



EVACUATION ROUTE

Municipality of Loíza, Puerto Rico

Abstract

The Puerto Rico Department of Transportation and Public Works through the Puerto Rico Highway and Transportation Authority propose the development of a new road infrastructure that would be used as an evacuation route during emergencies events for residents and visitors of the town area of the Municipality of Loíza, Puerto Rico. Loíza is a disadvantaged community with a rich cultural history vulnerable to natural disasters or incidents that would require the evacuation of the town during emergencies.

RAISE Grant Application
Planning Rural Area Project
Grant Amount Requested: \$12,372,393
PRHTA DUNS Number: 090287229

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Table of Contents

1	Project Description.....	1
1.1	Location of Municipality of Loíza	1
1.2	General Description of Loíza	1
1.3	Description of the Proposed Action Area	2
1.4	Vulnerability to Natural Disasters or Emergency Incidents.....	3
1.4.1	Tsunami.....	3
1.4.2	Breach of the Carraizo Dam	4
1.4.3	Floods.....	5
1.5	Current Emergency Plans.....	5
1.6	Experience during Emergency Situations	6
1.6.1	Flood Events	6
1.6.2	Earthquakes and Potential Tsunamis	6
1.7	PRHTA Evacuation Route Initiative.....	7
2	Project Location	12
3	Grant Funds, Sources and Uses of Project Funds	12
4	Merit Criteria	12
4.1	Safety.....	12
4.2	Environmental Sustainability	13
4.3	Quality of Life	13
4.4	Mobility and Community Connectivity	14
4.5	Economic Competitiveness and Opportunity.....	14
4.6	State of Good Repair	14
4.7	Partnership and Collaboration.....	15
4.8	Innovation.....	15
5	Project Readiness and Environmental Risk	16
5.1	Project Schedule	16
5.2	Required Approval	17
5.2.1	Environmental Evaluation	17
5.2.2	Permitting Process	17
5.2.3	Assessment of Project Risks and Mitigation Strategies.....	19
6	Benefit Cost Analysis	21

List of Appendixes

[Appendix 1 Photos taken Post Hurricane María \(September 2017\)](#)

[Appendix 2 Video of January 7, 2020, Earthquake Evacuation Process](#)

[Appendix 3 Documents that illustrate the Community claim for the Evacuation Route](#)

[Appendix 4 Opinion of Probable Environmental Evaluation and Design Cost](#)

[Appendix 5 Project Supporting Letters](#)

[Appendix 6 PRHTA Public Involvement Plan for the Environmental Process](#)

Acronyms

ABC	Accelerate Bridge Construction
ABFE	Advisory Base Flood Elevations
APP	Area of Persistent Poverty
B/C	Benefits/Cost
CBD	Central Business District
CEQ	Council on Environmental Quality
CWA	Clean Water Act
DBE	Disadvantaged Business Enterprise
DNER	Department of Natural and Environmental Resources
DTPW	Department of Transportation and Public Works
EIS	Environmental Impact Statement
EQB	Environmental Quality Board
EPA	Environmental Protection Agency
ESA	Endangered Species Act
FPPA	Farmland Protection Policy Act
FEMA	Federal Emergency Management Agency
FHWA	Federal Highway Administration
HDC	Historically Disadvantaged Community
ICP	Instituto de Cultura Puertorriqueña
LRTP	Long Range Transportation Plan
NHPA	National Historic Preservation Act
NEPA	National Environmental Policy Act
NPDES	National Pollutant Discharge Elimination System
NRHP	National Register of Historic Places

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NRHP	National Register of Historic Places
Mw	Moment Magnitude
OGPe	Oficina de Gerencia de Permisos (Permit Management Office)
PR	Puerto Rico
PRASA	Puerto Rico Aqueduct and Sewer Authority
PREPA	Puerto Rico Electric and Power Authority
PREPPL	Puerto Rico Environmental Public Policy Law
PRDTPW	Puerto Rico Department of Transportation and Public Works
PRHTA	Puerto Rico Highway and Transportation Authority
PS&E	Plans, Specifications and Estimate
RAISE	Rebuilding American Infrastructure with Sustainability and Equity
SGR	State of Good Repair
SHPO	State Historic Preservation Office
STIP	Statewide Transportation Improvement Program
USACE	United States Army Corps of Engineers
USC	United States Code
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
WOTUS	Waters of the US

EXECUTIVE SUMMARY

The Puerto Rico Department of Transportation and Public Works (PRDTPW) through the Puerto Rico Highway and Transportation Authority (PRHTA) propose the development of a new road infrastructure that would be used as an evacuation route during emergencies events for residents and visitors of the town area of the Municipality of Loíza, Puerto Rico. The proposed project purpose is to develop a feasible evacuation route for Loíza town area to save lives, taking in consideration the existing transportation system and the natural and socioeconomic environment of the community. Components of the alternatives under evaluation are identified in the Puerto Rico's Long Range Transportation Plan (LRTP) and Puerto Rico's Statewide Transportation Improvement Program (STIP) as Loíza Bypass.

Due to its geographical location, Puerto Rico is highly exposed to extreme natural events such as weather events (e.g., hurricanes) or earthquakes. The exposure to extreme natural events affects the transportation infrastructure. Damages to the transportation results in the isolation of communities limiting their ability to obtain supplies and services in an efficient and timely manner in the recovery phase after the extreme natural event. This has been proven by recent extreme events occurred in Puerto Rico. Consequently, the PR 2045 Long Range Transportation Plan (2045 LRTP) established the resiliency during transportation planning as one of the strategies to enhancing the quality of life through management of assets, environmental and social justice, improved accessibility, and better economic development.

The town of Loíza is in an area with privileged natural environmental characteristics. These characteristics make it vulnerable to natural disasters or incidents that would require the evacuation of the town during emergencies. According to 2020 Census the municipality has a population of 23,693. According to the Census criteria the municipality is not an urban area composed mostly of Latino (99.7 %) dominated by the black (38.7 %) and white (24.3 %) races. Poverty percent is estimated in 48.2 %. The town is in an Area of Persistent Poverty (APP) and is a Historically Disadvantaged Community (HDC).

This document represents the PRHTA application to Rebuilding American Infrastructure with Sustainability and Equity (RAISE) Grant Program for the project. The PRHTA application is for funds for the FY 2022 RAISE grant programs. The PRHTA application is for the RAISE funds available for planning. Funds will be used to develop the environmental evaluation and preparation of design (PS&E) for the project. The PRHTA estimates that the project planning phase will cost \$12,372,393.

The PRHTA is currently preparing the Feasibility Study for the project and funds for this phase have been allocated. The Feasibility Study is being financed by the Federal Highway Administration (FHWA). Feasibility Study has been coordinated with government agencies and public. The PRHTA is committed to continue project coordination with government agencies and public.

The PRHTA has prepared an analysis of the eligibility criteria for the funds, and we understand that the evacuation route project fulfills the requirements/criteria of the FY 2022 RAISE grant program. Copy of Proposal and Appendices are available for review also at the DTPW web page: [Evacuation Route Municipality of Loíza](#).

1 PROJECT DESCRIPTION

The Puerto Rico Department of Transportation and Public Works (PRDTPW) through the Puerto Rico Highway and Transportation Authority (PRHTA) propose the development of a new road infrastructure that would be used as an evacuation route during emergency events for residents and visitors of the town area of the Municipality of Loíza, Puerto Rico. The new infrastructure would also address traffic problems that may exist in the town area of Loíza. The current main access to Loíza is along State Roads PR-188 and PR-187. There is an additional route, the State Road PR-951, which runs adjacent to and parallel to the Grande de Loíza River. However, this road is affected when the river overflows. The State Road PR-951 is closed to traffic since 2017 due to the several landslides and bridge damages occurred during Hurricane María. Therefore, the currently evacuation route that Municipality of Loíza town have, is through the State Roads PR-187 and PR-188, but these routes are not adequate. The Government of Puerto Rico needs to look for an alternative of evacuation route taking in consideration that the 67% of the Loíza Municipality population lives in risk zones.

1.1 Location of Municipality of Loíza

Puerto Rico is a Caribbean group of islands measuring approximately 3,500 square miles, has a population of nearly 3.3 million people, and is located about 1,000 miles southeast of Miami, Florida. The Municipality of Loíza is located on the north coast of Puerto Rico main island approximately 11 miles east of San Juan the island capital. Figure 1 shows the location of Loíza. The geographic coordinates of the Central Business District (CBD) are Latitude 18°25'57.72"N and Longitude 65°52'47.53"W.

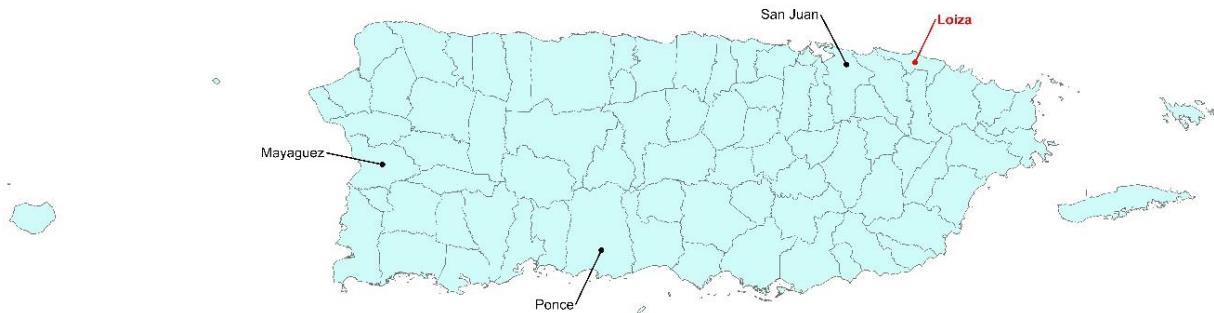


Figure 1. Location of Loíza in Puerto Rico Main Island.

1.2 General Description of Loíza

Loíza limits to the north with the Atlantic Ocean, to the south with the municipality of Canóvanas, to the east with municipality Río Grande and to the west with the municipality of Carolina. The municipality has six (6) wards: Torrecillas Baja, Torrecillas Alta, Canóvanas, Medianía Baja, Medianía Alta and Pueblo. The municipality has an area of approximately 19.4 square miles and the terrain is mostly flat and does not exceed 100 meters (328 feet) above sea level. Private vehicles are the principal mode of transportation in the municipality. The current main access to Loíza is along State Roads PR-188 and PR-187. Figure 2 shows the limits of Loíza and principal roads within the municipality.

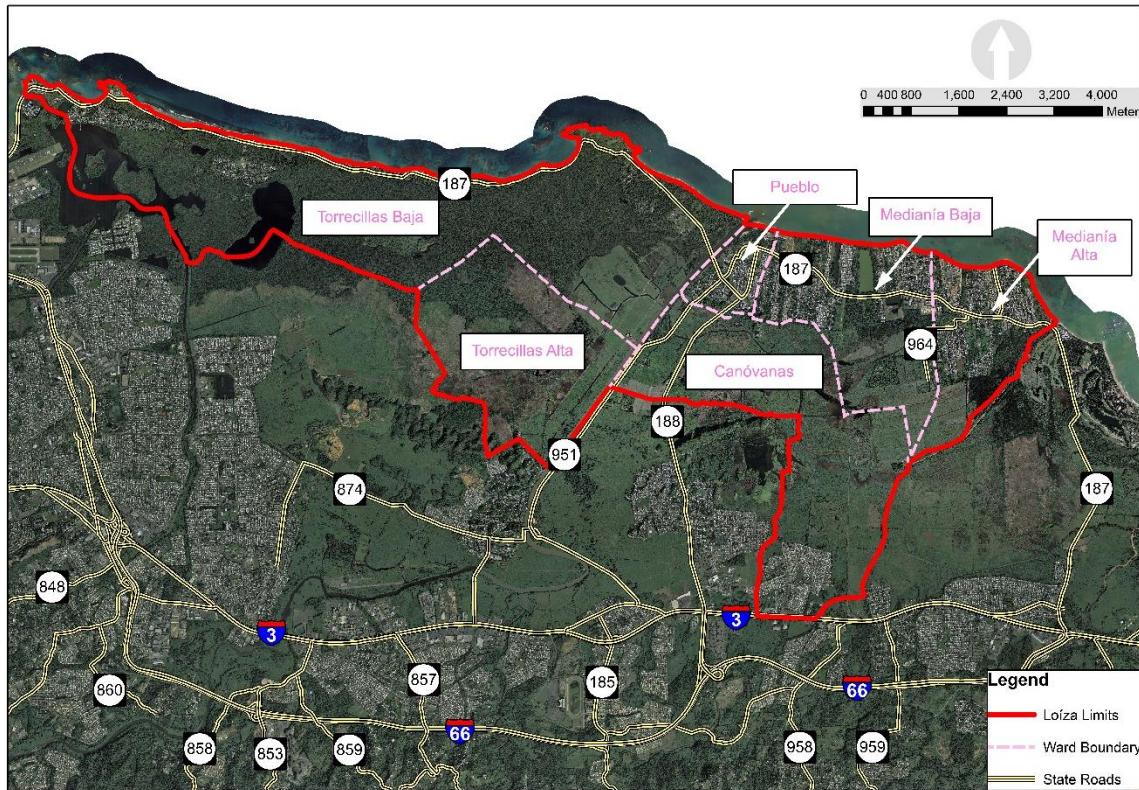


Figure 2. Loíza Limits and principal roads in an Aerial Photo.

The archeological studies performed in the area indicate that the region was inhabited at least approximately 2000 years ago. Small settlements of indigenous existed within a coastal and wetland economy. The Spanish colonizers established a site at this location and used the indigenous people for gold mining. With the rapid depletion of this metal, the economy turned to agriculture, livestock, and fishing. Currently tourism and retail are important components of today's economy.

According to 2010 and 2020 census the municipality has a population of 30,060 and 23,693, respectively. According to the Census criteria the municipality is not an urban area. There are non-permanent tourist populations that enjoy the pleasant natural and cultural environment of Loíza. Most of the population is Latino (99.7 %) dominated by the black (38.7 %) and white (24.3 %) races. Persons per household are estimated in 3.02 and the median household income is estimated in \$17,852. People in poverty are estimated as 48.2 %.

1.3 Description of the Proposed Action Area

Proposed action consists in providing a feasible evacuation route for Loíza town area. Town area encompasses Pueblo, Medianía Alta and Medianía Baja wards. These wards have a population of 15,875, representing the 67% of the municipality population. The Figure 3 shows the limits of the proposed action area.

Immediately north of town area is the Atlantic Ocean; an extensive wetland delimiting south boundary. At the west the town area is adjacent to Grande de Loíza River; meanwhile the west boundary is delimited by Herrera River. There are residences, institutions (hospital, school, etc...),

commerce and government agencies in the urban area. Main access to Loíza town is along secondary State Roads PR-188 and PR-187. PR-188 is a secondary road starting at PR-3 and ending in PR-187 (south of Loíza town area). PR-187 is a secondary road starting at PR-26 and ending at PR-3. PR-187 runs east/west bound along the urban area. Both roads are mostly a 2-lane (one in each direction).

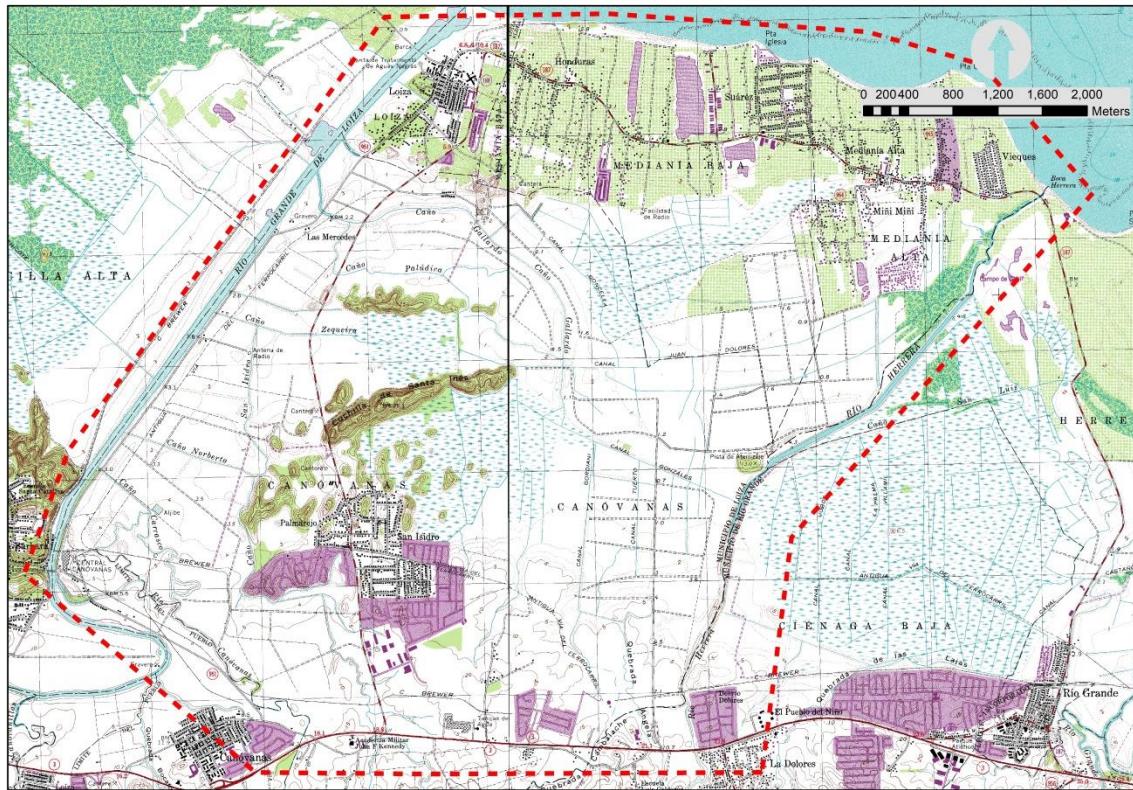


Figure 3. Location of the Proposed Action Area in the USGS Quadrangle.

1.4 Vulnerability to Natural Disasters or Emergency Incidents

The town of Loíza is in an area with privileged natural environmental characteristics. These characteristics make it vulnerable to natural disasters or incidents that would require the evacuation of the town during emergencies. Natural disasters or incidents that require a fast, safe, and orderly evacuation are:

1.4.1 Tsunami

Government agencies have prepared a map of the evacuation zone during a tsunami (refer to Figure 4). Because the entire town of Loíza is in low elevation terrain the population should be evacuated in the event of a tsunami.

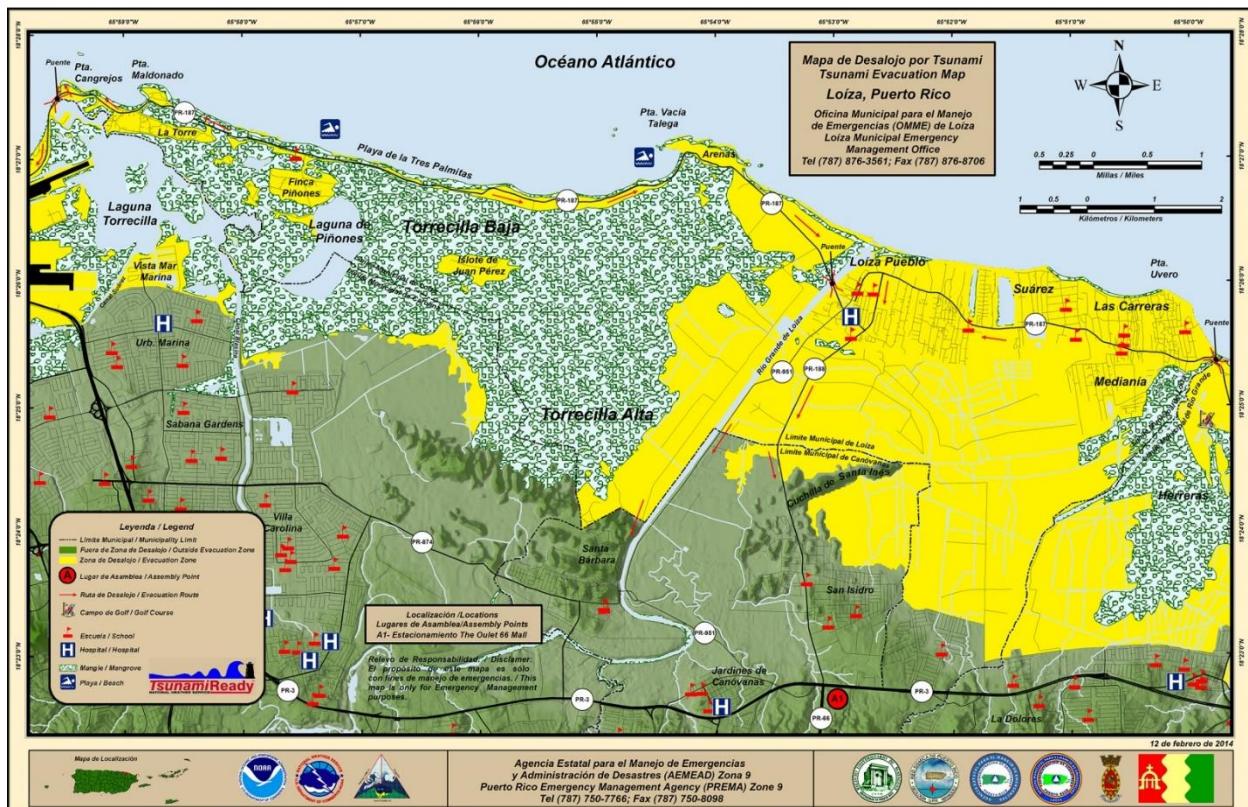


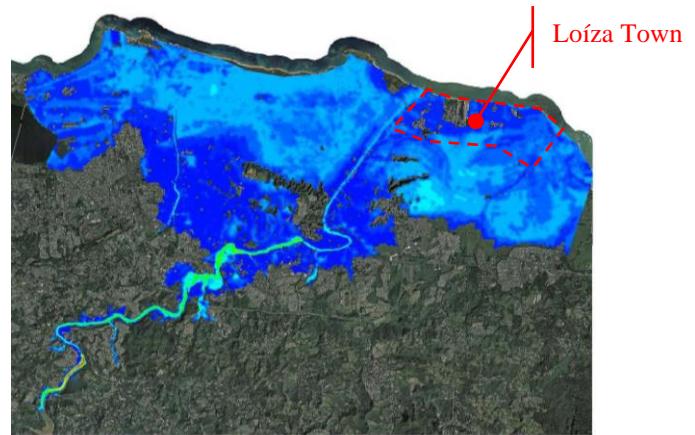
Figure 4. Map of the evacuation zone during a Tsunami.

1.4.2 Breach of the Carraizo Dam

A breach of the Carraizo dam located 26.5 km upstream at Rio Grande de Loíza (20 km to the southwest) should require an evacuation of Loíza town. The Figure 5 shows areas that could be flooded during a breach of Carraizo Dam.



During a Sunny Day



During a 100-year flood event

Figure 5. Flooded Areas during a Carraizo Dam Breach (Sunny Day and Flood Event with a 1% probability of occurs during a given year).

1.4.3 Floods

Proposed action is located within Grande de Loíza and Herrera Rivers regulatory floodplain (FIRM Maps 72000C0395J and 72000C0415J). The Federal Emergency Management Agency (FEMA) has prepared detailed studies of both rivers. At proposed action site FEMA has defined the flood Zone AE (areas with a 1% annual chance of flooding where base flood elevations are provided) and delineated the Floodway area in Zone AE. Advisory Base Flood Elevation (ABFE) Maps developed by FEMA after Hurricane María modified flood parameters within the proposed action area (refer to Figure 6). Proposed action area is a hydraulic connection (floodway) between both rivers during rainfall events.

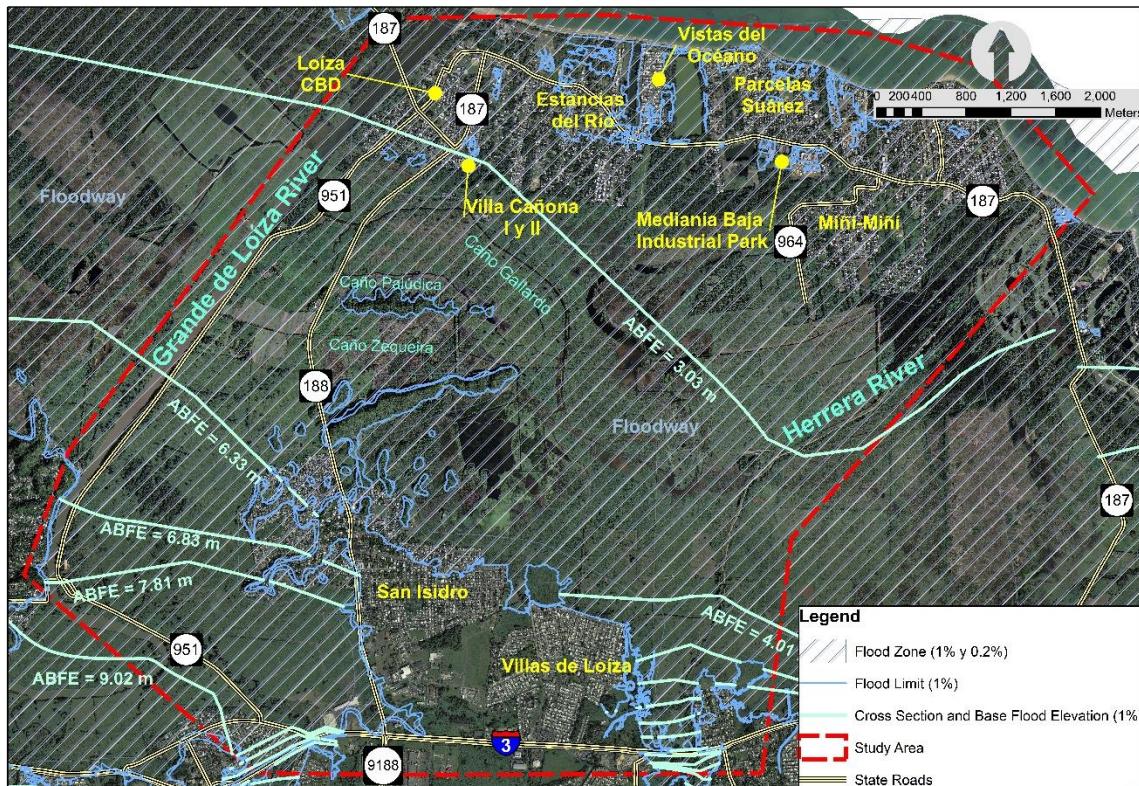


Figure 6. FEMA Advisory Base Flood Elevation Maps.

1.5 Current Emergency Plans

There is a government evacuation plan for Loíza town in the event of a disaster. Currently the evacuation routes are through States Roads PR-188 and PR-187 (refer to Figure 4 and Figure 7). The PR-188 is mostly a two-lane secondary road that runs from PR-3 and ends at PR-187 south of the town area of the municipality of Loíza. The PR-187 is a secondary two-lane highway that begins at PR-26 and ends at PR-3. The path of the highway is from east to west and runs through the town area of the municipality. The assembly places, for those who evacuate via PR-188, is the parking lot of The Outlet 66 Mall. For those who evacuate via PR-187, it is the Ovidio de Jesús baseball field, in the municipality of Río Grande.



PR -187 (photo taken looking east) PR-188 (photo taken looking north)

Figure 7. Photos of the PR-187 and PR-188

1.6 Experience during Emergency Situations

The town of Loíza has suffered several emergency situations as described below.

1.6.1 Flood Events

The town of Loíza has experienced floods caused by heavy rainfalls within the Grande de Loíza River (including Canóvanas and Canovanillas Rivers) and Herrera River watersheds. Recent events include flooding during Hurricanes Hugo (1989), Georges (1998) and María (2017). During these events, the population of the town was isolated by the floods, and the provision of services could not be performed effectively. Photos of the recent flood during Hurricane María are shown in Figure 8. Additional photos taken after Hurricane María are shown in **Appendix 1** Photos taken Post Hurricane María (September 2017).

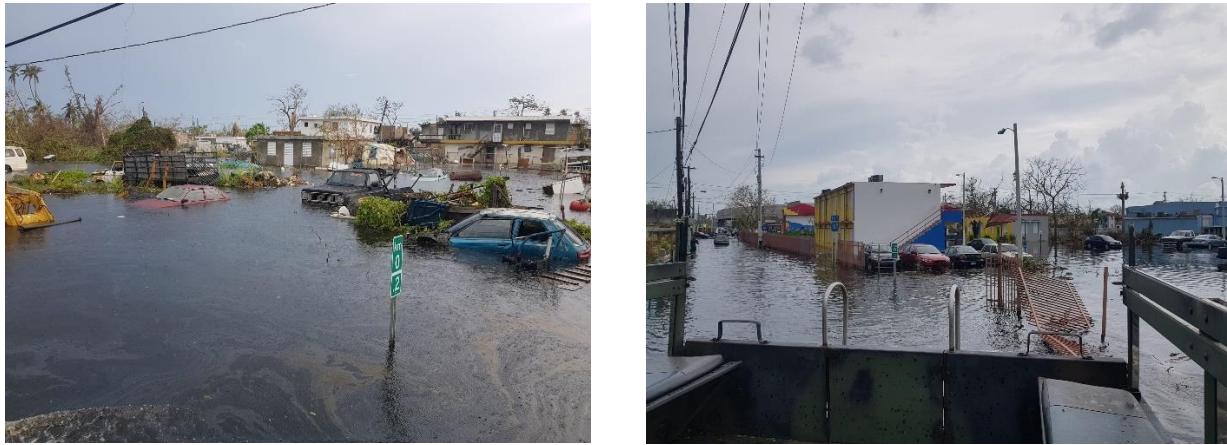


Figure 8. Photos of Loíza during Hurricane María (Source: Municipal Government).

1.6.2 Earthquakes and Potential Tsunamis

On January 7, 2020, an earthquake occurred in southwestern Puerto Rico with a 6.4 Mw mainshock. Residents of the town of Loíza left the area concerned about the possibility of a

tsunami. The evacuation process was slow and disorganized. The PRHTA prepared a diagram showing the evacuation process that a resident of Parcels Suárez (a neighborhood in the Loíza town) experienced. The diagram is shown in Figure 9. It took the resident 80 minutes to travel from the Suárez Parcels to the assembly site at The Outlet 66 Mall. It took 66 minutes to leave the area identified as susceptible to tsunami. **Appendix 2** Video of January 7, 2020, Earthquake Evacuation Process includes a video taken by a resident during the evacuation process.

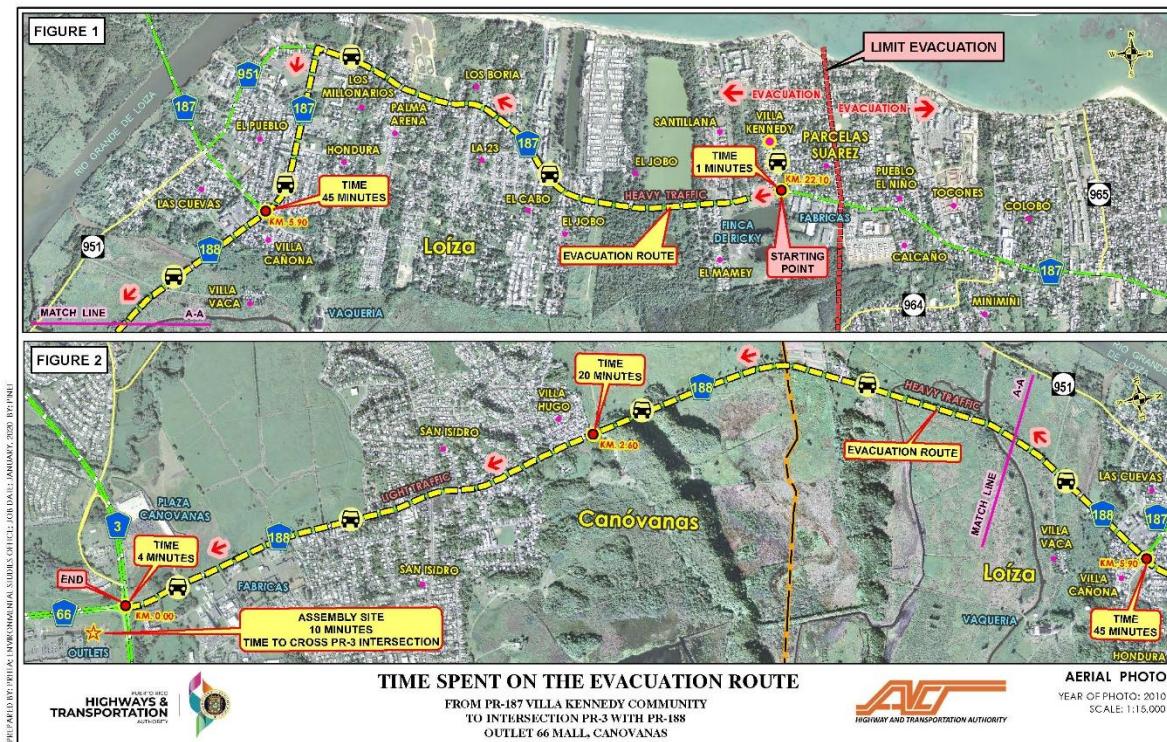


Figure 9. Diagram of evacuation process experience during January 7, 2020 earthquake.

1.7 PRHTA Evacuation Route Initiative

Since 2013 government entities are seeking alternatives to provide an evacuation route for the residents of the Loíza town. The evacuation route is a claim by the Loíza community due to its vulnerability to natural disasters. **Appendix 3** Documents that illustrate the Community claim for the Evacuation Route includes example documents that illustrate the community claim.

In 2017 the PRHTA initiated the process to evaluate alternatives to provide a feasible evacuation route for Loíza town area. The PRHTA prepared a schedule aligned with the typical process implemented for road infrastructure development (refer to Figure 10). As a first step the PRHTA is currently preparing the Feasibility Study. Each of the phases is described below.



Figure 10. Proposed Action Schedule.

Feasibility Study – The purpose is to determine which are the viable alternatives. This includes engineering, traffic, natural environment, and socioeconomic analyses. The study will determine which alternatives would be evaluated in the environmental assessment. During this phase information has been obtained from government agencies and institutions, and public. The government agencies and institutions include Loíza municipal government (provided current evacuation plan), PR Senate, University of Puerto Rico Mayaguez Campus (provided Tsunami model). Scoping meetings have been performed with the public to discuss the project and obtain suggestions and recommendations. These coordination's continues and this phase is expected to be completed in the second semester of 2022.

Environmental Evaluation – The purpose is to evaluate the environmental impact of the viable alternatives and determine the Preferred Alternative to provide an evacuation route and improve traffic in the town area of Loíza. This phase is expected to be completed in the second semester of 2024.

Design, Plans and Specifications – Preparation of construction documents for the Preferred Alternative. Includes plans, specifications, construction cost estimates, procurement process, and permitting. This phase is expected to be completed in the second semester of 2026.

Construction – Includes the ROW acquisition process, bidding process, contractor selection and construction of the Preferred Alternative. Construction is expected to commence in second semester of 2027.

Operation – Intergovernmental action that would use the infrastructure built to review the evacuation plans for the town area of Loíza.

As indicated, currently the PRHTA in coordination with the Federal Highway Administration (FHWA) is preparing the Feasibility Study. The preliminary feasibility study was performed using information on the resources and characteristics of the study area available from government agencies, information obtained from the public, studies performed, and information obtained during field visits. Four alternatives, including the No Action alternative, are being evaluated. From these, three alternatives have been preliminary determined to be feasible as an evacuation route. These are the No Action alternative and the construction of a new transportation infrastructure in three different alignments. The Figure 11, Figure 12 and Figure 13 show the alignment of these alternatives. Summary of these alternatives are included below.

Alternative #1 (No Action) - The no action alternative consists in maintaining the existing transportation infrastructure without significant changes. Existing evacuation routes would be used; improvements in pavement marking and signalization would be performed in existing evacuation routes (PR-188 and PR-187) to guide drivers.

Alternative #2 (Improvements to the Existing Road System and Construction of South Connector) – This alternative includes: (1) Build the South Connector (new road) from PR-187 km. 21 to PR-188 km. 5.3; and (2) Perform improvements to State Road PR-188 along its existing alignment, from the intersection of PR-187 with PR-188 (km 5.85) to the intersection of PR-3 with PR-188. Estimate construction cost of this alternative is \$93 million. This alternative can be constructed in three phases.

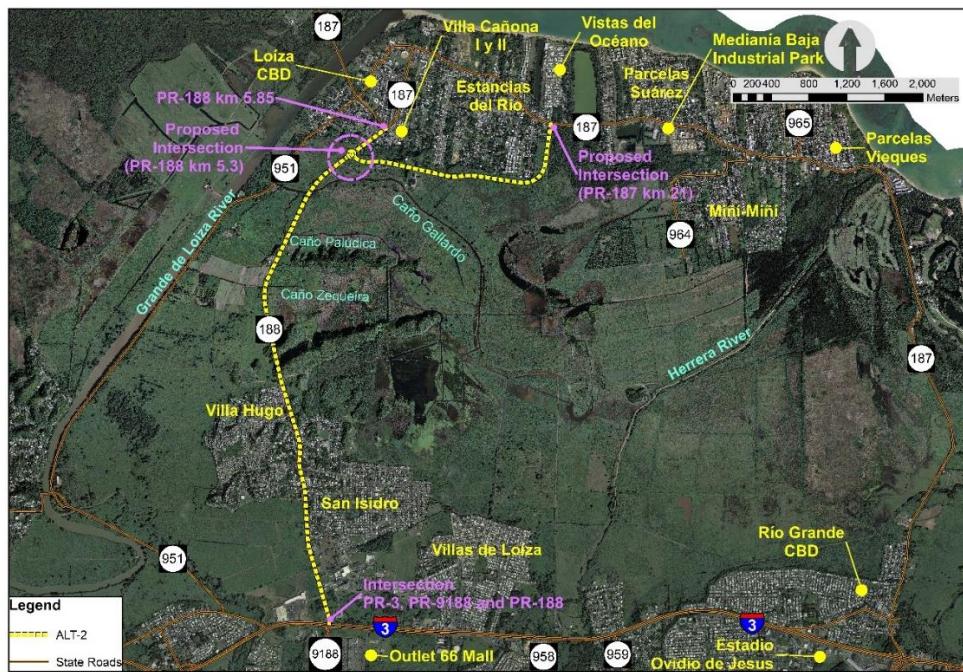


Figure 11. Evacuation Route Alternative #2 Alignment.

Alternative #3 (Improvements to the Existing Road System and Construction of South and Villas de Loíza Connectors) – This alternative includes: (1) Build the South Connector (new road) from PR-187 km. 21 to PR-188 km. 5.3; (2) Perform improvements to State Road PR-188 between kilometers 2.6 and 5.85.; and (3) The construction of Villas de Loíza Connector (new road) between PR-188 km. 2.6 and Calle #1 of the Villas de Loíza urbanization. Estimate construction cost of this alternative is \$145 million. This alternative can be constructed in three phases.

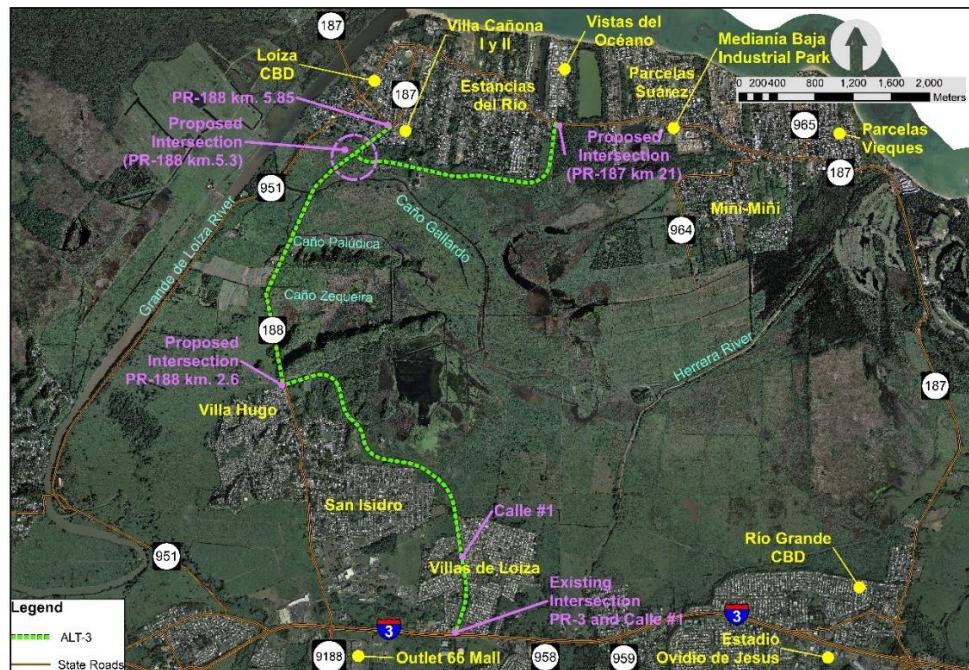


Figure 12. Evacuation Route Alternative #3 Alignment.

Alternative #4 (Construction of New Road-Bridge) – This alternative includes: (1) Build a new road (including a bridge of 2.87 km) from PR-187 km. 21 to Calle #1 of the Villas de Loíza urbanization. Estimate construction cost of this alternative is \$354 million. This alternative would be constructed in one phase.

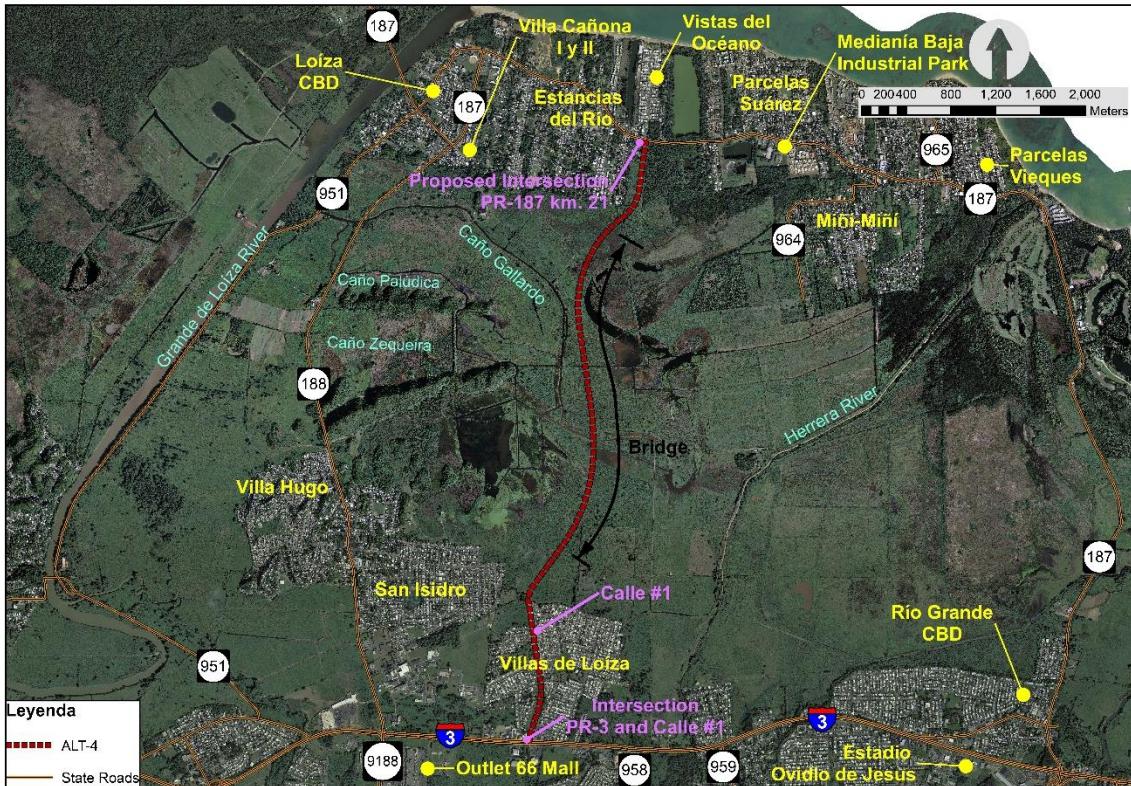
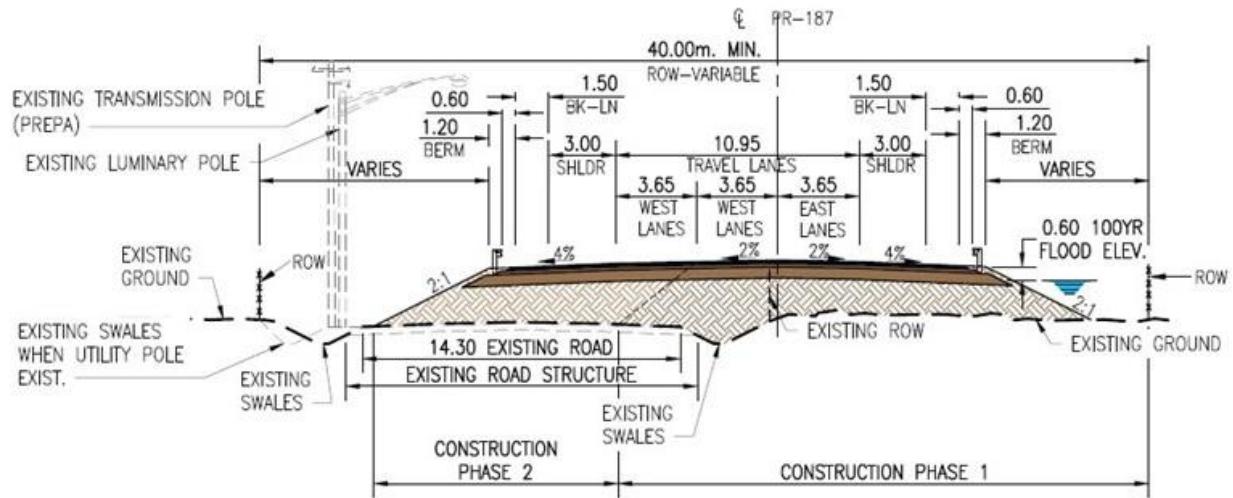


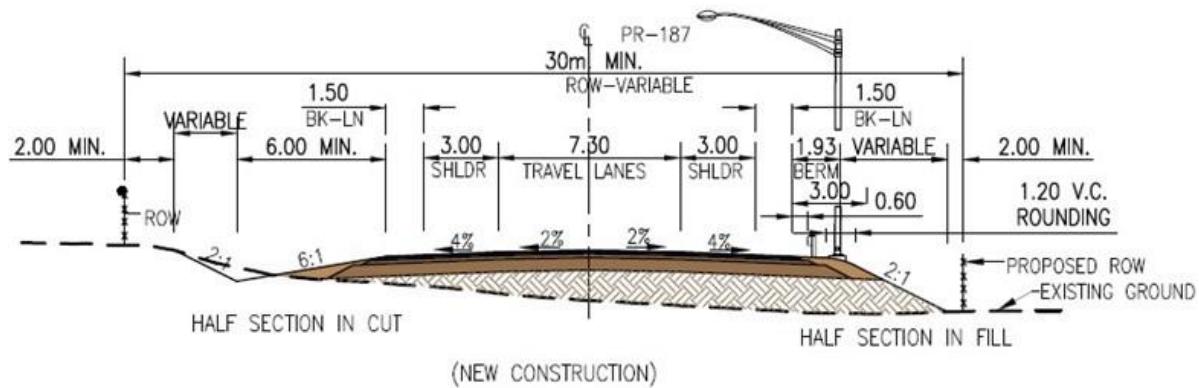
Figure 13. Evacuation Route Alternative #4 Alignment.

For all the alternatives the road profile would be above the flood levels. The typical road section of road PR-188, Villas de Loíza Connector and Alternative #4 would have three lanes (two north-south and one south-north). During an emergency event the southbound lanes would be used to evacuate the town, and the northbound lane would be used by government agencies to provide assistance to the population. The typical section of the South Connector would have two lanes (one in each direction). The road typical sections of the alternatives are shown in Figure 14.

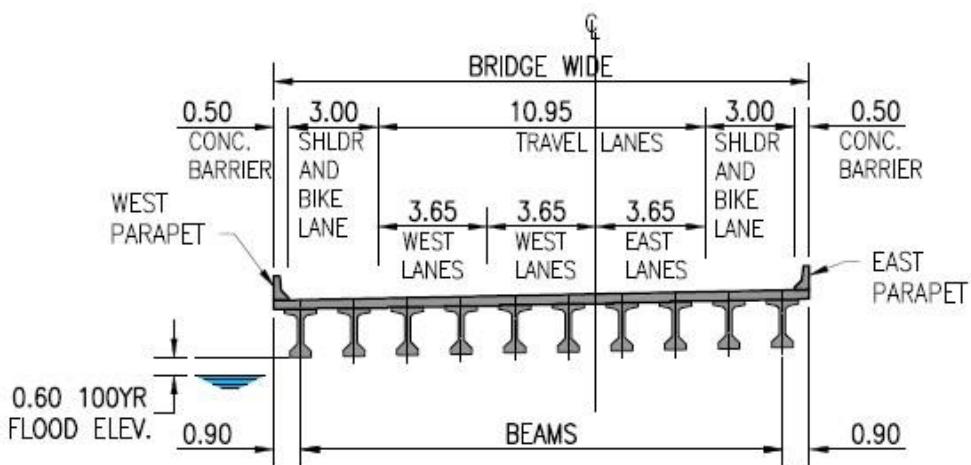
The PRHTA procured to include participation of the public in the Feasibility Study preparation. The PRHTA has performed several meetings with municipal government representatives, including the mayor, in where a presentation of the proposed action and alternatives were discussed. On September 14, 2021, an informative meeting was performed in the municipality where the public and government representatives (municipal and PR Senate) participated. Comments and suggestion made by the public includes the incorporation of bicycle lane to the alternatives evaluated. This component has been incorporated in the road typical section.



State Road PR-188 and Villas de Loíza South Connector



Loíza South Connector



Improvements to PR-188 Bridges and Alternative #4 Bridge

Figure 14. Alternatives #2 and #3 Road Typical Sections.

2 PROJECT LOCATION

Chapter 1 includes the project location and description. Puerto Rico is defined as an Area of Persistent Poverty (APP) and a Historically Disadvantaged Community (HDC). The municipality of Loíza is designated as an Opportunity Zone. For your reference the Census 2020 tracts of the Loíza town are 72087110101, 72087110102, 72087110200, 72087110301, 72087110302, 72087110400 and 72087110500.

3 GRANT FUNDS, SOURCES AND USES OF PROJECT FUNDS

The PRHTA is currently preparing the Feasibility Study and funds for this phase of the project have been allocated. The Feasibility Study is being financed by the FHWA. The PRHTA application is for the RAISE of funds available for planning (environmental evaluation and preparation of design). The PRHTA estimates that the project planning phase will cost \$12,372,393. The PRHTA estimates that the environmental process and design phase (PS&E) would cost \$1,315,000 and \$11,057,393, respectively. A cost estimate of these phases is included in **Appendix 4**Opinion of Probable Environmental Evaluation and Design Cost.

4 MERIT CRITERIA

The PRHTA performed an analysis to determine the eligibility of the proposed action to obtain funds under the RAISE Grant Program. The Selection Criteria Table included in the Department of Transportation Notice is used to determine the eligibility as explained below.

4.1 Safety

The town of Loíza is in an area vulnerable to natural disasters or incidents that would require the evacuation of the town during emergencies. The town of Loíza has suffered several emergency situations due to floods caused by heavy rainfalls within the Grande de Loíza River (including Canóvanas and Canovanillas Rivers) and Herrera River watersheds. During these events, the population of the town was isolated by the floods, and the provision of services could not be performed effectively. Recent evacuation process implemented during January 7, 2020, was slow (66-80 minutes to leave the area identified as susceptible to tsunami) and disorganized due to the lack of mobility in the area. The proposed project consists in the design of a feasible evacuation route for Loíza town area to saves lives, taking in consideration the natural and socioeconomic environment. The evacuation route will be developed in coordination with the government agencies and public following the existing guidelines for this type of infrastructure.

Another safety issue is that a review of available information about car accidents related to non-motorized travelers within the area recorded by the PRHTA disclosed the fact that between years 2019 and 2021, accidents with injuries were reported on highway PR-187 and PR-188. In addition, during the public participation process, the community indicated the importance of including a bicycle lane in the road improvements. There are Loíza residents that use the bicycles as a transportation mode.

The Loíza area offers unique natural visual resources which promote the use of roads by cyclist. Bicyclists in the area currently share lanes with drivers, which increases the potential for accidents to non-motorized travelers. Cycle tracks have been shown to be highly effective in reducing bicyclist crash and injury rates. The addition of safe biking options outside of the traveled roadway will reduce conflicts between motorists and cyclists. The proposed project includes a separate

bicycle lane (bike-only lane; refer to Figure 14) as part of the design which would protect non-motorized travelers from health and safety risks. Separating users (drivers and cyclist) would enhance safety for all road users. The design of the evacuation route would comply with the latest standards and guidelines of government agencies, including but not limited to, FHWA and PRHTA.

4.2 Environmental Sustainability

The project would not significantly increase the traffic in the Loíza area. Therefore, a significant increase in air pollution and greenhouse gases emission is not expected.

The alternatives selected as feasible maximize the improvement to the existing road infrastructure and minimize the impact on the natural environment of the Loíza. The PRHTA has developed feasible alternatives minimizing the impact to the wetland located south of the town of Loíza. In this manner, the PRHTA uses available resources responsibly, respects land use, minimize acquisition and preserves available resources for future generations. A reduction on the ambient concentration of air pollutants will result from less congestion along the corridor since the construction of a bicycle lane promotes the use of bicycle on the roads, which is one of the transportation modes used by the residents of Loíza.

Viable alternatives consider the change that could occur in ocean levels due to climate warming which would increment the risk of flooding caused by tsunami. Also due to climate change, more frequent and intense rain events are forecasted incrementing the risk of flooding. To address these increases in flooding, it is proposed to add to the grade of the roads around 1.0 additional meters to the estimated flood levels.

The road infrastructure to access the town of Loíza is subject to flooding caused by rainfall events in the Grande Loíza and Herrera rivers watersheds, and by tsunami. The proposed improvements to State Road PR-188 would prevent it from being flooded. Therefore, the proposed project would improve the road resilience.

A previous PRHTA initiative proposed that a segment of the Loíza South Connector run through the Villa Cañona I and II communities. These communities are among the most disadvantaged in Loíza. To address the disproportionate negative social impacts the PRHTA realigned the Loíza South Connector toward the south of the communities. The proposed project avoids the disproportionate negative impact to communities, including the disadvantage communities.

4.3 Quality of Life

Poverty in Puerto Rico occurs at significantly higher rates than in the U.S. In 2012, the poverty rate of individuals in Puerto Rico (45.1%) was more than three times the Nationwide rate (14.9%) and almost double that of Mississippi (22.3%), which was the State with the highest family poverty rate. Loíza is a disadvantaged community with a rich cultural history. According to the Census criteria the municipality is not an urban area composed mostly of Latino (99.7 %) dominated by the black (38.7 %) and white (24.3 %) races. Poverty percent is estimated in 48.2 %.

The town of Loíza is in an area with privileged natural environmental characteristics. These characteristics make it vulnerable to natural disasters or incidents that would require the evacuation of the town during emergencies. According to 2010 and 2020 census the municipality has a population of 30,060 and 23,693, respectively

The construction of an evacuation route would improve access to the town of Loíza, resulting in a fast, safe, and orderly evacuation in case to natural disasters or incidents during emergencies resulting in a better quality of life for Loíza residents, increasing equity and accessibility to a better mobility in case of emergency. Also, the improvements would enhance the enjoyment of the natural and social characteristics of Loíza.

4.4 Mobility and Community Connectivity

The evacuation route will provide the road infrastructure to guarantee the mobility of people and aid personnel during emergency events. Safely accessibility for non-motorized (cyclist) travelers is included in the project. Bicycles are a means of transportation used by the residents of Loíza.

4.5 Economic Competitiveness and Opportunity

Loíza is defined as an Area of Persistent Poverty (APP) and a Historically Disadvantaged Community (HDC). The municipality of Loíza is designated as an Opportunity Zone. This project will make a long-term significant contribution to the growth in employment, production, and economic activity to this highly economically distressed area. The construction of this project would result in the generation of approximately 1450 direct jobs, 1015 indirect jobs and 145 induced jobs, for a total of 2610 jobs.

The improvements to access would promote the enjoyment of the natural and cultural resources of the municipality, promoting the economic development of the municipality.

4.6 State of Good Repair

The PR 2045 Long Range Transportation Plan (2045 LRTP) is focused on enhancing the quality of life through management of assets, environmental and social justice, improved accessibility, and better economic development. The plan established the resiliency during transportation planning as one of the strategies. Due to the Puerto Rico geographical location, it is highly exposed to extreme weather events passing near or over the Island every year. This exposure to heavy rains, high speed winds and storm surge, causes landslides and flooding which affects the transportation infrastructure. Damages to the transportation resulted in the isolation of communities that in many cases limited their ability to obtain supplies and services in the recovery phase after the event in an efficient and timely manner.

The several alternatives for the evacuation routes propose the restoration and modernization of a segment of State Road PR-188 and improvements for the PR-187. Those roads are vulnerable to flooding caused by rainfall and tsunami events. The purpose of the PRHTA is to provide a resilient evacuation infrastructure considering possible emergency situations. In this manner this infrastructure capital asset would be able to operate at a full level of performance.

The need to improve PR-187 and PR-188 as a measure to provide resiliency to the Loíza transportation system has been long recognized by State and local governments through their short- and long-term improvement planning. As a matter of fact, Loíza Bypass, one component of the evacuation routes alternatives, is included in the Puerto Rico Long Range Transportation Plan and is consistent with the Construction Improvements Plan.

4.7 Partnership and Collaboration

The PRHTA has held several meetings with representatives of the PR legislature, municipal government, and the public. The PRHTA has obtained vital information from agencies and institutions with expertise in natural disasters.

As indicated previously, during the Feasibility Study preparation the PRHTA obtained information from government agencies, institutions, and public. The government agencies and institutions include Loíza municipal government (provided current evacuation plan), PR Senate, University of Puerto Rico Mayaguez Campus (provided Tsunami model). Copies of supporting letters from different entities are included in **Appendix 5** Project Supporting Letters. Scoping meetings has been performed with the public to discuss the project and obtain suggestions and recommendations. These coordinations continues and will continue during the development of the project. The evacuation route will be used by emergency government agencies to review the current evacuation plans for the town area of Loíza.

Currently the PRHTA is preparing an electronic presentation for the project. This presentation would be published in PRHTA and Loíza Municipal Government social media pages. As part of the presentation the public will have the opportunity to perform comments and suggestions to the project. Throughout the development of the project, the PRHTA has encouraged public participation.

As an agency policy, the PRHTA encourages the participation of Disadvantaged Business Enterprises (DBEs) in the planning, design, and construction of projects.

For the development of this evacuation route, besides the full participation of stakeholders, the integration of professionals from various fields is essential. This interdisciplinary approach will prove useful in establishing the scope of the project, while providing the necessary insight to address complex issues. The team of professionals that would participate in the development of this Project includes, but is not limited to, engineers, ecologists, archaeologists and economists. This team in coordination with the government agencies and the public would guarantee the development of an adequate evacuation route.

4.8 Innovation

The proposed project would include innovative methods and procedures during its development in accordance with the experience of the PRHTA in previous projects. The proposed project will implement innovative and resilient designs and construction methods, as well as innovative procurement methods to ensure low-cost construction and long-term maintenance given the fiscal and economic constraints in the Commonwealth.

During the environmental evaluation process of the project several interagency meetings would be performed as part of the project Coordination Plan to streamline the environmental assessment process. Several techniques would be implemented to promote the public participation, including but not limited, scoping meetings, announcements and presentations in PRHTA and Loíza municipality social media.

During the design of the project a team of professional with expertise in natural resources will participate to minimize the impacts to the natural resources of the project. PRHTA will use Accelerated Bridge Construction (ABC) for this project. Per FHWA guidance, ABC is bridge

construction that uses innovative planning, design, materials, and construction methods in a safe and cost-effective manner to reduce the on-site construction time that occurs when building new bridges or replacing and rehabilitating existing bridges.

It is important to mention that most of the feasible alternatives can be built in three functional phases which will allow the construction of the project by distributing the initial capital investment.

5 PROJECT READINESS AND ENVIRONMENTAL RISK

As indicated previously the PRHTA is preparing the Feasibility Study of the project (refer to Section 1.7). Alternatives were developed minimizing the adverse impacts in the natural, cultural, and social environment. A group of professionals including engineers, archeologist, ecologist, and economists are preparing the studies used in the Feasibility Study. In this manner the PRHTA adequately evaluates the alternatives and in advance identify the project tasks that should be attended promptly. Studies prepared as part of the Feasibility Study will be used in the subsequent project development phases. Information regarding the project readiness is discussed below.

5.1 Project Schedule

A general schedule of the project schedule is included in Section 1.7. A project schedule is included in Figure 15. Schedule indicates the project milestones and its relationship with the PR Statewide Transportation Improvement Program (STIP). The PRHTA is confident that the Environmental Evaluation and PS&E phases would be completed prior to December 31, 2026.

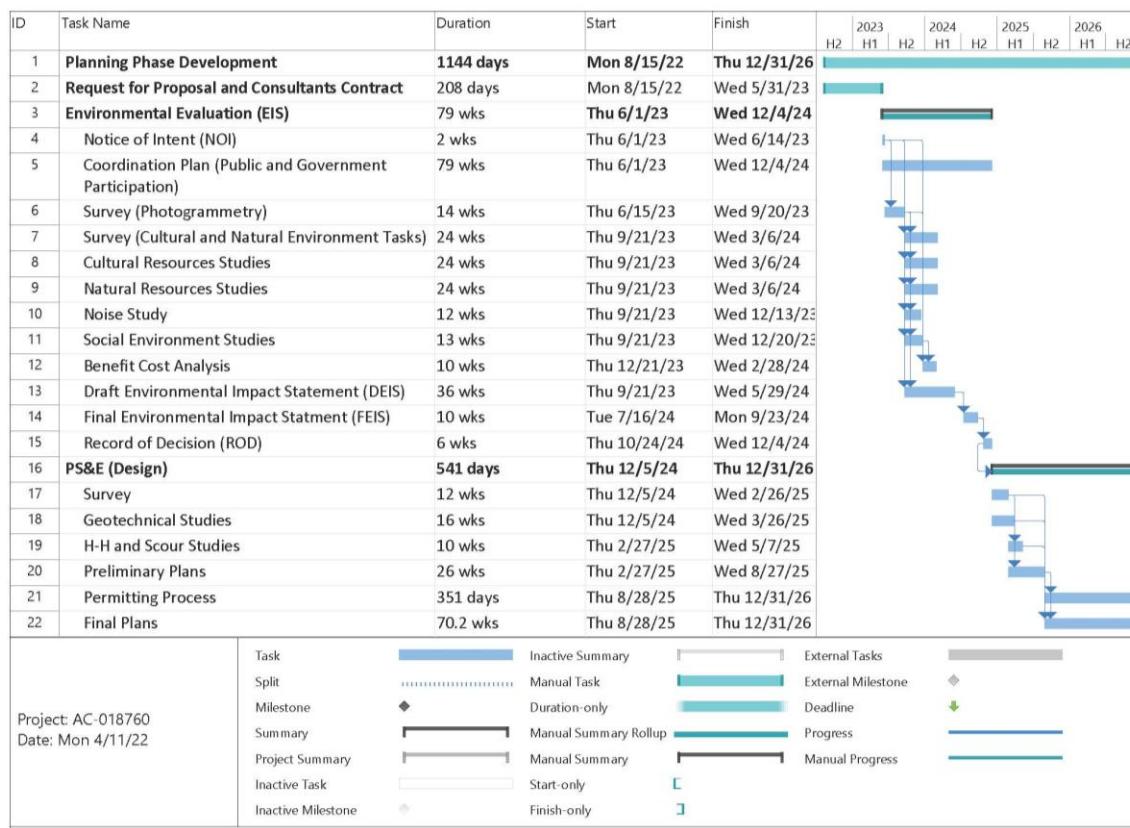


Figure 15. Environmental Evaluation and PS&E Phases Schedule.

5.2 Required Approval

The project will require environmental and permitting approvals. The PRHTA has identified them to timeline the efforts in the project schedule and to meet RAISE funds grant deadline.

5.2.1 Environmental Evaluation

The environmental evaluation will be performed in accordance with National Environmental Policy Act (NEPA) of 1969, as amended, and Puerto Rico Environmental Public Policy Law (PREPPL), as amended. Environmental Evaluation will be mainly governed by the following:

- 40 CFR 1500-1508- NEPA regulation of Council on Environmental Quality (CEQ)
- 23 CFR 771 - FHWA Environmental Impact and Related Procedures
- FHWA Environmental Guidebook
- EQB - Regulation of Evaluation and Processing of Environmental Documents
- PRDNER - New Law of Wild Life of Puerto Rico (Law 241 of August 15, 1999, as amended) and the Regulation to Rule the Conservation and Management of the Wild Life, the Exotic Species and the Hunting in the Commonwealth of Puerto Rico (Regulation 6765).
- Endangered Species Act (ESA)
- National Historic Preservation Act (NHPA)
- Farmland Protection Policy Act (FPPA)
- Clean Water Act (CWA)
- Executive Order 11988, Floodplain Management

The PRHTA understand that an Environmental Impact Statement (EIS), in accordance to 23 Code of Federal Regulations (CFR), Section 771.115 (a) would be prepared for the project to adequately evaluate the proposed action.

5.2.2 Permitting Process

Federal and local permits, endorsements, determinations, authorizations, certifications, recommendations, and consultations shall be obtained to construct the proposed action. These include, but are not limited to, those shown in Table 1; necessary permitting process would be performed / completed prior to construction. The local permitting process would be executed in accordance with the Puerto Rico Permits Process Reform Act (Act No. 161) of December 1, 2009, Puerto Rico Joint Regulation for Construction and Land Use, as amended, and agreements between government agencies and PRHTA, as applicable. Federal permitting process would be executed according to applicable law or regulation.

Table 1. Permitting Process Required during Planning Phase.

Government Agency	Permit, Endorsement, Determination, Authorization, Certification, Recommendation or Consultation	Applicable Law or Regulation
FHWA/EPA	Determination of Compliance with National Environmental Policy Act	40 CFR Parts 1500-1508
USACE	Section 404(b)(1) Permit	Section 404 of the Clean Water Act
USFWS	Endangered Species Act Consultation	Section 7 Endangered Species Act
SHPO	Section 106 Consultation – Historic and Archaeological Resources Consultation	Section 106 of the National Historic Preservation Act
FEMA/ PB / DNER	Federal Emergency Management Act / Non-Rise Certification	Flood Disaster Protection Act /Executive Order No. 11988
OGPe / EQB	Determination of Compliance with Puerto Rico Environmental Public Policy Law	Law Number, 416 of September 22, 2004 Regulation No. 7948, November 30, 2010
OGPe / DNER	Authorization for Tree Cutting, Removal and Planting	Law Number 131, July 1, 1975
DNER	Habitat Categorization Certification (HCC)	Law Number 241, 1999 / Regulation No. 6765 and 6766
OGPe / ICP	Recommendations	Law Number 112, July 20, 1988
OGPe / PRASA	Recommendations	Law Number 40, May 1, 1945 Section 10 (22 LPRA & 150)
OGPe / PREPA	Recommendations	Law Number 83, May 2, 1941 Section 14 (22 LPRA & 204)
OGPe / PRSWA	Recommendations / Reduction, Reuse and Recycling Plan	Law Number 70, September, 1992
Loíza Municipality	Project Endorsement	Law Number 81, August 30, 1991

5.2.3 Assessment of Project Risks and Mitigation Strategies

The preparation of a Feasibility Study allows the PRHTA to minimize the uncertain effects related with the natural, cultural, and social environment. By this means the PRHTA can define environmental evaluation and PS&E efforts required to construct the project avoiding delays in the project schedule. An assessment of project risks and mitigation strategies has been performed to minimize the risks to the phases of the project included in the RAISE funding request as discussed below. The tasks that could induce risks and the mitigation strategies to minimize the risks are discussed below.

5.2.3.1 Environmental Evaluation Phase

As discussed previously, feasible alternatives were developed minimizing impacts to communities and natural environments. Environmental information obtained during the Feasibility Study indicates that there are major tasks which could affect the scope, cost, and schedule of the environmental evaluation. The environmental tasks are public participation, potential impacts to Waters of the US (WOTUS), potential impacts to regulatory flood zones, and potential impacts to cultural resources. Table 2 discuss and provide mitigation strategies for each of these tasks.

Table 2. Environmental Evaluation Phase Risks and Mitigations.

Task	Risk	Mitigation
Public Participation	Loíza is a disadvantaged community. This characteristic could affect their participation in the environmental review process of the project.	<p>The PRHTA has established a Public Involvement Plan¹ for the environmental process in coordination with the FHWA. This plan would be implemented to maximize public participation. Copy of the plan is available in Appendix 6</p> <p>PRHTA Public Involvement Plan for the Environmental Process.</p> <p>During the EIS preparation the PRHTA will perform informative meetings and public hearings to inform and/or receive comments from the public.</p> <p>The PRHTA will continue to promote the public participation using different techniques such videos/presentation posted in the PRHTA social medias and coordination with municipal representatives.</p>

¹ Public Involvement Plan for the Environmental Process. Puerto Rico Highway and Transportation Authority. May 2, 2019.

Table 2. Environmental Evaluation Phase Risks and Mitigations.

Task	Risk	Mitigation
WOTUS	One of the major natural resources of Loíza is the wetlands. Wetlands would be impacted by the proposed project.	<p>Proposed alternatives have been developed maximizing the uses of existing road infrastructure (State Road PR-188), by this manner impacts to WOTUS are minimized.</p> <p>Early in the environmental evaluation process the PRHTA will coordinate with the USACE an authorization or permit for the project pursuant to the CWA. Permitting process will be led by personnel with vast experience in USACE permitting process.</p>
Regulatory Flood Zones	The project is located within regulatory flood zones.	<p>A preliminary Hydrologic-Hydraulic (H-H) Study is prepared as part of the Feasibility Study. This study is the initial step to ensure that regulatory flood parameters such as base flood would not increment as result of the construction of the proposed project.</p> <p>A more detailed H-H will be prepared during the preparation of the environmental evaluation. Capable personnel will perform the H-H Study.</p>
Cultural Resources	Loíza is an area where archaeological resources can be found.	<p>Proposed alternatives have been developed maximizing the uses of existing road infrastructure (State Road PR-188) by these means minimizing impacts to archeological resources.</p> <p>Cultural Resources studies will be performed as part of environmental evaluation process. The PRHTA will initiated consultation with the SHPO, pursuant to Section 106 of the National Historic Preservation Act, early in the process. Personnel with extensive expertise will perform the study and coordinate the consultation with the SHPO.</p>

As part of the environmental phase, interagency meeting will be coordinated to streamline the NEPA and permit process and minimize the risk. Also, through the implementation of the already Public Involvement Plan will minimize the public issues.

5.2.3.2 PS&E Phase

As part of the Feasibility Study several engineering studies are prepared. These studies include traffic analyses, geotechnical evaluations, and schematic designs. This allows the PRHTA identify the task that could affect the scope, cost, and schedule of the PS&E preparation. This project is a typical initiative implemented by the PRHTA. The PRHTA has a robust PS&E preparation process. The task that could impact the PS&E preparation process is field data collection. Table 3 discuss and provide mitigation strategies for this task.

Table 3. PS&E Evaluation Phase Risks and Mitigations.

Task	Risk	Mitigation
Field Data Collection	<p>The project requires obtaining surveying and geotechnical field data. The area is extensive, and some segments run through private properties.</p> <p>The access to the properties and the magnitude of the works could affect the schedule.</p>	<p>Early in the design stages, PRHTA will coordinate with private property owners for access to perform field studies.</p> <p>Different techniques will be used to obtain survey data such as photogrammetry, LiDAR, conventional and GPS. This will accelerate the collection of survey data.</p> <p>Geotechnical data collection should be performed by a company with the capacity to perform the field data collection in accordance with project schedule.</p>

6 BENEFIT COST ANALYSIS

A Benefit Cost Analysis (BCA) will be prepared as part of the environmental evaluation process. The RAISE funding request for the environmental assessment phase includes the funds required to prepare the BCA. It is important to mention that the RAISE notice of funding indicates that planning projects do not have to include a BCA in their application.