series for Puerto Rico and the Caribbean established by Dr. Irving Rouse (1964-1986-1992), will be taking in to account because is what the agencies present as the official classification. However, some other investigations that have shed light on this period of historical social development of the island, including our own in some cases are considered.

Period I (3,000 - 2,000 b.C.)

(Both CAT and OECH present this scheme in their descriptions of site for more information refer to oech.gov.pr and http://www.icp.pr.gov/wp-content/uploads/2018/06/tabla_culturas1-Manifestaciones-Prehistoricas-de-Puerto-Rico.pdf)

This period is characterized by bands of marine collectors, pre-ceramics linked to coastal environments, mangrove areas and the resources of caves and rock shelters. This population groups belong to the Lithic Era and is characterized by producing lithic instruments using the stone process.

Although is dated by Rouse on 3,000-2,000 b.C., the dates of Angostura place these societies in the 6000 b.C. This date has been confirmed by recent studies in Corozo, Cabo Rojo. (Dr. Isabel Rivera personal communication). During the IB Period (2,000 b.C. - 100 A.D.), the so-called Archaic Era was developed (Rouse 1986). This group practiced small-scale farming, fishing and the collection of wild plants and seeds. The lithic instruments were produced using the polished stone method. (Ayes, Carlos 2001 Inv. Arql Fase III Angostura, Barceloneta, CAT)

The Archaic society is characterized primarily by being gatherers and hunters. The difference is the minimal existence of animals for hunting, so the subsistence fell on the collection of both fruits and aquatic species. Aquatic species were collected both at sea and in the rivers. First, in the ocean were collected in the Thalasia prairies and in the mangroves. On the other hand, in the river, were collected both in the current itself, and under the stones. It is characterized for producing lithics instruments using in process of the flacked stone. (Ayes Carlos 1996). There is evidence that made simple ornaments in stone, shell, bone and other materials, as well as the practice of human burials. (Ayes, Carlos 1991). The indigenous of the archaic culture could have arrived at the island in migrations from South America. Some researchers have postulated possible migrations from North America, but it has not yet been evidenced in the archaeological record. Likewise, the mitochondrial DNA investigations that have been carried out on the island appear to three different migrations of South American tribes, which curiously coincides with the archaeological expositions. (Martínez Cruzado et al 2001) In addition, during this period, two phases were differentiated. Ayes on his investigations on Angostura and other archaic sites suggested the existence of two periods differentiated by a flake industry and another of knives. Although at first it was believed that they lacked ceramics, because of the research and being able to identify the production of ceramics in this period in what have been identified as a late period. (Rodríguez Miranda, Marisol 1997)

The investigators had the opportunity to observe this pottery in the archaic site of Angostura in Barceloneta. In addition, to describe it on an unpublished document and have observed it in excavations carried out in an archaic site of Cabo Rojo excavated by José Ortiz for a treatment plant.

Few researchers have taken up this research, although we have seen with pleasure how it has been cited in publications outside the island. Likewise, Dr. Peniel Rodríguez studies endorse these findings and define the period. (Rodríguez, Reniel, et al 2008) Moreover, this is an ongoing investigation.

Recent investigations produce data that will allow to define accurately this period of occupation. Some of this information came from the sites of Yanuel 9 and Puerto Ferro on Vieques. The earliest date come from the site of Angostura, which produced a 4900 b.C. radiocarbon date (Ayes Suárez 1993). The site of Maruca, located on the south-central coast, dates to ca. 3000 b.C. These 4th - millennium settlement dates are supported by additional studies on the island that have evidence for early landscape modifications through intentional burning and clearing of forested areas. Evidence from Cueva María de la Cruz, Paso del Indio, and Yanuel 9 on the island of Vieques (Tronolone et al. 1984) show that Archaic populations existed at least through the 1st century A.D. and interacted with the Saladoid populations. (Rodriguez, Reniel 2010)

In the municipality of Guayama, at least seven sites have been reported that could be archaic, with artifacts similar to that of Cayo Cofresí. All correspond to shell mounds -with the exception of a residuary- and none of them is associated with another period of prehistory. The totality of the sites was identified in the coastal plain in the Jobos Ward, being the most distant 2.8 km from the current coast and all are near ravines or the Seco River.⁸

Period II

During Period II, after Rouse the ceramic series known as Saladoide were developed in Puerto Rico. Especially the Sub-Series "Cedrosan Saladoids" (Rouse, Irving 1986) In this scheme is considered that these groups introduced for the first time in the Lesser Antilles, Puerto Rico and Hispaniola rudiments in the manufacture of ceramics, agriculture and sedentary life.

⁸ Melendez, Sharon, 2010 Sitios Brujos

Reconstruction of Landslide ER-HWY-308 Project, Guayama PR

Evidence of Saladoid pottery was first documented by Froelich Rainey with Dr. J.L. Montalvo Guenard at the site of Cañas in the early 1930's on the south-central coast of the island. Rainey documented red-painted pottery in the lower stratigraphic levels of this site in association with a high volume of crab claws, leading him to call this materialization the "Crab Culture" (Rainey 1940). Rouse (1952) called this tradition "Cuevas" and later subdivided the series into two styles: Hacienda Grande (early component) and Cuevas (later component). The tradition was eventually renamed as the Saladoid series after the type site of Saladero in the middle Orinoco of Venezuela (Rouse 1964) and the subseries Cedrosan for the type site of Cedros on the island of Trinidad. Evidence seems to indicate that the Cedrosan Saladoids Series (100 - 400 A.D.) originated in the middle Orinoco, subsequently moving towards the lower Orinoco, the north-eastern coast of Venezuela, the Guyanas coast, the Lesser Antilles, Puerto Rico and Spain. These settlers are carriers of an excellent ceramic tradition, highlighting its ceramics by a decoration painted white on red, incisions filled with paint and crisscrossed in area as one of the earliest stylistic elements. Its main site in Puerto Rico was in the Hacienda Grande de Loíza neighborhood (Period IIA). Its later stylistic manifestations are located under the Cuevas style of Period IIB (400-600 A.D.). Its economy was based on the cultivation of cassava and the exploitation of the resources of the marine littoral where they obtained mollusks, crabs and fish. They supplemented their diet with the hunting of small rodents.

During the next years, specifically in the beginning on 1977, Luis A. Chanlatte carried out field work in the archaeological sector of Sorcé, in La Hueca, Vieques, as part of a research program developed by the Archaeological Research Center of the University of Puerto Rico, Río Piedras. In this archaeological sector, this researcher defined a cultural complex which he called: La Hueca Cultural Complex or Agro I, according to his own classification. This complex is considered as a new agro pottery culture, with unpainted pottery, limiting its expressive and descriptive elements to the pottery technique of the incised model. This pottery was accompanied by an extraordinary lapidary industry that marveled, not only for the quality of its size and raw material, but for the overwhelming number of lithic amulets and body ornaments made of mother-of-pearl shell. Chanlatte obtained dates of C-14 for La Hueca, which places it around 5 b.C. According to Chanlatte, La Hueca cultural complex precedes the Sorcé complex.

Reconstruction of Landslide ER-HWY-308 Project, Guayama PR

In the light of these investigations, Rouse later added a second early subseries named Huecan, which contains one pottery style La Hueca. The addition of this subseries was to accommodate the presence of early, unpainted ceramics on the island of Vieques. This classification caused a substantial debate as the artifact assemblages recovered from the site of La Hueca-Sorcé and later at the Punta Candalero site in eastern Puerto Rico, Hope Estate and other sites in St. Martin, and Morel I in Guadeloupe suggested a distinct cultural group from the previously defined Saladoid (Oliver 1999). Considering recent archaeological discussions regarding La Hueca (see Oliver 1999; Rodríguez Ramos 2010; Rodríguez Ramos et al. 2010), it is assumed here that the Saladoid series and La Hueca complex are two distinct cultural groups that migrated to the region at approximately the same time. (Curet 2005; Oliver 2009; Rodríguez Ramos 2010; Torres 2009)

In Guayama, three sites with Saladoid components were identified (see table 1 and figure 6), in the coastal plain of the Jobos neighborhood (GY0100005 and GY01000020), on a terrace of the Guamaní River, 6 km from the coast, in the Caimital neighborhood (GY0100004). They were identified as shell mounds and residuaries and were close to rivers. In the sites located on the coast, Hacienda Grande and Cuevas style ceramics were identified, while in the mountain site the identified ceramics were Cuevas style, supporting the thesis that during the late period the Cedrosan Saladoid groups moved towards the mountainous area. Sites GY0100004 and GY0100005 showed evidence of continuous occupation from this series to the Chican Ostionoid sub-series. Only GY0100020 was reported as one component.⁹

Period III

Around the 5th century A.D., new social developments are registered within the island of Puerto Rico. It is believed that these developments are based on the interactions of pre-Arawak, Saladoid, and Huecoid social groups, emerged in a social landscape characterized by cultural and social plurality rather than homogeneity. (Chanlatte Baik 1990; Rodríguez Ramos 2010). The historical outcome of this diverse cultural landscape is documented by an increase of ceramic styles, but also by shifts in settlement patterns, domestic architecture, and the emergence of ceremonial structures.

⁹ Meléndez, Sharon 2010

Reconstruction of Landslide ER-HWY-308 Project, Guayama PR

This was a time when village missioning of settlements on the coastal plains intensified, and new settlements formed in the interior valleys of the foothills and mountainous uplands of the island. (Curet 2005, Oliver 2009) These changes are accompanied by material and social transformations considered to entail the development of regionally distinct identities, increased sociopolitical organization, and economic diversity. (Search 2011)

During Period III (600-1,200 A.D); the Sub-series "Elenan Ostionoids" was developed in Puerto Rico in the Passage area of Vieques. On the other hand, the Sub-series "Ostionan Ostionoids" developed in the Passage area of the Mona. Both Sub-series are developed stylistically from the ceramic style Cuevas of the series "Cedrosan Saladoids". These post-salaloid stylistic manifestations have been placed under the archaeological series "Ostionoids" which in turn have been subdivided into four sub-series "Elenan Ostionoids, Meillacan Ostionoids, Ostionan Ostionoids and Chican Ostionoids". (Rouse, 1986)

Both, new sub-series retained the technology and shapes of the final Cedrosan pottery, as well as its tabular lugs, on which the earlier has been placed, and its red painted areas, on which the earlier potter has painted white designs.

The Elenan Ostionoids artisan gradually made their pottery thicker, coarser and rougher and simplified its shape. The Ostionoid potters were more conservative. They continued to produce relatively thin, fine and smooth pottery and retained all the previous shapes.

The settlement pattern data for this period shows a dramatic increase in the distribution of sites, with the highest density of settlements situated on the coastal plains and foothill regions of the island. (Curet, Antonio et al 2004). Settlements appear to possess considerable variation regarding size and function, indicating an observable diversity in site types ranging from villages, small villages, or hamlets to farmsteads and specialized activity areas. (Search, 2009) Francisco Moscoso suggested in terms of the economic production and organization, that this was a time of social transition from a strategy of communal production to one characterized by a hierarchical, tribute-based system.

The moment of the appearance of the first ball court in Puerto Rico, found in Tibes, the south-central region of the island. (González-Colón, 1984), El Bronce, and Las Flores. (Wilson, 1991). In addition to ball court structures, there are centralized spaces delineated by large stones that form communal plazas. (Alegría, 1983). At the regional level, the number and elaborateness of monumental architectural features are interpreted as centers of political power, and an increase in territoriality. (Search 2011).

“In Guayama, 13 sites have components of the Ostionoid series. The Sites in these series present a higher level of complexity. The majority is in the Pozo Hondo neighborhood, which is located north of the coastal neighborhoods of Jobos and Machete. It is worth mentioning that according to Sued Badillo (1983: 21-22) there are also samples of Ostiones sites in the Quebrada Yeguas, Cimarrona, Carmen and Guamaní neighborhoods. These are not reported in the documentation reviewed for the present investigation.”¹⁰

Period IV

On the 12th century A.D, the entire archipelago of Puerto Rico appeared to be occupied. Throughout all the territory it can be found all sort of settlements ranging in size from a single domestic structure to sites with multiple ball court sand plazas. (Oliver, 2007)

Moreover, agriculture reached its maximum expression, with terraces, irrigation systems and drainage channels. In addition to the Hoyada, several planting techniques have been identified, namely terraces, ridges and piles. The latter, along with the development of the Montones Farming, have been worked by the author and the results are going to be presented. (Rodríguez, Marisol 2017)

Researchers have defined that their political development is represented in the system known as *cacicazgo*, which was constituted as a regional political center with power over a group of small villages.

¹⁰ Meléndez, Sharon ibid

Although the investigators concur with the development of a society, it's preferable to think of a society in which a system of incipient social classes is developed. (Initial classist society as defined by Felipe Bate Petersen). During the 1580's, the conquerors in their writings described villages with chiefs throughout the island. The same for the surrounding islands. Likewise, this points more towards the approach.

However, the Spaniards found a society divided between the elite *nitainos* and the *naborias*, or commoners. (Moscoso, 1981). Ceremonial architecture during this time is at its highest frequency, and recent work by Jose Oliver suggested that most *bate* sites were occupied, although nonresidential *batey* sites have also been identified. The large, complex ceremonial/residential sites of Caruana and Viví reflect group-oriented ritual activity in the constitution of social and political life. (Oliver, Jose and Juan Rivera 2007)

At the time of the Spanish invasion, is noted as being composed of approximately 18 political territories at the time of the Spanish arrival. (Coll y Toste 1907; Oliver 1999; Rouse 1952). Oliver notes were sent to King Phillip III by Juan Melgarejo, governor of San Juan, on which he stated that: "In this island there was no cacique that lorded over all of it, except that in each valley or principle river there was a cacique that had other captains as their lutenists who served him and who were called in their language *nitainos*" (Oliver 2009 page 199).

Ceremonial artifacts known from this period include highly elaborate three-pointed stones or *cemís*, carved masks and figurines, wood or stone *duhos* and elbow stones and stone collars, all of which suggested an intensification of ritual practices over the previous period and the personification of chiefly power manifested in material objects. (Ibid).

As in the preceding period, Chican Ostionoid assemblages are regionally variable based on an east-west trend in distribution. The Capá style is considered more common in western Puerto Rico and in the mountainous interior of the island. In the eastern portion of the island, the Esperanza style is predominant. Boca Chica is a rare trade ware originating in eastern Hispaniola and distributed through several outposts in south-central Puerto Rico.

All the Chican Ostionoid pottery is elaborate in its decorative style with complex incised designs and modeled lugs or *adornos*. Of the Chican ostionoid sub series, the one related directly to Vieques is the Esperanza series which was first identified by Rouse at the type site of Esperanza on the island of Vieques. (Rouse, Irving 1952).

Esperanza-style pottery A.D. 1200–1500 surface and paste characteristics resembles Santa Elena pottery, with coarse to very coarse paste with aplastic inclusions ranging from approximately 0.5 to 2 mm. Vessels are characteristically thick (~7–8 mm) and light brown to medium reddish-brown in color. Handles are absent in this style, although structural decorations can include tabs, lugs, and elaborately modeled anthropomorphic *adornos* often on globular bowls with restricted openings and a sharp carina (called *cazuelas*). Esperanza vessels are very rarely red slipped or painted, and surface treatment mainly consists of smoothing. The Esperanza decoration is characterized by broad, deep, and widely spaced incisions, and the design elements are limited to the upper portion of the vessel between the rim and shoulder. Diagnostic design motifs are sets of double or triple lines, either straight, curvilinear, or parallel/oblique. A wide, downward-facing curvilinear arched set of lines is a characteristic motif, as is a single horizontal line under the exterior rim. Moreover, punctuation is also present but in a low frequency, typically consisting of small dots imitating stippling.

There are three sites in Guayama identified for this period with Capá-style ceramics (GY0100004) or Esperanza (GY0100005 and GY0100008). The first two sites correspond to multicomponent residuaries and shell mounds, while the third corresponds to a batey with a shell mound, where it is suggested that one of the multiple mounds is Chican. There is a fourth site identified as of this subseries, GY0100002, which corresponds to an impressive set of petroglyphs in the Palos creek. These sites are distributed throughout the municipality, in the districts of Caimital, Jobos, Pozo Hondo and Jobos. In addition, Sued Badillo indicates that he identified "Taíno" sites in the neighborhoods of Carmen, Cimarrona, Olimpo and Barrancas.¹¹

¹¹idem

4.2 Municipality Prehistory

Archaeological investigations have been conducted in the Guayama area since the first archaeological research. In 1936, the archaeologist Irving Rouse, as part of the program of Caribbean Anthropology of the Peabody Museum of Yale University, detected some sites in the Quebrada Yeguas, Jobos, Cimarrona, Carmen and Guamaní. wards.

These sites were:

Guayama 1, Village site with Shell deposit.: A shell deposit 102 meters long by 16-meter-wide, 200 meters south of the village of Jobos.

Guayama 2, Village site with shell deposit. A deposit of small shells, mostly clams, about 1000 square meters, One hundred meters north east of the village of Jobos.

Guayama 3, Shell deposit (camp site). A medium size shell deposit. Fifty meters north of the village of Jobos

Guayama 4 Camp site with shell deposit This site is a shell heap about 75 cm in height and 25 About 100 meters north of the village of Jobos

Guayama 6: Camp site with shell deposit. Another deposit of small clam shells. About one kilometers WSW of the village of Jobos

Guayama 7 Camp site with shell deposit. This site is a shallow (25 cm deep) heap composed of small clam shells. The site covers an area 2000 square meters. About five kilometers ESE of the village of Jobos

During the evaluations made for the construction of highway PR-3, some pre-Columbian sites were identified by archaeologist Miguel Rodríguez. In 1995, Michael Cinquino conducted a study of flood control of the Guamaní River that detected sites along that basin.

But the most comprehensive study of the Guayama municipality was carried out on 2010 by archaeologist Sharon Meléndez. She made a study of general recognition of the archaeological sites of Guayama, that tried to relocate the sites previously reported and located additional ones. As a result, she discovered that some of the sites were destroyed and some can't be relocated. In this investigation it was incorporated some of her findings in the preceding discussion of the settlements in Puerto Rico.

Reconstruction of Landslide ER-HWY-308 Project, Guayama PR

The official record for archaeological sites registered on OECH archives in the municipality of Guayama established that they are 103, none of them near the undertaking. In the CAT archives there are reported 28 sites, most of them in the Machete Ward. In the OECH archives there are thirty-one (31) pre-Columbian sites reported.

Archaeological sites that cover all cultural periods have been identified; Preceramic (Archaic 4000 b.C-200 A.D.), Agroalfarero I (Saladoide 250b.C-600A.D.), Agro-potter II (Ostionoides 600 A.D.-1200 A.D.) and Agro-potter III (Taíno 1200A.D.-1500 A.D.).

In the register forms, sites Guayama 6, 7, 8, 9, 14 22 were identified as possible *bateyes* but in the study of Meléndez, she couldn't locate them. She also made a reconnaissance of previously identified areas of petroglyphs such as El Palo and Punta Brava, and concentration areas of shells and lithic such as Los Limones, Olimpo, and Jobos. Five multi-component archaeological sites were identified, where their evidences are both of pre-Columbian and historical-colonial material. Two other sites do not have the necessary information to locate them within the pre-Columbian or historical category but have been marked on the topographic maps of the OECH and identified with the code GY0300001 and GY0300002.

Following Meléndez, most of the sites correspond to historical related remains of the Haciendas. Approx. 31 sites are classified as pre-columbine. She said that “The variety of colonial types is much greater than that of precolonial sites. They identified about 24 different types, some of which (*haciendas, centrales* and *colonias*) include different types of properties. The most common types of properties are haciendas, residuaries, bridges and canals¹².”

Both lists of registered archaeological sites are in the tables below. There are no archaeological sites reported near the undertaking. Almost all the archaeological findings in the municipality are in the lower lands to the south. For that reason, the OECH maps are only presented, that most reliably represents the archaeology of the municipality.

¹² Meléndez, Sharon, 2010

NUM	TAG	SITE NAME
1	GY0100002	GA-2; El Palo.
2	GY0100003	GA-3; Phillips
3	GY0100004	Guamaní/GA-4; Temporary 8
4	GY0100005	Los Limones
5	GY0100006	X P-1 (PR-3)
6	GY0100007	X P-2 (PR-3)
7	GY0100008	X (P-3 y P-4)
8	GY0100009	X P-5 (PR-3)
9	GY0100010	X P-6 (PR-3)
10	GY0100011	X P-7 (PR-3)
11	GY0100012	Old Cemetery
12	GY0100013	GY0300009
13	GY0100014	Los Recreos
14	GY0100015	Cayo Caribe
15	GY0100016	PCI/Guamaní H-2; Channel P-60
16	GY0100017	X H-3 (PR-3)/ GA-16
17	GY0100018	X H-4 (PR-3)/GA-17
18	GY0100019	GY0100019
19	GY0100020	GY0300004
20	GY0100021	H-1, PCI
21	GY0100022	H-2, PCI/[X P-15, PR-3 G-13]
22	GY0100023	H-3, PCI
23	GY0100024	H-4, PCI
24	GY0100025	H-5, PCI, Pozo Hondo Bridge
25	GY0100026	H-6, PCI, Patillas Historic Channel
26	GY0100027	G-10
27	GY0100028	G-11
28	GY0100029	Machete Residuary
29	GY0100030	Hacienda La Juana
30	GY0100031	G-14, Temporary P-16

Table 1: Archaeological Sites in the Municipality of Guayama 1-30 (OECH Archives)

NUM	TAG	SITE NAME
31	GY0100032	X H-2 [PR-3] Pozo de Agua
32	GY0100038	Hacienda La Tuna
33	GY0100041	GY0100041
34	GY0100042	P-190 y P-191, Shell Fragments
35	GY0100043	P-28 y P-29, Brick Fragments
36	GY0100044	P-23 y P-24, Shell Fragments
37	GY0100045	P-1 y P-12
38	GY0100046	P-37, Brick fragments
39	GY0100047	P-78, P-79, P-80 y P-81
40	GY0100048	P-89, Shell Fragments
41	GY0100049	P-102, P-104 y P-105
42	GY0100050	Jobos, GA-5, Guayama #1
43	GY0100051	Guayama #2
44	GY0100052	Guayama #3
45	GY0100053	Guayama #4
46	GY0100054	Guayama #5
47	GY0100055	Guayama #6
48	GY0100056	Guayama #7
49	GY0100057	Punta Brava
50	GY0100058	La Pollera
51	GY0100059	El Mangle
54	GY0200001	Central Guamaní, HG-1, G-13
55	GY0200002	Hacienda Julia, Rancho Guayama, HG-15
56	GY0200003	Machete Central, H-3, G-6
57	GY0200004	Hacienda Vives, La Esperanza, HG-5
58	GY0200005	Hacienda y colonia de Algarrobo
59	GY0200006	Hacienda Carlota, HG-6, G-4
60	GY0200007	Hacienda Santa Elena, HG-7

Table 2: Archaeological Sites in the Municipality of Guayama 31-60. (OECH archives)

Reconstruction of Landslide ER-HWY-308 Project, Guayama PR

NUM	TAG	SITE NAME
61	GY0200008	Hacienda Felicia, HG-8
62	GY0200009	Acueducto de Aguirre, HG-9
63	GY0200010	Hacienda Gregoria M. Pica, HG-10, G-5
64	GY0200011	Hacienda La Adela, La Morocó
65	GY0200012	Hacienda Olimpo, Caimital HG-12, G-9
66	GY0200013	Hacienda y Colonia Reunión, HG-13, G-8
67	GY0200014	Hacienda Miramar
68	GY0200015	Carite Hydroelectric Plant #1, HG-16
69	GY0200016	Planta Hidroeléctrica Carite #2, HG-17
70	GY0200017	Los Barros Bridge, Bridge 616, HG-18
71	GY0200018	GY0200018
72	GY0200019	Hacienda El Palo
73	GY0200020	Carite Dam, HG-20
74	GY0200021	Represa en Río Guamaní
75	GY0200022	Las Palmas Roadmender House, HG-22
76	GY0200023	Hacienda y Colonia Josefa
77	GY0200024	Hacienda Las Mercedes
78	GY0200025	Colonia Fortaleza
79	GY0200026	Bridge del Algarrobo P&G R.R.
80	GY0200027	Hacienda Barrancas/ Roviras
81	GY0200028	Hacienda Vergaguer, HG-11
82	GY0200029	Hist 30227
83	GY0200030	Guayama's Jail, Casa del Rey HG-21
84	GY0200031	San Antonio de Pádua Church, HG-4
85	GY0200032	Nuestra Sra. Del Carmen Church
86	GY0200033	Municipal Cemetery
87	GY0200034	Ferrocarril, HG-23

Table 3: Archaeological Sites in the Municipality of Guayama 61-87 (OECH archives)

NUM	TAG	SITE NAME
88	GY0200035	El Armisticio, Sugar Crane y estación de pesajeand weigh station
89	GY0200036	Train guardian house
90	GY0200037	Train Stop
91	GY0200038	Guamaní Oeste Channel
92	GY0200039	PR 7707 Irrigation system
93	GY0200040	Irrigation Channel
94	GY0200041	Irrigation Channel ""El francés""
95	GY0200042	Bridge no. 138
96	GY0200043	Bridge over Corazón Creek, H-2, Bridge #00737
97	GY0200044	Bridge over Guásima Creek, H-2a
98	GY0200045	Casa Cautiño
99	GY0200046	Eleuterio Derkes School
100	GY0200047	GY0200047
101	GY0200048	H-6
102	GY0300001	GY0300001
103	GY0300002	GY0300002

Table 4: Archaeological Sites in the Municipality of Guayama 88-103 OECH Archives)

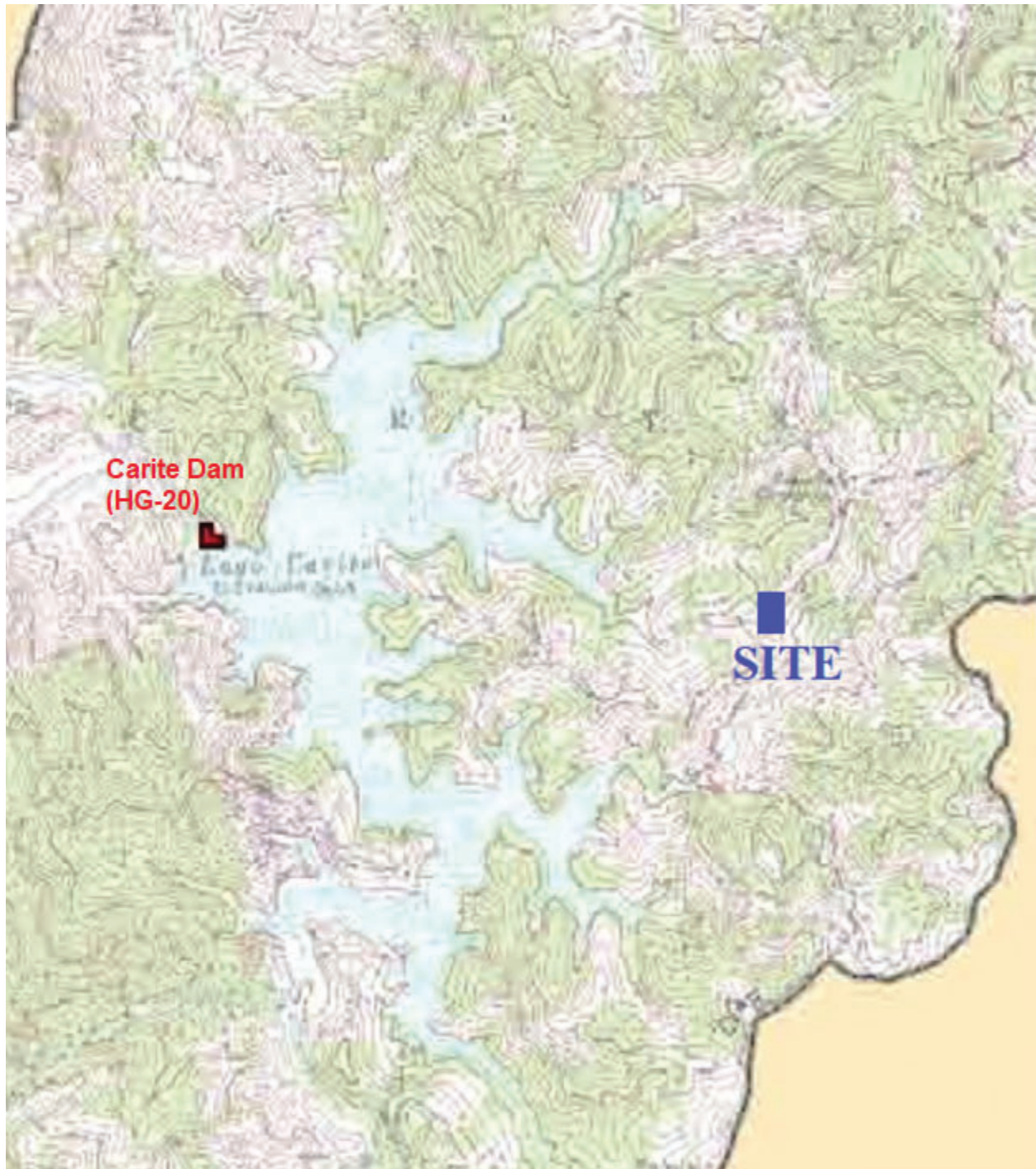


Figure 10: Archaeological Sites in the Carite Ward on OECH Archives

Archaeological Sites in CAT Archives

SITE	SITE NAME	WARD	PERIOD
GM-1	Jájome	Jájome	Prehistoric
GM-2	El Palo	Poblado del Carmen	Prehistoric
GM-3	Phillips		Prehistoric
GM-4	Guamaní	Caimital	Prehistoric
GM-5	Jobos-Rouse 52 #1 al 7	Poblado Jobos	Prehistoric
GM-6	Iglesia Parroquial San Antonio de Padua	Calle Ashfordo #5	colonial
GM-7	Ingenio Azucarero Vives	Machete	colonial
GM-8	Hacienda La Esperanza (Vives)	Machete	colonial
GM-9	Escuela Eleuterio Derkes		colonial
GM-10	Casa Cautiño		colonial
GM-11	Hacienda La Carlota	Machete	colonial
GM-12	Central Guamaní	Jobos	colonial
GM-13	Central Machete	Machete	colonial
GM-14	Hacienda Gregoria		colonial
GM-15	Hacienda Verdaguer	Machete	colonial
GM-16	Hacienda Olimpo		colonial
GM-17	Hacienda Reunión	Jobos	colonial
GM-18	Hacienda Tuna		colonial
GM-19	Puente #181 Puente de Cayey 1897	Guamaní	colonial
GM-20	Casa del Caminero Las Palmas	Las Palmas	colonial
GM-21	Hacienda Josefa	Jobos	colonial
GM-22	Centro Ceremonial Guamaní	Pozo Hondo	Prehistoric
GM-23	p3 ó p4	Pozo Hondo	Prehistoric
GM-24	P5	Pozo Hondo	Prehistoric
GM-25	Hacienda Adela		colonial
GM-26	Puente Algarrobo 1920	Algarrobo	colonial
GM-27	Punta Brava	Palmas	Santa Elena, Esperanza
GM-28	La Pollera	Carmen	Santa Elena, Esperanza

Table 5: Guayama Archaeological Sites (source CAT Archives)

4.3 Historical Sites of Guayama

As mentioned before, most of the archaeological sites in Guayama are related to the Spanish colonial period.

In the National Registry of Historic Places of Puerto Rico (revised at 1995), there are five (5) places identified as historical for the Municipality of Guayama:

- 1-Parish Church San Antonio de Padua
- 2-Vives Sugar Mill
- 3-Casa Cautiño
- 4-Eleuterio Derkes School
- 5-Cayey Bridge (# 181) 2001- (RS) -23-JP-SH

The Guayama historical center is declared a Historic Zone by the PRPB and the ICP. It's one of the better documented in the islands.

4.3.1 Places Registered in the National Inventory of Historic Places Historical Zone of Guayama JPH-4

Parish Church San Antonio de Padua

The Parish Church of Padua in Guayama is a structure of Neoromantic and Carolingian influences. Also, it was built in 1874. It has a plant cruciform: three naves with arcades and two semicircular chapels to the ends of the transept, which are covered by domes. A large dome emphasizes the Cruise space. The use of towers on the facades of churches is known as westwork (monumental entrance on the western facade with towers, hall and chapel towards where, by tradition, they look at the facades). This element, besides ennobling the facade, framed the main entrance to the enclosure. The facade is a mixture of Carolingian influences (the use of the Westwork that looks to the west) and *neorománicas* (its heaviness, its semicircular arches, or reduced arches, the rosette, the horizontality of its towers, the use of niches with sculptures). These elements give a great plasticity to the facade and a large presence to the structure within the traditional urban set of the center of Guayama (SHPO, 1995)

Vives Sugar Mill



Figure 11: Vives Sugar Mill

The Vives sugar mill in Guayama is a large structure, important for the development of the sugar industry in Puerto Rico, since it is the only existing structure related to the principles of the industry. The complex consists of two structures: a windmill and the plant processor. The mill is truncated cone 40 feet high and 28 feet in diameter, built on a promontory to the north of the processing plant. The structure has four levels built in wood. The sugar processing equipment was located on the first level, operated by the wind that moved the gear located in the fourth level. This space connected to the outside through four arcs of different sizes. The processing plant consists of a nave with dimensions 20 'x 137' x 35 ', oriented from north to south. The part closest to the mill, where the boilers are, is paved with brick, while the rest of the structure has a wooden floor. The original roof was made of wooden fences covered with roof tiles. The north aisle and chimney were destroyed and only parts of the base of its walls remain. The structures are built with river stones, granite blocks and bricks. Stone and granite are materials found in the area. The details in the building were built in stages, with the central nave being the oldest. The details of the doors and windows are different throughout the structure. It is not known its construction date nor the period of greater activity of the hacienda. In 1910, the complex was abandoned. (SHPO, 1995)

4.4 Guayama Archaeological Reports

There are 154 reports in the CAT archives for the Guayama Municipality. Only one is in the Carite Ward. From these, 78 has a positive report, which is a high percentage in comparison with other municipalities. Most of these reports consist of linear studies for infrastructure that are made along the rural main roads. Only the research of Sharon Melendez has a regional perspective.

The archaeological reports made for the municipality of Guayama began in the 1980's, when 25 investigations were conducted. But the most prolific is the 1990's when 64 investigations were conducted. From these, the one that stand out is the one from Olimpo Community made by Andrés Príncipe. Also, Desvío Sur De Guayama PR-3, Hacienda La Carlota by Marisol Rodríguez Miranda and Ethel Schlafer, the *Phase II* by Eugenio Barnes, the Porción Yacimiento Arqueológico En Sección De Servidumbre Conector Coquí and the Guamaní Ceremonial Court by Pedro Alvarado Zayas, and the Investigations in AES facilites by Marlene Ramos. They all have positive results that lead to further investigations Phase II and Mitigations.

Guayama is also included in some big projects developed along southern municipalities, the investigations for the PR 3, PR 53 and the recent investigation for the super aqueduct.

4.5 Archaeological Investigations Near the Project Area

In the archives of government agencies, two investigations in the Carite Ward were found, both covers the area of the undertaking. A Phase IA-IB of 1993 for the project Improvement to the Aqueduct System of Carite-Jobos conducted by Jesús Figueroa Lugo. It follows the road alignment of the mentioned communities and includes the area of PR 179 km 13. He briefly discussed the archaeology of the municipality and the road history. It had a negative result. (Fig. 12)

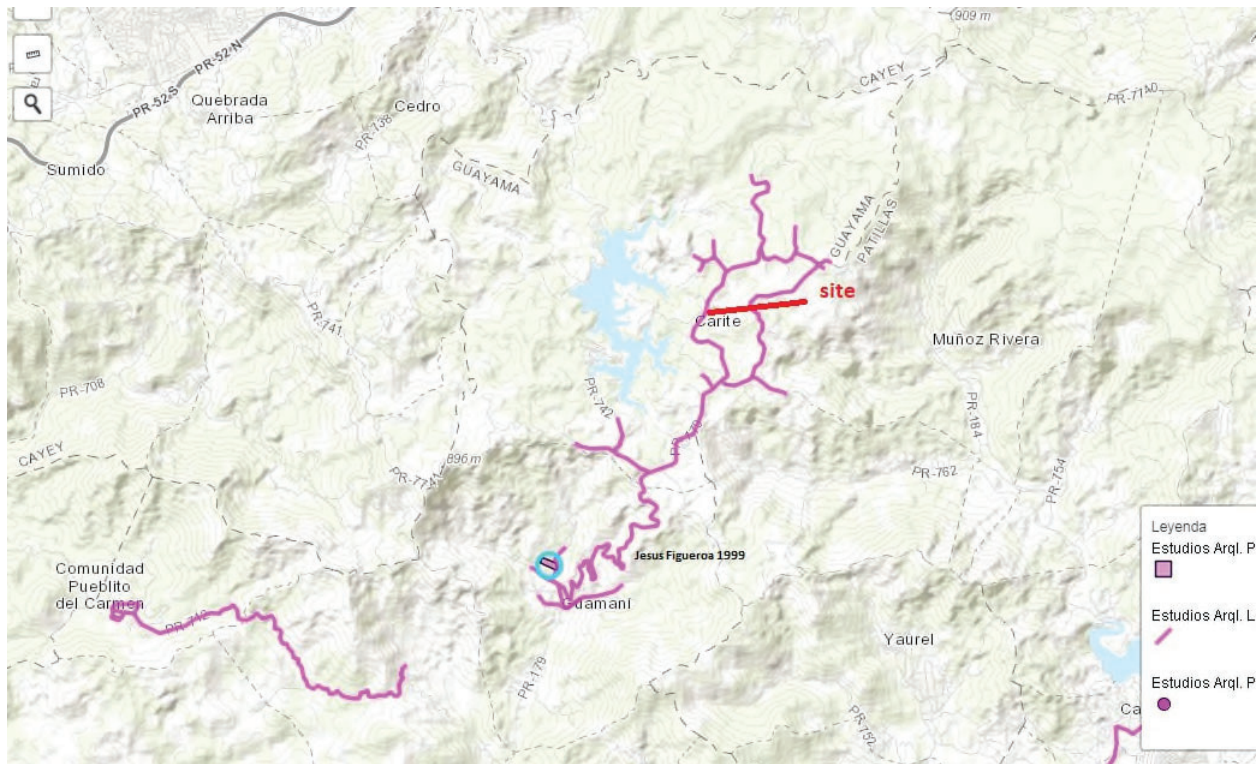


Figure 12: Image of the OECH System Showing the Location of the Investigation of Jesús Figueroa on 1993.

The other one is a Stage I Cultural Resources Assessment prepared by A. Gus Pantel in 1997 for the FEMA 4017 DR-PR HMPG project in Guavate, Cayey for PREPA. Although it is a project in another municipality, it includes important information about the history of the roads that leads from Cayey to Guayama, PR 184, PR 179. The first one began in Cayey and goes through Guavate to the Guamaní Sector. The second one goes through Carite. It also had a negative result.

Reconstruction of Landslide ER-HWY-308 Project, Guayama PR

NUM	Project	Agency	Date	Ward	Phase	Author	Result
1	Finca "La Hacienda" Parcela IA	CAT	??		IA-IB	Herminio R. Rodríguez Morales	Negative
2	Villas Del Mar Caribe	CAT	??	Machete	IB	Juan González Colón	Negative
3	Sewerage System (EPA Project No. C-72-107-01)	CAT	1981		IA	Marisol J. Meléndez Maíz	Positive
4	Wastewater Treatment Facilities Planned for Carmen, La Plena, Jájome Bajo, Pedro Ortiz	CAT- OECH	1981	Carmen, La Plena, Jájome Bajo y Pedro Ortiz	IA	Antonio Daubón Vidal	Positive
5	Planta Regional de Tratamiento	CAT	1986	Machete	IB	Miguel Rodríguez López	Positive
6	Guayama to Machete Ward Trunk Sewer and Machete Ward to W.W.T.P. Trunk Sewer	CAT	1986	Machete	IB	Harry Alemán Crespo	Negative
7	Centro Comercial Guayama Plaza Urb. Jardines de Monte Olivo	CAT	1986	Algarrobo	IA	Harry Alemán Crespo	Negative
8	Desvío Sur de Guayama PR- 3, Autoridad de Carreteras	CAT	1987	Pueblo	IA-IB	Miguel Rodríguez López	Positive
9	Whitehall Laboratories P.R.	CAT	1987	Pozo Hondo. Jobos	IA-IB	Jaime G. Vélez Vélez	Positive
10	Planta Regional De Guayama	CAT	1987	Machete	II	Miguel Rodríguez López	Positive
11	Iglesia Luterana de Cristo Urbanización Rexmanor	CAT	1987	Caimital	IA-IB	Andrés Príncipe Jacome	Negative
12	Whitehall Laboratories P.R. Informe Preliminar	CAT	1987	Jobos	IA	Jaime G. Vélez Vélez	Positive
13	Whitehall Laboratories P. R.	CAT	1987	Jobos	Informe Preliminar IB	Jaime G. Vélez Vélez	Negative
14	Improvements to the Water Supply System of Carmen Community	CAT	1987	Carmen	IB	Miguel Rodríguez López	Positive
15	Construcción Charca de Irrigación Planta Tratamiento Regional	CAT	1987	Machete	IB	Miguel Rodríguez López	Positive
16	New Proposed Route Between MH-A-21 to MH-A- 25 Salinas - Guayama Trunk Sewer	CAT	1987		IB	Miguel Rodríguez López	Positive
17	Guayama Regional Wastewater Conveyance Facilities (Remaining)	CAT- OECH	1987		IB	Miguel Rodríguez López	Positive
18	ICI Pharmaceuticals P.R. Inc.	CAT	1988	Pozo Hondo	IA	Jaime G. Vélez Vélez	Positive

Table 6: Archaeological Investigation in the Guayama Municipality from 1981-1988 (CAT and OECH Archives)

Reconstruction of Landslide ER-HWY-308 Project, Guayama PR

ICI Pharmaceuticals P.R. Inc.	CAT	1988	Pozo Hondo	IA	Jaime G. Vélez Vélez	Positive
Interamericana Park Carr. 744 KM 2.0	CAT	1988	Machete	IA-IB	Iván F. Méndez Bonilla	Negative
Guayama Regional Wastewater Conveyance Facilities	CAT	1988		IB	Marlene Ramos Vélez	Negative
Planta de Tratamiento de Agua Potable de Guayama	CAT	1988	Algarrobo	IA-IB	Armando J. Martí Carvajal	Negative
Hacienda La Carlota Desvío Sur De Guayama PR 3 R	CAT	1988	Machete	II	Marisol Rodríguez Miranda	Positive
Pfizer, Inc.	CAT	1988	Jobs-Pozo Hondo	IA-IB	Jaime G. Vélez Vélez	Positive
Nueva Ruta Acceso Phillips/Jobos Relocalización PR-3 Salinas - Guayama	CAT	1988		IB	Miguel Rodríguez López	Negative
Hacienda La Carlota PR-3	CAT	1989	Machete	Trabajo Adicional	Ethel V. Schlafer Román	Positive
Transmisor de Televisión	CAT	1990	Algarrobo	IA	Juan González Colón	Negative
Parque Industrial Guayama	CAT	1990	Jobs	IA-IB	Antonio Daubón Vidal	Positive
Terrenos que Ocupará el Parque de Bombas	CAT	1990	Pueblo	IA-IB	Daniel Molina Feal	Positive
Comercial Fast Food - Gas Station Carretera PR #3	CAT	1990	Machete	IA-IB	Jesús S. Figueroa Lugo	Negative
ICI Pharmaceuticals Off-Site	CAT	1990	Jobs	IA-IB	Antonio Daubón Vidal	Positive
Desarrollo Preliminar Ciudad Universitaria, Carretera PR-744 KM 1.3	CAT	1991	Machete	IA-IB	Iván F. Méndez Bonilla	Negative
ICI Pharmaceutical Off-Site P.R. 710	CAT	1991	Machete	Monitoría	Antonio Daubón Vidal	Negative
Facilidades de Protrero PR-3, Km 133.0	CAT	1991	Algarrobo	IA-IB	Jesús S. Figueroa Lugo	Negative
Porción Yacimiento Arqueológico En Sección De Servidumbre Conector Coquí	CAT	1991		II	Pedro A. Alvarado Zayas	Positive
Desvío Sur De Guayama PR-3, Hacienda La Carlota Informe Técnico	CAT	1991	Machete	III	Eugenio Barnés Español	Positive

Table 7: Archaeological Investigation in the Guayama Municipality from 1988 (CAT and OECH Archives)

Desarrollo Solares Residenciales Sector Olimpo, Carr. PR 748, Km. 2.5A37:G53	CAT	1992	Caimital	IA-IB	Jesús S. Figueroa Lugo	Negative
Desarrollo Solares Residenciales Carr. PR 748, Km 2.3	CAT	1992	Caimital	IA-IB	Jesús S. Figueroa Lugo	Negative
Troncal Sanitaria y Línea De Agua Potable, Anaquest Caribe, Inc.	\Ca	1992	Jobos	IA-IB	Virginia Rivera Calderón	Positive
Mejoras Al Sistema Sanitario Cárcel Regional De Guayama	CAT	1992	Jobos - Machete	IA-IB	Virginia Rivera Calderón	Negative
Pozo Histórico de Pozo Hondo P.R. 53, Guayama - Salinas	CAT	1992	Pozo Hondo	Estudios Adicionales	Pedro A. Alvarado Zayas	Positive
Urbanización Hacienda Adela	CAT	1992	Jobos	II	Eduardo Questell Rodríguez	Positive
Plaza Ceremonial Guamaní (P-2) PR-53, Estudios Adicionales	CAT	1992	Guamaní	Estudios Adicionales	Pedro A. Alvarado Zayas	Positive
Yacimiento Arqueológico Conector Coquí, PR-53 Estudios Adicionales	CAT	1992		II Extendida	Pedro A. Alvarado Zayas	Positive
Mejoras Al Sistema De Acueducto	CAT	1993	Carite - Guamaní	IA-IB	Jesús S. Figueroa Lugo	Negative
Desarrollo De Solares Sector Olimpo	CAT	1993	Caimital	IA-IB	Eduardo Questell Rodríguez	Negative
Mejoras Al Sistema De Acueductos Al Sector Culebras	CAT	1993	Guamaní	IA-IB	Aramis Font Negrón	Negative
Plaza Ceremonial Guamaní (P-2) PR-53	CAT	1993		III	Pedro A. Alvarado Zayas	Positive
Extensión Desvío Sur de Guayama (PR 54)	CAT	1994	Pueblo - Algarrobo	IA-IB	Eduardo Questell Rodríguez	Negative
Improvements to The Sanitary Sewer System Corazón & Olimpo Communities	CAT	1994	Caimital	IA-IB	Eugenio Barnés Español	Negative

Table 8: Archaeological Investigation in the Guayama Municipality from 1991-1994 (CAT and OECH Archives)

Reconstruction of Landslide ER-HWY-308 Project, Guayama PR

Improvements to The Sanitary Sewer System Corazón & Olimpo Communities (CORAZÓN COMMUNITY SECTION)	CAT	1994	Caimital	IA-IB	Eugenio Barnés Español	Negative
Planta De Energía Total AES Puerto Rico, L.P.	CAT	1994	Jobos	IA-IB	Marlene Ramos Vélez	Positive
Nuevas Facilidades A La Cárcel De Guayama	CAT	1994	Jobos	IA-IB	Ethel V. Schlafer Román	Negative
Improvements to The Sanitary Sewer System Corazón & Olimpo Communities (OLIMPO COMMUNITY SECTION)	CAT	1994	Caimital	IA-IB	Eugenio Barnés Español	Positive
Segregación de Ocho (8) Solares, K. 0.3, Desvío Sur PR-54	CAT	1994	Machete	IA-IB	Iván F. Méndez Bonilla	Negative
Construcción de Edificio Comercial	CAT	1994	Machete	IA-IB	Eduardo Questell	Negative
Extensión Desvío Sur de Guayama (PR 54), Alterna Numero 6	CAT	1995	Algarrobo	IA-IB	Eduardo Questell	Negative
Urbanización Estancias Vigía Calle Cautino Final	CAT	1995	Pueblo	IA	Antonio Daubón Vidal	Negative
Estación de Patrullaje Carr. PR #1, Km. 147.1	CAT	1995	Jobos	IB	Antonio Daubón Vidal	Negative
Construcción de Vivienda Social Apartamentos Multipisos Solar de 2,357.73 Metros Cuadrados	CAT	1995	Guayama	IA-IB	Marlene Ramos Vélez	Negative
Construcción De Vivienda Social Finca De 10.249 Cuerdas	CAT	1995	Machete	IA-IB	Marlene Ramos Vélez	Positive
Comercial Las Fuentes 3 Solares y Remanente Carr. Estatal PR-54 Km. 0.9	CAT	1995	Pueblo	IA	Iván F. Méndez Bonilla	Negative
Cultural Resource Survey of the Río Guamaní Flood Control Study Municipio de Guayama, Puerto Rico	CAT	1995		IA-IB	Michael A. Cinquino Argana	Positive

Table 9: Archaeological investigation in the Guayama Municipality from 1994-1996 (CAT and OECH archives)

Planta De Energía Total AES Puerto Rico, L.P. INFORME FINAL	CAT	1996	Jobos	II	Marlene Ramos Vélez	Positive
Planta De Energía Total AES Puerto Rico, L.P. (Informe Final)	CAT	1996	Jobos	III	Marlene Ramos Vélez	Positive
Desarrollo de 56 Solares Residenciales en el Barrio Guamaní	CAT	1996	Guamaní	IA-IB	José Rivera Meléndez	Positive
Sitio La Tuna 1	CAT	1996		IA-IB	Diana López Sotomayor	Negative
Mejoras a la carretera PR-3, desde desvío sur de Guayama hasta desvío de Patillas	CAT	1996	Algarrobo- Guayama y Palmas- Arroyo	IA-IB	Antonio Daubón Vidal	Positive
Monte Real	CAT	1997	Algarrobo	IA-IB	Harry Alemán Crespo	Negative
Desarrollo Finca Monte Olivo Carr. PR-748, Km 0.2	CAT	1997	Caimital	IA-IB	Eduardo Questell Rodríguez	Positive
Vista Hermosa Remanente 16 Solares Residenciales Carr. 744 Km. 1.8	CAT	1997	Machete	IA-IB	Harry Alemán Crespo	Positive
Urb. Caribe Mar Sector Cimarrona Carr. PR 713, Km. 1.8	CAT	1997	Jobos	IA-IB	Eduardo Questell Rodríguez	Negative
Estancias Del Olimpo II Sector Olimpo Carr. PR 748, Km. 2.2	CAT	1997	Caimital	IA-IB	Eduardo Questell Rodríguez	Negative
Parador Turístico Carr PR-7710, Km. 2.9 Sector Pozuelo	CAT	1997	Jobos	II	Iván F. Méndez Bonilla	Positive
Parador Turístico Carr. PR-7710, Km 2.9 Sector Pozuelo	CAT	1997	Jobos	IA-IB	Iván F. Méndez Bonilla	Positive
Urbanización Valle de Guayama	CAT	1998	Pueblo	IA-IB	Juan J. Ortiz Aguilú	Negative
Residencial Vista del Sol	CAT	1998	Machete	IA-IB	José Rivera Meléndez	Negative
Desarrollo Residencial "Reparto Los 22", to the north of Carr. P.R. #3 Km. 144.4	CAT	1998	Pozo Hondo	IA-IB	Harry Alemán Crespo	Negative

Table 10: Archaeological investigation in the Guayama Municipality from 1996-1998 (CAT and OECH archives)

Desarrollo Residencial "Brisas del Flamboyán" al Norte de Carr. P.R. #3 Km 145.4	CAT	1998	Jobos	IA-IB	Harry Alemán Crespo	Negative
Mejoras Al Sistema Sanitario Comunidad Olimpo	CAT	1998	Caimital	II	Andrés Príncipe Jacome	Positive
Mejoras Al Sistema Sanitario Comunidad Olimpo	CAT	1998	Caimital	II	Andrés Príncipe Jacome	Positive
Desarrollo De Varios Proyectos Relacionados A La Planta De Energía Total, AES Puerto Rico, L.P.	CAT	1999	Jobos	IA	Marlene Ramos Vélez	Positive
Nuevos Horizontes Treatment Center	CAT	1999	Caimital	IA	Aramis Font Negrón	Negative
Relacionado A Planta De Energía Total, AES Puerto Rico, L.P. Parcela Sur En Planta De Tratamiento Regional De La Autoridad De Acueductos, Al Oeste Del Sitio Arqueológico	CAT	1999	Jobos	II	Marlene Ramos Vélez	Positive
Varios Relativos A La Planta De Energía Total AES Puerto Rico, L.P.	CAT	1999	Jobos	IB	Marlene Ramos Vélez	Negative
Nuevo Hogar Seguro	CAT	1999	Jobos	IA-IB	Miguel Rodríguez López	Negative
Caribbean Golf & Equestrian Resort	CAT	1999	Cimarrona	IA	Juan González Colón	Negative
Mejoras Al Sistema Sanitario De Las Comunidades Corazón y Olimpo	CAT	1999		II	Andrés Príncipe Jacome	Positive
"Guayama Regional Aqueduct Strategic Project " (Alternativa 2)	CAT	1999		IA-IB	Miguel Rodríguez López	Positive
Residencial Unifamiliar Haciendas Del Sur	CAT	2000	Jobos	IA-IB	Antonio Daubón Vidal	Negative
Urb. Hacienda Adela	CAT	2000	Jobos	IA-IB	Jesús S. Figueroa Lugo	Positive
Jardines De La Reina	CAT	2000	Jobos	IA-IB	José Rivera Meléndez	Negative
General Planta Energía Total, AES Puerto Rico, L.P.	CAT	2000	Jobos	(Ampliación) IB	Marlene Ramos Vélez	Positive

Table 11: Archaeological Investigations in the Guayama Municipality from 1998-2000

Reconstruction of Landslide ER-HWY-308 Project, Guayama PR

Nueva Ruta De Un Segmento De Tubería ("Guayama Regional Aqueduct Strategic Project")	CAT	2000	Pueblo y Palmas	IA-IB	Miguel Rodríguez López	Negative
Construcción de Parque de Softball y Área Recreativa	CAT	2000	Guamaní	Fase I	Armando J. Martí Carvajal	Negative
Molino Apartments	CAT	2001	Machete	IA-IB	Juan González Colón	Positive
Berwind Realty S.E. (Farmacia El Amal)	CAT	2001	Machete	IA	Antonio Daubón Vidal	Negative
El Legado Golf Course	CAT	2001	Cimarrona	IB	Juan González Colón	Negative
Construcción Parque De Pelota Calle Picaflor, Comunidad Olimpo	CAT	2001	Caimital	IA-IB	Antonio Daubón Vidal	Negative
Rampa De Salida Desde La PR-53 Hacia La PR-713	CAT	2001	Pozo Hondo, Sector Cimarrona	IA	Norma Medina Carrillo	Negative
Ventanas Al Mar Calle Carlota, Urb. Vista Mar	CAT	2001	Machete	Fase 1	Armando J. Martí Carvajal	Negative
Escuela Superior Vocacional de Guayama	CAT	2002	Pueblo	IA-IB	Adalberto Maurás Casillas	Negative
Hacienda Los Recreos	CAT	2003	Pozo Hondo	IA-IB	Ethel V. Schlafer Román	Positive
Urbanización Costa Real, Carr. PR-3, Km 132.1, Interior SHPO # 05-09-03-03	CAT	2003	Algarrobo	IA-IB	Harry Alemán Crespo	Negative
Soterrado, Mobiliario Urbano y Mejoras de Aceras	CAT	2003	Pueblo	Monitoría	Harry E. Alemán Crespo	
Urb. Hacienda Los Recreos	CAT	2003	Pozo Hondo	Monitoría	Antonio Daubón Vidal	Positive
Urb. La Pradera	CAT	2004	Machete	IA	Eduardo Questell Rodríguez	Negative
En ocho (8) Solares Vacantes O Baldíos Al Proyecto Diseño Y Reconstrucción De Unidades Para Vivienda Y Oficinas Municipales En Centro Urbano De Guayama	CAT	2004	Guayama	IA	Harry Alemán Crespo	

Table 12: Archaeological Investigation in the Guayama Municipality from 2000-2004 (source CAT-OECH Archives)

Reconstruction of Landslide ER-HWY-308 Project, Guayama PR

Oleoducto Philips – Aguirre	CAT	2004	Jobos - Aguirre	IA	Raquel del C. Camacho Hernández	Positive
Hacienda Los Recreos	CAT	2005	Pozo Hondo	III	Dr. Jesús Vega	
Estancias de Dulce Sueño	CAT	2005	Caimital	IA-IB	Juan J. Ortiz Aguilú	Negative
Cimarrona Village	CAT	2005	Pozo Hondo	IA-IB	Eduardo Questell Rodríguez	Negative
Extensión Centro Pontificia Universidad Católica de Puerto Rico	CAT	2005	Machete	IA-IB	Fesús FigueroaLugo y Luis A. Rodríguez Gracia	Negative
Desarrollo Comercial El Molino	CAT	2005	Machete	IA-IB	Juan González Colón	Negative
Centro Comercial Guayama Plaza	CAT	2006	Algarrobo	IA-IB Revisado	Aramis Font Negrón	Negative
El Delirio	CAT	2006	Jobos	IB	Marisol Martínez Garayalde	Negative
Institución Super Máxima Seguridad, Complejo Correccional	CAT	2006	Jobos	IA-IB	Aramis Font Negrón	Positive
Go-Karts Guayama Communications Site	CAT	2007	Pozo Hondo	Fase I	Raquel del C. Camacho Hernández	Negative
Residencial Y Turístico	CAT	2007	Algárrobo	IA-IB	Aramis Font Negrón	Negative
Proyecto Comercial	CAT	2007	Machete	IA-Ib	Marisol Martínez Garayalde	Negative
Replacement of Bridge No. 138 Over Guamani River on PR-3	CAT	2007	Machete	IA-Ib	Eduardo Questell Rodríguez	Negative
Urbanización Brisas del Mar Sección IV, V y VI	CAT	2007	Machete	IA-IB	Marisol Martínez Garayalde	Negative

Table 13: Archaeological Investigation in the Guayama Municipality from 2004-2007(source CAT-OECH Archives)

Construcción del Sistema Sanitario para la Comunidad San Marín y Eliminación de la Estación de Bombas de Green Hills	CAT	2007	Algarrobo	Monitoría	Jaime G. Vélez Vélez	Negative
Sea Breeze	CAT	2008	Machete	IA	Juan González Colón	Negative
Plaza & Parque del Monte	CAT	2008	Caimital y Algarrobo	IA-IB	Eduardo Questell Rodríguez	Negative
Villas de Cimarrona	CAT	2008	Cimarrona	IA-IB	Osvaldo torres y Federico Freytes Rodríguez	Negative
Ext. Urbanización Hacienda Los Recreos	CAT	2010	Pozo Hondo	IB	Antonio Daubón Vilar	Negative
Salvation Army Kroc Comunity Center	CAT	2010	Machete	IA Revisado	Ethel V. Schlafer Román	Negative
Desarrollo Residencial Piñero	CAT	2010	Jobs y Pozo Hondo	IA-IB Revisado	Aramis Font Negrón	Negative
Urbanización Brisas del Mar, Canal de Desagüe, Carretera Estatal PR 54, Km. 0.3 Interior	CAT	2010		IA-IB	Marisol Martínez Garayalde	Negative
AES Ilumina LLC	CAT	2010	Jobs	IA	Miguel Rodríguez López	Positive
AES Ilumina LLC	CAT	2010	Jobs	IB	Miguel Rodríguez López	Positive
Ares-Ilumina Sitio 2	CAT	2011	Jobs	II	Miguel Rodríguez López	Positive
Parador Sol del Caribe	CAT	2011	Jobs	IA-IB	Fernando Alvarado Muñoz	Negative
Pase Tablado Punta Pozuelo	CAT	2011	Jobs	IA-IB	Fernando Alvarado Muñoz	Negative
AES-Ilumina Sitio 1	CAT	2011	Jobs	II	Miguel Rodríguez López	Positive
Guayama Valley Master Plan	CAT	2011	Pozo Hondo	IA	Antonio Daubón Vidal	Positive

Table 14: Archaeological Investigation in the Guayama Municipality from 2007-2011 (source CAT-OECH archives)

Improvements to the Water Treatment Plant	CAT	2011		IA	Adalberto Maurás Casillas	Negative
Molino Vives	CAT	2011		IA-IB	Oswaldo Torres	Positive
Remodelación de Casa Alcaldía en Calle Vicente Plés Anés #2 Este	CAT	2011	Pueblo	IA	Harry E. Alemán Crespo	Positive
Ingenio Azucarero Molino Vives	CAT	2012		II	Oswaldo Torres	Positive
La Melanía Solarfarm	CAT	2012	Pozo Hondo	IA	Fernando Alvarado Muñoz	Positive
Extracción de Corteza Terrestre Finca Santisteban	CAT	2012	Pozo Hondo	IA-IB	Fernando Alvarado Muñoz	Negative
Remodelación Casa del Rey. Centro de la Edad Dorada. Calle Ashford esquina Calle Cautiño	CAT	2012	Pueblo	IA	Harry E. Alemán Crespo	Positive
Dow Agrosienciences/ Mycogen Seed	CAT	2012		IA	Sharon Meléndez Ortiz	Positive
Walmart Supercenter Facilities. Documentación de Remanentes Estructurales	CAT	2013	Pueblo. Algarrobo	IA	Juan González Colón	Positive
Dow Agrosienciences-Mycogen Seeds PR	CAT	2013		II	Sharon Meléndez Ortiz	Positive
Dow Agrosienciences/Mycogen Seed Informe de Fin de Campo	CAT	2013		II	Sharon Meléndez Ortiz	Positive
Dragado de mantenimiento de la Bahía Las Mareas	CAT	2015		Subacuática	Richard Fontánez Aldea	Negative

Table 15: Archaeological Investigation in the Guayama Municipality from 2011-2015(source CAT-OECH Archives)

Urbanización Jardines de Guayama Avenida Laporte y Carr. PR-3	CAT	2016	Machete	IA-IB	Harry Alemán Crespo	Negative
Centro Comercial Santa Elena	CAT	2016	Machete	IA-IB	Aramis Font Negrón	Negative
Inn-093 Pozuelo-Guayama Site. Carretera PR-07710 Km. 4.8	CAT	2016	Jobos	IA-IB	Fernando Alvarado Muñoz	Negative
Demolición total de la antigua industria farmacéutica TAPI	CAT	2016	Jobos	IA	Ethel V. Schlafer Román	Positive
Guayama Machete site	CAT	2017	Machete	IA-IB	Fernando Alvarado Muñoz	Negative

Table 16: Archaeological Investigation in the Guayama Municipality from 2011-2015(source CAT-OECH Archives)

5. Brief Historical Context

5.1 The Town

Due to the limited scope of the undertaking, a brief history of the municipality to enclosure the project will be presented. It must be taken into consideration that the location of the undertaking, in the mountainous area, far away from the urban nucleus of the population, points out to an area whose development has not been well historically documented. At this moment, despite the treacherous roads and scarp land it can be observed houses and small “caseríos” along the road that connects Cayey and Guayama, by the Carite area. Our experience tells us that this settlement pattern is the continuation in time, of old settlements that go back to the colonial time and possibly to the pre-hispanic period.

In the 16th century this was the land of caciques Guayama and Guamaní. These caciques were part of the wars and rebellion that occurred in the first centuries of the conquest. These areas were taken by the contrabandist to establish their ports. So, in this century the greatest asset that this municipality had was its port. It provided refuge to contraband and clandestine trade, specially of hides from cattle and for slave trade.

During the 17th century, the area suffered an economic plunge due to the fall in the ginger and sugar price which stopped, to a certain extent, its urban growth, although the area did not stop being inhabited by its settlers.



Figure 13: Fragment of a 1600's Map Showing at the South the "Pto de Guayama". (Descripción Distrito Isla Española (source : bibliotecadigitalhispanica. Consulted 2018)

The process of founding villages in the 18th century began when a neighbor of a herd, riverside or crossroads of rural roads, or any other unpopulated place, built sets of homes built that promised to increase, requested the government a license to establish the town and a hermitage or church. The petition was accompanied by a power from neighbors. If the government approved the request, it appointed an official who distributed the lots and the land for cultivation, and designated the lands for the church, the king's house, the plaza, and the call is all more or less in accordance with the stipulations of the laws of Indias. ¹³

¹³ Hostos 1976 page 424

It is important to know that applications for a license to found a town were always signed by a small number of applicants and by a large majority of strangers which signed "on their behalf". In addition, all or almost all these illiterate applicants were destitute, even if they possessed some land by a neighborhood card, or at least by the permission to cultivate as "aggregates" of the owner of the parent *hato*, was understood that they were intimately subject in practice to the domain of the owner of the *hato*.

In the 18th century, a village began to form around an Ermita erected in honor of San Antonio de Padua. Although there are no exact data on the date of foundation of this town in the archives, Don Pedro Tomas de Cordova assured that it was on January 29, 1736 when the Governor of the Island, Matías de Abadía, authorized the founding of the town. For this date, the port of Guayama was already very crowded and the town was considered as the third in the order of wealth and yields. For this purpose, a church was erected under the same dedication of the hermitage and the parish was founded. This parish was the first between Coamo and Humacao. At this moment its territory was reduced. In 1793, Yabucoa was separated. Also, in 1799, Maunabo was separated as well.

By the third part of the century, Fernando Miyares y González documented the current state and the news of the towns of this island in 1775. He told that Guayama at that time:

"This town is dominated by a hill, it is one of the best on the island, composed of 100 houses that form a square, where the church is very regular, as the "estancias" are immediate, so there are always some families in the town, what does not happen on any other town on the island. They have two companies of infantry disciplinary militias. They cultivate with some abundance the coffee and malagueta or pepper from Tabasco. One "legua" from Guayama is Puerto Real or Arroyo, very open but so shallow that only in the farrest part vessels of medium size can dock, and there is a league to the Guayama River, which forms a port as bad as the antecedent, covering the Cabo Malapascua on the east, which is the most southern of the whole island. Many neighbors in this area have carefully cultivated their fields ... the streams and the river run and irrigate the plains, the sugarcane, the orchards and the bisques ... passing a quarter of a league on the flat road the roughest broken that the coast begins, continuing for

eight leagues this Buena Vista ... past the Guayanes mouth, risky in time of water, you can clearly see the island of Bieques, which is deserted ... shortly they discovered some twelve houses scattered, what they call Buena Vista. "

A year later, in 1776, Fray Iñigo Abbad, y Lasierra, in his description of the towns established that:

"This town of Guayama is the first on this south coast, from the city of Puerto Rico, that has its houses congregated up to 200, formed by a spacious square, leaving its church and Plaza in the center. It is located in an arid and sterile sand. The sea surrounds it by east and "medio día", by north the mountains of the Cordillera and the Cape of Malapascua and by the west a dilated plain that produces only sterile trees.

Still, its inhabitants, that amount to 531 families with a population of 4, 589 souls of every *casta* , have medium size farms at the foot of the mountains and the shores of Guamani River, in which they cultivate, coffee, tobacco, sugarcane, maize and other produce, being of those that they take more advantage of the pepper and wood from the forests to sell it furtively to foreigners, with livestock that breed on the mountain, which also passes to the islands"

The difference in the number of houses reported can relate to the territory that they consider to be the main part of the town. At this time around the island, the town square consisted of two or three streets, and the larger part or the population scarce around the territory near the farms. A fact to emphasize is that of the activities in the mountainous area of the municipality. Being the trade of ginger, pepper and cattle the main source of sustenance in the first centuries, it can point to the reason for the settlements in that harsh area.

By the end of the century, naturalist Andre Pierre Ledru reported that Guayama had a population of 5,120, that cultivated rice, corn, coffee and allspice ¹⁴ , and exported plenty cattle abroad. They also exported excellent wood for construction. ¹⁵

¹⁴ He refers to malagueta, that is the pepper that have been recollected along the centuries in the area.

¹⁵ Ledru, A.P.

Reconstruction of Landslide ER-HWY-308 Project, Guayama PR

In the early 19th century, the Colonel of Infantry Don Pedro Tomas de Córdoba visited the Municipality of Guayama. In his book *Geographical, Historical and Statistics Memorial of the Island of Puerto Rico*, he referred to the origin and foundation of Guayama in addition to the geographical, social and infrastructure of this.

"It is located on the south coast of the island, a quarter of a league away interior ... It was founded in 1761. The only river that runs through this jurisdiction is from Guamaní, which goes out to sea in the port of Jobos ... There are establishments of great value in agriculture, and it is one of the first towns ... The roads are passable and are stripped of weeds, but in rainy weather they suffer from the same inconveniences as all of the Island. However, they have better shape and direction than the ones that are usually in it ... In 1824 it had a population of 5,113 souls and in 1828 the census came to 67,974 ... Among the neighbors there were 117 artisans, 30 emigrated, 292 foreigners, 1 land surveyor, 1 notary and 1 doctor. There were 11 houses and 51 swamps in the town; and 299 houses, 372 deposits in the field, 36 stores and 19 *ventorrillos*. It also has an inhabited port with Customs and other corresponding employees, which moved from Humacao, where it was first established ...

The Church is ruined. It was erected in 1736 with the invocation of Saint Anthony of Padua. It is being built nowadays. Mass is celebrated in a small *hermita* (sic) of wood and tile ... The cemetery with wooden fence is in good condition. In the visit of 1824 Mr. Latorre arranged, the means were arbitrated to build the king's house; the Church was rebuilt, and the roads composed... That party has had an extraordinary increase in agriculture. Many good cane plantations occupy the land that a little time ago was full of weeds. So, because of its importance agricultural, its port is very busy, and it is the third town in the order of wealth and returns. It must flourish a lot because they provide this improvement with their good lands, the port and the industriousness of the neighbors. "

During 1804 and 1805, the residents of Patillas, fought and obtained "the transfer of the parish to that place, (Patillas) as a point more suitable for a large population, without being subject to the dryness of it. After many prosecutions by the prosecutor Don Francisco Ayesa, he obtained from the court the order to return the parish to Guayama.

Several years later, in 1811, the town of Patillas was founded.¹⁶ In 1847, it was annexed by Salinas to be separated in 1851. Likewise, in 1855, Arroyo was separated.

At the beginning of the 19th century the area of Guayama flourished as a sugar emporium. The cane fields covered their fertile lands and the valleys near the coast were dismantled. During this time, modern sugar mills were also built for grinding sugarcane and the port was built. Due to the need of man-labor for the sugar estates, a significant number of "bozales", black slaves born in Africa, were settled in this town.

Some of the haciendas in the territory of Guayama at the time were:¹⁷

Hacienda Gregoria/Gregoria M Pica - Guayama. It was established by Matias Pica ca. 1830 with an ox driven mill, upon his death in 1842 it passed on to his heirs which included his daughter Carmen Pica Martelo and her husband Luis Cabassa Tassara. The estate was represented by Benito Texidor until 1860 when its administration passed on to Leopoldo Cabassa who in 1865 installed a steam mill and acquired additional lands growing it to 425 acres of which 250 were planted with sugarcane. According to Luis Figueroa in his book *Sugar, Slavery and Freedom in Nineteenth-Century Puerto Rico*, "Don Jesús Maria Texidor y Vazquez (1836-) owned still another plantation, Hacienda Gregoria, a mid-size estate that was nevertheless Guayama's fifth most productive in 1872". It was located about 1,350 m Northwest of Central Machete just south of the Patillas Irrigation Canal.

Reunión - Guayama. Was established in 1850 by Elias Montaña and was acquired by José Gual Frias, a Catalanian immigrant who soon was going to become one of the leading proponents of technological modernization and the reorganization of production in Guayama's sugar industry during the 1880's. In 1891, it was acquired by the firm Amorós Hnos. It consisted of 550 acres of which 500 were planted with sugarcane. It was in Barrio Jobos about 3 Km from Guayama.

¹⁶ Montilla, Jaime

¹⁷ According to the site Riquezas de Puerto Rico. Consulted on noviembre 2018.

Santa Elena - Guayama. During the latter part of the 1800's, was the most productive Hacienda in Guayama and was owned by Catalina and Josefa Curet, daughters of Catalonian immigrant Pedro Curet and Andrea Lozada. This family came to Puerto Rico from Venezuela after the war of independence there. Catalina was married to Joaquin Villodas who had also been identified as owner of Santa Elena.

Between 1824 and 1827, the church was rebuilt, and in 1828 the construction of the new Casa del Rey was completed. At the beginning of this last year, Guayama was affected by a terrible fire that began in the residence of Francisco A. Ortiz, a resident of this municipality. The flames of the sinister fire destroyed 57 houses and 9 were hurt.

In 1831, Guayama appeared constituted by the Pueblo, Arroyo, Ancones, Yaurel, Jobos, Machete, Carreras, Algarrobos and Guamani wards. In 1848, however, the Pueblo Ward was subdivided into Pueblo Norte and Pueblo Sur and the Arroyo Ward was subdivided into Arroyo Este and Arroyo Oeste. In addition to the original wards at this date, in July 1854, the districts of Pozo Hondo, Palmas de Aguamanil, Caimital, Pitajayas, Cuatro Calles, Sabana-Enea, Palmas and the Salinas wards were added by Royal Order to the territory of Guayama. Salinas, that previously belonged to the Coamo Village, became part of Guayama. Then was constituted as an independent municipality three years later. (1851)

By 1848, the Arroyo Ward had developed into a large population that progressed rapidly and that in 1855 was an independent town under the name of Arroyo.

In 1878, Guayama appeared as the head of the 6th department, one of the seven departments which the island was divided territorially. This department included: Guayama, Sabana, Palmar (Comerio), Cidra., Cayey, Salinas, Arroyo, Hato Grande (San Lorenz, Juncos, Gurabo, Caguas and Aguas Buenas) and also consisted of the wards of Pueblo Norte and Pueblo Sur, Algarrobo, Guamani, Jobos, Machete, Pozo Ondo, Caimital, Carite and Quebrada Yeguas. The Wards of Ancones, Arroyo, Yaurel, Pitajayas and Cuatro Calles became part of the municipality of Arroyo. The Carreras mud was not an urban area.

At this moment the Palmas de Aguamanil and Sabana-Enea Wards, which were mentioned in 1848, had disappeared. However, the ward of Carite and Quebrada Yeguas emerged.¹⁸ In 1869, the Carite ward was annexed and increased to 168.7 square km (65.1 mi²) equivalent to 42,997 acres.

On August 12, 1898, Guayama was taken by US troops. During this year, Quebrada Yeguas disappeared and the Carmen ward appeared, probably because of a name substitution.

At the time of turmoil, Guayama was a poor town. According to Alexis Tirado Rivera:

“in 1898 was poor, but of working people. It was surrounded by cane and large areas of land dedicated to cattle grazing and horse. By 1899, the population of the city was 12,749 inhabitants. He suffered in those moments a strong drought and the City Council debated the need of having an irrigation system that would provide water to the sugar plantations.”¹⁹

The municipality maintained 40,126 acres of land used for different purposes. 2,261 of these were destined for the sowing of sugarcane; 1,282 for coffee and 16,945 were used as cattle grass. The municipal budget was scarce (about 60,000 pesos), which only covered the basic municipal expenses such as charity services, public education and road repairs.

After the Hispano-American War, the municipality continued to develop. In 1913, the Bernardini Theater was inaugurated, built by engineers Manuel Texidor and Alcalá del Olmo. The same property of the graduate Tomás Bernardini was the stage for artists of international fame. At this time, Guayama was considered, in the social order, one of the most important communities of Puerto Rico²⁰

¹⁸ JP, 1952

¹⁹ Tirado Rivera, 2017

²⁰Biblioteca de PR

During the 20th century, four modern sugar mills were established in Guayama that came to monopolize the productive activity of the first six decades of the century. These were the Central Machete, the Central Aguirre, the Central Lafayette and the Central Guamani.

According to Guillermo Atilés García, the Central Machete got its name from the same named ward, due to a piece of land with a machete figure located to the south (to Machete Beach). The central was first known as Hacienda Verdaguer and by the foundation of the Central in 1903, the haciendas Carlota, Santa Elena, Pica, Barrancas and Olimpo were integrated. Its owners and founders were the McCormick Brothers, successors of Don Félix Massó, represented by Don Bernardo Ferrer and Don Fernando Calimano. Of the *haciendas* mentioned, only Olympus lies in the Guamaní ward, the others belong to Machete. The centralist initiative originated under the management of Bernardo Ferrer, and this is how the Hacienda Santa Elena is joined by the property of Don Fernando Calimano, the Hacienda Carlota of the McCormick Brothers Sucesssion., the Hacienda Barrancas of the Succession of Don Antonio J. Alcaide, the Hacienda Pica of the Succession Cabassa & Pica, and the Hacienda Olimpo of Don Mariano Capó, being tenants the McCormick Brothers. At the time of its foundation the Central Machete had 3,500 *cuerdas* cultivated and had a capacity to grind more than 700 tons, although its daily production was around 500.

Interesting details of this *hacienda* is the fact that, according to Guillermo Atilés in the Central Machete, as well as in the 'Providence' and the *hacienda* 'Cuatro Calles', there are no wineries to force the workers to leave their day's wages in the centralists store again, but they were paid every Saturday in cash.²¹

²¹ (Atilés García, G. *Kaleidoscopio: prosa y verso*, Tomo I. Ponce, P.R.: Est. Tip. de Manuel López, 1905. pags. 57-60).

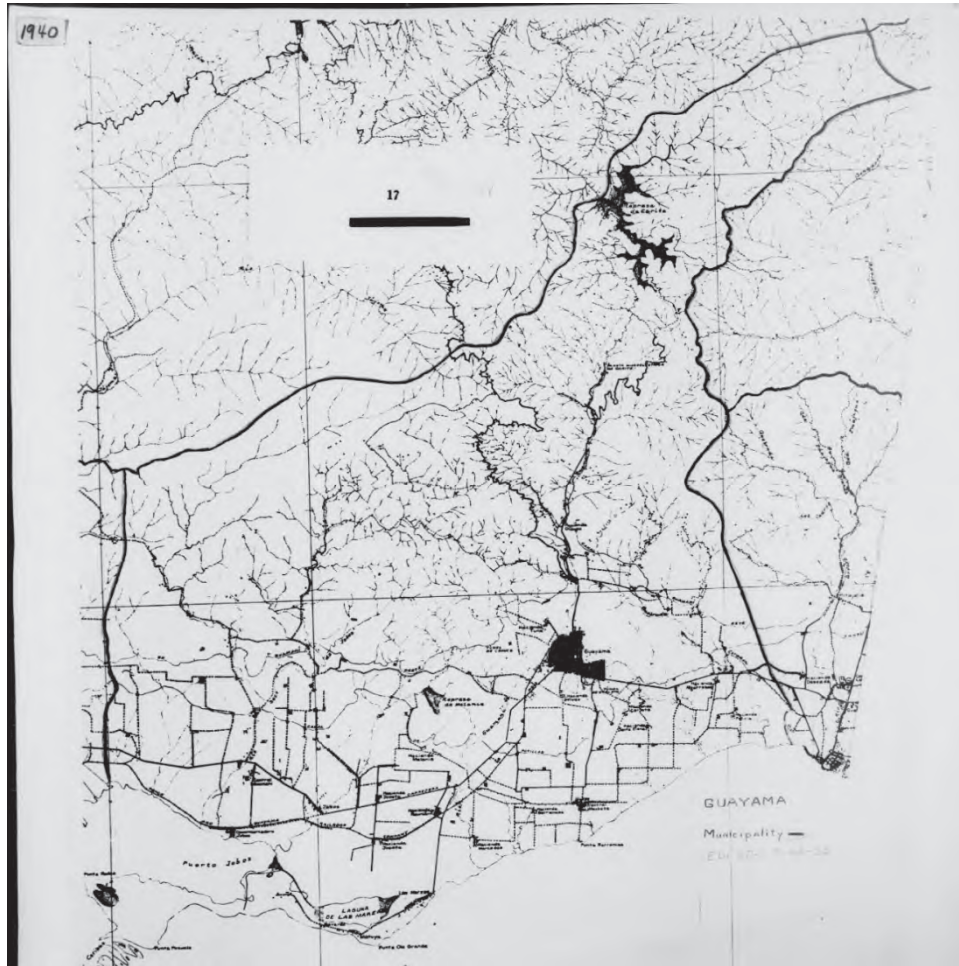


Figure 14: Map of Guayama I 1940 on the US National Archives (Consulted Online 2018)

During 1947 and 1948, when the Planning Board of Puerto Rico prepared the current Official Map of the Municipality of Guayama and its wards, following instructions from the municipal authorities, the urban area of this municipality was extended to include part of the rural areas Algarrobo, Caimital, Jobs, Machete and Pozo Hondo. From this date, the political organization of the municipality of Guayama has not changed, being currently constituted by the Pueblo ward and the rural wards of Algarrobo, Caimital, Carite, Carmen, Guamaní, Jobs, Machete, Palmas and Pozo Hondo.²²

²² JP, idem

By this time Guayama achieved a great industrial development, especially with the arrival of the Univis Optical Corp., the Angela Manufacturing Company and the establishment of the petrochemical complex of the Philips Petroleum Company. In 1968, the company began its production of paraffin, benzine, synthetic fibers, nylon, anhydrous plastic, one million gallons of gasoline daily and many other products. That same decade a thermoelectric plant was installed in the Las Mareas Ward. By then, agriculture began to decline as a result of the loss of land, industrialization and the construction of multiple housing developments. This urban growth affected the sowing of sugarcane. Despite this, in 1974 155,595 tons of cane were harvested in this municipality that produced 12,655 tons of sugar

5.2 The Road

Although it's possible to think that this is one of the oldest roads in the island, it was officially built in the 20th century, unless it existed earlier. Maybe it is the remain of the well-known "caminos de indios" that existed along the island and connected the "cacicazgos" or major "aldeas". Its configuration is that of a "camino de herradura", a term the Spaniards used to name the winding roads that followed the topographic contours in the mountainous areas.

It served to connect the Cayey Town to Guayama via the Carite Forest. But it is not well documented, as is the PR 4, (actual PR 14). It's said that in 1853, the mayor of Cayey suggested routes going either through Jajome or Carite, to enforce the agriculture.²³

In the AGPR there are a file dated 1884, when the Topographic Commission Corps of Engineers of the Crown of Spain made an Itinerary of the Military Map of the roads of the island and one of them reports the itinerary from Cayey to Guayama through Carite, from the Carretera Central between Caguas and Cayey to the crossroad with the road from Cayey to Guamani. As we said it is classified as a "camino de herradura" (Fig 15)

²³ Pantel, 1997



Figure 15: Route from Cayey to Guayama Through Carite. (Source: AGPR)

The initial description of the road is as follows:

“This road, from its start to where the Hacienda Nuñez is located, is quite good because it is the service road of the *hacienda* but has the disadvantage of passing over the La Plata River, that at flood time can’t be used. From that point, the road is very bad both for the large number of water courses that have to pass and for the “speed” (*rapidez*) of its slopes and soil, because only during the time of a large drought is not dangerous to travel through it”²⁴

The description continues mentioning all the creeks and topographic features of the road. From this information we couldn’t locate the actual point where the landslides are located, because no topographic feature is identified in this area.

In Figure 16 is presented a fragment of the main croquis showing the area that corresponds to the actual undertaking location. The map marks the area as Cerro del Chivo, and the characteristic curve to the south can be appreciated.

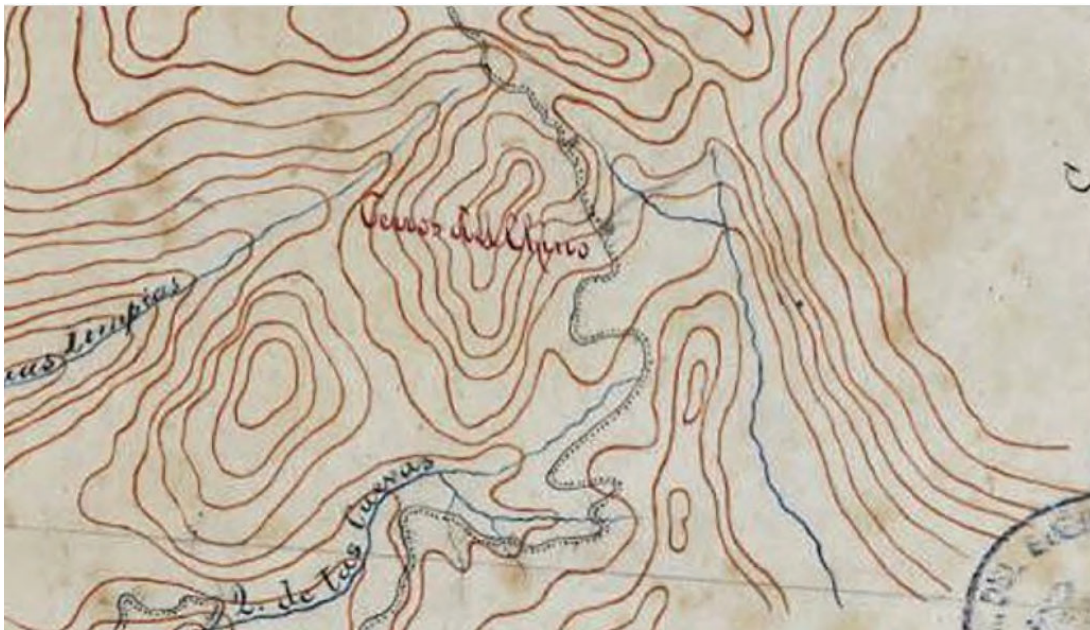


Figure 16: Fragment of the Croquis from 1884 Showing the Area of the Undertaking. It is Named Cerros del Chivo. The Characteristic Curve Can Be Seen Below.

²⁴ Itinerario ...1884, AGPR



Figure 17: Other of the Maps in the Itinerario from Guamana to Cayey to Carite 1884 File

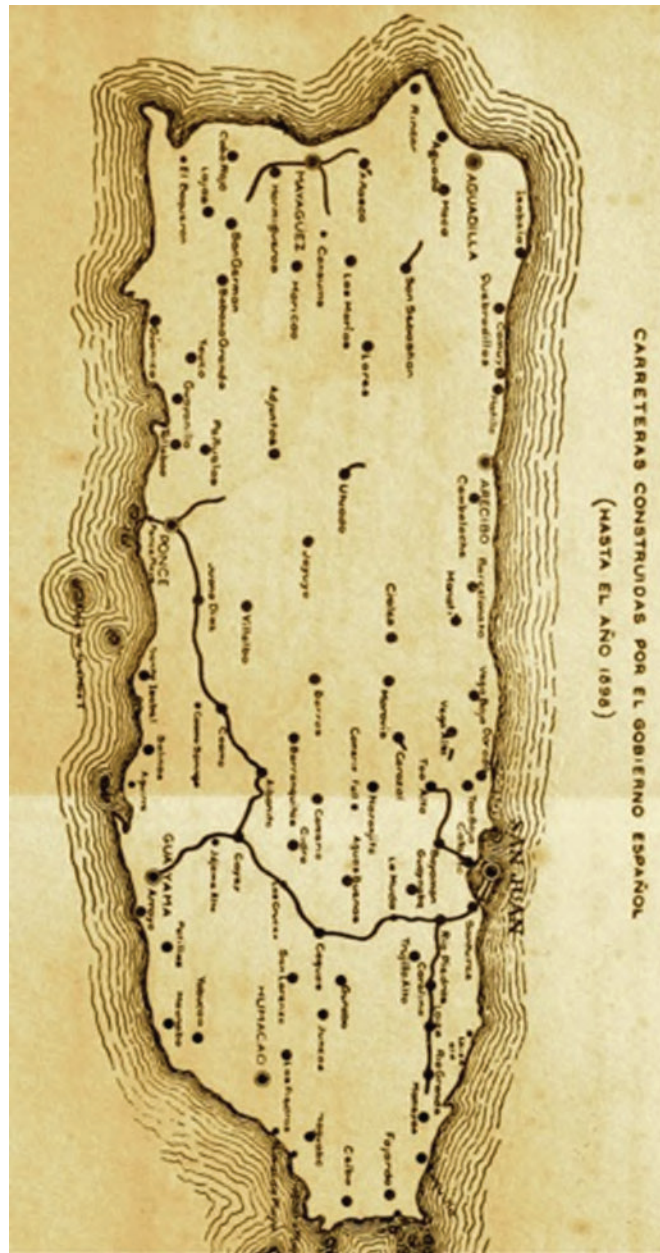


Figure 18: Map of Roads Built by the Spanish Government 1898. Only the Main Roads Area Marked in this Map. The Road Shown Between Cayey and Guayama is the PR 4

In an 1898 map of roads built by the Spanish Government, the road didn't appear. (Fig. 18) But in the Isla de Puerto Rico map blueprint from the same date, the road can be seen although unnamed, (Fig 19) another. A third one from the same date doesn't show the road but depicts the Carite reservoir. (Fig. 20)

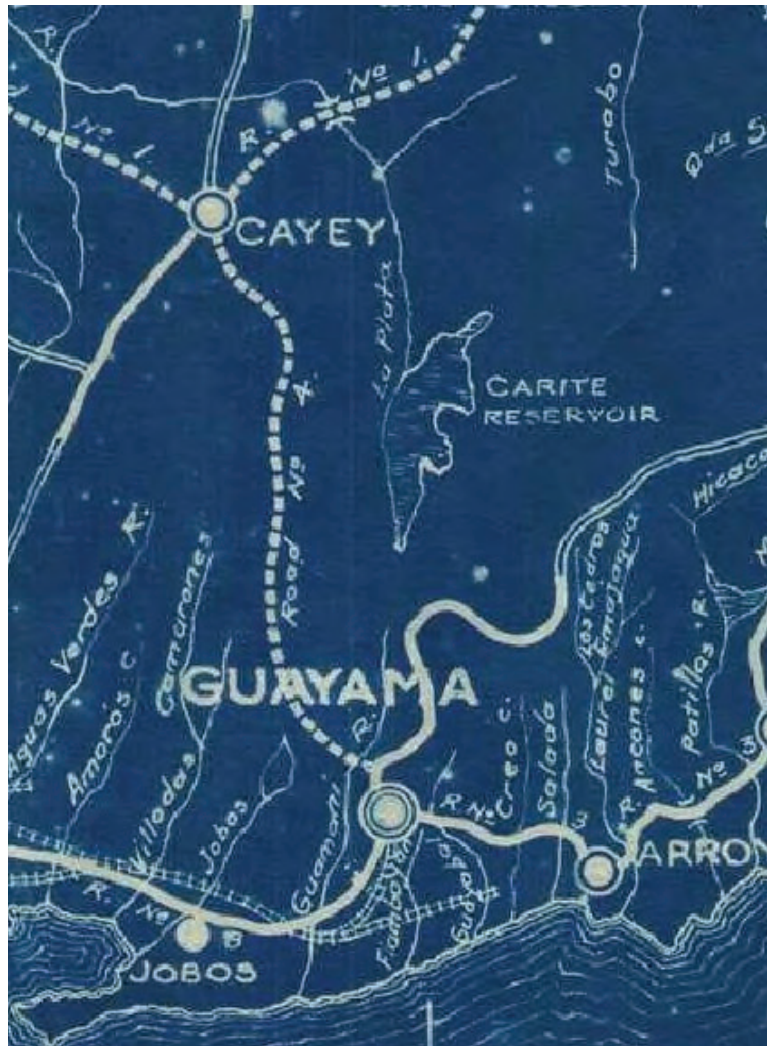


Figure 20: Fragment of the Railroad and Roads Blueprint from 1898/ The Carite Road Isn't Shown.

During the 1929 and 1930, issues of the *Revista de Obras Públicas* (Public Works Magazine) photos were found of the construction of the road. So, it's possible to assume that the road was constructed by this date as a rustic road.

In 1950, the government planned the development of the area with the distribution of parcels. In this year, the government gave these parcels.²⁵

²⁵ Figueroa, Jesus 1993



Figure 21: Photo of the Construction of the Road from Guayama to Carite, (Source: ROP VI:20 October 1929 :280)



Figure 22: Road from Guayama Through Carite (Source ROP VII:3 (1930) 82)

Reconstruction of Landslide ER-HWY-308 Project, Guayama PR

On the other hand, the figure 23 illustrates the Aerial Photo of the area in 1937. The road is clearly appreciated.

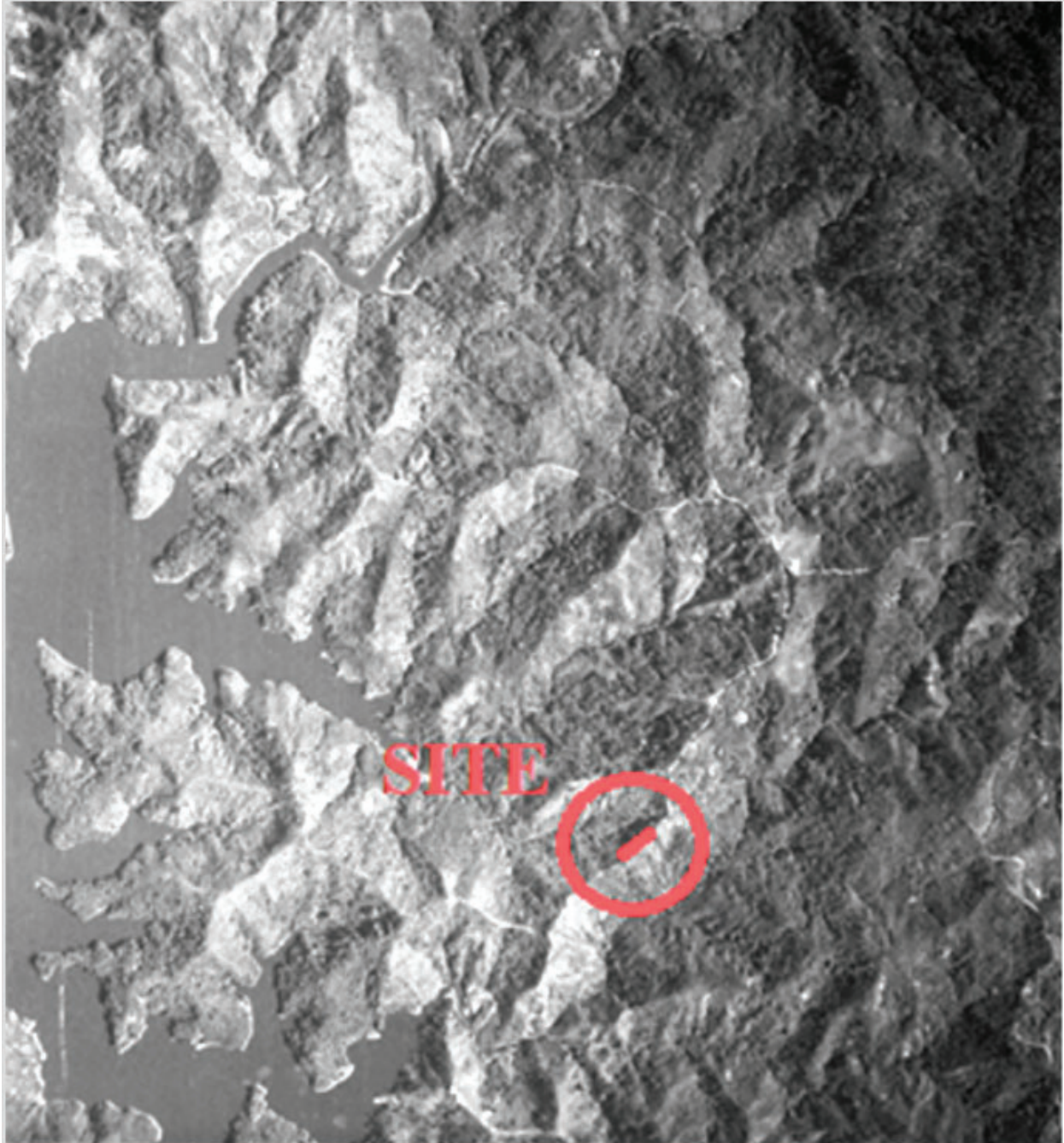


Figure 23: 1937 Aerial Photo

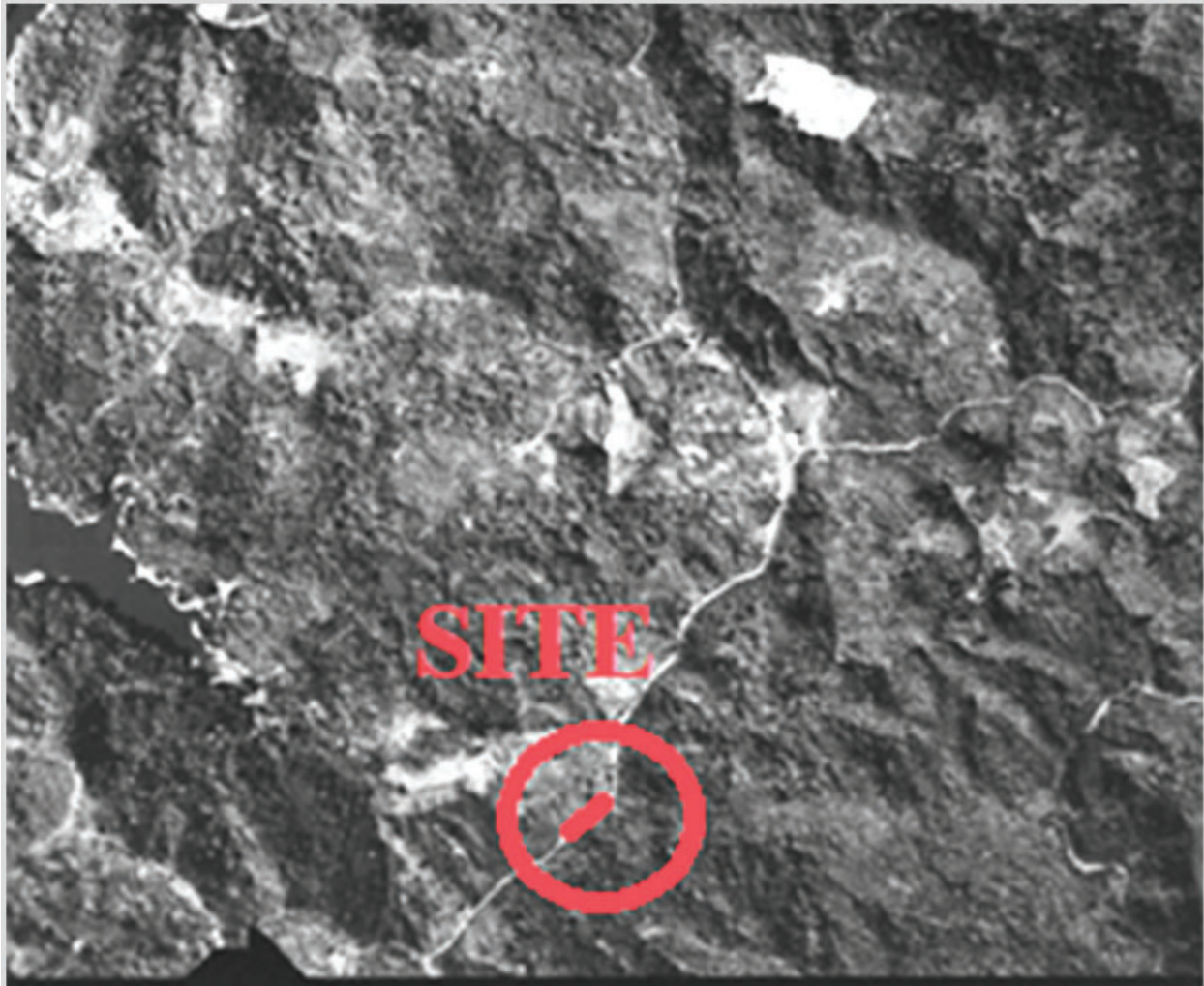


Figure 24: Aerial Photo of 1951

The *Oficina de Diseño, Conservación y Reconstrucción, Sección de Archivos* located on the 9th floor of the *Centro Gubernamental Roberto Sánchez Vilella*, South Tower have in their archive's blueprints of the segment of road designed in 1957 for PR 179. This are presented herein:

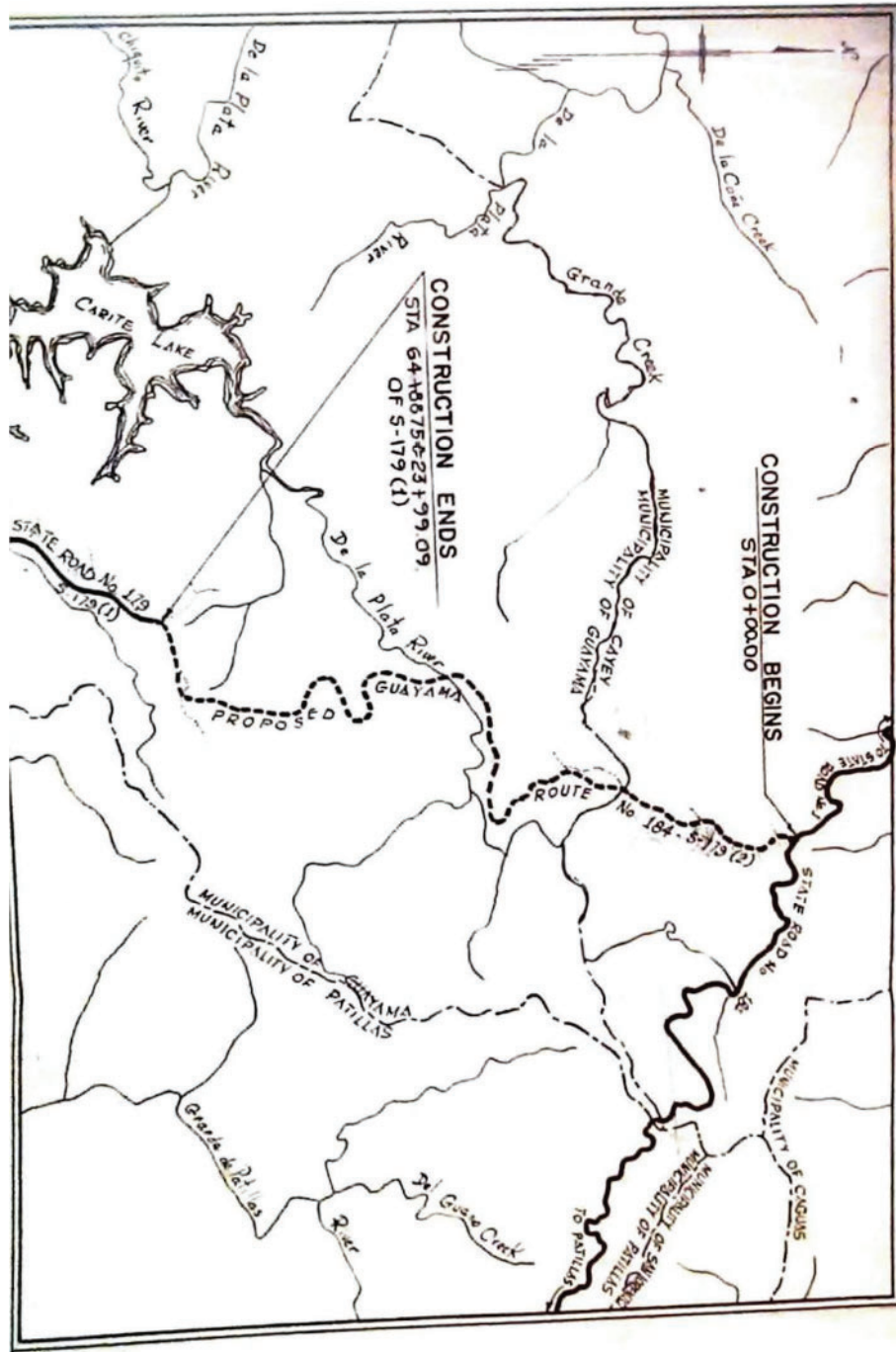


Figure 25: Plan for the Road, 1957

The road was paved, plumbing was installed, and later, in 1960, new roads were developed.²⁶

²⁶ Figueroa, Jesús 1993

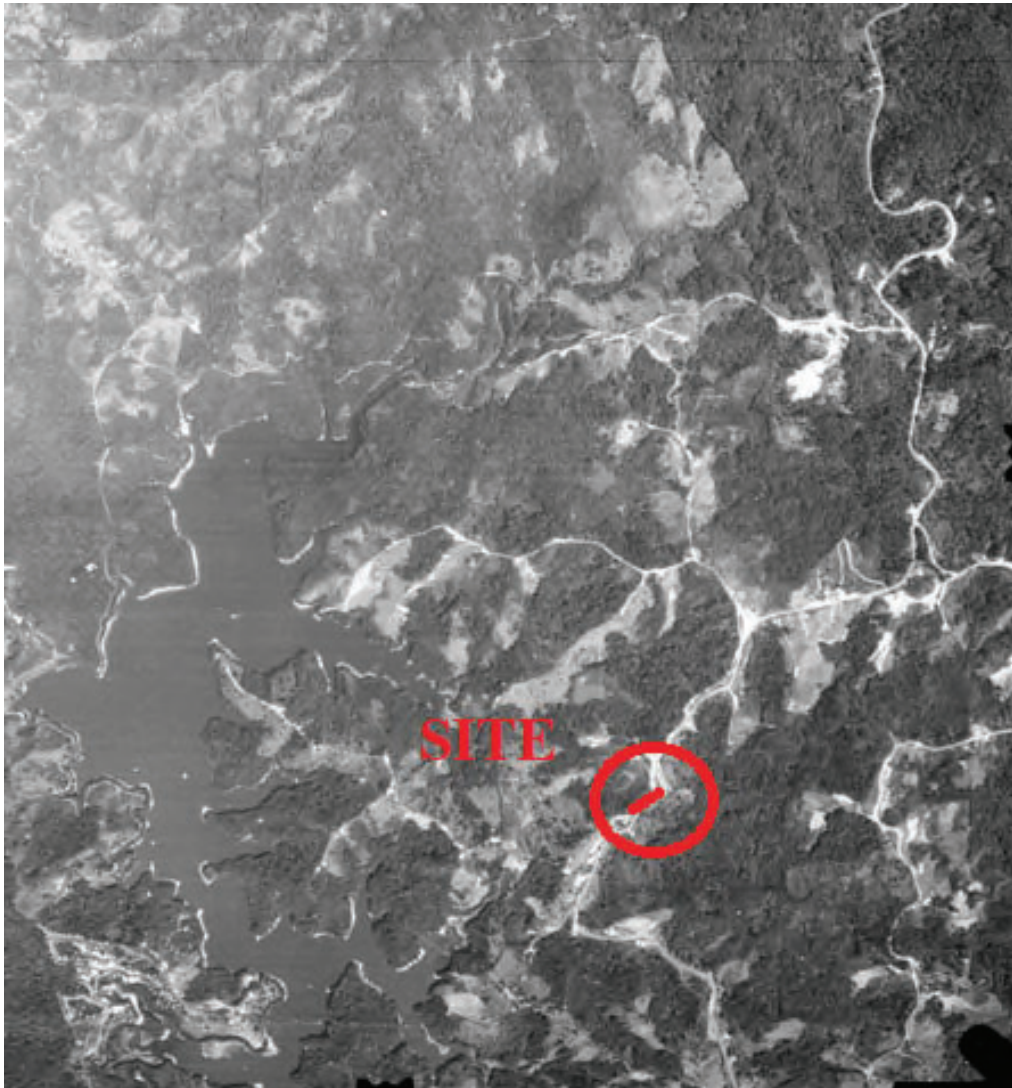


Figure 26: Aerial Photo from 1977

6. Fieldwork

6.1 Methodology

Due to the nature of this Project, methodological approach consists in the identification of the area of the landslide, a walking inspection, the review of the section at the side of the roads, and the excavation of four shovel tests in the selected areas.

The reconnaissance began at km. 13.4, that is where the signals and the photos provided by the consulting firm shows the location of the project.



Figure 27: Image of PR 179 to the South at the km 13.3 Aprox.



Figure 28: Area at the Side of the Road at km. 13. 35 Aprox. This Elevation is a Fill.

The inspection continued until the approach of a landslide located at km. 13.3 approx. It is protected by a concrete barrier. To the west is the entrance of an interior road. The slopes to the west are severe and to the east the topography drops dramatically.

Some excavations were located at the side of the road. In addition, clean the profiles at the side of the road were also located. The excavations were made with a double shovel.



Figure 29: View of the Landslide from the 13.3 Mark.



Figure 30: View of the Landslide at 13.25 from the South



Figure 31: View to the Area Across the Road in the Landslide at km. 13.25.



Figure 32: Aerial View of the Landslide at km. 13.25 from the East (Image Supplied)



Figure 33: Shovel Testing at km 13.2

6.2 Results

A total of four shovel tests were made with a negative result. The stratigraphy consists of a layer of brownish silty clay with rocks, followed by a reddish clay with rocks. In the profiles along the road, it can be observed a thick layer of reddish clay.

Number	Layer	Depth (cm.)	Color	Result
1	I	0-15	Brown	Negative
	II	15-50	Red	Negative
2	I	0-10	Brown	Negative
	II	10=50	Red	Negative
3	I	0-17	Brown	Negative
	II	17-50	Red	Negative
4	I	0-9	Brown	Negative
	II	9=50	Red	Negative

Table 17: Shovel Pits Results



Figure 34: Shovel Test Showing the Stratigraphy



Figure 35: Other Shovel Test Showing the First Layer of Brownish Clay followed by a Reddish Rocky Clay



Figure 36: View of the Gap at km 13.0 Below the Asphalt It's the Brownish Layer Followed by the Reddish Clay



Figure 37: View of the Side of the Road with the Characteristic Stratigraphy



Figure 38: View of the Stratigraphy at the West Side of the Road



Figure 39: View of the Topography.



Figure 40: View of One of the Areas Cleaned to Observe the Stratigraphy



Figure 41: View of Another Area Cleaned to Observed the Stratigraphy Near km. 13.25

7. Conclusions and Recommendations

7.1 Conclusions

The archive investigation shows no evidence of any archaeological finding in or near the undertaking. Although this can form part of the ancient road system that was disturbed when it was constructed in 1957, turning it from a “camino de heradura” to a rural highway.

The project is limited only to the area where the landslide occurred, and we are improving the existing storm system to prevent the slope from failing again in a future event. The project is an improvement for an existing road, where the landslide will be repaired to provide safe conditions for traffic. The hydraulic structure that crosses the PR-179 and that will be replaced is a reinforced concrete pipe. PR-15 (listed in the National Register of Historic Places (NRHP)) and since the 19th century, roadways and bridle paths, is located more than 5 km in a straight line to the west of the project, and the landslide occurred on the slope east of PR-179. Finally, a Phase IA-IB survey was conducted, and no evidence of historic and cultural resources was found in the work area.

The proposed project will not limit the possibility of data collection, its integrity, location, design, environment, materials, workmanship, feeling or association of any adjacent resources and cultural vestiges, including the PR #15.

7.2 Proposed Actions

The regulation requires the proposal of alternatives actions for the undertaking. The first is to consider is no action, that based on all the information recorded, analysis and discussion, and current state of disrepair of the road, is not recommended. This project proposed the construction of **Sheet Piles Cap Beam** to repair the landslide and the surrounded area.

No further action is recommended for this undertaking. Even so, it should be specified that local laws commands that in case that during the earth remotion or a construction process, if archaeological remains are detected the works must be stopped immediately and the authorities shall be notified, in this case CAT and OECH.

8. Bibliography

Abbad y Lasierra Fray Inigo

1788 historia Geográfica, civil y Natural de la Isla de San Juan de Puerto Rico. Imprenta y Librería Acosta 1866 prólogo de José Julián Acosta consulted of 2018
cervantesvirtual.com

Alegría, Ricardo

1951 The Ball Game Played by the Aborigines of the Antilles. American Antiquity 16:348–352.

1955 The Archaic Tradition in Puerto Rico. American Antiquity 21(2):113–121.

1975 “Los dibujos del naturalista francés Augusto Plee (1821-1823) in Revista del Instituto de Cultura Puertorriqueña, Primera serie número 68, julio - septiembre de 1975. San Juan, Puerto Rico

1978 Apuntes en torno a la mitología de los indios taínos de las Antillas Mayores y sus orígenes suramericanos. Centro de Estudios Avanzados de Puerto Rico y el Caribe: San Juan.

1983^a Historia de nuestros indios: Versión elemental. Colección de Estudios Puertorriqueños, San Juan.

1983^b Ball Courts and Ceremonial Plazas in the West Indies. Yale University Publications in Anthropology Number 79, New Haven.

Alegría, Ricardo E., H. B. Nicholson, and Gordon R. Willey

1955 The Archaic Tradition of Puerto Rico. American Antiquity 21(2):113–121.

AGPR

1884 Itinerario de Cayey a Guayama por Carite desde la separación de la carretera central entre Caguas y Cayey hasta la unión con el camino de este último pueblo a Guayama por Guamaní. ejecutado por el Comandante de Estado Mayor Francisco Larrea y Liso y el Capitán del mismo Cuerpo Manuel Moriano y Vivó,

Ayes Suarez, Carlos

1989 “Angostura. Un Yacimiento Arcaico Temprano del Valle del Manatuabon”, en Revista Universidad de América 1(2) 24-37

1991 “Un ídolo zoomórfico arcaico descubierto en el Barrio Pesas de Ciales” en Ecós de Plazuela 3 págs. 13-14

1996 La Cueva del Cupey. Serie Investigación Arqueológica. Publicación Ocasional 1. Centro Grafico Grafito, Vega Baja

Bate, Luis F.

2001 Propuestas para la Arqueología Recopilación de artículos y ensayos. Drake & Morgan Editores, México

Boccheciamp, Rafael A.

1969 Soil Survey of Humacao Area of Eastern Puerto Rico. (United States Department of Agriculture Soil Conservation Service, in cooperation with University of Puerto Rico, College of Agricultural Sciences.

Callaghan, Richard T.

1993 Passages to the Greater Antilles: An Analysis of Watercraft and the Marine Environment. In Proceedings of the XIV International Congress for Caribbean Archaeology, edited by A. Cummins and P. King, pp. 64–72. International Association for Caribbean Archaeology, Bridgetown, Barbados.

1995 Antillean Cultural Contacts with Mainland Regions as a Navigation Problem. In Proceedings of the Fifteenth International Congress for Caribbean Archaeology, edited by R. E. Alegría and M. Rodríguez, pp. 181–190. Centro de Estudios Avanzados de Puerto Rico y el Caribe, San Juan.

1999 Computer Simulations of Ancient Voyaging. *Northern Mariner/Le Marin du Nord* 1:24–33.

2001 Analysis of Ceramic Age Seafaring and Interaction Potential in the Antilles. *Current Anthropology* 42:308–313.

2003 Comments on the Mainland Origins of the Preceramic Cultures of the Greater Antilles. *Latin American Antiquity* 14(3):323–338.

Caro Costas, Aida

Antología de lecturas de historia de Puerto Rico (siglos XV-XVIII). (Río Piedras, Puerto Rico, Editorial Universitaria, Universidad de Puerto Rico, 1977)

Chanlatte Baik, Luis

1981 La Hueca y Sorcé (Vieques, Puerto Rico): Primeras migraciones agroalfareros antillanas. Nuevo esquema para los procesos culturales de la arqueología antillana. Published by the author, Santo Domingo, Dominican Republic.

1995 Los arcaicos y el formativo antillano (6000 AC–1492 DC). Proceedings of the Sixteenth International Congress for Caribbean Archaeology, edited by G. Richard, pp. 267–275. International Association for Caribbean Archaeology, Martinique.

Reconstruction of Landslide ER-HWY-308 Project, Guayama PR

2003 Cuál fue el destino final de las poblaciones arcaicas Antillanas? In Proceedings of the Twentieth International Congress for Caribbean Archaeology, edited by G. Tavares María and M. García Arévalo, pp. 317–322. Museo del Hombre Dominicano, Santo Domingo.

Autoridad de Carreteras y Transportación

2018 Oficina de Archivo de Planos, Oficina de Fotogrametría

Chanlatte Baik, Luis A., and Yvonne M. Narganes Stordes

1983 Vieques, Puerto Rico: Asiento de una nueva cultura aborígen antillana. Impresora Corporán, Santo Domingo.

1985 Asentamiento poblacional Agro- I, complejo cultural La Hueca, Vieques, Puerto Rico. In Proceedings of the Tenth International Congress for the Study of the Pre- Columbian Cultures of the Lesser Antilles, edited by L. Allaire, pp. 225–250. Centre de Reserches Caraïbes, Université de Montréal, Montreal.

1986 Proceso y desarrollo de los primeros pobladores de Puerto Rico y las Antillas. Published by the authors, Santo Domingo, Dominican Republic.

2005 Cultura La Hueca. Museo de Historia, Antropología y Arte, Universidad de Puerto Rico, Río Piedras.

Comisión Topográfica de 1885

1886 Croquis y Datos Estadísticos del Pueblo de Fajardo. Mapa Militar de la isla no. 47. Cuerpo del E.M. De Ejecito Sección de Puerto Rico Secured https://www.ecured.cu/R%C3%ADO_Herrera

Curet, L. Antonio, Joshua Torres, and Miguel Rodríguez

2004 Political and Social History of Eastern Puerto Rico: The Ceramic Age. In Late Ceramic Age Societies in the Eastern Caribbean, edited by A. Delpuech and C. L. Hofman, pp. 59–85. British Archaeological Reports, International Series 1273. British Archaeological Reports, Oxford.

Enciclopedia de Puerto Rico

<https://enciclopedia.pr.org/encyclopedia/municipio-de-rio-grande/>

Ferreras Pagán, Jaime

1902 Biografía de las riquezas de Puerto Rico, <https://bibliotecavirtualpr.wordpress.com>

Gierbolini, Roberto E.,

1975 Soil Survey of Mayagüez Area of Western Puerto Rico. (Mayagüez, Puerto Rico, United States Department of Agriculture, Soil Conservation Service, in cooperation with the University of Puerto Rico, College of Agricultural Sciences,)

Junta de Planificación de Puerto Rico

1952 municipio de Fajardo memoria suplementaria y mapa de límites jurisdiccionales de barrios en Archivo Nacional de Puerto Rico

Gifford, Jhon C

1905 The Luquillo Forest Reserve, Porto Rico (PDF). *Washington, D.C.: U.S. Department of Agriculture.*

Hernández Méndez, Eugenio

1969 Crónicas de Puerto Rico. Editorial UPR. Rio Piedras.

Hostos, Adolfo de

1976 Diccionario Histórico Bibliográfico Comentado de Puerto Rico. Academia Puertorriqueña de La Historia, San Juan.

Interamerican University

Centrales Azucareras de Puerto Rico -1873 2007.
<http://www.metro.inter.edu/facultad/esthumanisticos/ciho/centrales/centralfajardo.asp>,
consulted August 2018

Library of Congress

Map Collection
<http://lcweb4.loc.gov/service/gdc/lhbpr/06061/06061.pdf>

López Marrero, T., M.A. Lorenzo Pérez, C.F. Rivera Lo pez, A.C. González Toro, D. Rivera Santiago, H.I Nieves Crespo and P.N. Hernández González.

2017. Porto Rico 1930 Georeferenced: A Coastal Mosaic. Interdisciplinary Center for Coastal Studies. Mayagüez, PR: University of Puerto Rico, Mayagüez Campus. 15 p consulted July 2018)

Mallen Sean Thomas

2016 REASSESSING CONSENSUS: ALEJANDRO O'REILLY'S 1765 VISITA AND PUERTO RICAN HISTORY, Master Thesis, Florida Atlantic University, College of Arts and Letters on PDF

Marín, Héctor y Joseph Harrison

1988 ARQUEOLOGIA Documental DEL SISTEMA DE FORTIFICACIONES COSTANERAS DE PUERTO RICO EN EL SIGLO manuscrito para Asociación de Amigos de los Castillos.

Martínez-Cruzado JC, Toro-Labrador G, Ho-Fung V, Estévez-Montero MA, Lobaina-Manzanet A, Padovani-Claudio DA, Sánchez-Cruz H, Ortíz-Bermúdez P, Sánchez-Crespo A

2001 Mitochondrial DNA analysis reveals substantial Native American ancestry in Puerto Rico. Hum Biol 73: 491-511.

2002 “El uso del ADN mitocondrial para descubrir las migraciones precolombinas al Caribe: Resultados para Puerto Rico y expectativas para la República Dominicana.” KACIKE: Revista de la historia y antropología de los indígenas del Caribe [Revista electrónica], Edición Especial, Lynne Guitar, redactora. Disponible en: <http://www.kacike.org/MartinezEspanol.pdf>

Medina, Norma y Marisol Rodríguez

2009 Fase IB Planta de tratamiento Canóvanas. Informe presentado al ICP

Melgarejo, Juan

1582 Memoria y Descripción de la isla de Puerto Rico en Biblioteca de Puerto Rico, Coll y Toste disponible en:

<http://edicionesdigitales.info/biblioteca/memoriamelgarejo.pdf>

Montilla Jaime

2015 Puerto Rico Sugar Mill Project <http://jaimemontilla.com/pr-sugar-mills-project>

Moscoso, Francisco

1999 Sociedad y economía de los taínos. Editorial Edil, Río Piedras, Puerto Rico
O reilly, Alejandro

1765 Circunstancia del actual estado de la población, frutos y proporciones para fomento que tiene la isla de San Juan de Puerto-Rico, con algunas ocurrencias sobre los medios conducentes a ello, formada para noticia de S. M. y de sus Ministros, por el Mariscal de Campo D. Alejandro O'Reilly, y de resulta de la visita general que acaba de hacer en la expresada Isla, para evacuar las comisiones que se ha dignado fiar a su celo la piedad del Rey. Río Piedras, Puerto Rico, Editorial Universitaria 1980. (consulted on line on scribbr.com)

Municipio de Guayama

2006 DIAE Plan Territorial de Guayama. Prepared by Dueno Rodriguez Associates. Online <http://www.gobierno.pr/NR/rdonlyres/E8BB6BCC-252B-44D2-97E2-F7AD5B030E2D/0/DIAE060201.pdf>. Consulted November 8, 2018.

Oliver, José

1999 The “La Hueca Problem” in Puerto Rico and the Caribbean: Old Problems, New Perspectives, Possible Solutions. In *Archaeological Investigations on St. Martin (Lesser Antilles)*, edited by Corinne L. Hofman and Menno L. P. Hoogland, pp. 253–297. Faculty of Archaeology, Leiden University, Leiden, The Netherlands.

2009 Caciques and Cemi Idols: The Web Spun by Taino Rulers between Hispaniola and Puerto Rico. The University of Alabama Press, Tuscaloosa.

Oliver, José R., Juan Rivera Fontán, and Lee A. Newsom

1999 Arqueología del Barrio Caguana, Puerto Rico: Resultados preliminares de las temporadas, 1996–1997. In *Trabajos de investigación arqueológica en Puerto Rico: Tercer encuentro de investigadores*, edited by J. Rivera Fontan, pp. 7–26. Publicación Ocasional de la División de Arqueología, Instituto de Cultura Puertorriqueña, San Juan.

O reilly, Alejandro

1765 Circunstancia del actual estado de la población, frutos y proporciones para fomento que tiene la isla de San Juan de Puerto-Rico, con algunas ocurrencias sobre los medios conducentes a ello, formada para noticia de S. M. y de sus Ministros, por el Mariscal de Campo D. Alejandro O'Reylly, y de resulta de la visita general que acaba de hacer en la expresada Isla, para evacuar las comisiones que se ha dignado fiar a su celo la piedad del Rey. Rio Piedras, Puerto Rico, Editorial Universitaria 1980. (consulted on line on scribbr.com)

Oficina Estatal de Conservación Histórica OECH)

2016 informe Arqueológico del Municipio de Fajardo.
<http://www2.pr.gov/oech/oech/Documents/ActualizacionDatosMunicipales/Municipios/Informe%20Arqueol%C3%B3gico%20del%20Municipio%20de%20Fajardo.pdf>

Pagán Jiménez, Jaime R.

VIII. Antropología en Puerto Rico: Dicotomía de Centro y Periferia. *Boletín de Antropología Americana* 36:193–202.

Picó, Rafael

1969 Nueva geografía de Puerto Rico, física, económica y social. (Río Piedras, Puerto Rico, Editorial Universitaria,

Recursos de agua de Puerto Rico

2017 <http://www.reursosaguapuertorico.com/Cuencas-Principales-en-PR.html>

Rodríguez Miranda, Marisol

1997 El Pulguero, Puerto Rico, Hallazgo de Cerámica en el periodo Arcaico. Ponencia presentada en el 16 Congreso Internacional de Arqueología del Caribe. Bahamas.

2017 La siembra en montones y el montón de siembra. Ponencia presentada en el Tercer Foro de la Ruralia. Asociación Puertorriqueña de Estudios Rurales, Caguas, Puerto Rico

2018 Natpro, Fase IA Rio Grande, Puerto Rico

Rodríguez Vázquez, Luis Antonio

2013 Las fichas y riles de las haciendas de Puerto Rico. Ed. Lulú.

Sepúlveda Rivera, Aníbal

2004 Puerto Rico Urbano. Carimar, San Juan, Puerto Rico.

Sociedad Amigos de la Historia

“Los incidentes de Fajardo 3 al 7 d agosto de 1998” en 1898 The Hispanoamerican Dar in Puerto Rico. Consulte on line 2018

Tirado Rivera, Alexis

2014 Historia de una ciudad: Guayama 1898-1930, Ediciones Bayoán, 2014.

2017 El Guayama de Luis Palés Matos y Luis Muñoz Marín: un encuentro en el año 1917 en Revista Cayey Num 98. Online

https://humanidadescayey.files.wordpress.com/2018/04/articulo_alexistirado.pdf

Tomas de Córdova, Pedro

Memorias geográficas, históricas y estadísticas de la Isla de Puerto Rico.

Toro Sugrañes, José A.

1997 Historia de los pueblos de Puerto Rico, Editorial Edil, Rio Piedras.

US Census Bureau

<https://www.census.gov/geo/maps-data/data/gazetteer.html>

US Department of interior

1970 geological survey research chapter A. Geological survey professional pare 700-A. US G Print Office

USDA

2017 Soil Survey of Humacao Area of Eastern Puerto Rico
https://www.nrcs.usda.gov/Internet/FSE_MANUSCRIPTS/puerto_rico/PR689/0/Humacao.pdf

USGS

2017 USGS Topographic
https://geonames.usgs.gov/apex/f?p=262:18:0::NO:RP:P18_STATE%2CP18_SCALE%2CP18_MAP_NAME%2CP18_MAP_TYPE:PR%2CALL%2C%5Crio+grande%5C%2CAll

US National Archives

2018 Maps of Puerto Rico online database

Watson Monroe,

1971 Las divisiones geomórficas de Puerto Rico, en Geovisión de Puerto Rico. en María Teresa B. De Galiñanes (ed. Editorial Río Piedras, Puerto Rico)

Wilson, Samuel M.

1990 Hispaniola: Caribbean Chiefdoms in the Age of Columbus. The University of Alabama Press, Tuscaloosa.

1991 Current Research. *American Antiquity* 56(1):143–160.

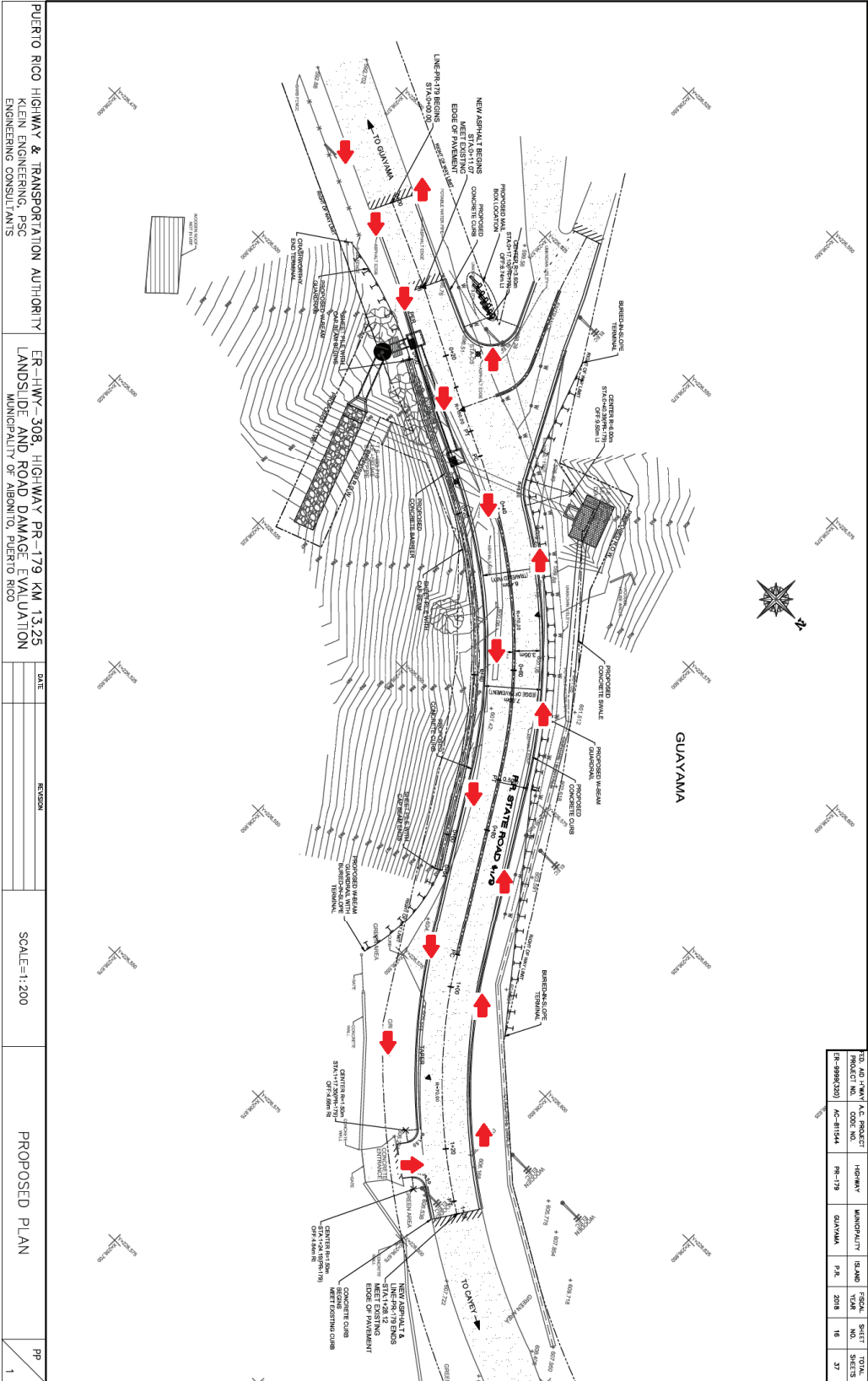
1993 The Cultural Mosaic of the Indigenous Caribbean. *Proceedings of the British Academy* 81:37–66.

2001 Cultural Pluralism and the Emergence of Complex Society in the Greater Antilles. In *Proceedings of the Eighteenth International Congress for Caribbean References / 299 Archaeology*, vol. 2, edited by G. Richard, pp. 7–12. International Association for Caribbean Archaeology, Guadeloupe.

2007 *The Archaeology of the Caribbean*. Cambridge University Press, New York.

9. Annexes

- a. “As Built Plan” with the Surface Inspection Made
- b. Plan with the Location of the Boreholes
- c. Development Proposed Plan



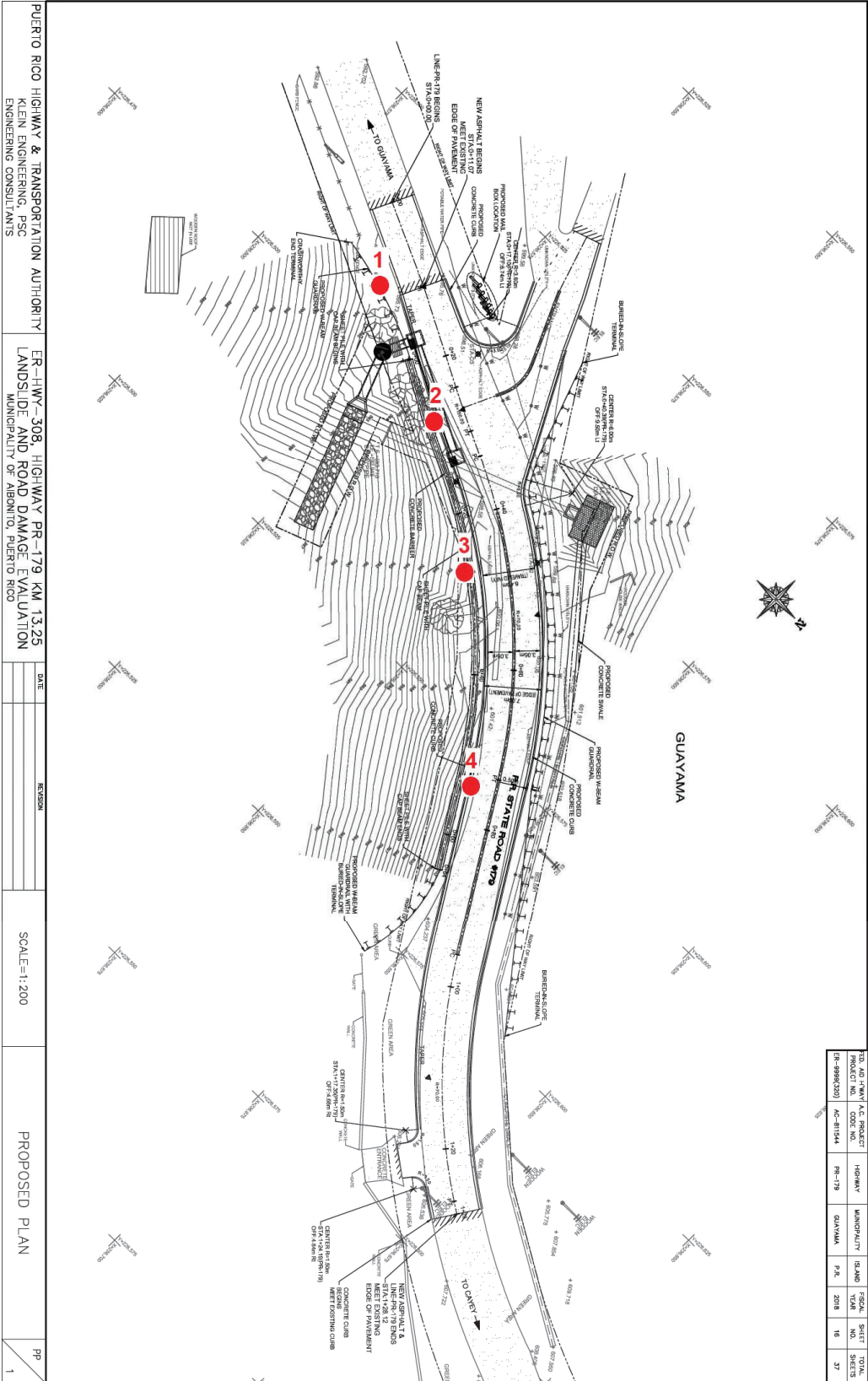
PUERTO RICO HIGHWAY & TRANSPORTATION AUTHORITY
 KLEIN ENGINEERING, P.S.C.
 ENGINEERING CONSULTANTS

ER-HWY-308, HIGHWAY PR-179, KM. 13.25
 LANDSLIDE AND ROAD DAMAGE EVALUATION
 MUNICIPALITY OF GUAYAMA, PUERTO RICO

DATE: _____
 REVISION: _____
 SCALE=1:200
 PROPOSED PLAN
 PP 1

TO: AD. HWY. A.C. PROJECT	PROJECT NO.	CDOT NO.	HWY	MUNICIPALITY	SCALE	SHEET NO.	TOTAL SHEETS
(B-999003)	42-8154	PR-179	GUAYAMA	P.R.	2018	16	37

“As Built Plan” with the Surface Inspection Made



PROJECT NO.	AC PROJECT CODE NO.	HIGHWAY	MUNICIPALITY	ISLAND	SHEET NO.	TOTAL SHEETS
ER-9996(200)	AC-8154	PR-179	GUAYAMA	P.R.	2018	18
						37

PURTO RICO HIGHWAY & TRANSPORTATION AUTHORITY
 KLEIN ENGINEERING, PSC
 ENGINEERING CONSULTANTS

ER-HWY-308, HIGHWAY PR-179, KM 13.25
 LANDSLIDE AND ROAD DAMAGE EVALUATION
 MUNICIPALITY OF ABOINTO, PUERTO RICO

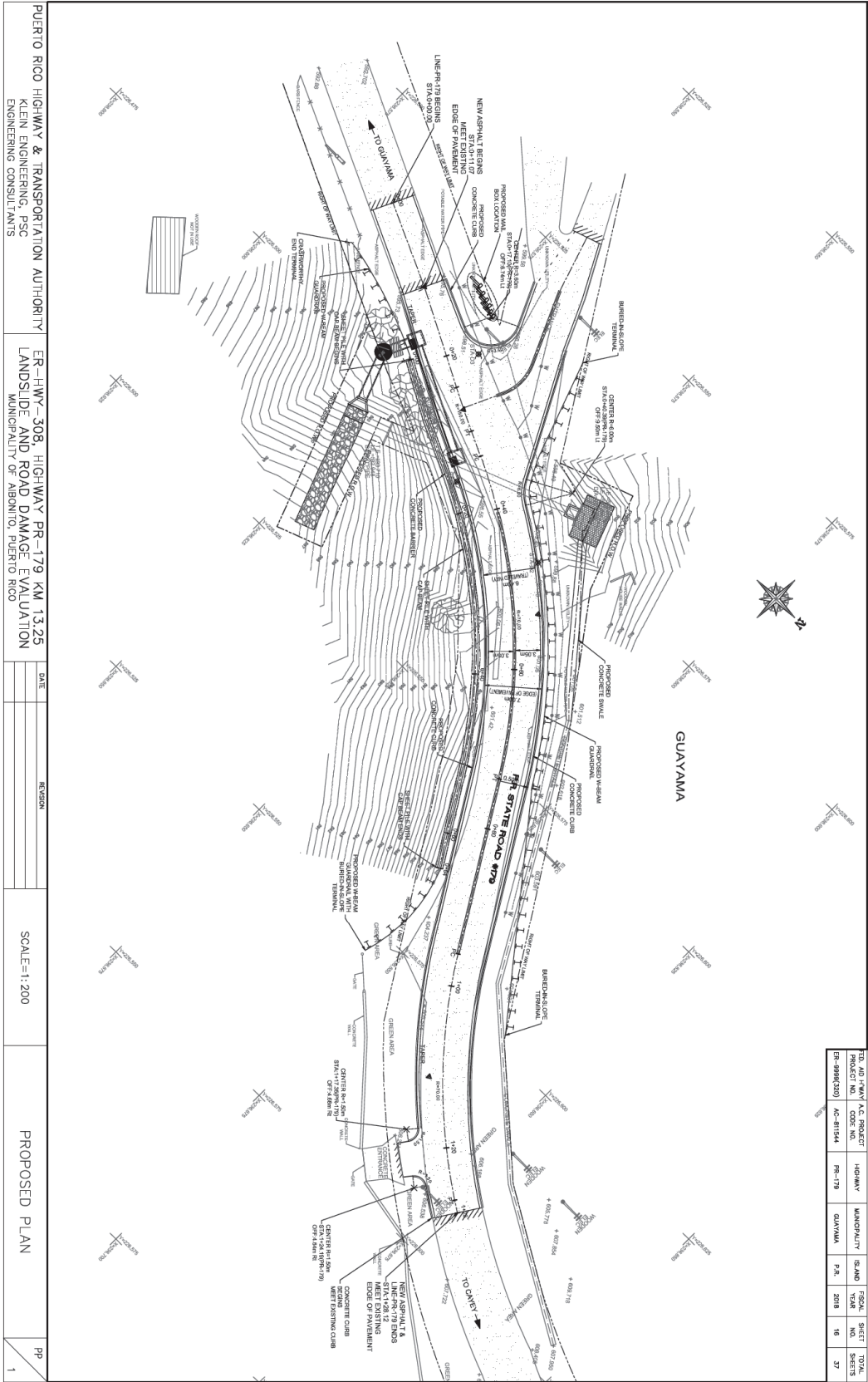
DATE: _____ REVISION: _____

SCALE=1:200

PROPOSED PLAN

PP 1

Plan with the Location of the Boreholes



PUERTO RICO HIGHWAY & TRANSPORTATION AUTHORITY
 KLEIN ENGINEERING, PSC
 ENGINEERING CONSULTANTS

ER-HWY-308, HIGHWAY PR-179, KM. 13.25
 LANDSLIDE AND ROAD DAMAGE EVALUATION
 MUNICIPALITY OF ABRONTO, PUERTO RICO

DATE	REVISION

SCALE=1:200

PROPOSED PLAN

PP 1

TOTAL PROJECT	A.C. PROJECT	HIGHWAY	MUNICIPALITY	SCALE	YEAR	SHEET NO.	TOTAL SHEETS
ER-999(200)	KC-81154	PR-179	GUAYAMA	P.L.	2018	16	37

Development Proposed Plan

Reconstruction of Landside
ER-HWY-410

PR 722 KM. 5.7 Robles Ward, Aibonito PR
Archaeological Survey Stage IA
AC-811544
Federal #: ER-9999 (320)

Submitted to:

**Puerto Rico Highway and
Transportation Authority**

Realized by:



AM GROUP

SERVICIOS DE CONSULTORIA ARQUEOLOGICA

Arql. Fernando Alvarado Muñoz

HC 3 Box 10608

Juana Díaz, PR 00795-9501

Celular: 787-637-9807

amgrouppr@gmail.com

February 18, 2021

Reconstruction of Landside
ER-HWY-410

PR 722 KM. 5.7 Robles Ward, Aibonito PR
Archaeological Survey Stage IA
AC-811544
Federal #: ER-9999 (320)

Submitted to:

**Puerto Rico Highway and
Transportation Authority**

Realized by:



AM GROUP

SERVICIOS DE CONSULTORIA ARQUEOLOGICA

Arql. Fernando Alvarado Muñoz
Principal Archaeologist, Co-Author

Eduardo Questell Rodríguez
Archaeologist, Co Author

February 18, 2021

Table of Contents	Page
Executive Summary	1
I. Introduction	3
II. Project Description and Scope of Work	3
a. Legal Framework	3
b. Description and Actual Conditions of the Areas	5
III. Environmental Framework	7
a. Topography	7
b. Geology and Soils	9
c. Climate	9
d. Hydrography	12
e. Flora and Fauna	13
IV. Synthesis of Cultural Development	13
a. Classification Scheme	14
b. Prehistory of Aibonito	20
c. Analysis of Archaeological Reports Near the Project	25
d. Archaeological Reports of Aibonito	27
V. Historical Cultural Context	31
a. The Beginning	32
b. The 19 th Century	34
c. Road in Aibonito	35
VI. Economic Development	36
a. 20th Century: The Central Highway and the Beginning of the PR- 722	40

b.	Data of the Central Highway in Aibonito and the Beginning of PR-722	40
c.	Other Maps, Figures, Historical Structures and Resources	44
VII.	Aerial Photos of Aibonito	46
VIII.	Fieldwork	49
IX.	Conclusion and Recommendations	53
a.	Proposed Actions	53
X.	Bibliography	54
XI.	Annexes	60
a.	“As Built Plan” with the Surface Inspection Made	
b.	Development Proposed Plan	

Figures

Figure 1	Project Location ER-HWY-410 USGS 1: 20,000	6
Figure 2	Location of the Municipality of Aibonito	7
Figure 3	Location of Aibonito and its Neighborhoods	8
Figure 4	Location of the project. Aerial Photo by Google Earth	8
Figure 5	Fragment of the Geology of the Comerío Quadrangle	10
Figure 6	Fragment of the Soil Survey of the San Juan Area	11
Figure 7	Archaeological Sites Near Undertaking in CAT	23
Figure 8	Archaeological Sites of Aibonito in SHPO Archives	24
Figure 9	Detail, “Puerto Rico 1775” Juan de Surville	33
Figure 10	Detail, “Puerto Rico 1791”, Tomás López	34
Figure 11	Part of the 6 th Leaf of the Road Itinerary Plans	42

Figure 12 Part of the Plan Around Aibonito, 1885	43
Figure 13 Part of the 6 th Leaf of the Road Itinerary Plans,	43
Figure 14 Croquis of Aibonito, 1884	44
Figure 15 Atarjea in the PR 14 KM. 51.7	45
Figure 16 Casillas de Camineros in Street PR 14 Km. 51.8	45
Figure 17 Aerial Photo of Aibonito, 1937	46
Figure 18 Aerial Photo of Aibonito, 1964	47
Figure 19 Aerial Photo of Aibonito, 1977	48
Figure 20 Photo 1	49
Figure 21 Photo 2	50
Figure 22 Photo 3	50
Figure 23 Photo 4	51
Figure 24 Photo 5	51
Figure 25 Photo 6	52

Tables

Table 1 Archaeological Sites in the Municipality of Aibonito in the ICP	22
Table 2 Archaeological Sites in the Municipality of Aibonito in SHPO	23
Table 3 Archaeological studies in the Municipality of Aibonito	27

LIST OF ABBREVIATIONS

ACHP	Advisory Council for Historic Preservation
ACT	Autoridad de Carreteras y Transportación
ADA	American Deshabilites Act
AGP	Archivo General de Puerto Rico (Puerto Rico General Archive)
APE	Area of Potential Effect
CAT	Consejo de Arqueología Terrestre (Terrestrial Archaeology Council)
CBC	Construction Building Codes
DTOP	Departamento de ransportación y Obras Pñblicas (Public Transportation ad Works Department)
EA	Environmental Assessment
ELA	Estado Libre Asociado de Puerto Rico (Commonwealth of Puerto Rico)
FEMA	Federal Emergency Management Agency
ICP	Instituto de Cultura Puertorriqueña (Puerto Rican Culture Institute)
JP	Junta de Planificación (Puerto Rico Planning Board)
MARAD	Maritime Administration
NHPA	National Historic Preservation Act
NRHP	National Register of Historic Places
NOAA	National Oceanic and Atmospheric Administration
OECH	Oficina Estatal de Conservación Histórica (State Historic Preservation Office acting as SHPO)
PRPA	Puerto Rico Port Authority
PRHTA	Puerto Rico Highway and Transportation Authority
USGS	United States Geological Survey

Executive Summary

The Puerto Rico Highway and Transportation Authority (PRHTA) is requesting technical and financial proposals from qualified engineering consultants to provide support in their Emergency Relief Program. The project consists of the evaluation and reconstruction of landslides on several highways segments due to impacts associated with Hurricanes Irma and Maria. Those highways segments are located within the Puerto Rico's Federal Aid Highways System, and other highways and roads under the jurisdiction of the Department of Transportation and Public Works (DTPW). The Consultant will execute the site reconnaissance, investigations, monitoring and studies, necessary to provide appropriate recommendations to reconstruct the highway to its previous conditions. The sites were identified after a site inspection performed by a multidisciplinary team.

The proposed Project design shall include all proposals needed for work (to be provided by sub-consulting firms), that may include Surveying, Geotechnical Studies, Property Registration Studies, Archaeological Studies, Presence of Asbestos and Lead Studies, Environmental Studies, etc. The Project designs shall comply with the PRHTA's Design Manual (HDM), and with any other manual that applies.

The following report presents the results of the archaeological assessment for the Task ER-HWY-410 (Group A) site, located in the Robles Ward, PR-722, km 5.7, in Aibonito, Puerto Rico. The Puerto Rico Highway and Transportation Authority (PRHTA), in agreement with the Federal Emergency Management Agency (FEMA) requires an archaeological Assessment for the Project (Task ER-HWY-410 (Group A)). This is required under Section 106 of the National Historic Preservation Act (NHPA) and its implementing regulation 36 CFR part 800. This archaeological assessment reviews the archaeological and historical information available for the location within the undertaking to provide tools to the regulatory agencies to make the appropriate decisions under the applicable laws.

The project site was visited (which is about 50 meters long). The investigators took photographs and obtained, from the archeological point, the environmental data of the place, which, as indicated, is located at the kilometer 5.7 of the road PR-722, in Robles of Aibonito. After, the land in the topographic maps of the Agencies that regulate the archaeological aspects in our country was located. In addition, the sites with archaeological value (prehistoric or historical) closest to the project were also located, as well as the places for Aibonito in the National Registry of Historic Places. Finally, the archaeological reports for Aibonito established different locations that were close to the project under investigation.

The project is limited only to the area where the landslide occurred, and we are improving the existing storm system to prevent the slope from failing again in a future event. The project is an improvement project for an existing road, where the landslide will be repaired to provide safe conditions for traffic. The hydraulic structure that crosses the PR-722 and that will be replaced is a reinforced concrete pipe. The storm drainage design of the area where the landslide occurred has been carried out considering a more efficient management of runoff, providing adequate capacity and energy dissipation mechanisms at the discharge points.

The proposed project will not limit the possibility of data collection, its integrity, location, design, environment, materials, workmanship, feeling or association of any adjacent resources and cultural vestiges, including the PR #14 or the Panoramic Route.

The information obtained allowed to the conclusion that the realization of the project (to evaluate and reconstruct the landslide that occurred in the indicated place), will not have any effect on the archaeological resources known near the place, also there are at a considerable distance.

I. Introduction

The Puerto Rico Highway and Transportation Authority (PRHTA), acting in accordance with the Federal Emergency Management Agency (FEMA) acting as soliciting agencies requires an archaeological Assessment for the Project in PR 722 Km. 5.7 (Task ER-HWY-410 (Group A)). This is required under Section 106 of the National Historic Preservation Act (NHPA) and its implementing regulation 36 CFR part 800. This archaeological assessment reviews the archaeological and historical information available for the location within the undertaking to provide tools to the regulatory agencies to make the appropriate decisions under the applicable laws.

As required by the mentioned federal regulations, the undertaking must comply with the state and local regulations. This report complies with the regulations contained in the Regulation 8932 of February of 2017 known as Regulation for Filling and Archeological Evaluation of Development and Construction Projects of the Terrestrial Archaeology Council (CAT) under Law 112 of July 20 of 1988 as amended. It also complies with the “*Guía Oficial para la Investigación de Recursos Culturales (ICP)*”.

The research was conducted in November 2018 by the archaeologist Fernando Alvarado as Principal Investigator, the archeologist Eduardo Questell Rodríguez as co-investigator and author. In addition, Eduardo Luis Questell served as technician. Also, as the main reference for the format and other data, the investigators used *The Fajardo Ferry Terminal Assesment* (F. Alvarado y Marisol Rodríguez, 2018).

II. Project Description and Scope of Work

a. Legal Framework

To comply with regulations, this report does an analysis of documentation to include an archaeological assessment and conform to local, state, and federal requirements.

As indicated, this investigation was conducted to comply with Section 106 of the National Historic Preservation Act of 1966 (NHPA) (PL 89-665) as amended and it's implementing regulation 36 CFR Part 800 (Protection of Historic Properties), the Archaeological and Historic Preservation Act of 1974 (PL 93-291) as amended and the National Environmental Policy Act of 1969.

Section 106 of the NHPA requires Federal agencies to consider the effects of their undertakings on historic properties and afford the Advisory Council on Historic Preservation (ACHP) a reasonable opportunity to comment. (<http://www.achp.gov/106summary.html>)

Reconstruction of Landside ER-HWY-410 Project, Aibonito PR

First, the responsible Federal agency determines whether it has an undertaking that is a type of activity that could affect historic properties. Historic properties are the properties that are included in the National Register of Historic Places (NRHP) or that meet the criteria for it. It should plan to involve the public and identify other potential consulting parties. If it determines that it has no undertaking, or that its undertaking is a type of activity that has no potential to affect historic properties, the agency has no further Section 106 obligations.

This report also complies with the Puerto Rican Commonwealth (ELA) Law 112 of June 28, 1992 as amended that creates de Council for the Protection of the Terrestrial Archaeological Patrimony of Puerto Rico, known as the Terrestrial Archaeology Council (CAT). The content of this report is guided by what is stipulated in the Regulation 8932 of February 8, 2017: “Regulation for the Filing and Archaeological Evaluation of Project of Construction and Development”.

The Secretary of the Interior’s Standards for Identification (National Park Service, 1983) defined two categories of archaeological survey aimed at gathering field information: Reconnaissance and Intensive Surveys. These categories are defined based on the objectives of the survey, the results of the survey, and the historic preservation management needs.

Phase IA reconnaissance surveys results in the characterization of a region's archaeological sites. These surveys generally involve extensive background research with limited field investigations, often focused on soil and preservation conditions rather than systematic archaeological site discovery.

Reconnaissance surveys may serve a variety of functions. They may be applied for administrative, planning, or management purposes. However, it should be noted that reconnaissance surveys are very general in scope and do not normally make determinations of significance or NRHP eligibility.

Phase IA reconnaissance surveys can indicate that a portion or the totality of a project area lacks the potential to contain intact archaeological deposits, and therefore no further archaeological work is warranted in these areas. However, in most instances, reconnaissance surveys may not contain enough information with which to support an agency’s determination of effect in fulfillment of mandated compliance.

The primary goal of doing the Phase I: Cultural Resource Investigation is to identify archaeologically sensitive and cultural/sacred areas to identify standing structures that are at least 50 years old, that may be affected by a proposed project. Secondly, to locate all prehistoric and historic cultural/archaeological resources that may exist within the proposed project area are intended to gather information concerning the environmental/physical setting of a specific project area as well as its cultural setting.

It is the interrelationship of the physical environment and the cultural, historical setting that provide the basis for the sensitivity assessment. This research should include a consideration of relevant geomorphology and soils information, culture history, and previous archaeological research to provide for the development of explicit expectations or predictions regarding the nature and locations of sites. Regardless of the project size, archaeologists should consider all relevant data in developing these expectations.

To complete the section 106 process, investigations should be conducted in an Area of Potential Effect. (APE) According to the ACHP, the APE is the geographic area(s) within which an undertaking may directly or indirectly cause alterations in the character or use of historic properties, if any such properties exist.

The APE is influenced by the scale and nature of the undertaking and may be different for other kinds of effects caused by the undertaking [36 CFR § 800.16(d)]. Because the APE defines the geographic limits of federal agency responsibility for purposes of Section 106, is necessary to review the archaeological survey necessary to identify and evaluate historic properties is carried out within its boundaries. However, within the APE, the level of effort may vary considerably depending on such factors as anticipated effects and prior ground disturbance. (ACHP Archaeology Guidance.pdf). Because the APE involves the federal agencies responsibility it must be defined by them in consultation with SHPO prior to initiating identification efforts.

b. Description and Actual Conditions of the Areas

The route of the PR-722 road in question begins on highway PR-14, east of the town of Aibonito, and crosses the Robles neighborhood until it reaches highway PR-1.

As observed in the visit, the site corresponds to a stretch of about 50 meters long on Highway PR-722, in the neighborhood Robles, near the kilometer 5.7. The project site, which is a landslide to the northwest that affected the width of the road, is bounded by concrete barriers for protection. The section of the road is in a semi-curve, rising moderately and immediately to an access road to residences. Then, there is a more marked and prolonged curve. In the place a culvert of the pluvial drainage that runs towards the northwest was visible. The landslide affected the concrete curb on all that northwest side of the stretch.

The scope of the evaluation includes the indicated section of Highway PR-722 and its surroundings next to kilometer 5.7 of said road (See Figure No. 1).

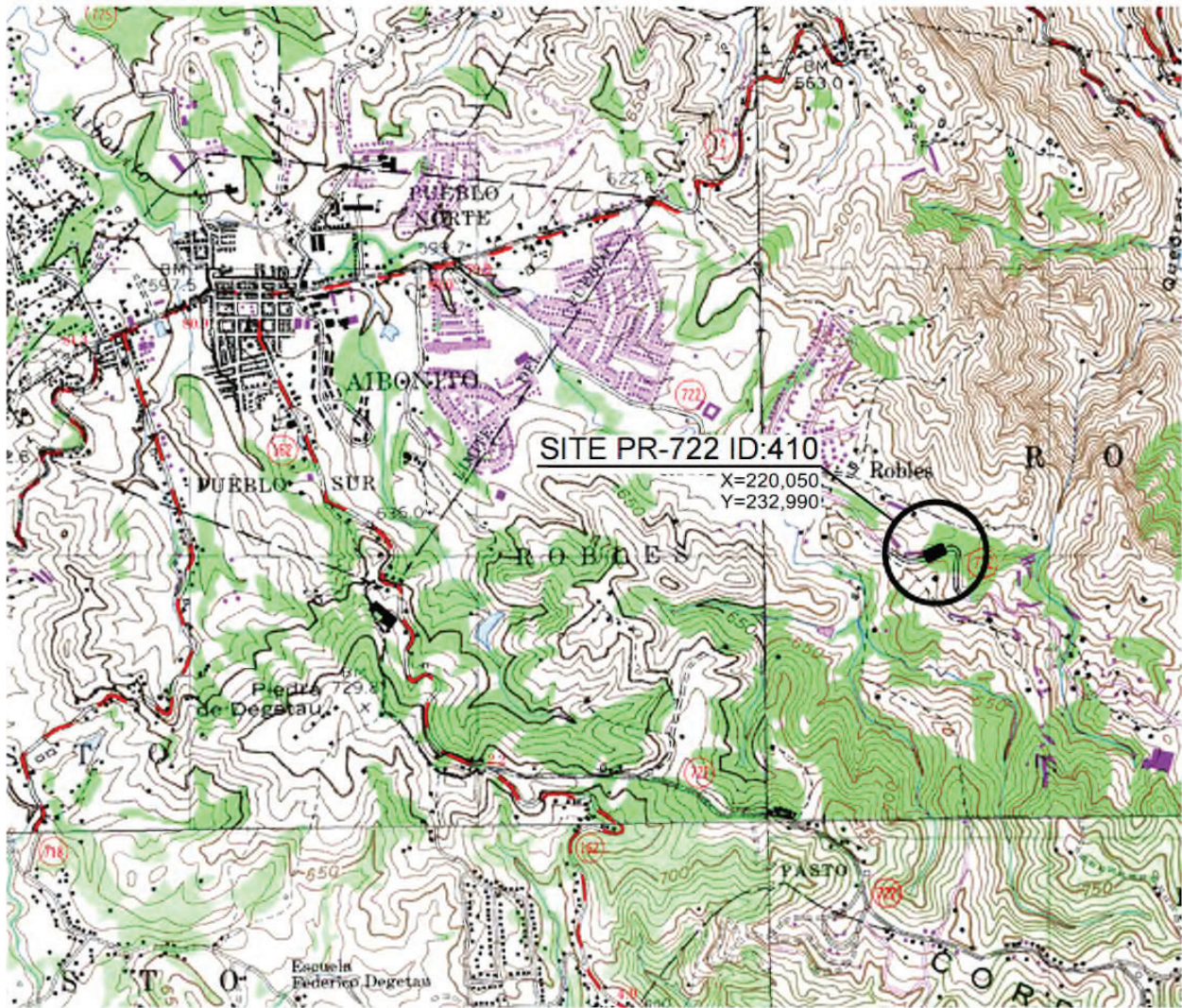


Figure 1: Image Showing Location of the Project ER-HWY-410 (USGS 1:20,000)

c. Proposed Action

As previously established, the rehabilitation will consist of the evaluation and reconstruction of the landslide, and one of the aspects of such evaluation is the preparation of this archaeological Assessment for the Project in PR 722 Km. 5.7 (Task ER-HWY-410 (Group A).

III. Environmental Framework

As part of the process to document the general sensitivity of the area for the presence or absence of archaeological resources, is necessary to conceptualize the property inside the widest frame that represents the geographical and environmental characteristics in general. The zone of Aibonito has been widely studied, thus an exhaustive revision on this matter will not be repeated in this document. The general trend for Puerto Rico and the Caribbean is to use the presence of environmental or ecological variables as a factor to predict the existence of pre-Columbian settlements. So, it is logical to conclude that the present territory of the municipality discussed presents a high degree of sensitivity and archaeological potential. Among these variables stand out: the basins of the rivers La Plata, Cuyón, Aibonito and Usabón, with the valleys and plains. Other existing variables could be constituted by fertile lands suitable for agriculture, abundant rainfall, mountainous areas with wooded areas, freshwater streams such as rivers. Moreover, to provide water, resources, and tributaries. The rivers must have been channels of communication, also favoring the creation of settlements bordering their banks.

The municipality of Aibonito is in the humid mountains of central east, near the geographic center of the island in pure Puerto Rican mountains. (José A. Toro Sagrañes, 1995, p.33). On the north, it borders the municipality of Barranquitas, on the northwest with Cidra, on the east with Cayey, on the south it has Salinas and on the southwest on Coamo (*Ibid*).

Its area that is mostly mountainous, covers about 33.3 square miles, or 20,627 *cuerdas*. Its population, according to the Census of 1990, was 25,551 inhabitants, which classified it then as number 52 among the municipalities of Puerto Rico (*Ibid*, p.35).

The municipality of Aibonito is divided in: Pueblo, Asomante, Algarrobo, Cuyón, Llanos, Plata, Pasto, and Robles Wards (Fig. 3).



Figure 2: Location of Aibonito Within the Island of Puerto Rico



Figure 3: Wards of the Municipality of Aibonito



Figure 4: Location of the Project. Aerial Photo by Google Earth

a. Topography:

Topographically, Puerto Rico is a steep island, with surface covered in most cases by hills and mountains. It has been anticipated that not more of the third part of Puerto Rico can qualify as flat or undulating.

In terms of slopes, almost the fourth part of Puerto Rico consists of very steep slopes of 45 or more grades of inclination degrees which is almost the half of the entire area. It can be estimated that 40 % of the island is covered by mountains, with 35% of hills and 25% of flats. (Rafael Picó, *Nueva Geografía de Puerto Rico, física, económica y social*. Río Piedras, Puerto Rico, Editorial Universitaria, 1969).

In his work, the geomorphologist Watson Monroe, indicated that: "There are three major geomorphic provinces in Puerto Rico: The Central Interior Mountainous Province, the Northern Karst Province, and the Coastal Plains Province. Each of these provinces has its own characteristics both in terms of relieve and in terms of form. The Province of the Central Interior Mountainous shows, predominantly, the effects of the erosion of a structurally complex succession of many kinds of igneous and sedimentary rocks. Additionally, the Province of Karst illustrates the effects of the solution processes on the limestones. On the other hand, the Province of the Coastal Plains presents areas of deposition. (Watson Monroe, "Las divisiones geomórficas de Puerto Rico", publicado en María Teresa B. de Galiñanes (ed.), *Geovisión de Puerto Rico*. (Río Piedras, Puerto Rico, Editorial Universitaria).

As indicated, the municipality of Aibonito is in the humid mountains of the central east of the Island. The topography of the land is seed with a slope to the west and northwest. The highest point of the terrain is about 640 meters above sea level, near its eastern limit of the section studied. The major rivers such as La Plata, Cuyón, Aibonito and Usabón formed alluvial valleys.

Aibonito shares with Barranquitas the San Cristóbal Canyon, a phenomenon of nature, which with nine kilometers in length and with a maximum depth of about 700 feet offers us one of the most important and interesting ecosystems in the country (Toro Sugrañes, Op. Cit., p.33).

b. Geology and Soils

Adding to the geographic factors, regarding the possibility of the presence of archaeological resources and the sensitivity of the area it must be considered the geology and the composition of the soils, which present characteristics of fertility, compaction, and water access, among others factors that favor its use by human groups. The area has been intensely documented. Correspondingly, the analysis was limited.

Nevertheless, the geology of the Comerío Quadrangle, which is the quadrangle where the project land is located, was made by the American geologists Maurice H. Pease, Jr. and Reginald P. Briggs, in 1960. These two geologists indicate that the only rock on the site is part of the **Robles Formation**, chiefly of thinly stratified fine-grained sedimentary rocks (Kr), but includes fine-grained volcanic breccia (Krb), and lava flows (Krf). They also indicated that these rocks are medium dark gray to medium bluish gray when fresh, but weather to pale shades of brown and to reddish-brown soil.

Observing the geological map of the site prepared by the geologists (See Figure No. 5) it can be seen that the layers of rocks near the project site have an inclination (dip) of more than 30 degrees to the southeast and that about 220 meters south-southeast of the precise place of the slip defines the center of a small syncline, so is understandable that the type of rock is not responsible for the landslide.

On the other hand, the soils of the municipality of Aibonito were studied by Rafael A. Boccheciamp, in 1978 (Soil Survey of San Juan Area of Puerto Rico). This indicates that the predominant soil in the project lands (leaf No. 48) is the Humatas clay, with 40 to 60 percent slopes (HtF). The figure no. 6 illustrates the soils in the area.

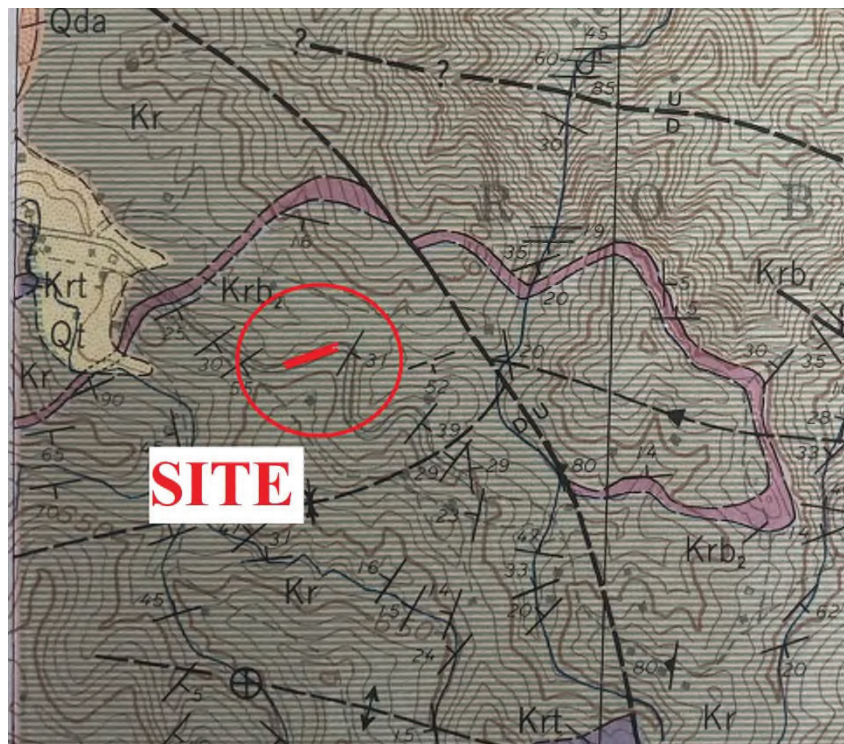


Figure 5: Fragment of the Geology of the Comerío Quadrangle, Puerto Rico.



Figure 6: Fragment of the Soil Survey of the San Juan Area of Puerto Rico.

The Humatas series (*Ibid*, p. 53) consist of clayey, kaolinitic, isohyperthermic Typic Tropohumults. These soils are deep, are well drained, and have a B2 horizon of red clay. They formed in residuum of basic volcanic rocks. The Humatas soils are on narrow ridgetops and side slopes. Slopes range from 20 to 60 percent but are dominantly 40 to 60 percent. The mean annual precipitation is 86 inches, and the mean annual temperature is 76 degrees F.

Specifically, the Humatas Clay, 40 to 60 percent slopes is a very steep, well-drained soil on side slopes and ridgetops of strongly dissected humid uplands (*Ibid*, p. 17). Slopes are convex and are 200 to 1000 feet long. The areas range from 10 to 500 acres. Typically, the surface layer is dark brown, friable clay about 5 inches thick. The subsoil is about 29 inches thick; it is a red friable clay and yellowish red, friable silty clay. The substratum, beginning at a depth of 34 inches, is red, dark red, yellowish red, strong brown, and olive yellow, friable silty clay saprolite.

Permeability and the available water capacity are moderate. Runoff is rapid, and erosion is a hazard. Slippage is common in roadbanks, ditches, and drainageways. This soil is difficult to work because it is very steep and because of the stickiness and plasticity of the clay. Hill-side ditches and diversions are difficult to lay out, establish, and maintain. The root zone is deep. Natural fertility is medium. Crops respond well to heavy applications of lime and fertilizers. Also, controlling erosion is the major concern of management.

Reconstruction of Landside ER-HWY-410 Project, Aibonito PR

This soil is limited for most urban uses because it is very steep and subject to landslides. If the soil is used as construction sites, development should be on the contour. Removal of vegetation should be held to a minimum, and temporary plant cover established quickly in denuded areas.

c. Climate

Climate is the generalized state of the atmosphere in a given area. The elements of climate are temperature, wind, precipitation and the seasons of the year. In Puerto Rico, there are two zones of temperature differentiated by height: the "hot earth" (tropical), in the low plains and hills, and the "temperate earth" (subtropical), towards the high part of the mountains. The area under evaluation is located on the boundary between the tropical zone and the temperate zone. This limit is represented by an isotherm of 74 degrees Fahrenheit, and approximately coincides with the level curve of 1,000 feet of altitude (300 meters) (Rafael Picó, 1969, p. 159). The prevailing winds that pass through the island are the so-called trade winds, which blow fifty percent of the time in the East-West direction. The other wind regimes identified for the island are sea and land breezes, mountain and valley breezes and hurricanes. (*Ibid.*, p. 162)

Climate can be adjoined as a factor to identify the archaeological sensitivity of areas on the island of Puerto Rico resulting with a somewhat lesser relative importance, due to the few climatic fluctuations that the island has in general. Perhaps, it is the pluvial precipitation one of the factors that can better modify the presence or absence and the type of anthropogenic activities in specific areas.

In general, the lands of the municipality of Aibonito enjoy a very pleasant climate, with an annual average temperature of between 71- and 72-degrees F (R. Picó, 1964, page 5, figure 3). The average rainfall for the area is about 60 inches per year (*Ibid*, page 6, figure 4), with Aibonito being in the so-called "Humid Mountains of the East" (*Ibid*, p.10, figure 7).

d. Hydrography

In general terms, it can be affirmed that the topographic of the island forms four main slopes through which the rainwater flows towards the sea. These slopes are the north or Atlantic slope; the southern slope or the Caribbean Sea; the eastern slope, or the Passage and the Vieques Sound; and the western slope, or Paso de la Mona.

As previously indicated, the town is irrigated by the rivers: La Plata, Cuyón, Aibonito and Usabón. These form valleys and plains. Therefore, their lands are irrigated by the rivers Cuyón, Aibonito, which crosses it diagonally, the Usabon and La Plata that passes through its northeast side, making it collide with Cidra (Toro Sagrañes, Op. Cit., P.33), and numerous perpetuals or intermittent streams that cross it everywhere.

e. Flora and Fauna

The predominant flora in the area consisted of bamboo, African tulip, guamá, guinea grass, moriviví and coitre. The fauna was represented by the following animals: reinita, pitirre, rolita, cattle heron, dogs and lizards.

IV. Synthesis of Cultural Development

In the following chapter it will be discussed the chronological aspects of Puerto Rico and Aibonito. In addition, what regards to the archaeology near the undertaking will be discussed more precisely. Also, the report entitled *Fajardo Ferry Terminal Assesment* (F. Alvarado y Marisol Rodríguez, 2018) was used as a main reference for this part of the research.

First, when the Spaniards arrived on the island, the inhabitants of the island, called by them, Taínos, had the means to rescue and reproduce their historical memories, customs and traditions through oral tradition. However, there is minimal information about this oral tradition. Historical written sources are classified based on the degree of knowledge of the chronicler. It is known as primary sources when is the person who collects the information, either by direct observation or by narration. Also, the other sources are classified as secondary and are almost always collections of narrations told by people who were at the sites and which the chroniclers consider to be their own.

Aibonito has the distinction of having several archaeological sites that have been used for development of the societies that inhabited our archipelago. Consequently, the definition of this development is relatively well presented.

Nevertheless, for Puerto Rico, these historical sources are limited. However, it includes Fray Ramón Pané, the chronicler who collected the only source considered as primary. It is a short text that tells mostly mythological aspects of this society. As secondary sources, there are several chroniclers such as Gonzalo Fernández de Oviedo and Fray Bartolomé de las Casas who rescued memories of ceremonies and aspects of daily life, but especially on the island of Hispaniola. Later, monks or envoys of the crown had the task of narrating about everything concerning the economy and development of the people they encountered. As time has progressed, and with the facilities that globalization has given us, first hand data has been made available that researchers have been collecting and analyzing in the Spanish and island archives. Which many of them are available on the net, because of the generosity of the authors.

a. Classificatory Scheme

Early, in the study of Puerto Rico, inhabitant's, schemes were established for their study. During the Spanish colonization, many creole investigators known as dilettantes because of the various aspects that they studied including flora and fauna, poetry and archaeology, produced a lot of information about the sites that they found on the island. As primarily examples of dilettantes there are Dr. Cayetano Coll y Toste, Dr. Salvador Brau and Dr. Adolfo de Hostos among others.

Early, during the North American invasion, the new owners of the island sent their experts to study the different aspects of the society. In the case of archaeology, the task was put in hands of the Smithsonian Institute. The first researchers were Jesse Water Fewkes and Aldon Mason. But it's with the visit of Dr. Irving Rouse that the schemes took their final shape. Yet, with certain changes among the decades is still used today.

The classification scheme and the temporal spatial framework that includes the archaeological periods and series for Puerto Rico and the Caribbean established by Dr. Irving Rouse (1964-1986-1992), will be taking in to account because is what the agencies present as the official classification. However, some other investigations that have shed light on this period of historical social development of the island, including our own in some cases will be taken into consideration.

Period I (3,000 - 2,000 b.C.)

Both el Consejo de Arqueología Terrestre (CAT) and la Oficina de Conservación Histórica (OECH) present this scheme in their descriptions of site. (for more information refer to *oech.gov.pr*)

This period is characterized by bands of marine collectors, pre-ceramics linked to coastal environments, mangrove areas and the resources of caves and rock shelters. This population groups belong to the Lithic Era and is characterized by producing lithic instruments using the stone process.

Although is dated by Rouse on 3,000-2,000 b.C., the dates of Angostura place these societies in the 6000 b.C. This date has been confirmed by recent studies in Corozo, Cabo Rojo. During the IB Period (2,000 b.C. - 100 A.D.), the so-called Archaic Era was developed (Rouse 1986). This group practiced small-scale farming, fishing and the collection of wild plants and seeds. The lithic instruments were produced using the polished stone method. (Carlos Ayes, Carso 2001 Inv. Arql Fase III Angostura, Barceloneta, CAT).

The Archaic society is characterized primarily by being gatherers and hunters. The difference is the minimal existence of animals for hunting, so the subsistence fell on the collection of both fruits and aquatic species. Aquatic species were collected both at sea and in the rivers. First, in the ocean there were collected in the *Thalasia* prairies and in the mangroves. On the other hand, in the river, there were collected both in the current itself, and under the stones. It is characterized for producing lithics instruments using in process of the flaked stone. (Ayes, 1996). There is evidence that made simple ornaments in stone, shell, bone and other materials, as well as the practice of human burials. (Ayes, 1991). The indigenous of the archaic culture could have arrived at the island in migrations from South America. Some researchers have postulated possible migrations from North America, but it has not yet been evidenced in the archaeological record. Likewise, the mitochondrial DNA investigations that have been carried out on the island appear to three different migrations of South American tribes, which curiously coincides with the archaeological expositions. (Martínez Cruzado et al, 2001)

In addition, during this period, two phases were differentiated. Ayes on his investigations on Angostura and other archaic sites suggested the existence of two periods differentiated by a flake industry and another of knives. Although at first it was believed that they lacked ceramics, because of the research and being able to identify the production of ceramics in this period in what have been identified as a late period. (Marisol Rodríguez Miranda, 1997)

The investigators had the opportunity to observe this pottery in the archaic site of Angostura in Barceloneta. In addition, to describe it on an unpublished document and have observed it in excavations carried out in an archaic site of Cabo Rojo excavated by José Ortiz for a treatment plant. Few researchers have taken up this research, although we have seen with pleasure how it has been cited in publications outside the island. Likewise, Dr. Reniel Rodríguez studies endorse these findings and define the period. (Rodríguez, Reniel, et. al, 2008). Also, this is an ongoing investigation.

Recent investigations produce data that will allow us to define accurately this period of occupation. Some of this information came from the sites of Yanuel 9 and Puerto Ferro on Vieques. The earliest date come from the site of Angostura, which produced a 4900 b.C. radiocarbon date (Ayes, 1993). The site of Maruca, located on the south-central coast, dates to ca. 3000 b.C. These 4th -millennium settlement dates are supported by additional studies on the island that have evidence for early landscape modifications through intentional burning and clearing of forested areas. Evidence from Cueva María de la Cruz, Paso del Indio, and Yanuel 9 on the island of Vieques (Tronolone et al, 1984) showed that Archaic populations existed at least through the 1st century A.D. and interacted with the Saladoid populations. (Reniel Rodríguez, 2010)

There are many sites representing this period on the Vieques Island. In fact, almost half of the sites Rouse identifies in his visit are from this period. The most known are Caño Hondo, Laguna Jalova and Puerto Ferro. This last, studied by Luis Chanlatte of the Center of Archaeological Investigations of the University of Puerto Rico is a base site for the study of this period. Results of these investigations are still contributing to the knowledge of the early human occupation in the Caribbean. Reniel Rodríguez in base of this new information about dates and the use of ceramic proposed the term Pre-Arawak for this period. (*Ibid*)

Period II

During Period II, after Rouse the ceramic series known as Saladoide were developed in Puerto Rico. Especially the Sub-Series "Cedrosan Saladoids" (Rouse, 1986) In this scheme is considered that these groups introduced for the first time in the Lesser Antilles, Puerto Rico and Hispaniola rudiments in the manufacture of ceramics, agriculture and sedentary life.

Evidence of Saladoid pottery was first documented by Froelich Rainey with Dr. J. L. Montalvo Guenard at the site of Cañas [Ponce] in the early 1930's on the south-central coast of the island. Rainey documented red-painted pottery in the lower stratigraphic levels of this site in association with a high volume of crab claws, leading him to call this materialization the "Crab Culture" (Rainey, 1940). Rouse (1952) called this tradition "Cuevas" [for a site in Trujillo Alto] and later subdivided the series into two styles: Hacienda Grande (early component) and Cuevas (later component). The tradition was eventually renamed as the Saladoid series after the type site of Saladero in the middle Orinoco of Venezuela (Rouse 1964) and the subseries Cedrosan for the type site of Cedros on the island of Trinidad. Evidence seems to indicate that the Cedrosan Saladoids Series (100 - 400 A.D.) originated in the middle Orinoco, subsequently moving towards the lower Orinoco, the north-eastern coast of Venezuela, the Guyanas coast, the Lesser Antilles, Puerto Rico and Spain.

These settlers are carriers of an excellent ceramic tradition, highlighting its ceramics by a decoration painted white on red, incisions filled with paint and crisscrossed in area as one of the earliest stylistic elements. Its main site in Puerto Rico was in the Hacienda Grande de Loíza neighborhood (Period IIA). Its later stylistic manifestations are located under the Cuevas style of Period IIB (400-600 A.D.). Its economy was based on the cultivation of cassava and the exploitation of the resources of the marine littoral where they obtained mollusks, crabs and fish. They supplemented their diet with the hunting of small rodents.

During the years, specifically in the beginning on 1977, Luis A. Chanlatte carried out field work in the archaeological sector of Sorcé, in La Hueca, Vieques, as part of a research program developed by the Archaeological Research Center of the University of Puerto Rico, Río Piedras. In this archaeological sector, this researcher defined a cultural complex which he called: La Hueca Cultural Complex or Agro I, according to his own classification. This complex is considered as a new agro pottery culture, with unpainted pottery, limiting its expressive and descriptive elements to the pottery technique of the incised model. This pottery was accompanied by an extraordinary lapidary industry that marveled, not only for the quality of its size and raw material, but for the overwhelming number of lithic amulets and body ornaments made of mother-of-pearl shell. Chanlatte obtained dates of C-14 for La Hueca, which places it around 5 b.C. According to Chanlatte, La Hueca cultural complex precedes the Sorcé complex.

In the light of these investigations, Rouse later added a second early subseries named Huecan, which contains one pottery style La Hueca. The addition of this subseries was to accommodate the presence of early, unpainted ceramics on the island of Vieques. This classification caused substantial debate as the artifact assemblages recovered from the site of La Hueca-Sorcé and later at the Punta Candalero site in eastern Puerto Rico, Hope Estate and other sites in St. Martin, and Morel I in Guadeloupe suggested a distinct cultural group from the previously defined Saladoid (Oliver 1999). Considering recent archaeological discussions regarding La Hueca (see Oliver 1999; Rodríguez Ramos 2010; Rodríguez Ramos et al., 2010), it is assumed here that the Saladoid series and La Hueca complex are two distinct cultural groups that migrated to the region at approximately the same time (Curet, 2005; Oliver, 2009; Rodríguez Ramos, 2010; Torres, 2009).

Period III

Around the 5th century A.D., new social developments are registered within the island of Puerto Rico. It is believed that these developments are based on the interactions of pre-Arawak, Saladoid, and Huecoid social groups, emerged in a social landscape characterized by cultural and social plurality rather than homogeneity (Chanlatte Baik 1990; Rodríguez Ramos 2010). The historical outcome of this diverse cultural landscape is documented by an increase of ceramic styles, but also by shifts in settlement patterns, domestic architecture, and the emergence of ceremonial structures. This was a time when village missioning of settlements on the coastal plains intensified, and new settlements formed in the interior valleys of the foothills and mountainous uplands of the island. (Curet, 2005; Oliver, 2009). These changes are accompanied by material and social transformations considered to entail the development of regionally distinct identities, increased sociopolitical organization, and economic diversity. (Search, 2011).

During Period III (600-1,200 A.D.); the Sub-series "Elenan Ostionoids" was developed in Puerto Rico in the Passage area of Vieques. On the other hand, the Sub-series "Ostionan Ostionoids" developed in the Passage area of the Mona. Both Sus-series are developed stylistically from the ceramic style Cuevas of the series "Cedrosan Saladoids". These post-salaloid stylistic manifestations have been placed under the archaeological series "Ostionoids" which in turn have been subdivided into four sub-series "Elenan Ostionoids, Meillacan Ostionoids, Ostionan Ostionoids and Chican Ostionoids" (Rouse, 1986).

Both, new sub-series retained the technology and shapes of the final Cedrosan pottery, as well as its tabular lugs, on which the earlier has been placed, and its red painted areas, on which the earlier potter has painted white designs.

The Elenan Ostionoids artisan gradually made their pottery thicker, coarser and rougher and simplified its shape. The Ostionoid potters were more conservative. They continued to produce relatively thin, fine and smooth pottery and retained all the previous shapes.

The settlement pattern data for this period showed a dramatic increase in the distribution of sites, with the highest density of settlements situated on the coastal plains and foothill regions of the island. (Antonio Curet et al, 2004). Settlements appear to possess considerable variation regarding size and function, indicating an observable diversity in site types ranging from villages, small villages, or hamlets to farmsteads and specialized activity areas. (Search, 2009). Francisco Moscoso suggested in terms of the economic production and organization, that this was a time of social transition from a strategy of communal production to one characterized by a hierarchical, tribute-based system.

The moment of the appearance of the first ball court in Puerto Rico, found in Tibes, the south-central region of the island (González-Colón, 1984), El Bronce, and Las Flores (Wilson, 1991). In addition to ball court structures, there are centralized spaces delineated by large stones that form communal plazas (Alegría, 1983). At the regional level, the number and elaborateness of monumental architectural features are interpreted as centers of political power, and an increase in territoriality (Search, 2011).

Period IV

On the 12th century A.D., the entire archipelago of Puerto Rico appeared to be occupied. Throughout all the territory it can be found all sort of settlements ranging in size from a single domestic structure to sites with multiple ball court sand plazas. (Oliver, 2007)

Moreover, agriculture reached its maximum expression, with terraces, irrigation systems and drainage channels. In addition to the Hoyada, several planting techniques have been identified, namely terraces, ridges and piles. The latter, along with the development of the Montones Farming, have been worked by the author and the results are going to be presented (Marisol Rodríguez, 2017).

Researchers have defined that their political development is represented in the system known as cacicazgo, which was constituted as a regional political center with power over a group of small villages. Although the investigators concur with the development of society, its preferable to think of a society in which a system of incipient social classes is developed (Initial classist society as defined by Felipe Bate Petersen in 1980s). The conquerors in their writings describe villages with chiefs throughout the island. The same for the surrounding islands. Likewise, this points more towards the approach.

However, Spain found a society divided between the elite *nitainos* and the *naborias*, or commoners (Moscoso, 1981). Ceremonial architecture during this time is at its highest frequency, and recent work by José Oliver suggested that most *bate* sites were occupied, although nonresidential *batey* sites have also been identified. The large, complex ceremonial/residential sites of Caruana and Viví reflect group-oriented ritual activity in the constitution of social and political life. (José Oliver and Juan Rivera, 2007)

At the time of the Spanish invasion of Puerto Rico is noted as being composed of approximately 18 political territories (Coll y Toste 1907; Oliver 1999; Rouse 1952). This is particularly intriguing because the size of Hispaniola is eight times the size of Puerto Rico. Oliver notes were sent to King Phillip III by Juan Melgarejo, governor of San Juan, which stated that: “In this island there was no cacique that lorded over all of it, except that in each valley or principle river there was a cacique that had other captains as their lutenists who served him and who were called in their language *nitainos*” (Oliver, 2009, p. 199).

Ceremonial artifacts known from this period include highly elaborate three-pointed stones or *cemís*, carved masks and figurines, wood or stone *duhos* and elbow stones and stone collars, all of which suggested an intensification of ritual practices over the previous period and the personification of chiefly power manifested in material objects (*Ibid*).

As in the preceding period, Chican Ostionoid assemblages are regionally variable based on an east–west trend in distribution. The Capá style is considered more common in western Puerto Rico and in the mountainous interior of the island. In the eastern portion of the island, the Esperanza style is predominant. Boca Chica is a rare trade ware originating in eastern Hispaniola and distributed through several outposts in south-central Puerto Rico.

Reconstruction of Landside ER-HWY-410 Project, Aibonito PR

All the Chican Ostionoid pottery is elaborate in its decorative style with complex incised designs and modeled lugs or adornos. Of the Chican ostionoid sub series, the one related directly to Vieques is the Esperanza series which was first identified by Rouse at the type site of Esperanza on the island of Vieques (Rouse, 1952).

Esperanza-style pottery (1200–1500 A.D.) surface and paste characteristics resembles Santa Elena pottery, with coarse to very coarse paste with aplastic inclusions ranging from approximately 0.5 to 2 mm. Vessels are characteristically thick (~7–8 mm) and light brown to medium reddish-brown in color. Handles are absent in this style, although structural decorations can include tabs, lugs, and elaborately modeled anthropomorphic adornos often on globular bowls with restricted openings and a sharp carina (called *cazuelas*). Esperanza vessels are very rarely red slipped or painted, and surface treatment mainly consists of smoothing. The Esperanza decoration is characterized by broad, deep, and widely spaced incisions, and the design elements are limited to the upper portion of the vessel between the rim and shoulder. Diagnostic design motifs are sets of double or triple lines, either straight, curvilinear, or parallel/oblique. A wide, downward-facing curvilinear arched set of lines is a characteristic motif, as is a single horizontal line under the exterior rim. Moreover, punctuation is also present but in a low frequency, typically consisting of small dots imitating stippling.

b. Municipality Prehistory

Through a written communication dated to September 10, 2004 between Isabel Rivera Collazo (the Technician in Archeology) and the Arql. Marisol Rodríguez (Director of the Office of the Terrestrial Archaeological Council) they included an Analysis Report Archaeological Sites, Municipality of Aibonito, where it was stated that: "The inventory of archaeological sites for the municipality of Aibonito consists of 10 chips, 9 of them coded AI-001-009 and the last without official code assigned. The analysis of the Municipality of Aibonito has already been completed. "The indicated communication also indicated that:

En el cuadrángulo topográfico se observan 10 marcas dentro de los límites municipales del municipio de Aibonito, identificadas de la siguiente manera: AI-1 con un signo de interrogación; AI-3; AI-5; AI-2 y 7 unidos en un círculo; un círculo que delimita todo el Cañón de San Cristóbal; un círculo alrededor de palabras "Jobo Dulce" en el cuadrángulo; un círculo con cruzado interior con nota que lee "existían bateyes, hay cerámica prehistórica. H. Moya y J. González informan petroglifo aislado"; letras A y B con nota que lee "informe Marisol Meléndez El Fresal"; y un círculo amplio con nota que lee "Cueva del Indio Aibonito, C. Solís 10/87. Identificamos 2 lugares incluidos en el Registro Nacional de Lugares Históricos para este municipio.

Also, he added that:

“En total se identificaron 21 sitios arqueológicos, 11 más de los registrados oficialmente (210% de aumento), registrando sitios prehistóricos e históricos. Durante el análisis de la bibliografía se encontró que un mismo sitio tenía dos fichas, AI-1 y AI-8, por lo que se eliminó el número 8. No se pudo encontrar información sobre 8 de los sitios previamente registrados. Sobre el sitio ahora registrado como AI-13, se revisó el expediente del caso y se pudo ver que hay querellas sobre saqueo donde se intervino en para [r, detener] el proyecto. La última comunicación data de 1992, cuando se le solicitó a la compañía que indicara qué ha hecho para proteger el sitio, como se le requirió con el endoso del proyecto. Esta carta nunca se contestó. Posteriormente, un proyecto de 1998 reporta que el sitio sigue siendo intensamente saqueado.”

The attached list includes the final list of the sites registered for Aibonito.

Archaeological Sites Identified for the Municipality of Aibonito [2004]

- AI-1 Asomante, Las Abejas
- AI-2
- AI-3 Usabón I
- AI-4 La Vega del Seboruco
- AI-5 Los Burgos
- AI-6 Jobo Dulce
- AI-7 La Cuchilla
- Entrada repetida
- AI-9 El Cañón
- AI-10 Piedra Pintada
- AI-11 Iglesia San José de Aibonito
- AI-12 Villa Julita
- AI-13 Fomento
- AI-14 Puente 175, Puente de Quebrada Honda
- AI-15 Casilla de Caminero [PR-14] km. 60.1
- AI-16 Casilla de Caminero [PR-14] km. 51.8

Reconstruction of Landside ER-HWY-410 Project, Aibonito PR

- AI-17 Almacén de tabaco y antiguo despalillado
- AI-18 Atarjea
- AI-19 Residencia de verano, Serrallés
- Doesn't say anything [but is AI-20 El Fresal]
- AI-21 Finca [cafetalera] Ceiba-Mattei

Another list of archeological sites for Aibonito is in the Council of Terrestrial Archeology and contains the same places above, with additional data from each site, including the AI-20 (El Fresal), and information about a site with no assigned number, which they call Lime Kilns, studied by the archaeologist Marisol Meléndez Maíz in 1988 as part of the El Fresal site.

Table 1: Archaeological Sites in the Municipality of Aibonito in the ICP

Site	Name
AI00001	Asomante, Las Abejas
AI00002	Posible abrigo rocoso en barrio Plata
AI00003	Usabón I
AI00004	La Vega del Seboruco
AI00005	Los Burgos
AI00006	Jobo Dulce
AI00007	La Cuchilla
AI00008	Repetido
AI00009	El Cañón
AI00010	Piedra Pintada
AI00011	Iglesia San José de Aibonito
AI00012	Villa Julita
AI00013	Fomento
AI00014	Puente 175, Puente de Quebrada Honda
AI00015	Casilla de Caminero, km. 60.1
AI00016	Casilla de Caminero, km. 51.8
AI00017	Almacén de tabaco y antiguo despalillado
AI00018	Atarjea
AI00019	Residencia de Verano, Serrallés
AI00020	El Fresal
AI00021	Finca Ceiba-Mattei



Figure 7: Archaeological Sites Near Undertaking in CAT

Table 2: Archaeological Sites in the Municipality of Aibonito in SHPO

TAG*	Site Name
AI0100001	Las Abejas (before Asomante)
AI0100002	AI-2 / Aibonito 2
AI0100003	AI-3 / Aibonito 3
AI0100004	Vega del Seboruco
AI0100005	Los Burgos
AI0100006	Yacimiento Algarrobo
AI0100007	Batey del Barrio Llanos
AI0200001	Iglesia San José
AI0200002	Antigua Ferretería Mendoza (c. 1900)
AI0200003	Residencia Suarez de Bruno (c. 1918)
AI0200004	Residencia Martínez-Berrios (c.1910)
AI0200005	Antiguo Teatro Encantos (c. 1930)
AI0200006	Antigua Farmacia Moscoso (c. 1910)

AI0200007	Edificio Gil Ramón González (c. 1909)
AI0200008	Residencia y Comercio (c. 1913)
AI0200009	Antiguo Colmado
AI0200010	Edificio Aibonito Trading (c. 1916)
AI0200011	Edificio Comercial (c. 1916)
AI0200012	Anigua Residencia Don Leopoldo Mercado (c. 1900)
AI0200013	Villa Julita (c. 1915) / Casa Ulrish
AI0200014	Casa Museo Federico Degetau / Quinta Rosacruz
AI0200015	Casa de Caminero #1
AI0200016	Casa de Caminero #2
AI0200017	Casa de Caminero #3
AI0200018	Casa de Caminero #4
AI0200019	Puente de Quebrada Honda / Puente #176
AI0200020	La Piedra Degetau

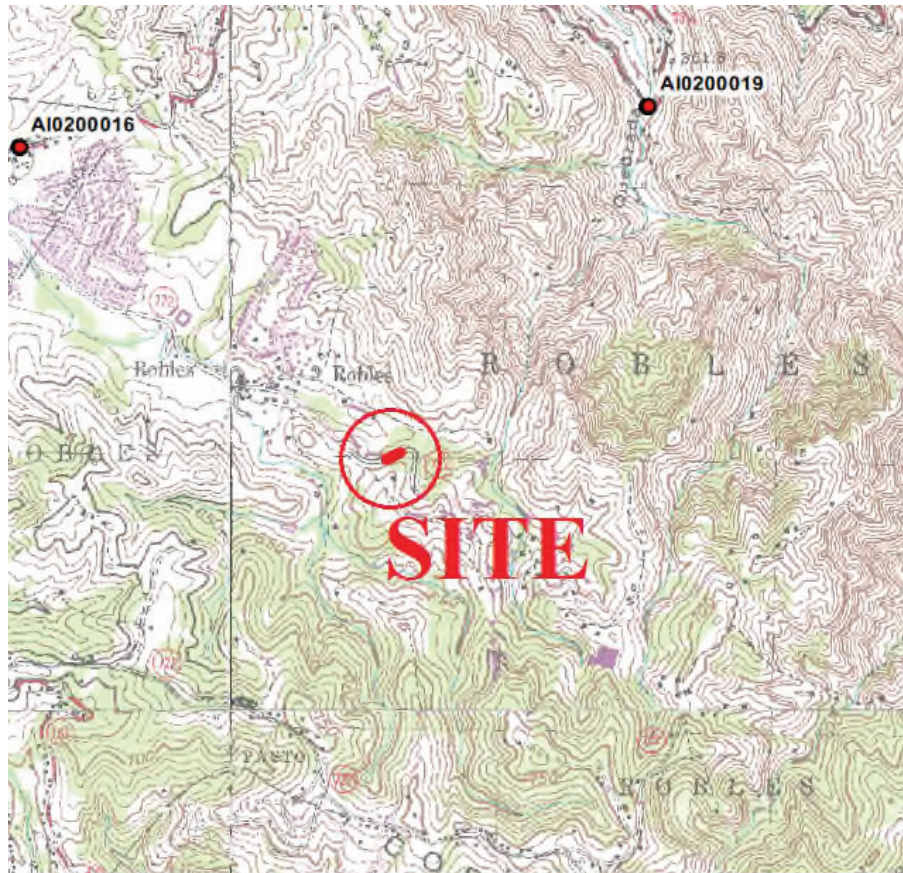


Figure 8: Archaeological Sites of Aibonito in SHPO Archives

Reconstruction of Landside ER-HWY-410 Project, Aibonito PR

Regarding the properties of Aibonito in the National Register of Historic Places, we know that there are two registered sites: The San José de Aibonito Church - on the street Ramón Emeterio Betances attached to the Town Square (10 / dec / 84) 84000451 and Villa Julita - on Avenida San José # 401 (19 / dec / 86) 86003491.

c. Archaeological Investigations Near the Project Area

In the archives of the Consejo de Arqueología Terrestre (CAT) there are no less of 63 archaeological investigations on the Aibonito Municipality between 1979 and 2016, but the ones corresponding to the barrio Robles, that is where the project that occupies us is located, they are possibly limited to seven, and none is truly located nearby. In addition, in 2005, researchers Marisol J. Meléndez Maíz, Sharon Meléndez, Hernán Bustello, Liza Colón, Hugh Tosteson and Jorge Lizardi worked on the study: *Identificación de Indicadores arqueológicos para los establecimientos comerciales y públicos en los centros urbanos del siglo XIX en Puerto Rico. Caso de Aibonito*, whose report was submitted to the State Office of Historic Conservation (SHPO).

In May of 1989, the archaeologist Marlene Ramos Vélez worked in an archaeological investigation Phase IA-IB in the lands of the project Improvements to the system of aqueducts in the neighborhoods Pueblo and Robles de Aibonito (AI-89-01-05). The southernmost sections of her project are in Robles, about 1.0 kilometers, at its closest point, west-northwest of the area of the current project under investigation. In the Final Conclusions and Recommendations of her project, the archaeologist Ramos Vélez pointed out that: "In general terms, the route to be followed by the 16" pipeline located along roads and streets and the access road to the tanks are already areas impacted ... The most sensitive area seems to be the section of highway PR-14 where residences are still being observed that date from the beginning of the century [XX] ... No cutting, well of sounding and inspection of the surface yielded positive results to cultural resources. In view of the foregoing, we recommend that PRASA [Aqueduct and Sewer Authority] be granted permission to carry out the construction of the project "(page 14 of its report).

In April 1991, the archaeologist Iván F. Méndez Bonilla studied, in a Phase IA, the lands of the Bella Vista project, in the Robles neighborhood of the Municipality of Aibonito (AI-91-02-04). This place is located about 1.7 kilometers north-northwest of the project now studied. Because of his study Méndez found that "... the site is a highly impacted site where soil had previously been removed from the site to be used as a filler in the works of the Reparto Buena Vista project and subsequent removals. During the visit and inspection of the site, the investigators did not find any cultural evidence in the surroundings. As can be seen from the documentary study that was conducted, there are no archaeological and historical sites in the evaluated area. The documents, reports, maps and inventory of archaeological sites were consulted in the Research Center of the Instituto de Cultura Puertorriqueña and they do not identify any archaeological or historical site in the area near the project "(page 20 of the Méndez report).

In March 1996, the archaeologist Juan González worked on a Phase IB for *the Aibonito Shopping Center* project (AI-96-04-02), located at kilometer 6.7 of the PR-722 highway in the Robles de Aibonito neighborhood. The project is located about 1.0 kilometers west of the area now under investigation. He pointed out (1996) the archaeologist González that: "For this evaluation of cultural resources, as far as the field work is concerned, the profiles and the surface of the lands were tracked / inspected (until [where] the vegetation and the topography allowed) that they will be intervened; In addition, fifteen (15) test probes were excavated manually, no pre-Columbian or historical resources were located "(page 8 of his report). In addition, Gonzalez said: "The work done has indicated that there are no pre-Columbian or historical cultural resources in the property that will be intervened by the planned construction."

In December 1996, the archaeologist Carlos M. Ayes Suárez worked an IA-IB Phase for the *Aibonito Plaza Shopping Center* project (AI-96-04-05), which was located between kilometers 52.7 and 53.0 of highway PR-14 in the Robles neighborhood, about 1.7 kilometers north of the area now studied. In his research, Ayes identified a fragment of pottery, possibly pre-Columbian, but in the Recommendations of his report (p.34) he indicates that: "Whenever the results of our archaeological prospecting of the project show that there is no archaeological site in place I did not begin [sic] the isolated discovery of a pre-Columbian ceramics, we understand that the development of it will not have any archaeological impact. For this reason, we would like to recommend to the Archeology Program of the Institute of Puerto Rican Culture that it grant the requested endorsement to the proposing party".

On the other hand, in 1999, the archaeologist Harry Alemán Crespo worked on a Phase I project for the Construction of the Aged Center and/or Specialized Housing (Aurora Home), in the Robles of Aibonito (AI-99-05-01). The report was submitted to Mennonite General Hospital (SHPO # 11-08-96-02). The researcher carried out a historical study, intensive recognition and excavation of 4 wells in a 5-string property with negative results. The location of the project places it more than 2.0 kilometers northwest of the current site studied, so is understandable that the place is in the Caonillas neighborhood.

Meanwhile, the archaeologist Norma Medina Carrillo carried out for the years 2002 and 2003, a Phase IA (AI-02 -05-06) and a Phase IB (AI-03-05-06) for the project Improvements for Ensanche, lane of rise in PR-7722, from PR-1, Aibonito-Cayey. The closest place of this project, in the Robles neighborhood, to the land of our interest is located about 1.6 kilometers to the southeast. First, the archaeologist recommended a Phase IB and this last report, in February 2003, produced negative results for cultural resources.

Later, in 2007, the archaeologist Harry Alemán Crespo worked on a research phase IA-IB project *Desarrollo de 23 solares en 25.1331 cuerdas por la Corp. de Desarrollo e Inversiones de la Montaña, PR-14 km. 51.8 (Interior)*. The project was in the neighborhoods: Robles and Caonillas (AI-07-07-03), about 1.9 kilometers to the northwest of the current study. The researcher conducted a historical investigation, a surface survey and the excavation of 50 cuts with negative results.

Finally, in December of 2011, the archaeologist Ethel V. Schlafer worked in archaeological research Phase IA for the project *Walgreens de Aibonito*, located on the PR-14 road, supposedly in the Robles neighborhood. After carefully checking the location of the project, that it is in the Pueblo. However, the site is located about 1.8 kilometers northwest of the section now under investigation and the archaeologist indicates that: "The results of the archaeological survey were negative and sterile to the presence of visible cultural resources in the field."

d. Aibonito's Archaeological Reports (CAT)

Table 3: Archaeological Studies in the Municipality of Aibonito

Project	Neighborhood	Phase and code	Archaeologist	Results	Material
Brisas de Aibonito SHPO #11-05-79-01		Phase IA? 1979	Antonio Daubon y Miguel Rodríguez	Negative	Sociedad Espeleo- Arqueológica de Puerto Rico
Sanitary Sewer System	San Luis Community	Phase IB AI-85-01-01	Antonio Daubon	Negative	
Improvements to the Aqueduct System	Pasto and Asomante	Phase IB AI-87-01-02	Antonio Daubon	Positive	An aboriginal ball court, Phase II is recommended
Segregación de Solares	Asomante	Phase IA-IB AI-87-01-03	Juan González	Negative	
Franja del Yacimiento Área B Proyecto El Fresal	Cuyón	Mitigación AI-88-01-04	Marisol J. Meléndez	Positive	Área habitacional con estructuras, fogones, cerámica y lítica
Improvements to the Aqueduct System	Pueblo and Robles	Phase IA-IB AI-89-01-05	Marlene Ramos	Negative	

Project	Neighborhood	Phase and code	Archaeologist	Results	Material
Las Abejas: A Ceremonial Ball Court	Asomante	Phase II AI-89-01-06	Carlos M. Ayes	Positive	Ceremonial ball court
Colinas de San Francisco	Llanos	Phase IA-IB AI-91-02-01	Antonio Daubon	Negative	
Paseo Montecarlos	Pueblo	Phase IA-IB AI-91-02-02	Antonio Daubon	Negative	
Escuela Intermedia Urbana	Pueblo	Phase IA-IB AI-91-02-03	Juan González	Negative	
Bella Vista	Robles	Phase IA AI-91-02-04	Iván F. Méndez	Negative	
Urbanización Industrial	Llanos	Phase IA-IB AI-91-02-05	J. González y H. Moya	Positive	Rock with petroglyph. Phase II is recommended
Las Margaritas Apartments	Llanos	Phase IA-IB AI-92-02-06	Juan González	Negative	
Buena Vista	Pueblo	Phase IA-IB AI-92-02-07	Juan González	Negative	
Hacienda El Polluelo	Pasto	Phase IA-IB AI-93-03-01	Iván F. Méndez	Negative	
Praderas de Aibonito	Asomante	Phase IA-IB AI-93-03-02	Iván F. Méndez	Negative	
Cementerio La Paz del Señor	Llanos	Phase IA-IB AI-94-03-03	Iván F. Méndez	Negative	
Desarrollo de Solares	Pasto	Phase IA-IB AI-94-03-04	Marlene Ramos	Negative	
Área de Descanso Carr. Panorámica	Pasto	Phase IA-IB AI-95-03-05	Jesús Vega	Negative	
Paseo Las Delicias	Llanos	Phase IA-IB AI-95-03-06	Juan González	Negative	
Rancho G	Llanos	Phase IA AI-95-03-07	Armando J. Martí	Negative	
Complejo Deportivo de Aibonito	Pueblo	Phase IA AI-95-03-08	Armando J. Martí	Negative	

Project	Neighborhood	Phase and code	Archaeologist	Results	Material
Hotel La Piedra	Pasto	Phase IA AI-95-03-09	Jesús Vega	Negative	
Segregación de Solares	Caonillas	Phase IA AI-95-03-10	Armando J. Martí	Negative	
Extension of the Sanitary Sewer System, Road 162	Pueblo	Phase IA-IB AI-96-04-01	Juan González	Negative	
Aibonito Shopping Center	Robles	Phase IB AI-96-04-02	Juan González	Negative	
Puente sobre Río La Plata, PR-173	Plata	Phase IA-IB AI-96-04-03	José Rivera Meléndez	Negative	
Segregación de Solares	Asomante	Phase IA-IB AI-96-04-04	Miguel Rodríguez	Negative	
Centro Comercial Aibonito Plaza	Robles	Phase IA-IB AI-96-04-05	Carlos M. Ayes	Negative	
Desarrollo de 21 solares residenciales Asomante II	Asomante	Phase IA-IB AI-96-04-06	José Rivera Meléndez	Negative	
Aibonito Shopping Center	Llanos	Phase IA-IB AI-97-04-07	Ether V. Schlafer	Negative	
Desarrollo de 90 solares residenciales	Llanos	Phase IA-IB AI-98-04-08	José Rivera Meléndez	Negative	
Hacienda La Montaña	Pasto	Phase IA-IB AI-98-04-09	Juan González	Negative	
Centro de Envejecientes	Caonillas	Phase IA-IB AI-99-05-01	Harry Alemán	Negative	
Escuela Segunda Unidad Llanos	Llanos	Phase IA-IB AI-00-05-02	Harry Alemán	Negative	
Paseo Reina de las Flores	Pasto	Phase IA-IB AI-02-05-03	Antonio Daubon	Negative	
Segregación 8 solares	Asomante	Phase IA-IB AI-02-05-04	José Rivera Meléndez	Negative	
Mejoras para ensanche de carril PR-7722	Robles	Phase IA AI-02-05-05	Norma Medina	Negative	Phase IB is recommended

Project	Neighborhood	Phase and code	Archaeologist	Results	Material
Mejoras para ensanche de carril PR-7722	Robles	Phase IB AI-03-05-06	Norma Medina	Negative	
Extensión de las calles Betances y Vizcarrondo	Pueblo	Phase IA-IB AI-03-05-07	Jaqueline López	Positive	Phase II is recommended
Colinas del Paraiso	Llanos	Phase AI-03-05-08	Ethel Schlafer	Negative	
Residencial Asomante Bonito	Asomante	Phase 1A AI-03-06-01	Marisol Martínez	Negative	
Parque de Bombas	Pueblo	Phase IA AI-05-06-04	Iván F. Méndez	Negative	
Lotificación de 13 solares	Asomante	Phase IA-IB AI-06-07-01	Eduardo Questell	Negative	
Construcción de 32 solares		Phase IA AI-00-06-05	Marlene Ramos	Negative	
Desarrollo de 23 solares	Caonillas	Phase IA-IB AI-07-07-03	Harry Alemán	Negative	
Desarrollo de 18 solares residenciales		Phase IA-IB AI-04-06-03	José Rivera Meléndez	Negative	
Conector entre la PR-14 y calle Julio Cintrón	Pueblo	Phase IA-IB AI-11-08-01	Jaqueline López	Positive	Atarjeas históricas
Walgreens de Aibonito	Pueblo	Phase IA AI-11-08-02	Norma Medina	Negative	Recomienda monitoría
Centro Judicial de Aibonito	Pueblo	Phase IA AI-12-08-03	Jaqueline López	Negative	
Los Dardanelos Shopping Court	Pueblo	Phase IA-IB AI-08-09-01	Harry Alemán	Negative	
Eligibility Determination Aibonito Flowers	Asomante	Eligibility AI-16-09-02	J.W. Joseph y Sharon Meléndez	Positive	Presence of precolonial, colonial and modern artifacts.
Edificio para Estacionamiento	Pueblo and Llanos	Phase IA AI-07-09-03	Lydia I. Ortiz	Negative	

In addition to the previous projects, other studies have been carried out in Aibonito which includes at least the following:

1986 - *Adquisición de terrenos facilidades recreativas, Bos. Caonillas y Pasto*, Phase IA-IB, Sibanacán (Harry Alemán, Edgar J. Maíz y Eduardo Questell Rodríguez), negative results.

1987 – *Aibonito Filter Plant Expansion, Barrio La Plata*, Phase IA, Daniel Molina y Diana López, negative results.

1991 – *Distribución Sanitaria al Sector Las Mercedes, Barrio Llanos*, Phase IA-IB, Sibanacán (Harry Alemán, Edgar J. Maíz y Eduardo Questell Rodríguez), SHPO #03-20-91-06, negative results.

1991 - *Proyecto Villa de la Rosa*, Phase I, Barrio Llanos, Antonio Ramos (Mao). negative

1994 - *Improvements to the Water Supply System of Algarrobo, Coamo-Aibonito*, Phase I, Juan Rivera Fontán. negative

1996 - *Instalación de Sistemas Sanitarios Comunidades Jatibonico y Cristián Belén*, Jesús Vega, SHPO #12-12-94-02, negative results.

2007 – *Hacienda Las Abejas*, Phase IA, Raquel Camacho, (AI-07-07-04), negative results.

2007 – *Mejoras a la Planta de Filtración, Barrio La Plata*, Jaqueline López (AI-07-07-02), negative results.

2008 – *Conector entre la PR-14 y la Interior PR-725*, Phase IA-IB, José Rivera Meléndez (AI-08-07-06), negative results

2010 – *Proyecto Recreativo Comunal, Barrio La Plata*, Harry Alemán (AI-10-07-07), with negative results.

V. Historical Context

Much of the following information is about the history of the Municipality of Aibonito and was taken from the Report titled: *Archaeological Survey and National Register of Historic Places Eligibility Determination at the Aibonito Flowers Inventory Property, Asomante, Aibonito, Puerto Rico*, prepared in 2016 by New South Associates, Inc., J.W. Joseph and Sharon Meléndez (pp. 36-43). However, when another reference is going to be used during this part of the report, it will be indicated.

a. The Beginning

The earliest mention of the word “Aibonito”, or any derivatives of that name (eg., *Laybonito*, *Ay Bonito*) was in the sources consulted relate to a cattle ranch/holding (*hato ganadero*) within the boundaries of the early Coamo jurisdiction (*partido de Coamo*). Santiago González’s work on landholding patterns in Aibonito from the mid-18th century up to 1898, mentioned uncorroborated oral traditions affirming there was a group of cattle-ranchers within the jurisdiction of the future municipality of Aibonito since 1630, founded by the Spaniard Diego Zoroascoechea.

This “*hato de Laybonito*” appear to have existed until the mid-18th century, like many others, with cattle-ranching for beef production as its oldest and primary economic activity. The dissolution of the “*hato de Laybonito*” as part of land reforms in Puerto Rico was initiated in 1751, but it was not until 1753 that this process really took hold. The intensifying establishment of farms (*estancias*) focused on agricultural crops stimulated land segregation, as opposed to the previous pattern which favored large landholdings for cattle ranching as a principal economic activity. This process would continue until the end of the eighteenth century and beginning of the 19th century and established the basis for the establishment of the future township (Santiago González 1988: 20-21; Morales Cassagné 1948:6; Santiago and Cardona 1985:16-18).

Miyare’s description in 1775, stated that the jurisdiction of Aibonito “... has some planted portions that abundantly produce whatever crops are on the island, with the rest occupied by trees of disproportionate magnitude...” (Fernández Méndez 1995: 299).

A map dated that same year (figure 9) shows the location of “Aybonito” identified with a symbol for a mill (*ingenio*, as per the map legend), and surrounded by what appear to be cultivated areas. Speaking of Coamo, one of the earliest settled areas on the island. Spanish friar Abbad y Lasierra (1781) stated that a portion of its inhabitants, which at the time were 480 families totaling 4,317 inhabitants, “... had their haciendas on the mountain of Laibonito (*emphasis ours*); the other three [parts] live in Salinas, Juana Díaz and Coamo de Abajo [the future Santa Isabel] on the seashore ...” (Abbad, 1979:114).



Figure 9: Detail “Puerto Rico 1775”, Juan de Surville
(Anibal Sepúlveda Rivera, 2004, Tomo 1, pp. 28-29)

Noted what appear to be cultivated areas (squares) and the symbol for “mill” (ingenio) just below “Aibonito”, also note inverted North.

The next reference found concerning Aibonito is another map, dated 1791 (Figure 10), showing the location of “Aybonito” and two roads leading from it toward Coamo and Caguas (off map), the latter presumably passing through Cayey; however, no further information can be derived from this image.

Reconstruction of Landside ER-HWY-410 Project, Aibonito PR

Aibonito's founding process was completed between 1822 and 1824, by separating itself from the jurisdiction of Coamo. Santiago González told that, at the time, the municipality "... constituted a little developed community of farmers, whose lifestyle was centered on producing basic crops such as rice, sweet potatoes, yams, corn, bananas and plantains, and to a lesser degree raising livestock both for their own consumption as well as to supply local markets and maybe to sell in the larger town markets in the South ..." (Santiago González 1988:25).

Returning to Córdoba, he informed that the 1828 census reported a total of nine houses and 11 thatch huts (*bohíos*) in town, while the rural areas had a total of 80 houses, 220 *bohíos* and three stores (*ventorrillos*). The passage of a hurricane in 1829 motivated a letter from the mayor describing the great losses suffered by the coffee, plantain, sugar cane and other crops, which were destroyed. In addition, he requested permission to obtain food supplies (*viveres*) through the port of Salinas, "... which is so close to this town" (*Letter about hurricane, AGPR, Spanish Government Collection, Aibonito, Box #397, August 6, 1829*). Recovery from this event was prompt, since on his visit to the town at the beginning of the 1830, then-Governor de la Torres expressed satisfaction with the good conditions of the church, the *Casa del Rey* and the roadways (Morales Cassagné 1948: 15).

c. Roads in Aibonito

The earliest documentary reference found on roads in Aibonito is dated 1826, when a total of six were identified crossing the municipal jurisdiction, as follows:

- 1) Royal road or highway crossing the island from north to south, from San Juan to Ponce, which passed through the town core from east to west, leading to Cayey and Cidra;
- 2) Road to Barranquitas to the north, identified as the old mail route;
- 3) Road to Guayama, heading south;
- 4) Road to Salinas to the southwest;
- 5) Road to Sabana del Palmar (the future Comerío) to the northeast; and
- 6) Rural road (*camino vecinal*) to Coamo, traveling from north to south and passing by the town of Aibonito at a distance of three quarters of a league ("Descr. Topográfica del pueblo de Aybonito y su división, 18 Nov. 1826", AGPR, FOP, SOM, Caja #183).

Mayor Pablo Rivera reported that construction of the "road to the capital" began in November of 1828, with a segment already open to traffic by 1831 ("Expediente sobre relación de obras públicas, 1829-31", AGPR, FOP, SCV, Aibonito, Caja #1378, Legajo #5; see also Santiago and Cardona 1985:37; and Córdoba 1968:367). By 1829, all roads were functional, and additional construction had begun on a hillside known as Quebrada Honda (*La Gaceta del Gobierno de Puerto Rico*, 29 de junio de 1830, in Santiago and Cardona 1985:37).

Reconstruction of Landside ER-HWY-410 Project, Aibonito PR

The roadways were opened by the local inhabitants the following year, as instructed by the government, and construction was carried out on the road to Coamo, including drainage gutters on each side (*La Gaceta del Gobierno de Puerto Rico*, 4 de septiembre de 1832, in Santiago and Cardona 1985:37).

By 1842, work had been carried out on the “royal roads”, with no specific details of the work or which road in particular (Minutes of meeting between the mayor and assemblymen <Jan. 15, 1842>, AGPR, FGE, Aibonito, Caja #398). However, by 1853, five roads identified in Aibonito, leading to Cidra, Coamo, Barranquitas, Salinas/Guayama, and Sabana del Palmar (the future Comerío). These appear to correspond to the roads identified in 1826 (see above), except for the road from Barranquitas to Coamo. The description adds that all these roads were in bad conditions and almost impassable during the rains. Concerning the one to Coamo, the source indicates it was under construction at that time and was expected to be one of the best in its class. Finally, there was only one wooden bridge over the Piedras creek, immediately west of the town (Document ca. 1853 <as per date referenced in the text>, AGPR, FOP, SOM, Aibonito, Caja #183).

VI. Economic Development

Despite its origins as a cattle-ranching and subsistence agriculture zone, Aibonito’s development was furthered by coffee and tobacco cultivation. Tobacco, which is native for the New World, has been documented in the Antilles since the earliest discovery and colonization periods, and its importance as a crop in Puerto Rico has been known as early as the 17th century (Aguayo 1876:11-14; Fernández Méndez 1995:79-80, 178, 217 and 1997:9, 11-12, 17-18, 42; Hawks 1970:1-2). On the other hand, coffee which originated in eastern Africa, was introduced in Puerto Rico by 1736, arriving from Arabia through Europe, then the French islands, Cuba and Santo Domingo. Both crops (coffee and tobacco) were important features in the development of subsistence agriculture since their introduction on the island, as elements of contraband trade and later as crops favored when the larger-scale cattle landholdings were dissolved, starting in the mid-18th century, followed by the development of agriculture for exportation as a fundamental economic activity in Puerto Rico (Pumarada 1990:5, 11-15). The report of Marshall Alejandro O’Reilly’s visit to Puerto Rico in 1765 commented that at that time only tobacco, coffee and sugar cane were grown, while other crops grew in the wild (Fernández Méndez 1995:240, 256, 258, 260).

However, the relatively late founding date for Aibonito (1824) inserts this municipality as such in the agricultural economic cycles of the 19th and 20th centuries, when the coffee and tobacco crops, respectively, acquired greater economic importance throughout the island.

According to Santiago González, the level of agricultural production in Aibonito prior to, as well as after, its founding suggested the existence of a natural subsistence economy. This is more explicitly evident when one observes that only 2.18 percent of the municipality's lands were under cultivation. This relative lack of development meant that Aibonito did not experience the same economic expansion seen in other coffee-producing municipalities such as Utuado, Lares or Yauco, as well as sugar-producing municipalities. While it is true that Aibonito saw coffee production, by the 1840's, production levels suggested that they were oriented towards satisfying local demand rather than commercial export. By 1845, the territorial distribution of each agricultural product was as follows: sugar cane, 19 *cuerdas*; coffee, 305 *cuerdas*; lesser crops (*frutos menores*), 691 *cuerdas*; and uncultivated lands in grasses, etc., 16,791 *cuerdas*. While lands dedicated to coffee cultivation had increased, coffee production sometimes exceeded local demand, and the excess was sold to trading firms established in the southern ports, particularly Salinas, Guayama or Santa Isabel de Coamo (Santiago González 1988:27-30, 35-37).

At that same time, Santiago González pointed out that coffee production during this period declined, relative to the growing population in Aibonito (close to 80%, probably due to local and foreign immigration), and the subsequent rise in acreage dedicated to subsistence crops. This suggested that the demand for foodstuffs affected the balance of these product's crops (Santiago González 1988:31-32). However, as Pumarada pointed out, this trend would be reversed by the greater coffee boom of the second half of the 19th century, which in many areas of the interior that did not produce top-shelf crops, tended to favor the continuity of small and medium landowners (Pumadara 1990:35).

Just as in other coffee-producing municipalities, coffee production in Aibonito registered significant growth during the 1870's, but the failure of the local trading firms countered this impulse, leaving the commercial trade for this product in the hands of those in other municipalities (Santiago González 1988:47-48). However, coffee production in Puerto Rico peaked during the 1880's and 1890's, and by 1890, the island was Latin America's fourth largest coffee exporter (Pumarada 1890:36-37). By 1894, over 2,500 *cuerdas* of land in Aibonito were dedicated to coffee cultivation, while lesser food crops occupied some 1.300 *cuerdas* (Santiago González 1988:49). By the end of the nineteenth century, Aibonito's coffee production was marketed principally by trading firms from Coamo (eg., J. Picó & Co., Aguilú & Co., Antonio Acosta Palmieri) and Barranquitas (eg., José Monserrate Santiago, Nicolás Santini y Gerónimo Colón) (Santiago González 1988:50).

There were other crops in Aibonito besides coffee, of which Santiago González highlights tobacco, since it would be of fundamental importance in the economic future of the municipality, especially after the great coffee crash (*la quiebra del café*) during the first decades of the 20th century.

Santiago González points out that the tendency to switch over to tobacco as a crop was a common tendency in most of the coffee-producing areas in Puerto Rico (Santiago González 1988:51). The gradual increase of tobacco acreage in Aibonito can be seen from even before the 1870's, reaching a total of 293 *cuerdas* by 1894. The implication is that this increase promoted a lesser acreage dedicated to other crops grown in the shade, such as coffee, plantains and bananas, which was the setting for the change of sovereignty in 1898 due to the Spanish-American War, as well as the destruction caused by Hurricane San Ciriaco in 1899 (Santiago González 1988:52-54).

The earliest mention found on tobacco as a crop in Aibonito is from 1842, when sources indicates there were eight *cuerdas* planted in tobacco (Santiago González 1988). At the time, close to 97.5 percent of the land in Aibonito were grasses and wild vegetation, whereas close to 1.5 percent were dedicated to coffee crops and less than one percent to sugar cane and other lesser crops (probably including tobacco), which echoes Spanish chronicler Miyares' description in 1775 (see above) (Santiago González 1988:31-32, 36). During the 1840's is when farmers began organizing agricultural and trading firms to take advantage of these crops (that is, coffee and tobacco) for exportation. Although tobacco continued gaining importance, coffee was the primary crop during the time and until the end of the nineteenth century as mentioned above (Santiago González 1988:47-50). Despite this growth, the coffee industry would ultimately fail, making way for the development of tobacco during the first decades of the 20th century.

In Aibonito, various local inhabitants were attracted to tobacco cultivation as a commercial enterprise, whom requested permission to clear their own lands to plant tobacco for market export. As previously stated, this led to over 237 *cuerdas* being planted in tobacco by 1894, and possibly more. One advantage was that tobacco was a crop whose season was different from many other crops, allowing alternate planting with yam, bean, and corn crops, among others (Santiago González 1988:51-54).

The establishment of *La Colectiva* in Cayey marked the entry of the U.S. capital into the tobacco market of the sector that included Aibonito (Morales Cassagné 1948:58). Focused on planting and buying tobacco, this was the popular name given to the *Porto Rico Leaf Tobacco Company*, a local subsidiary of the *American Tobacco Company*, the great U.S. tobacco trust that was legally dissolved in 1911 (Baldrich 1988:21-22, 41).

The importance of tobacco in the daily life and economy of Aibonito during the first decades of the 20th century cannot be understated. Morales Cassagné offers us a brief image of the time, as follows:

“... in the morning, towards seven, and in the afternoon at about one, during workdays, you can see hundreds of female workers (despalilladoras) and seamstresses walking along the main street. They were headed to the two tobacco cleaning shops, and also an undergarment and glove shop that exited in town.

At the end of the day, the female workers, many of which are graceful younger women living in town and the surrounding countryside, leave the shops in a hurry, and walk hurriedly, headed for their homes” (Morales Cassagné 1948:41-42).

Fernández Méndez stated that by the 1930's there were large warehouses for tobacco processing, fermenting and packaging in Aibonito, Cayey, Caguas, Ciales, Comerío, Utuado and San Lorenzo, amongst others (Fernández Méndez 1997:34). By 1935, there were 17,600 tobacco farms (a third of all existing farms), 13,000 of which derived the greater part of their income from growing tobacco, and thus classified as tobacco farms.

By 1878, the agricultural wealth of Aibonito was calculated in 34,619 pesos, in 4,105 the urban one, and in 6,507 the livestock, paying the total of them 2261.50 of contribution to the treasure (M. Úbeda and Delgado, 1878, p 229). The public buildings for that year were: the wooden church; the house-Town Hall, also of wood, of two floors; the cemetery, of masonry; the butcher shop, made of wood; the parish house, also made of wood; and the barracks of the Civil Guard (Ibid, p.230).

The construction of the Central Highway (current PR-14), which was completed in 1886, gave the municipality a lot of life and prosperity (Ortiz Archilla, 2007, page 38). In 1887, the Governor of the Island, Captain General Romualdo Palacios González went to reside in Aibonito, and for a time the town was considered as the capital to make provision. Palace, of sad remembrance in the Island as initiator of the "comportes" against the autonomists, however, was very interested in making Aibonito one of the main towns of the Island (Ibid, pp. 38 and 39). On May 12, 1888, Aibonito was granted the title of Villa due to the efforts of the ex-Governor General of Puerto Rico.

In 1898, the agricultural wealth consisted on: 456 ropes of cane, 2,618 ropes of coffee, 331 ropes of tobacco, 8,760 of pastures, and 1,562 of smaller fruits, with 7,953 of mountains and weeds (J. Santiago and WA Cardona, Op. Cit., P.64). The urban wealth varied in the following way: houses of housing 153; stores 30; coffee establishments 5; bohíos 145; masonry buildings 8; masonry and wood buildings 4; wooden buildings 189; buildings of straw and yaguas 147.

a. 20th Century: The Central Highway and the Beginning of the PR-722

At the beginning of the 20th century, coffee remained the main agricultural product of the region, but, as already mentioned, it was replaced by tobacco by the early 1930's. However, the planting of tobacco in many places, such as for example: La Plata neighborhood gave way to livestock development, particularly the production of poultry meat (Ibid, p.99). By 1963, Aibonito had the most important poultry industry on the island (Ibid).

In 1960, the population of Aibonito was then 18,360 inhabitants. By the 1980 census of the population indicated that this had ascended to 22,163 people. In addition, in the Census of 1990, the population had increased to 25,551, which ranked it number 52 among the municipalities of Puerto Rico.

In 1898, when the change of sovereignty happened, the municipality of Aibonito appeared constituted by the same neighborhoods as in 1878, that were: Caonillas, Llanos, Plata, Robles, Algarrobo, Cuyón, Pasto and Asomante. In 1910, the Pueblo neighborhood is subdivided into Pueblo Norte and Pueblo Sur. Since then, the territorial organization of Aibonito did not change until 1948, when the Maps of Municipalities and Districts of Puerto Rico prepared by the Planning Board of Puerto Rico and following instructions from the municipal authorities, the urban area of the municipality of Aibonito was expanded to include parts of the Caonillas, Llanos, Pasto and Robles neighborhoods (Ortiz Archilla, *Op. cit*, p. 39).

b. Data of the Central Highway in Aibonito and the Beginning of PR-722.

Due to its importance for the project in question, now will be presented some additional data to those already mentioned on the construction of the Central Highway in Aibonito, which was later No. 1 and is currently the PR-14, especially the stretch East of said Villa. The road PR 722, connect at the beginning with PR-14 (listed in the National Register of Historic Places (NRHP), in the traditional urban of Aibonito, and when it runs through rural areas becomes part of the Panoramic Route. The Panoramic Route, even through is from the 1970's decade, is a potential historic property. The PR 14, is a highway connecting Cayey to Ponce, Puerto Rico. The road runs the same course as the historic Carretera Central. The Coamo-to-Ponce section of PR-14 was built under the direction of Spanish engineer Raimundo Camprubí Escudero.

Most of the data was taken from the IA-IB Phase Report of the archaeologist Jaqueline López Meléndez entitled Connector between PR-14 and Julio Cintrón Street, Aibonito, Puerto Rico (AI-11-08-01), held in November 2011 for the Highway Authority.

Next, the origin of the PR-722 road will be discussed. This is where the project is located, with figures illustrating its development from its beginning as a dirt road to nowadays, as an asphalt road.

By 1843, the Public Works Board of the Spanish government in Puerto Rico propelled the development and construction of new roads, abandoning those of difficult passage or with high maintenance costs. Within this new plan, began to construction of the 1851 Highway No. 1 from San Juan to Ponce Beach, passing through Caguas, [Cayey], Aibonito and Coamo. This new road would shorten the time of crossing between San Juan and Ponce and would facilitate the transport of fruits and merchandise from Aibonito to Coamo and Ponce, which was done in ox carts or horses. Although the construction of the section of the Central Highway between Aibonito and Juana Díaz was approved by 1862 and it was not until 1872 that the budget for its execution was approved. By 1875, the section of Juana Díaz to Coamo was already being used, while the works of Coamo to Aibonito continued.

The section 4 of the Central Highway included the construction of said highway between Cayey and Aibonito. This is the section of the most rugged road, with numerous slopes, the most notable being the La Plata slope, or the climb to Aibonito. Between the two towns (Cayey and Aibonito) there was a difference of 320 meters in height, so joining them was the reason for a careful study to make a project well laid out and as economical as possible. Mr. Don Manuel López Bayo, designed the project.

The construction of this section of the Central Highway was divided into four parts, the fourth being from the so-called Quebrada Tronco to the town of Aibonito (about 5,320.87 meters), the part that concerned the investigators. By 1886, a good part of the project had been completed except for the pontoons on the Quebradas Toíta and Honda, as well as on the Rabanal Ravine at Km. 79.85, where a sewer had been designed and a pontoon was built.

The figure 11, taken from a CD of the book Documentation of Puerto Rico in the Cartographic Archive and Geographical Studies of the Army Geographical Center that was published by the Ministry of Defense of the Spanish Government in 2007, illustrates part of the Descriptive Itinerary of the San Juan Highway from Puerto Rico to Ponce Beach [entry 147, sheet 6 of the plans, year 1884]. On page 105 of the text, [at entry 147], there is information specific to the site where the crossing of the indicated road over the Rabanal (or Tendal) Ravine that was at the then kilometer 79,915 is located. At kilometer 79,925 there was the house of one Don Hilario Rivera. Immediately at that intersection, the then dirt road began toward the Robles neighborhood (to the southeast), which would later become the PR-722 highway. The crossing is indicated with a black circle.



*Figure 11: Part of the 6th Leaf of the Road Itinerary Plans
from San Juan to Ponce, 1884
(CD del libro Documentación de Puerto Rico...)*

The archaeologist López Meléndez indicated that in the search for documents for her project (Connector between the PR-14 ...) in the General Archive of Puerto Rico she found the plans of the junctions of this part of the Central Highway section and that these dated between 1887 and 1888 (page 49 of his report). The archaeologist added that: “La atarjea localizada en la intersección con la [actual] carretera PR-722 donde comienza nuestro proyecto, podría ser la atarjea o pontón Quiles”. Its understandable that after the figure 13, that it must be the Atarjea del Tendal.

The figure 12 which was taken from the CD of the book Documentation of Puerto Rico ... (entry 32, year 1885) it illustrates the area east of the town of Aibonito, where the dirt road to the southeast that led to the neighborhood of Oak is visible. Above all, it can be seen that there was indeed a brick track on one of the sections of the road (which at first was divided into two) and that east of the indicated track, on the other side of the Rabinal Ravine had an area called "quarry". Undoubtedly both places were source of materials for the construction of the indicated Central Highway. The two sites with sources of materials are indicated by us with black circles.

c. Other Maps, Figures, Photos, Historical Structures and Resources.

The figure 14 is a copy of the excellent Crocus de Aibonito that was originally prepared by the Spanish Commander: Francisco Larrea and Captain Manuel Moriano (entry 178, year 1884, book Documentation of Puerto Rico ...), and was took from Anibal Sepúlveda Rivera: Puerto Rico Urbano, Volume 3, p. 74

Now, as seen, one of the possible archaeological sites near the place of the current study, which is a historic junction on the highway PR-14, Km. 50.4, it could be the AI00018, but the file indicated that it is on a Quebrada. The Figure 15 is a copy of a photograph of the archaeologist J. López (Photo 26, page 24, of the report Phase IA-IB of the Connector between PR-14 and Julio Cintrón de Aibonito Street) where a connection is illustrated in the highway PR. 14, but it was located at the kilometer 51.7. On the other hand, the figure 9 of the report by J. López located the junction on the Rabanal Ravine, at the beginning of the PR-722 road at its northwest end, which is why the question arises: Are they two ties? One at kilometer 50.4, and another at 51.7? In addition, the Figure 14 of the report by the archaeologist López identified the junction of kilometer 50.4 at the entrance to the town of Aibonito from Coamo, so it would be much further away.



Figure 14: Croquis of Aibonito, 1884
(Anibal Sepúlveda Rivera, 2004, Tomo 3, p. 74)



Foto 26. Atarjea en la carretera PR-14 Km. 51.7.

*Figure 15: Atarjea in the PR-14, km. 51.7
(Jaqueline López, 2011, p. 24)*

The Figure 16 illustrates in a copy of a photograph of the archaeologist Jaqueline López, another Phase IA report entitled Judicial Center of Aibonito (AI-12-08-03, Photo 9, page 12), the archaeological-historical site in the area closest to the project, which is the road box at kilometer 51.8 of highway PR-14. This, as indicated, is located about 1.55 kilometers northwest of the land of our project. Immediate to the previous site, is the structure or Historical Place known as Villa Julita and nearby is the chapel of Doña Mercedes Pérez de Serrallés. All located in Pueblo Norte.



*Figure 16: Casilla de Camineros in Street PR-14, Km. 51.8
(Jaqueline López, 2012, p. 12)*

VII. Aerial Photographs:

The route of the old dirt road that crossed from PR-1 (current (PR-14) to the neighborhood of El Roble, Aibonito) it's clearly visible. To the northeast of the road has been located (marked in red) the place of the slide. It was covered by vegetation in 1937. In the aerial photograph, the absence of structures and residences trough the route of the PR-7722 road in the project land is noted.

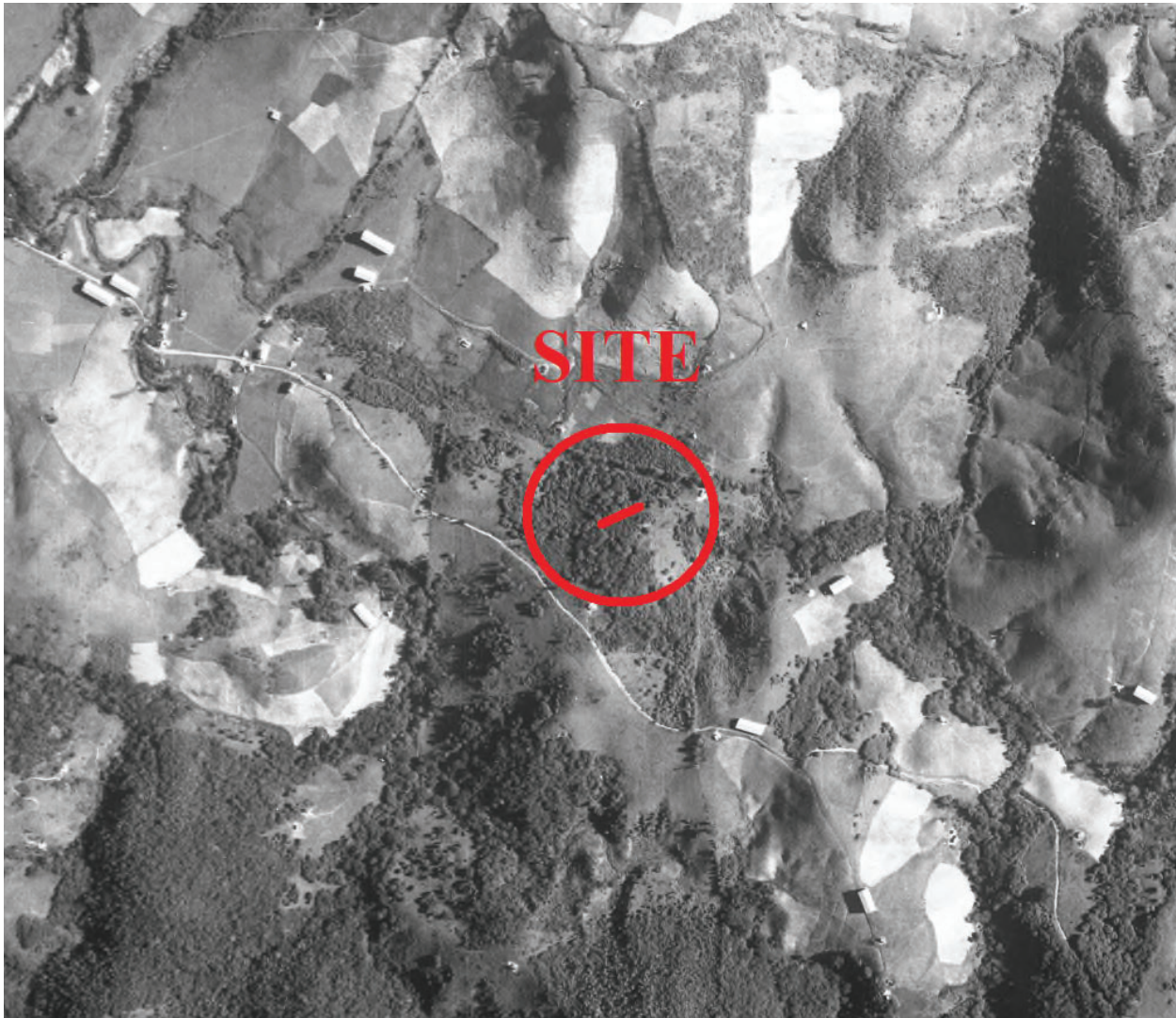


Figure 17: 1937 Aerial Photo of Aibonito (source: ACT Photogrammetry Office)

Nowadays, the PR-722 road was already built and the area where the landslide occurred (2017) is visible. The area southeast of the place where the landslide occurred is covered with protective vegetation. The new road was built on the site about 100 meters to the northwest of the old road.



Figure 18: 1964 Aerial Photo of Aibonito

The buildings around the PR-722 road and the changes made by the urban development in that rural area of Aibonito can be observed. Some protective vegetation southeast of the site where the landslide occurred can be seen. The route of the ancient road cannot be distinguished, although in the quadrangles the trajectory is still illustrated as a path or dirt road.

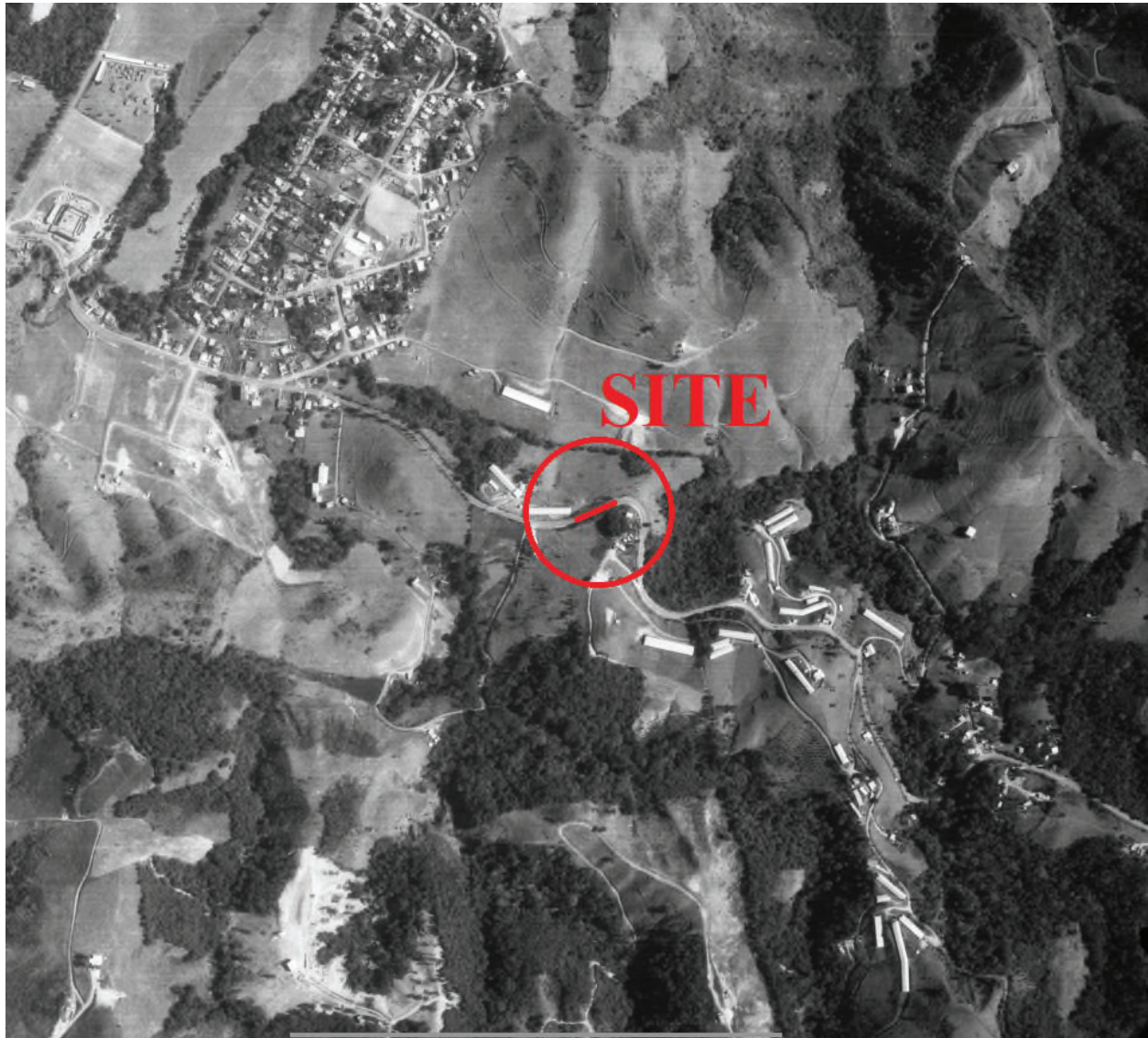


Figure 19: 1977 Aerial Photo of Aibonito

VIII. Fieldwork

As previously indicated, the project site was visited, and photographs were taken. In addition, it was obtained, from an archeology point of view, the environmental data of the place, which was located at kilometer 5.7 of the PR-722 road, in the neighborhood Robles of Aibonito. The research was conducted in November 2018 by the archeologist Fernando Alvarado as Principal Investigator, the archaeologist Eduardo Questell Rodríguez as co-investigator and author. In addition, Eduardo Luis Questell served as a technician.

The route of the PR-722 road in question begins on highway PR-14, east of the town of Aibonito, and crosses the Robles neighborhood until it reaches highway PR-1. The evaluation's scope includes only the indicated section of Highway PR-722, and it's near kilometers 5.7 of the mentioned highway (See Figure No. 1). The PR 14 it's at approximately 1.5km north of the project.

As observed in the visit, the site corresponds to a stretch of about 50 meters long on Highway PR-722, in the neighborhood Robles, near kilometer 5.7 (see photo # 1). The project site, which is a landslide to the northwest that affected the road's width, is delimited by concrete barriers for protection (see photo # 2). The road section is in a semi-curve, rising moderately and immediately to an access road to residences (see photos No. 2 and 3). Then there is a more marked and prolonged curve. In the place, a culvert of the storm drain that runs towards the northwest was visible (see photos # 4 and 5). An arrow indicates the sewer in photo #5. The landslide affected the concrete curb on the entire northwest side of the stretch (see photo # 6). No evidence of cultural activity was observed in the surveyed areas.



*Figure 20: Photo 1
View Towards the Northeast Showing the Project.*



*Figure 21: Photo 2
Concrete Barriers of Protection in the Project.*



*Figure 22: Photo 3
View Towards the Northwest Showing the Access Road to Residences.*



*Figure 23: Photo 4
Culvert on the Southeast Side of the Section.*



*Figure 24: Photo 5
View Towards the Southwest of the Project. The Arrow Indicates the Place of the Storm Drain.*



*Figure 25: Photo 6
It Illustrates the Damage of the Collapse to the Curb of the Road.*

The Storm drain evidenced is a modern one, built in concrete with a single opening, and is intended to collect stormwater and transport it under PR 722 to a slope outside the project area.

The project is limited only to the area where the landslide occurred, and we are improving the existing storm system to prevent the slope from failing again in a future event. The project is an improvement project for an existing road, where the landslide will be repaired to provide safe conditions for traffic. The hydraulic structure that crosses the PR-722 and that will be replaced is a reinforced concrete pipe. The storm drainage design of the area where the landslide occurred has been carried out considering a more efficient management of runoff, providing adequate capacity and energy dissipation mechanisms at the discharge points.

The proposed project will not limit the possibility of data collection, its integrity, location, design, environment, materials, workmanship, feeling or association of any adjacent resources and cultural vestiges, including the PR #14 or the Panoramic Route.

IX. Conclusions and Recommendations

One of the main goals of the assessment is to establish the potential adverse effect that an undertaking can cause to known and unknown archaeological features. To establish it, the historical data and investigations recollected must be analyzed.

The site, as previously indicated, is a small section (about 50 meters long) of the PR-722 road at kilometer 5.7. All archival research made it clear that there is no prehistoric or historical archaeological site in the specific areas of the project or in its vicinity. The nearest archeological (historical) site is a road box on the PR-14 highway about 1.55 kilometers to the northwest.

During the visit to the lands, there wasn't any evidence of cultural activity in the place under investigation apart from the road itself, which was built after 1946. From the data obtained, it was concluded that the project has a very low archaeological sensitivity and additional studies aren't recommended.

a. Proposed Actions

The regulation requires the proposal of alternatives actions for the undertaking. The first is to consider that there is no action required because based on the information recorded, the analysis and discussion is not recommended. The landslide must be corrected, and the appropriate measures must be taken in that direction. This project proposed a **Cantilever Retaining Wall** to correct the landslide and the surrounded area.

The agency can also consider monitoring any work that involves scraping, digging or any kind of subsoil intervention. In this case, it must be part of the document established by the Memorandum of Agreement (MOA). Also, and a contract establishing that the archaeologist can stop the digging at any moment, but in this case is not consider necessary.

X. Bibliography

Abbad y Lasiera Fray Inigo

1788 historia Geográfica, civil y Natural de la Isla de San Juan de Puerto Rico. Imprenta y Librería Acosta 1866 prólogo de José Julián Acosta consulted of 2018
cervantesvirtual.com

Alegría, Ricardo

1951 The Ball Game Played by the Aborigines of the Antilles. American Antiquity 16:348–352.

1955 The Archaic Tradition in Puerto Rico. American Antiquity 21(2):113–121.

1975 “Los dibujos del naturalista francés Augusto Plee (1821-1823) in Revista del Instituto de Cultura Puertorriqueña, Primera serie número 68, julio - septiembre de 1975. San Juan, Puerto Rico

1978 Apuntes en torno a la mitología de los indios taínos de las Antillas Mayores y sus orígenes suramericanos. Centro de Estudios Avanzados de Puerto Rico y el Caribe: San Juan.

1983^a Historia de nuestros indios: Versión elemental. Colección de Estudios Puertorriqueños, San Juan.

1983b Ball Courts and Ceremonial Plazas in the West Indies. Yale University Publications in Anthropology Number 79, New Haven.

Alegría, Ricardo E., H. B. Nicholson, and Gordon R. Willey

1955 The Archaic Tradition of Puerto Rico. American Antiquity 21(2):113–121.

Ayes Suarez, Carlos

1989 “Angostura. Un Yacimiento Arcaico Temprano del Valle del Manatuabon”, en Revista Universidad de América 1(2) 24-37

1991 “Un ídolo zoomórfico arcaico descubierto en el Barrio Pesas de Ciales” en Ecos de Plazuela 3 págs. 13-14

1996 La Cueva del Cupey. Serie Investigación Arqueológica. Publicación Ocasional 1. Centro Grafico Grafito, Vega Baja

Bate, Luis F.

2001 Propuestas para la Arqueología Recopilación de artículos y ensayos. Drake & Morgan Editores, México

Boccheciamp, Rafael A.

1969 Soil Survey of Humacao Area of Eastern Puerto Rico. (United States Department of Agriculture Soil Conservation Service, in cooperation with University of Puerto Rico, College of Agricultural Sciences.

Callaghan, Richard T.

- 1993 Passages to the Greater Antilles: An Analysis of Watercraft and the Marine Environment. In Proceedings of the XIV International Congress for Caribbean Archaeology, edited by A. Cummins and P. King, pp. 64–72. International Association for Caribbean Archaeology, Bridgetown, Barbados.
- 1995 Antillean Cultural Contacts with Mainland Regions as a Navigation Problem. In Proceedings of the Fifteenth International Congress for Caribbean Archaeology, edited by R. E. Alegría and M. Rodríguez, pp. 181–190. Centro de Estudios Avanzados de Puerto Rico y el Caribe, San Juan.
- 1999 Computer Simulations of Ancient Voyaging. *Northern Mariner/Le Marin du Nord* 1:24–33.
- 2001 Analysis of Ceramic Age Seafaring and Interaction Potential in the Antilles. *Current Anthropology* 42:308–313.
- 2003 Comments on the Mainland Origins of the Preceramic Cultures of the Greater Antilles. *Latin American Antiquity* 14(3):323–338.

Caro Costas, Aida

Antología de lecturas de historia de Puerto Rico (siglos XV-XVIII). (Río Piedras, Puerto Rico, Editorial Universitaria, Universidad de Puerto Rico, 1977)

Chanlatte Baik, Luis

- 1981 La Hueca y Sorcé (Vieques, Puerto Rico): Primeras migraciones agroalfareros antillanas. Nuevo esquema para los procesos culturales de la arqueología antillana. Published by the author, Santo Domingo, Dominican Republic.
- 1995 Los arcaicos y el formativo antillano (6000 AC–1492 DC). Proceedings of the Sixteenth International Congress for Caribbean Archaeology, edited by G. Richard, pp. 267–275. International Association for Caribbean Archaeology, Martinique.
- 2003 Cuál fue el destino final de las poblaciones arcaicas Antillanas? In Proceedings of the Twentieth International Congress for Caribbean Archaeology, edited by G. Tavares María and M. García Arévalo, pp. 317–322. Museo del Hombre Dominicano, Santo Domingo.

Chanlatte Baik, Luis A., and Yvonne M. Narganes Stordes

- 1983 Vieques, Puerto Rico: Asiento de una nueva cultura aborígen antillana. Impresora Corporán, Santo Domingo.
- 1985 Asentamiento poblacional Agro- I, complejo cultural La Hueca, Vieques, Puerto Rico. In Proceedings of the Tenth International Congress for the Study of the Pre- Columbian Cultures of the Lesser Antilles, edited by L. Allaire, pp. 225–250. Centre de Reserches Caraïbes, Université de Montréal, Montreal.
- 1986 Proceso y desarrollo de los primeros pobladores de Puerto Rico y las Antillas. Published by the authors, Santo Domingo, Dominican Republic.

2005 Cultura La Hueca. Museo de Historia, Antropología y Arte, Universidad de Puerto Rico, Río Piedras.

Comisión Topográfica de 1885

1886 Croquis y Datos Estadísticos del Pueblo de Fajardo. Mapa Militar de la isla no. 47. Cuerpo del E.M. De Ejecito Sección de Puerto Rico Secured
https://www.ecured.cu/R%C3%ADo_Herrera

Curet, L. Antonio, Joshua Torres, and Miguel Rodríguez

2004 Political and Social History of Eastern Puerto Rico: The Ceramic Age. In Late Ceramic Age Societies in the Eastern Caribbean, edited by A. Delpuech and C. L. Hofman, pp. 59–85. British Archaeological Reports, International Series 1273. British Archaeological Reports, Oxford.

Enciclopedia de Puerto Rico

<https://enciclopediapr.org/encyclopedia/municipio-de-rio-grande/>

Ferrerías Pagán, Jaime

1902 Biografía de las riquezas de Puerto Rico disponible en
<https://bibliotecavirtualpr.wordpress.com/2015/09/14/biografia-de-las-riquezas-de-puerto-rico-1902/>

Gierbolini, Roberto E.,

1975 Soil Survey of Mayagüez Area of Western Puerto Rico. (Mayagüez, Puerto Rico, United States Department of Agriculture, Soil Conservation Service, in cooperation with the University of Puerto Rico, College of Agricultural Sciences,)

Junta de Planificación de Puerto Rico

1952 municipio de Fajardo memoria suplementaria y mapa de límites jurisdiccionales de barrios en Archivo Nacional de Puerto Rico

Gifford, Jhon C

1905 The Luquillo Forest Reserve, Porto Rico (*PDF*). *Washington, D.C.: U.S. Department of Agriculture.*

Hernández Méndez, Eugenio

1969 Crónicas de Puerto Rico. Editorial UPR. Río Piedras.

Hostos, Adolfo de

1976 Diccionario Histórico Bibliográfico Comentado de Puerto Rico. Academia Puertorriqueña de La Historia, San Juan.

Interamerican University

Centrales Azucareras de Puerto Rico -1873 2007.
<http://www.metro.inter.edu/facultad/esthumanisticos/ciho/centrales/centralfajardo.asp>,
consulted August 2018

López Marrero, T., M.A. Lorenzo Pérez, C.F. Rivera Lopez, A.C. González Toro, D. Rivera Santiago, H.I Nieves Crespo and P.N. Hernández González.

2017. Porto Rico 1930 Georeferenced: A Coastal Mosaic. Interdisciplinary Center for Coastal Studies. Mayagüez, PR: University of Puerto Rico, Mayagüez Campus. 15 p consulted July 2018)

Library of Congress

Map Collection
<http://lcweb4.loc.gov/service/gdc/lhbpr/06061/06061.pdf>

Mallen Sean Thomas

2016 REASSESSING CONSENSUS: ALEJANDRO O'REILLY'S 1765 VISITA AND PUERTO RICAN HISTORY, Master Thesis, Florida Atlantic University, College of Arts and Letters on PDF

Marín, Héctor y Joseph Harrison

1988 ARQUEOLOGIA Documental DEL SISTEMA DE FORTIFICACIONES COSTANERAS DE PUERTO RICO EN EL SIGLO manuscrito para Asociación de Amigos de los Castillos.

Martínez-Cruzado JC, Toro-Labrador G, Ho-Fung V, Estévez-Montero MA, Lobaina-Manzanet A, Padovani-Claudio DA, Sánchez-Cruz H, Ortíz-Bermúdez P, Sánchez-Crespo A

2001 Mitochondrial DNA analysis reveals substantial Native American ancestry in Puerto Rico. *Hum Biol* 73: 491-511.

2002 "El uso del ADN mitocondrial para descubrir las migraciones precolombinas al Caribe: Resultados para Puerto Rico y expectativas para la República Dominicana." KACIKE: Revista de la historia y antropología de los indígenas del Caribe [Revista electrónica], Edición Especial, Lynne Guitar, redactora. Disponible en: <http://www.kacike.org/MartinezEspanol.pdf>

Medina, Norma y Marisol Rodríguez

2009 Fase IB Planta de tratamiento Canóvanas. Informe presentado al ICP

Melgarejo, Juan

1582 Memoria y Descripción de la isla de Puerto Rico en Biblioteca de Puerto Rico, Coll y Toste disponible en:
<http://edicionesdigitales.info/biblioteca/memoriamelgarejo.pdf>

Montilla Jaime

2015 Puerto Rico Sugar Mill Project <http://jaimemontilla.com/pr-sugar-mills-project>

Morales Muñoz, Generoso

1949 La Fundación del pueblo de Fajardo.

Moscoso, Francisco

1999 Sociedad y economía de los taínos. Editorial Edil, Río Piedras, Puerto Rico

O reilly, Alejandro

1765 Circunstancia del actual estado de la población, frutos y proporciones para fomento que tiene la isla de San Juan de Puerto-Rico, con algunas ocurrencias sobre los medios conducentes a ello, formada para noticia de S. M. y de sus Ministros, por el Mariscal de Campo D. Alejandro O'Reilly, y de resulta de la visita general que acaba de hacer en la expresada Isla, para evacuar las comisiones que se ha dignado fiar a su celo la piedad del Rey. Río Piedras, Puerto Rico, Editorial Universitaria 1980. (consulted on line on scribbr.com)

Oliver, José

1999 The “La Hueca Problem” in Puerto Rico and the Caribbean: Old Problems, New Perspectives, Possible Solutions. In *Archaeological Investigations on St. Martin (Lesser Antilles)*, edited by Corinne L. Hofman and Menno L. P. Hoogland, pp. 253–297. Faculty of Archaeology, Leiden University, Leiden, The Netherlands.

2009 Caciques and Cemi Idols: The Web Spun by Taino Rulers between Hispaniola and Puerto Rico. The University of Alabama Press, Tuscaloosa.

Oliver, José R., Juan Rivera Fontán, and Lee A. Newsom

1999 Arqueología del Barrio Caguana, Puerto Rico: Resultados preliminares de las temporadas, 1996–1997. In *Trabajos de investigación arqueológica en Puerto Rico: Tercer encuentro de investigadores*, edited by J. Rivera Fontan, pp. 7–26.

Publicación Ocasional de la División de Arqueología, Instituto de Cultura Puertorriqueña, San Juan.

O reilly, Alejandro

1765 Circunstancia del actual estado de la población, frutos y proporciones para fomento que tiene la isla de San Juan de Puerto-Rico, con algunas ocurrencias sobre los medios conducentes a ello, formada para noticia de S. M. y de sus Ministros, por el Mariscal de Campo D. Alejandro O'Reilly, y de resulta de la visita general que acaba de hacer en la expresada Isla, para evacuar las comisiones que se ha dignado fiar a su celo la piedad del Rey. Río Piedras, Puerto Rico, Editorial Universitaria 1980. (consulted on line on scribbr.com)

Oficina Estatal de Conservación Histórica OECH)

2016 informe Arqueológico del Municipio de Fajardo.

<http://www2.pr.gov/oech/oech/Documents/ActualizacionDatosMunicipales/Municipios/Informe%20Arqueol%C3%B3gico%20del%20Municipio%20de%20Fajardo.pdf>

Pagán Jiménez, Jaime R.

VIII. Antropología en Puerto Rico: Dicotomía de Centro y Periferia. Boletín de Antropología Americana 36:193–202.

Picó, Rafael

1969 Nueva geografía de Puerto Rico, física, económica y social. (Río Piedras, Puerto Rico, Editorial Universitaria,

Recursos de agua de Puerto Rico

2017 <http://www.recursosaguapuertorico.com/Cuencas-Principales-en-PR.html>

Rodríguez Miranda, Marisol

1997 El Pulguero, Puerto Rico, Hallazgo de Cerámica en el periodo Arcaico. Ponencia presentada en el 16 Congreso Internacional de Arqueología del Caribe. Bahamas.

2017 La siembra en montones y el montón de siembra. Ponencia presentada en el Tercer Foro de la Ruralia. Asociación Puertorriqueña de Estudios Rurales, Caguas, Puerto Rico

2018 Natpro, Fase IA Rio Grande, Puerto Rico

Rodríguez Vázquez, Luis Antonio

2013 Las fichas y riles de las haciendas de Puerto Rico. Ed. Lulú.

Sepúlveda Rivera, Aníbal

2004 Puerto Rico Urbano. Carimar, San Juan, Puerto Rico.

Sociedad Amigos de la Historia

“Los incidentes de Fajardo 3 al 7 d agosto de 1998” en 1898 The Hispanoamerican Dar in Puerto Rico. Consulte on line 2018

Tomas de Córdoba, Pedro

Memorias geográficas, históricas y estadísticas de la Isla de Puerto Rico.

Toro Sagrañes, José A.

1997 Historia de los pueblos de Puerto Rico, Editorial Edil, Rio Piedras.

US Census Bureau

<https://www.census.gov/geo/maps-data/data/gazetteer.html>

USDA

2017 Soil Survey of Humacao Area of Eastern Puerto Rico
https://www.nrcs.usda.gov/Internet/FSE_MANUSCRIPTS/puerto_rico/PR689/0/Humacao.pdf

USGS

2017 USGS Topographic
https://geonames.usgs.gov/apex/f?p=262:18:0::NO:RP:P18_STATE%2CP18_SCALE%2CP18_MAP_NAME%2CP18_MAP_TYPE:PR%2CALL%2C%5Crio+grande%5C%2CAll

Watson Monroe,

1971 Las divisiones geomórficas de Puerto Rico, en Geovisión de Puerto Rico. en María Teresa B. De Galiñanes (ed. Editorial Río Piedras, Puerto Rico)

Wilson, Samuel M.

1990 Hispaniola: Caribbean Chiefdoms in the Age of Columbus. The University of Alabama Press, Tuscaloosa.

1991 Current Research. American Antiquity 56(1):143–160.

1993 The Cultural Mosaic of the Indigenous Caribbean. Proceedings of the British Academy 81:37–66.

2001 Cultural Pluralism and the Emergence of Complex Society in the Greater Antilles. In Proceedings of the Eighteenth International Congress for Caribbean References / 299 Archaeology, vol. 2, edited by G. Richard, pp. 7–12. International Association for Caribbean Archaeology, Guadeloupe.

2007 The Archaeology of the Caribbean. Cambridge University Press, New York.

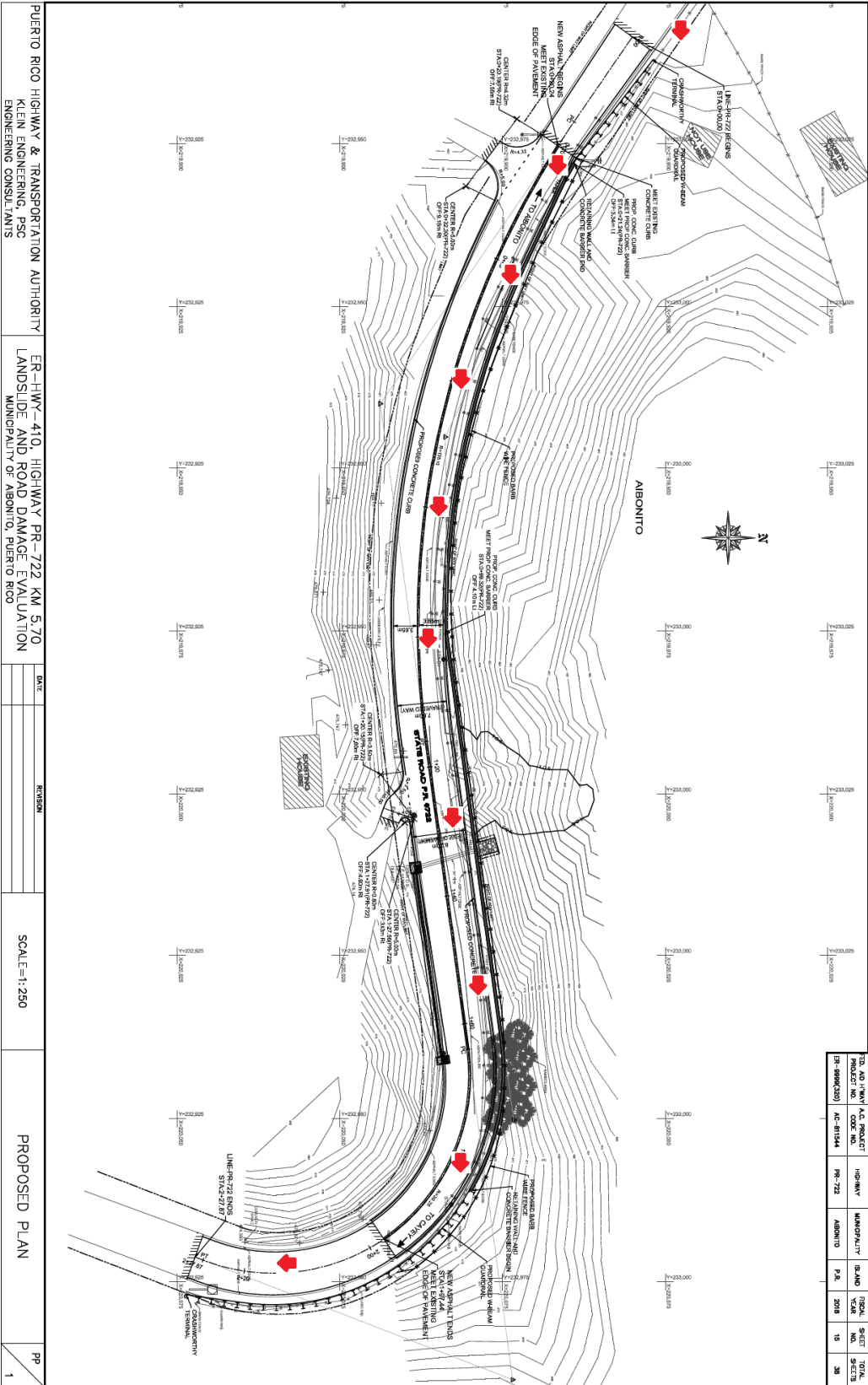
XI. Annexes

A.

“As Built” Plan with the surface inspection made

B.

Development Proposed Plan



TOTAL PROJECT	AC PRODUCT	HIGHWAY	MUNICIPALITY	ISLAND	YEAR	SHEET	TOTAL
15	AC-8154	PR-722	ABONTO	P.R.	2018	15	38

PUERTO RICO HIGHWAY & TRANSPORTATION AUTHORITY
 KLEIN ENGINEERING, PSC
 ENGINEERING CONSULTANTS

ER-HWY-410, HIGHWAY PR-722 KM 5.70
 LANDSLIDE AND ROAD DAMAGE EVALUATION
 MUNICIPALITY OF ABONTO, PUERTO RICO

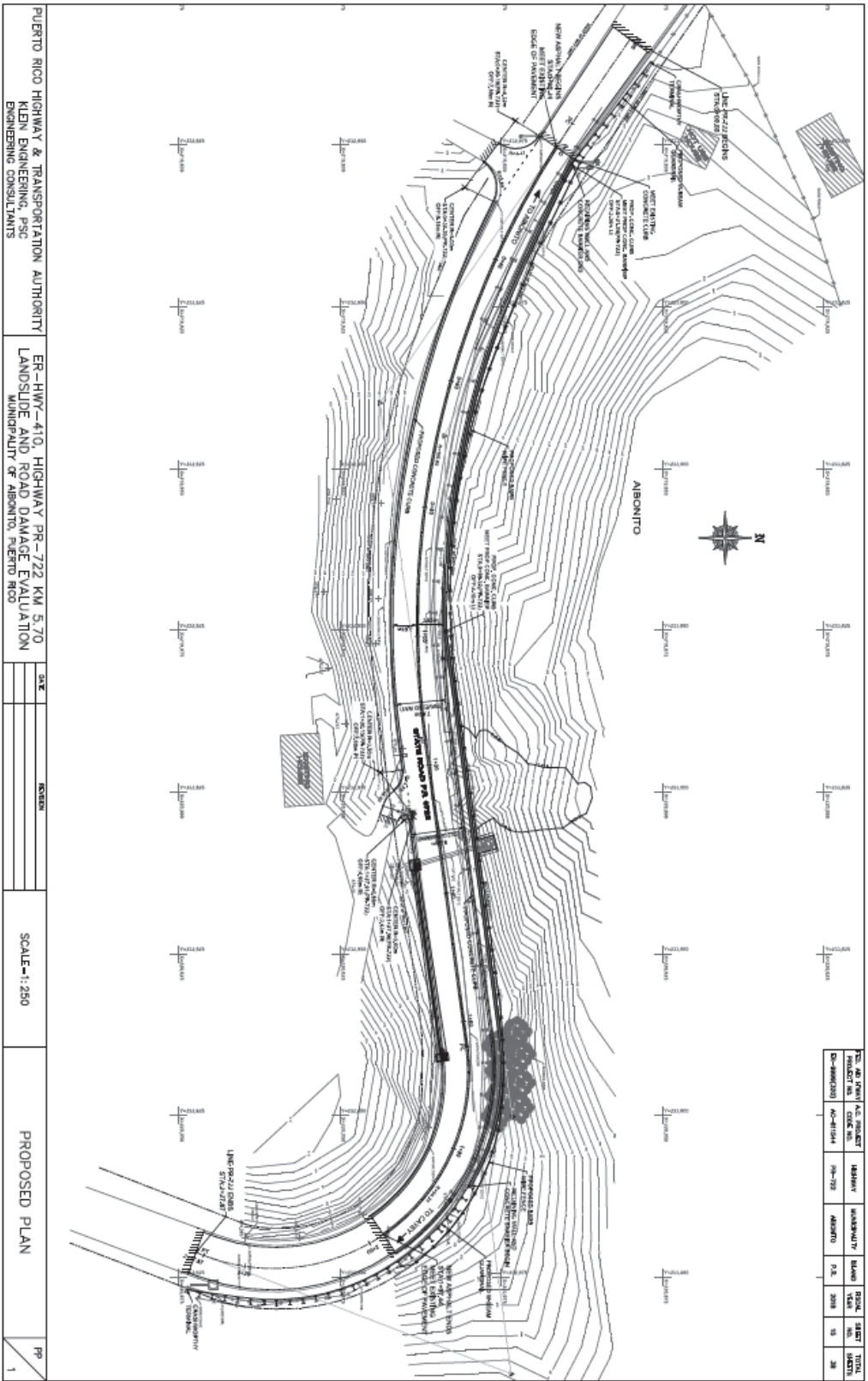
DATE	REVISION

SCALE=1:250

PROPOSED PLAN

PP
 1

“As Built” Plan with the surface inspection made



Development Proposed Plan