

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

**NEPR**  
**Received:**  
**Apr 21, 2021**  
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**IN RE:** OPTIMIZATION PROCEEDING  
OF MINIGRID TRANSMISSION AND  
DISTRIBUTION INVESTMENTS

**CASE NO.:** NEPR-MI-2020-0016

**SUBJECT:** Compliance with March 24, 2021  
Resolution

**THE PUERTO RICO ELECTRIC POWER AUTHORITY'S  
RESPONSES IN COMPLIANCE WITH THE MARCH 24, 2021 RESOLUTION**

COMES NOW the Puerto Rico Electric Power Authority through its legal representation and respectfully submits the responses to Attachment A- *Questions to Stakeholders* listed in the *Resolution* entered by the Puerto Rico Energy Bureau of the Public Service Regulatory Board on March 24, 2021. Exhibit A.

RESPECTFULLY SUBMITTED.

In San Juan Puerto Rico, this 21<sup>st</sup> day of April 2021.

s/ Katuska Bolaños-Lugo  
Katuska Bolaños-Lugo  
[kbolanos@diazvaz.law](mailto:kbolanos@diazvaz.law)  
TSPR No. 18888

DÍAZ & VÁZQUEZ LAW FIRM, P.S.C.  
290 Jesús T. Piñero Ave.  
Oriental Tower, Suite 803  
San Juan, PR 00918  
Tel. (787) 395-7133  
Fax. (787) 497-9664

## CERTIFICATE OF SERVICE

It is hereby certified that, on this same date, I have filed the above motion with the Office of the Clerk of the Energy Bureau using its Electronic Filing System at <https://radicacion.energia.pr.gov/login>, and a courtesy copy of the filing was sent via e-mail to [mario.hurtado@lumamc.com](mailto:mario.hurtado@lumamc.com); [wayne.stensby@lumamc.com](mailto:wayne.stensby@lumamc.com); [Ashley.engbloom@lumamc.com](mailto:Ashley.engbloom@lumamc.com); [Legal@lumamc.com](mailto:Legal@lumamc.com); [margarita.mercado@us.dlapiper.com](mailto:margarita.mercado@us.dlapiper.com); [Elias.sostre@aes.com](mailto:Elias.sostre@aes.com); [jesus.bolinaga@aes.com](mailto:jesus.bolinaga@aes.com); [cfl@mcvpr.com](mailto:cfl@mcvpr.com) ; [ivc@mcvpr.com](mailto:ivc@mcvpr.com); [notices@sonnedix.com](mailto:notices@sonnedix.com); [leslie@sonnedix.com](mailto:leslie@sonnedix.com); [victorluisgonzalez@yahoo.com](mailto:victorluisgonzalez@yahoo.com) ; [jcmendez@reichardescalera.com](mailto:jcmendez@reichardescalera.com); [r.martinez@fonroche.fr](mailto:r.martinez@fonroche.fr) ; [gonzalo.rodriguez@gestampren.com](mailto:gonzalo.rodriguez@gestampren.com); [kevin.devlin@patternenergy.com](mailto:kevin.devlin@patternenergy.com); [fortiz@reichardescalera.com](mailto:fortiz@reichardescalera.com) ; [jeff.lewis@terraform.com](mailto:jeff.lewis@terraform.com); [mperez@prrenewables.com](mailto:mperez@prrenewables.com) ; [cotero@landfillpr.com](mailto:cotero@landfillpr.com) ; [geoff.biddick@radiangen.com](mailto:geoff.biddick@radiangen.com) ; [hjcruz@urielrenewables.com](mailto:hjcruz@urielrenewables.com) ; [carlos.reyes@ecoelectrica.com](mailto:carlos.reyes@ecoelectrica.com); [brent.miller@longroadenergy.com](mailto:brent.miller@longroadenergy.com) ; [tracy.deguise@everstreamcapital.com](mailto:tracy.deguise@everstreamcapital.com) ; [agraitfe@agraitlawpr.com](mailto:agraitfe@agraitlawpr.com) ; [h.bobea@fonrochepr.com](mailto:h.bobea@fonrochepr.com) ; [ramonluisnieves@rlnlegal.com](mailto:ramonluisnieves@rlnlegal.com) ; [hrivera@oipc.pr.gov](mailto:hrivera@oipc.pr.gov) ; [info@sesapr.org](mailto:info@sesapr.org) ; [yan.oquendo@ddec.pr.gov](mailto:yan.oquendo@ddec.pr.gov) ; [acarbo@edf.org](mailto:acarbo@edf.org) ; [pjcleanenergy@gmail.com](mailto:pjcleanenergy@gmail.com) ; [Jmadej@veic.org](mailto:Jmadej@veic.org) ; [nicolas@dexgrid.io](mailto:nicolas@dexgrid.io) ; [javrua@gmail.com](mailto:javrua@gmail.com) ; [JavRua@sesapr.org](mailto:JavRua@sesapr.org) ; [lmartinez@nrdc.org](mailto:lmartinez@nrdc.org) ; [thomas.quasius@aptim.com](mailto:thomas.quasius@aptim.com) ; [rortbert@rmi.org](mailto:rortbert@rmi.org); [tjtorres@amscm.com](mailto:tjtorres@amscm.com) ; [lionel.orama@upr.edu](mailto:lionel.orama@upr.edu) ; [noloseus@gmail.com](mailto:noloseus@gmail.com) ; [aconer.pr@gmail.com](mailto:aconer.pr@gmail.com) ; [dortiz@elpuente.us](mailto:dortiz@elpuente.us) ; [wilma.lopez@ddec.pr.gov](mailto:wilma.lopez@ddec.pr.gov) ; [gary.holtzer@weil.com](mailto:gary.holtzer@weil.com); [ingridmvila@gmail.com](mailto:ingridmvila@gmail.com) ; [rstgo2@gmail.com](mailto:rstgo2@gmail.com); [agc@agcpr.com](mailto:agc@agcpr.com) ; [presidente@ciapr.org](mailto:presidente@ciapr.org) ; [cpsmith@unidosporutuado.org](mailto:cpsmith@unidosporutuado.org) ; [jmenen6666@gmail.com](mailto:jmenen6666@gmail.com) ; [cpares@maximosolar.com](mailto:cpares@maximosolar.com) ; [CESA@cleanegroup.org](mailto:CESA@cleanegroup.org) ; [acasepr@gmail.com](mailto:acasepr@gmail.com) ; [secretario@ddec.pr.gov](mailto:secretario@ddec.pr.gov); [julia.mignuccisanchez@gmail.com](mailto:julia.mignuccisanchez@gmail.com) ; [professoraviles@gmail.com](mailto:professoraviles@gmail.com) ; [gmch24@gmail.com](mailto:gmch24@gmail.com) ; [ausbopr88@gmail.com](mailto:ausbopr88@gmail.com) ; [carlos.rodriguez@valairlines.com](mailto:carlos.rodriguez@valairlines.com) ; [amaneser2020@gmail.com](mailto:amaneser2020@gmail.com) ; [acasellas@amgprlaw.com](mailto:acasellas@amgprlaw.com) ; [presidente@camarapr.net](mailto:presidente@camarapr.net) ; [jmarvel@marvelarchitects.com](mailto:jmarvel@marvelarchitects.com); [amassol@gmail.com](mailto:amassol@gmail.com) ; [jmartin@arcainc.com](mailto:jmartin@arcainc.com) ; [melitza.lopez@aep.pr.gov](mailto:melitza.lopez@aep.pr.gov); [eduardo.rivera@afi.pr.gov](mailto:eduardo.rivera@afi.pr.gov) ; [leonardo.torres@afi.pr.gov](mailto:leonardo.torres@afi.pr.gov) ; [carsantini@gmail.com](mailto:carsantini@gmail.com) ; [directoralcaldes@gmail.com](mailto:directoralcaldes@gmail.com) · [imolina@fedalcaldes.com](mailto:imolina@fedalcaldes.com) ; [crivera@fedalcaldes.com](mailto:crivera@fedalcaldes.com); [LCSchwartz@llb.gov](mailto:LCSchwartz@llb.gov); [thomas@fundacionborincana.org](mailto:thomas@fundacionborincana.org) ; [cathykunkel@gmail.com](mailto:cathykunkel@gmail.com) ; [joseph.paladino@hq.doe.gov](mailto:joseph.paladino@hq.doe.gov); [adam.hasz@ee.doe.gov](mailto:adam.hasz@ee.doe.gov) ; [Sergio.Gonsales@patternenergy.com](mailto:Sergio.Gonsales@patternenergy.com) ; [energiaverdepr@gmail.com](mailto:energiaverdepr@gmail.com) ; [Arnaldo.serrano@aes.com](mailto:Arnaldo.serrano@aes.com); [Gustavo.giraldo@aes.com](mailto:Gustavo.giraldo@aes.com); [accounting@everstreamcapital.com](mailto:accounting@everstreamcapital.com); [mqrpcorp@gmail.com](mailto:mqrpcorp@gmail.com) ; [jczayas@landfillpr.com](mailto:jczayas@landfillpr.com), [auriarte@newenergypr.com](mailto:auriarte@newenergypr.com); [Jeanna.steele@sunrun.com](mailto:Jeanna.steele@sunrun.com); [mildred@liga.coop](mailto:mildred@liga.coop); [rodrigomasses@gmail.com](mailto:rodrigomasses@gmail.com); [presidencia-secretarias@seguros multiples.com](mailto:presidencia-secretarias@seguros multiples.com)

In San Juan, Puerto Rico, this 21<sup>st</sup> day of April 2021.

*s/ Katuska Bolaños-Lugo*  
Katuska Bolaños-Lugo

Exhibit A

Responses to Attachment A  
*Questions to Stakeholders* Questions 1 through 4

## **PREPA's Responses to Questions to Stakeholders**

1. Refer to Table 1.- Exhibit 2-9 (PREPA response to Appendix B questions of December 22 Resolution), below. There are thirteen (13), 115 kV new underground projects listed. Five are within the San Juan / Bayamón region.
  - a. State specifically which projects make up what is referred to as the "San Juan underground loop" in the FEMA infrastructure filing/ report.
  - b. Describe the San Juan underground loop project and why it is needed.

### **PREPA's Responses for 1(a) and 1(b) –**

San Juan 115kV Underground Loop (SJ UG) is an existing infrastructure designed to provide reliable interconnection of highly important load centers with generation stations in the metro area thru a series on underground cable segments. The SJ UG loop connects 6 highly important load centers with 2 generation sites to supply reliable power to the metropolitan area.

Generation sites: Palo Seco Steam Plant (PSSP) & San Juan Steam Plant (SJSP)

Load centers: Monacillos, Bayamón, Hato Rey, Martin Peña, Viaducto and Isla Grande

The project was completed in 2009 as part of a FEMA funded hazard mitigation project (DR-1247-PR) following hurricane Georges.

Since then, it has proven essential for power transfer and system reliability during normal operation and for system recovery following natural disasters.

Currently, some breakers along the loop have damaged components that need repairs/replacement, new breakers are needed to complete the loop in SJSP and some cable segments that had been damaged by third parties need replacement. This limits the operation of the loop as originally intended to provide a reliable power service to the metropolitan area.

SJUG loop project has been submitted to FEMA (FAAst #168226) as a top priority infrastructure that PREPA plans to restore using FEMA settlement for permanent works.

In general terms, the project includes replacement of submarine cable segment between Isla Grande and SJSP as well as protection and control (P&C) panels and breakers repairs/replacements at certain stations. Attached (See Attachment – #1) please find the FEMA submitted preliminary SOW with a description of action items at each station and a Class 5 cost estimate of \$10M.

- c. Of these 13 projects, which are most critical for overall transmission reliability in the San Juan/ Bayamón and adjoining regions under extreme weather event conditions?
- d. As best as able, provide a priority order ranking of importance for these projects.
- e. Provide further additional explanation as warranted to support the priority ranking.
- f. Are any of these 13 projects required to support operations under "blue sky" conditions? If so, explain why for each project.

### **PREPA's Responses for questions 1 (c), 1 (d), 1 (e), 1(f) —**

Table #1 (See Attachment #2) has been expanded to include additional information that provides more context into each of the proposed projects, independent of the area / MiniGrid. These projects respond to the need for: (1) provide interconnection between MiniGrids, (2) expand the reach of reliable generation or (3) provide relief to contingency overload conditions of current infrastructure.

The projects that have been highlighted in [red] are in the San Juan / Bayamon area and serve the purposes mentioned above.

**Project #3** – New 115 kV Underground Circuit Palo Seco Steam Plant –Hato Tejas TC - Dorado TC @2750 kcmil Cu XLPE - The segment Palo Seco to Hato Tejas is a new line extending the reach of the Palo Seco Generation and initiating the backbone of the MiniGrid. The segment Hato Tejas - Dorado parallels the existing line and its role it creates the backbone.

**Project #10**- Line 40500 extension to Interconnect Venezuela TC GIS @2750 kcmil Cu XLPE - This is a new UG segment (extension) to interconnect a Station (Venezuela) that will be expanded to have a 115 kV SWYD.

**Project#11** – New Underground 115 kV Line Martin Peña GIS - Berwind TC @ 2750 kcmil Cu XLPE - Under heavy transfers south - north the outage of the 230 kV line 50900 Bayamón - Aguas Buenas the 115 kV line 38900 Berwind - Martín Peña presents heavy loadings beyond its current limit. This circuit would provide support and relief to congestion issues and is a continuation of the project 12 below extending the MiniGrid backbone.

**Project #12** – New Underground 115 kV Line Sabana Llana TC- Berwind TC @ 2750 kcmil Cu XLPE - Under heavy transfers south - north the outage of line 50900 Bayamon - Aguas Buenas results in heavy loadings on the lines Sabana Llana - Escorial -Berwind. Additionally, these lines can overload for the loss of the single Bayamon transformer under these transfers. The proposed project addresses this situation and extends the Carolina MiniGrid Backbone to the Bayamon - San Juan MiniGrid to Create High Reliability/Resiliency Zones.

**Project#13** - New 115 kV Underground Circuit Caguas TC/Bairoa TC – Monacillo TC @2750 kcmil Cu XLP - This is a continuation of the MiniGrid backbone that starts at Yabucoa (ID 4, 6, 7). Creates a resilient interconnection that can be supplied from the north (Palo Seco / San Juan) or the south. There is a parallel overhead Caguas – Monacillos: line 37800.

- g. Explain the relative importance of the last three projects, #14-16, in comparison to the new underground proposed projects.

## **PREPA's Response for 1 (g) —**

**Project 14 - Construction of 115 kV Line 37800 for Bairoa TC @ 1192.5 kcmil ACSR** – The works proposed at this site consider adding a new source of power to the Caguas area by providing service to a new 115/38 kV transformer at Bairoa TC. Under the current arrangement, contingencies at one of Caguas TC 115/38 kV transformers create congestion and/or voltage violations that affect service of loads in Caguas, Gurabo and San Lorenzo. Having Bairoa TC and hence, an additional 115 kV source provides back-up and additional reliability to the area. This project is the part of a larger scope that includes the installation of the Bairoa TC transformer and extension of two additional 38 kV lines in the Caguas area. This overhead new line is not related to the new underground circuits nor it competes with the importance of those. This new overhead line addresses the pre-existing need of a new power source at Caguas to provide reliable power under contingencies of power transformers.

**Project 15 - New 115 kV Hatillo TC – Mora TC** – The 115 kV system has been historically designed to be meshed and act as a backup for the 230 kV system. Furthermore, the 115 kV system also provides similar functionality to the system as the 230 kV, transferring large amounts of power from generation sources (and transmission centers) to urban and industrialized areas. In the case on this new line, this project will be closing the northwest loop that is currently incomplete at the 115 kV level. This situation has existed since the construction of the line 50500 that used the right-of way of the old 39100 (115 kV). While the 230 kV 50500-line interconnects Mora TC and Arecibo it does not have a back-up at the 115 kV level. The addition of this line provides increased reliability and resiliency to large, important industries and urban areas along the northwest corridor of the island. This overhead new line is not related to the new UG circuits nor it competes with the importance of those. This new overhead line addresses the need providing a backup source interconnection at 115 kV voltage level in the northwest for the event of contingency of existing overhead 230 kV line 50500.

**Project 16 - New 115 kV Costa Sur – Dos Bocas** – The original right-of-way of the former 37300 115 kV line was used to build the 51200 230 kV line as quick as possible. This arrangement left Dos Bocas 115 kV isolated from its main source of power —Costa Sur Plant and thus, with limited functionality. This new 115 kV line will reconnect Dos Bocas with Costa Sur, providing a reliable source of power to the central part of the island and act as a backup for the 51200 line. This overhead new line is not related to the new underground circuits nor it competes with the importance of those. This new overhead line addresses the need providing a backup source interconnection at 115 kV voltage level between Dos Bocas and Costa Sur for the event of contingency of existing overhead 230 kV line 51200.

2. There are more than 100, 38 kV undergrounding projects, for roughly 318 miles, listed in IRP Exhibits 23, 35, 43, 51, 61, 69, 83 (and approximately 35 projects in the San Juan/Bayamón region - see Table 2 below).
  - a. For the San Juan and Bayamón region projects listed, provide a rough ranking of the projects, or groups of projects, that would be required to serve what PREPA understands to be the densest clusters of feeders or 38kV-connected critical loads.
  - b. Provide additional explanation or support for prioritized 38 kV new underground work.

- c. Are any of the 35 projects in the San Juan / Bayamón region required to support operations under "blue sky" conditions? If so, explain why for each project.

**PREPA's Responses for questions 2(a), 2(b) and 2(c)—**

New underground projects at the 38 kV satisfy several objectives: (1) serve as a backbone extension of potential MiniGrids, (2) interconnection of critical loads directly connected at 38 kV or at a Distribution substation energized from 38 kV and (3) increase reliability to current infrastructure, among others. These criteria are not mutually exclusive and most of the time, these projects will add reliability to existing connections while facilitating the materialization of MiniGrids. It is also important to notice that the 38 kV system serves a dual purpose as it is considered a sub-transmission voltage, 38 kV lines transfer significant amount of energy from source to load and at the same time, serve important commercial, industrial loads.

The table #2 has been expanded (See Attachment #3) to provide additional information to the loads and type of areas that are served by these underground projects. One can notice many these projects ~22 serve loads at the 38 kV level. These loads are predominantly medical centers, hospitals and in smaller number but not less important, water pumps/treatment facilities, industrial, commercial centers, and town centers. Having these underground projects provides high level of reliability and resiliency to critical loads that serve densely populated areas as the loads in question are in the San Juan-Bayamon area. Additionally, we have included critical loads at the distribution level based on the timeline established in the 10-Year Infrastructure Plan; near, medium- and long-term improvements.

As a method to provide prioritization to these projects, PREPA recommends starting with the 38 kV lines that serve critical loads at the 38 kV and subsequently, assign priority based on the aggregate amount of critical load served at the distribution level. These criteria can serve as a proxy to provide a rough measure of the impact of these improvements. See last row of attachment #3.

- d. What is PREPA's best estimate of the total costs of additional distribution system hardening work required to enable delivery of power to critical loads attached to the hardened network or lines resulting from 38 kV undergrounding?

**PREPA's Response to question 2(d)—**

Cost estimates were completed for the Short-Term List distribution feeder projects of the 10-Year Infrastructure Plan, which was recently submitted to the Puerto Rico Energy Bureau

(PREB). These cost estimates include feeder improvements and upgrades to current Codes and Standards. Please review below the cost estimates for the Short-Term List distribution feeders with critical loads:

- 1716-03: \$7.16 M
- 1801-02: \$4.23 M
- 1801-03: \$1.52 M
- 9401-01: \$9.63 M

3. For the 115 kV and 38 kV new underground projects listed in the above questions (San Juan/ Bayamón region):
  - a. Are there clearly identifiable clusters of critical loads that in total represent the most densely loaded areas of the San Juan / Bayamón region, that could benefit from increased reliability through specific undergrounding projects? If so, please identify those clusters with as much specificity as possible.
  - b. For those clusters, identify which projects are necessary, in combination, in order to serve the critical load
  - c. Specify the critical loads in question, and the magnitude (confidential response).

**PREPA Response to questions 3 (a), (b), (c) —**

See response to question #2.

4. Of the 43 substation hardening projects listed in response to Appendix 8 questions (see Table 3 below):
  - a. For each project, state with specificity the underlying rationale for the proposed hardening.

**PREPA's Response to question 4 (a) —**

The list of 43 substations in Table 3 comes from IRP Appendix 1. Transmission and Distribution, Exhibit 2-12. Each one of these existing stations is recommended for hardening because each serve as a major interconnection point at 38 kV or 115 kV level between generation and loads within their corresponding MiniGrid as defined in IRP Appendix 1. Transmission and Distribution- Exhibit 2.1

For example, if you take the Arecibo MiniGrid as defined in Exhibit 2.1, you can confirm that the following Stations are of utmost importance to connect generation with loads within the Arecibo MiniGrid demarcation, following a natural disaster and isolating from the grid. So, hardening of the 115 & 38 kV assets at these stations is essential for this MiniGrid Region.





Manati TC - 115 kV and 46 kV Switchyards
Cambalache - TC 115 kV and 46 kV Switchyards
Dos Bocas HP - 115 kV and 46 kV Switchyards
Barceloneta TC - 115 kV and 46 kV Switchyards

- b. Which projects are recommended for hardening separate from any consideration of a MiniGrid configuration across the Island? Why?

**PREPA's Response to question 4 (b) —**

In addition to the stations listed in Table 3 and apart from any consideration of a MiniGrid, PREPA has identified a set of 44 stations that needs hardening. Those 44 were submitted to PREB on April 14, 2021 as part of PREPA Short Term priority list projects due to being equipment beyond industry standard useful life, leaking, causing failures, stations still out of service since the hurricane or only having temporary repairs right after the natural disaster.

Attachments I, II,III

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*



***Transmission - San Juan 115-kV***  
***Underground Transmission Loop***  
***<Insert Project Number Here>***

12/18/2020



**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 Esimtate*
- *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	San Juan 115-kV Underground Transmission Loop
PREPA Project Number	
PREPA Project Sponsor	
Program Manager Lead	

### Federal Information

(provided by FEMA)

Damage Number	206253
Damaged Inventory/Asset Category	Island Wide Transmission Line System
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	Number	GPS Start	GPS End
115kV Line from San Juan SP Manhole #8 to Isla Grande (New-UG) Manhole #9	115 kV Line 38000 - Manhole #8 to Manhole #9	18.441915, -66.080692	18.437594, -66.084989
San Juan Steam Plant Install Circuit Breakers to Complete the UG Loop	Breakers 38040 & 41640	18.42778, -66.1052	18.42778, -66.1052
Isla Grande TC 49 Upgrade P&C	P&C L38000 & L39200	18.45421, -66.0867	18.45421, -66.0867
Martin Pena TC 57 Upgrade P&C	P&C L39300 & L40000	18.4342, -66.0602	18.4342, -66.0602
Bayamon TC 13: Replace Circuit Breaker and Upgrade P&C	Breaker 40730, P&C L40600 & L40700	18.39868, -66.1405	18.39868, -66.1405
Palo Seco TC 43: Terminate 115kV Line to Breaker, Upgrade P&C	Breaker 41620, P&C L41600 & L47000	18.45454 -66.1488	18.45454 -66.1488
Viaducto 13: Upgrade P&C	P&C L39200 & L40000	18.44627, -66.0779	18.44627, -66.0779
Hato Rey TC 55 Replace Circuit Breaker, Upgrade P&C	Breaker 39350, P&C L39300 & 40500	18.42707, -66.0677	18.42707, -66.0677
Monacillos TC 65 Upgrade P&C	P&C L40500 & L40600	18.37306, -66.0729	18.37306, -66.0729

### 2.2. Facilities Description

San Juan 115kV Underground Loop is meant to provide a highly reliable power path around San Juan that will be protected from severe weather. The Loop ties together the most significant TCs around San Juan that PREPA relies on to supply power to the metropolitan area.

The 115kV Line 38000 is a portion of the Loop that is routed between the San Juan Steam Plant Switchyard and the Isla Grande TC. The cable crosses under the Martin Pena Canal near the Constitution Bridge. This section of submarine cable was damaged by a third party between 115 kV Manhole #8 and 115 kV Manhole #9.

The Underground Loop connects seven large TC substations around San Juan listed in Section 2. Circuit breakers require repair or replacement at Bayamon and Hato Rey. A breaker at Palo Seco will be placed in service and L41600 terminated to the breaker.



Protection and Control (grid modernization) upgrades are required at Viaducto TC, Monacillos TC, Bayamon TC, Isla Grande TC, Palo Seco SP, Martin Pena TC and Hato Rey TC for 115kV lines 38000, 39200, 40000, 39300, 40500, 40600, 40700 and 41600.

## Section 3. Scope Scope of Work

### 3.1. Plan for Repair Description

The SOW will include three replacement and upgrade tasks:

1. **Line 38000 Damage Replacement.** Replacing the damaged cable section of Line 38000.
  - a. **MH-8 Component Replacement.** A subtask of Task 1.
2. **115kV Circuit Breaker Replacements.** Replacing the 115-kV circuit breakers at Bayamon TC (40730) and Hato Rey TC (39350).
3. **Protection Upgrade.** Upgrading Protection and Control (grid modernization) are required at Viaducto TC, Monacillos TC, Bayamon TC, Isla Grande TC, Palo Seco SP, Martin Pena TC and Hato Rey TC for 115kV lines 38000, 39200, 40000, 39300, 40500, 40600, 40700 and 41600.
4. **115kV Breaker Installations and Line Terminations.** At San Juan SP two new GIS circuit breakers will be installed with P&C, and transmission lines will be terminated to the new breakers. Scope at San Juan SP will be funded by the San Juan 11kV GIS project.

For Task 1 – Line 38000 Damage Replacement, there are two options to replace the damaged section of cable. These options will be considered during the 30% engineering phase and are:

- **Option 1.** Install the cable in conduit and attach it to the underside of Constitution Bridge spanning the Martin Peña Canal.
- **Option 2.** Make a directional bore, installing the cable on the floor of the canal. (This option would put the cable in a similar position to where it was installed when it was damaged.)

Because time has elapsed since the initial damaging event, corrosion has occurred on the cable and connections at MH-8. The extent of the damage and this corrosion mean that the cable conductors and cable splice bodies are **not** repairable. Every component must be replaced in this damaged section.

Additional, saltwater residues found in the 115-kV MH-8 cable ends indicate that an additional section of cable between MH-7 and MH-8 is required.

A summary for the scope of work for the MH-8 Component Replacement is:

1. Replace the water sump pump. Restore the water management system.
2. Replace three 2750-Kcmil feeder cables going to MH-7 to ensure system reliability.
3. Replace feed cables and supports to MH-9 (Martin Peña Canal). Replace temperature monitor fiber optic cable and 5000 MCM grounding cable to MH-9 (Martin Peña Canal).

For MH-9, will need to replace feeder cables and supports to MH-8 (Martin Peña Canal). Replace temperature monitor fiber optic cable and 5000 MCM grounding cable to MH-8 (Martin Peña Canal).



### 3.2. Improvements

<b>Does the intended plan include any other improvements, not required by codes and standards, including changes in facility size, capacity, dimension, or footprint?</b>
No
<Description of the changes in facility size, capacity, dimension, or footprint>

**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
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.

### 4.2. Industry Standards

Yes
Industry standards will be identified during the A&E work

## 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, 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.





Substation Name	Total Cost (\$M)	30% Engineering (\$M)	Engineering Total (\$M)
115kV San Juan Underground Loop	\$10M*	\$0.6	\$1.0

*\*PREPA intends to offset the total cost of the project by approximately \$2M received from the settlement with the contractor that damaged the cable*

## Section 6. 406 Hazard Mitigation Proposal

### 6.1. 406 Mitigation Opportunity Scope of Work

During the 30% design phase, PREPA will develop and propose 406 Hazard Mitigation proposals consistent with the damages. These proposals will be documented with BCAs.

### 6.2. 406 Mitigation Opportunity Cost Estimate

PREPA will provide detailed cost estimates for each 406 Hazard Mitigation proposal for this substation.

## Section 7. Environmental and Historic Planning (EHP) Requirements

EHP considerations will be identified and evaluated during the 30% design phase and submitted to FEMA for review. Requirements will be incorporated into the final design and construction documents to be approved by FEMA prior to construction activities.

Environmental issues associated with Martin Pena Canal will be evaluated. If the cables are attached to the bridge, coordination with the Department of Transportation will be required.



### Section 8. Program Manager Lead Certification

*Based on my knowledge and I believe, I certify that the documents above 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>&lt;Insert any comments here&gt;</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)>



San Juan UG Loop  
Input.pdf

San Juan UG Loop Input



Line 38000 115 KV  
Martin Pena-Damag

Line 38000 115kV Damage Assessment

### 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)>



115kV UG LOOP  
SENDOUT.pdf

115kV UG Loop Diagram

### 10.4. Other: (Please Describe)

<Insert other documents attached to this submittal>

OH or UG?	Per IRP Exhibit 2-9: New Lines (OH & UG): 16 Projects ~ 141 miles			Information	
	ID	Project	Miles	Existing Parallel OH TLine	
UG	1	New 115 kV Underground Circuit Vega Baja TC – Manati TC @2750 kcmil Cu XLPE	6.78	The existing line has been observed to overload for the trip of the single Bayamon 230/115 kV for the outage of the two 230 kV lines connected to Bayamon that follow the same ROW. This underground line is an interconnection between the S&B and the Arecibo MiniGrid Backbone extending the reach of the generation from Palo Seco to this area.	TL37400 Vega Baja TC - Manati TC
UG	2	New 115 kV Underground Circuit Cambalache TC – Barceloneta TC @2750 kcmil Cu XLPE	8.46	Minigrd backbone extending the realible reach of the generation at Cambalache.	TL37400 Cambalache TC - Barceloneta TC
UG	3	New 115 kV Underground Circuit Palo Seco Steam Plant –Hato Tejas TC - Dorado TC @2750 kcmil Cu XLPE	10.88	The segment Palo Seco to Hato Tejas is a new line extending the reach of the Palo Seco Generation and initiating the backbone of the MiniGrid. The segment Hato Tejas - Dorado parallels the exting line and its role it create the backbone.	TL37400 Hato Tejas TC - Dorado TC
UG	4	New Underground Line 115 kV Yabucoa TC- Humacao TC @ 2750 kcmil Cu XLPE	2.50	The corridor Yabucoa to Humacao has been historically subject to high loadings which heavy sout to north transfers (i.e. lower generation levels in the north). There are currently two 115 kV lines 36300 & 41000 between Yabucoa and Humacao and under various studies we have observed that the trip of one line overloaded the other. In the IRP this underground line would become part of the MiniGrid backbone delivering the energy from Yabucoa to the loads in Cayey.	TLS 36300 & 41000
UG	5	Underground 115 kV Line Yabucoa TC - Sun Oil - Juan Martin Sect @ 2750 kcmil Cu	5.12	Minigrd backbone	TL36300 Yabucoa-SunOil-Juan Martin
UG	6	New 115 kV Underground Circuit Juncos TC – Caguas TC- Bairoa TC @2750 kcmil Cu XLPE	9.17	This circuit provides a parallel path to the line Jobs - Cayey (37800) and it continuation Cayey - Caguas (37800) that under heavy flows under severe contingencies as the loss of both parallel lines Aguirre - Aguas Buenas. It is a continuation of the Caguas MiniGrid backbone.	TL37800
UG	7	New 115 kV Underground Circuit Humacao TC - Juncos TC @ 2750 kcmil Cu XLPE	10.60	This is a continuation of the project with ID 4 above. The trip of the 115 kV line 36300 Humacao Rio Blanco produces heavy loadings on Humacao to Juncos (41400) and this additional circuit would address these loadings in addition to providing a backbone to the minigrd (continuation of the transfer of generation from Yabucoa to the loads in the MiniGrid)	TL41400 Humacao TC - Juncos TC
UG	8	New 115 kV Underground Circuit Daguao TC – Fajardo TC@ 2750 kcmil Cu XLPE (manhole to be provided in front of Playa Los Machos 115 kV Sect. GIS)	10.16	Minigrd backbone to provide a resilient outlet for the generation at Daguao and benefits Vieques and Culebra islands.	TL36200 Daguao TC - Fajardo TC
UG	9	New 115 kV Underground Circuit Canóvanas TC – Palmer TC@2750 kcmilCu XLPE	11.00	Minigrd backbone to provide a resilient interconnection with new generation at Sabana Llana and Canóvanas.	TL36800 Canóvanas TC - Palmer TC
UG	10	Line 40500 extension to Interconnect Venezuela TC GIS @2750 kcmil Cu XLPE	0.68	This is a new UG segment (extension) to interconnect a Station (Venezuela) that will be expanded to have a 115 kV SWYD	TL40500 exists (Monacillos-Hato Rey)
UG	11	New Underground 115 kV Line Martin Peña GIS - Berwind TC @ 2750 kcmil Cu XLPE	6.60	Under heavy transfers south - north the outage of the 230 kV line 50900 Bayamon - Aguas Buenas the 115 kV line 38900 Berwind - Martin Peña presents heavy loadings beyond its current limits. This circuit would provide support and is a continuation of the project 12 below extending the MiniGrid backbone.	TL38900 Martin Peña GIS - Berwind TC
UG	12	New Underground 115 kV Line Sabana Llana TC- Berwind TC @ 2750 kcmil Cu XLPE	2.70	Under heavy transfers south - north the outage of line 50900 Bayamon - Aguas Buenas results in heavy loadings on the lines Sabana Llana - Escorial -Berwind. Additionally these lines can overload for the loss of the single Bayamon transformer under this transfers. The proposed project addresses this situation and extends the Carolina MiniGrid Backbone to the Bayamon - San Juan MiniGrid to Create High Reliability/Resiliency Zones	TL38900 Sabana Llana TC- Berwind TC
UG	13	New 115 kV Underground Circuit Caguas TC/Bairoa TC – Monacillo TC @2750 kcmil Cu XLPE	10.59	This is a continuation of the MiniGrid backbone that starts at Yabucoa (ID 4,6,7). Creates a resilient interconnection that can be supplied from the north (Palo Seco / San Juan) or the south. There is a parallel overhead Caguas - Monacillos 37800.	
OH	14	Construction of 115 kV Line 37800 for Bairoa TC @ 1192.5 kcmil ACSR	1.55	See question 1 (g)	
OH	15	New 115 kV Line Hatillo TC - Mora TC @1192.5 kcmil ACSR Bunting	17.33	The technical justification was the interconnection of critical loads to Minigrd Main Backbone. See also question 1 (g)	
OH	16	New 115 kV Line Costa Sur - Dos Bocas HP @1192.5 kcmil ACSR Bunting	26.80	See question 1 (g)	
			<b>140.92</b>		

Project Description	Load @ 20 kv	Region	Technical Justification	Miles	Total Cost in Millions (\$)	Distribution Substations with Critical Loads	Feeders with Critical Loads in Short Term List	Feeders with Critical Loads in Intermediate Term List	Feeders with Critical Loads in Long Term List	Critical Loads Connected	Ranking (Based on Critical Load Circuit)
Baldrich Sect. 48 KV GIS (including interconnection to new underground to Asella Medical)	HOSPITAL	San Juan	Interconnection of Critical Loads		15.1						1000
New Underground Line Segment 48 KV Hato Rey TC - San Juan Medical Center Sect. @ 2000 kcmil Cu	HOSPITAL	San Juan	Interconnection of Critical Loads	3.2	13.6						1000
New Underground Line 48 KV Venezuela TC - Fonaldeca - San Juan Medical Center Sect. @ 2000 kcmil Cu	HOSPITAL	San Juan	Interconnection of Critical Loads	2.5	9.9						1000
New Underground Line 48 KV Moravia TC - San Juan Medical Center Sect. @ 2000 kcmil Cu	HOSPITAL	San Juan	Interconnection of Critical Loads	1.9	7.7						1000
New Underground 48 KV Line New Crematorio 48 KV Sect. - AAA (Subs 1372) - SAM's (Sub 1581) - Puma Energy (Sub 1571) @ 2-800 kcmil Cu	WATER PUMP, PORTS, COMMERCIAL	San Juan	Interconnection of Critical Loads	1.5	6.6						1000
Underground distribution system and circuits for internal facilities at San Juan Medical Center @ 2-800 kcmil Cu (includes integration of critical loads to new line)	HOSPITAL	San Juan	Interconnection of Critical Loads	1.2	5.1						1000
New Underground 48 KV Line Venezuela TC - Asella Medical - Baldrich Sect. @ 2-800 kcmil Cu	HOSPITAL	San Juan	Interconnection of Critical Loads	1.1	4.8						1000
New Underground 48 KV Line Fonaldeca Sect. GS - Hosp. El Maestro 2-800 kcmil (ACB 89298)	HOSPITAL	San Juan	Interconnection of Critical Loads	0.7	3.1						1000
New Underground 48 KV Line San Juan Medical Center Sect. - 4800 Tap America Miranda @ 2-800 kcmil Cu (includes integration of critical loads to new line)	HOSPITAL	San Juan	Interconnection of Critical Loads	0.7	2.9						1000
Underground 48 KV Circuit Las Lomas Sect. GS - Hospital Metropolitano (ACB 10101) @ 2-800 kcmil Cu	HOSPITAL	San Juan	Interconnection of Critical Loads	0.5	1.5						1000
New Underground 48 KV Line New Trujillo Alto 48 KV Sect. - Sergio Cuevas Substations @ 2-800 kcmil Cu	WATER PUMP	San Juan	Interconnection of Critical Loads	0.3	1.0						1000
New Underground 48 KV Line Vega Baja TC - Hospital Wilma Vazquez - Waldmar - Orfho - Manatí TC @ 2-800 kcmil Cu	HOSPITAL	Bayamón	Interconnection of Critical Loads	4.7	10.7						1000
New Underground 48 KV Line Dorado TC - ACB 10729 (Waldmar) - Moham - AAA Sub. 9384 - Sub. 9388 (Subs @ 2-800 kcmil Cu)	WATER PUMP, COMMERCIAL	Bayamón	Interconnection of Critical Loads	3.1	13.8						1000
New Underground 48 KV Circuit P. Soto - AAA (New ACB between 9303C and Sub. 3883) @ 2-800 kcmil Cu	WATER PUMP	Bayamón	Interconnection of Critical Loads	1.6	8.1						1000
New Underground 48 KV Line Guanajay Sect. - Pan Pagan - AAA Supersubstations - COSTCO @ 2-800 kcmil Cu	WATER PUMP	Bayamón	Interconnection of Critical Loads	1.6	8.8						1000
New Underground 48 KV Circuit Cataño Sect. - Centro Médico Carol/Carroll Regional (New ACB between 9303C and 9303D) @ 2-800 kcmil Cu	PRISON, HOSPITAL	Bayamón	Interconnection of Critical Loads	1.4	6.0						1000
Underground of 48 KV Line 4300 Bayamón TC - Hosp. San Pablo (ACB 4301) - Bayamón Pueblo Sect. @ 2-800 kcmil Cu	HOSPITAL	Bayamón	Interconnection of Critical Loads	1.4	6.0						1000
New Underground 48 KV Circuit Cataño Sect. - Zona Industrial Goya (New 3 Way GSAB between 9025A and 9025B) @ 2-800 kcmil Cu	INDUSTRIAL	Bayamón	Interconnection of Critical Loads	1.4	5.9						1000
New Underground 48 KV Short Line New Canal TC - New Ravilla Zone (Big Knot, Home Depot) with Backup from 4800 (not to avoid unnecessary changes from master line) @ 2-800 kcmil Cu	COMMERCIAL	Bayamón	Existing Infrastructure Hardening for Reliability	1.4	5.6						1000
Complete Underground 48 KV Line 4000 Bayamón Pueblo Sect. - ACB 4000A (Pan de Sal) N. Dept. Waldmar @ 2-800 kcmil Cu (interior @ substations)	COMMERCIAL TOWN CENTER	Bayamón	Interconnection of Critical Loads	1.0	4.3						1000
Underground Line 4200 Cataño Sect. - Puma Energy (Sub. 3771) @ 2-800 kcmil Cu	INDUSTRIAL	Bayamón	Interconnection of Critical Loads	0.8	3.3						1000
Underground 48 KV Line 8200 Cataño Sect. - ACB 8215A (Sub. 1882 - Clave) @ 2-800 kcmil Cu	INDUSTRIAL	Bayamón	Interconnection of Critical Loads	0.7	0.7						1000
New Underground 48 KV Line Planta San Juan - New Crematorio 48 KV Sect. @ 2-800 kcmil Cu (New 4800)	INDUSTRIAL	San Juan	Interconnection of Critical Loads	1.0	4.2	No Critical Loads Found					1000
Interconnection/Restoring Underground 48 KV Line 4300 to Isla Grande TC GS @ 2-800 kcmil Cu	San Juan		Mingled Backbone Extensions to Create High Reliability/Resiliency Zones	0.7	2.6	No Critical Loads Found					1000
New Underground 48 KV Circuit Bayamón TC - Cataño Sect. @ 2-800 kcmil Cu	Bayamón		Interconnection of Critical Loads		1801, 1716	1801-02 (3.2 MVA), 1801-02 (3.3 MVA), 1716-02 (3.4 MVA)	1716-01 (2.0 MVA), 1716-02 (4.2 MVA)	1801-02 (Pública), 1801-02 (COF), Manó de Emergencia, Bombas Puzales, Policía, Bomberos, Refugio (Escuela Francisco Oller), 1716-01 (Bayamón Medical Center), 1716-02 (Centro Gubernamental), 1716-03 (Manó de Emergencia, Hospital Puzales)			19.5
Underground 48 KV Line 4300 Bayamón TC - Juan Domingo Sect. - Caparra Sect. @ 2-800 kcmil Cu	Bayamón		Mingled Backbone Extensions to Create High Reliability/Resiliency Zones		1716, 1911	1716-03 (3.6 MVA)	1911-06 (4.9 MVA), 1716-01 (2.0 MVA), 1716-02 (4.2 MVA)	1911-06 (FEMA, Oficinas de Agencia Federal, Facilidades de Telecomunicaciones), 1716-01 (Bayamón Medical Center, Torre Médica, Hospital San Pablo), 1716-02 (Centro Gubernamental), 1716-03 (Manó de Emergencia, Hospital Puzales)			17.7
Underground 48 KV Line 9400 Dorado TC - Tosa Alta Sub. 9401 @ 2-800 kcmil Cu (Backup shall be provided by distribution line from distribution line 2200 Domingo TC - Hosp. 9400)	Bayamón		Interconnection of Critical Loads	2.5	11.2	9401, 9203	9401-01 (2.4 MVA)	9203-02 (2.3 MVA), 9206-08 (2.3 MVA)	9203-02 (2.3 MVA), 9206-08 (2.3 MVA)		6.9
Underground 48 KV Line 9200 Dorado TC - New Dorado Pueblo Sect. @ 2-800 kcmil Cu	Bayamón		Interconnection of Critical Loads	3.4	15.1	9206, 9205, 9202	9202-01 (1.6 MVA), 9202-02 (1.9 MVA)	9206-08 (FEMA, Manó de Emergencia), 9203-02 (Pública, Alcañal), 9401-01 (Hospital Municipal), Bombas de Aguas Usadas 9202-02 (COF Manó)			6.4
Underground 48 KV Line 4300 Caparra Sect. - Juan Domingo Sect. - Bayamón TC @ 2-800 kcmil Cu	Bayamón		Mingled Backbone Extensions to Create High Reliability/Resiliency Zones		1911		1911-06 (4.9 MVA)	1911-06 (FEMA, Oficinas de Agencia Federal, Facilidades de Telecomunicaciones)			1.6
Underground Line 3500 48 KV Circuit Caparra Sect. - Cacheta Sect. - Las Lomas Sect. - Moravia TC @ 2-800 kcmil Cu	San Juan		Interconnection of Critical Loads	4.2	18.3	1911	1911-06 (4.9 MVA)	1911-06 (FEMA, Oficinas de Agencia Federal, Facilidades de Telecomunicaciones)			4.9
New Underground Line 48 KV M. Pella GS - Villamar Sect. @ 2000 kcmil Cu	San Juan		Interconnection of Critical Loads	3.2	14.4	1113	1113-03 (2.5 MVA)	1113-03 (COF El Molino en la Calle Barroquero de Barrio Olmos)			7.5
Underground Line 10100 Las Lomas Sect. - ACB1011/1012 (Suiza Dairy) - Reparto Metropolitano TD @ 2-800 kcmil Cu (includes underground of line tap to Suiza Dairy @ 1-800 kcmil Cu)	INDUSTRIAL	San Juan	Interconnection of Critical Loads	1.7	7.6	1511	1511-02 (2.20 MVA)	1511-02 (Clínica Cervasis Médica)			2.29
Underground 48 KV Line 15300 Berwind TC - Los Angeles Sect. @ 2-800 kcmil Cu	San Juan		Interconnection of Critical Loads	1.7	7.6	1301	1301-03 (1.3 MVA)	1301-03 (Planta Filtración Calle Neblón)			1.3
Underground Line 3300 Yabucoa TC - Episcopa Sect. @ 2-800 kcmil Cu	San Juan		Interconnection of Critical Loads	0.6	1.6	1100	1100-03 (0.3 MVA)	1100-03 (Bombas colectores de agua en la Av. Fernández Juncos)			0.3
Underground Line 10000 Yabucoa TC - Villamil Sub. @ 2-800 kcmil Cu	San Juan		Interconnection of Critical Loads	0.5	2.2	1100	1100-03 (0.3 MVA)	1100-03 (Bombas colectores de agua en la Av. Fernández Juncos)			0.9