

**GOVERNMENT OF PUERTO RICO
PUBLIC SERVICE REGULATORY BOARD
PUERTO RICO ENERGY BUREAU**

NEPR

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IN RE: REVIEW OF THE PUERTO RICO
ELECTRIC POWER AUTHORITY'S 10-
YEAR INFRASTRUCTURE PLAN –
DECEMBER 2020

CASE NO.: NEPR-MI-2021-0002

SUBJECT: Motion to Submit Second Group
of Generation Projects Initial SOWs

**MOTION TO SUBMIT SECOND GROUP OF
GENERATION PROJECTS INITIAL SOWS**

COMES NOW the Puerto Rico Electric Power Authority (PREPA), through its counsel of record, and respectfully submits and requests as follows:

1. On March 26, 2021, the Puerto Rico Energy Bureau of the Public Service Regulatory Board (the "Energy Bureau" or "Bureau") entered a Resolution and Order (the "March 26 Order") by which it ordered PREPA, among other things, to:

submit to the Energy Bureau each new capital investment project. For projects to be funded with the [Federal Emergency Management Administration "FEMA"] fund and/or any other federal funds, PREPA shall submit the specific projects to the Energy Bureau at least thirty (30) calendar days prior to its submittal to the [Central Office for Recovery, Reconstruction and Resiliency "COR3"], FEMA and/or any other federal agency.

March 26 Order at pp. 18-19, ¶ 10.

2. PREPA has prepared a second group of initial scopes of work (SOW) for several generation projects. In compliance with the March 26 Order, PREPA herein presents the initial SOWs for said projects.

a. Irrigation District Projects. Exhibit A. This submission includes a set of three (3) irrigation district projects that address repairs required for the network of water storage and conveyance structures providing essential water for agriculture irrigation, power, and public water supply on the island. The overall objective is to restore the facilities to pre-

disaster function and to approved codes/standards. The district that will be affected are Isabela, Lajas and the South Coast. Together, these three (3) irrigation districts serve as the primary source of potable water for approximately 450,000 residents on the island. Irrigation district assets consist of reservoirs, regulating structures, open channel canals, penstocks, tunnels, abandoned hydro power plants, and water treatment facilities. The proposed work for each project includes site visits to inspect and assess the condition of existing irrigation district assets, and design repairs to restore full water supply functionality of the system. PREPA anticipates project work will consist of strategic repair or replacement of channel linings, structures, foundations, fences, gates, supports, and slopes as required to provide a safe, consistent, and reliable water source in each irrigation district. This project will be funded with the FEMA Section 428 Public Assistance (PA) program.

- b. Dams Minor Repairs.** Exhibit B. The Dams Minor Repairs project addresses minor repair work required across 16 dams managed by PREPA. The scope and complexity of required work across the 16 dams is similar in nature, which lends itself well to being executed as a single project. Damaged assets at these 16 dams vary but typically include buildings, electrical systems, sluice gates, railings, fencing, access roads, parking areas, spillways, and drainage piping. The scope of work for this project consists of site inspections at each dam, architectural and design engineering, and subsequent repair recommendations to be included in the detailed SOW and Cost Estimate. This project will be funded with the FEMA Section 428 PA program.

- c. **Simple Cycle Gas Turbine at Yabucoa.** Exhibit C. The Yabucoa plant is located in the southeastern coast of Puerto Rico and consists of two (2) 21 MW no. 2 fuel oil-fired gas turbine generators that began commercial operation in 1971. The Yabucoa plant has been used and is capable for black-starting in island mode of both critical loads and high in-rush demand critical industrial installations, also for continuous emergency operation (islanded and grid connected), peaking services and to support system reliability (for example during transmission system repairs or scheduled works in the area). The scope of work for this project includes procuring and installing two (2) new ~20 MW simple cycle gas turbines generation units, and associated supporting infrastructure, capable of firing natural gas from liquified natural gas (LNG) and diesel, to replace the existing 21 MW no. 2 fuel oil-fired gas turbine generators.

This project is being submitted to replace the New Black Start System at Aguirre project that was approved by the Energy Bureau on June 8, 2021. *See Resolution and Order, Attachment A, p. 9, ¶ 42.* PREPA respectfully asserts that, after further analysis, it has concluded that it would best serve system needs to install black-start units at the Yabucoa location instead of Aguirre. This project is therefore being submitted in place of, not in addition to, the New Black Start System at Aguirre project. As a separate initiative, PREPA will seek to use any of the existing gas turbines in the Aguirre Combined Cycle (ACC) to provide black-start services to the Aguirre Power Complex. This can be achieved by installing redundant ~2 MW emergency generators, ACC internal service bus bar and not grid connected, to provide the capacity needed to start any of the existing gas turbines.

With the approach as explained above, PREPA believes that black-start and continuous emergency operation services will be most maximized while complying with the Integrated

Resource Plan (IRP) goals, by reaching a much broader area coverage and diversity of clients who provide critical services to the population. As an example, in the aftermath of Hurricane María, the Yabucoa plant was responsible to provide continuous service on isolated, island mode for the region, as well as black-start services on several occasions to an important oxygen plant located in the Humacao industrial area, when oxygen for hospitals was urgently needed. Also, as a matter of fact, the Yabucoa plant was also responsible for black-starting the Aguirre Power Complex during the blackout caused by the earthquake on January 7, 2020. This project will be funded with the FEMA Section 404 Hazard Mitigation Grant Program.

- d. Toro Negro Hydroelectric System Connection.** Exhibit D. The Toro Negro Water Conveyance System supports an electric micro-grid and domestic water supply in Villalba, in south central Puerto Rico. The system provides water to two (2) hydroelectric plants that provide electricity to approximately 12,500 people in and around Villalba, including a local hospital, schools, and the police station. The pipelines also provide raw water supply for approximately 3,000 local residents. The objective of the Toro Negro Hydroelectric System Connection project is to perform permanent repairs required to ensure reliable water supply to local residents and restoration of full water supply service to the two impacted hydroelectric power plants. The scope of work for this project includes site visits, engineering assessments of existing conditions, and design of necessary pipe and structural support repairs for the dual water conveyance pipelines and powerhouse penstocks within the Toro Negro Water Conveyance System. This project will be funded with the FEMA Section 428 PA program.

3. The above-listed projects are aligned with the operative IRP and Modified Action Plan approved by the Energy Bureau on August 24, 2021. *See Final Resolution and Order on the Puerto Rico Electric Power Authority's Integrated Resource Plan* entered in case no. CEPR-AP-2018-0001, *In Re: Review of the Puerto Rico Electric Power Authority Integrated Resource Plan*.

WHEREFORE, PREPA respectfully requests the Energy Bureau to approve the above-listed projects.

RESPECTFULLY SUBMITTED.

In San Juan Puerto Rico, 7th day of September 2021.

Maralíz Vázquez-Marrero
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TSPR No. 16,187

s/ Katuska Bolaños-Lugo
Katuska Bolaños-Lugo
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CERTIFICATE OF SERVICE

It is hereby certified that I have filed the foregoing with the Clerk of the Energy Bureau using the electronic filing system using <https://radicacion.energia.pr.gov/login> and also, that I have served a copy on LUMA Energy, LLC and LUMA Energy ServCo, LLC through their counsel of record at laura.rozas@us.dlapiper.com and margarita.mercado@us.dlapiper.com.

In San Juan Puerto Rico on this 7th day of September 2021.

s/ Katuska Bolaños-Lugo
Katuska Bolaños-Lugo

EXHIBIT A



Government of Puerto Rico

Puerto Rico Electric Power Authority



DR-4339-PR Public Assistance

Initial SOW

PROJECT SCOPE OF WORK with COST ESTIMATES
Submittal to COR3 and FEMA



Isabela Irrigation District - Canals
(Water Assets - Conveyance and Canals)

Damage Inventory Numbers:	245516, 245519; 245520
PREPA 10-Year Plan Project Numbers:	06-04-245516-00007 06-04-245519-00009 06-04-245520-00008
FEMA Project Numbers:	To be determined

Revision Number: FINAL, Rev 2

Revision Date: June 28, 2021



Introduction

The purpose of this document is to present and update a Project Scope of Work (SOW) with Cost Estimates to be submitted to COR3 and FEMA for projects under DR-4339-PR Public Assistance. The completed document will be reviewed by COR3 and FEMA to create and version a specific project worksheet and post fixed-cost estimates to repair, restore, or replace eligible facilities including Section 406 hazard mitigation for a specific project.

Puerto Rico Electric Power Authority (PREPA) is the agency that provides the electric service to the entire island of Puerto Rico. As such, the facilities, sites, and systems identified in this Scope of Work are eligible as critical services facilities as defined in the PAAP (Section 428) and BBA 2018 guidance documents. Additional details may be found in Sections 3 and 4, respectively.

This document will be updated with information developed during the initial design and engineering phase through the construction phase.

The sections included in this document are:

- *Project Information*
- *Facilities*
- *Scope of Work*
- *Codes and Standards*
- *Cost Estimate*
- *406 Hazard Mitigation Proposal*
- *Environmental and Historic Preservation (EHP) Requirements*
- *Program Manager Certification*
- *PREPA Project Sponsor Comments*
- *Attachments*

Document Revision History

Version	Date	Summary of Changes



Section 1. Project Information

General Information

Recipient	Central Office for Recovery, Reconstruction and Resiliency (COR3)
Sub-Recipient	Puerto Rico Electric Power Authority (PREPA)
Project Title	Isabela Irrigation District - Canals
PREPA Project Number	06-04-245516-00007 (Diversion Channel and Forebay) 06-04-245519-00009 (Moca Channel) 06-04-245520-00008 (Principal/Main and Aguadilla Channels)

Federal Information

(provided by FEMA)

Damage Number	1. 245516 (Diversion Channel and Forebay) 2. 245519 (Moca Channel) 3. 245520 (Principal/Main and Aguadilla Channels)
Damaged Inventory/Asset Category	Hydro, Dams, Irrigation, Reservoir and Water Conveyances
FEMA Project Number (formerly Project Worksheet)	To Be Determined
Amendment Number	

Program Manager: <Name>

<Insert title here>

PREPA Project Sponsor: <Name >

<Insert title here>



Section 2. Facilities

2.1. Facilities List

Name	Damage Number	GPS Start	GPS End
Diversion Channel and Forebay	06-04-245516-00007		
Principal/Main and Aguadilla Channels	06-04-245520-00008		
Moca Channel	06-04-245519-00009		

Note: GPS coordinates are required for all facilities.

2.2. Facilities Description

The **Isabela Irrigation District** is located in the north-western region of Puerto Rico and includes a network of water storage and conveyance structures consisting of reservoirs, a Forebay regulating structure, open channel canals, penstocks, tunnels, abandoned hydro power plants and water treatment facilities that convey essential water for agriculture irrigation, power, and public water supply. It is the primary source of potable water for over 300,000 people residing in the north-western part of the island. The general arrangement of this canal system is illustrated in a schematic presented in Attachment A and an aerial photo of the district's service area in Attachment B.

The **Diversion Channel** is part of a critical irrigation canal system within the Isabela Irrigation District. (This channel is incorrectly referred to as the "Derivation Channel" in FEMA's Attachment 7 Cost Estimating document). Flow to this channel begins at a water discharge control gate structure in the Guajataca Reservoir, just upstream of Guajataca Dam, and ends at the **Forebay** water regulating structure. This section of the canal system is about 10 miles long and consists of mainly concrete lined channels with an average width of about 6 feet, depth of 5 feet and includes twenty-one (21) tunnels or conduits of various lengths. Flow in the channel is regulated by control valves at the downstream toe of Guajataca Dam that are capable of discharging flows of up to 75 CFS (cubic-feet per second). However, the average flow at this point is about 60 CFS, that is equivalent to 26,928 GPM (gallons per minute) or 38.78 MGD (million gallons per day).

The **Principal/Main Channel** is fed from the outflow of the Diversion Channel at the Forebay regulating structure, and heads north-west where it ends at the Guerrero Reservoir. It has a total length of about 4.88 miles and consists of a 51-inch pipeline, concrete lined canal and an unlined ditch that supports typical flows of between 30 and 55 CFS. The **Aguadilla Channel** is an extension of the Main Channel and flows from the Guerrero Reservoir through an open, unlined canal about 5.7 miles long ending at the Calero Regulating Reservoir. The average flow through the channel is between 25 and 35 CFS.

The **Moca Channel** also gets its water from the outflow of the Diversion Channel at the Forebay regulating structure, and heads in a westerly direct from there to the Isabela Water Regulating Reservoir. It's 13.67 mile long channel consists of an unlined canal that supports a typical flow of between 10 and 25 CFS.



Section 3. Scope of Work

3.1. Scope of Work Description (e.g., Plan for Repair)

The proposed work for the **Isabela Irrigation District** canal system includes site visits to inspect and assess the existing channel conditions and design repairs to restore full water supply functionality of the canal system thus ensuring long-term operations for reliable water supply and irrigation services. In general, it is anticipated that the scope of work will consist of strategic repair or replacement of channel linings, structures, foundations, fences, gates, supports, slopes, etc. as required to provide a safe, consistent, and reliable water source for the Isabela Irrigation System. All work will be designed in accordance with locally adopted codes and standards and/or FEMA-approved industry standards.

Based on the engineering assessment, the extent of repairs required will be outlined, and conceptual design options for repair developed. Preliminary engineering studies will evaluate repair options and recommend the extent and locations where repairs are needed to restore the channel, channel lining, fence and railings. Recommendations of the most appropriate repair solutions for each damaged segment will be based on site conditions, accessibility, reliability, durability, constructability and construction costs.

Site specific plans and specifications will be developed and implemented for each of the following three main components of the Isabela Irrigation District system, including:

1. **Diversion Channel and Forebay** damages were primarily caused by high winds, wind-driven rainfall, and flash flooding resulting in erosion and localized landslides. This created an accumulation of sediment, vegetation, felled trees, stone, large boulders and other miscellaneous debris within the irrigation canals. These blockages caused adverse back water affects within the canal and out-of-bank water releases, which restricted effective operation of the canal system. These extreme flood conditions caused structural cracking, scouring, and failure of significant sections of canal liner at multiple locations.

This project will restore the existing channel functionality by repairing ruptures, patching cracks, and where required, total replacement, of damaged concrete lining along the Diversion Channel. Repairs and improvements to light fixtures, power lines, railings, fences, gates, pavement, and antennas at the Forebay structure are also anticipated.

2. Damages along the **Principal/Main and Aguadilla Channel** were caused by high winds, wind-driven rainfall and flash flooding resulting in erosion and local landslides. This created an accumulation of sediment, vegetation, felled trees, stone, large boulders and other miscellaneous debris within the irrigation canals. This erosion and blockages caused adverse backwater affects and out-of-bank releases, which restricted effective operation of the canal system. These extreme flood conditions, caused structural cracking, scouring, and failure of significant sections of canal liner at multiple locations.

This project will restore the existing channel functionality by repairing and replacing damaged concrete lining, including cracked, displaced, and scoured areas below the surface of the lining. Damaged railings, fences, and gates will also be repaired.

3. **Moca Channel** damage was also mainly caused by high winds, wind-driven rainfall and flash flooding resulting in erosion, landslides and collection of large debris within the irrigation channel, including large trees and sediment, thus impeding operation of the canal system. This erosion of the side slopes and channel bottom led to failure of the concrete channel in many locations.



This project will restore the existing channel functionality by repairing and replacing damaged concrete lining, and other damaged components, such as light fixtures, power lines, railings, fences, gates, pavements, and antennas.

Development of the final design package, including detailed plans, specifications, permits and submittal of a **Detailed SOW to CORE3** and **FEMA** will be completed on or before January 01, 2024 and construction is expected to be completed on or before December 31, 2027.

3.2. Type of Project

Indicate whether the intended plan is a(n):

1. **Restoration to Codes/Standards:** Restores the facility(s) to pre-disaster function and to approved codes/standards
2. **Improved Project:** Restores the pre-disaster function of the facility(s) and incorporates improvements including any:
 - a. Other improvements, not required by codes and standards
 - b. Changes in facility size, capacity, dimension, or footprint
3. **Alternate Project:** Does not restore the pre-disaster function of the damaged facility(s)

Choose One (Restoration, Improved or Alternate)

If improved, provide the changes in facility size, capacity, dimension, or footprint. If alternate, provide rationale for recommendation.

Restores to Codes/Standards

Note: If 30% A&E work has not been completed, the type of work designation is considered initial and is based on currently available information. The type of work designation may be revised based on the results of the completed 30% A&E work.

3.3. 30% Architectural and Engineering (A&E)

Is architectural and engineering funding required to help define the intended scope of work?

Yes

Section 4. Codes and Standards

Which of the following types of codes, specifications, and standards apply to the restoration, replacement, relocation, or alternate scope of work?

4.1. Codes, Specifications, and Standards

Yes If yes, describe how incorporated below.

Approved codes and standards will be incorporated into the SOW and final plans and specifications.



4.2. Industry Standards

Yes If yes, describe how incorporated below.

Appropriate industry standards will be identified during the preliminary engineering phase and incorporated into the final scope of work document, design plans, and project specifications.

Section 5. Cost Estimates

Cost estimates to complete the work have been generated at a Class 5 level, which is between - 50% and +100% of the final project cost. This estimate includes materials, construction labor and equipment, engineering, permitting, management, and contingencies. For the engineering estimates provided, the 30% Engineering estimate is a subset of the Engineering Total, which is a subset of the Total Cost. These costs were developed from the Detailed Damaged Descriptions provided for each damage number. If further repairs and/or improvement are needed beyond the scope and/or quantities defined within these reports the costs will subject to change.

5.1. Isabela Irrigation District

Diversion Channel & Forebay

Cost Type	Amount (\$M)
Preliminary Engineering to Design (30%)	\$0.30
Final Design and Engineering (including 30%)	\$0.75
Construction	\$4.25
Total Project Estimated Cost	\$5.00

Note: If available, detailed engineering cost estimates will be included as an attachment.

Principal/Main & Aguadilla Channels

Cost Type	Amount (\$M)
Preliminary Engineering to Design (30%)	\$0.30
Final Design and Engineering (including 30%)	\$0.75
Construction	\$4.25
Total Project Estimated Cost	\$5.00

Note: If available, detailed engineering cost estimates will be included as an attachment.



Moca Channels

Cost Type	Amount (\$M)
Preliminary Engineering to Design (30%)	\$0.30
Final Design and Engineering (including 30%)	\$0.75
Construction	\$4.25
Total Project Estimated Cost	\$5.00

Note: If available, detailed engineering cost estimates will be included as an attachment.

Section 6. 406 Hazard Mitigation Proposal

6.1. 406 Mitigation Opportunity Scope of Work

PREPA intends to develop 406 Hazard Mitigation proposals for the repair of the Water System Conveyance System's channel, and gravity pipelines. These improvements may include, but are not limited to:

- A. Diversion Channel and Forebay (245516)
 - 1. Channel structure and lining modifications to mitigate future damage due to flooding and erosion from heavy rainfall.
 - 2. Other improved reliability modifications to help mitigate similar damage from future disaster events.
- B. Principal/Main and Aguadilla Channels (245520)
 - 1. Channel structure and lining modifications, including scouring below surface of the lining, to mitigate future damage due to flooding and erosion from heavy rainfall.
- C. Moca Channel (245519)
 - 1. Channel structure and lining modifications, including scouring below surface of the lining, to mitigate future damage due to flooding and erosion from heavy rainfall.

PREPA will provide cost information and BCAs for 406 Hazard Mitigation proposals submitted for this project.

Section 7. EHP Requirements

EHP considerations (complete EHP scoping document and checklist) will be identified and evaluated during the preliminary engineering (30% design) phase and submitted to FEMA for review. Requirements will be incorporated into the final design and construction documents approved by FEMA prior to construction activities.



Section 8. Program Manager Lead Certification

Based on my knowledge and information available to date, I certify that the contents of this document accurately reflect the project scope of work and cost estimates.

Program Manager's Printed Name

Date

Title

Signature

Section 9. PREPA Project Sponsor Comments

Comments
<i><Insert any comments here></i>

PREPA Project Sponsor's Printed Name

Date

Title

Signature



Section 10. Attachments

10.1. Project Detailed Cost Estimates

<Insert project detailed cost estimates from A&E here (if available)>

10.2. Engineering Studies and Designs

<Insert engineering studies and designs (if available)>

10.3. Location Maps and Site Pictures

See Attached:

Attachment A: Isabela District - System Schematic
Attachment B: Isabela District – Location Map (Aerial Photo)

10.4. Other: (Please Describe)

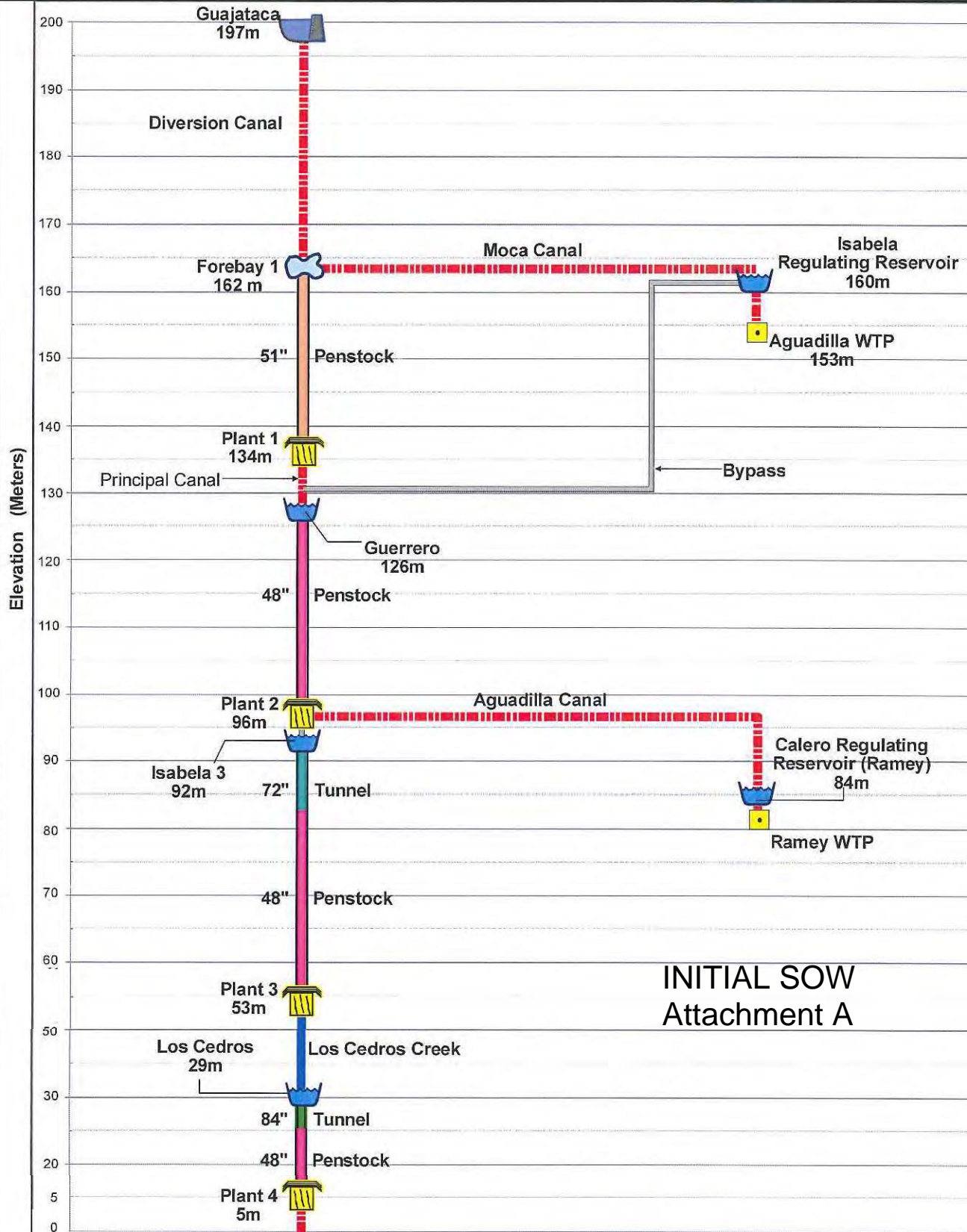
<Insert other documents attached to this submittal>

Isabela System Schematic



Legend

Filtration Plant	Regulating Reservoir	Canal	Pipe (Diameter)	72"
Hydroelectric Plant	Reservoir	River/Stream	48"	84"
	Forebay		51"	Unknown



PREPA Isabela Irrigation District Location Map

Incident Complex - Puerto Rico

Attachment B: Isabela District - Location Map

DI 245516 ISABELA IRRIGATION DISTRICT DERIVATION CHANNEL
DI 245519 ISABELA IRRIGATION DISTRICT MOCA CHANNEL
DI 245520 ISABELA IRRIGATION DISTRICT MAIN AND AGUADILLA CHANNEL



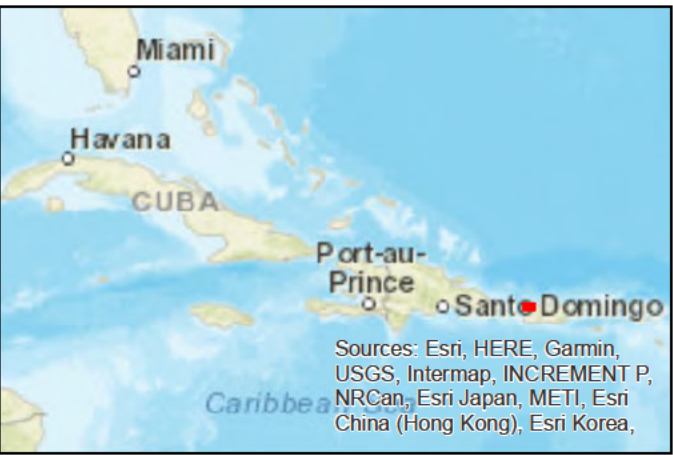
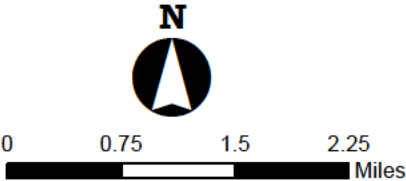
- Legend
- surveyPoint
 - Isabela Irrigation District**
 - Derivation Channel
 - Moca Channel
 - Main Channel
 - Aguadilla Channel
 - PR_Hydrography
 - Reservoirs_Lagoons_PR

INITIAL SOW
Attachment B

Data Layer / Map Description:

Map shows Isabela Irrigation District that receive water from Guajataca Dam and includes Derivation, Moca, Main and Moca Channels.

Data Sources:
FEMA, PREPA





Government of Puerto Rico

Puerto Rico Electric Power Authority



DR-4339-PR Public Assistance

Initial SOW

PROJECT SCOPE OF WORK with COST ESTIMATES
Submittal to COR3 and FEMA



Lajas Valley Irrigation District - Canals
(Water Assets - Conveyance and Canals)

Damage Inventory Numbers:	245531, 245532
PREPA 10-Year Plan Project Numbers:	06-04-245531-00049 06-04-245532-00050
FEMA Project Numbers:	To be determined

Revision Number: FINAL, Rev 0

Revision Date: June 28, 2021



Introduction

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- *Environmental and Historic Preservation (EHP) Requirements*
- *Program Manager Certification*
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- *Attachments*

Document Revision History

Version	Date	Summary of Changes



Section 1. Project Information

General Information

Recipient	Central Office for Recovery, Reconstruction and Resiliency (COR3)
Sub-Recipient	Puerto Rico Electric Power Authority (PREPA)
Project Title	Lajas Valley Irrigation District - Canals
PREPA Project Number	06-04-245531-00049 (Lajas Irrigation Channel) 06-04-245532-00050 (Lajas Lateral Channels)

Federal Information

(provided by FEMA)

Damage Number	245531 (Lajas Irrigation Channel) 245532 (Lajas Lateral Channels)
Damaged Inventory/Asset Category	Hydro, Dams, Irrigation, Reservoir and Water Conveyances
FEMA Project Number (formerly Project Worksheet)	To Be Determined
Amendment Number	

Program Manager: <Name>

<Insert title here>

PREPA Project Sponsor: <Name >

<Insert title here>



Section 2. Facilities

2.1. Facilities List

Name	Damage Number	GPS Start	GPS End
Lajas Irrigation Channel	06-04-245531-00049		
Lajas Lateral Channels	06-04-245532-00050	See below	See below
LATERAL M-5			
LATERAL M-10			
LATERAL M-13			
LATERAL M-18			
LATERAL M-22			
LATERAL M-27			
LATERAL M-29			
LATERAL M-33			
LATERAL M-37			
LATERAL M-40			
LATERAL M-44			
LATERAL M-58			
LATERAL M-59			
LATERAL M-63			
LATERAL M-68			
LATERAL M-76			
LATERAL M-84			
LATERAL M87			
LATERAL M-88			
LATERAL M-89			
LATERAL M-93			
LATERAL M-95			
LATERAL M-97			
LATERAL M-102			
LATERAL M-106			
LATERAL M-109			
LATERAL M-113			

Note: GPS coordinates are required for all facilities.



2.2. Facilities Description

The **Lajas Valley Irrigation District** is located along the southern coast of Puerto Rico and includes a network of water storage and conveyance structures consisting of reservoirs, regulating structures, open channel canals, penstocks, tunnels, abandoned hydro power plants and water treatment facilities that convey essential water for agriculture irrigation, power, and public water supply. It is the primary source of potable water for over 105,000 people residing in the south coastal region of the island. The general arrangement of this canal system is illustrated in Attachments A, B and C.

The **Lajas Irrigation Channel** (245531) is part of a critical irrigation canal system within the Lajas Valley Irrigation District. Flow to this channel begins at a water discharge control gate structure in the Loco Reservoir in Yauco, and ends at Betances in Cabo Rojo. This section of the canal system is about 21.76 miles long and consists concrete lined canals and an unlined ditch that supports typical flows of between 18.05 and 68.78 CFS. However, the average flow is about 42.07 CFS, that is equivalent to 18,882 GPM (gallons per minute) or 27.19 MGD (million gallons per day).

The **Lajas Lateral Channels** (245532) are also part of the Lajas Valley Irrigation District that begins at Susúa in Sabana Grande, and ends at Betances in Cabo Rojo. These sections of the canal system are a total of about 40 miles in length and consists concrete lined canals and an unlined ditch that supports typical flows of between .74 and 11.33 CFS. However, the average flow is about 5.11 CFS, that is equivalent to 2,293 GPM (gallons per minute) or 3.3 MGD (million gallons per day).

Section 3. Scope of Work

3.1. Scope of Work Description (e.g., Plan for Repair)

The proposed work for the **Lajas Valley Irrigation District** canal system includes site visits to inspect and assess the existing channel conditions and design repairs to restore full water supply functionality of the canal system thus ensuring long-term operations for reliable water supply and irrigation services. In general, it is anticipated that the scope of work will consist of strategic repair or replacement of channel linings, structures, foundations, fences, gates, supports, slopes, etc. as required to provide a safe, consistent, and reliable water source for the Lajas Valley Irrigation System. All work will be designed in accordance with locally adopted codes and standards and/or FEMA-approved industry standards.

Based on the engineering assessment, the extent of repairs required will be outlined, and conceptual design options for repair developed. Preliminary engineering studies will evaluate repair options and recommend the extent and locations where repairs are needed to restore the channel, channel lining, fence and railings. Recommendations of the most appropriate repair solutions for each damaged segment will be based on site conditions, accessibility, reliability, durability, constructability and construction costs.

Site specific plans and specifications will be developed and implemented for each of the following three main components of the Lajas Valley Irrigation District system, including:

1. **Lajas Irrigation Channel (245531)** damages were primarily caused by high winds, wind-driven rainfall, and flash flooding resulting in erosion and undermining of concrete lined sections of the channel at many locations. This created an accumulation of sediment, vegetation and felled trees that caused adverse back water affects within the canal and out-of-bank water releases, which restricted effective operation of the canal system. These



extreme flows within the channels caused erosion of the canal banks and damaged many sections of the concrete lining, resulting in significantly increased water loss due to seepage and ground infiltration.

This project will restore the existing channel functionality by repairing ruptures, patching cracks, and where required, total replacement, of damaged concrete lining along the Lajas Irrigation Channel.

2. Damages along the **Lajas Lateral Channels (245532)** were caused by high winds, wind-driven rainfall, and flash flooding resulting in erosion and undermining of concrete lined sections of the channel at many locations. This created an accumulation of sediment, vegetation and felled trees that caused adverse back water affects within the canal and out-of-bank water releases, which restricted effective operation of the canal system. These extreme flows within the channels caused erosion of the canal banks and damaged many sections of the concrete lining, resulting in significantly increased water loss due to seepage and ground infiltration.

This project will restore the existing channel functionality by repairing ruptures, patching cracks, and where required, total replacement, of damaged concrete lining along the Lajas Lateral Channels.

Development of the final design package, including detailed plans, specifications, permits and submittal of a **Detailed SOW to CORE3** and **FEMA** will be completed on or before January 01, 2024 and construction is expected to be completed on or before December 31, 2027.

3.2. Type of Project

Indicate whether the intended plan is a(n):

1. **Restoration to Codes/Standards:** Restores the facility(s) to pre-disaster function and to approved codes/standards
2. **Improved Project:** Restores the pre-disaster function of the facility(s) and incorporates improvements including any:
 - a. Other improvements, not required by codes and standards
 - b. Changes in facility size, capacity, dimension, or footprint
3. **Alternate Project:** Does not restore the pre-disaster function of the damaged facility(s)

Choose One (Restoration, Improved or Alternate)

If improved, provide the changes in facility size, capacity, dimension, or footprint. If alternate, provide rationale for recommendation.

Restores to Codes/Standards

Note: If 30% A&E work has not been completed, the type of work designation is considered initial and is based on currently available information. The type of work designation may be revised based on the results of the completed 30% A&E work.

3.3. 30% Architectural and Engineering (A&E)

Is architectural and engineering funding required to help define the intended scope of work?

Yes



Section 4. Codes and Standards

Which of the following types of codes, specifications, and standards apply to the restoration, replacement, relocation, or alternate scope of work?

4.1. Codes, Specifications, and Standards

Yes If yes, describe how incorporated below.
Approved codes and standards will be incorporated into the SOW and final plans and specifications.

4.2. Industry Standards

Yes If yes, describe how incorporated below.
Appropriate industry standards will be identified during the preliminary engineering phase and incorporated into the final scope of work document, design plans, and project specifications.

Section 5. Cost Estimates

Cost estimates to complete the work have been generated at a Class 5 level, which is between - 50% and +100% of the final project cost. This estimate includes materials, construction labor and equipment, engineering, permitting, management, and contingencies. For the engineering estimates provided, the 30% Engineering estimate is a subset of the Engineering Total, which is a subset of the Total Cost. These costs were developed from the Detailed Damaged Descriptions provided for each damage number. If further repairs and/or improvement are needed beyond the scope and/or quantities defined within these reports the costs will subject to change.

5.1. Lajas Valley Irrigation District

Lajas Irrigation Channel (245531)

Cost Type	Amount (\$M)
Preliminary Engineering to Design (30%)	\$0.45
Final Design and Engineering (including 30%)	\$1.13
Construction	\$6.38
Total Project Estimated Cost	\$7.50

Note: If available, detailed engineering cost estimates will be included as an attachment.

**Lajas Lateral Channels (245532)**

Cost Type	Amount (\$M)
Preliminary Engineering to Design (30%)	\$0.45
Final Design and Engineering (including 30%)	\$1.13
Construction	\$6.38
Total Project Estimated Cost	\$7.50

Note: If available, detailed engineering cost estimates will be included as an attachment.

Section 6. 406 Hazard Mitigation Proposal

6.1. 406 Mitigation Opportunity Scope of Work

PREPA intends to develop 406 Hazard Mitigation proposals for the repair of the Water System Conveyance System's channel, and gravity pipelines. These improvements may include, but are not limited to:

- A. Lajas Irrigation Channel (245531)
 - a. Channel structure and lining modifications, including scouring below surface of the lining, to mitigate future damage due to flooding and erosion from heavy rainfall.
- B. Lajas Lateral Channels (245532)
 - a. Channel structure and lining modifications, including scouring below surface of the lining, to mitigate future damage due to flooding and erosion from heavy rainfall.

PREPA will provide cost information and BCAs for 406 Hazard Mitigation proposals submitted for this project.

Section 7. EHP Requirements

EHP considerations (complete EHP scoping document and checklist) will be identified and evaluated during the preliminary engineering (30% design) phase and submitted to FEMA for review. Requirements will be incorporated into the final design and construction documents approved by FEMA prior to construction activities.

Section 8. Program Manager Lead Certification

Based on my knowledge and information available to date, I certify that the contents of this document accurately reflect the project scope of work and cost estimates.

Program Manager's Printed Name

Date

Title

Signature



Section 9. PREPA Project Sponsor Comments

Comments
<i><Insert any comments here></i>

PREPA Project Sponsor's Printed Name

Date

Title

Signature



Section 10. Attachments

10.1. Project Detailed Cost Estimates

<Insert project detailed cost estimates from A&E here (if available)>

10.2. Engineering Studies and Designs

<Insert engineering studies and designs (if available)>

10.3. Location Maps and Site Pictures

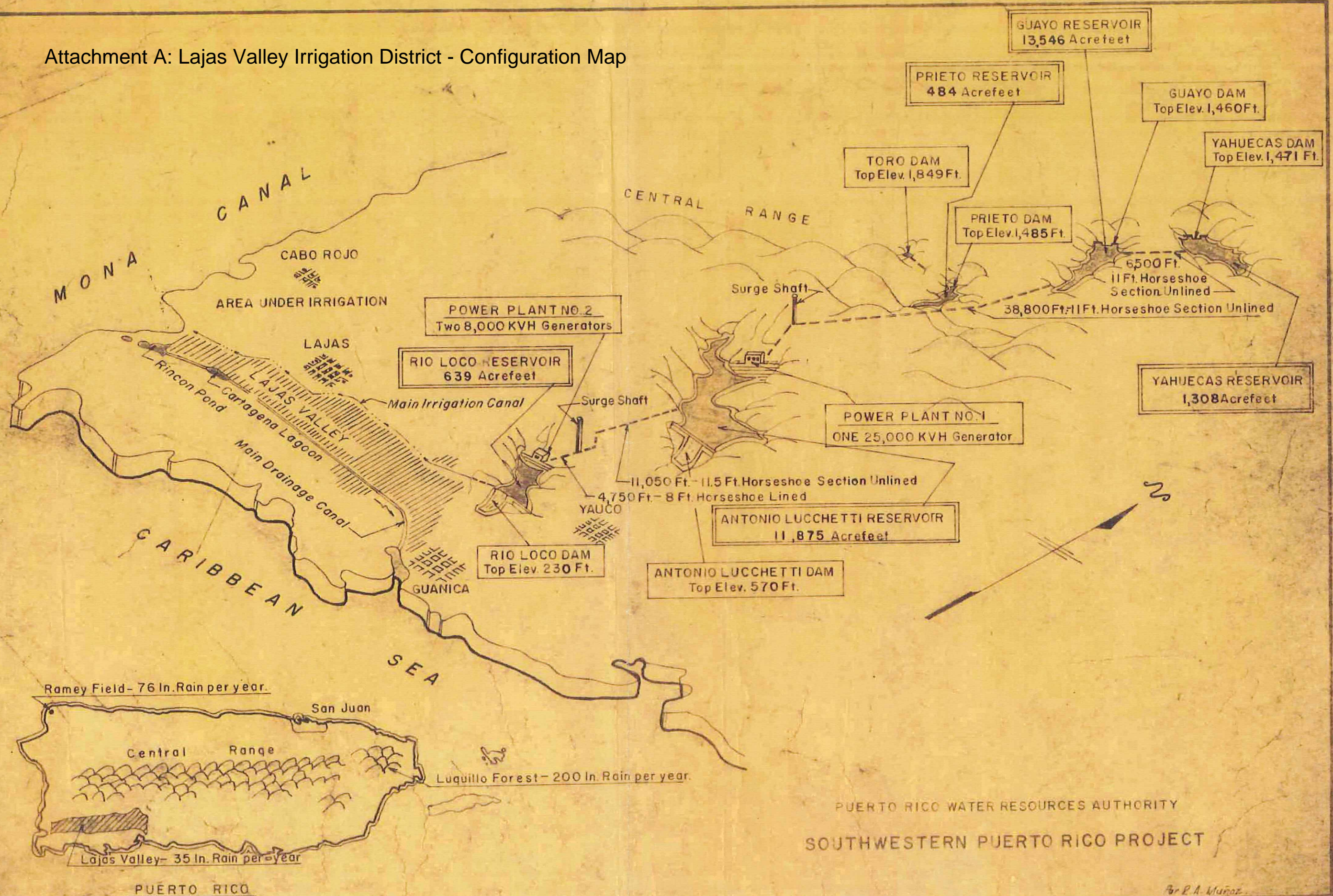
See Attached:

Attachment A: Lajas Valley Irrigation District – Configuration Map
Attachment B: Lajas Valley Irrigation District – General Map
Attachment C: Lajas Valley Irrigation District – Geographic Limits

10.4. Other: (Please Describe)

<Insert other documents attached to this submittal>

Attachment A: Lajas Valley Irrigation District - Configuration Map



Attachment B: Lajas Valley Irrigation District - General Map



SCALE: 1:50,000

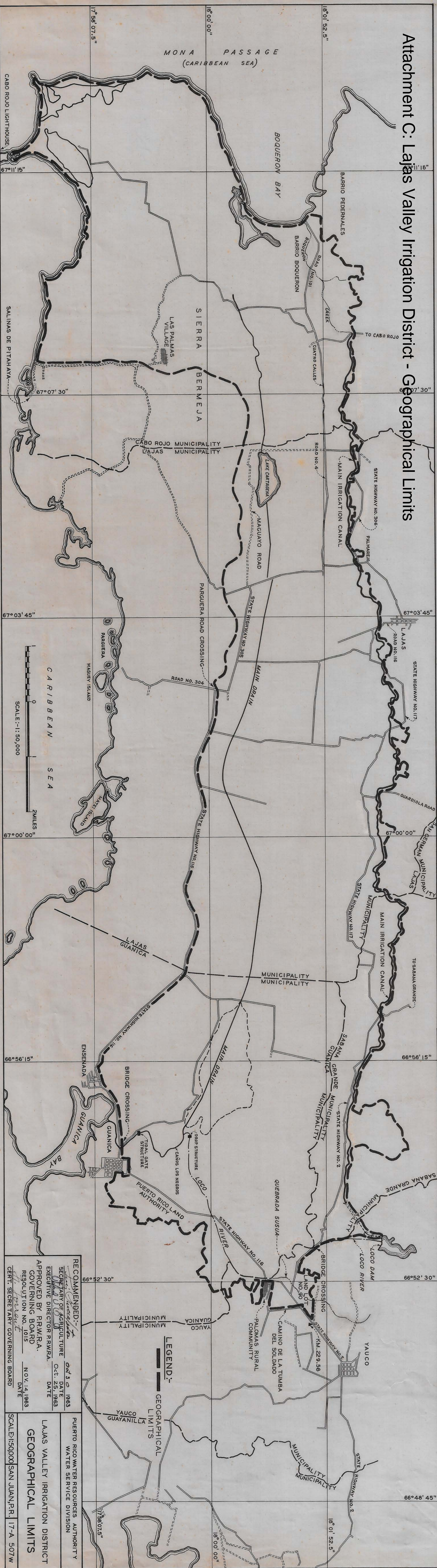
PUERTO RICO WATER RESOURCES AUTHORITY
ENGINEERING AND CONSTRUCTION DIVISION

SOUTHWESTERN P. R. PROJECT
LAJAS VALLEY IRRIGATION SYSTEM
GENERAL MAP

APPROVED: [Signature]
RECOMMENDED: [Signature]
SAN JUAN, P.R.

DRAWN: C.F.A.
TRACED: C.F.A.
CHD: [Signature]

Attachment C: Lajas Valley Irrigation District - Geographical Limits



RECOMMENDED:		DATE	1963
SECRETARY OF AGRICULTURE		DATE	Oct. 25, 1963
EXECUTIVE DIRECTOR P.R.W.R.A.		DATE	NOV. 14, 1963
APPROVED BY P.R.W.R.A. GOVERNING BOARD		DATE	NOV. 14, 1963
RESOLUTION NO. 1015		DATE	NOV. 14, 1963
CERT. SECRETARY GOVERNING BOARD		DATE	NOV. 14, 1963
PUERTO RICO WATER RESOURCES AUTHORITY		DATE	NOV. 14, 1963
WATER SERVICE DIVISION		DATE	NOV. 14, 1963
LAJAS VALLEY IRRIGATION DISTRICT		DATE	NOV. 14, 1963
GEOGRAPHICAL LIMITS		DATE	NOV. 14, 1963
SCALE: 1:50,000		DATE	NOV. 14, 1963
SAN JUAN, P.R.		DATE	NOV. 14, 1963
17-A 507'W		DATE	NOV. 14, 1963



Government of Puerto Rico

Puerto Rico Electric Power Authority



DR-4339-PR Public Assistance

Initial SOW

PROJECT SCOPE OF WORK with COST ESTIMATES
Submittal to COR3 and FEMA



South Coast Irrigation District - Canals
(Water Assets - Conveyance and Canals)

Damage Inventory Numbers:	245521, 245527, 245531
PREPA 10-Year Plan Project Numbers:	06-04-245521-00026 06-04-245526-00033 06-04-245527-00039
FEMA Project Numbers:	To be determined

Revision Number: FINAL, Rev 0

Revision Date: June 25, 2021



Introduction

The purpose of this document is to present and update a Project Scope of Work (SOW) with Cost Estimates to be submitted to COR3 and FEMA for projects under DR-4339-PR Public Assistance. The completed document will be reviewed by COR3 and FEMA to create and version a specific project worksheet and post fixed-cost estimates to repair, restore, or replace eligible facilities including Section 406 hazard mitigation for a specific project.

Puerto Rico Electric Power Authority (PREPA) is the agency that provides the electric service to the entire island of Puerto Rico. As such, the facilities, sites, and systems identified in this Scope of Work are eligible as critical services facilities as defined in the PAAP (Section 428) and BBA 2018 guidance documents. Additional details may be found in Sections 3 and 4, respectively.

This document will be updated with information developed during the initial design and engineering phase through the construction phase.

The sections included in this document are:

- *Project Information*
- *Facilities*
- *Scope of Work*
- *Codes and Standards*
- *Cost Estimate*
- *406 Hazard Mitigation Proposal*
- *Environmental and Historic Preservation (EHP) Requirements*
- *Program Manager Certification*
- *PREPA Project Sponsor Comments*
- *Attachments*

Document Revision History

Version	Date	Summary of Changes



Section 1. Project Information

General Information

Recipient	Central Office for Recovery, Reconstruction and Resiliency (COR3)
Sub-Recipient	Puerto Rico Electric Power Authority (PREPA)
Project Title	South Coast Irrigation District - Canals
PREPA Project Number	06-04-245521-00026 (Juana Diaz Channel) 06-04-245526-00033 (Guamani Channel) 06-04-245527-00039 (Patillas Channel))

Federal Information

(provided by FEMA)

Damage Number	245521 (Juana Diaz Channel) 245526 (Guamani Channel) 245527 (Patillas Channels)
Damaged Inventory/Asset Category	Hydro, Dams, Irrigation, Reservoir and Water Conveyances
FEMA Project Number (formerly Project Worksheet)	To Be Determined
Amendment Number	

Program Manager: <Name>

<Insert title here>

PREPA Project Sponsor: <Name >

<Insert title here>



Section 2. Facilities

2.1. Facilities List

Name	Damage Number	GPS Start	GPS End
Juana Diaz Channel	06-04-245521-00026		
Guamani Channel	06-04-245526-00033		
Patillas Channel	06-04-245527-00039		

Note: GPS coordinates are required for all facilities.

2.2. Facilities Description

The **South Coast Irrigation District** is located along the southern coast of Puerto Rico and includes a network of water storage and conveyance structures consisting of reservoirs, regulating structures, open channel canals, penstocks, tunnels, abandoned hydro power plants and water treatment facilities that convey essential water for agriculture irrigation, power, and public water supply. It is the primary source of potable water for over 41,000 people residing in the south coastal region of the island. The general arrangement of this canal system is illustrated in Attachments A thru H.

The **Juana Diaz Channel** (245521) is part of a critical irrigation canal system within the South Coast Irrigation District. Flow to this channel begins at a water discharge control gate structure in the Guayabal Reservoir located at Guayabal Dam, and ends at Salinas. This section of the canal system is about 27.4 miles long and consists concrete lined canals and an unlined ditch that supports typical flows of between 20 and 30 CFS. However, the average flow is about 25 CFS, that is equivalent to 11,220 GPM (gallons per minute) or 16.16 MGD (million gallons per day).

The **Guamani Channel** (245526) is also part of the South Coast Irrigation District that begins at Negihborhood Guamani located at Guayama, and ends at Negihborhood El Coco located at Salinas. This section of the canal system is about 14 miles long and consists concrete lined canals and an unlined ditch that supports typical flows of between 5 and 20 CFS. However, the average flow is about 9.5 CFS, that is equivalent to 4264 GPM (gallons per minute) or 6.14 MGD (million gallons per day).

The **Patillas Channel** (245527) is another part of the South Coast Irrigation District. Flow to this channel begins at a water discharge control gate structure in the Patillas Reservoir located at Patillas Dam, and ends in river Nigua at Salinas. This section of the canal system is about 24.5 miles long and consists concrete lined canals and an unlined ditch that supports typical flows of between 25 and 90 CFS. However, the average flow is about 25 CFS, that is equivalent to 11,220 GPM (gallons per minute) or 16.16 MGD (million gallons per day).



Section 3. Scope of Work

3.1. Scope of Work Description (e.g., Plan for Repair)

The proposed work for the **South Coast Irrigation District** canal system includes site visits to inspect and assess the existing channel conditions and design repairs to restore full water supply functionality of the canal system thus ensuring long-term operations for reliable water supply and irrigation services. In general, it is anticipated that the scope of work will consist of strategic repair or replacement of channel linings, structures, foundations, fences, gates, supports, slopes, etc. as required to provide a safe, consistent, and reliable water source for the South Coast Irrigation System. All work will be designed in accordance with locally adopted codes and standards and/or FEMA-approved industry standards.

Based on the engineering assessment, the extent of repairs required will be outlined, and conceptual design options for repair developed. Preliminary engineering studies will evaluate repair options and recommend the extent and locations where repairs are needed to restore the channel, channel lining, fence and railings. Recommendations of the most appropriate repair solutions for each damaged segment will be based on site conditions, accessibility, reliability, durability, constructability and construction costs.

Site specific plans and specifications will be developed and implemented for each of the following three main components of the South Coast Irrigation District system, including:

1. **Juana Diaz Channel (245521)** damages were primarily caused by high winds, wind-driven rainfall, and flash flooding resulting in erosion and undermining of concrete lined sections of the channel at many locations. This created an accumulation of sediment, vegetation and felled trees that caused adverse back water affects within the canal and out-of-bank water releases, which restricted effective operation of the canal system. These extreme flows within the channels caused erosion of the canal banks and damaged many sections of the concrete lining, resulting in significantly increased water loss due to seepage and ground infiltration.

This project will restore the existing channel functionality by repairing ruptures, patching cracks, and where required, total replacement, of damaged concrete lining along the Juana Diaz Channel.

2. Damages along the **Guamani Channel (245526)** were caused by high winds, wind-driven rainfall, and flash flooding resulting in erosion and undermining of concrete lined sections of the channel at many locations. This created an accumulation of sediment, vegetation and felled trees that caused adverse back water affects within the canal and out-of-bank water releases, which restricted effective operation of the canal system. These extreme flows within the channels caused erosion of the canal banks and damaged many sections of the concrete lining, resulting in significantly increased water loss due to seepage and ground infiltration.

This project will restore the existing channel functionality by repairing ruptures, patching cracks, and where required, total replacement, of damaged concrete lining along the Guamani Channel.

3. The **Patillas Channel (245527)** damage was also mainly caused by high winds, wind-driven rainfall, and flash flooding resulting in erosion, undermining of concrete lined sections of the channel at many locations and concrete bridge decks. This created an accumulation of sediment, vegetation and felled trees that caused adverse back water affects within the canal and out-of-bank water releases, which restricted effective operation of the canal system. These extreme flows within the channels caused erosion of the canal banks and damaged



many sections of the concrete lining, resulting in significantly increased water loss due to seepage and ground infiltration.

This project will restore the existing channel functionality by repairing ruptures, patching cracks, and where required, total replacement, of damaged concrete lining along the Patillas Channel.

Development of the final design package, including detailed plans, specifications, permits and submittal of a **Detailed SOW to CORE3 and FEMA** will be completed on or before January 01, 2024 and construction is expected to be completed on or before December 31, 2027.

3.2. Type of Project

Indicate whether the intended plan is a(n):

1. **Restoration to Codes/Standards:** Restores the facility(s) to pre-disaster function and to approved codes/standards
2. **Improved Project:** Restores the pre-disaster function of the facility(s) and incorporates improvements including any:
 - a. Other improvements, not required by codes and standards
 - b. Changes in facility size, capacity, dimension, or footprint
3. **Alternate Project:** Does not restore the pre-disaster function of the damaged facility(s)

Choose One (Restoration, Improved or Alternate)

If improved, provide the changes in facility size, capacity, dimension, or footprint. If alternate, provide rationale for recommendation.

Restores to Codes/Standards

Note: If 30% A&E work has not been completed, the type of work designation is considered initial and is based on currently available information. The type of work designation may be revised based on the results of the completed 30% A&E work.

3.3. 30% Architectural and Engineering (A&E)

Is architectural and engineering funding required to help define the intended scope of work?

Yes

Section 4. Codes and Standards

Which of the following types of codes, specifications, and standards apply to the restoration, replacement, relocation, or alternate scope of work?

4.1. Codes, Specifications, and Standards

Yes If yes, describe how incorporated below.

Approved codes and standards will be incorporated into the SOW and final plans and specifications.



4.2. Industry Standards

Yes If yes, describe how incorporated below.

Appropriate industry standards will be identified during the preliminary engineering phase and incorporated into the final scope of work document, design plans, and project specifications.

Section 5. Cost Estimates

Cost estimates to complete the work have been generated at a Class 5 level, which is between - 50% and +100% of the final project cost. This estimate includes materials, construction labor and equipment, engineering, permitting, management, and contingencies. For the engineering estimates provided, the 30% Engineering estimate is a subset of the Engineering Total, which is a subset of the Total Cost. These costs were developed from the Detailed Damaged Descriptions provided for each damage number. If further repairs and/or improvement are needed beyond the scope and/or quantities defined within these reports the costs will subject to change.

5.1. South Coast Irrigation District

Juana Diaz Channel (245521)

Cost Type	Amount (\$M)
Preliminary Engineering to Design (30%)	\$0.64
Final Design and Engineering (including 30%)	\$1.61
Construction	\$9.13
Total Project Estimated Cost	\$10.74

Note: If available, detailed engineering cost estimates will be included as an attachment.

Guamani Channel (245526)

Cost Type	Amount (\$M)
Preliminary Engineering to Design (30%)	\$0.64
Final Design and Engineering (including 30%)	\$1.61
Construction	\$9.13
Total Project Estimated Cost	\$10.74

Note: If available, detailed engineering cost estimates will be included as an attachment.



Patillas Channel (245527)

Cost Type	Amount (\$M)
Preliminary Engineering to Design (30%)	\$0.64
Final Design and Engineering (including 30%)	\$1.61
Construction	\$9.13
Total Project Estimated Cost	\$10.74

Note: If available, detailed engineering cost estimates will be included as an attachment.

Section 6. 406 Hazard Mitigation Proposal

6.1. 406 Mitigation Opportunity Scope of Work

PREPA intends to develop 406 Hazard Mitigation proposals for the repair of the Water System Conveyance System's channel, and gravity pipelines. These improvements may include, but are not limited to:

- A. Juana Diaz Channel (245521)
 - a. Channel structure and lining modifications, including scouring below surface of the lining, to mitigate future damage due to flooding and erosion from heavy rainfall.
- B. Guamani Channel (245526)
 - a. Channel structure and lining modifications, including scouring below surface of the lining, to mitigate future damage due to flooding and erosion from heavy rainfall.
- C. Patillas Channel (245527)
 - a. Channel structure and lining modifications, including scouring below surface of the lining, to mitigate future damage due to flooding and erosion from heavy rainfall.

PREPA will provide cost information and BCAs for 406 Hazard Mitigation proposals submitted for this project.

Section 7. EHP Requirements

EHP considerations (complete EHP scoping document and checklist) will be identified and evaluated during the preliminary engineering (30% design) phase and submitted to FEMA for review. Requirements will be incorporated into the final design and construction documents approved by FEMA prior to construction activities.



Section 8. Program Manager Lead Certification

Based on my knowledge and information available to date, I certify that the contents of this document accurately reflect the project scope of work and cost estimates.

Program Manager's Printed Name

Date

Title

Signature

Section 9. PREPA Project Sponsor Comments

Comments
<Insert any comments here>

PREPA Project Sponsor's Printed Name

Date

Title

Signature



Section 10. Attachments

10.1. Project Detailed Cost Estimates

<Insert project detailed cost estimates from A&E here (if available)>

10.2. Engineering Studies and Designs

<Insert engineering studies and designs (if available)>

10.3. Location Maps and Site Pictures

Attachment A: South Coast Irrigation District - General Map A
 Attachment B: South Coast Irrigation District - General Map B
 Attachment C: South Coast Irrigation District - General Map C
 Attachment D: Guamani Channel – Area Map
 Attachment E: Juana Diaz Channel – Area Map
 Attachment F: Juana Diaz Channel - System Schematic
 Attachment G: Patillas Channel – Area Map
 Attachment H: Patillas Channel - System Schematic

10.4. Other: (Please Describe)

<Insert other documents attached to this submittal>

Attachment A: South Coast Irrigation District - General Map A



SUBMITTED FOR APPROVAL

APPROVED

IRRIGATION DISTRICT
EASTERN DIVISION
MAP SHOWING MAIN CANALS, LATERALS, OUTLETS AND STRUCTURES

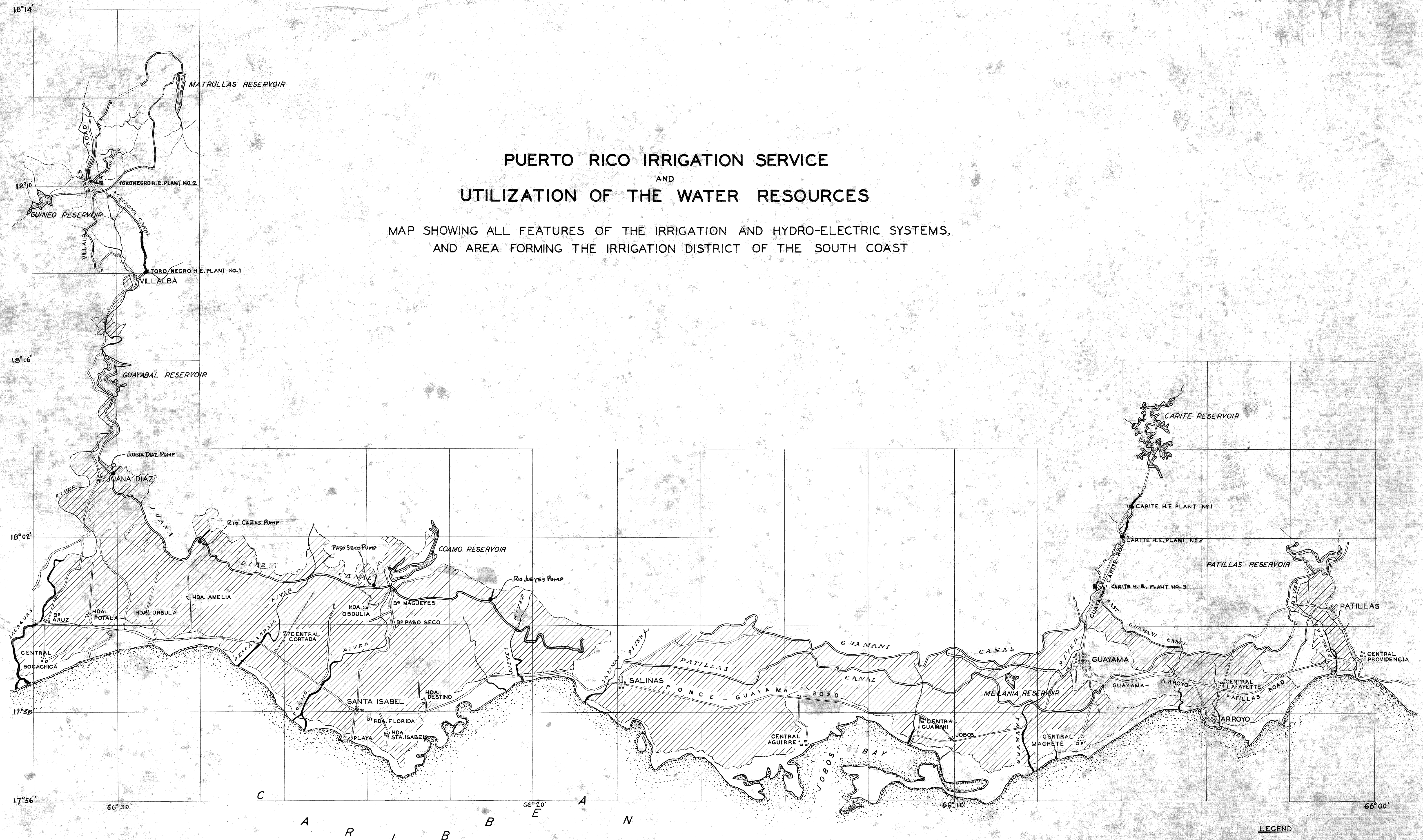
PUERTO RICO WATER RESOURCES AUTHORITY
WATER SERVICE DIVISION
GUAYAMA, P.R.

DATE: APRIL - 1927	SCALE: 1/64,000
FIELDWORK	DRAWING
COMPUTATIONS	CHECK
DESIGN	TRACING R.V.
CHECK	CHECK

Attachment B: South Coast Irrigation District - General Map B

PUERTO RICO IRRIGATION SERVICE AND UTILIZATION OF THE WATER RESOURCES

MAP SHOWING ALL FEATURES OF THE IRRIGATION AND HYDRO-ELECTRIC SYSTEMS,
AND AREA FORMING THE IRRIGATION DISTRICT OF THE SOUTH COAST



- LEGEND**
- CANALS (POWER & DISTRIBUTION)
 - RESERVOIRS
 - TUNNELS
 - H.E. POWER PLANTS
 - LANDS IRRIGATED
 - IRRIGATION PUMPING UNIT

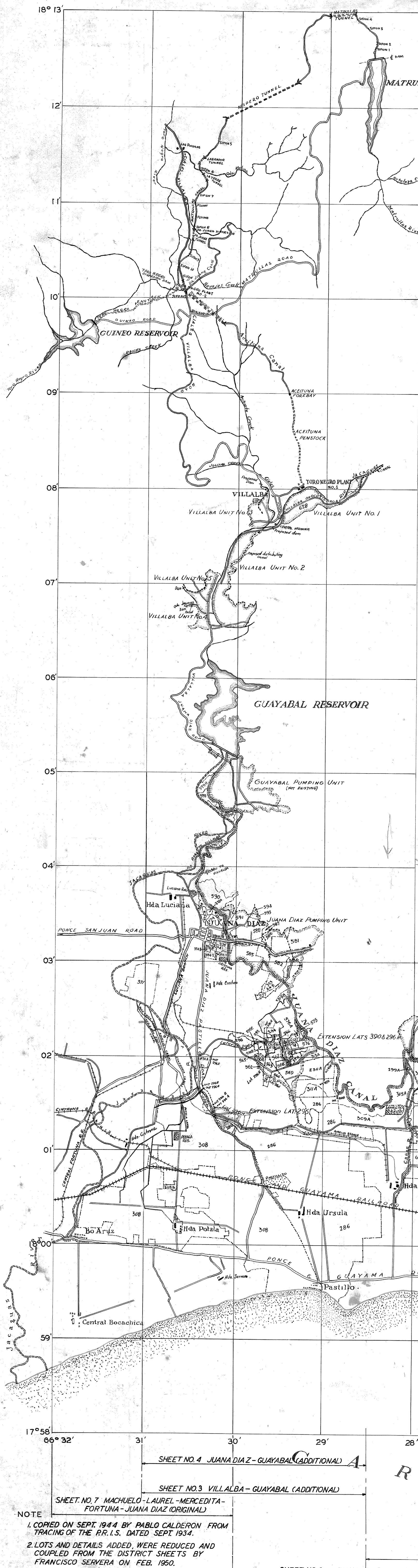
A. Picchetti
DIRECTOR AND CHIEF ENGINEER

27-L-1000
JANUARY 20, 1936
REVISED: MAY 6, 1964 BY: F3-JB

A tachment C South Co st l gat on Dist ct - Gene a Map C

PUERTO RICO WATER RESOURCES AUTHORITY
WATER SERVICE DIVISION

LIST OF LAND LOTS INCLUDED IN THE ORIGINAL AND ADDITIONAL IRRIGATION DISTRICTS
WESTERN IRRIGATION SECTION



LOT NO.	NET INCLUDED AREA (ACRES)	OUTLET NO.	DISTRICT	SHEET NO.	LOT NO.	NET INCLUDED AREA (ACRES)	OUTLET NO.	DISTRICT	SHEET NO.	LOT NO.	NET INCLUDED AREA (ACRES)	OUTLET NO.	DISTRICT	SHEET NO.	LOT NO.	NET INCLUDED AREA (ACRES)	OUTLET NO.	DISTRICT	SHEET NO.
181	114.00		ORIGINAL	4	266	7.60		ORIGINAL	5	374-1	14.71		ORIGINAL	7	561	6.00		ADDITIONAL	4
182	152.00		"	"	267	113.00		"	"	374-2	1.29		"	"	562	4.00		"	"
183	294.00		"	"	268A	4.50		"	6	375	4.10		"	"	563	10.00		"	"
184	50.00		"	"	270	3.80		"	5	376A	3.87		"	"	564	8.00		"	"
185	114.00		"	"	272	47.00		"	5-6	376-B	4.63		"	"	565	0.48		"	"
186	65.00		"	"	272A	20.00		"	"	377A	10.00		"	"	566	9.00		"	"
187	1117.00		"	4-5	273	7.40		"	5	378A	1.80		"	"	567	12.60		"	"
188	100.00		"	4	274	10.00		"	"	378-B	1.00		"	"	568	3.74		"	"
189	253.00		"	"	274A	5.10		"	"	378A	5.80		"	"	569	27.00		"	"
189A	168.00		"	"	275	11.00		"	"	379B	9.40		"	"	570	850		"	"
189B	105.00		"	"	277	17.00		"	"	379C	10.00		"	"	571	1.00		"	"
200	52.00		"	"	277B	14.00		"	6	379D	15.00		"	"	572	6.75		"	"
201	14.00		"	"	277C	97.00		"	5-6	379F	6.00		"	"	573	3.00		"	"
201A	2.90		"	"	277D-1	32.96		"	6	379G	13.00		"	"	574	7.20		"	"
202	369.00		"	4-5	277D-2A	32.78		"	"	379H	9.60		"	"	575	2.50		"	"
203	264.00		"	4	277D-2B	5.26		"	"				"	"	576	11.70		"	"
204A	260.00		"	"	277H	9.80		"	"				"	"	576A	3.00		"	"
204B	22.00		"	4-5	277E-1	30.48		"	5	501	98.00		ADDITIONAL	2	577	6.00		"	"
205A	8.00		"	4	277E-2	10.07		"	6	502	59.00		"	"	580	22.50		"	"
206	570.00		"	"	277E-3-1	12.15		"	"	503	32.00		"	"	581	70.00		"	"
206A	50.00		"	"	277E-3-2	130.30		"	5	504	148.00		"	"	582	31.00		"	"
207	905.00		"	4-5	280A	1.00		"	6	505	19.00		"	"	585	49.00		"	"
208	569.00		"	"	279	251.00		"	5-6	505A	55.00		"	"	586	17.50		"	"
229	231.00		"	5	281	47.00		"	6	505B	50.00		"	"	587	4.00		"	"
229	85.00		"	"	282	186.00		"	"	506	221.00		"	"	588	35.50		"	"
230	155.00		"	"	282A	15.00		"	"	508E	28.00		"	"	590	65.50		"	"
230A	157.00		"	"	283	80.00		"	"	509	72.00		"	"	591	27.00		"	"
231	45.00		"	"	284-B-1	6.90		"	"	510	115.00		"	"	593	4.50		"	"
232	120.00		"	"	284-B-2	13.10		"	"	510A	30.00		"	"	594	1.50		"	"
247	801.00		"	5-6	285A	75.00		"	"	511	312.00		"	"	628	70.00		"	"
248	119.00		"	5	286	75.00		"	6-7	511A	35.00		"	"	630	67.00		"	"
249	10.00		"	"	289A	17.00		"	6	512	44.00		"	"	631	30.00		"	"
249C	2.80		"	"	292	8.00		"	"	513	134.00		"	"	632	72.00		"	"
249D	1.30		"	"	294	2.50		"	"	514	108.00		"	"	633	47.00		"	"
250	13.00		"	"	295C	2.50		"	"	518	64.00		"	"				"	"
250A+B	9.70		"	"	295D	0.70		"	"	519	280.00		"	"	* 508 P	98.00		"	"
251	88.00		"	"	296	11.00		"	6-7	520	149.00		"	"	* 515	20.00		"	"
252	8.60		"	"	308A	57.00		"	6	536	27.00		"	"	* 516	157.00		"	"
253	4.00		"	"	305A	68.00		"	"	537	15.00		"	"	* 517	5.00		"	"
253A	5.20		"	"	308	1039.00		"	6-7	538	37.50		"	"	* 522	13.43		"	"
254	1.50		"	"	319A	6.50		"	6	539	164.00		"	"	* 523	31.00		"	"
256	10.00		"	"	311A	33.00		"	"	539A	13.00		"	"	* 524	11.00		"	"
257A	68.48		"	"	W311A	14.00		"	7	539B	12.00		"	"	* 525	95.00		"	"
257B	5.52		"	"	E311A	44.00		"	6	540	35.00		"	"	* 526	15.00		"	"
258A	7.28		"	"	313A	17.00		"	"	546	16.00		"	"	* 527	54.00		"	"
258B	2.22		"	"	327A	2.10		"	7	547	57.00		"	"	* 529	10.00		"	"
263	4.40		"	"	323A+B	16.00		"	6	549	6.60		"	"	* 529	10.00		"	"
264	0.20		"	"	371	100.00		"	7	549	10.00		"	"	* 530	28.00		"	"
265	10.00		"	"	331A	8.90		"	"	550	111.00		"	"				"	"
265A	10.00		"	"	333A	9.80		"	"	560	18.00		"	"				"	"

GENERAL MAP OF LANDS INCLUDED IN THE PRESENT IRRIGATION DISTRICT
WESTERN IRRIGATION SECTION

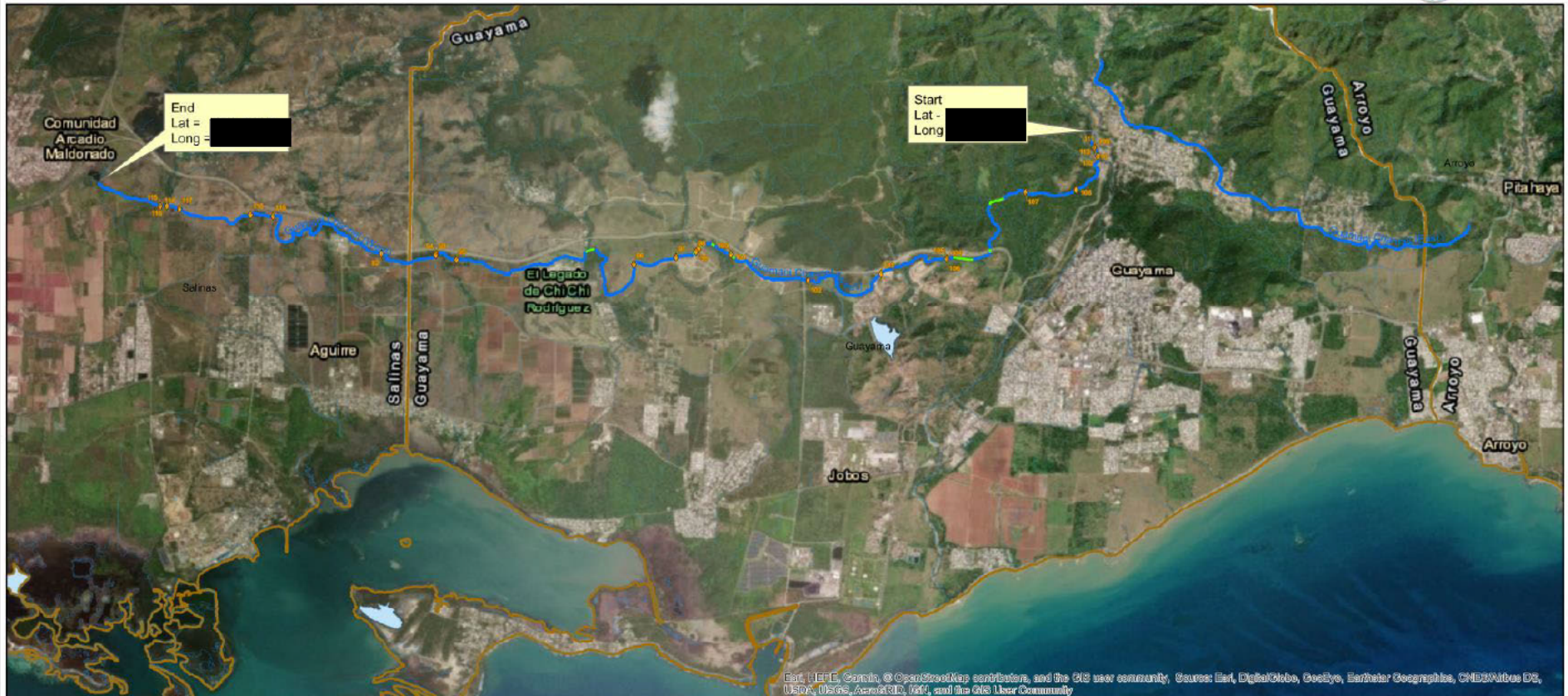
PUERTO RICO WATER RESOURCES AUTHORITY

SCALE 1:36,000 DATE SEPT. 1944 JRGW. NO.

Attachment D: Guamani Channel - Area Map

PREPA Guamaní Channel Damage Locations

Incident Complex - Puerto Rico

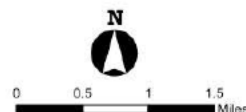


- Legend**
- ◆ surveyPoint
 - Guamaní (West) Siphons-Tunnels
 - Guamaní (West) Open Channel
 - Guamaní (East) Open Channel
 - PR_Hydrography
 - Municipios
 - Reservoirs_Lagoons_PR

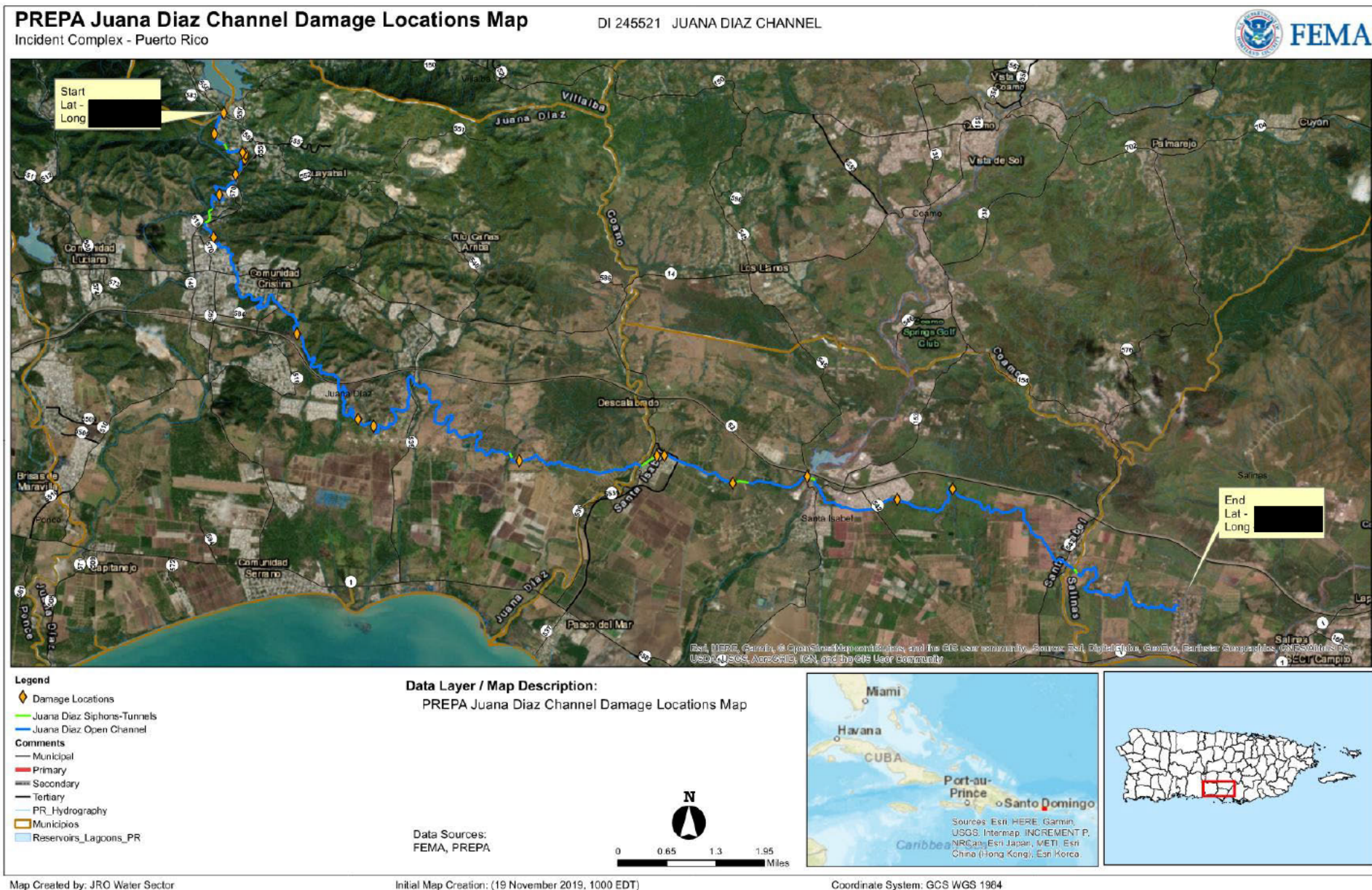
Data Layer / Map Description:

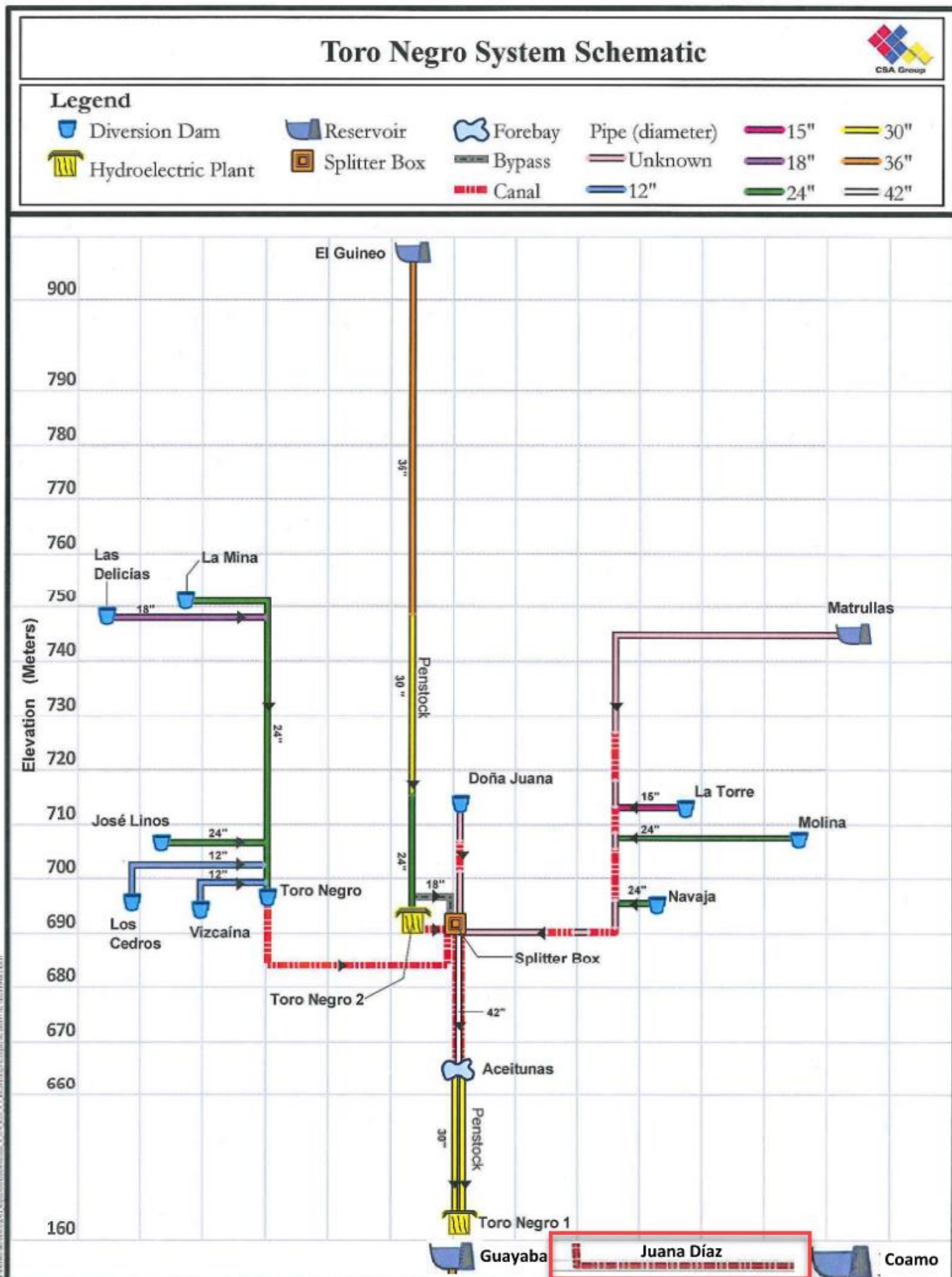
Map shows Guamaní Channels East and West Damage Locations. The West Channel was inspected for damages related to DR-4339PR. The East Channel has no damages reported by applicant.

Data Sources:
FEMA, PREPA



Attachment E: Juana Diaz Channel - Area Map





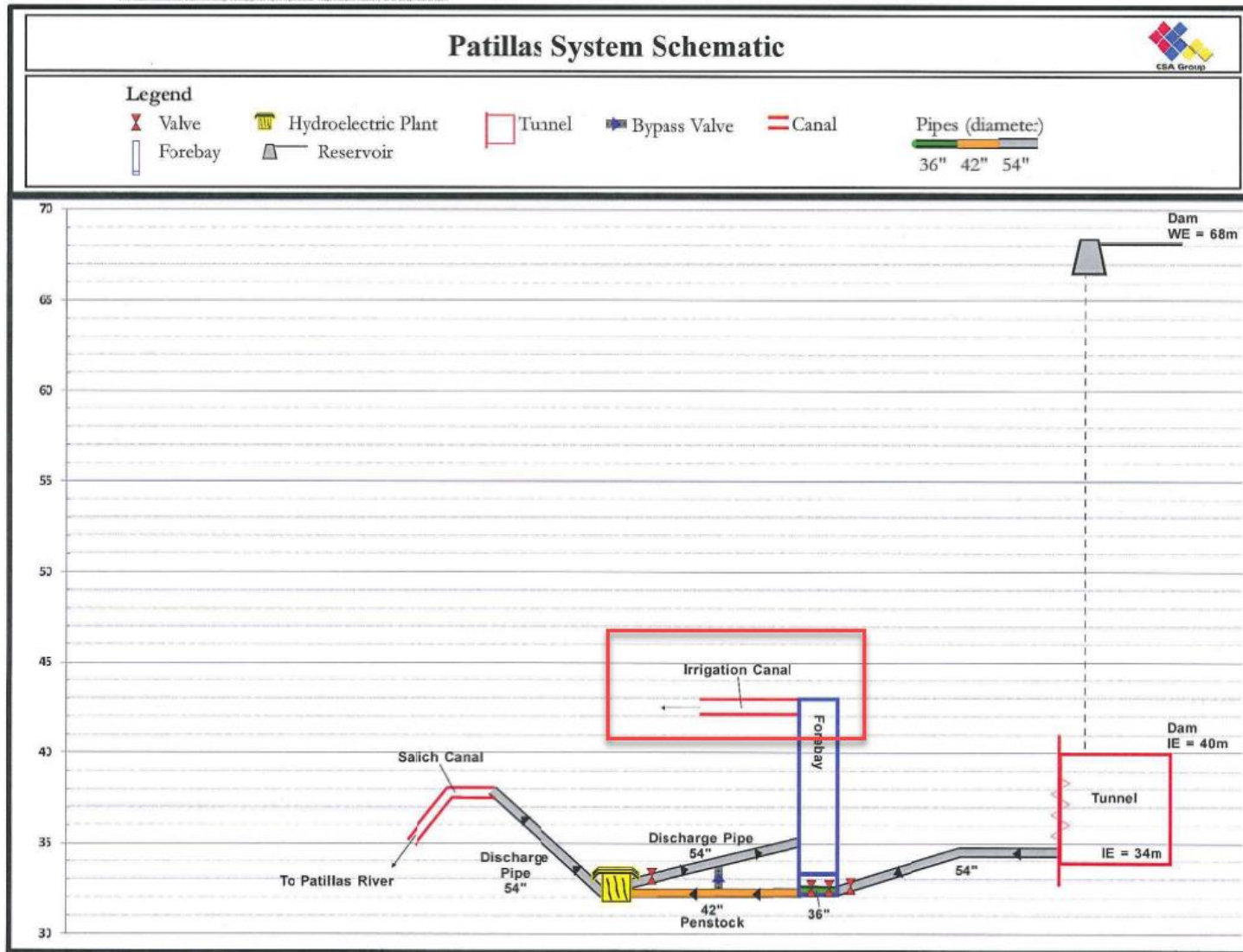
* Indicates input to be used for a brief project description in the "Priorities" section of the work plan

Attachment G: Patillas Channel - Area Map



* Indicates input to be used for a brief project description in the “Priorities” section of the work plan

Attachment H: Patillas Channel - System Schematic



* Indicates input to be used for a brief project description in the "Priorities" section of the work plan

EXHIBIT B

Government of Puerto Rico

Puerto Rico Electric Power Authority



DR-4339-PR Public Assistance

PROJECT SCOPE OF WORK WITH COST ESTIMATES
Submittal to COR3 and FEMA



FAASt - Dams Minor Repairs
(Dams/Hydro)

<FEMA Project Number>

8/26/2021



Introduction

The purpose of this document is to present and update a Project Scope of Work (SOW) with Cost Estimates to be submitted to COR3 and FEMA for projects under DR-4339-PR Public Assistance. The completed document will be reviewed by COR3 and FEMA to create and version a specific project worksheet and post fixed-cost estimates to repair, restore, or replace eligible facilities including Section 406 hazard mitigation for a specific project.

Puerto Rico Electric Power Authority (PREPA) is the agency that provides the electric service to the entire island of Puerto Rico. As such, the facilities, sites, and systems identified in this Scope of Work are eligible as critical services facilities as defined in the PAAP (Section 428) and BBA 2018 guidance documents. Additional details may be found in Sections 3 and 4, respectively.

This document will be updated with information developed during the initial design and engineering phase through the construction phase.

The sections included in this document are:

- *Project Information*
- *Facilities*
- *Scope of Work*
- *Codes and Standards*
- *Cost Estimate*
- *406 Hazard Mitigation Proposal*
- *Environmental and Historic Preservation (EHP) Requirements*
- *Program Manager Certification*
- *PREPA Project Sponsor Comments*
- *Attachments*

Document Revision History

Version	Date	Summary of Changes



Section 1. Project Information

General Information

Recipient	Central Office for Recovery, Reconstruction and Resiliency (COR3)
Sub-Recipient	Puerto Rico Electric Power Authority (PREPA)
Project Title	FAAST - Dams Minor Repairs (Dams/Hydro)
PREPA Project Number	

Federal Information

(provided by FEMA)

Damage Number(s)	Listed by dam in section 2.1 below
Damaged Inventory/Asset Category	Island Wide Dams and Hydroelectric Power Plants
FEMA Project Number (formerly Project Worksheet)	
Amendment Number	

Program Manager: <Name>

<Insert title here>

PREPA Project Sponsor: <Name >

<Insert title here>



Section 2. Facilities

2.1. Facilities List

Name	Damage Number	GPS Location
Adjuntas Dam	296317	
Carite Dam	296319	
Coamo Dam	245457	
Dos Bocas Dam	296321	
Garzas Dam	296326	
Guayabal Dam	245461	
Guayo Dam	245464	
Guineo Dam	296327	
Loco Dam	296328	
Luchetti Dam	245471	
Matrullas Dam	296329	
Patillas Dam	296331	
Pellejas Dam	296333	
Prieto Dam	TBD	
Vivi Dam	296334	
Yahuecas Dam	245483	

Note: GPS coordinates are required for all facilities.



2.2. Facilities Description

The Dams Minor Repairs project addresses minor repair work required across 16 dams managed by PREPA. The scope and complexity of required work across the 16 locations is similar in nature, which lends itself well to being executed as a single project. PREPA has determined that it can secure the best pricing and complete the work at the lowest cost, and in the least time, by executing work across all 16 locations as a single project. The 16 dams in scope are listed in section 2.1 above and are described in section 3.1 below.

Section 3. Scope of Work

3.1. Scope of Work Description (e.g., Plan for Repair)

Brief descriptions of each dam included in this project, and the damages sustained during Hurricanes Irma and Maria, are provided below. The scope of work for this project consists of site inspections at each dam, architectural and design engineering, and subsequent repair recommendations to be included in the detailed SOW and Cost Estimate.

- **Adjuntas Dam** – Adjuntas Dam is a gravity dam located in Utuado, Puerto Rico. The dam was built in 1950 on the Grande de Arecibo River to support hydroelectric power production. Hurricane-damaged components include doors, walls, conduits and electrical systems, sluice gate hydraulic hoist and hydraulic power unit, railings, access road and parking area, intake rack structure, and drainage piping.
- **Carite Dam** – Carite Dam is an earth dam built in 1913 on the La Plata River, located in Guayama, Puerto Rico. Hurricane damages to this dam include the reservoir spillway, site erosion, access roads, parking areas, safety railing, valves, gabion baskets, expansion joints, access bridge to intake tower, and the intake tower structure.
- **Coamo Dam** – Coamo Dam is a buttress dam built in 1914 on the Coamo River to support irrigation, and is located in Santa Isabel, Puerto Rico. Damages to this dam include fencing, slope erosion, and cracks in the dam's gallery.
- **Dos Bocas Dam** – Dos Bocas Dam is a gravity dam located in Arecibo, Puerto Rico. The dam was built in 1942 on the Arecibo River to support hydroelectric power production. Hurricane-damaged components include communications systems, valves, dam foundation, electrical components, the hydraulic power unit and motor, reservoir monitoring system, crane structure, sedimentation of sluiceway, lights, fencing, drainage ditches, and tile drains.
- **Garzas Dam** – Garzas Dam is an earth dam built on the Vacas River in Adjuntas, Puerto Rico in 1943. Hurricane-damaged components include roads, electrical infrastructure, fences, poles, diversion tunnel electrical equipment, wiring, conduit, sluice gate mechanical equipment, railings, diversion tunnel, and spillway.
- **Guayabal Dam** – Guayabal Dam is a buttress dam built in 1913 on the Jacaguas River located in Juana Diaz, Puerto Rico. Damages to this dam include access roads, parking lots, fencing, building shell, crane structures, electrical components, site erosion, flood gates, signs, and spillway.
- **Guayo Dam** – Guayo Dam is a gravity dam built on the Guayo River in 1956 and is located in Espino, Puerto Rico. Hurricane-damaged components include electrical lines, access



road, sluice gate hydraulic hoist and power unit, door to communication shed, and a chain link swing gate.

- **Guineo Dam** – Guineo Dam is a rockfill dam built on the Toro Negro River in 1931 and is located in Ciales, Puerto Rico. Damages include a chain link fence surrounding the morning glory spillway and upstream and downstream sluice valves.
- **Loco Dam** – Loco Dam is a gravity dam built on the Loco River in 1951 and is located in Yauco, Puerto Rico. Hurricane-damaged components include the access road bridge, site erosion, gates, buoys and buoy floatlines, fencing, access road, wire ropes, electrical components, sluiceway intake rack and surroundings, actuator, and windows.
- **Luchetti Dam** – Lucchetti Dam is a gravity dam located in Yauco, Puerto Rico. The dam was built on the Yauco River in 1952 to support irrigation. Hurricane-damaged assets include electrical components, utility poles, cracked gallery, hydraulic unit motor and oil pump, pressure gauges, actuator, and control gate operator.
- **Matrullas Dam** – Matrullas Dam is an earth dam built on the Matrullas River in 1934 and is located in Ciales, Puerto Rico. Hurricane-damaged components include fencing, flow measurement instrumentation, access roadway, and signage.
- **Patillas Dam** – Patillas Dam is built on the Grande de Patillas River in 1976 and is located in Patillas, Puerto Rico. Damaged assets include concrete beams at the intake tower access bridge, building walls/windows/doors/roofing, communication system components, gate alarm system, power distribution components, lighting, stairs, railing, flooring, fencing, and slope erosion.
- **Pellejas Dam** – Pellejas Dam is a gravity dam located in Utuado, Puerto Rico. The dam was built on the Pellejas River in 1950 to support hydroelectric power production. Hurricane-damaged assets include electrical components, sluice gate hydraulic hoist and hydraulic power unit, railings, access road and parking area, and intake rack structure and surroundings.
- **Prieto Dam** – Prieto Dam is a gravity dam built on the Prieto River in 1955 and is located in Maricao, Puerto Rico. Damaged assets include electrical components, mechanical components, access road, hydraulic sluice gate hoist, hydraulic power unit, sluiceway intake rack and surroundings, and safety/guard railing.
- **Vivi Dam** – Vivi Dam is a gravity dam located in Utuado, Puerto Rico. The dam was built on the Vivi River in 1950 to support hydroelectric power production. Damages include site erosion, structure doors and windows, electrical components, sluice gate hydraulic hoist and power unit, railings, fencing, access road and parking area, and intake rack structure and surroundings.
- **Yahuecas Dam** – Yahuecas Dam is a gravity dam built on the Rio Blanco River in 1956 and is located in Espino, Puerto Rico. Hurricane-damaged components include access road, vertical trash grill, intake rack structure, fencing, and railing

The final SOW (plans and specifications) is expected to be completed by 7/30/2022 and construction is planned for completion by 12/15/2024.



3.2. Type of Project

Indicate whether the intended plan is a(n):

1. **Restoration to Codes/Standards:** Restores the facility(s) to pre-disaster function and to approved codes/standards
2. **Improved Project:** Restores the pre-disaster function of the facility(s) and incorporates improvements including any:
 - a. Other improvements, not required by codes and standards
 - b. Changes in facility size, capacity, dimension, or footprint
3. **Alternate Project:** Does not restore the pre-disaster function of the damaged facility(s)

Choose One (Restoration, Improved or Alternate)

If improved, provide the changes in facility size, capacity, dimension, or footprint. If alternate, provide rationale for recommendation.

Restores to Codes/Standards

Note: If A&E work has not been completed, the type of work designation is considered initial and is based on currently available information. The type of work designation may be revised based on the results of the completed A&E work.

3.3. Preliminary Architectural and Engineering (A&E)

Is architectural and engineering funding required to help define the intended scope of work?

Yes

This document is being submitted to obtain funding for A&E services necessary to develop a detailed SOW for the project.

Section 4. Codes and Standards

Which of the following types of codes, specifications, and standards apply to the restoration, replacement, relocation, or alternate scope of work?

4.1. Codes, Specifications, and Standards

Yes. If yes, describe how incorporated below.

Applicable codes and standards will be identified and incorporated into the plans and specifications.

4.2. Industry Standards

Yes. If yes, describe how incorporated below.

Applicable industry standards will be identified and incorporated into the plans and specifications.



Section 5. Cost Estimates

The cost estimate below has been generated at a class 5 level, which is between -50% and +100% of the final project cost. The estimate includes materials, demolition, construction labor and equipment, engineering, permitting, management, and contingencies.

Cost Type	Amount (\$M)
Preliminary Architectural & Engineering Design	\$0.37
Final Design and Engineering	\$0.37
Construction	\$2.63
Total Project Estimated Cost	\$3.37

Note: If available, detailed engineering cost estimates will be included as an attachment.

Section 6. 406 Hazard Mitigation Proposal

6.1. 406 Mitigation Opportunity Scope of Work

PREPA will evaluate hazard mitigation opportunities as part of the A/E design phase, document the results of Benefit-Cost Analyses (BCAs) associated with mitigation opportunities, and submit any proposed 406 mitigation measures with the detailed SOW and Cost estimate for this project.

6.2. 406 Mitigation Opportunity Cost Estimate

PREPA will provide cost estimates and BCAs for any 406 Hazard Mitigation proposals that are identified during the A/E design phase and will submit them with the detailed SOW and Cost Estimate for this project.

Note: If available, detailed engineering cost estimates will be included as an attachment.

Section 7. EHP Requirements

EHP considerations will be identified and evaluated during the Preliminary Architectural and Engineering Design phase and will be submitted to FEMA for review. Requirements will be incorporated into the final design and construction documents approved by FEMA prior to construction activities.



Section 8. Program Manager Lead Certification

Based on my knowledge and information available to date, I certify that the contents of this document accurately reflect the project scope of work and cost estimates.

Program Manager's Printed Name

Date

Title

Signature

Section 9. PREPA Project Sponsor Comments

Comments
<i><Insert any comments here></i>

PREPA Project Sponsor's Printed Name

Date

Title

Signature



Section 10. Attachments

10.1. Project Detailed Cost Estimates

<Insert project detailed cost estimates from A&E here (if available)>

10.2. Engineering Studies and Designs

<Insert engineering studies and designs (if available)>

10.3. Location Maps and Site Pictures

<Insert a map of sufficient scale identifying the project area and any additional location maps and site pictures (if available)>

10.4. Other: (Please Describe)

<Insert other documents attached to this submittal>

EXHIBIT C

Government of Puerto Rico

Puerto Rico Electric Power Authority



DR-4339-DR-PR

PROJECT SCOPE OF WORK WITH COST ESTIMATES
Submittal to COR3 and FEMA



***New Simple Cycle Gas Turbines at
Yabucoa (Generation)***

FEMA Project number

9/1/2021



Introduction

The purpose of this document is to present and update a Project Scope of Work (SOW) with Cost Estimates to be submitted to COR3 and FEMA for projects under DR-4339-PR Public Assistance. The completed document will be reviewed by COR3 and FEMA to create and version a specific project worksheet and post fixed-cost estimates to repair, restore, or replace eligible facilities including Section 406 hazard mitigation for a specific project.

Puerto Rico Electric Power Authority (PREPA) is the agency that provides the electric service to the entire island of Puerto Rico. As such, the facilities, sites, and systems identified in this Scope of Work are eligible as critical services facilities as defined in the PAAP (Section 428) and BBA 2018 guidance documents. Additional details may be found in Sections 3 and 4, respectively.

This document will be updated with information developed during the initial design and engineering phase through the construction phase.

The sections included in this document are:

- *Project Information*
- *Facilities*
- *Scope of Work*
- *Codes and Standards*
- *Cost Estimate*
- *406 Hazard Mitigation Proposal*
- *Environmental and Historic Preservation (EHP) Requirements*
- *Program Manager Certification*
- *PREPA Project Sponsor Comments*
- *Attachments*

Document Revision History

Version	Date	Summary of Changes



Section 1. Project Information

General Information

Recipient	Central Office for Recovery, Reconstruction and Resiliency (COR3)
Sub-Recipient	Puerto Rico Electric Power Authority (PREPA)
Project Title	New Simple Cycle Gas Turbines at Yabucoa
PREPA Project Number	

Federal Information

(provided by FEMA)

Damage Number	
Damaged Inventory/Asset Category	Island Wide Generation Plants
FEMA Project Number (formerly Project Worksheet)	
Amendment Number	

Program Manager: <Name>

<Insert title here>

PREPA Project Sponsor: <Name >

<Insert title here>



Section 2. Facilities

2.1. Facilities List

Yabucoa peaker site is located off of Highway 3, approximately six miles north of the Puerto Yabucoa, on the east side of Puerto Rico.

GPS Coordinates for the site are as follows: Latitude: [REDACTED], Longitude: [REDACTED].

Note: GPS coordinates are required for all facilities.

2.2. Facilities Description

Yabucoa consists of two 21 MW No. 2 fuel oil-fired John Brown gas turbine generators, which began commercial operation in 1971. The plant is mainly used for peaking services and system reliability. Fuel is delivered to the plant by truck on an as-needed basis.

Section 3. Scope of Work

3.1. Scope of Work Description (e.g., Plan for Repair)

The SOW includes procuring and installing two (2) new ~20 MW simple cycle gas turbines capable of firing natural gas from LNG as primary fuel and diesel as back up to replace the existing 21 MW No. 2 fuel oil fired John Brown gas turbine generators. In addition to the power generator equipment and accessories, the balance of plant equipment to be installed includes:

- One common Generator Step Up (GSU) transformer for both turbine generators including foundation
- Connection of utilities at the boundary of the existing location of the units including fuel piping as required, oily water drain system and separator, and electrical generator interconnection
- Natural gas “Delivery Point” receiving station to connect to the LNG regasification plant by others
- Instrumentation and controls not provided with turbine generator package
- Demolition and removal of the the two existing units and auxiliary equipment will have to be completed before construction of the new units can begin; infrastructure that can potentially be reused includes current foundations, No. 2 diesel tanks, and existing site fire protection system

The final SOW (plans and specifications) are planned for completion by 11/19/2021 and construction is planned for completion by 3/15/2023.

3.2. Type of Project

Indicate whether the intended plan is a(n):

1. **Restoration to Codes/Standards:** Restores the facility(s) to pre-disaster function and to approved codes/standards



2. **Improved Project:** Restores the pre-disaster function of the facility(s) and incorporates improvements including any:
 - a. Other improvements, not required by codes and standards
 - b. Changes in facility size, capacity, dimension, or footprint
3. **Alternate Project:** Does not restore the pre-disaster function of the damaged facility(s)

Choose One (Restoration, Improved or Alternate)

If improved, provide the changes in facility size, capacity, dimension, or footprint. If alternate, provide rationale for recommendation.

Restores to Codes/Standards

Note: If Preliminary A&E work has not been completed, the type of work designation is considered initial and is based on currently available information. The type of work designation may be revised based on the results of the completed Preliminary A&E work.

3.3. Preliminary Architectural and Engineering (A&E)

Is architectural and engineering funding required to help define the intended scope of work?

Yes

This document is being submitted to obtain funding for A&E services necessary to develop a detailed SOW for the and replacement of the current generating units.

Section 4. Codes and Standards

Which of the following types of codes, specifications, and standards apply to the restoration, replacement, relocation, or alternate scope of work?

Consensus-based codes and standards approved by FEMA consistent with the FEMA Public Assistance Alternative Procedures (Section 428) guide for Permanent Work, the Bipartisan Budget Act of 2018, and the latest Design Criteria Documents (DCDs) will be the basis for the final design and specifications for this project.

4.1. Codes, Specifications, and Standards

Yes/No. If yes, describe how incorporated below.

Integration of Codes and Standards will be identified in the Plans and Specifications.

4.2. Industry Standards



Yes/No. If yes, describe how incorporated below.

Integration of Codes and Standards will be identified in the Plans and Specifications.

Section 5. Cost Estimates

Cost estimates to complete the work have been generated at a class 5 level, which is between - 50% and +100% of the final project cost. The estimate includes materials, demolition, construction labor and equipment, engineering, permitting, management, and contingencies.

Cost Type	Amount (\$M)
Preliminary Architectural & Engineering Design	\$0.4
Final Design and Engineering	\$1.1
Equipment, Construction	\$43.7
Total Project Estimated Cost	\$45.2

Note: If available, detailed engineering cost estimates will be included as an attachment.

Section 6. 406 Hazard Mitigation Proposal

6.1. 406 Mitigation Opportunity Scope of Work

PREPA will develop and propose multiple 406 Hazard Mitigation features for the simple cycle turbine generation project. BCAs will be provided during the A&E phase to document the benefits of these proposals. Proposals may include the construction of flood walls or elevation of equipment.

6.2. 406 Mitigation Opportunity Cost Estimate

Costs for proposed 406 Hazard Mitigation Proposals will be developed during the A&E phase of this projects along as part of the BCA.

Cost Type	Amount (\$M)
Architectural & Engineering to Design	
Final Design and Engineering	
Construction	
Total Project Estimated Cost	

Note: If available, detailed engineering cost estimates will be included as an attachment.



Section 7. EHP Requirements

EHP considerations will be identified and evaluated for each simple cycle gas turbine unit during the preliminary design phase and submitted to FEMA for review. This being a replacement project of the existing generating units, it is likely that it will not go through the PSD (Prevention of Significant Deterioration) process. However, limitation on operating hours will apply with a non-PSD process to stay below pollutants threshold. Requirements will be incorporated into the final design and construction documents to be approved by FEMA prior to construction activities.



Section 8. Program Manager Lead Certification

Based on my knowledge and information available to date, I certify that the contents of this document accurately reflect the project scope of work and cost estimates.

Program Manager's Printed Name

Date

Title

Signature

Section 9. PREPA Project Sponsor Comments

Comments
<i><Insert any comments here></i>

PREPA Project Sponsor's Printed Name

Date

Title

Signature



Section 10. Attachments

10.1. Project Detailed Cost Estimates

<Insert project detailed cost estimates from A&E here (if available)>

10.2. Engineering Studies and Designs

<Insert engineering studies and designs (if available)>

10.3. Location Maps and Site Pictures

<Insert a map of sufficient scale identifying the project area and any additional location maps and site pictures (if available)>

10.4. Other: (Please Describe)

<Insert other documents attached to this submittal>

EXHIBIT D

Government of Puerto Rico
Puerto Rico Electric Power Authority



DR-4339-PR Public Assistance
PROJECT SCOPE OF WORK WITH COST ESTIMATES
Submittal to COR3 and FEMA



Toro Negro Hydroelectric System
Connection (Dams/Hydro)
FEMA Project Number TBD
9/1/2021



Introduction

The purpose of this document is to present and update a Project Scope of Work (SOW) with Cost Estimates to be submitted to COR3 and FEMA for projects under DR-4339-PR Public Assistance. The completed document will be reviewed by COR3 and FEMA to create and version a specific project worksheet and post fixed-cost estimates to repair, restore, or replace eligible facilities including Section 406 hazard mitigation for a specific project.

Puerto Rico Electric Power Authority (PREPA) is agency that provides the electric service to the entire island of Puerto Rico. As such the facilities identified in this Scope of Work are considered to provide a BBA-eligible critical service and will be constructed to an approved industry standard. Additional details may be found in Sections 3 and 4, respectively.

This document will be updated with information developed during the initial design and engineering phase through the construction phase.

The sections included in this document are:

- *Project Information*
- *Facilities*
- *Scope of Work*
- *Codes and Standards*
- *Cost Estimate*
- *406 Hazard Mitigation Proposal*
- *Project Manager Certification*
- *PREPA Project Sponsor Comments*
- *Attachments*

Document Revision History

Version	Date	Summary of Changes



Section 1. Project Information

General Information

Recipient	Central Office for Recovery, Reconstruction and Resiliency (COR3)
Sub-Recipient	Puerto Rico Electric Power Authority (PREPA)
Project Title	Toro Negro Hydroelectric System Connection (Dams/Hydro)
PREPA Project Number	06-05-245508-00004, 06-05-245502-00005, 06-05-245501-00006
PREPA Project Sponsor	
Program Manager Lead	

Federal Information

(provided by FEMA)

Damage Number	245508, 245508BBA, 245502, 245501
Damaged Inventory/Asset Category	Water Conveyance Systems
FEMA Project Number (formerly Project Worksheet)	
Amendment Number	

Program Manager: <Name>

<Insert title here>

PREPA Project Sponsor: <Name >

<Insert title here>



Section 2. Facilities

2.1. Facilities List

Name	Damage Number	GPS Start	GPS End
Water Conveyance System between Splitter Box and Aceitunas Forebay	245501		
Toro Negro Hydroelectric System Connection (4)	245502		N/A
Toro Negro 2 Penstock	245508 & 245508BBA		

Note: GPS coordinates are required for all facilities.

2.2. Facilities Description

The Toro Negro Water Conveyance System supports an electric micro-grid and domestic water supply in Villalba, in south central Puerto Rico. The system provides water to two (2) hydroelectric plants via dual concrete pipelines, hammer-welded steel pipe, and canals (water conveyance) that gravity-feed water from the El Guineo, Las Delicias, La Mina, Matrullas, La Torre, Molina, Navaja, Jose Linos, Los Cedros, Vizcaina, Toro Negro, and Aceitunas Reservoirs.

The hydroelectric plants provide electricity to approximately 12,500 people in and around Villalba, including a local hospital, schools, and the police station. The pipelines also provide raw water supply for approximately 3000 local residents.

After Hurricane Maria, these pipelines were temporarily reconnected with HDPE pipe supported on a steel frame. These repairs allowed water supply for the hydroelectric plants and domestic water system to be restored; however, this was only a temporary solution as HDPE pipe is not suitable for long-term exposure to sunlight, and no provisions were made for mitigation against future damage from heavy water runoff.

Detailed descriptions of each facility are provided in the table below.



Name	Damage Number	Description
Water Conveyance System between Splitter Box and Aceitunas Forebay	245501	Approximately 200 linear feet of dual water conveyance pipeline and supporting structures between the Toro Negro Splitter Box and Aceitunas Forebay were destroyed during Hurricane Maria. Channelized runoff water and debris from the intense rainfall are suspected to have caused severe erosion and collapse of the pipe support structure at a location where the pipeline crosses a small gulch. As a result, the hydroelectric power plant and raw water supply for the local public water system downstream of the broken pipeline were taken out of service.
Toro Negro Hydroelectric System Connection (4)	245502	Several raw water conveyance pipelines located throughout the Toro Negro Hydroelectric System were damaged by falling or transported debris during Hurricane Maria. Damage was observed throughout the Toro Negro system, both upstream of the Toro Negro Diversion Dam and downstream of the Matrullas Dam.
Toro Negro 2 Penstock	245508 & 245508BBA	A 6,370-foot-long pipeline (hammer-welded steel pipe transitioning from 36" to 30" to 24") serves as the penstock conveying raw water from the El Guineo Reservoir to the Toro Negro 2 Hydroelectric Plant. Along an 817 linear foot segment of the 30" above-grade penstock, significant erosion or debris transport caused damage to two (2) aerial pipe supports. One support has tilted and is no longer supporting the pipe while the second support has an exposed foundation and is in danger of failure.

Section 3. Scope of Work

3.1. Scope of Work Description (e.g., Plan for Repair)

The objective of this project is to ensure reliable water supply to local residents and restoration of full water supply service to the two impacted hydroelectric power plants. The scope of work for this project includes site visits, engineering assessments of existing conditions, and design of necessary pipe and structural support repairs for the dual water conveyance pipelines and powerhouse penstocks within the Toro Negro System.

Based on the engineering assessments, the extent of required repairs will be outlined and conceptual repair design options will be developed. Preliminary engineering studies will



evaluate repair options and recommend the most appropriate repair for each damaged segment. Selection of the preferred design solution will consider site conditions, accessibility, reliability, durability, constructability, and construction costs.

All work will be designed in accordance with locally adopted codes and standards and/or FEMA-approved industry standards. Additional detail specific to each of the three major project subcomponents is provided below.

- **Toro Negro Hydroelectric System Connection between Splitter box and Aceitunas Forebay** (Damage #245501) – Permanent repairs to the gravity pipelines and support structures spanning the gulch are necessary to permanently restore connections to collection reservoirs, conveyance system, and the Toro Negro Hydroelectric system. This portion of the project will focus on a missing section of 30-inch concrete pipe, the enclosed concrete canal, and structural supports – including protection against erosion from future storms.
- **Toro Negro Hydroelectric System Connection** (Damage #245502) – Repairs are required to restore and maintain full conveyance capacity of currently damaged pipeline segments in the Toro Negro System. This portion of the project will focus on the 24" pipe and conveyance systems between the La Mina and Toro Negro Reservoirs, and the conveyance system between the Matrullas Reservoir and the splitter box near the Toro Negro 2 Hydroelectric facility.
- **Toro Negro 2 Penstock** (Damage # 245508 & 245508BBA) – Objectives for this portion of the project include upgrading and maintaining a functioning penstock resistant to similar damages during future storms. This portion of the project will focus on the hammer-welded steel pipeline, and associated supports, from the conveyance outlet portal to the hydroelectric plant, including soil conditions and erosion control around the pipeline supports.

The final SOW (plans and specifications) is planned for completion by 10/1/2022 and construction is planned for completion by 9/1/2027.

3.2. Type of Project

Indicate whether the intended plan is a(n):

1. **Restoration to Codes/Standards:** Restores the facility(s) to pre-disaster function and to approved codes/standards
2. **Improved Project:** Restores the pre-disaster function of the facility(s) and incorporates improvements including any:
 - a. Other improvements, not required by codes and standards
 - b. Changes in facility size, capacity, dimension, or footprint
3. **Alternate Project:** Does not restore the pre-disaster function of the damaged facility(s)

**Choose One (Restoration, Improved or Alternate)**

If improved, provide the changes in facility size, capacity, dimension, or footprint. If alternate, provide rationale for recommendation.

Restores to Codes/Standards

Note: If Preliminary A&E work has not been completed, the type of work designation is considered initial and is based on currently available information. The type of work designation may be revised based on the results of the completed preliminary A&E work.

3.3. Preliminary Architectural and Engineering (A&E)

Is architectural and engineering funding required to help define the intended scope of work?

Yes

Section 4. Codes and Standards

Which of the following types of codes, specifications, and standards apply to the restoration, replacement, relocation, or alternate scope of work?

4.1. Codes, Specifications, and Standards

Yes. If yes, describe how incorporated below.

Yes, applicable codes and standards will be identified and incorporated into the plans and specifications.

4.2. Industry Standards

Yes. If yes, describe how incorporated below.

Yes, applicable industry standards will be identified and incorporated into the plans and specifications.

Section 5. Cost Estimates

Cost estimates to complete the work have been generated at a class 5 level, which is between - 50% and +100% of the final project cost. The estimates below include materials, construction labor and equipment, engineering, permitting, management, and contingencies. Cost estimates were developed from the Detailed Damage Description reports provided for each damage number. If further repairs and/or improvements are needed beyond the scope and/or quantities defined within these reports, project cost estimates will be updated accordingly.



5.1 Water Conveyance System between Splitter Box and Aceitunas Forebay

Cost Type	Water Conveyance System Amount (\$M)
Preliminary Architectural & Engineering Design	\$0.38
Final Design and Engineering	\$0.57
Construction	\$6.55
Total Project Estimated Cost	\$7.50

Note: If available, detailed engineering cost estimates will be included as an attachment.

5.2 Toro Negro Hydroelectric System Connection (4)

Cost Type	Juana Díaz Channel Amount (\$M)
Preliminary Architectural & Engineering Design	\$0.01
Final Design and Engineering	\$0.01
Construction	\$0.16
Total Project Estimated Cost	\$0.18

Note: If available, detailed engineering cost estimates will be included as an attachment.

5.3 Toro Negro 2 Penstock

Cost Type	Toro Negro 2 Penstock Amount (\$M)
Preliminary Architectural & Engineering Design	\$0.38
Final Design and Engineering	\$0.57
Construction	\$6.59
Total Project Estimated Cost	\$7.54

Note: If available, detailed engineering cost estimates will be included as an attachment.

Section 6. 406 Hazard Mitigation Proposal



6.1. 406 Mitigation Opportunity Scope of Work

PREPA intends to develop 406 Hazard Mitigation proposals for the repair of the Water Conveyance System's canal, penstock, and gravity pipelines. These improvements may include, but are not limited to:

- Gulch crossing pipe and structure modifications to mitigate future damage due to flooding and erosion from heavy rainfall. Similar damage to these assets occurred prior to Hurricane Maria, and alternatives should be considered that will provide protection from damage during future disaster events (DI 2445001)
- Other pipe modifications to mitigate against damage from future flooding and heavy rainfall events (DI 245502 and 245508)

BCAs will be developed during the preliminary engineering phase to document the benefits of these proposals. PREPA will provide cost information and BCAs for 406 Hazard Mitigation proposals with the detailed SOW and Cost estimate submissions for this project.

Section 7. EHP Requirements

EHP considerations (complete EHP scoping document and checklist) will be identified and evaluated during the preliminary A&E design phase and submitted to FEMA for review. Requirements will be incorporated into the final design and construction documents approved by FEMA prior to construction activities.



Section 8. Program Manager Lead Certification

Based on my knowledge and information available to date, I certify that the contents of this document accurately reflect the project scope of work and cost estimates.

Program Manager's Printed Name

Date

Title

Signature

Section 9. PREPA Project Sponsor Comments

Comments
<i><Insert any comments here></i>

PREPA Project Sponsor's Printed Name

Date

Title

Signature



Section 10. Attachments

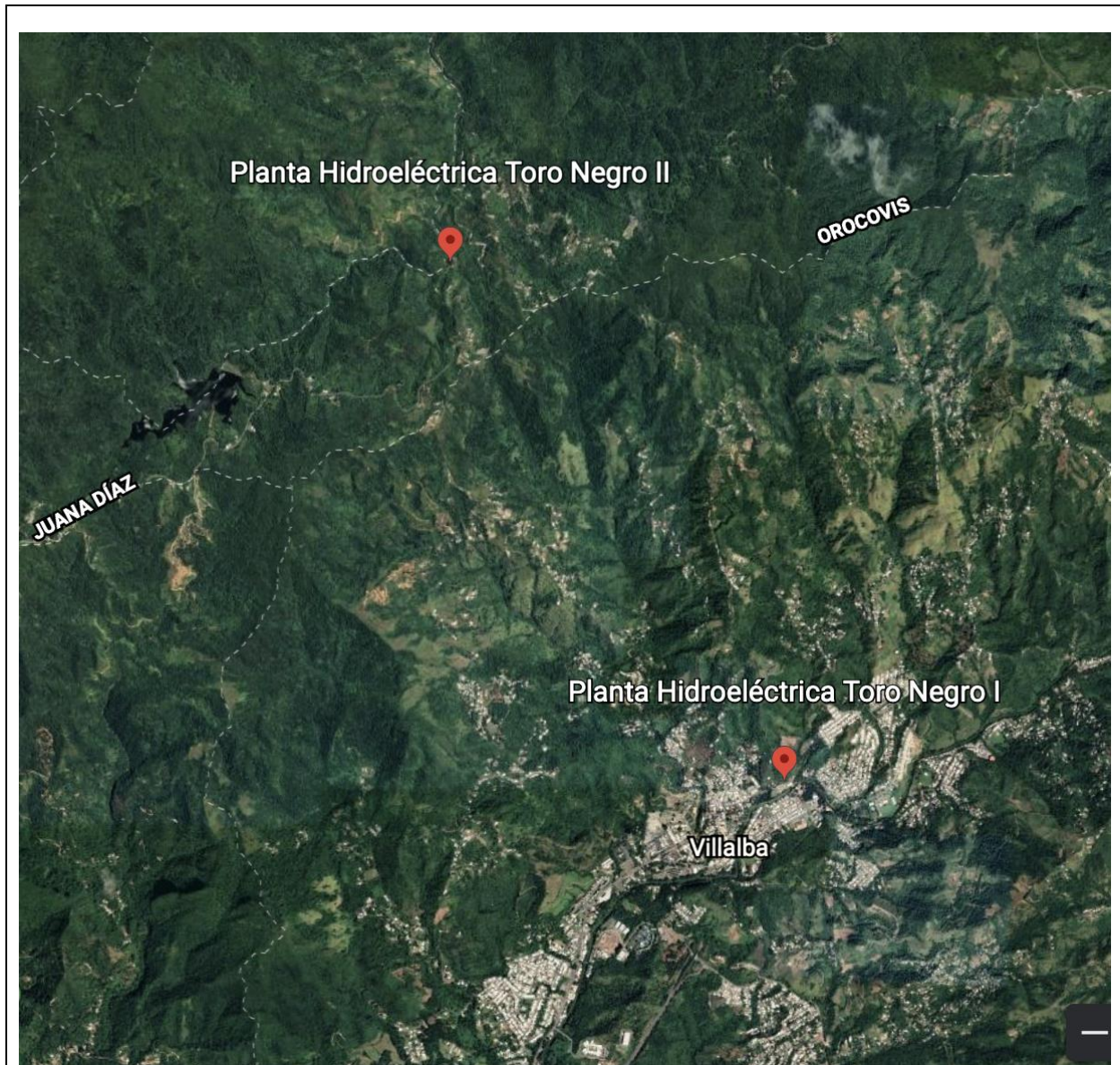
10.1. Project Detailed Cost Estimates

<Insert project detailed cost estimates from A&E here (if available)>

10.2. Engineering Studies and Designs

<Insert engineering studies and designs (if available)>

10.3. Location Maps and Site Pictures



10.4. Other: (Please Describe)

<Insert other documents attached to this submittal>