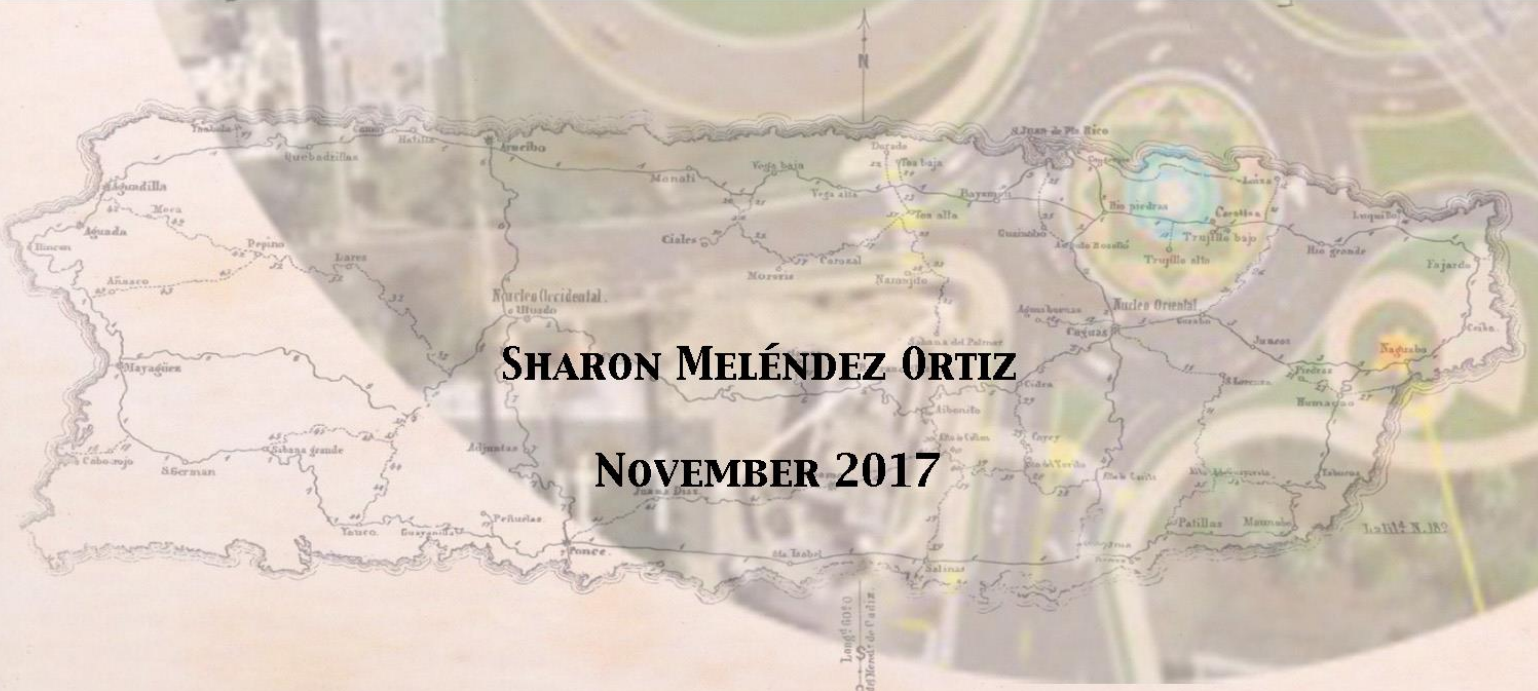


**PHASE IA CULTURAL RESOURCES ASSESSMENT  
FOR THE PROJECT  
IMPROVEMENT TO INTERSECTIONS PR-2, 2R AND SAN JUAN ST  
(RUM ENTRANCE, LA VITA), PR-2 KM153.90  
MAYAGÜEZ  
[AC-200241 P00002441 MP-2 (66)]**



**PHASE IA CULTURAL RESOURCES ASSESSMENT  
FOR THE PROJECT  
IMPROVEMENT TO INTERSECTIONS PR-2, 2R AND SAN  
JUAN ST (RUM ENTRANCE, LA VITA), PR-2 KM153.90,  
MAYAGUEZ  
[AC-200241 P00002441 MP-2 (66)]**

**PRESENTED TO:**

ALPHA ENGINEERING

**PRESENTED BY:**



**SHARON MELÉNDEZ ORTIZ**

ARCHAEOLOGIST

Villas de Caney J-3 Mabo, Trujillo Alto 00976-3543  
Telephone: 787-485-9459 / Email: smelendezortiz@hotmail.com

November 2017/Revised March 2018

---

## ABSTRACT

---

The PRHTA proposes the study and implementation of geometrical and operational improvements to a section of Highway PR-2 in Mayaguez, located between km 152 and 154. Five (5) intersections will be improved: San Juan Street with PR-2 (La Vita), San Juan St. with PR-2R (University of Puerto Rico, Mayagüez Campus entrance), Chardón St. with PR-2, PR-3108 with PR-2, and PR-102 with PR-2. Six different alternatives were developed. All alternatives include the construction of elevated bridges, roundabouts, and frontage roads at the intersections. For cultural resources management purposes, the alternatives are similar, except for Alternative IV, which includes the construction of a separated level cloverleaf intersection in a vacant area. Alternative VI is the one recommended by the designer to be adopted for final implementation.

This report consists of a Phase IA Cultural Resources Assessment conducted as part of the NEPA process, prepared to analyze the potential impacts of the undertaking to the human and natural environment. The study was performed to comply with Section 106 of the National Historic Preservation Act and with the Act for the Protection of the Terrestrial Archaeological Heritage of Puerto Rico (Law 112 of 20 July 1988). The overall objective of Phase I archaeological assessment is to determine the presence or absence of historical properties in the project's area of potential effects. The research strategy for this study includes archival research, cartographic and aerial photographs analysis, and field inspection.

The assessment concluded that the potential of finding unknown cultural resources that may be affected by any of the proposed alternatives is minimal, based in the historic uses of the zone, the absence of known cultural resources within the project area, and the considerable impacts identified. Therefore, it is not recommended to carry out additional archaeological studies for the alternative, VI, nor for alternatives I, II, III, and V. However, if alternative IV is selected, a subsurface survey should be carried out only in the area where the half cloverleaf intersection would be built. This is a barren area with no previous or obvious signs of impact.

---

## TABLE OF CONTENT

---

Abstract	i
Table of Content	ii
List of Figures	iii
List of Photos	iv
I. Introduction	1
II. Project Alternatives	4
III. Description of project area	15
A. General Site Description	15
B. Description of Project Area	16
C. Geology and Soils	17
IV. Archaeological Background	19
V. Historic Background of Mayaguez and Road 2	24
VI. Field Inspection	31
VII. Previous Impacts and Archaeological Potential	44
A. Previous Impacts	44
B. Archaeological Potential	46
VIII. Conclusions and Recommendations	47
IV. References Cited	49

---

## LIST OF FIGURES

---

Figure 1: Project location in Topographic Quadrangle (USGS 1964)	1
Figure 2: Intersections to be improved	2
Figure 3: Alternative I	9
Figure 4: Alternative II	10
Figure 5: Alternative III	11
Figure 6: Alternative IV	12
Figure 7: Alternative V	13
Figure 7B: Alternative VI	14
Figure 8: Wards of Mayagüez	15
Figure 9: Geology of the project area	17
Figure 10: Soil map	18
Figure 2: Location and Results of Archaeological Studies in the Periphery of the Project	20
Figure 3: Location of Cultural Resources	21
Figure 13: Plano de contornos de Mayagüez de 1850	25
Figure 14: Plan Carretero de la Isla de Puerto Rico, 1860	26
Figure 15: Road under construction, photo by Walter Townsend, 1898	27
Figure 16: Segment of the maps of the island of the Bureau of Public Works of Porto Rico	28
Figure 17: Aerial photo of 1936	29
Figure 18: Aerial photo of 1993	30
Figure 19: Section 1: From Project Start to intersection with PR-102	31
Figure 20: The intersection between PR-2 and PR-102	32
Figure 21: Section 2: Between PR-102 and PR-3108	33
Figure 22: Intersection of PR-2 and PR-3108	34
Figure 23: Section 3: Between PR 3108 and Carlos E. Chardón St.	36
Figure 24: The intersection of PR 2 with Chardon St.	37
Figure 25: Section 4: between Chardón and San Juan St.	38
Figure 26: Intersections between PR 2/ 2R and San Juan St.	40
Figure 27: PR 2R, San Juan St. to Project End SE	42
Figure 28: PR2, San Juan St. to Project End SW	43
Figure 29: Area (in red) where a subsurface survey (Stage IB) is recommended, <u>only</u> if Alternative IV is selected	48
Figure 30: Area (in red) where a subsurface survey (Stage IB) may be recommended for future extension of PR-3108	48

---

## LIST OF PHOTOS

---

Photo 1: Residence Durán Esmoris.	23
Photo 2: Structures built for the 21 <sup>st</sup> Central American and Caribbean Games	30
Photo 3: Left: median; Right: southbound lane with ditch and entrance to tire shop	32
Photo 4: Top left: intersection; Top right: PR-102 west (towards the ferry); Bottom left: exit from PR-2 to PR-102 east; Bottom right: stripped lot with terraced profile.	33
Photo 5: Left: southbound lane; Right: drainage ditch.	34
Photo 6: Top: lot west of intersection; Center left: southeast corner with bust of Dr. Ramon Baez Machado and other signs and utilities; Center right: hill with cut profiles at northeastern corner; Bottom: profile detail	35
Photo 7: Left: portion of side street, Mayaguez Terrace, looking south; right: segment of side street looking north	36
Photo 8: Top left: southbound lane PR-2; Top right: hardware store parking area; Bottom left: overgrown area west of PR-2; Bottom right: canal at culvert.	37
Photo 9: Left: general view of the intersection looking south; right: the entrance to the shopping mall.	38
Photo 10: Top left: side street on east of PR-2, looking south; Top right: intersection PR-2 with Chardón St., looking west; Bottom left: Oro creek, looking west from bridge; Bottom right: general view of PR-2	39
Photo 11: Left: Quebrada Oro in University campus; right: Hostos park.	40
Photo 12: Top: Entrance to the RUM, looking west (right) and south (left) from PR-2R; bottom right: PR-2R looking south; bottom left: supermarket parking	41
Photo 13: Views of the intersection between PR-2 and San Juan street	41
Photo 14: Segment of PR-2R	42
Photo 15: View of PR-2 towards project end, looking south	43
Photo 16: Top left: water valve cover; top right: Cover marked AAA CONTADOR FUNDICION CUBANO; bottom: pipe at culvert over Quebrada Oro	45
Photo 17: Left: sewer access; right: unidentified MH cover	45
Photo 18: Cast Iron MH cover marked PUERTO RICO TELEPHONE COMPANY (left); subterranean utilities access boxes, marked PREPA (center), and DTOP (right)	45
Photo 19: Street intersection with patched up pavement and storm-water drain catch	46

## I. INTRODUCTION

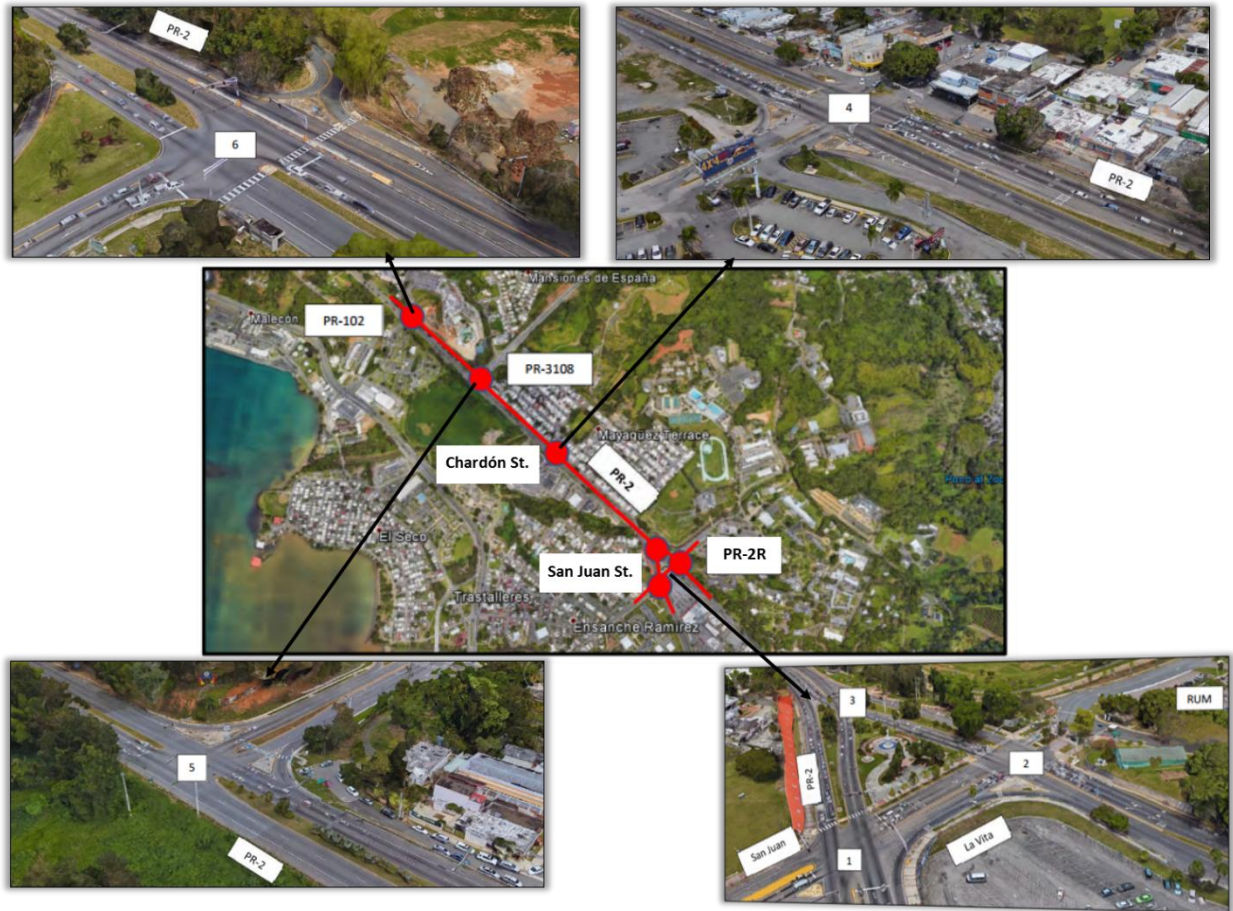
The Puerto Rico Highway and Transportation Authority (PRHTA) is evaluating six (6) alternatives to improve a section of Highway PR-2 between km 152.0 and km 154.0 in the Municipality of Mayagüez (Figure 1). In this Highway section, there are five (5) intersections that will be improved: San Juan Street with PR-2 (La Vita), San Juan St. with PR-2R (University of Puerto Rico, Mayagüez Campus entrance [RUM]), Chardón St. with PR-2, PR-3108 with PR-2, and PR-102 with PR-2 (Figure 2). The project seeks to solve the traffic congestion and level of service of these intersections along PR-2 by eliminating traffic signals and direct entrance to the PR-2, eliminating left turns at various intersections, providing frontage roads to the east and west along the PR-2 corridor to provide local circulation and access, and proposing simple interchanges that minimize space requirements.

**Figure 4:** Project location in Topographic Quadrangle (USGS 1964)



It is understood that the area of potential effects of the project, direct and indirect, corresponds to the footprint of the project. The surrounding areas consist of tall trees or exposed profiles to the north, and modern developments in the center. The southern part of the project, the one closest to the historic center of Mayagüez, adjoins an elevated stretch of the PR-2, which is why there is no potential for new elevated sections visually affecting historical properties.

Figure 2: Intersections to be improved



This report consists of a Phase IA Cultural Resources Assessment conducted to comply with Section 106 of the National Historic Preservation Act and with the Act for the Protection of the Terrestrial Archaeological Heritage of Puerto Rico (Law 112 of 20 July 1988). It complies with all federal and state applicable laws, regulations and guidelines, specifically the *Guía para hacer investigaciones arqueológicas, fases I, II y III*, and the *Guía para preparar informes arqueológicos, fases I, II y III* of the Puerto Rico State Historic Preservation Office (SHPO) (1993a y b) and the *Reglamento para la radicación y evaluación arqueológica de proyectos de construcción y desarrollo* (Regulation #8932 of February 8, 2017) of the Council for the Protection of the Archaeological Terrestrial Heritage of Puerto Rico (Council), ascribed to the Institute of Puerto Rican Culture (ICP); and it is consistent with the *Standards and Guidelines for Evaluation and Archeological Documentation* of the U.S. Secretary of the Interior, and the National Park Service Bulletins *How to Apply the National Register Criteria for Evaluation* (Secretary of the Interior 1990) and *Guidelines for Evaluating and Registering Archeological Properties* (Little et. Al 2000).

The overall objective of a Phase I archaeological assessment is to determine the presence or absence of historical properties and cultural resources in the Area of Potential Effect (APE) of a project, and includes two sub-phases: Phase IA and IB. Phase IA consists of an archival research and inspection of sensitivity, and involves two main aspects: an investigation of all existing documentary sources and a visual inspection of the surface of the study area in order to establish the archaeological potential of the APE. The four



specific objectives of a Phase IA are to: (1) identify the presence of known historic properties within the APE or in the immediate environs of the study area; (2) evaluate the possibility of discovering new historic properties within the APE; (3) determine the impact that the project may have on known or potential historic properties; and (4) provide properly supported recommendations to carry out additional studies, if necessary. In synthesis, a Phase IA assessment's intention is to provide a summary of the history of the project area, identify previously reported historic properties and determine the potential sensitivity to the presence of unknown resources. It constitutes the basis for the planning and implementation of subsequent field research.

The research strategy for this study included three (3) main tasks: archival research, cartographic and aerial photographs analysis, and field inspection. The purposes of the archival research were to: (1) gather specific data regarding the history of the Project Area; (2) identify all historic properties located within the APE that are listed on the National Register of Historic Places (NRHP) or have been determined eligible or ineligible for the NRHP; and (3) evaluate the Project Area's potential for the existence of unknown archaeological resources, as well as determining the type of resources that may be expected. All relevant data repositories providing information about previous cultural resources investigations that have taken place within or immediately adjacent to the APE were consulted. Specifically, the archives of the PRSHPO and the Terrestrial Archaeology Council were consulted to obtain information about historic properties and previous research in the APE and its environs. Relevant inventories –site forms, historic bridges, schools, Historic American Buildings Survey/Historic American Engineering Record (HABS/HAER), historic railroad, architectural and sugar haciendas- were also consulted. The historic research was based on primary as well as secondary sources. On the other hand, the cartographic analysis allows comprehending the geomorphologic situation of the area under study before visiting the field. The analysis of current and historic cartographic sources and aerial photographs permits the evaluation of the conditions of the APE, identifying historic changes and transformations, as well as previous impacts. In other words, it allows recreating and understanding the use history of the site. As part of this analysis, cartographic resources and aerial photographs dating from the 1930's to the present were systematically and comprehensively reviewed. Finally, the field inspection's purpose was to assess the existing conditions of the APE, and collect information regarding previous alterations and impacts.

The research was performed in July and August of 2017 by archaeologist Sharon Meléndez Ortiz, and Samuel Figueroa Jiménez, whom in addition to participating in the field work, was responsible for the final editing of the report.

---

## II. PROJECT ALTERNATIVES

---

The PRHTA proposes the study and implementation of geometrical and operational improvements to a section of Highway PR-2 in Mayaguez. The scope of work includes a Traffic Impact Study to analyze the actual conditions of the highway, and the development and evaluation of different geometrical improvement alternatives. On the *Concept Design Report* of February 3, 2017, José A. Batlle y Asociados proposed four (4) alternatives, labelled Alternative I to IV. After evaluating the alternatives, the PRHTA asked for a change to the proposed geometric concept, so a fifth alternative -Alternative V- was conceived on May 2017. Posteriorly, in 2018, a sixth alternative was considered. Alternative VI is the one recommended to be adopted for final implementation.

In general terms, all alternatives include the construction of elevated bridges, roundabouts, and frontage roads at the intersections located between km 152 and 154 of PR-2. The location and length of the elevated bridges varies in the different alternatives. Only Alternative IV includes the construction of a separated level cloverleaf intersection at PR-3108.

The six alternatives require the relocation of the PREPA utilities and lighting. Existing lines will be converted to an underground feeder and underground lines. Also, a new electrical lighting system will be installed throughout the project, including new street lighting poles and luminaries.

The alternatives also require relocating PRASA utilities, that may include 4"φ, 8"φ, 10"φ, 12"φ, 16"φ and 20 φ water pipes, and 8"φ, 10"φ and 12"φ sanitary sewer pipes. Those pipes that will remain in place may need to be protected with concrete. The pipes that need to be relocated or protected vary in the different alternatives. The existing 66"φ sanitary trunk sewer will not be affected.

The bridge #784 over Oro Creek (not historic) is on the route of all alignment alternatives. The structure of the bridge consists of two cells reinforced concrete box culvert with clear spans of 6.0m and clear heights of 1.135m. This bridge would be partially demolished during construction and replaced.

The following describes each of the alternatives:

### **Alternative I**

This alternative consists of the construction of bypass elevated bridges for commuting traffic and the channelization of local traffic thru parallel Frontage Roads east and west of PR-2. The reassignment of the local traffic volumes has been allocated to the intersection approaches of two Roundabouts that provide access to San Juan St. and RUM, and three (3) diamond intersections at Mayagüez Terrace, PR-3108 and PR-102 (Figure 3).

Alternative I includes the construction of two viaduct bridges to be located over the existing PR-2 in order to eliminate traffic signals in five (5) of the mayor intersections: PR-2 and San Juan Street and PR-2 and PR-2R, just at the entrance of the UPR Mayagüez Campus (La Vita), PR-2 and Chardon Street at Mayagüez Terrace Access, PR-2 and PR-3108 and PR-2 and PR-102 (Batlle 2017: 18-19). The first of these bridges will carry the northbound lanes of the improved PR-2 roadway proposed. The second of these two viaduct

bridges will carry southbound lanes of the improved PR-2 roadway proposed. These two viaduct bridges would control the through-traffic on the PR-2 corridor without any stop condition. The local circulation and access on this corridor, pedestrians, cyclist, residents and commerce will be control by the proposed one-way frontage roads to the east and to the west along the PR-2 corridor.

At PR-2 and San Juan Street intersection an urban double lane linked roundabout is proposed to eliminate the traffic signal and congestion on this intersection. A Free Right Turn Loop Ramp is proposed in this intersection for the left turn movement from east to southbound traffic. Similarly, at PR-2 and PR-2R (RUM Entrance) intersection an Urban Double Lane Linked Roundabout is proposed. A southbound left turn ramp from PR-2 to the RUM entrance is proposed under the two Viaduct Bridges. These Two Linked Roundabouts with the landscape design will be considered as a Landmark for La Vita and the Rum Entrance. At the intersections of PR-2 with Chardon Street, University Plaza, PR-3108 and PR-102, the local traffic will be controlled by a coordinate traffic signal system at the proposed frontage roads and with Texas U-Turns.

### **Alternative II**

This alternative consists of the construction of bypass elevated bridges for commuting traffic at intersections San Juan St., UPRM, and PR-3108; construction of two limited access intersections with right-in right-out provisions at Mayagüez Terrace and PR- 102, and the construction of an underpass diamond intersection at PR-3108 (Figure 4).

Alternative II includes two (2) overpass bridges to be located over the existing PR-2 to eliminate traffic signals in three (3) of the mayor intersections (Batlle 2017: 19-20). At existing intersections of PR-2 and San Juan St. and PR-2 and PR-2R, just at the entrance of the UPR Mayagüez Campus (La Vita) and at existing intersection of PR-2 and PR- 3108. The other two (2) existing signalized intersections on PR-2 and Chardon St. at Mayagüez Terrace Access and PR-2 and PR-102 will have their traffic signals eliminated, the median will be closed to eliminate left turns, and only right turns will be permitted to enter and exit the respective secondary street through the proposed frontage roads. The elevated structures will permit U-turns without the need of traffic signals between these two intersections.

As Alternative I, at PR-2 and San Juan St. intersection an urban double lane linked roundabout is proposed, with a free right turn loop ramp for the left turn movement from east to southbound traffic. At PR-2 and PR-2R (RUM Entrance) intersection another roundabout is proposed. A southbound left turn ramp from PR-2 to the RUM entrance is projected under the two viaduct bridges. At the intersection of PR-2 and PR-3108, the local traffic will be controlled by a coordinate traffic signal system at the proposed frontage roads. Texas U Turn will be provided in intersections PR-2 with San Juan Street, just at the entrance of the UPR Mayagüez Campus (La Vita), and PR-2 with PR- 3108.

### Alternative III

This alternative consists of the construction of bypass elevated bridges for commuting traffic at intersections San Juan St., RUM, and PR-3108; construction of two limited access intersections with right-in right-out provisions at Mayagüez Terrace and PR- 102; and the construction of an underpass diamond intersection with Texas U-Turn facilities at PR-3108 (Figure 5).

This alternative consists in the development of one (1) overpass bridge to be located over the existing PR-2 and one (1) single T intersection of PR-3108 over PR-2, with elevated structures of Texas U Turn and ramps to eliminate traffic signals in two (2) of the mayor intersections of PR-2 (Batlle 2017: 20). These two (2) bridges will be located at existing intersection of PR-2 and San Juan Street, just at the entrance of the UPR Mayagüez Campus (La Vita), and at existing intersection of PR-2 and PR-3108. The local traffic on this corridor, pedestrians, cyclist, residents and commerce will be manage by the proposed frontage roads to the east and to the west along the PR-2 corridor. The other two (2) existing signalized intersections on PR-2 and Chardon Street at Mayagüez Terrace Access and PR-2 and PR-102 will have their traffic signals eliminated, the median will be closed to eliminate left turns, and only right turns will be permitted to enter and exit the respective secondary street through the proposed frontage roads. The elevated structures will permit U-turns without the need of traffic signals between these two intersections. As in Alternatives I and II, at PR-2 and San Juan Street, and at PR-2 and PR-2R (RUM Entrance) intersections urban double lane roundabouts are proposed.

### Alternative IV

This alternative consists of the construction of bypass elevated bridges for commuting traffic at intersections San Juan St. and RUM; construction of two limited access intersections with right-in right-out provisions at Mayagüez Terrace and PR-102, and the construction a separated level cloverleaf intersection at PR-3108 (Figure 6).

This alternative includes one (1) overpass bridge to be located over the existing PR-2 and one (1) Half Cloverleaf Intersection of PR-3108 over PR-2 to accommodate left-turning movements (Batlle 2017: 21). The other two (2) existing signalized intersections on PR-2 and Chardon Street at Mayagüez Terrace Access and PR-2 and PR-102 will have their traffic signals eliminated, the median will be closed to eliminate left turns, and only right turns will be permitted to enter and exit the respective secondary street through the proposed frontage roads. The elevated structures will permit U-turns without the need of traffic signals between these two intersections. At PR-2 and San Juan Street, and at PR-2 and PR-2R (RUM Entrance) intersections urban double lane roundabouts are proposed. Texas U Turns will be provided in the intersections PR-2 with San Juan Street, just at the entrance of the UPR Mayagüez Campus (La Vita), and PR-2 with PR- 3108.

### Alternative V

Alternative V -the preferred one- consists of the construction of bypass elevated bridges for commuting traffic at intersections San Juan St., RUM, PR-3108 and PR-102; construction of a limited access intersection with right-in right-out provisions at Mayagüez Terrace; and the construction of two underpass diamond intersections at PR-3108 and PR-102 (Figure 7).

This alternative includes three (3) overpass bridges to be located over the existing PR-2 to eliminate traffic signals in three (3) of the mayor intersections (Batlle 2017b: 19-20). At existing intersections of PR-2 and San Juan Street and PR-2 and PR-2R, just at the entrance of the UPR Mayagüez Campus (La Vita); at existing intersection of PR-2 and PR- 3108; and at existing intersection of PR-2 and PR-102. The other existing signalized intersection on PR-2 and Chardon Street at Mayagüez Terrace Access will have it traffic signals eliminated, the median will be closed to eliminate left turns, and only right turns will be permitted to enter and exit the secondary street through frontage roads. At the intersection of PR-2 and PR-3108, the local traffic will be controlled by a coordinate traffic signal system at the proposed frontage roads. Texas U Turn will be provided in intersections PR-2 with San Juan Street, just at the entrance of the UPR Mayagüez Campus (La Vita), PR-2 with PR- 3108, and PR-2 with PR-102.

As the other alternatives, the construction of urban double lane linked roundabouts are proposed at PR-2 and San Juan Street, and at PR-2 and PR-2R (RUM Entrance) intersections. The difference of this alternative is that it does not include a free right turn loop ramp for the left turn movement from east to southbound traffic in the intersection between PR-2 and San Juan St.

### Alternative VI

This alternative consists in the development of two (2) overpass bridges to be located over the existing PR-2, in order to eliminate traffic signals in two (2) of the mayor intersections. At existing intersection of PR-2 and San Juan Street, just at the entrance of the UPR Mayagüez Campus (La Vita) and at existing intersection of PR-2 and PR-3108. The intersection on PR-2 and Chardon Street at Mayagüez Terrace Access will have their traffic signals eliminated, the median will be closed to eliminate left turns, and only right turns will be permitted to enter and exit the respective secondary street through the proposed frontage roads. In the intersection of PR-2 and PR-102, a High Type Intersection (Continuous Green T – Intersection) is proposed. The Traffic Signal in the Northbound lanes will be eliminated, in order to maintain the through traffic on the PR-2 corridor and only the Traffic Signal in the Southbound lanes will be installed. A future connection between PR-2 and PR-102 (Extension of PR-3108) and a construction of Right In – Right Out in the intersection of PR-2 and PR-102, will eliminate the traffic signal in the Southbound lanes. The elevated structures will permit U-turns without the need of traffic signals between these intersections. The first of these overpass bridges on PR-2 and San Juan Street will carry the northbound lanes of the improved PR-2 roadway proposed. The second of these overpass bridge will carry southbound lanes of the improved PR-2 roadway proposed. The second of these overpass bridges on PR-2 and PR-3108 will carry the northbound lanes of the improved PR-2 roadway proposed. The second of these overpass bridge will and carry southbound lanes of the improved PR-2 roadway proposed. These two overpass bridges would control the through-traffic on the PR-2 corridor without any stop condition.

The local traffic on this corridor, pedestrians, cyclist, residents and commerce will be manage by the proposed frontage roads to the east and to the west along the PR-2 corridor. At PR-2 and San Juan Street and PR-2 and PR-2R intersections Urban Double Lane Roundabouts are proposed in order to eliminate the traffic signal and congestion on this intersection. A southbound left turn ramp from PR-2 to the RUM entrance is proposed under the two viaduct bridges. Intersection of PR-2 and PR-3108 the local traffic will be controlled by coordinate traffic signal system at the proposed frontage roads. Texas U Turn will be provided in the intersections PR-2 and San Juan Street, just at the entrance of the UPR Mayagüez Campus (La Vita), PR-2 and PR-3108.

Of the six alternatives described, it is understood that # IV has greater impact capacity due to the construction of a half cloverleaf intersection in a vacant and undeveloped area west of the intersection of the PR-2 with the PR-3108. The future connection between PR-2 and PR-3108 mentioned in Alternative VI will impact a portion of the same vacant plot. The rest of the alternatives will impact similar areas.

Figure 3: Alternative I



Figure 4: Alternative II

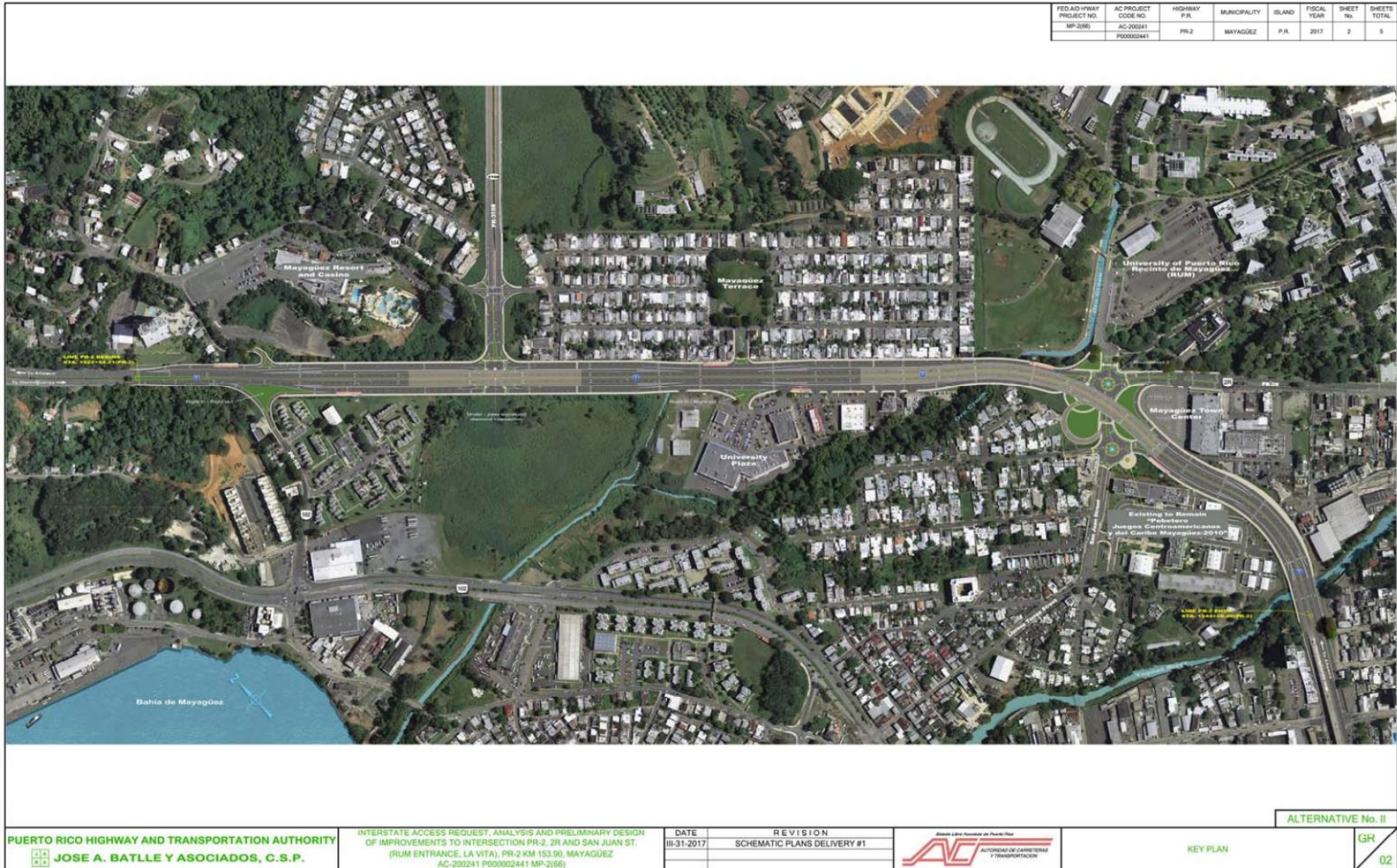


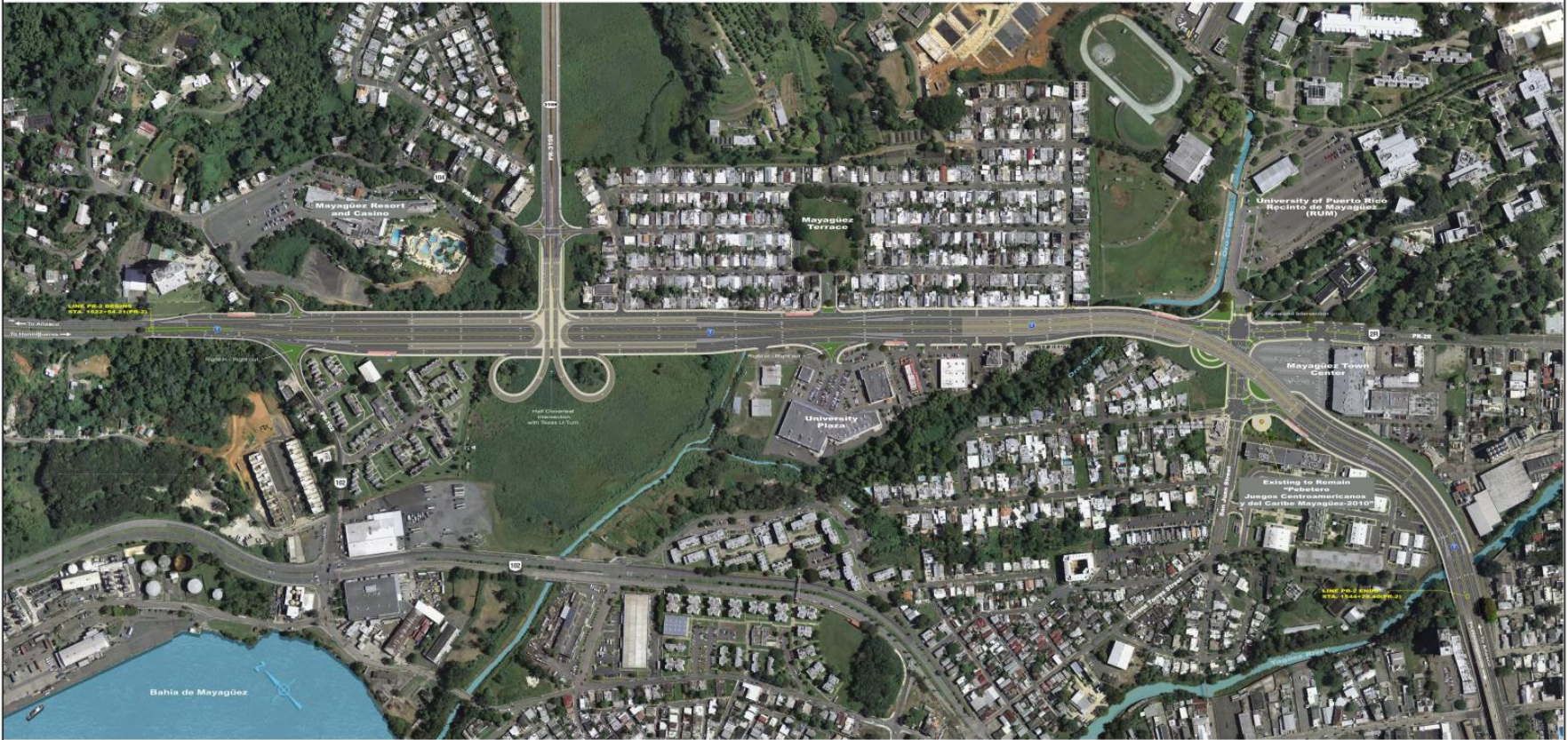


Figure 5: Alternative III



Figure 6: Alternative IV

FED.AID HWAY PROJECT NO.	AC PROJECT CODE NO.	HIGHWAY P.R.	MUNICIPALITY	ISLAND	FISCAL YEAR	SHEET No.	SHEETS TOTAL
MP-2(66)	AC-200241	PR-2	MAYAGÜEZ	P.R.	2017	4	5



ALTERNATIVE No. IV

**PUERTO RICO HIGHWAY AND TRANSPORTATION AUTHORITY**  
  
**JOSE A. BATLLE Y ASOCIADOS, C.S.P.**

INTERSTATE ACCESS REQUEST, ANALYSIS AND PRELIMINARY DESIGN OF IMPROVEMENTS TO INTERSECTION PR-2, 2R AND SAN JUAN ST. (RUM ENTRANCE, LA VITA), PR-2 KM 153.90, MAYAGÜEZ. AC-200241 P000002441 MP-2(66)

DATE	REVISION
III-31-2017	SCHEMATIC PLANS DELIVERY #1



KEY PLAN

GR  
04

Figure 7: Alternative V



Figure 7B: Alternative VI



### III. DESCRIPTION OF PROJECT AREA

#### A. General Site Description

The municipality of Mayagüez is located on the west coast of Puerto Rico, north of Cabo Rojo, Hormigueros and San Germán; south of Añasco; west of Las Marías and Maricao, and east of La Mona Passage. Its land area is 77.6 square miles (201.06 km<sup>2</sup>). It is composed by 21 wards: Algarrobo, Bateyes, Guanajibo, Isla de Mona e Islote Monito, Juan Alonso, Leguísimo, Limón, Malezas, Mayagüez Arriba, Mayagüez Pueblo -where most of the Project is located, Miradero, Montoso, Naranjales, Quebrada Grande, Quemado, Río Cañas Abajo, Río Cañas Arriba, Río Hondo, Rosario, Sábalos and Sabanetas (Figure 8).

**Figure 8:** Wards of Mayagüez



The municipality belongs to the Western Coastal Valleys (*Valles costeros del oeste*) geographical region. It is characterized by the existence of triangular valleys created by rivers, with the vertex in the interior and the base parallel to the coast (Picó 1969: 47). Mayagüez has coastal plains, river valleys, marshland, hills and mountains. Most of the higher elevations are to the northeast and east, where the Urayoán ridge is located, but there are some notable elevations to the south, such as Los Matos Ridge (Río Hondo and Malezas wards) or the Las Mesas ridge (Quebrada Grande, Juan Alonso, and Rosario wards). The hydrographic system is comprised of three main rivers: the Grande de Añasco, the Guanajibo and the Yagüez.

The project begins in the northern hills, and continues mainly in the coastal plain of the municipality. According to the topographic quadrangle (Figure 1), there are at least six (6) bodies of water that cross PR-2: Quebrada Oro, and five (5) unnamed creeks. The Yaguez River is located south of the APE.

## B. Description of Project Area

The project area consists of a stretch of almost 2 km of PR-2 highway, between kilometers 152.0 and 154.00, and by five (5) intersections. The project begins to the north in a sparsely populated area, with abundant vegetation on both sides, and which has a marked slope to the south. The first intersection is located approximately 500 m from the beginning of the project. This is the T-shaped intersection between PR-2 and PR-102, which goes south, to the pier where the ferry to Dominican Republic docks. On the other side of the road, (northeast of PR-2), the small 2-lane road connects with road PR-104, which gives access to the facilities of the Mayagüez Resort and Casino.

The second intersection is at ca. 380 m from the preceding one. In this zone the PR-2 is bordered by trees, after which there is an urbanization at a lower level to the southwest, and an area where soil has been extracted and the Mayagüez Resort to the northeast. The intersection between the PR-2 and PR-3108 is also T-shaped, with PR-3108 oriented northeast. This road is a bypass connecting in the northeast with the PR-108. On the south side of the intersection there is a vacant area, bordered by a channel or canalized stream, which is covered with vegetation.

The Mayagüez Terrace development lies east of PR-2. It begins at the second intersection and extends to the campus of the University of Puerto Rico in Mayagüez. Along the length of the urbanization there is a frontage road, named Dr. José E. Arrarás, it starts to the south from the PR-2R, finishing north on a dead-end street. On the opposite side is the University Plaza shopping center, with shops, fast food restaurants and parking. Along the back of this shopping center runs the Oro Creek, which passes under the PR-2 immediately southeast of this area. The third intersection, from PR-2 to Chardón Street, is located 420 m from the second, and is the access to University Plaza shopping center to the southwest, and Mayagüez Terrace to the northeast.

Five hundred twenty (520) meters southeast of the third intersection, to the southeast of where Oro Creek passes below the PR-2, there is a Y-shaped fork formed by the meeting of the PR-2 and the PR-2R. In the triangle-shaped area that is formed between both roads there is a park with fountains. To the southeast of the park is San Juan Street, oriented north-south. This street gives access to an urbanized zone to the south of the PR-2, and ends at the gates of the Mayagüez University Campus of the University of Puerto Rico (RUM). On both sides of San Juan Street, southwest of PR-2, there is a plaza and several monuments alluding to the Central American Games held in Mayagüez in 2010. The fourth intersection is precisely between San Juan Street and PR-2, and the fifth intersection between San Juan Street and PR-2R. The PR-2R continues in a southeasterly direction, bordering the RUM, and along the north of the Mayagüez Town Center, becoming the Pedro Albizu Campos Avenue. On the other hand, the PR-2 continues, also in a southwest direction, passing along the south of the mall, until it turns completely south, where it is elevated over the Yagüez River. This marks the end of the project. The historic area of Mayagüez begins south of the river.

### C. Geology and Soils

Geologically, the northern part of the project is located in the Yauco Formation (Ky), and the central and southern part in Alluvium (Qal) (Figure 9). The Yauco Formation is described as a dark bluish gray to dark gray, to dark greenish gray, interbedded, calcareous, volcanoclastic sandstone, siltstone, mudstone, claystone, limestone, and subordinate breccia and conglomerate, characteristically thin to medium bedded and fine to medium grained. Typically, beds range from 5 to 10 cm thick; locally, breccia or conglomerate beds are massive. A minimum thickness of 1300 m is present in the area. The Alluvium is described as poorly to moderately sorted and moderately to well-bedded sand, silt, and cobble or boulder gravel, chiefly along streams; includes unsorted rock-fall and landslide debris at foot of steep slopes (Curet 1986).

**Figure 9:** Geology of the project area (Curet 1986)



According to the Soil Survey of Mayagüez Area of Western Puerto Rico (Gierbolini 1975), the soils of the study area have been classified as Consumo clay, 20 to 40 percent slopes, eroded (CoE) in the northern part of the project; Alluvial land (Al) in the middle part; and Levelled clayey land (Lc) in the southern part of the project and in urbanized areas (Figure 10).

The Consumo clay 20 to 40 percent slopes (CoE) is a well-drained soil, strongly acid and moderately permeable. This soil is formed in residual material weathered from volcanic rock and tuffaceous mudstone. In a representative profile, the surface layer is reddish brown, very strongly acid clay, about 15 cm thick. The subsoil, to a depth of 51 cm, is red, very strongly acid, friable, slightly sticky and slightly

plastic clay and silty clay. The substratum is thick, very strongly acid, very friable, non-sticky and slightly plastic silty clay loam with varying proportions of red, yellow, brown, and light gray. Depth to semiconsolidated rock is more than 2.2 m (Gierbolini 1975: 38-39).

Alluvial land (An) is in lagoon-like positions and in depressions on the flood plains of streams and rivers. The water table is at or near the surface during most of the year, and water covers the surface during the rainy season. The soil material ranges from fine textured to medium textured. Draining this soil is not feasible, because it is either difficult or impossible to obtain drainage outlets. This land type is not suitable for cultivation and has little or no value as pasture (Gierbolini 1975: 23).

Levelled clayey land (Lc) is in areas that have been so disturbed by earthmoving equipment that it is not possible to recognize the original soil. The profile of the original soil has been changed by cutting, filling and leveling. The present soil material consists mainly of well-drained, strongly acid, moderately permeable, slightly sticky and plastic clay. The underlying material is highly weathered and is easily worked with earthmoving equipment. The depth to hard rock is more than 2 m (Gierbolini 1975: 68).

**Figure 10:** Soil map (Gierbolini 1975)





## IV. ARCHAEOLOGICAL BACKGROUND

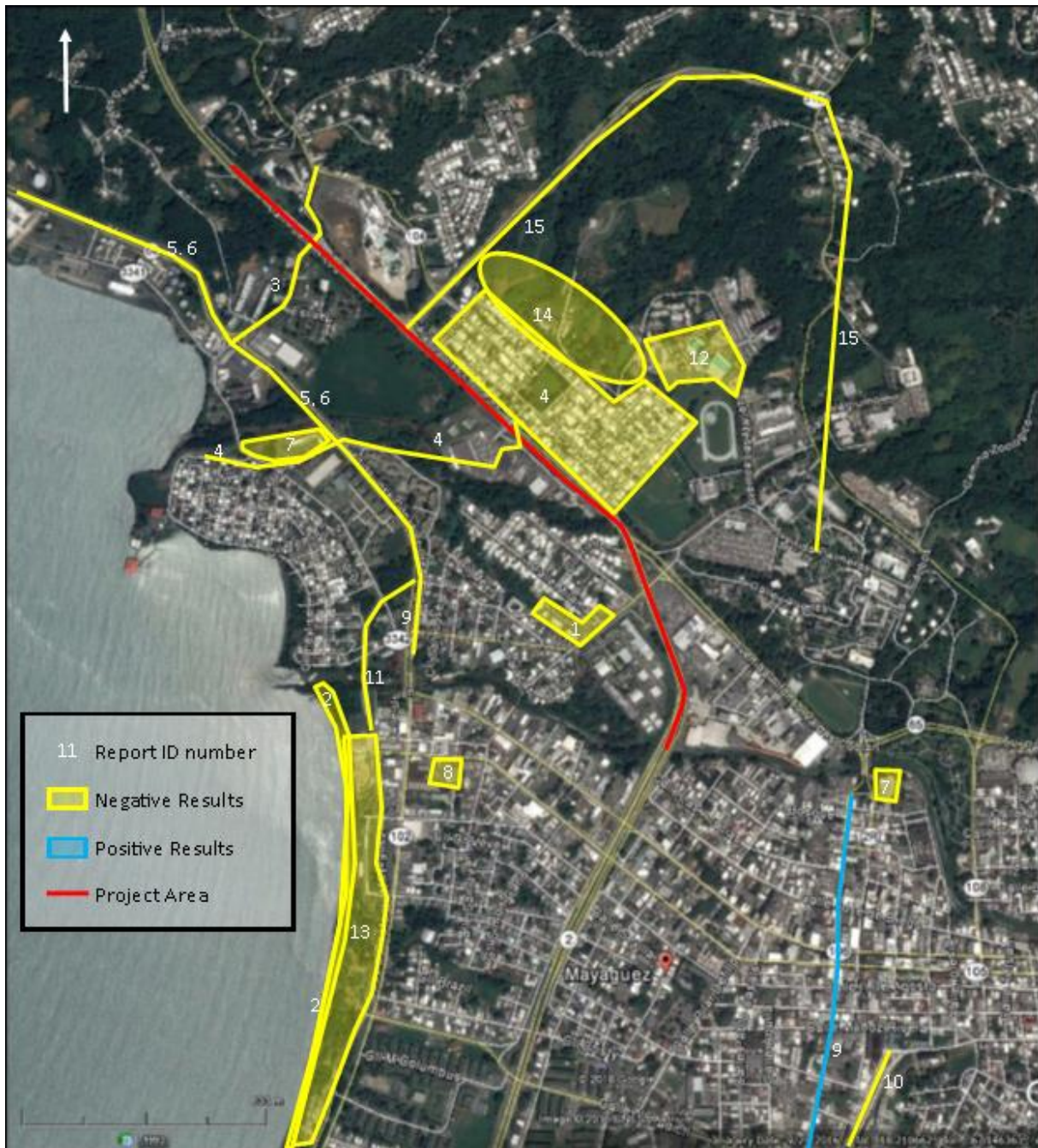
The primary reference documents for the Project Area are cultural resources investigations prepared to comply with Section 106 of the National Historic Preservation Act of 1966, as amended, and P.R. Law 112 of 20 July 1988 for the Protection of the Terrestrial Archaeological Heritage of Puerto Rico. Based on a review of the Consejo de Arqueología Terrestre and PRSHPO project files, there are 15 archaeological reports in the proximity of the project area (see Figure 11 and table 1). These studies have included only Phase I archaeological surveys for construction projects for new buildings or house developments (4), road construction (7), and sanitary sewers (2). Also, one archaeological supervision report was found, for a project conducted within the historic center of the Municipality (report 9). All the studies were negative to the presence of archaeological resources.

**Table 1:** Archaeological Studies in the Periphery of the Project

ID	Author	Title	Year	Code	Results
1	Antonio Daubón Vidal	Fase IA Condominio Paseos de Miramar, calles Miramar y Llorens Torres	1995	MY-95-05-06	Negative
2	Jesús Figueroa	Fase IA-IB Ensanche Ave. González Clemente (PR-102), Zona Urbana Playera y Barrio Guanajibo.	1991	MY0018	Historic structures in the vicinity.
3	Aramis Font Negrón	Fase IB Mejoras al Sistema de Aguas de Mayagüez Fases C & D	2007	MY-07-15-02	Negative
4	Aramis Font Negrón	Fase IA Mejoras al sistema sanitario Urb. Mayagüez Terrace	2008	MY-08-15-06 /MY0062	Negative
5	Jaqueline López	Fase IB Suplemento, Proyecto Desvío de Mayaguez (PR-64, PR-341)	2004	MY0047	Negative
6	Armando Martí Carvajal	Fase IA Desvío de Mayagüez (carreteras PR-341 y PR-64)	2002	MY-01-09-05	Negative
7	José Muñoz	Fase IA-IB Construcción de un edificio industrial Sector Marina Concordia	1988	MY0012	Negative
8	José Muñoz	Fase IA-IB Construcción Oficina de Correos del Barrio Marina de Mayagüez	1997	MY0030	Negative
9	Eduardo Questell	Monitoría	2005	(No SHPO)	In historic district.
10	Virginia Rivera	Fase IA-IB Boulevard Eudaldo Baez García	1995	MY0024	Negative
11	Virginia Rivera	Fase IA-IB Ensanche de la carretera PR-102 (ave. González Clemente) desde Estación 22+42.73	2001	MY0040	Negative.
12	Maritza Torres Martínez	Fase IA Natatorio para los Juegos Centroamericanos y del Caribe	2006	MY-06-13-01	Negative
13	Maritza Torres Martínez	Fase IA Revisada Parque del Litoral Mayagüez 2010	2007	MY-07-14-08	Negative

ID	Author	Title	Year	Code	Results
14	Oswaldo Torres Morales	Fase IA-IB Diseño vial al Recinto de Mayagüez desde la PR-3108	2008	MY0056	Negative
15	Jesús E. Vega	Fase IA-IB Relocalización PR-108	1996	MY-96-06-02 / MY0048	Negative

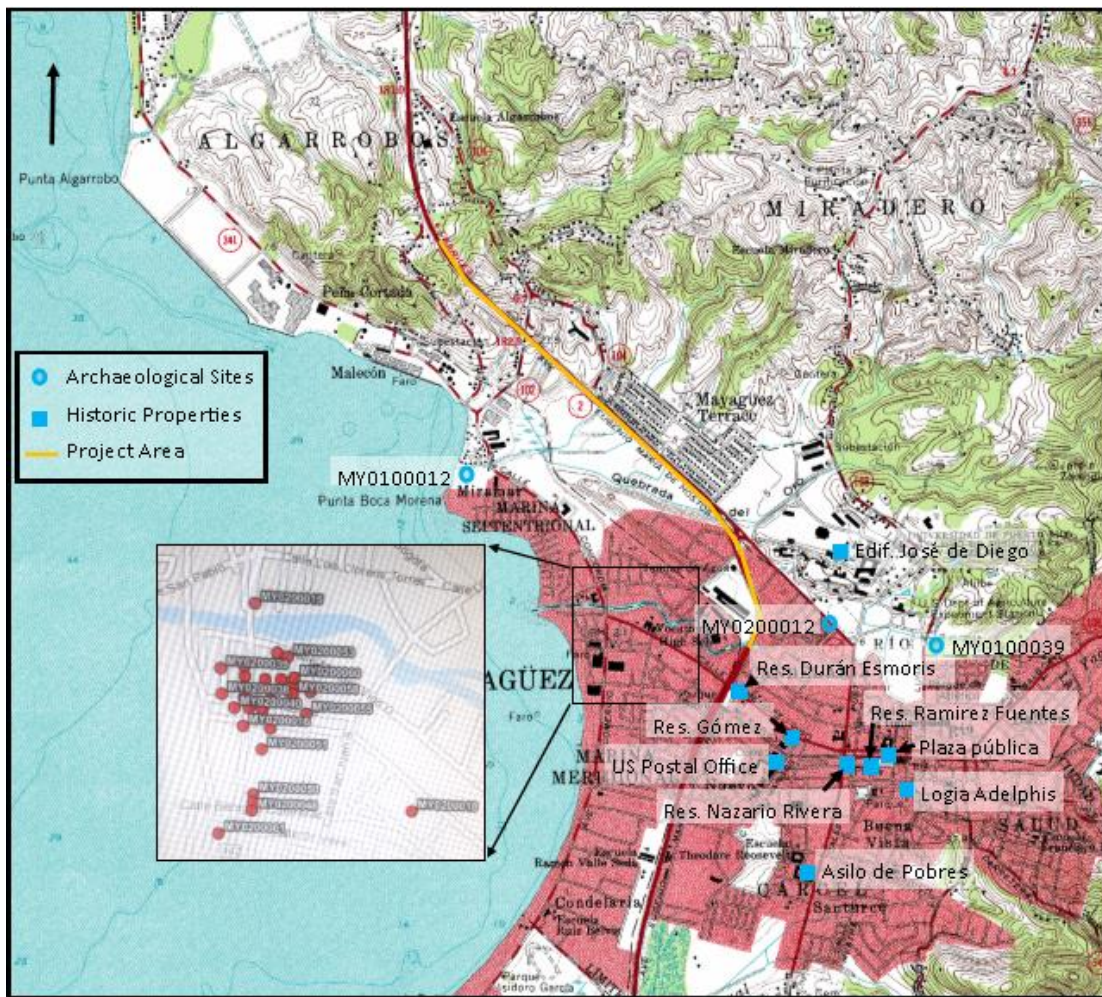
**Figure 5:** Location and Results of Archaeological Studies in the Periphery of the Project



Of the archaeological studies, reports 3, 15 and 4 stand out because they include part of the project area, in particular, the intersections between PR-2 and PR-102, PR-3108 and Chardon Street, respectively. As mentioned earlier, these studies were negative to the presence of cultural resources.

In contrast to what can be expected from the results of archaeological studies, Mayagüez is a municipality rich in cultural resources. A review of the archaeological site files in the *Consejo de Arqueología Terrestre* and the PRSHPO reveals that there are at least 57 resources reported in the municipality, of which 17 are listed in the National Register of Historic Places. Most of these resources are architectural, and are located in the Port of Mayagüez or in the urban core area. Figure 12 shows the resources closest to the project area, which are listed in Table 2.

Figure 6: Location of Cultural Resources



**Table 2:** Cultural Resources Near the Project's Area

ID	Name	Description
MY0200021 /MY-6	Edificio José de Diego	Administration Building, Mayagüez Campus, UPR. Listed in the NRHP.
MY0200033 /MY-18	Residencia Durán Esmoris	Residence built in 1921. Listed in the NRHP.
MY-16	Residencia Ramirez Fuentes	Residence built in 1925. Listed in the NRHP.
MY-14	Residencia Gómez	Residence built in 1933 by architect Francisco Porrata Doria. Listed in the NRHP.
MY-11	U.S. Postal Office	19th century building, listed in the NRHP.
MY-19	Res. Nazario Rivera	Residence built in the 20th century by architect Joaquín Hernández. Listed in the NRHP.
MY-8	Plaza Colón	Public plaza. The space function dates form the 18th century. Listed in the NRHP.
MY-9	Logia Adelphis	Built in 1912. Listed in the NRHP.
MY-7	Asilo de Pobres	19th century institutional building. Listed in the NRHP.
MY0100012	Conchero Bocamorena	Precolonial shell midden.
MY0100039	La Cuadra/Hacienda Carmen	Remains of a 19th century sugar hacienda.
MY0200012 / MY-30	Casa de Caminero	Brick and stone masonry structure built in 1870.

According to the consulted references, there are no historical properties within the area of potential effects of the project. The nearest historical properties are located to the south, in the urban core area, where there are multi-level buildings, as well as modern structures (Photo 1-left). These properties are of architectural nature, mainly houses built in the first three decades of the 20th century - like the residences Durán Esmoris, Ramírez Fuentes y Gómez, and some institutional buildings of the late 19th century, such as the postal office, the asylum for the poor and the *casa de peón caminero* or road house.

Located some hundred meters from the southern limit of the project, is the Durán Esmoris Residence, now known as Restaurant Casa Penchi Steakhouse. However, despite the proximity, there is no visual access to the project area from this property due to the PR-2 overpass (Photo 1-right). In fact, none of the aforementioned historic structures can be seen from the project area, precisely because of the presence of the PR-2 overpass.

**Photo 1: Durán Esmoris Residence.** Left: Main facade of the residence, facing north. Note the presence of modern multi-story buildings on both sides of the image. Right: Relationship of the historical structure with the overpass of the PR-2 (indicated by the black arrow).



Based on the information discussed above, it can be concluded that there are no historical properties within the APE, and that the project does not have the potential to directly or indirectly affect known historic properties.

---

## V. HISTORIC BACKGROUND OF MAYAGÜEZ AND ROAD 2

---

The area now occupied by the municipality of Mayagüez was inhabited during prehistoric times, as evidenced by the presence of many important archaeological sites. Among the best-known sites we can mention Las Mesas (MY-1), Machuca (MY-2), and Batey El Delfin (MY-3), all villages populated since Ostionoid times. In the municipality, archaeological sites of all the precolonial periods of the region have been reported, from the Archaic to the Chican Ostionoid, which suggests that it has been inhabited for at least two thousand years. Most pre-Columbian sites are located in the alluvial terraces of the many rivers crossing the area.

As we saw in the previous section, no pre-Columbian sites are reported in the area of interest. This does not necessarily mean the zone was unpopulated at the time, since the possibility exists that the archaeological record has been affected by the development of the Mayagüez urban area, as well as by the agricultural activities that were carried out in the municipality since the Spanish colonial period.

Mayagüez was founded in 1760, according to Abbad and Lasierra, or in 1763, according to Pedro Tomás de Córdova (Sepúlveda 2004, I: 114). From early in its history it was distinguished by its good geographical location and its harbor (Miyares 1775, Abbad y Lasierra 1778). De Córdova described it in 1824 as:

*“el partido más adelantado de la Isla en los ramos de agricultura, industria y comercios; que su aduana es la más productiva después de la Capital; que la riqueza fomenta extraordinariamente; que esta parece bastante sólida, y es también la mayor población reunida que existe hoy”* (De Córdova 1824 en Sepúlveda 2004, I: 114).<sup>1</sup>

Despite the importance of the town, its streets and roadways were rustic, impassable in rainy weather. This was common for the rest of the island, which did not have good communication routes until the 19th century, and even the 20th century. In fact, in the 19th century, multiple attempts were made to modernize the island's road network. A first attempt was the creation, by Governor Méndez Vigo, of the *Comisión de Caminos y Canales* (Commission of Roads and Canals). With it, the structuring of a more organized plan of roads and highways began, which until then had responded to individual or community needs and not to good urban planning.

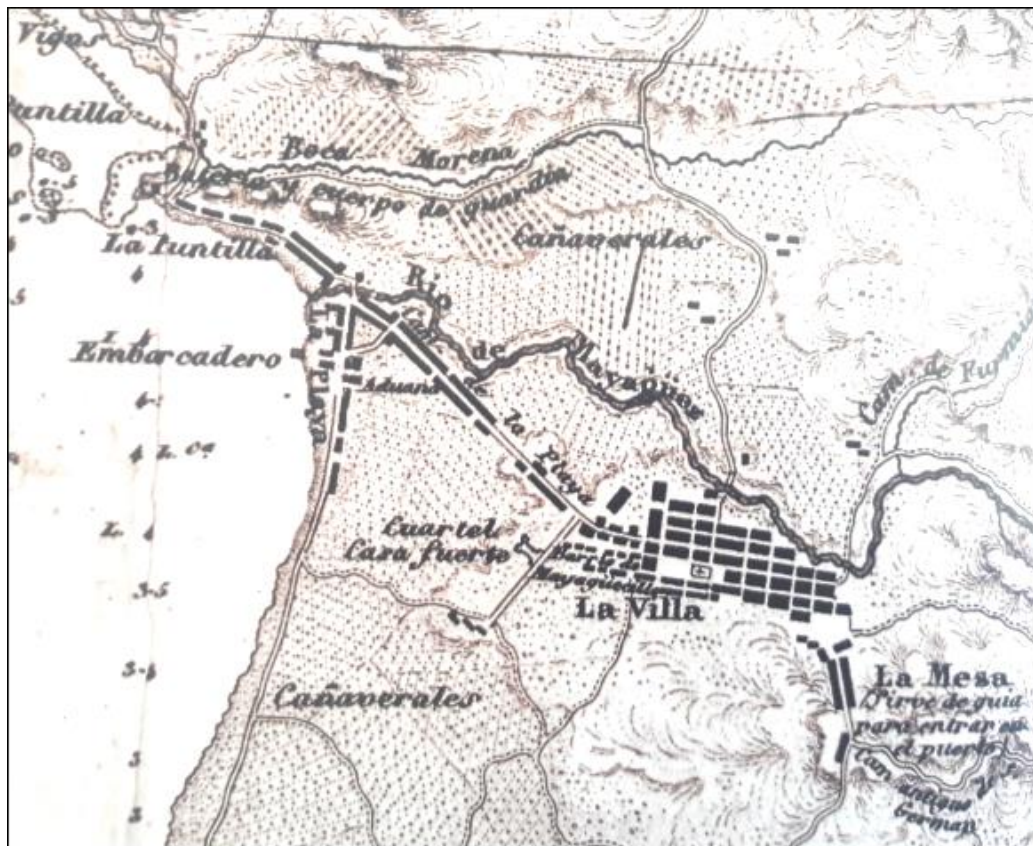
In the first half of the 19th century, the town of Mayagüez doubled its population in just four years (from 1824 to 1828), and quadrupled its agricultural production, this -according to Pedro Tomás de Córdova- thanks to improvements in the infrastructure of its territory (de Córdova 1868: 208-216). The airs of progress in Mayagüez were thwarted by the ferocious fire that occurred on January 30, 1841, during which most of the houses and structures of the settlement were destroyed. The then governor of the island, Santiago Méndez Vigo, personally took charge of the reconstruction of the city, improving even the functionality of the harbor (Fernández Méndez 1981: 434-435).

---

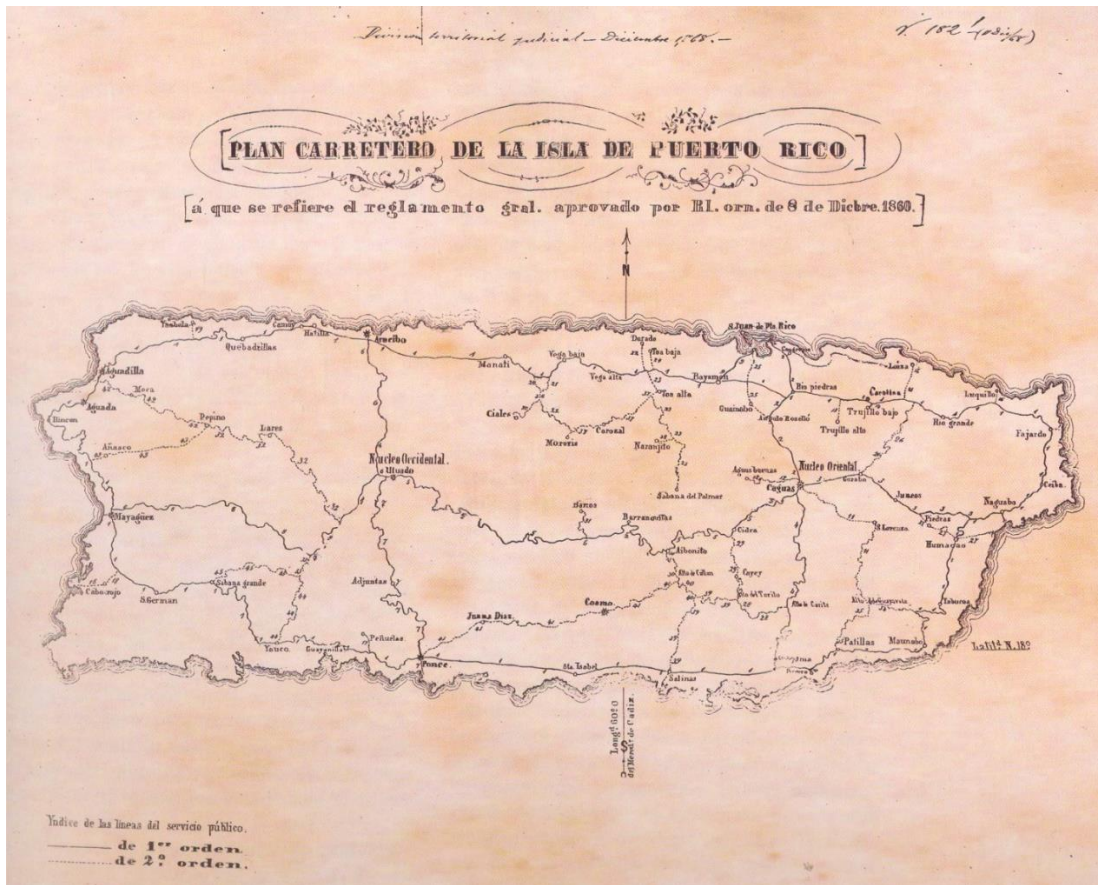
<sup>1</sup> "The most advanced district of the Island in the fields of agriculture, industry and commerce; that its customs office is the most productive after the Capital; that wealth fosters extraordinarily; that this seems quite solid, and it is also the largest population that exists today " (De Córdova 1824 in Sepúlveda 2004, I: 114).

In the first half of the 19th century, the town had a network of roads that connected it with the coast and the mountains, as can be seen in a map of 1850 (Figure 13). The main road connected the urban core with the port and wharf to the west, where another path parallel to the coast ran. The town also had a road north to Añasco, one to the south, to Hormigueros and another to the mountainous area to the east. The road to Añasco, of interest for this work, had to cross through several waterways and creeks; one of which was the Quebrada Oro, where a masonry bridge was reported in 1847 (AGPR, in Sepúlveda 2004, 2: 121).

**Figure 13:** Plano de contornos de Mayagüez de 1850 [contours map of Mayagüez 1850] (from Sepúlveda 2004, 2: 123)



An important effort for the development of road infrastructure in the Island came to fruition under the mandate of Governor Fernando de Norzagaray y Escudero. In 1853 Norzagaray initiated a program of construction of public works and roads that consolidated the marketing routes in Puerto Rico. In 1857 the *Dirección de Obras Públicas* (Department of Public Works) was created, which would supervise and fund the necessary works. In 1860, as an effort to develop a road network that managed to cross the mountains and valleys and reach the ports, was shaped the *Plan General de Carreteras de 1860* (Pumarada O'Neill 1991: 18). According to this Plan, Mayagüez would have a coastal road of the first order that would connect it with Añasco in the north and Cabo Rojo and San Germán in the south, and another road inland, in an easterly direction, towards Las Marías. This road network was very similar to the one that already existed during the first half of the 19th century.

**Figure 14:** Plan Carretero de la Isla de Puerto Rico, 1860 [Road Map] (AGPR, from Sepúlveda 2004, 2: 21)

The *Plan General de Carreteras* was revised in 1869. Since that year, due to the economic importance gained by the southern coastal plains, a coastal road was planned, to expedite the transportation of the sugarcane to the ports of the area (AGPR, La Carretera Central, Obras Públicas, legajo 21A). The layout of a rural road, which for decades communicated Ponce with the towns of the west, was continued. Road No. 2 was intended to circumvent the Island starting in Ponce across the west, then up to the north to travel throughout the coast and reach San Juan. Thus, the coastal plains of the south and north became intertwined. Road No. 2 was carried out bit by bit on a tight budget as the metropolis did not disburse the promised resources. The sections that connected the towns of Ponce, Peñuelas, Yauco, Guayanilla, Sábana Grande and San Germán managed to be outlined and paved between the years 1859 and 1898. The routes between the towns of San Germán, Hormigueros, Mayagüez, Añasco, Rincón and Aguadilla were -supposedly- only outlined (AGPR, Conservación de Carretera No. 3, 1858-1863-1864-1876-1900 y 1903, Legajo No. 266-70).

Found in several issues of the *Gaceta de Puerto Rico*, and dated from the last decade of the 19th century, are announcements by the *Cuerpo Nacional de Ingenieros de Caminos, Canales y Puertos* [National Corps of Engineers of Roads, Canals and Ports], requesting auction or auction award for the supply of stockpiles of crushed stone for the conservation of the firm of the section of the road number two from Mayagüez to the Añasco river. This suggests that this route was not only outlined, as indicated in the road file, cited



above, but that it was already macadamized. Figure 15 shows the macadamization process of a street in Mayagüez in 1898.

**Figure 15:** Road under construction, photo by Walter Townsend, 1898 (from Sepúlveda 2004, 3: 256)



The progress of road construction in 19th century Puerto Rico was not as expected. At the end of that century the central highway or Road No. 1 was finished, while roads No. 2 and No. 3 were outlined, with some paved segments (CIH, Collection of Cartographic Archive and Geographical Studies of the Army Geographical Center: Various Itineraries, 1886-1890). In 1898, according to the report of the US military government on the conditions of the Island, only 267.4 kilometers of roads were built, half of which belonged to the Central road or No. 1. The remainder was scattered in pieces of Roads 2 and 3 as well as some commercial streets within towns.

During the 19th century, and until the middle of the 20th century, the economy of Mayaguez was agricultural, chiefly comprised of sugarcane, coffee, cocoa, tobacco and cotton crops. Agricultural wealth boosted trade through the port, having 28 export houses, warehouses and other workshops. An important product of this wealth was the creation of the *Colegio de Agricultura y Artes Mecánicas de la Universidad de Puerto Rico*, now the *Recinto Universitario de Mayagüez de la Universidad de Puerto Rico*,<sup>2</sup> inaugurated in 1911. The campus grounds are adjacent to the project area, and in fact, one of the accesses which the project aims to improve is precisely its entrance. In 1918 the town was shaken by an earthquake that caused significant damage.

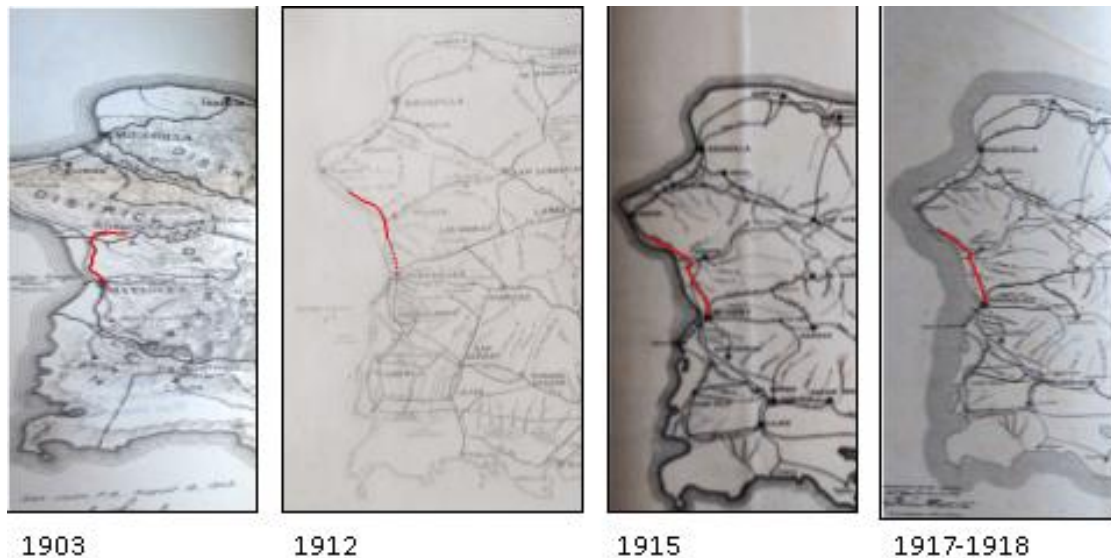
Starting the 20th century, Mayagüez was considered one of the most important cities in Puerto Rico, with a great coffee market and port, and with military strategic significance due to its harbor, large amounts

<sup>2</sup> College of Agriculture and Mechanical Arts of the University of Puerto Rico, now Mayagüez University Campus of the University of Puerto Rico

of supplies, and connections “by good roads to Maricao, Las Marias and later the other inland towns and roads” (Armstrong 1909, in Sepúlveda 2004, 3: 267). According to Armstrong, until recently (within a few years) there have been no good roads to connect to Mayagüez. Presumably, the good roads that connect the town, all of them macadamized, were completed during the US occupation.

The road PR-2 between Mayagüez and San Germán was completely paved between 1915 and 1925 (AGPR, Obras Públicas, Carreteras y Puentes, Leg.898). The segment between Mayagüez and Añasco must have been also paved in those years. The yearly report of the Bureau of Public Works of Porto Rico was accompanied with a map of the island showing the roads constructed, the roads under construction, 2<sup>nd</sup> class roads finished and not finished, trails and 3<sup>rd</sup> class roads, and railroads. In Figure 16, a comparison between the maps of 1903, 1915 and 1916 can be appreciated. In 1903, PR-2 (or its predecessor) ran between the urban cores of Mayagüez and Añasco, ending apparently east of the latter. It is depicted with several curves, as a 1<sup>st</sup> class constructed road. A second road is shown nearby, to the west, running between Mayagüez, and turning towards Rincón, and continuing towards Aguadilla and Isabela. In the 1912 map, road no. 2 appears with a new alignment and straighten, running from Mayagüez towards the northwest, where it continues towards Rincón, Aguadilla and Isabela. The segment immediately north of Mayagüez appears under construction. Road no. 2 is depicted as finished in the 1915 and 1916 maps.

**Figure 16:** Segment of the maps of the island of the Bureau of Public Works of Porto Rico 1903, 1912, 1915, 1917 (Reports of the Governor of Puerto Rico)



In the 1936 aerial photo, the southernmost section of the project area can be seen (Figure 17). It shows a road that leaves the urban center of Mayagüez with the same alignment of the PR-2 to the northwest, but eventually, after passing over Oro creek, it turns north, similar to the current PR-104. Therefore, the section of the PR-2 under study, in its entirety, came to be sometime after 1936. The surrounding area appears planted. Along the seemingly narrow road, you can see some structures, a large rectangular one standing out in the central area of the image.

**Figure 17:** Aerial photo of 1936 (DTOP)

In the following years, significant changes occurred in the municipality. By the late 1940s the economy of Mayagüez was transformed from a primarily agricultural to a manufacturing industrial one. From 1960 onward, the tuna industry was the main productive activity, with the establishment of companies such as Star Kist Caribe and Neptune. In addition to tuna, about 100 factories related to the manufacture of footwear, soft drinks, medicines, among other products, opened (Enciclopedia de Puerto Rico). In these years, specifically in 1954, the Dr. Juan A. Rivero Zoo, the principal zoo in the country, was inaugurated.

Because of the manufacturing development, the PR-2 highway was enlarged and underwent geometric improvements. In the topographic quadrangle, the PR-2 is identified as Avenida Eugenio María de Hostos (Figure 1). By 1964, the highway had four lanes, and it continued northwest after Oro creek, and then turned north, like in the present. The intersection with streets PR-102, PR-104, and PR-2R is also shown. In this period the Mayagüez Terrace urbanization was built, and the urban areas grew.

In the aerial photo of 1993 it is observed that the area to the south is more densely urbanized, while the northern area, with more broken topography, still has undeveloped areas (Figure 18). The road has the same alignment as at the present, and the elevated section of the road is already built, bridging the Yágüez River. In the next decades the road remains the same. The exception is the construction of the intersection with PR-3108 in 2009. The surrounding areas continue to develop, particularly with the construction of commercial buildings.

**Figure 18:** Aerial photo of 1993 (DTOP)

Mayaguez continues to be considered one of the most important municipalities of the island. Less than a decade ago, the municipality hosted the 21<sup>st</sup> Central American and Caribbean Games that took place in Mayagüez in the summer of 2010. In the APE and its periphery, there are structures that were erected for these games, among which stand out the cauldron and a long retaining wall with the icons of athletic events (Photo 2).

Photo 2: Structures built for the 21<sup>st</sup> Central American and Caribbean Games

---

## VI. FIELD INSPECTION

---

We visited and surveyed the project area on Sunday August 6, 2017. It was a partially cloudy day with some rain, there was medium to low traffic and very few pedestrians, as compared to the heavy traffic expected for weekdays along this stretch of road which encompasses several important intersections in the city of Mayagüez.

To aid in the description, the project area was divided in sections between intersecting roads with each intersection reviewed accordingly.

**Figure 19:** Section 1: From Project Start to intersection with PR-102



Starting at Km 152 of road PR-2, this section of highway is aligned at about 133 degrees from north to south through a less populated commercial area, with overgrown vegetation along the western margin and a moderate slope to the southeast (Figure 19, Photo 3). It is a 4-lane highway with a central median strip and emergency stop lanes. The median has street lighting posts with underground wiring, grass and some trees and palms. Along the western side of the road there are wooden poles with aerial electric and communication cables. There are roadside markers and guardrails. There are open drain ditches parallel to PR-2 on both sides, with pipe culverts at the business' entrances. A truck tire shop and its parking area lie west of the road along the first 90 m of this highway section. Shallow abutments and grading on both sides indicate previous earthworks. The higher ground on the east and lower terrain to the west suggest the landscape sloped westward prior to the roads construction.

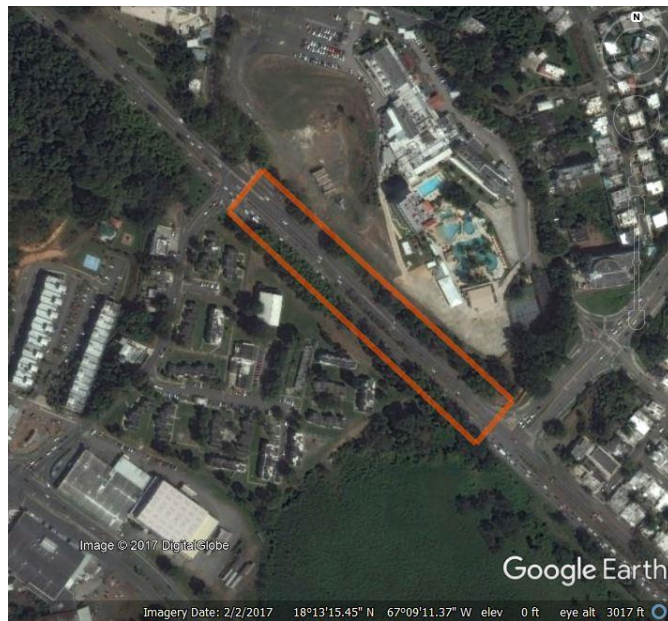
**Photo 3:** Left: median; Right: southbound lane with ditch and entrance to tire shop.**Figure 20:** The intersection between PR-2 and PR-102

In the intersection between PR-2 and PR-102, traffic is regulated by semaphores on metal assemblages which are connected by underground installations (Figure 20, Photo 4). The ramp exiting PR-2 west on the southbound lane forms a grassy triangular shaped area with some palm trees and other foliage. From this point road PR-102, a two-lane road, travels west towards the ferry. There is a row of concrete powerline poles along its south side, as well as a housing development. Along the north side, the road is lined by some businesses and a wooded area. On the other side of PR-2 (east of the intersection), PR-102 climbs the hillside towards the Mayaguez Resort and Casino Hotel and the Algarrobos residential area. A wall of concrete barriers closes off eastbound traffic from PR-102, and allows northbound traffic from PR-2 to bypass the stoplight at this intersection or exit right, re-entering road PR 102 towards the hotel and surrounding houses. To the east of this intersection there is a striped area with evident earthworks, resembling a small quarry, with a cluster of derelict container trailers parked midway. Tall profiles with terraced abutments show the rocky subsoil has been exposed.

**Photo 4:** Top left: intersection; Top right: PR-102 west (towards the ferry); Bottom left: exit from PR-2 to PR-102 east; Bottom right: stripped lot with terraced profile.



**Figure 21:** Section 2: Between PR-102 and PR-3108

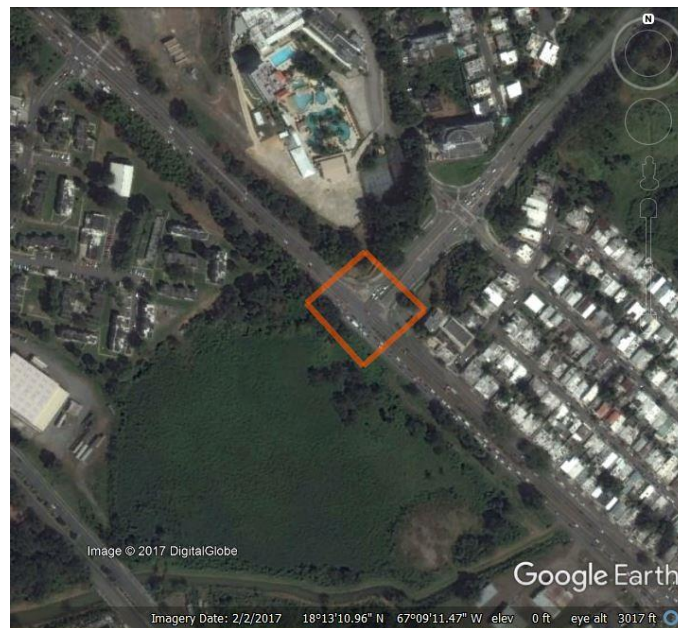


The stretch of road between PR-102 and PR-3108 follows a slight slope south (Figure 21, Photo 5). Streetlights are installed along the median, connected by underground wiring, while high tension aerial power lines are laid at a short distance along the southbound lane. To the west, the immediate environs beyond the guardrails are overgrown with a dense bamboo hedge and other vegetation, mostly covering the drainage ditch, beyond which is a housing development set on a graded mound. Along the northbound side of the highway there is an empty lot with some container trailers and a steeply terraced profile, above which rests the Mayaguez Resorts' water park.

**Photo 5:** Left: southbound lane; Right: drainage ditch.



**Figure 22:** Intersection of PR-2 and PR-3108



PR-3108 is a 4-lane highway with a grassy median and sidewalks. It ends at its intersection with PR-2, coming from the eastern ward of Miraderos (Figure 22). Streetlights, underground wiring control boxes, traffic lights and signs riddle the T-shaped intersection of PR-2 and PR-3108. A bronze bust is set on a pedestal at the southeast corner, facing the north corner of the intersection where the hill has been cut,



exposing the reddish subsoil on a profile several meters high. Beyond the guardrail to the west, opposite to the PR -108 there is a vacant wetland area, with tall shrubbery and spiny vegetation (Photo 6). One of the projects' alternatives (# IV) proposes a half cloverleaf ramp to be built here. There are power lines with concrete poles crossing this lot near the intersection. Sewer and storm water installations are also evidenced by their manhole covers.

**Photo 6:** Top: lot west of intersection; Center left: southeast corner with bust of Dr. Ramon Baez Machado and other signs and utilities; Center right: hill with cut profiles at northeastern corner; Bottom: profile details



The section of highway between PR-3108 and Chardón ST. (Figure 23) also has streetlights installed on the median with underground connections. There is a side street along the east of PR-2 separated by guardrails and small incline. It is slightly ( $< 1$  m) lower than the highways' level, which indicates the highway was raised by fill. This side street is lined by houses belonging to the Mayaguez Terrace Urbanization. Some of the structures are businesses (Photo 7).

**Figure 23:** Section 3: Between PR 3108 and Carlos E. Chardón St.**Photo 7:** Left: portion of side street, Mayaguez Terrace, looking south;  
right: segment of side street looking north

The west side of this portion of highway is mostly vacant, overgrown with marsh-like vegetation. Beyond the guardrail, the powerlines hang from concrete and wooden poles running parallel to PR-2. At the southern end of the lot there is a canal or canalized creek that flows west, having emerged from under the highway through a concrete culvert found at the entrance to a local hardware store (Ferretería Martínez) (Photo 8).

**Photo 8:** Top left: southbound lane PR-2; Top right: hardware store parking area; Bottom left: overgrown area west of PR-2; Bottom right: detail of canal at culvert.



**Figure 24:** The intersection of PR 2 with Chardon St.



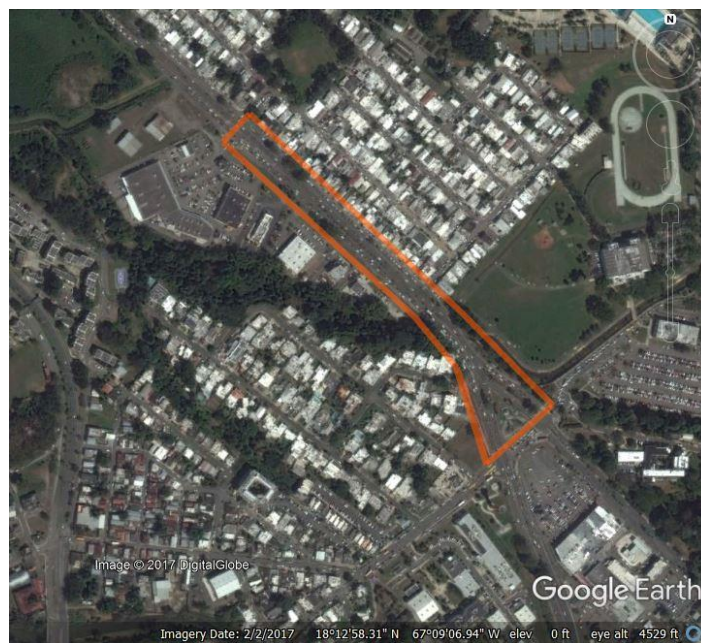
The intersection of PR-2 with Cardon St. (Figure 24) manages traffic from the PR-2 highway, the side street and Chardon street, which enters the Mayaguez Terrace urbanization. Immediately west of this intersection lies an open shopping mall with several businesses like Pitusa, Walgreens, McDonalds and others. The area is flat, used as parking space with both paved and unpaved patches were the subsoil is exposed. Previous subsurface impacts are evidenced by sewer manhole covers and by traffic lights and

street lighting that are connected to underground grids, while a tangle of telephone and power lines hang overhead from concrete and wooden poles (Photo 9).

**Photo 9:** Left: general view of the intersection looking south; right: the entrance to the shopping mall.



**Figure 25:** Section 4: between Chardón and San Juan St.



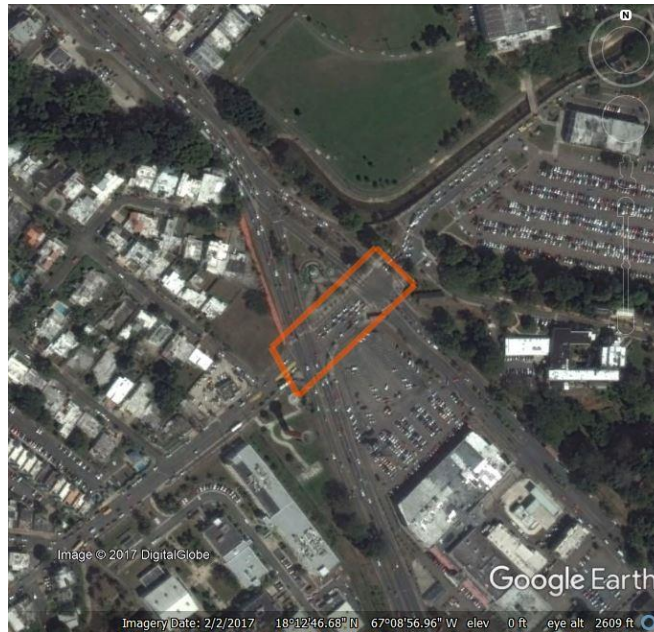
The segment between Chardón and San Juan streets has side streets on both sides with a high density of commercial establishments and infrastructure installations, it is thoroughly disturbed regarding archaeological considerations (Figure 25, Photo 10). The side street on the east of PR-2 is below the level of the highway, it continues to the end of the Mayaguez Terrace urbanization. The sloped median dividing the side street from the highway has grass and some trees. Along the west side street there are utility poles and parking areas for a shopping park (Advance Auto Parts, El Mesón and other businesses). The commercial area extends south and west to a swiftly flowing stream (Quebrada Oro). Highway PR-2 passes over Quebrada Oro by means of a modern Bridge #784. At this point the PR-2R, or Alfonso Valdes Cobián avenue intersects the highway (PR-2, or Eugenio María de Hostos Avenue) at a 180-degree angle creating

a Y-shaped intersection, so that there is a bend and PR-2 turns to follow an almost north-south (160 degrees) trajectory. The west side of the road is now lined by a sidewalk and a tall orange wall with sports icons which forms part of the works for the 2010 *Juegos Centroamericanos y del Caribe*. There are houses perched at a higher level immediately beyond this 50-m long retainment wall, which then banks for a remaining 100 m to the intersection with San Juan street.

**Photo 10:** Top left: side street on east of PR-2, looking south; Top right: intersection PR-2 with Chardón St., looking west; Bottom left: Oro creek, looking west from bridge; Bottom right: general view of PR-2



To the east of the intersection, the stream has been canalized with concrete banks as it traverses the campus of the RUM. Immediately south of the intersection there is a park, with benches, fountains, palm trees, sidewalks, lighting and art (Photo 11). It is shaped as a triangle defined by PR-2 to the west, PR-2R to the east, and San Juan street to the south.

**Photo 11:** Left: Quebrada Oro in University campus; right: Hostos park.**Figure 26:** Intersections between PR 2/ 2R and San Juan St.

San Juan street encounters PR-2R immediately in front of the university gates (Figure 26, Photo 12 and 13). The bare asphalt parking space of a Pueblo supermarket lies at a lower level on the southeast of this crossing, while the northwest is lined by the park. A 60 m long 4-lane segment with concrete median and sidewalks connects to the intersection with PR-2. Here the vegetation seems groomed in the northern side as it is occupied by the park, while to the west the more visible infrastructure, (light posts, Traffic lights, signs and control boxes), incorporates art objects and features residual of the 2010 games.

**Photo 12:** Top: Entrance to the RUM, looking west (right) and south (left) from PR-2R; bottom right: PR-2R looking south; bottom left: supermarket parking



**Photo 13:** Views of the intersection between PR-2 and San Juan street



**Figure 27:** PR 2R, San Juan St. to Project End SE

A 4-lane highway with planted median and sidewalks, Avenida Alfonso Valdes Cobián crosses between a supermarket and the university, then between the zoo and a gas station. There is evidence of major utilities. In this segment, street lighting is installed on posts along the sidewalk (Photo 14).

**Photo 14:** Segment of PR-2R



**Figure 28:** PR2, San Juan St. to Project End SW

The segment of the project between San Juan St. and the project end cant and curves to head southwest. It passes between the Pueblo supermarket and factory-like industrial buildings with no entrance at either side (Photo 15). This area also shows evidence of grading and earthworks. The project ends at the Rio Yaguez.

**Photo 15:** View of PR-2 towards project end, looking south

Immediately beyond the project area, by way of the next exit and underpass, the landmark historic building which houses Restaurant Casa Penchi is found (Photo 1). Such structures herald the older parts of the city of Mayaguez and a greater potential for historic archaeological features.

---

## VII. PREVIOUS IMPACTS AND ARCHAEOLOGICAL POTENTIAL

---

### A. Previous Impacts

According to the field visit and the information obtained from the documentary research, it can be concluded that the project area has been significantly altered. The first obvious impact is the construction of the current highway PR-2, which required cutting, leveling and filling. This is evidenced in some exposed profiles along the highway, particularly on the north section. The construction of the urbanizations adjacent to the project, such as Mayagüez Terrace, and the University Plaza shopping center, also involved movement of earth. In addition, fill layers of between 4 to 21 feet thick were deposited in areas near Mayagüez Terrace (Font 2008: 9).

According to the *Concept Design Report* of February 2017, there are PREPA (Puerto Rico Electric Power Authority) and PRASA (Puerto Rico Aqueduct and Sewers Authority) utilities along the project area. The PREPA utilities include aerial and underground lines. The existing 13.2 kv system coming from PR-2R goes underground through the intersection of PR-2 and Chardón St. as a branch to serve intersection loads and tying to an aerial branch that serves University Plaza Shopping Center and goes to Mayagüez Terrace at Chardon Street. That same point connects a feeder across the Mayagüez Town Center parking and continues over PR-2, going to San Juan Street. The 13.2 kv line that goes to Mayagüez Terrace at PR-2 northbound, goes across PR- 2 Road to serve several sites at University Plaza Shopping Center and continuing to Mayagüez Resort and Casino Intersection at this side of the road, crossing at the intersection PR-3108 to serve Mayagüez Resort and others. There is a 38 kv sub-transmission line that comes from San Juan Street going south on PR-2 southbound to serve “Cervecera de P.R.” Brewing site. In addition, there are lighting poles and luminaries, most of them with underground connections.

PRASA utilities consist on 4"φ, 8"φ, 12"φ, 16"φ and 20"φ water pipes; 6"φ, 8"φ, 10"φ and 12"φ sanitary sewer lines, and a 66"φ sanitary trunk sewer. These pipes are located along PR-2, and under all the intersections but PR-102.

During the field inspection, the extent of the utilities impact could be assessed: several trench scars were observed at the intersections with frontage roads and, although covered by smooth pavement, a crisscross of utility trenches is assumed from the above-surface infrastructure. The frequency of apparent utilities is larger at intersections in the more densely populated areas with commerce and communication services. Several cast-iron covers marked AGUA as well as installations marked AAA were observed. A large diameter water supply pipe is visible along the west side of the culvert over Oro creek. Sewer system, and storm water management manhole covers were observed throughout the project area, some marked PRASA (Photos 16 to 19).

Communications infrastructure is also evident throughout; telephone wires are seen hung from wood and metal poles, usually shared with electric power lines. Subterranean telecommunications installations are evidenced by hardware at the two southernmost intersections. Power (electricity) installations are also present both above (aerial on poles) and below the surface.

**Photo 16:** Top left: water valve cover; top right: Cover marked AAA CONTADOR FUNDICION CUBANO;  
bottom: pipe at culvert over Quebrada Oro



**Photo 17:** Left: sewer access; right: unidentified MH cover



**Photo 18:** Cast Iron MH cover marked PUERTO RICO TELEPHONE COMPANY (left); subterranean utilities  
access boxes, marked PREPA (center), and DTOP (right)



**Photo 19:** Street intersection with patched up pavement and storm-water drain catch



## **B. Archaeological Potential**

The research conducted did not show evidence of the existence of cultural resources or historical properties within the project area. These properties are mainly concentrated in the historic town center, to the south of the project; or for pre-Columbian resources, in the alluvial terraces of the region. Furthermore, the archaeological studies that have been performed in the area have been negative to the presence of cultural resources.

An important resource that should not go unnoticed, is the same PR-2 road, whose planning dates back to the 19th century, but which gets its current appearance during the second half of the 20th century. Main artery of the western area of the island, this road has been intervened on multiple occasions, as evidenced by the presence of an overpass south of the project end, which passes over the Yáguez river, and over part of the historic center of the municipality.

Taking into account the absence of known cultural resources and the significant disturbances that the area has suffered, it is understood that the potential for archaeological resources with integrity in the project area is very low.

---

## VIII. CONCLUSIONS AND RECOMMENDATIONS

---

Six different alternatives were developed to improve the geometry of a 2 km-section of PR-2, north of the urban center of Mayaguez. The alternatives are aimed at improving the flow of vehicles at several key intersections, including the entrance to the University of Puerto Rico at Mayaguez. All alternatives include the construction of elevated bridges, roundabouts, and frontage roads at intersections located between km 152 and 154 of PR-2, as well as the relocation of most of the utilities located in the area.

Road PR-2 was for a long time the only route of communication between the coastal towns of the western half of Puerto Rico, including the capital. This road, conceived since the 19th century, was built section by section, improved and widened, to adapt to the needs of the people it has served. Whether to transport agricultural products, goods and passengers to and from the port, troops or industrial equipment, the PR-2 has been essential for the economic development of the west coast of the island. This road continues to be the main artery of Mayaguez, used to access the university, the ferry to Dominican Republic, several shopping centers, and the historic port and urban center. This project of improvements to several intersections can be understood as part of that historical process of adapting the highway to the needs of the population.

According to the historical and archaeological documentation reviewed, neither in the area under study nor in its immediate periphery are there known cultural resources. The documentary and cartographic sources evidenced that the historical use of the area has been mainly agricultural, until the urbanization process began in the 1930s, and with more intensity from the 1960s onward. Since then, the PR-2 has its current alignment. The urbanization process has been more concentrated in the periphery of the historic center and the RUM. Towards the north of the project, there are still some vacant areas, which is also the result of a more rugged topography.

The surface inspection, as well as the results of other archaeological studies conducted nearby, showed that this segment of PR-2 is considerably impacted. The construction of the PR-2 itself involved the cutting and leveling of terrain, as evidenced by exposed slopes; or in contrast, the deposit of fill, as inferred by the difference in level between the road and adjacent areas. In addition, there are multiple underground utilities, prominently potable water, storm water and sanitary sewer lines - particularly a 66-inch diameter sanitary trunk.

For cultural resources management purposes, the evaluated alternatives of improvements to the PR-2 are similar. Although the location and length of the elevated bridges varies, the area of impact is basically the same. The exception is Alternative IV, which includes the construction of a separated level cloverleaf intersection in a vacant area. However, this is not the preferred alternative. Alternative VI is the one recommended by the designer to be adopted for final implementation.

Considering the history of use of the project area, as well as the multiple impacts it has suffered, it can be concluded that the potential of finding unknown cultural resources that may be affected by any of the proposed alternatives is minimal. For this reason, it is not recommended to carry out additional archaeological studies for alternative, VI, nor for alternatives I, II, III, and V. However, if alternative IV is

selected, it is recommended that a subsurface survey (Phase IB) be carried out in the area where the half cloverleaf intersection would be built, west of the intersection of PR-2 and PR-3108 (Figure 29). This area does not present evident signs of previous impacts.

**Figure 29:** Area (in red) where a subsurface survey (Stage IB) is recommended, **only if Alternative IV is selected**



It must be noted that the description and figure of Alternative VI mention a future extension of PR-3108 in order to connect PR-2 and PR-102. This connection will traverse the above-mentioned area, with no evident signs of previous impacts (Figure 30). For this future project, a Phase IB survey may be necessary.



**Figure 30:** Area (in red) where a subsurface (Stage IB) may be recommended for future extension of PR-3108.

---

## IX. REFERENCES CITED

---

### A. Primary Sources

Annual Reports of the Governor of Puerto Rico 1902, 1912, 1915, 1917-1918

Puerto Rico General Archive (AGPR)

- La Carretera Central, Obras Públicas, legajo 21<sup>a</sup>
- Conservación de Carretera No. 3, 1858-1863-1864-1876-1900 y 1903, Legajo No. 266-70
- Obras Públicas, Carreteras y Puentes, Leg.898

University of Puerto Rico at Río Piedras, Centro de Investigaciones Históricas (CIH)

- Colección Archivo Cartográfico y de Estudios Geográficos del Centro Geográfico del Ejército: Varios Itinerarios, 1886-1890

### B. Secondary Sources

Abbad y Lasierra, Iñigo

1866 *Historia geográfica, civil y natural de la isla de San Juan Bautista*. Puerto Rico. Imprenta y Librería de Acosta.

Batlle, José A. y Asociados

2017 *Concept Design Report. Interstate Access Request, Analysis and Preliminary Design of Improvements to Intersections PR-2, 2R and San Juan St. (RUM Entrance, La Vita), PR-2 km 153.90, Mayaguez*. February 3, 2017.

2017b *Traffic Impact Study and Access Modification Justification, Highway PR-2, km 152 to km 154, Mayaguez, Puerto Rico. Modified Report PR-2 for Alternative V*. May 2017.

Consejo para la protección del patrimonio arqueológico terrestre de Puerto Rico

1992 *Reglamento para la Radicación y Evaluación Arqueológica de Proyectos de Construcción* (Reglamento #4643 del 26 de febrero de 1992).

Curet, Ángel F.

1986 *Mayaguez and Rosario Geological Quadrangle*. United States Geological Survey (USGS).

de Córdova, Pedro Tomás

1831 *Memorias geográficas, históricas, económicas y estadísticas de la Isla de Puerto Rico*. Puerto Rico. En la oficina del gobierno, a cargo de D. Valeriano de Sanmillan.

Fernández Méndez, Eugenio

1981 *Crónicas de Puerto Rico. Desde la conquista hasta nuestros días, 1493-1955*. Río Piedras, Puerto Rico, Editorial Universitaria.

Font, Aramis

2008 *Fase IA Mejoras al sistema sanitario Urb. Mayagüez Terrace*. SHPO Archives.

Gierbolini, Gilberto

1975 *Soil Survey of Mayaguez Area of Western Puerto Rico*. US Dept. of Agriculture Soil Conservation Service in cooperation with Univ. of Puerto Rico Agricultural Experiment Station.

Miyares Gonzáles, Fernando

1954 *Noticias particulares de la isla y plaza de San Juan Bautista de Puerto Rico*. Editorial Universidad de Puerto Rico en Río Piedras.

Picó, Rafael

1969 *Nueva geografía de Puerto Rico: física, económica y social*. Editorial Universitaria.

Pumarada O'Neill, Luis

1991 *Los puentes históricos de Puerto Rico, Mayagüez*: Universidad de Puerto Rico-Recinto de Mayagüez

Puerto Rico State Historic Preservation Office

1993a *Guía para hacer investigaciones arqueológicas, fases I, II y III*

1993b *Guía para preparar informes arqueológicos, fases I, II y III*

Secretary of the Interior, National Park Service

1983 *Secretary of the Interior's Standards and Guidelines for Identification and Evaluation, Federal Register, Archeology and Historic Preservation*.

Sepúlveda Rivera, Aníbal

2004 *Puerto Rico Urbano, Atlas Histórico de la Ciudad Puertorriqueña*. Centro de Investigaciones CARIMAR y Departamento de Transportación y Obras Públicas. 4 Vol's., San Juan, P.R.