FEMA Project Scope of Work

Project Name:

San German Electrical Service Center

Revision: 0

Date: 19AUG2021

APPROVALS

The signatures below formally approve the FEMA Project Scope of Work Template.

Grant Manager's Name	Signature	Date
Hernando Gee, IEM		8/25/21
Section Manager's Name	**Signature**	**Date**
Jenn Blackmore	DocuSigned by: Jenn Blackmore 7BD7055EB948428...	8/23/2021
Department VP's Name	**Signature**	**Date**
Darren Miller	DocuSigned by: D. B. Mix 2FC0AE89CACA46B...	8/25/2021

Document Change Control

This table contains a history of the revisions made to this document

Rev.	Date of Issue	Brief Description of Change
REV 0	19AUG2021	Issued for Use

Contents

Overview

Project Name:	San German Electrical Service Center
Region:	Mayaguez
Damage Number:	250080
Damaged Inventory/Asset Category:	Island Wide Buildings
FEMA Project Number: *(formerly Project Worksheet)*	<Provided by FEMA>

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.

LUMA Energy provides the Operations and Maintenance of the electric service to the entire island of Puerto Rico. Puerto Rico Electric Power Authority (PREPA) is the agency that owns the facilities, sites, and systems identified in this Scope of Work that are eligible as critical services facilities as defined in the PAAP (Section 428) and BBA 2018 guidance documents.

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

Facilities

The facilities listed below are buildings in the San Germán Electric Service Center (ESC). They are occupied by LUMA for the objective of supporting LUMA's operations in the San Germán and adjacent municipalities. GPS Coordinates for the buildings noted in the table below and depicted on the attached maps.

Facility	Address	Coordinates	Area (Sq. Ft.)
San German - Operations	PR-362 Int. PR-360, Bo. Guama San Germán 00683	18.089185, -67.039169	2,500.00
San German - Operations 2	PR-362 Int. PR-360, Bo. Guama San Germán 00683	18.089404, -67.039102	2,500.00
San German - Fleet	PR-362 Int. PR-360, Bo. Guama San Germán 00683	18.089275, -67.038884	4,200.00
San German - Operations Locker Room	PR-362 Int. PR-360, Bo. Guama San Germán 00683	18.089617, -67.038774	5,200.00
San German - Transformer Warehouse	PR-362 Int. PR-360, Bo. Guama San Germán 00683	18.089747, -67.038181	2,000.00
San German - Warehouse	PR-362 Int. PR-360, Bo. Guama San Germán 00683	18.089913, -67.038621	6,200.00
San Germán ESC - Site (No Blgs.)	PR-362 Int. PR-360, Bo. Guama San Germán 00683	18.089231, -67.038308	262,629.00
San Germán ESC FLT 2	PR-362 Int. PR-360, Bo. Guama San Germán 00683	18.089681, -67.037552	6,600.00

Facilities Description

The San German ESC is a complex of different buildings and one (1) site/pavement/parking area located in the San German Municipality in Puerto Rico. The complex is located in Road # 362, Intersection Road # 360, Bo. Guama, San German PR. 00636. It has an area of approximately 292,000 square feet and it was constructed in the year 1960 approximately. Its different buildings are used for storage, storage laydown areas, administration buildings and fleet shops. Common systems to all buildings in the site are the following:

Acoustical ceiling systems	Doors	Drainages
Electrical and plumbing fixtures	Electrical systems	Emergency electrical generators
Exhaust fans	Exterior shell of buildings	Fences
Fire protection systems and alarms	Flooring	Furniture
Main entrance Gate - 24Ft (L) 8 Ft (H)	HVAC systems (including ducts)	Lighting systems
Painting	Pavements	Plumbing
Restrooms	Roof waterproofing	Siding panels
Structural elements (such as, but not limited to steel or concrete beams and columns)	Walls and partitions	Water storage systems (cisterns, pumps and associated plumbing and electrical work)
Windows	Perimeter Chain-Link Fence of approximately 2,093 Ft	And other related building components.

These buildings will assist LUMA operate 24 hours a day and 7 days a week, in a safe and stable manner.

Project Scope

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

All buildings in in San Germán ESC will undergo a preliminary and final design for the purpose of addressing specific building requirements, including adjacent parking lots and pavements. This engineering work will develop field assessments of the facilities and document damaged assets to be repaired or replaced. The results of these assessments will help further define the scope of restoration to code and industry standards.

The engineering team will conduct building-specific studies to verify building code compliance, fire safety compliance, structural damage, verify for electric hazards, identify conflicts with various utilities inside the building, test subsurface conditions, verify site drainage, identify environmental and cultural impacts, and verify the site perimeter is properly secured.

Structural elements of the buildings such as (but not limited to) foundations, columns and beams connections will be designed and engineered to confirm structural soundness and stability. Damaged structures will be replaced with higher class (strength) structural elements of suitable materials. Building panels used for roofing and siding, prone to wind damage and water infiltration, shall be replaced with more robust and structurally stable alternatives. Several buildings may require structural assessments, to verify their structural code compliance. The preliminary engineering phase may require soil boring or testing, to make sure load-bearing conditions are suitable for the installation of structures, equipment pads, or underground conduit systems.

Malfunctioning equipment will be replaced conforming to the intended building use and required capacity, per codes and standards. For example, HVAC systems and water pumps. Electrical load and water consumption studies will be required during the design phase to verify the proper equipment is specified. The final scope of work (plans and specifications) will be completed by Q3, 2022 and construction will be started by Q4, 2022.

Type of Project

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.
Restoration to Codes/Standards
This work will be in compliance with FEMA (Public Assistance Alternative Procedures (Section 428) Guide for Permanent Work FEMA-4339-DR-PR February 2020)

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.

Preliminary Engineering

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

Yes

Codes and Standards

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

The following will be referenced when applying specific codes, specifications, and standards to the project design:

1. Consensus-based codes, per FEMA (Public Assistance Alternative Procedures (Section 428) Guide for Permanent Work FEMA-4339-DR-PR February 2020).

2. Industry standards per FEMA Recovery Policy FP-104-009-5, Version 2, Implementing Section 20601 of the 2018 Bipartisan Budget Act through the Public Assistance Program.

3. FEMA Recovery Interim Policy FP-104-009-11 Version 2.1, Consensus-Based Codes, Specifications, and Standards for Public Assistance.

4. LUMA's latest Design Criteria Document (DCD) which aggregates the design considerations of the vast majority of the consensus-based codes, specifications, and standards listed in FEMA Recovery Interim Policy 104-009-11 Version 2.1 (December 20, 2019).

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

Industry Standards

Yes If yes, describe how incorporated below.
Applicable codes and standards will be identified and incorporated into the plans and specifications.

Estimate

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.

Estimated Budget for Architectural & Engineering Design:	$421,290
Estimated Budget for Construction & Procurement:	$2,056,891
Estimated Overall Budget for the Project:	$2,478,182

406 Hazard Mitigation Proposal

406 Mitigation Opportunity Scope of Work

LUMA/IEM will develop 406 Hazard Mitigation proposals consistent with the damages. These proposals will be supported with BCAs.

406 Mitigation Opportunity Cost Estimate

Estimated Budget for Architectural & Engineering to Design:	**Unknown at this time**
Estimated Budget for Procurement:	**Unknown at this time**

Estimated Budget for Construction:	**Unknown at this time**
Estimated Overall Budget for the Project:	**Unknown at this time**

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

Environmental & Historic Preservation Requirements

Environmental & Historic Preservation considerations will be identified and evaluated for during the preliminary 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.

Attachment

Document Name	Description
<N/A>	Project Cost Estimates
<N/A>	Engineering Studies and Designs
<N/A>	Location Maps and Site Picture

FEMA Project Scope of Work

Project Name:

Arecibo Region Repairs

Revision: 0

Date: 19AUG2021

APPROVALS

The signatures below formally approve the FEMA Project Scope of Work Template.

Grant Manager's Name	Signature	Date
Hernando Gee, IEM		8/25/21
Section Manager's Name	**Signature**	**Date**
Jenn Blackmore	DocuSigned by: Jenn Blackmore 7BD7055ED94842D...	8/23/2021
Department VP's Name	**Signature**	**Date**
Darren Miller	DocuSigned by: D. B. Mi 2FC9AE89CACA46B...	8/25/2021

Document Change Control

This table contains a history of the revisions made to this document

Rev.	Date of Issue	Brief Description of Change
REV 0	19AUG2021	Issued for Use

Contents

Overview

Project Name:	Arecibo Region Repairs
Region:	Arecibo
Damage Number:	250080
Damaged Inventory/Asset Category:	Island Wide Buildings
FEMA Project Number: *(formerly Project Worksheet)*	<Provided by FEMA>

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.

LUMA Energy provides the Operations and Maintenance of the electric service to the entire island of Puerto Rico. Puerto Rico Electric Power Authority (PREPA) is the agency that owns the facilities, sites, and systems identified in this Scope of Work that are eligible as critical services facilities as defined in the PAAP (Section 428) and BBA 2018 guidance documents.

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

Facilities

The facilities listed below are buildings in the Arecibo Region. These sites are occupied by LUMA for the objective of supporting LUMA's operations in the region: Administration, customer service, mechanical shops, operations and storage. GPS Coordinates for the buildings noted in the table below and depicted on the attached maps.

Facility	Address	Coordinate	Area (Sq. Ft.)
Manatí ESC Bldg. 3	PR-2 Km 50.1, Bo. Tierras Nuevas Manati, PR 00674, Int. Ave. Kilómetro	18.431947, -66.490928	6,600.00
Manatí ESC Bldg. 1	PR-2 Km 50.1, Bo. Tierras Nuevas Manati, PR 00674, Int. Ave. Kilómetro	18.431665, -66.491585	1,400.00
Manatí ESC Bldg. 2	PR-2 Km 50.1, Bo. Tierras Nuevas Manati, PR 00674, Int. Ave. Kilómetro	18.431786, -66.491339	3,900.00
Manatí ESC Bldg. 4	PR-2 Km 50.1, Bo. Tierras Nuevas Manati, PR 00674, Int. Ave. Kilómetro	18.432025, -66.490434	2,100.00
Manatí ESC Bldg. 5	PR-2 Km 50.1, Bo. Tierras Nuevas Manati, PR 00674, Int. Ave. Kilómetro	18.431199, -66.491304	10,500.00
Manatí ESC Site (no Bldgs.)	PR-2 Km 50.1, Bo. Tierras Nuevas Manati, PR 00674, Int. Ave. Kilómetro	18.431435, -66.491166	126,391.00
Utuado Bldg. 1 - Operations	PR-10, Km. 41.8 Utuado, PR 00641	18.264859, -66.721656	4,000.00
Utuado ESC Bldg. 2 - Restrooms	PR-10, Km. 41.8 Utuado, PR 00641	18.264545, -66.721718	3,400.00
Utuado ESC Bldg. 3 - FLT	PR-10, Km. 41.8 Utuado, PR 00641	18.264476, -66.721366	4,400.00
Utuado ESC Bldg. 4 - WHS	PR-10, Km. 41.8 Utuado, PR 00641	18.264148, -66.721574	8,500.00

Utuado ESC Bldg. 5 - Fuel Pumps	PR-10, Km. 41.8 Utuado, PR 00641	18.264532, -66.721967	600
Utuado ESC Bldg. 6 - Lockers	PR-10, Km. 41.8 Utuado, PR 00641	18.264278, -66.722299	5,600.00
Utuado ESC Bldg. 7 - Doc. WHS	PR-10, Km. 41.8 Utuado, PR 00641	18.264263, -66.722030	1,000.00
Utuado ESC Bldg. 8 - Doc WHS	PR-10, Km. 41.8 Utuado, PR 00641	18.263953, -66.722236	2,200.00
Utuado Site (No Bldgs)	PR-10, Km. 41.8 Utuado, PR 00641	18.264377, -66.721917	121,322.00
Vega Baja - CEX	Calle Betances No. 55, Int. Calle A Bo. Algarrobo, Vega Baja, PR, 00693	18.445553, -66.391086	5,300.00
Vega Baja ESC - FLT	Calle Betances No. 55, Int. Calle A Bo. Algarrobo, Vega Baja, PR, 00693	18.446117, -66.390887	4,700.00
Vega Baja ESC OPS	Calle Betances No. 55, Int. Calle A Bo. Algarrobo, Vega Baja, PR, 00693	18.445553, -66.391309	3,200.00
Vega Baja ESC WHS	Calle Betances No. 55, Int. Calle A Bo. Algarrobo, Vega Baja, PR, 00693	18.446109, -66.391177	3,800.00
Vega Baja Site (no Bldgs)	Calle Betances No. 55, Int. Calle A Bo. Algarrobo, Vega Baja, PR, 00693	18.445931, -66.391215	34,800.00

Facilities Description

The region is composed of different buildings and site/pavements/parking areas used by LUMA to service the Arecibo Region. They will assist LUMA operate 24 hours a day and 7 days a week, in a safe and stable manner. They are used for storage, laydown areas, administration services, customer experience centers and fleet shops. Common systems to all buildings are the following:

Acoustical ceiling systems	Doors	Drainages
Electrical and plumbing fixtures	Electrical systems	Emergency electrical generators
Exhaust fans	Exterior shell of buildings	Fences
Fire protection systems and alarms	Flooring	Furniture
Gates	HVAC systems (including ducts)	Lighting systems
Painting	Pavements	Plumbing
Restrooms	Roof waterproofing	Siding panels
Structural elements (such as, but not limited to steel or concrete beams and columns)	Walls and partitions	Water storage systems (cisterns, pumps and associated plumbing and electrical work)
Windows	Perimeter fence	And other related building components.

Project Scope

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

All buildings will undergo a preliminary and final design for the purpose of addressing specific building requirements, including adjacent parking lots and pavements. This engineering work will develop field assessments of the facilities and document damaged assets to be repaired or replaced. The results of these assessments will help further define the scope of restoration to code and industry standards.

Note that this project is based on a damage assessment sample that was extrapolated across the entire building portfolio, therefore for several building's existing documentation of hurricane damage may not be available. The engineering team will conduct building-specific studies to verify building code compliance, fire safety compliance, structural damage, verify for electric hazards, identify conflicts with various utilities inside the building, test subsurface conditions, verify site drainage, identify environmental and cultural impacts, and verify the site perimeter is properly secured.

Structural elements of the building such as (but not limited to) foundations, columns and beams connections will be designed and engineered to confirm structural soundness and stability. Damaged structures will be replaced with higher class (strength) structural elements of suitable materials. Building panels used for roofing and siding, prone to wind damage and water infiltration, shall be replaced with more robust and structurally stable alternatives. Several buildings may require structural assessments, to verify their structural code compliance. The preliminary engineering phase may require soil boring or testing, to make sure load-bearing conditions are suitable for the installation of structures, equipment pads, or underground conduit systems.

Malfunctioning equipment will be replaced conforming to the intended building use and required capacity, per codes and standards. For example, HVAC systems and water pumps. Electrical load and water consumption studies will be required during the design phase to verify the proper equipment is specified.

The final scope of work (plans and specifications) will be completed by Q1, 2022 and construction will be started by Q3, 2022.

Type of Project

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.
Restoration to Codes/Standards
This work will be in compliance with FEMA (Public Assistance Alternative Procedures (Section 428) Guide for Permanent Work FEMA-4339-DR-PR February 2020)

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.

Preliminary Engineering

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

Yes

Codes and Standards

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

The following will be referenced when applying specific codes, specifications, and standards to the project design:

1. Consensus-based codes, per FEMA (Public Assistance Alternative Procedures (Section 428) Guide for Permanent Work FEMA-4339-DR-PR February 2020).

2. Industry standards per FEMA Recovery Policy FP-104-009-5, Version 2, Implementing Section 20601 of the 2018 Bipartisan Budget Act through the Public Assistance Program.

3. FEMA Recovery Interim Policy FP-104-009-11 Version 2.1, Consensus-Based Codes, Specifications, and Standards for Public Assistance.

4. LUMA's latest Design Criteria Document (DCD) which aggregates the design considerations of the vast majority of the consensus-based codes, specifications, and standards listed in FEMA Recovery Interim Policy 104-009-11 Version 2.1 (December 20, 2019).

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

Industry Standards

Yes If yes, describe how incorporated below.
Applicable codes and standards will be identified and incorporated into the plans and specifications.

Estimate

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

Estimated Budget for Architectural & Engineering Design:	$1,568,573
Estimated Budget for Construction:	$7,658,329
Estimated Overall Budget for the Project:	$9,226,902

406 Hazard Mitigation Proposal

406 Mitigation Opportunity Scope of Work

LUMA/IEM will develop 406 Hazard Mitigation proposals consistent with the damages. These proposals will be supported with BCAs.

406 Mitigation Opportunity Cost Estimate

Estimated Budget for Architectural & Engineering to Design:	Unknown at this time
Estimated Budget for Procurement:	Unknown at this time
Estimated Budget for Construction:	Unknown at this time
Estimated Overall Budget for the Project:	Unknown at this time

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

Environmental & Historic Preservation Requirements

Environmental & Historic Preservation considerations will be identified and evaluated for during the preliminary 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.

Attachment

Document Name	Description
<N/A>	Project Cost Estimates
<N/A>	Engineering Studies and Designs
<N/A>	Location Maps and Site Picture

FEMA Project Scope of Work

Project Name:

Palo Seco South Building Repairs

Revision: 0

Date: 19AUG2021

APPROVALS

The signatures below formally approve the FEMA Project Scope of Work Template.

Grant Manager's Name	Signature	Date
Hernando Gee, IEM		8/25/21
Section Manager's Name	**Signature**	**Date**
Jenn Blackmore	DocuSigned by: Jenn Blackmore 7DD7055ED94842B...	8/23/2021
Department VP's Name	**Signature**	**Date**
Darren Miller	DocuSigned by: 2FC9AE89CACA46B...	8/25/2021

Document Change Control

This table contains a history of the revisions made to this document

Rev.	Date of Issue	Brief Description of Change
REV 0	19AUG2021	Issued for Use

Contents

Overview

Project Name:	Palo Seco South Building Repairs
Region:	Bayamón
Damage Number:	250080
Damaged Inventory/Asset Category:	Island Wide Buildings
FEMA Project Number: *(formerly Project Worksheet)*	<Provided by FEMA>

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.

LUMA Energy provides the Operations and Maintenance of the electric service to the entire island of Puerto Rico. Puerto Rico Electric Power Authority (PREPA) is the agency that owns the facilities, sites, and systems identified in this Scope of Work that are eligible as critical services facilities as defined in the PAAP (Section 428) and BBA 2018 guidance documents.

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

Facilities

The facilities listed below are buildings in the Bayamón Region. These sites are occupied by LUMA for the objective of supporting LUMA's operations in the region: Administration, customer service, mechanical shops, operations and storage. GPS Coordinates for the buildings noted in the table below and depicted on the attached maps.

Facility	Address	Coordinate	Area (Sq. Ft.)
Palo Seco - FLT	Carretera # 165 Km. 30.5, Bo. Palo Seco	18.452641, -66.152013	15,200.00
Palo Seco - FLT Shed 1	Carretera # 165 Km. 30.5, Bo. Palo Seco	18.452686, -66.151734	900
Palo Seco - FLT Shed 2	Carretera # 165 Km. 30.5, Bo. Palo Seco	18.452295, -66.151777	6,800.00
Palo Seco - Oil Warehouse	Carretera # 165 Km. 30.5, Bo. Palo Seco	18.448971, -66.155502	3,800.00
Palo Seco - Ops	Carretera # 165 Km. 30.5, Bo. Palo Seco	18.450349, -66.155214	14,300.00
Palo Seco - Warehouse #11	Carretera # 165 Km. 30.5, Bo. Palo Seco	18.449490, -66.156976	116,300.00
Palo Seco - Warehouse 5	Carretera # 165 Km. 30.5, Bo. Palo Seco	18.450841, -66.155818	21,500.00
Palo Seco - Warehouse 5 Site (No Bldg)	Carretera # 165 Km. 30.5, Bo. Palo Seco	18.450153, -66.156033	382,500.00
Palo Seco Construction Bldg.	Carretera # 165 Km. 30.5, Bo. Palo Seco	18.453540, -66.152131	11,000.00
Palo Seco Construction Bldg. Site (No Bldgs)	Carretera # 165 Km. 30.5, Bo. Palo Seco	18.453540, -66.152131	68,700.00

Palo Seco FLT Site (No Bldgs)	Carretera # 165 Km. 30.5, Bo. Palo Seco	18.452552, -66.151902	129,298.00
Palo Seco OPS Shed	Carretera # 165 Km. 30.5, Bo. Palo Seco	18.450537, -66.155778	2,400.00
Palo Seco OPS Site (no Bldgs)	Carretera # 165 Km. 30.5, Bo. Palo Seco	18.450581, -66.155566	45,044.00
Palo Seco WHS 11 Shed 1	Carretera # 165 Km. 30.5, Bo. Palo Seco	18.448676, -66.156267	14,000.00
Palo Seco WHS 11 Shed 2	Carretera # 165 Km. 30.5, Bo. Palo Seco	18.448682, -66.157264	9,000.00
Palo Seco WHS 11 Shed 3	Carretera # 165 Km. 30.5, Bo. Palo Seco	18.448220, -66.157737	11,500.00
Palo Seco WHS 11 Shed 4 (Small Bldg)	Carretera # 165 Km. 30.5, Bo. Palo Seco	18.449581, -66.157807	600
Palo Seco WHS 11 Shed 5	Carretera # 165 Km. 30.5, Bo. Palo Seco	18.449804, -66.158561	2,400.00
Palo Seco WHS 11 Shed 6	Carretera # 165 Km. 30.5, Bo. Palo Seco	18.450042, -66.157875	1,200.00
Palo Seco WHS 11 Site (No Bldgs)	Carretera # 165 Km. 30.5, Bo. Palo Seco	18.449119, -66.157367	498,336.00
Palo Seco WHS A	Carretera # 165 Km. 30.5, Bo. Palo Seco	18.453148, -66.152718	7,900.00
Palo Seco WHS A,B & C Site (no bldgs)	Carretera # 165 Km. 30.5, Bo. Palo Seco	18.452531, -66.152636	51,000.00
Palo Seco WHS B	Carretera # 165 Km. 30.5, Bo. Palo Seco	18.452748, -66.152600	6,200.00

Palo Seco WHS C	Carretera # 165 Km. 30.5, Bo. Palo Seco	18.452304, -66.152474	7,300.00

Facilities Description

The Palo Seco South site is composed of different buildings used for storage, laydown yards for transmission and distribution structures, structure assembly area, storage laydown area, administration buildings, fleet shops and site/pavements/parking areas used by LUMA to service the island. Common systems to all buildings in the site are the following:

Acoustical ceiling systems	Doors	Drainages
Electrical and plumbing fixtures	Electrical systems	Emergency electrical generators
Exhaust fans	Exterior shell of buildings	Fences
Fire protection systems and alarms	Flooring	Furniture
Gates	HVAC systems (including ducts)	Lighting systems
Painting	Pavements	Plumbing
Restrooms	Roof waterproofing	Siding panels
Structural elements (such as, but not limited to steel or concrete beams and columns)	Walls and partitions	Water storage systems (cisterns, pumps and associated plumbing and electrical work)
Windows	Perimeter fence	And other related building components.

These buildings will assist LUMA operate 24 hours a day and 7 days a week, in a safe and stable manner.

Project Scope

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

All buildings in Palo Seco South will undergo a preliminary and final design for the purpose of addressing specific building requirements. This engineering work will develop field assessments of the facilities and document damaged assets to be repaired or replaced, including adjacent parking lots and pavements. The results of these assessments will help further define the scope of restoration to code and industry standards.

The engineering team will conduct building-specific studies to verify building code compliance, fire safety compliance, structural damage, verify for electric hazards, identify conflicts with various utilities inside the building, test subsurface conditions, verify site drainage, identify environmental and cultural impacts, and verify the site perimeter is properly secured.

Structural elements of the buildings such as (but not limited to) foundations, columns and beams connections will be designed and engineered to confirm structural soundness and stability. Damaged structures will be

replaced with higher class (strength) structural elements of suitable materials. Building panels used for roofing and siding, prone to wind damage and water infiltration, shall be replaced with more robust and structurally stable alternatives. Several buildings may require structural assessments, to verify their structural code compliance. The preliminary engineering phase may require soil boring or testing, to make sure load-bearing conditions are suitable for the installation of structures, equipment pads, or underground conduit systems. Malfunctioning equipment will be replaced conforming to the intended building use and required capacity, per codes and standards. For example, HVAC systems and water pumps. Electrical load and water consumption studies will be required during the design phase to verify the proper equipment is specified. The final scope of work (plans and specifications) will be completed by Q3,2022 and construction will be started by Q4, 2022.

Type of Project

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.
Restoration to Codes/Standards
This work will be in compliance with FEMA (Public Assistance Alternative Procedures (Section 428) Guide for Permanent Work FEMA-4339-DR-PR February 2020)

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.

Preliminary Engineering

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

Yes

Codes and Standards

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

The following will be referenced when applying specific codes, specifications, and standards to the project design:

1. Consensus-based codes, per FEMA (Public Assistance Alternative Procedures (Section 428) Guide for Permanent Work FEMA-4339-DR-PR February 2020).
2. Industry standards per FEMA Recovery Policy FP-104-009-5, Version 2, Implementing Section 20601 of the 2018 Bipartisan Budget Act through the Public Assistance Program.
3. FEMA Recovery Interim Policy FP-104-009-11 Version 2.1, Consensus-Based Codes, Specifications, and Standards for Public Assistance.
4. LUMA's latest Design Criteria Document (DCD) which aggregates the design considerations of the vast majority of the consensus-based codes, specifications, and standards listed in FEMA Recovery Interim Policy 104-009-11 Version 2.1 (December 20, 2019).

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

Industry Standards

Yes If yes, describe how incorporated below.
Applicable codes and standards will be identified and incorporated into the plans and specifications.

Estimate

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

Estimated Budget for Architectural & Engineering to Design:	$1,898,983
Estimated Budget for Construction:	$9,271,509
Estimated Overall Budget for the Project:	$11,170,493

406 Hazard Mitigation Proposal

406 Mitigation Opportunity Scope of Work

LUMA/IEM will develop 406 Hazard Mitigation proposals consistent with the damages. These proposals will be supported with BCAs.

406 Mitigation Opportunity Cost Estimate

Estimated Budget for Architectural & Engineering to Design:	Unknown at this time
Estimated Budget for Procurement:	Unknown at this time
Estimated Budget for Construction:	Unknown at this time
Estimated Overall Budget for the Project:	Unknown at this time

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

Environmental & Historic Preservation Requirements

Environmental & Historic Preservation considerations will be identified and evaluated for during the preliminary 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.

Attachment

Document Name	Description
<N/A>	Project Cost Estimates
<N/A>	Engineering Studies and Designs
<N/A>	Location Maps and Site Picture

FEMA Project Scope of Work

Project Name:

Bayamon Region Repairs

Revision: 0

Date: 19AUG2021

APPROVALS

The signatures below formally approve the FEMA Project Scope of Work Template.

Grant Manager's Name	Signature	Date
Hernando Gee, IEM		8/25/21
Section Manager's Name	**Signature**	**Date**
Jenn Blackmore	DocuSigned by: Jenn Blackmore 7BD7055EB94042B...	8/23/2021
Department VP's Name	**Signature**	**Date**
Darren Miller	DocuSigned by: D. B. Miller 2FC9AE89CACA46B...	8/25/2021

Document Change Control

This table contains a history of the revisions made to this document

Rev.	Date of Issue	Brief Description of Change
REV 0	19AUG2021	Issued for Use

Contents

Overview

Project Name:	Bayamón Region Repairs
Region:	Bayamón
Damage Number:	250080
Damaged Inventory/Asset Category:	Island Wide Buildings
FEMA Project Number: *(formerly Project Worksheet)*	<Provided by FEMA>

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.

LUMA Energy provides the Operations and Maintenance of the electric service to the entire island of Puerto Rico. Puerto Rico Electric Power Authority (PREPA) is the agency that owns the facilities, sites, and systems identified in this Scope of Work that are eligible as critical services facilities as defined in the PAAP (Section 428) and BBA 2018 guidance documents.

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

Facilities

The facilities listed below are buildings in the Bayamón Region. These sites are occupied by LUMA for the objective of supporting LUMA's operations in the region: Administration, customer service, mechanical shops, operations and storage. GPS Coordinates for the buildings noted in the table below and depicted on the attached maps.

Facility	Address	Coordinate	Area (Sq. Ft.)
Bayamón Regional Offices	Calle Dr. Ferrer, Int. Calle Dr. Maceo; Bayamón	18.398282, -66.156979	7400
Bayamón Regional Offices Site (No Bldgs)	Calle Dr. Ferrer, Int. Calle Dr. Maceo; Bayamón	18.398282, -66.156979	13721
Minillas - Operations	Carretera Estatal # 831 Intercepción Carretera Estatal # 174, Bo. Minillas	18.377591, -66.144587	7,800.00
Minillas ESC Bldg. 1	Carretera Estatal # 831 Intercepción Carretera Estatal # 174, Bo. Minillas	18.378286, -66.145024	46000
Minillas ESC Bldg. 2	Carretera Estatal # 831 Intercepción Carretera Estatal # 174, Bo. Minillas	18.377698, -66.145267	3200
Minillas ESC Bldg. 3	Carretera Estatal # 831 Intercepción Carretera Estatal # 174, Bo. Minillas	18.377839, -66.145271	19,800.00
Minillas ESC Bldg. 4	Carretera Estatal # 831 Intercepción Carretera Estatal # 174, Bo. Minillas	18.377645, -66.145860	5000
Minillas Site (No Bldgs)	Carretera Estatal # 831 Intercepción Carretera Estatal # 174, Bo. Minillas	18.377591, -66.144587	325,840.00
Cataño - Fleet	Carr. 869, Km 2.2, Zona Industrial, Bo. Palma	18.434735, -66.154740	35,000.00

Cataño - Fleet Site (No Bldgs)	Carr. 869, Km 2.2, Zona Industrial, Bo. Palma	18.434735, -66.154740	57,522.00
Corozal - Operations	PR-159 int PR-891, Corozal, PR 00783	18.340799, -66.309253	4,300.00
Corozal - Operations Site (no Bldgs)	PR-159 int PR-891, Corozal, PR 00783	18.340799, -66.309253	51,286.00
Guaynabo - CEX	Carretera # 20, Km. 2.6, Bo. Frailes	18.385877, -66.106828	6,700.00
Guaynabo - Operations	Carretera # 20, Km. 2.6, Bo. Frailes	18.385978,-66.107182	17,600.00
Guaynabo - Warehouse	Carretera # 20, Km. 2.6, Bo. Frailes	18.385942, -66.107872	14,300.00
Guaynabo ESC Site (No Bldgs)	Carretera # 20, Km. 2.6, Bo. Frailes	18.386370, -66.107009	213,898.00
Guaynabo FLT	Carretera # 20, Km. 2.6, Bo. Frailes	18.386126, -66.107140	11,100.00
Guaynabo Microfilm Bldg.	Carretera # 20, Km. 2.6, Bo. Frailes	18.385378, -66.107389	10,300.00
Naranjito - Customer Experience	Calle Georgetti, No. 54; Carretera # 164 Salida Bayamón	18.300142, -66.241186	5,000.00
Toa Alta - FLT	Carretera # 829 Km. 2.7 Bo. Ortiz, Toa Alta	18.365369, -66.208397	1,400.00
Toa Alta - Operations	Carretera # 829 Km. 2.7 Bo. Ortiz, Toa Alta	18.364953, -66.208407	1,500.00
Toa Alta - WHS	Carretera # 829 Km. 2.7 Bo. Ortiz, Toa Alta	18.365001, -66.208241	2,200.00
Toa Alta Shed 1	Carretera # 829 Km. 2.7 Bo. Ortiz, Toa Alta	18.365769, -66.208550	2,300.00
Toa Alta Shed 2	Carretera # 829 Km. 2.7 Bo. Ortiz, Toa Alta	18.366075, -66.208162	5,000.00
Toa Alta Site (No Bldgs)	Carretera # 829 Km. 2.7 Bo. Ortiz, Toa Alta	18.365011, -66.208334	83,718.00

Facilities Description

The region is composed of different buildings and site/pavements/parking areas used by LUMA to service the Bayamón Region. They will assist LUMA operate 24 hours a day and 7 days a week, in a safe and stable manner. They are used for storage, laydown areas, administration services, customer experience centers and fleet shops. Common systems to all buildings are the following:

Acoustical ceiling systems	Doors	Drainages
Electrical and plumbing fixtures	Electrical systems	Emergency electrical generators
Exhaust fans	Exterior shell of buildings	Fences
Fire protection systems and alarms	Flooring	Furniture
Gates	HVAC systems (including ducts)	Lighting systems
Painting	Pavements	Plumbing
Restrooms	Roof waterproofing	Siding panels
Structural elements (such as, but not limited to steel or concrete beams and columns)	Walls and partitions	Water storage systems (cisterns, pumps and associated plumbing and electrical work)
Windows	Perimeter fence	And other related building components.

Project Scope

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

All buildings will undergo a preliminary and final design for the purpose of addressing specific building requirements. This engineering work will develop field assessments of the facilities and document damaged assets to be repaired or replaced, including adjacent parking lots and pavements. The results of these assessments will help further define the scope of restoration to code and industry standards.

Note that this project is based on a damage assessment sample that was extrapolated across the entire building portfolio, therefore for several buildings existing documentation of hurricane damage may not be available. The engineering team will conduct building-specific studies to verify building code compliance, fire safety compliance, structural damage, verify for electric hazards, identify conflicts with various utilities inside the building, test subsurface conditions, verify site drainage, identify environmental and cultural impacts, and verify the site perimeter is properly secured.

Structural elements of the building such as (but not limited to) foundations, columns and beams connections will be designed and engineered to confirm structural soundness and stability. Damaged structures will be replaced with higher class (strength) structural elements of suitable materials. Building panels used for roofing and siding, prone to wind damage and water infiltration, shall be replaced with more robust and structurally stable alternatives. Several buildings may require structural assessments, to verify their structural code compliance. The preliminary engineering phase may require soil boring or testing, to make sure load-bearing conditions are suitable for the installation of structures, equipment pads, or underground conduit systems.

Malfunctioning equipment will be replaced conforming to the intended building use and required capacity, per codes and standards. For example, HVAC systems and water pumps. Electrical load and water consumption studies will be required during the design phase to verify the proper equipment is specified.

The final scope of work (plans and specifications) will be completed by Q1, 2022 and construction will be started by Q3, 2022

Type of Project

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.
Restoration to Codes/Standards
This work will be in compliance with FEMA (Public Assistance Alternative Procedures (Section 428) Guide for Permanent Work FEMA-4339-DR-PR February 2020)

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.

Preliminary Engineering

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

Yes

Codes and Standards

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

The following will be referenced when applying specific codes, specifications, and standards to the project design:

1. Consensus-based codes, per FEMA (Public Assistance Alternative Procedures (Section 428) Guide for Permanent Work FEMA-4339-DR-PR February 2020).

2. Industry standards per FEMA Recovery Policy FP-104-009-5, Version 2, Implementing Section 20601 of the 2018 Bipartisan Budget Act through the Public Assistance Program.

3. FEMA Recovery Interim Policy FP-104-009-11 Version 2.1, Consensus-Based Codes, Specifications, and Standards for Public Assistance.

4. LUMA's latest Design Criteria Document (DCD) which aggregates the design considerations of the vast majority of the consensus-based codes, specifications, and standards listed in FEMA Recovery Interim Policy 104-009-11 Version 2.1 (December 20, 2019).

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

Industry Standards

Yes If yes, describe how incorporated below.
Applicable codes and standards will be identified and incorporated into the plans and specifications.

Estimate

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.

Estimated Budget for Architectural & Engineering Design:	$2,626,721
Estimated Budget for Construction & Procurement:	$12,824,583
Estimated Overall Budget for the Project:	$15,451,305

406 Hazard Mitigation Proposal

406 Mitigation Opportunity Scope of Work

LUMA/IEM will develop 406 Hazard Mitigation proposals consistent with the damages. These proposals will be supported with BCAs.

406 Mitigation Opportunity Cost Estimate

Estimated Budget for Architectural & Engineering to Design:	**Unknown at this time**
Estimated Budget for Procurement:	**Unknown at this time**
Estimated Budget for Construction:	**Unknown at this time**
Estimated Overall Budget for the Project:	**Unknown at this time**

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

Environmental & Historic Preservation Requirements

Environmental & Historic Preservation considerations will be identified and evaluated for during the preliminary 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.

Attachment

Document Name	Description
<N/A>	Project Cost Estimates
<N/A>	Engineering Studies and Designs
<N/A>	Location Maps and Site Picture

FEMA Project Scope of Work

Project Name:

Caguas Region Repairs

Revision: 0

Date: 19AUG2021

APPROVALS

The signatures below formally approve the FEMA Project Scope of Work Template.

Grant Manager's Name	Signature	Date
Hernando Gee, IEM		8/25/21
Section Manager's Name	**Signature**	**Date**
Jenn Blackmore	DocuSigned by: Jenn Blackmore 7BD7055EB948428...	8/23/2021
Department VP's Name	**Signature**	**Date**
Darren Miller	DocuSigned by: D. B. Mi 2FC9AE89CACA48B...	8/25/2021

Document Change Control

This table contains a history of the revisions made to this document

Rev.	Date of Issue	Brief Description of Change
REV 0	19AUG2021	Issued for Use

Contents

Overview

Project Name:	Caguas Region Repairs
Region:	Caguas
Damage Number:	250080
Damaged Inventory/Asset Category:	Island Wide Buildings
FEMA Project Number: *(formerly Project Worksheet)*	<Provided by FEMA>

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.

LUMA Energy provides the Operations and Maintenance of the electric service to the entire island of Puerto Rico. Puerto Rico Electric Power Authority (PREPA) is the agency that owns the facilities, sites, and systems identified in this Scope of Work that are eligible as critical services facilities as defined in the PAAP (Section 428) and BBA 2018 guidance documents.

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

Facilities

The facilities listed below are buildings in the Caguas Region. These sites are occupied by LUMA for the objective of supporting LUMA's operations in the region: Administration, customer service, mechanical shops, operations and storage. GPS Coordinates for the buildings noted in the table below and depicted on the attached maps.

Facility	Address	Coordinate	Area (Sq. Ft.)
Aibonito - Customer Experience	305 Ave San José, Aibonito, 00705	18.140599, -66.258891	1,400.00
Aibonito - Customer Experience Site (No Bldg)	305 Ave San José, Aibonito, 00705	18.140599, -66.258891	3,900.00
Barranquitas - Dispatch office	PR-156 Km. 12.5, Bo. Palo Hincado, La Vega Barranquitas, PR 00794	18.188721, -66.320315	120
Barranquitas ESC Bldg. 7	PR-156 Km. 12.5, Bo. Palo Hincado, La Vega Barranquitas, PR 00794	18.188872, -66.319315	3,500.00
Barranquitas ESC Bldg. 1	PR-156 Km. 12.5, Bo. Palo Hincado, La Vega Barranquitas, PR 00794	18.190721, -66.319176	2,700.00
Barranquitas ESC Bldg. 5	PR-156 Km. 12.5, Bo. Palo Hincado, La Vega Barranquitas, PR 00794	18.189373, -66.319202	7,000.00
Barranquitas ESC Bldg. 6	PR-156 Km. 12.5, Bo. Palo Hincado, La Vega Barranquitas, PR 00794	18.188634, -66.318561	7,500.00
Barranquitas ESC Bldg. 8	PR-156 Km. 12.5, Bo. Palo Hincado, La Vega Barranquitas, PR 00794	18.188495, -66.319195	2,400.00
Barranquitas ESC site (no buildings)	PR-156 Km. 12.5, Bo. Palo Hincado, La Vega Barranquitas, PR 00794	18.188872, -66.319315	382,715.00
Caguas ESC - DOC	Carretera # 1 Km 34.5 Esq. Carretera # 33, Bo. Bairoa	18.239386, -66.035877	2,000.00
Caguas ESC - Bldg. 1 (Old Dispatch Center)	Carretera # 1 Km 34.5 Esq. Carretera # 33, Bo. Bairoa	18.238426, -66.036927	3,750.00

Caguas ESC - Bldg. 2 (Construction and Improvements)	Carretera # 1 Km 34.5 Esq. Carretera # 33, Bo. Bairoa	18.239733, -66.037385	4,900.00
Caguas ESC - Bldg. 3 (Conservation)	Carretera # 1 Km 34.5 Esq. Carretera # 33, Bo. Bairoa	18.239938, -66.035848	4,000.00
Caguas ESC - Bldg. 4 (Regional Offices)	Carretera # 1 Km 34.5 Esq. Carretera # 33, Bo. Bairoa	18.239300, -66.036064	6,600.00
Caguas ESC - Fleet	Carretera # 1 Km 34.5 Esq. Carretera # 33, Bo. Bairoa	18.239190, -66.036481	19,000.00
Caguas ESC - Warehouse	Carretera # 1 Km 34.5 Esq. Carretera # 33, Bo. Bairoa	18.238532, -66.037232	11,000.00
Caguas ESC Site (no Buildings)	Carretera # 1 Km 34.5 Esq. Carretera # 33, Bo. Bairoa	18.239300, -66.036064	317,128.00
Caguas Old ICEE Offices	PR-1, Caguas, 00725, near the US Post Office	18.237068, -66.035328	5,000.00
Caguas Old ICEE Offices Site (No Bldgs)	PR-1, Caguas, 00725, near the US Post Office	18.237068, -66.035328	20,500.00
Culebra - Operations	Carreterra # 250, Isla Municipio de Culebra	18.309308, -65.282396	3,000.00
Fajardo A - Operations	400 Av. Marcelito Gotay	18.329158, -65.646773	6,340.00
Fajardo A - Operations Site (No Bldgs)	400 Av. Marcelito Gotay	18.329158, -65.646773	82,660.00
Fajardo B - Fleet	400 Av. Marcelito Gotay	18.329304, -65.645869	4,400.00
Fajardo B - Warehouse	400 Av. Marcelito Gotay	18.329275, -65.646177	6,000.00
Fajardo B Site (No Bldgs)	400 Av. Marcelito Gotay	18.329275, -65.646177	37,233.00
Humacao - Customer Experience	Calle Flor Gerena, Int. Calle Luisa, Humacao	18.148401, -65.823655	4,900.00
Humacao - Customer Experience Site (No Bldgs)	Calle Flor Gerena, Int. Calle Luisa, Humacao	18.148401, -65.823655	21,100.00

Humacao ESC - Warehouse	Carr. #3 KM. 85.9 Bo. Mariana	18.137457, -65.827989	6,400.00
Humacao ESC - Fleet	Carr. #3 KM. 85.9 Bo. Mariana	18.137664, -65.828046	6,400.00
Humacao ESC - Locker rooms	Carr. #3 KM. 85.9 Bo. Mariana	18.137486, -65.828244	1,060.00
Humacao ESC - Operations	Carr. #3 KM. 85.9 Bo. Mariana	18.137635, -65.827816	2,400.00
Humacao ESC - Operations Dispatch Building	Carr. #3 KM. 85.9 Bo. Mariana	18.137385, -65.827769	1,760.00
Humacao ESC - Terrace and Conf. Rooms	Carr. #3 KM. 85.9 Bo. Mariana	18.137303, -65.827921	2,000.00
Humacao ESC - Transformer Warehouse	Carr. #3 KM. 85.9 Bo. Mariana	18.137115, -65.828130	2,400.00
Humacao ESC Site (No buildings)	Carr. #3 KM. 85.9 Bo. Mariana	18.137635, -65.827816	161,380.00
Vieques - Customer Experience	Carretera # 200, Bo. Florida Sector Isabel Segunda	18.142935, -65.443936	2,500.00
Vieques - Operations	Carretera # 200, Bo. Florida Sector Isabel Segunda	18.139259, -65.458513	41,000.00

Facilities Description

The region is composed of different buildings and site/pavements/parking areas used by LUMA to service the Caguas Region. They will assist LUMA operate 24 hours a day and 7 days a week, in a safe and stable manner. They are used for storage, laydown areas, administration services, customer experience centers and fleet shops. Common systems to all buildings are the following:

Acoustical ceiling systems	Doors	Drainages
Electrical and plumbing fixtures	Electrical systems	Emergency electrical generators
Exhaust fans	Exterior shell of buildings	Fences
Fire protection systems and alarms	Flooring	Furniture
Gates	HVAC systems (including ducts)	Lighting systems

Painting	Pavements	Plumbing
Restrooms	Roof waterproofing	Siding panels
Structural elements (such as, but not limited to steel or concrete beams and columns)	Walls and partitions	Water storage systems (cisterns, pumps and associated plumbing and electrical work)
Windows	Perimeter fence	And other related building components.

Project Scope

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

All buildings will undergo a preliminary and final design for the purpose of addressing specific building requirements. This engineering work will develop field assessments of the facilities and document damaged assets to be repaired or replaced, including adjacent parking lots and pavements. The results of these assessments will help further define the scope of restoration to code and industry standards.

Note that this project is based on a damage assessment sample that was extrapolated across the entire building portfolio, therefore for several buildings existing documentation of hurricane damage may not be available. The engineering team will conduct building-specific studies to verify building code compliance, fire safety compliance, structural damage, verify for electric hazards, identify conflicts with various utilities inside the building, test subsurface conditions, verify site drainage, identify environmental and cultural impacts, and verify the site perimeter is properly secured.

Structural elements of the building such as (but not limited to) foundations, columns and beams connections will be designed and engineered to confirm structural soundness and stability. Damaged structures will be replaced with higher class (strength) structural elements of suitable materials. Building panels used for roofing and siding, prone to wind damage and water infiltration, shall be replaced with more robust and structurally stable alternatives. Several buildings may require structural assessments, to verify their structural code compliance. The preliminary engineering phase may require soil boring or testing, to make sure load-bearing conditions are suitable for the installation of structures, equipment pads, or underground conduit systems.

Malfunctioning equipment will be replaced conforming to the intended building use and required capacity, per codes and standards. For example, HVAC systems and water pumps. Electrical load and water consumption studies will be required during the design phase to verify the proper equipment is specified.

The final scope of work (plans and specifications) will be completed by Q1, 2022 and construction will be started by Q3, 2022

Type of Project

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.
Restoration to Codes/Standards
This work will be in compliance with FEMA (Public Assistance Alternative Procedures (Section 428) Guide for Permanent Work FEMA-4339-DR-PR February 2020)

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.

Preliminary Engineering

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

Yes

Codes and Standards

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

The following will be referenced when applying specific codes, specifications, and standards to the project design:

1. Consensus-based codes, per FEMA (Public Assistance Alternative Procedures (Section 428) Guide for Permanent Work FEMA-4339-DR-PR February 2020).

2. Industry standards per FEMA Recovery Policy FP-104-009-5, Version 2, Implementing Section 20601 of the 2018 Bipartisan Budget Act through the Public Assistance Program.

3. FEMA Recovery Interim Policy FP-104-009-11 Version 2.1, Consensus-Based Codes, Specifications, and Standards for Public Assistance.

4. LUMA's latest Design Criteria Document (DCD) which aggregates the design considerations of the vast majority of the consensus-based codes, specifications, and standards listed in FEMA Recovery Interim Policy 104-009-11 Version 2.1 (December 20, 2019).

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

Industry Standards

Yes If yes, describe how incorporated below.
Applicable codes and standards will be identified and incorporated into the plans and specifications.

Estimate

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

Estimated Budget for Architectural & Engineering to Design:	$2,460,258
Estimated Budget for Construction:	$12,011,850
Estimated Overall Budget for the Project:	$14,472,109

406 Hazard Mitigation Proposal

406 Mitigation Opportunity Scope of Work

LUMA/IEM will develop 406 Hazard Mitigation proposals consistent with the damages. These proposals will be supported with BCAs.

406 Mitigation Opportunity Cost Estimate

Estimated Budget for Architectural & Engineering to Design:	**Unknown at this time**
Estimated Budget for Procurement:	**Unknown at this time**
Estimated Budget for Construction:	**Unknown at this time**
Estimated Overall Budget for the Project:	**Unknown at this time**

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

Environmental & Historic Preservation Requirements

Environmental & Historic Preservation considerations will be identified and evaluated for during the preliminary 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.

Attachment

Document Name	Description
<N/A>	Project Cost Estimates
<N/A>	Engineering Studies and Designs
<N/A>	Location Maps and Site Picture

FEMA Project Scope of Work

Project Name:

San Juan Region Repairs

Revision: 0

Date: 19AUG2021

APPROVALS

The signatures below formally approve the FEMA Project Scope of Work Template.

Grant Manager's Name	Signature	Date
Hernando Gee, IEM		8/25/21
Section Manager's Name	**Signature**	**Date**
Jenn Blackmore	DocuSigned by: Jenn Blackmore 7BD7055EB94842D...	8/23/2021
Department VP's Name	**Signature**	**Date**
Darren Miller	DocuSigned by: D. B. Mi 2FC9AE89CACA46D...	8/25/2021

Document Change Control

This table contains a history of the revisions made to this document

Rev.	Date of Issue	Brief Description of Change
REV 0	19AUG2021	Issued for Use

Contents

OVERVIEW

Project Name:	San Juan Region Repairs
Region:	San Juan
Damage Number:	250080
Damaged Inventory/Asset Category:	Island Wide Buildings
FEMA Project Number: *(formerly Project Worksheet)*	<Provided by FEMA>

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.

LUMA Energy provides the Operations and Maintenance of the electric service to the entire island of Puerto Rico. Puerto Rico Electric Power Authority (PREPA) is the agency that owns the facilities, sites, and systems identified in this Scope of Work that are eligible as critical services facilities as defined in the PAAP (Section 428) and BBA 2018 guidance documents.

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

Facilities

The facilities listed below are buildings in the San Juan Region. These sites are occupied by LUMA for the objective of supporting LUMA's operations in the region: Administration, customer service, mechanical shops, operations and storage. GPS Coordinates for the buildings noted in the table below and depicted on the attached maps.

Facility	Address	Coordinate	Area (Sq. Ft.)
Canóvanas - Customer Experience	Calle Palmer, Esquina Vargas # 151 Canóvanas, PR 00729	18.379630, -65.899851	1,000.00
Canóvanas - Customer Experience Site (No Bldgs)	Calle Palmer, Esquina Vargas # 151 Canóvanas, PR 00729	18.379630, -65.899851	1,400.00
Canóvanas ESC - Fleet	Carretera # 188 Parque Industrial, Bo. San Isidro, Canóvanas	18.382832, -65.877734	8,800.00
Canóvanas ESC Guardhouse	Carretera # 188 Parque Industrial, Bo. San Isidro, Canóvanas	18.382777, -65.877247	2,000.00
Canóvanas ESC - Operations	Carretera # 188 Parque Industrial, Bo. San Isidro, Canóvanas	18.382255, -65.877701	4,000.00
Canóvanas ESC - Operations 2	Carretera # 188 Parque Industrial, Bo. San Isidro, Canóvanas	18.382251, -65.877699	8,000.00
Canóvanas ESC - Warehouse	Carretera # 188 Parque Industrial, Bo. San Isidro, Canóvanas	18.382896, -65.878402	6,500.00
Canóvanas ESC - Warehouse 2	Carretera # 188 Parque Industrial, Bo. San Isidro, Canóvanas	18.382454, -65.878448	5,500.00

Canóvanas ESC Site (without buildings)	Carretera # 188 Parque Industrial, Bo. San Isidro, Canóvanas	18.382251, -65.877699	379,682.00
Carolina - Operations	Bo. Martín González, Carretera # 887 Calle Campeche Km. 9.6, Centro Industrial Julio N. Matos	18.373800, -65.970817	29,700.00
Carolina - Warehouse	Bo. Martín González, Carretera # 887 Calle Campeche Km. 9.6, Centro Industrial Julio N. Matos	18.373678, -65.970387	17,200.00
Carolina site (no Bldgs)	Bo. Martín González, Carretera # 887 Calle Campeche Km. 9.6, Centro Industrial Julio N. Matos	18.373262, -65.970954	195,043.00
Carolina site 2 - Parking	Bo. Martín González, Carretera # 887 Calle Campeche Km. 9.6, Centro Industrial Julio N. Matos	18.373816, -65.972238	84,400.00
Monacillo Building and Grounds Offices	PR-8838, Int. Calle Veterano, San Juan, P.R. 00926	18.371314, -66.073491	4,100.00
Monacillo Building and Grounds Offices Site (No Bldgs)	PR-8838, Int. Calle Veterano, San Juan, P.R. 00926	18.371314, -66.073491	7,300.00
Monacillo DOC	PR-8838, Int. Calle Veterano, San Juan, P.R. 00926	18.371818, -66.075594	7,700.00
Monacillo DOC Site (No Bldgs)	PR-8838, Int. Calle Veterano, San Juan, P.R. 00926	18.371818, -66.075594	33,200.00
Monacillo Durotex	PR-8838, Int. Calle Veterano, San Juan, P.R. 00926	18.371549, -66.073683	9,100.00

Monacillo Durotex Site (No Bldgs)	PR-8838, Int. Calle Veterano, San Juan, P.R. 00926	18.371549, -66.073683	19,053.00
Monacillo FLT 1 - Shop 1	PR-8838, Int. Calle Veterano, San Juan, P.R. 00926	18.370795, -66.074703	12,500.00
Monacillo FLT 1 - Shop 2	PR-8838, Int. Calle Veterano, San Juan, P.R. 00926	18.370933, -66.075062	3,800.00
Monacillo FLT 1 Site (No Bldgs)	PR-8838, Int. Calle Veterano, San Juan, P.R. 00926	18.370668, -66.074936	18,700.00
Monacillo FLT 2 Shop 1	PR-8838, Int. Calle Veterano, San Juan, P.R. 00926	18.370616, -66.073799	700
Monacillo FLT 2 Shop 2	PR-8838, Int. Calle Veterano, San Juan, P.R. 00926	18.370485, -66.073863	2,500.00
Monacillo FLT 2 Shop 3	PR-8838, Int. Calle Veterano, San Juan, P.R. 00926	18.370497, -66.074045	4,700.00
Monacillo FLT 2 Shop 4	PR-8838, Int. Calle Veterano, San Juan, P.R. 00926	18.370291, -66.073951	1,400.00
Monacillo FLT 2 Shop 5	PR-8838, Int. Calle Veterano, San Juan, P.R. 00926	18.370196, -66.074030	1,400.00
Monacillo FLT 2 Shop 6	PR-8838, Int. Calle Veterano, San Juan, P.R. 00926	18.370073, -66.074252	600
Monacillo FLT 2 Site	PR-8838, Int. Calle Veterano, San Juan, P.R. 00926	18.370235, -66.074151	81,587.00
Monacillo FLT 2 WHS	PR-8838, Int. Calle Veterano, San Juan, P.R. 00926	18.370948, -66.073900	4,400.00
Monacillo La Casita	PR-8838, Int. Calle Veterano, San Juan, P.R. 00926	18.371839, -66.073419	1,300.00

Monacillo La Torre Site (No Bldgs)	PR-8838, Int. Calle Veterano, San Juan, P.R. 00926	18.372068, -66.073088	122,900.00
Monacillo Lockers	PR-8838, Int. Calle Veterano, San Juan, P.R. 00926	18.371355, -66.075014	19,200.00
Monacillo Lockers Site (No Bldgs)	PR-8838, Int. Calle Veterano, San Juan, P.R. 00926	18.371355, -66.075014	22,000.00
Monacillo NEOM	PR-8838, Int. Calle Veterano, San Juan, P.R. 00926	18.373292, -66.072177	21,400.00
Monacillo NEOM Multistory Parking	PR-8838, Int. Calle Veterano, San Juan, P.R. 00926	18.373632, -66.072173	17,000.00
Monacillo NEOM Site (No Bldgs)	PR-8838, Int. Calle Veterano, San Juan, P.R. 00926	18.372905, -66.072169	33,887.00
Monacillo OPS Bldg 1	PR-8838, Int. Calle Veterano, San Juan, P.R. 00926	18.371671, -66.075968	5,900.00
Monacillo OPS Bldg 2	PR-8838, Int. Calle Veterano, San Juan, P.R. 00926	18.371167, -66.075925	5,500.00
Monacillo OPS Bldg 3	PR-8838, Int. Calle Veterano, San Juan, P.R. 00926	18.371307, -66.076662	1,600.00
Monacillo OPS Bldg 4	PR-8838, Int. Calle Veterano, San Juan, P.R. 00926	18.371114, -66.076597	3,500.00
Monacillo OPS Bldg 5	PR-8838, Int. Calle Veterano, San Juan, P.R. 00926	18.370831, -66.076493	2,600.00
Monacillo OPS Bldg 6	PR-8838, Int. Calle Veterano, San Juan, P.R. 00926	18.370667, -66.076234	1,700.00
Monacillo OPS Bldg 7	PR-8838, Int. Calle Veterano, San Juan, P.R. 00926	18.370294, -66.076335	3,500.00

Monacillo OPS Bldg 8	PR-8838, Int. Calle Veterano, San Juan, P.R. 00926	18.370285, -66.075867	2,000.00
Monacillo OPS Bldg 9	PR-8838, Int. Calle Veterano, San Juan, P.R. 00926	18.371497, -66.075601	700
Monacillo OPS Site (no Bldgs)	PR-8838, Int. Calle Veterano, San Juan, P.R. 00926	18.371414, -66.076105	181,257.00
Monacillo TOC - La Torre Bldg	PR-8838, Int. Calle Veterano, San Juan, P.R. 00926	18.372310, -66.073141	14,488.00
Monacillo TOC - La Torre Bldg Site (No Bldgs)	PR-8838, Int. Calle Veterano, San Juan, P.R. 00926	18.372310, -66.073141	109,756.00
Monacillo WHS - Underground Construction Site (No Bldgs)	PR-8838, Int. Calle Veterano, San Juan, P.R. 00926	18.370870, -66.075372	48,083.00
Monacillo WHS - Underground Construction WHS 1	PR-8838, Int. Calle Veterano, San Juan, P.R. 00926	18.370862, -66.075566	3,700.00
Monacillo WHS - Underground Construction WHS 2	PR-8838, Int. Calle Veterano, San Juan, P.R. 00926	18.370721, -66.075102	1,000.00
Monacillo WHS 13	PR-8838, Int. Calle Veterano, San Juan, P.R. 00926	18.371960, -66.075239	10,300.00
Monacillo WHS 13 Site (No Bldgs)	PR-8838, Int. Calle Veterano, San Juan, P.R. 00926	18.371960, -66.075239	4,400.00
Monacillo WHS 18	PR-8838, Int. Calle Veterano, San Juan, P.R. 00926	18.371907, -66.073676	6,500.00
Monacillo WHS 18 Site (No Bldgs)	PR-8838, Int. Calle Veterano, San Juan, P.R. 00926	18.371907, -66.073676	6,700.00
Río Piedras - Fleet	PR-47, Int. Calle Juan Pea Reyes, San Juan.	18.398111, -66.025499	14,400.00

Rio Piedras - Fleet 2	PR-47, Int. Calle Juan Pea Reyes, San Juan.	18.398476, -66.025859	15,600.00
Río Piedras - Metering	PR-47, Int. Calle Juan Pea Reyes, San Juan.	18.397366, -66.025117	13,000.00
Río Piedras - Warehouse	PR-47, Int. Calle Juan Pea Reyes, San Juan.	18.397834, -66.025626	27,100.00
Río Piedras - Warehouse (Meters)	PR-47, Int. Calle Juan Pea Reyes, San Juan.	18.397604, -66.025647	12,500.00
Río Piedras OPS	PR-47, Int. Calle Juan Pea Reyes, San Juan.	18.397380, -66.025638	27,800.00
R'io Piedras Site (No Bldgs)	PR-47, Int. Calle Juan Pea Reyes, San Juan.	18.398420, -66.025429	136,352.00
Santurce - Juan Ruiz Velez	1250 Ave. Juan Ponce De León, Santurce, P.R.	18.451791, -66.076693	21,128.00
Santurce - Luchetti	1250 Ave. Juan Ponce De León, Santurce, P.R.	18.451394, -66.076094	16,600.00
Santurce - Multistory Parking	1250 Ave. Juan Ponce De León, Santurce, P.R.	18.450714, -66.076554	43,100.00
Santurce - NEOS	1250 Ave. Juan Ponce De León, Santurce, P.R.	18.451048, -66.076297	31,123.00
Santurce Corp Plaza	1250 Ave. Juan Ponce De León, Santurce, P.R.	18.45156072382131, -66.0764985141612	29,300.00
Santurce Site (No Bldgs)	1250 Ave. Juan Ponce De León, Santurce, P.R.	18.451076, -66.077038	150,415.00

Facilities Description

The region is composed of different buildings and site/pavements/parking areas used by LUMA to service the San Juan Region. They will assist LUMA operate 24 hours a day and 7 days a week, in a safe and stable manner. They are used for storage, laydown areas, administration services, customer experience centers and fleet shops. Common systems to all buildings are the following:

Acoustical ceiling systems	Doors	Drainages
Electrical and plumbing fixtures	Electrical systems	Emergency electrical generators
Exhaust fans	Exterior shell of buildings	Fences

Fire protection systems and alarms	Flooring	Furniture
Gates	HVAC systems (including ducts)	Lighting systems
Painting	Pavements	Plumbing
Restrooms	Roof waterproofing	Siding panels
Structural elements (such as, but not limited to steel or concrete beams and columns)	Walls and partitions	Water storage systems (cisterns, pumps and associated plumbing and electrical work)
Windows	Perimeter fence	And other related building components.

Project Scope

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

All buildings will undergo a preliminary and final design for the purpose of addressing specific building requirements. This engineering work will develop field assessments of the facilities and document damaged assets to be repaired or replaced, including adjacent parking lots and pavements. The results of these assessments will help further define the scope of restoration to code and industry standards.

Note that this project is based on a damage assessment sample that was extrapolated across the entire building portfolio, therefore for several buildings existing documentation of hurricane damage may not be available. The engineering team will conduct building-specific studies to verify building code compliance, fire safety compliance, structural damage, verify for electric hazards, identify conflicts with various utilities inside the building, test subsurface conditions, verify site drainage, identify environmental and cultural impacts, and verify the site perimeter is properly secured.

Structural elements of the building such as (but not limited to) foundations, columns and beams connections will be designed and engineered to confirm structural soundness and stability. Damaged structures will be replaced with higher class (strength) structural elements of suitable materials. Building panels used for roofing and siding, prone to wind damage and water infiltration, shall be replaced with more robust and structurally stable alternatives. Several buildings may require structural assessments, to verify their structural code compliance. The preliminary engineering phase may require soil boring or testing, to make sure load-bearing conditions are suitable for the installation of structures, equipment pads, or underground conduit systems.

Malfunctioning equipment will be replaced conforming to the intended building use and required capacity, per codes and standards. For example, HVAC systems and water pumps. Electrical load and water consumption studies will be required during the design phase to verify the proper equipment is specified.

The final scope of work (plans and specifications) will be completed by Q1, 2022 and construction will be started by Q3, 2022

Type of Project

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.
Restoration to Codes/Standards
This work will be in compliance with FEMA (Public Assistance Alternative Procedures (Section 428) Guide for Permanent Work FEMA-4339-DR-PR February 2020)

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.

Preliminary Engineering

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

Yes

Codes and Standards

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

The following will be referenced when applying specific codes, specifications, and standards to the project design:

1. Consensus-based codes, per FEMA (Public Assistance Alternative Procedures (Section 428) Guide for Permanent Work FEMA-4339-DR-PR February 2020).

2. Industry standards per FEMA Recovery Policy FP-104-009-5, Version 2, Implementing Section 20601 of the 2018 Bipartisan Budget Act through the Public Assistance Program.

3. FEMA Recovery Interim Policy FP-104-009-11 Version 2.1, Consensus-Based Codes, Specifications, and Standards for Public Assistance.

4. LUMA's latest Design Criteria Document (DCD) which aggregates the design considerations of the vast majority of the consensus-based codes, specifications, and standards listed in FEMA Recovery Interim Policy 104-009-11 Version 2.1 (December 20, 2019).

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

Industry Standards

Yes If yes, describe how incorporated below.
Applicable codes and standards will be identified and incorporated into the plans and specifications.

Estimate

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

Estimated Budget for Architectural & Engineering to Design:	$5,274,884
Estimated Budget for Construction & Procurement:	$25,753,845
Estimated Overall Budget for the Project:	$31,028,730

406 Hazard Mitigation Proposal

406 Mitigation Opportunity Scope of Work

LUMA/IEM will develop 406 Hazard Mitigation proposals consistent with the damages. These proposals will be supported with BCAs.

406 Mitigation Opportunity Cost Estimate

Estimated Budget for Architectural & Engineering to Design:	**Unknown at this time**
Estimated Budget for Procurement:	**Unknown at this time**
Estimated Budget for Construction:	**Unknown at this time**
Estimated Overall Budget for the Project:	**Unknown at this time**

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

Environmental & Historic Preservation Requirements

Environmental & Historic Preservation considerations will be identified and evaluated for during the preliminary 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.

Attachment

Document Name	Description
<N/A>	Project Cost Estimates
<N/A>	Engineering Studies and Designs
<N/A>	Location Maps and Site Picture

FEMA Project Scope of Work

Project Name:

Mayaguez Region Repairs

Revision: 0

Date: 19AUG2021

APPROVALS

The signatures below formally approve the FEMA Project Scope of Work Template.

Grant Manager's Name	Signature	Date
Hernando Gee, IEM		8/25/21
Section Manager's Name	**Signature**	**Date**
Jenn Blackmore	DocuSigned by: Jenn Blackmore 79D7055E894842B...	8/23/2021
Department VP's Name	**Signature**	**Date**
Darren Miller	DocuSigned by: D. B. Mi 2FC9AE89CACA48B...	8/25/2021

Document Change Control

This table contains a history of the revisions made to this document

Rev.	Date of Issue	Brief Description of Change
REV 0	19AUG2021	Issued for Use

Contents

OVERVIEW

Project Name:	Mayagüez Region Repairs
Region:	Mayagüez
Damage Number:	250080
Damaged Inventory/Asset Category:	Island Wide Buildings
FEMA Project Number: *(formerly Project Worksheet)*	<Provided by FEMA>

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.

LUMA Energy provides the Operations and Maintenance of the electric service to the entire island of Puerto Rico. Puerto Rico Electric Power Authority (PREPA) is the agency that owns the facilities, sites, and systems identified in this Scope of Work that are eligible as critical services facilities as defined in the PAAP (Section 428) and BBA 2018 guidance documents.

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

Facilities

The facilities listed below are buildings in the Mayagüez Region. These sites are occupied by LUMA for the objective of supporting LUMA's operations in the region: Administration, customer service, mechanical shops, operations, and storage. GPS Coordinates for the buildings noted in the table below and depicted on the attached maps.

Facility	Address	Coordinate	Area (Sq. Ft.)
Aguadilla - Customer Experience	485 Avenida Victoria, Aguadilla Pueblo, Aguadilla 00603	18.413135, -67.153662	18,000.00
Aguadilla - Customer Experience Site (No Bldgs)	485 Avenida Victoria, Aguadilla Pueblo, Aguadilla 00603	18.413135, -67.153662	40,200.00
Hormigueros - Customer Experience	PR#319 Int. #2, Bo. Area Industrial Hormigueros, 00660	18.136690, -67.125260	11,200.00
Hormigueros - Customer Experience Site (No Bldgs)	PR#319 Int. #2, Bo. Area Industrial Hormigueros, 00660	18.136690, -67.125260	30,100.00
Isabela ESC Bldg. 2	Pr-2, Near Int. PR 112, Isabela, 00662	18.469984, -67.030142	2,200.00
Isabela ESC FLT	Pr-2, Near Int. PR 112, Isabela, 00662	18.469194, -67.030097	4,300.00
Isabela ESC OPS	Pr-2, Near Int. PR 112, Isabela, 00662	18.469328, -67.029385	6,000.00
Isabela ESC Site (no Bldgs)	Pr-2, Near Int. PR 112, Isabela, 00662	18.469694, -67.029570	231,483.00
Isabela ESC WHS	Pr-2, Near Int. PR 112, Isabela, 00662	18.469746, -67.030277	2,700.00
Mayagüez - DOC	109 Calle de la Candelaria, Mayagüez, 00680	18.202903, -67.144958	1,500.00
Mayagüez - El Mani, Construction Yard	Carretera # 2 Km. 148.9, Bo. Sabanetas Mayaguez, PR 00682	18.247370, -67.159547	163,000.00

Mayagüez DOC Site (No Bldgs)	109 Calle de la Candelaria, Mayagüez, 00680	18.203184, -67.145056	35,500.00
Mayagüez ESC - Fleet	Carretera # 2 Km., Bo. Sabanetas Mayaguez, PR 00682	18.243439, -67.159275	12,500.00
Mayagüez ESC - Operations	Carretera # 2 Km., Bo. Sabanetas Mayaguez, PR 00682	18.243695, -67.160313	7,000.00
Mayagüez ESC - Operations 2	Carretera # 2 Km., Bo. Sabanetas Mayaguez, PR 00682	18.243914, -67.160053	3,200.00
Mayagüez ESC - Warehouse 1	Carretera # 2 Km., Bo. Sabanetas Mayaguez, PR 00682	18.243426, -67.159634	8,000.00
Mayagüez ESC - Warehouse 2	Carretera # 2 Km., Bo. Sabanetas Mayaguez, PR 00682	18.243638, -67.159668	3,700.00
Mayagüez ESC - Warehouse 3	Carretera # 2 Km., Bo. Sabanetas Mayaguez, PR 00682	18.243664, -67.158355	6,600.00
Mayagüez ESC - Warehouse 4	Carretera # 2 Km., Bo. Sabanetas Mayaguez, PR 00682	18.244021, -67.158447	2,000.00
Mayagüez ESC Locker Rooms	Carretera # 2 Km., Bo. Sabanetas Mayaguez, PR 00682	18.243908, -67.159483	10,000.00
Mayagüez ESC Site (No Bldgs)	Carretera # 2 Km., Bo. Sabanetas Mayaguez, PR 00682	18.243695, -67.160313	196,737.00
Mayagüez WHS at DOC	109 Calle de la Candelaria, Mayagüez, 00680	18.203089, -67.145096	11,300.00
Quebradilas ESC Site (no Bldgs)	101-89, PR-479, Quebradillas, PR 00678	18.471575, -66.936770	88,251.00
Quebradillas ESC Bldg 4	101-89, PR-479, Quebradillas, PR 00678	18.471670, -66.936576	2,700.00

Quebradillas ESC Bldg. 1	101-89, PR-479, Quebradillas, PR 00678	18.471750, -66.937002	2000
Quebradillas ESC Bldg. 2	101-89, PR-479, Quebradillas, PR 00678	18.471362, -66.936822	10000
Quebradillas ESC Bldg. 3	101-89, PR-479, Quebradillas, PR 00678	18.471127, -66.936472	6,700.00
Quebradillas ESC Bldg. 5	101-89, PR-479, Quebradillas, PR 00679	18.471046, -66.936136	2,600.00
San Sebastian CEX	Calle José Méndez Cardona # 10, Bo. Bahomamey San Sebastián, 00685	18.336648, -66.994074	5,600.00
San Sebastian CEX Site (No Bldgs)	Calle José Méndez Cardona # 10, Bo. Bahomamey San Sebastián, 00685	18.336648, -66.994074	39,000.00
San Sebastian ESC - Bldg. A	Calle José Méndez Cardona # 10, Bo. Bahomamey San Sebastián, 00685	18.339692, -66.988595	1,900.00
San Sebastian ESC - Bldg. B	Calle José Méndez Cardona # 10, Bo. Bahomamey San Sebastián, 00685	18.339898, -66.988839	2,600.00
San Sebastian ESC - Bldg. C	Calle José Méndez Cardona # 10, Bo. Bahomamey San Sebastián, 00685	18.339945, -66.989013	1,500.00
San Sebastian ESC - Bldg. D	Calle José Méndez Cardona # 10, Bo. Bahomamey San Sebastián, 00685	18.340857, -66.988629	500
San Sebastian ESC - Locker Rooms	Calle José Méndez Cardona # 10, Bo. Bahomamey San Sebastián, 00685	18.340089, -66.988684	1,800.00
San Sebastian ESC - Operations	PR-111, Int. Pr-119 (Ramal PR-111), San Sebastian	18.340172, -66.989283	3,100.00

San Sebastian ESC - Warehouse	PR-111, Int. Pr-119 (Ramal PR-111), San Sebastian	18.339811, -66.988277	7,000.00
San Sebastian Site (No Bldgs)	Calle José Méndez Cardona # 10, Bo. Bahomamey San Sebastián, 00685	18.340304, -66.988741	197,297.00
Yauco - Operations/CEX	25 de Julio St. (PR-127) Int. Matienzo Cintron St. Yauco, 00698	18.032543, -66.852026	3,200.00
Yauco - Warehouse 1	25 de Julio St. (PR-127) Int. Matienzo Cintron St. Yauco, 00698	18.031535, -66.852395	5,800.00
Yauco - Warehouse 2	25 de Julio St. (PR-127) Int. Matienzo Cintron St. Yauco, 00698	18.031254, -66.852173	6,300.00
Yauco - Warehouse 3	25 de Julio St. (PR-127) Int. Matienzo Cintron St. Yauco, 00698	18.031657, -66.851460	2,700.00
Yauco ESC - Lockers	25 de Julio St. (PR-127) Int. Matienzo Cintron St. Yauco, 00698	18.031664, -66.852041	1,900.00
Yauco ESC - Shed 1	25 de Julio St. (PR-127) Int. Matienzo Cintron St. Yauco, 00698	18.032399, -66.852437	4,500.00
Yauco ESC Site (No Bldgs)	25 de Julio St. (PR-127) Int. Matienzo Cintron St. Yauco, 00698	18.032245, -66.852091	193,496.00
Yauco ESC FLT	25 de Julio St. (PR-127) Int. Matienzo Cintron St. Yauco, 00698	18.031845, -66.851865	7,000.00
Yauco Shed 2	25 de Julio St. (PR-127) Int. Matienzo Cintron St. Yauco, 00698	18.032615, -66.851674	800

Facilities Description

The region is composed of different buildings and site/pavements/parking areas used by LUMA to service the Mayagüez Region. They will assist LUMA operate 24 hours a day and 7 days a week, in a safe and stable manner. They are used for storage, laydown areas, administration services, customer experience centers and fleet shops. Common systems to all buildings are the following:

Acoustical ceiling systems	Doors	Drainages
Electrical and plumbing fixtures	Electrical systems	Emergency electrical generators
Exhaust fans	Exterior shell of buildings	Fences
Fire protection systems and alarms	Flooring	Furniture
Gates	HVAC systems (including ducts)	Lighting systems
Painting	Pavements	Plumbing
Restrooms	Roof waterproofing	Siding panels
Structural elements (such as, but not limited to steel or concrete beams and columns)	Walls and partitions	Water storage systems (cisterns, pumps and associated plumbing and electrical work)
Windows	Perimeter fence	And other related building components.

Project Scope

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

All buildings will undergo a preliminary and final design for the purpose of addressing specific building requirements. This engineering work will develop field assessments of the facilities and document damaged assets to be repaired or replaced, including adjacent parking lots and pavements. The results of these assessments will help further define the scope of restoration to code and industry standards.

Note that this project is based on a damage assessment sample that was extrapolated across the entire building portfolio, therefore for several buildings existing documentation of hurricane damage may not be available. The engineering team will conduct building-specific studies to verify building code compliance, fire safety compliance, structural damage, verify for electric hazards, identify conflicts with various utilities inside the building, test subsurface conditions, verify site drainage, identify environmental and cultural impacts, and verify the site perimeter is properly secured.

Structural elements of the building such as (but not limited to) foundations, columns and beams connections will be designed and engineered to confirm structural soundness and stability. Damaged structures will be replaced with higher class (strength) structural elements of suitable materials. Building panels used for roofing and siding, prone to wind damage and water infiltration, shall be replaced with more robust and structurally stable alternatives. Several buildings may require structural assessments, to verify their structural code

compliance. The preliminary engineering phase may require soil boring or testing, to make sure load-bearing conditions are suitable for the installation of structures, equipment pads, or underground conduit systems. Malfunctioning equipment will be replaced conforming to the intended building use and required capacity, per codes and standards. For example, HVAC systems and water pumps. Electrical load and water consumption studies will be required during the design phase to verify the proper equipment is specified. The final scope of work (plans and specifications) will be completed by Q1, 2022 and construction will be started by Q3, 2022

Type of Project

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.
Restoration to Codes/Standards
This work will be in compliance with FEMA (Public Assistance Alternative Procedures (Section 428) Guide for Permanent Work FEMA-4339-DR-PR February 2020)

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.

Preliminary Engineering

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

Yes

Codes and Standards

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

The following will be referenced when applying specific codes, specifications, and standards to the project design:

1. Consensus-based codes, per FEMA (Public Assistance Alternative Procedures (Section 428) Guide for Permanent Work FEMA-4339-DR-PR February 2020).

2. Industry standards per FEMA Recovery Policy FP-104-009-5, Version 2, Implementing Section 20601 of the 2018 Bipartisan Budget Act through the Public Assistance Program.

3. FEMA Recovery Interim Policy FP-104-009-11 Version 2.1, Consensus-Based Codes, Specifications, and Standards for Public Assistance.

4. LUMA's latest Design Criteria Document (DCD) which aggregates the design considerations of the vast majority of the consensus-based codes, specifications, and standards listed in FEMA Recovery Interim Policy 104-009-11 Version 2.1 (December 20, 2019).

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

Industry Standards

Yes If yes, describe how incorporated below.
Applicable codes and standards will be identified and incorporated into the plans and specifications.

Estimate

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

Estimated Budget for Architectural & Engineering to Design:	$2,268,881
Estimated Budget for Construction:	$11,077,479
Estimated Overall Budget for the Project:	$13,346,360

406 Hazard Mitigation Proposal

406 Mitigation Opportunity Scope of Work

LUMA/IEM will develop 406 Hazard Mitigation proposals consistent with the damages. These proposals will be supported with BCAs.

406 Mitigation Opportunity Cost Estimate

Estimated Budget for Architectural & Engineering to Design:	**Unknown at this time**

Estimated Budget for Procurement:	**Unknown at this time**
Estimated Budget for Construction:	**Unknown at this time**
Estimated Overall Budget for the Project:	**Unknown at this time**

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

Environmental & Historic Preservation Requirements

Environmental & Historic Preservation considerations will be identified and evaluated for during the preliminary 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.

Attachment

Document Name	Description
<N/A>	Project Cost Estimates
<N/A>	Engineering Studies and Designs
<N/A>	Location Maps and Site Picture

FEMA Project Scope of Work

Project Name:

Ponce Region Repairs

Revision: 0

Date: 19AUG2021

APPROVALS

The signatures below formally approve the FEMA Project Scope of Work Template.

Grant Manager's Name	Signature	Date
Hernando Gee, IEM		8/25/21
Section Manager's Name	**Signature**	**Date**
Jenn Blackmore	DocuSigned by: Jenn Blackmore 7DD7055ED94042D...	8/23/2021
Department VP's Name	**Signature**	**Date**
Darren Miller	DocuSigned by: 2FC9AE89CACA46B...	8/25/2021

Document Change Control

This table contains a history of the revisions made to this document

Rev.	Date of Issue	Brief Description of Change
REV 0	19AUG2021	Issued for Use

Contents

Overview

Project Name:	Ponce Region Repairs
Region:	Ponce
Damage Number:	250080
Damaged Inventory/Asset Category:	Island Wide Buildings
FEMA Project Number: *(formerly Project Worksheet)*	<Provided by FEMA>

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.

LUMA Energy provides the Operations and Maintenance of the electric service to the entire island of Puerto Rico. Puerto Rico Electric Power Authority (PREPA) is the agency that owns the facilities, sites, and systems identified in this Scope of Work that are eligible as critical services facilities as defined in the PAAP (Section 428) and BBA 2018 guidance documents.

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

Facilities

The facilities listed below are buildings in the Ponce Region. These sites are occupied by LUMA for the objective of supporting LUMA's operations in the region: Administration, customer service, mechanical shops, operations and storage. GPS Coordinates for the buildings noted in the table below and depicted on the attached maps.

Facility	Address	Coordinate	Area (Sq. Ft.)
Guayama - Customer Experience	Carretera Estatal # 3, Km. 138 Bo. Machete	17.980462, -66.119372	7,200.00
Guayama - Customer Experience Site (No Bldgs)	Carretera Estatal # 3, Km. 138 Bo. Machete	17.980462, -66.119372	25,800.00
Guayama ESC Bldg 2	Carr. 748 KM. 0.6 Bo. Algarrobo, Int. Calle 1	17.976017, -66.086585	6,000.00
Guayama ESC Bldg 5	Carr. 748 KM. 0.6 Bo. Algarrobo, Int. Calle 1	17.976233, -66.085930	5,000.00
Guayama ESC Bldg 6	Carr. 748 KM. 0.6 Bo. Algarrobo, Int. Calle 1	17.975593, -66.086086	7,000.00
Guayama ESC Bldg. 1	Carr. 748 KM. 0.6 Bo. Algarrobo, Int. Calle 1	17.976861, -66.086616	1,800.00
Guayama ESC Bldg. 3	Carr. 748 KM. 0.6 Bo. Algarrobo, Int. Calle 1	17.975615, -66.086768	9,000.00
Guayama ESC Bldg. 4	Carr. 748 KM. 0.6 Bo. Algarrobo, Int. Calle 1	17.975044, -66.086890	6,000.00
Guayama ESC Bldg. 7	Carr. 748 KM. 0.6 Bo. Algarrobo, Int. Calle 1	17.975351, -66.086134	4,300.00
Guayama ESC Bldg. 8	Carr. 748 KM. 0.6 Bo. Algarrobo, Int. Calle 1	17.975205, -66.086256	4,300.00
Guayama ESC Site (no Bldgs)	Carretera # 1 Km 34.5 Esq. Carretera # 33, Bo. Bairoa	17.975746, -66.086426	365,841.00
Ponce - Old Regional OPS Office	Calle Villa, Int. Calle Esperanza, Ponce, P.R.	18.010120, -66.621219	12,000.00
Ponce - Old Regional OPS Office Site (No Bldgs)	Calle Villa, Int. Calle Esperanza, Ponce, P.R.	18.010120, -66.621219	22,000.00

Ponce ESC - DOC	Ave. Hostos PR-123, Int. PR-163	18.002086, -66.613056	2,700.00
Ponce ESC - OPS	Ave. Hostos PR-123, Int. PR-163	18.002241, -66.612731	2,500.00
Ponce ESC - Warehouse	Ave. Hostos PR-123, Int. PR-163	18.002210, -66.613032	10,000.00
Ponce ESC Bldg. 10 - OPS (Telecom, Substations and Controls)	Ave. Hostos PR-123, Int. PR-163	18.001263, -66.612265	7,000.00
Ponce ESC Bldg. 2	Ave. Hostos PR-123, Int. PR-163	18.002212, -66.612485	1,000.00
Ponce ESC Bldg. 3	Ave. Hostos PR-123, Int. PR-163	18.001802, -66.612747	1,600.00
Ponce ESC Bldg. 4	Ave. Hostos PR-123, Int. PR-163	18.001323, -66.612664	5,300.00
Ponce ESC Bldg. 7 - FLT	Ave. Hostos PR-123, Int. PR-163	18.001766, -66.612165	6,000.00
Ponce ESC Bldg. 8 - OPS (Telecom, Substations and Controls)	Ave. Hostos PR-123, Int. PR-163	18.001444, -66.612519	3,400.00
Ponce ESC Bldg. 9 - TOC	Ave. Hostos PR-123, Int. PR-163	18.001278, -66.612451	7,200.00
Ponce ESC Guard House	Ave. Hostos PR-123, Int. PR-163	18.002014, -66.613257	100
Ponce Site (No Bldgs)	Ave. Hostos PR-123, Int. PR-163	18.001505, -66.612314	253,200.00
Santa Isabel ESC - Fleet	89-99, Calle Muñoz Rivera, Bo. Santa Isabel	17.963648, -66.400009	5,000.00
Santa Isabel ESC - General Warehouse	89-99, Calle Muñoz Rivera, Bo. Santa Isabel	17.963706, -66.400508	4,700.00
Santa Isabel ESC - Operations & CEX	89-99, Calle Muñoz Rivera, Bo. Santa Isabel	17.964510, -66.400159	3,200.00
Santa Isabel ESC - Training Bldg.	89-99, Calle Muñoz Rivera, Bo. Santa Isabel	17.963948, -66.400394	1500

Santa Isabel ESC Site (No Bldgs)	89-99, Calle Muñoz Rivera, Bo. Santa Isabel	17.963927, -66.400183	91,793.00

Facilities Description

The region is composed of different buildings and site/pavements/parking areas used by LUMA to service the Ponce Region. They will assist LUMA operate 24 hours a day and 7 days a week, in a safe and stable manner. They are used for storage, laydown areas, administration services, customer experience centers and fleet shops. Common systems to all buildings are the following:

Acoustical ceiling systems	Doors	Drainages
Electrical and plumbing fixtures	Electrical systems	Emergency electrical generators
Exhaust fans	Exterior shell of buildings	Fences
Fire protection systems and alarms	Flooring	Furniture
Gates	HVAC systems (including ducts)	Lighting systems
Painting	Pavements	Plumbing
Restrooms	Roof waterproofing	Siding panels
Structural elements (such as, but not limited to steel or concrete beams and columns)	Walls and partitions	Water storage systems (cisterns, pumps and associated plumbing and electrical work)
Windows	Perimeter fence	And other related building components.

Project Scope

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

All buildings will undergo a preliminary and final design for the purpose of addressing specific building requirements. This engineering work will develop field assessments of the facilities and document damaged assets to be repaired or replaced, including adjacent parking lots and pavements. The results of these assessments will help further define the scope of restoration to code and industry standards.

Note that this project is based on a damage assessment sample that was extrapolated across the entire building portfolio, therefore for several buildings existing documentation of hurricane damage may not be available. The engineering team will conduct building-specific studies to verify building code compliance, fire safety compliance, structural damage, verify for electric hazards, identify conflicts with various utilities inside the building, test subsurface conditions, verify site drainage, identify environmental and cultural impacts, and verify the site perimeter is properly secured.

Structural elements of the building such as (but not limited to) foundations, columns and beams connections will be designed and engineered to confirm structural soundness and stability. Damaged structures will be

replaced with higher class (strength) structural elements of suitable materials. Building panels used for roofing and siding, prone to wind damage and water infiltration, shall be replaced with more robust and structurally stable alternatives. Several buildings may require structural assessments, to verify their structural code compliance. The preliminary engineering phase may require soil boring or testing, to make sure load-bearing conditions are suitable for the installation of structures, equipment pads, or underground conduit systems. Malfunctioning equipment will be replaced conforming to the intended building use and required capacity, per codes and standards. For example, HVAC systems and water pumps. Electrical load and water consumption studies will be required during the design phase to verify the proper equipment is specified. The final scope of work (plans and specifications) will be completed by Q1, 2022 and construction will be started by Q3, 2022

Type of Project

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.
Restoration to Codes/Standards
This work will be in compliance with FEMA (Public Assistance Alternative Procedures (Section 428) Guide for Permanent Work FEMA-4339-DR-PR February 2020)

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.

Preliminary Engineering

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

Yes

Codes and Standards

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

The following will be referenced when applying specific codes, specifications, and standards to the project design:

1. Consensus-based codes, per FEMA (Public Assistance Alternative Procedures (Section 428) Guide for Permanent Work FEMA-4339-DR-PR February 2020).
2. Industry standards per FEMA Recovery Policy FP-104-009-5, Version 2, Implementing Section 20601 of the 2018 Bipartisan Budget Act through the Public Assistance Program.
3. FEMA Recovery Interim Policy FP-104-009-11 Version 2.1, Consensus-Based Codes, Specifications, and Standards for Public Assistance.
4. LUMA's latest Design Criteria Document (DCD) which aggregates the design considerations of the vast majority of the consensus-based codes, specifications, and standards listed in FEMA Recovery Interim Policy 104-009-11 Version 2.1 (December 20, 2019).

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

Industry Standards

Yes If yes, describe how incorporated below.
Applicable codes and standards will be identified and incorporated into the plans and specifications.

Estimate

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

Estimated Budget for Architectural & Engineering to Design:	$3,450,027
Estimated Budget for Construction:	$16,844,251
Estimated Overall Budget for the Project:	$20,294,279

406 Hazard Mitigation Proposal

406 Mitigation Opportunity Scope of Work

LUMA/IEM will develop 406 Hazard Mitigation proposals consistent with the damages. These proposals will be supported with BCAs.

406 Mitigation Opportunity Cost Estimate

Estimated Budget for Architectural & Engineering to Design:	**Unknown at this time**
Estimated Budget for Procurement:	**Unknown at this time**
Estimated Budget for Construction:	**Unknown at this time**
Estimated Overall Budget for the Project:	**Unknown at this time**

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

Environmental & Historic Preservation Requirements

Environmental & Historic Preservation considerations will be identified and evaluated for during the preliminary 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.

Attachment

Document Name	Description
<N/A>	Project Cost Estimates
<N/A>	Engineering Studies and Designs
<N/A>	Location Maps and Site Picture

FEMA Project Scope of Work

Project Name:

Telecom Infrastructure

Revision: 0

Date: 20AUG2021

Approvals

The signatures below formally approve the FEMA Project Scope of Work Template.

Grant Manager's Name	Signature	Date
Hernando Gee, IEM		8/22/2021
Department VP's Name	**Signature**	**Date**
Don Cortez		8/23/21

Document Change Control

This table contains a history of the revisions made to this document

Rev.	Date of Issue	Brief Description of Change
REV 0	20AUG2021	Issued for Use

Contents

Overview

Project Name:	Telecom Infrastructure
Region:	All Regions
Damage Number:	223318
Damaged Inventory/Asset Category:	Island-Wide telecommunications System
FEMA Project Number: *(formerly Project Worksheet)*	<Provided by FEMA>

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.

LUMA Energy provides the Operations and Maintenance of the electric service to the entire island of Puerto Rico. Puerto Rico Electric Power Authority (PREPA) is the agency that owns the facilities, sites, and systems identified in this Scope of Work that are eligible as critical services facilities as defined in the PAAP (Section 428) and BBA 2018 guidance documents.

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

Facilities

Facilities List

Name	Number	GPS Start	GPS End
Offices, generation facilities, substations, and radio sites with existing network infrastructure	50	See note	See note
Control Centers	Not Applicable	Not Applicable	Not Applicable
Intelligent devices located along distribution lines	Not Applicable	Not Applicable	Not Applicable
Existing Telecom Buildings	15	See note	See note

Note: GPS coordinates will be confirmed during initial assessment.

Facilities Description

Puerto Rico Electric Power Authority's (PREPA's) communication towers and telecommunication buildings that support point-to-point Microwave, Land Mobile Radio (LMR), and field area network (FAN) services suffered severe damage during hurricane Maria. Most of the towers, built to older EIA/TIA standards were damaged beyond repair and must be replaced. The damage to the towers was statistically based on the 14 inspected facilities and extrapolated to 50 locations.

The telecommunication buildings are concrete-block construction and suffered damage. This project will consider replacement or repair of 50 towers and 15 buildings at standalone telecom sites. Several sites are within U.S. Forest Service or P.R. Department of Natural Resources protected land and must adhere to federal and state requirements for building aesthetics. Additional construction regulations or permits may be required.

Replacement of towers provides a hardened telecommunications network that will alleviate damage from future weather-related events to increase reliability and resiliency. Where possible, replacement with taller towers will provide better coverage of the LMR system and provide space for future networking solutions.

Project Scope

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

This project will consider replacing or repairing approximately 50 damaged communications towers to be TIA 222 H compliant and designed to withstand sustained winds of 160 mph, or higher, as per the latest P.R. Building code wind model requirements/ATC Hazards by Location Modeling and microzoning. Approximately 15 telecommunication buildings will be repaired and refurbished with associated equipment such as generators, battery systems, HVAC and monitoring equipment.

The project scope will include:

1. Conduct stakeholder discussions/engagement to identify requirements and standards for replacement structures.

2. Conduct assessment of building sites and radio towers to determine the extent of the damage to the buildings and towers, propose options to alleviate future damages and the effort required to bring them to applicable codes and standards.
3. Review Microwave, FAN and LMR studies to determine preliminary tower heights and priority of tower locations for all sites.
4. Ensure all new locations comply with all FCC, FAA and environmental requirements of the National Environmental Protection Act and SHPO (State Historical Preservation Office) rules and regulations.,
5. Develop a scope of work (SOW) for EPC contractor.
6. Update and finalize design standards for A&E scope of work.
7. Update tower construction standards for the EPC contractor to follow.
8. Complete tower erection and site construction.
9. Repair buildings and install new Prime/Continuous Power generators and HVAC as necessary. HVAC will provide for a main and back up arrangement.

The final SOW and construction work dates will be determined after assessments are concluded.

Type of Project

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.
Restoration to Codes/Standards
This work will be in compliance with FEMA (Public Assistance Alternative Procedures (Section 428) Guide for Permanent Work FEMA-4339-DR-PR February 2020)

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.

Preliminary Engineering

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

Yes

Codes and Standards

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

The following will be referenced when applying specific codes, specifications, and standards to the project design:

1. Consensus-based codes, per FEMA (Public Assistance Alternative Procedures (Section 428) Guide for Permanent Work FEMA-4339-DR-PR February 2020).

2. Industry standards per FEMA Recovery Policy FP-104-009-5, Version 2, Implementing Section 20601 of the 2018 Bipartisan Budget Act through the Public Assistance Program.

3. FEMA Recovery Interim Policy FP-104-009-11 Version 2.1, Consensus-Based Codes, Specifications, and Standards for Public Assistance.

4. LUMA's latest Design Criteria Document (DCD) which aggregates the design considerations of the vast majority of the consensus-based codes, specifications, and standards listed in FEMA Recovery Interim Policy 104-009-11 Version 2.1 (December 20, 2019).

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

Industry Standards

Yes If yes, describe how incorporated below.
Applicable codes and standards will be identified and incorporated into the plans and specifications.

Estimate

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.

Estimated Budget for Architectural & Engineering Design	12.0M
Estimated Budget for Construction & Procurement	84.5M
Estimated Overall Budget for the Project:	96.5M

406 Hazard Mitigation Proposal

406 Mitigation Opportunity Scope of Work

LUMA/IEM will develop 406 Hazard Mitigation proposals consistent with the damages. These proposals will be supported with BCAs.

406 Mitigation Opportunity Cost Estimate

Estimated Budget for Architectural & Engineering to Design:	**Unknown at this time**
Estimated Budget for Procurement:	**Unknown at this time**
Estimated Budget for Construction:	**Unknown at this time**
Estimated Overall Budget for the Project:	**Unknown at this time**

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

Environmental & Historic Preservation Requirements

Environmental & Historic Preservation considerations will be identified and evaluated for during the preliminary 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.

Attachments

Document Name	Description
N/A	Project Cost Estimates
N/A	Engineering Studies and Designs
N/A	Location Maps and Site Picture

Document Name:

FEMA Project Scope of Work

Project Name:

Mircowave Point-to-Point

Revision: 0

Date: 20AUG2021

Approvals

The signatures below formally approve the FEMA Project Scope of Work Template.

Grant Manager's Name	Signature	Date
Hernando Gee, IEM		8/22/2021
Department VP's Name	**Signature**	**Date**
Don Cortez		8/23/21

Document Change Control

This table contains a history of the revisions made to this document

Rev.	Date of Issue	Brief Description of Change
REV 0	20AUG2021	Issued for Use

Contents

Overview

Project Name:	Microwave Point-to-Point
Region:	All Regions
Damage Number:	223318
Damaged Inventory/Asset Category:	Island-Wide telecommunications System
FEMA Project Number: *(formerly Project Worksheet)*	<Provided by FEMA>

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.

LUMA Energy provides the Operations and Maintenance of the electric service to the entire island of Puerto Rico. Puerto Rico Electric Power Authority (PREPA) is the agency that owns the facilities, sites, and systems identified in this Scope of Work that are eligible as critical services facilities as defined in the PAAP (Section 428) and BBA 2018 guidance documents.

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

Facilities

Facilities List

Name	Number	GPS Start	GPS End
Transmission Microwave PTP radios	108	See note	
Distribution PTMP microwave radios	174	See note	
Repeater Sites – Distribution Radios	30	See Note	

Note: GPS coordinates will be confirmed during initial field assessment.

Facilities Description

Equipment damage by hurricane Maria requires that all microwave equipment be replaced, and links rebuilt in support of reliable connectivity of the network.

The microwave network consists of multiple licensed point to point (PTP) microwave radio links supporting the transmission network, and unlicensed point to multipoint (PTMP) microwave (MW) radios supporting the distribution network.

The licensed PTP transmission links utilize microwave radio equipment that utilizes licensed frequencies granted by the Federal Communications Commission (FCC) in both the 6 GHz and 11 GHz MW bands. The FCC license database lists 49 actively licensed links in the 6 GHz band and 8 actively licensed links in the 11 GHz band. The transmission microwave currently has AVIAT Eclipse, HARRIS FARRION (HF) and HARRIS TRUEPOINT5000 (HT) microwave radios. Based on inspection of 90 microwave radios (45 Links), 100% of the radios were found damaged. To maintain the system working, non-critical links were used as temporary spare parts to repair critical links and keep them functioning at a limited capacity as of to date. By extrapolation to the universe of 108 radios, all 108 units are considered damaged. The damage was caused by water intrusion and power fluctuations. HF is not supported by manufacturer anymore, and the HT is no longer available to purchase as of December 31, 2010. Thus, all 108 microwave radios will be replaced with AVIAT Eclipse under PA claim. AVIAT Eclipse is the equivalent of the HF and HT as per the manufacturer.

The unlicensed Distribution PTMP Wireless Radios are currently INETS and AIRMUX radio modems. Both types of modems suffered damage. 116 out of 160 each INET were found damaged according to PREPA's list of damages and FEMA/COR3 assessments. 58 each Airmux 400/ODU were found damaged according to PREPA's list of damages and FEMA/COR3 assessments. 116 INET will need to be replaced with new Orbit- Model due to the current model no longer being supported. 58 AIRMUX damaged units will be replaced in kind.

The implementation of the new MW equipment is dependent on restoring or rebuilding the required site facilities and towers. This effort will need microwave system planning and coordination. Construction/rebuilding of towers and facilities will start prior to implementation of the new MW systems. The microwave systems implementation will most likely lag any new tower construction by a year.

Project Scope

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

The MW PTP project includes all the licensed and unlicensed MW PTP/PTMP radios, antennas, and other ancillary equipment required to operate the PREPA MW PTP system. The scope of work will include an initial assessment of all the l MW PTP/PTMP sites to determine their status and condition and to verify and document the status and condition of the MW equipment, towers, antennas, and other components of the existing MW system. Further elements of the SOW and plan for repair will include the following:

1. Develop RFP for assessment of existing microwave equipment, antenna and supporting peripheral equipment.
2. Repair or replace damaged existing MW radios, antennas, feed lines and peripheral equipment sufficient to support the network for the next 3 years.
3. Develop RFP for engineering study and a path analysis to establish and validate the future topology of the OT data network. This study will consider fiber optic availability required to restore facilities and in conjunction with the fiber network, propose licensed and unlicensed MW links and their requirements for capacity, redundancy, and reliability in design of a resilient network utilizing fiber backbone and redundancy.
4. Develop RFP for microwave replacement and for system integration including network management System (NMS) and device management software.
5. Conduct all necessary FCC work including site license modifications, new site applications, and path frequency coordination
6. Migrate existing transmission and distribution MW radios and peripheral equipment to the new systems.

The damage included in the FEMA settlement was extrapolated from a limited set of visited facilities. A complete assessment of all existing systems is included in this scope of work.

The final SOW (plans and specifications) will be completed by Q4 2023 and construction will be completed by 2028.

Type of Project

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.
Restoration to Codes/Standards
This work will be in compliance with FEMA (Public Assistance Alternative Procedures (Section 428) Guide for Permanent Work FEMA-4339-DR-PR February 2020)

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.

Preliminary Engineering

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

Yes

Codes and Standards

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

The following will be referenced when applying specific codes, specifications, and standards to the project design:

1. Consensus-based codes, per FEMA (Public Assistance Alternative Procedures (Section 428) Guide for Permanent Work FEMA-4339-DR-PR February 2020).

2. Industry standards per FEMA Recovery Policy FP-104-009-5, Version 2, Implementing Section 20601 of the 2018 Bipartisan Budget Act through the Public Assistance Program.

3. FEMA Recovery Interim Policy FP-104-009-11 Version 2.1, Consensus-Based Codes, Specifications, and Standards for Public Assistance.

4. LUMA's latest Design Criteria Document (DCD) which aggregates the design considerations of the vast majority of the consensus-based codes, specifications, and standards listed in FEMA Recovery Interim Policy 104-009-11 Version 2.1 (December 20, 2019).

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 including: • NFPA 1221: Standard for the Installation, Maintenance and Use of Emergency Services Communications Systems, Backhaul Microwave Systems. • Manual of Regulations and Procedures for Federal Radio Frequency Management (aka "The Red Book"). • 47 CFR 101, Federal Communications Commission (FCC) rules and regulations regarding fixed microwave services • ANSI/NECA/BICSI 607-2011, Standard for Telecommunications Bonding and Grounding Planning and Installation Methods for Commercial Buildings • TDMM 14th Edition – 2020, Telecommunications Distribution Methods Manual • OSPDRM 6th Edition – 2018, Outside Plant Design Reference Manual • ITSIMM 7th Edition – 2017, Information Technology System Installation Methods • TIA 607 • TIA Suite of Standards

Industry Standards

Yes If yes, describe how incorporated below.
Applicable industry standards will be identified and incorporated into the plans and specifications. See Note in previous Section.

Estimate

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.

Estimated Budget for Architectural & Engineering Design	2.5M
Estimated Budget for Construction & Procurement	15.0M
Estimated Overall Budget for the Project:	17.5M

406 Hazard Mitigation Proposal

406 Mitigation Opportunity Scope of Work

LUMA/IEM will develop 406 Hazard Mitigation proposals consistent with the damages. These proposals will be supported with BCAs.

406 Mitigation Opportunity Cost Estimate

Estimated Budget for Architectural & Engineering to Design:	**Unknown at this time**
Estimated Budget for Procurement:	**Unknown at this time**
Estimated Budget for Construction:	**Unknown at this time**
Estimated Overall Budget for the Project:	**Unknown at this time**

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

Environmental & Historic Preservation Requirements

Environmental & Historic Preservation considerations will be identified and evaluated for during the preliminary 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.

Attachments

Attachments will be provided after High Level Assessments (HLA) are completed.

Document Name	Description
N/A	Project Cost Estimates
N/A	Engineering Studies and Designs
N/A	Location Maps and Site Picture

FEMA Project Scope of Work

Project Name:

SCADA Remote Access and RTU Replacements

Revision: 0

Date: 20AUG2021

Approvals

The signatures below formally approve the FEMA Project Scope of Work Template.

Grant Manager's Name	Signature	Date
Hernando Gee, IEM		8/22/2021
Department VP's Name	**Signature**	**Date**
Don Cortez		8/23/21

Document Change Control

This table contains a history of the revisions made to this document

Rev.	Date of Issue	Brief Description of Change
REV 0	20AUG2021	Issued for Use

Contents

Overview

Project Name:	SCADA Remote Access and RTU Replacements
Region:	All Regions
Damage Number:	223318
Damaged Inventory/Asset Category:	Island-Wide telecommunications System
FEMA Project Number: *(formerly Project Worksheet)*	<Provided by FEMA>

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.

LUMA Energy provides the Operations and Maintenance of the electric service to the entire island of Puerto Rico. Puerto Rico Electric Power Authority (PREPA) is the agency that owns the facilities, sites, and systems identified in this Scope of Work that are eligible as critical services facilities as defined in the PAAP (Section 428) and BBA 2018 guidance documents.

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

Facilities

Facilities List

Name	Number	GPS Start	GPS End
349 Substations with existing RTUs currently installed		See note	See note

Note: GPS coordinates will be confirmed during initial assessments.

Facilities Description

PREPA has 349 Remote Terminal Units (RTU) that form the Transmission and Distribution Supervisory Control and Data Acquisition (SCADA) system, providing monitoring and operation of the devices within its substations. The RTUs collect data from site-level devices and provide subsets of that data to the Energy Management System (EMS). The EMS collects this data from the RTUs for monitoring, storing, and analyzing purposes. Additionally, the EMS sends controls to the RTUs which in turn sends controls to their respective site-level devices for operation.

Damage necessitates replacement of 35 of the existing RTUs. Because of the interdependency between the RTUs and EMS, all of the remainder of the RTUs also need to be replaced. Interdependency includes interoperability issues from lack of Distributed Network Protocol (DNP3) support and Internet Protocol (IP) support and that the older legacy CDC protocols are no longer supported. None of the current RTUs support the latest industry cyber security standards and architectures. New RTUs are needed for the short-term projects for the SCADA system including EMS and communications systems. Priority will be given to those older models (44450 & 8850) and those who still use CDC protocol. Based on project schedules and requirements and interim protocol conversion solution may be required for CDC protocol devices, while RTUs are replaced.

The new RTUs will be equipped with current technology, protocols and support remote access requirements. All communications-capable protective relays, meters, network devices, and other intelligent electronic devices (IEDs) will receive remote access connectivity through a managed access platform at the substation. The access platform provides an integrated, comprehensive solution with a seamless configuration environment, ensuring IED connectivity. Activity logging is maintained at the substation level, even if the connection to the central server is temporarily disabled. In addition to capturing compliance record information (NERC CIP), the project will confirm connectivity to all appropriate devices identified at all the substation locations.

Project Scope

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

1. Develop implementation plan for replacement legacy RTUs and ancillary components.
    - Legacy RTUs are outdated technology no longer supported by the vendors.
    - These legacy RTUs are a critical vulnerability without the ability to maintain these systems.
    - Outdated communication protocols are used with these RTUs, which are no longer the industry standard for SCADA systems.
    - These legacy RTUs do not support all the required features of a modern SCADA system.
2. Develop and deploy a remote device access management system.
    - Provide remote access to all microprocessor based intelligent electronic devices (IEDs) within the substation.
    - Utilize active directory validation of users to have a single sign on for utilizing the system.
    - Log usage, connection, and modifications made through the system.

- Manage passwords of all protective relays pushing updated complex passwords out to the devices on a regularly scheduled basis.
- Protective measures for RTUs are in place to support the cybersecurity architecture and profile.
- Automatically retrieve protective relay event files to support post-mortem analysis of faults from the EMS control center.

3. Design and Plan new RTU/Communication Gateway and SCADA platform will include:
    - Support of current industry standard protocols such as DNP3, IEC61850, IEEE C37.118 Synchro phasor and Simple Network Management Protocol (SNMP) while also supporting some legacy protocols such as Modbus.
    - GPS clock supporting IEEE 1588 Precision Time Protocol (PTP) as well as traditional IRIG timing. It is also recommended to add SNTP (server-client) support
    - All devices shall include PRP functionality in order to comply with IEC 62439-3 for network redundancy and resiliency for protection applications such as IEC61850.
    - Device redundancy support capabilities
    - Human Machine Interface (HMI) providing single interface for field technicians to evaluate, monitor and control the substation.
    - Capability of providing hardwired IO when necessary. Panel (cabinet) considerations for space and access limitations.
    - Support IT authentication protocols
4. Develop an RFP for integration services installing RTUs in substations.
    a. Implement interim protocol conversion solution for CDC protocol devices if necessary.
5. Develop an RFP to purchase RTU and associated equipment and warranty.
6. Award RFPs and schedule material ordering and delivery for installation.

Additional functions from the project:

- Cybersecurity and inter-operability features.
- DNP3 Secure Authentication (SAv5)/ SSL functionality.
- Facilitated access to fault location information allowing quicker dispatch times of field services.
- Enhanced remote access, system monitoring, time stamping (PTP), and network and grid diagnostic capability.
- Station and grid-wide Fault Event Reports and Sequence of Events (SOE) recording which support Root Cause Analysis (RCA) functionality.
- New assets that are actively supported by their manufacturers for maintenance and troubleshooting issues.
- Local Area IP networks capable of providing redundancy and resiliency required for implementing IEC-61850 protocol for power system protection.
- RTUs using a wide area IP network that provides redundancy and resiliency required to mitigate network outages caused by weather events or other network disruptions.
- Standardized SCADA systems will reduce operations and maintenance costs.
- Access Management Platform will allow LUMA to easily manage remote connectivity to its entire population of field IEDs. User access is role based, and the user is not provided with any device password or network topology detail thus providing a more secure environment.
- Implemented network-level troubleshooting tools, bringing at-a-glance visibility to IED communications and overall network health.
- System-wide remote access connectivity will reduce PREPA's Engineering and Operations teams costs for configs, troubleshooting, commissioning, and maintenance.
- Audit log of activity and WAN or Remote Access to remote devices.
- Access Management Platform will allow PREPA to quickly gather fault event reports automatically for post-mortem analysis. This will result in faster troubleshooting, reduced system downtime, and enhanced service recovery speed for all customers.

The damage to the SCADA system was identified specifically as damaged RTUs and RTUs that need to be replaced to support applicable codes and standards and cybersecurity requirements.

The final SOW (plans and specifications) will be complete by Q!2022, construction should be complete by 2026.
.

Type of Project

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.
Restoration to Codes/Standards
This work will be in compliance with FEMA (Public Assistance Alternative Procedures (Section 428) Guide for Permanent Work FEMA-4339-DR-PR February 2020)

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.

Preliminary Engineering

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

Yes

Codes and Standards

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

The following will be referenced when applying specific codes, specifications, and standards to the project design:

1. Consensus-based codes, per FEMA (Public Assistance Alternative Procedures (Section 428) Guide for Permanent Work FEMA-4339-DR-PR February 2020).

2. Industry standards per FEMA Recovery Policy FP-104-009-5, Version 2, Implementing Section 20601 of the 2018 Bipartisan Budget Act through the Public Assistance Program.

3. FEMA Recovery Interim Policy FP-104-009-11 Version 2.1, Consensus-Based Codes, Specifications, and Standards for Public Assistance.

4. LUMA's latest Design Criteria Document (DCD) which aggregates the design considerations of the vast majority of the consensus-based codes, specifications, and standards listed in FEMA Recovery Interim Policy 104-009-11 Version 2.1 (December 20, 2019).

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

Industry Standards

Yes If yes, describe how incorporated below.
Applicable codes and standards will be identified and incorporated into the plans and specifications.

Estimate

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.

Estimated Budget for Architectural & Engineering Design	3.0M
Estimated Budget for Construction	27.0M
Estimated Overall Budget for the Project:	30.0M

406 Hazard Mitigation Proposal

406 Mitigation Opportunity Scope of Work

LUMA/IEM will develop 406 Hazard Mitigation proposals consistent with the damages. These proposals will be supported with BCAs.

406 Mitigation Opportunity Cost Estimate

Estimated Budget for Architectural & Engineering to Design:	**Unknown at this time**
Estimated Budget for Procurement:	**Unknown at this time**
Estimated Budget for Construction:	**Unknown at this time**
Estimated Overall Budget for the Project:	**Unknown at this time**

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

Environmental & Historic Preservation Requirements

Environmental & Historic Preservation considerations will be identified and evaluated for during the preliminary 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.

Attachments

Attachments will be provided after High Level Assessments (HLA) are completed.

Document Name	Description
N/A	Project Cost Estimates
N/A	Engineering Studies and Designs
N/A	Location Maps and Site Picture

FEMA Project Scope of Work

Project Name:

Transport Network

Revision: 0

Date: 20AUG2021

Approvals

The signatures below formally approve the FEMA Project Scope of Work Template.

Grant Manager's Name	Signature	Date
Hernando Gee, IEM		8/22/2021
Department VP's Name	**Signature**	**Date**
Don Cortez		8/23/21

Document Change Control

This table contains a history of the revisions made to this document

Rev.	Date of Issue	Brief Description of Change
REV 0	20AUG2021	Issued for Use

Contents

Overview

Project Name:	Transport Network
Region:	All Regions
Damage Number:	223318
Damaged Inventory/Asset Category:	Island-Wide telecommunications System
FEMA Project Number: *(formerly Project Worksheet)*	<Provided by FEMA>

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.

LUMA Energy provides the Operations and Maintenance of the electric service to the entire island of Puerto Rico. Puerto Rico Electric Power Authority (PREPA) is the agency that owns the facilities, sites, and systems identified in this Scope of Work that are eligible as critical services facilities as defined in the PAAP (Section 428) and BBA 2018 guidance documents.

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

Facilities

Facilities List

Name	Number	GPS Start	GPS End
Offices, generation facilities, water dams, substations, and radio sites served by existing wide-area network infrastructure	*400+*	See note	See note
Control Centers	*2*	See note	See note

Note: GPS coordinates will be confirmed during initial assessment.

Facilities Description

Puerto Rico Electric Power Authority (PREPA) has Synchronous Optical Network (SONET) and Ethernet nodes that form the current telecommunications wide-area transport network. In total (substations, microwave sites, and data center locations) the communication network will extend to approximately 400 sites. This Operations Technology (OT) network communicates over a combination of fiber and wireless connections, allowing for remote monitoring, control, protection, and engineering access to the electric grid. As part of the rebuilding effort defined in separate SOWs, PREPA will have new fiber cables installed, and wireless infrastructure built-out.

The scope of this SOW includes a Dense Wavelength Division Multiplexing (DWDM) and Internet Protocol (IP) / multiprotocol label switching (MPLS) network created to connect its control centers, substation generation, and office facilities. Business services and offices will be served by Software Defined Network (SDWAN) that shares the same physical infrastructure, such as fiber optic cables.

A robust communication network is the cornerstone to safe and reliable operation, maintenance, and recovery of the electric grid. During both normal and storm conditions, communication networks allow operators and engineers insight into the state of the grid, providing the key information that will drive and guide any response. The evolution of industry standard technologies from the older SONET to DWDM and IP/MPLS is a cost-effective way to optimize the bandwidth of the existing fiber network and to prepare for future network demands. As has been shown in utilities across the world, a communication system built around an IP/MPLS transport backbone network provides the scalability, reliability, and adaptability required for Supervisory Control And Data Acquisition (SCADA), Distribution Automation (DA), engineering access, Field Area Network (FAN) backhaul, Advanced Metering Infrastructure (AMI) backhaul, distributed energy resource (DER) control, security systems connectivity, and other services.

Project Scope

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

This effort involves the installation of DWDM optical transport equipment, MPLS routers, firewalls, and switches interconnected from station to station via a combination of fiber and wireless connections. The network infrastructure will include the control centers and other strategic sites and expand outward to the rest of the network in a layered approach. Substation communications include the necessary devices to provide network connectivity. Key requirements, including network functionality, network management, quality of service (QoS), timing, and maintenance, will be identified and incorporated within the new network solution.

Key milestones to implement the network replacement include the following tasks:

1. Conduct Engineering study to evaluate the communication transport needs across the program to establish a proposed IP/MPLS and DWDM architecture that can meet those needs. The architecture will be developed following the latest industry and technology standards.

2. Develop an RFP for installation & integration services to send to firms experienced in planning, configuring, and deployment of carrier/utility-scale IP/MPLS and DWDM networks. A network deployment of this size should be performed with the assistance of an experienced System Integrator. The RFP should include the testing, planning, configuration, management, training, and commissioning support needed to support the network buildout over the life of the program.

3. Award RFP and begin phased implementation of new transport network: The proposed IP/MPLS technology and system architecture has been previously tested in lab and will be further tested in field as part of deployment. A pilot project will be part of field evaluation. Specifications, design criteria, and procedures will be developed for the installation, cutover, and implementation of the network.

Network deployment will based on a prioritized schedule to alleviate some of the possible issues on how other program needs such as Substation, Transmission, and Distribution affect network scheduling. The current transport network will maintain system operations while new technologies are implemented, and infrastructure built.

The final SOW (plans and specifications) will be completed by Q1 2022 and construction will be completed by 2025.

Type of Project

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.
Restoration to Codes/Standards
This work will be in compliance with FEMA (Public Assistance Alternative Procedures (Section 428) Guide for Permanent Work FEMA-4339-DR-PR February 2020)

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.

Preliminary Engineering

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

Yes

Codes and Standards

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

The following will be referenced when applying specific codes, specifications, and standards to the project design:

1. Consensus-based codes, per FEMA (Public Assistance Alternative Procedures (Section 428) Guide for Permanent Work FEMA-4339-DR-PR February 2020).
2. Industry standards per FEMA Recovery Policy FP-104-009-5, Version 2, Implementing Section 20601 of the 2018 Bipartisan Budget Act through the Public Assistance Program.
3. FEMA Recovery Interim Policy FP-104-009-11 Version 2.1, Consensus-Based Codes, Specifications, and Standards for Public Assistance.
4. LUMA's latest Design Criteria Document (DCD) which aggregates the design considerations of the vast majority of the consensus-based codes, specifications, and standards listed in FEMA Recovery Interim Policy 104-009-11 Version 2.1 (December 20, 2019).

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

Industry Standards

Yes If yes, describe how incorporated below.
Applicable codes and standards will be identified and incorporated into the plans and specifications.

Estimate

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.

Estimated Budget for Architectural & Engineering Design	37.0M
Estimated Budget for Construction	148.0M
Estimated Overall Budget for the Project:	185.0M

406 Hazard Mitigation Proposal

406 Mitigation Opportunity Scope of Work

LUMA/IEM will develop 406 Hazard Mitigation proposals consistent with the damages. These proposals will be supported with BCAs.

406 Mitigation Opportunity Cost Estimate

Estimated Budget for Architectural & Engineering to Design:	**Unknown at this time**
Estimated Budget for Procurement:	**Unknown at this time**
Estimated Budget for Construction:	**Unknown at this time**
Estimated Overall Budget for the Project:	**Unknown at this time**

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

Environmental & Historic Preservation Requirements

Environmental & Historic Preservation considerations will be identified and evaluated for during the preliminary 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.

Attachments

Document Name	Description
N/A	Project Cost Estimates
N/A	Engineering Studies and Designs
N/A	Location Maps and Site Picture

Document Name:

FEMA Project Scope of Work

Project Name:

Line 2700 Victoria TC to Quebradillas Sect.

Revision: 0

Date: 20AUG2021

APPROVALS

The signatures below formally approve the FEMA Project Scope of Work Template.

Grant Manager's Name	Signature	Date
Hernando Gee, IEM		8/22/2021
Department VP's Name	**Signature**	**Date**
Don Cortez		8/23/21

Document Change Control

This table contains a history of the revisions made to this document

Rev.	Date of Issue	Brief Description of Change
REV. 0	August 20, 2021	Issued for Use

Contents

Overview

Project Name:	Line 2700 Victoria TC to Quebradillas Sect.
Region:	Mayaguez & Arecibo
Damage Number:	206253
Damaged Inventory/Asset Category:	Island Wide Transmission Line System
FEMA Project Number: *(Formerly Project Worksheet)*	<Provided by FEMA>

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.

LUMA Energy provides the Operations and Maintenance of the electric service to the entire island of Puerto Rico. Puerto Rico Electric Power Authority (PREPA) is the agency that owns the facilities, sites, and systems identified in this Scope of Work that are eligible as critical services facilities as defined in the PAAP (Section 428) and BBA 2018 guidance documents.

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

Facilities

Facilities List

The facilities listed below are part of the 20.3 circuit miles of overhead transmission line for 38kV Line 2700 between Victoria TC substation and Quebradillas Sect. This line is a Near-Term priority identified by LUMA.

Name	Number	GPS Start	GPS End	Voltage Level (kV)
Victoria TC to Quebradillas Sect.	2700	18.404295, -67.153923	18.471970, -66.936852	38kV

Facilities Description

The specific facilities included in this proposed project are structures (including their foundations), framing and insulators, load break switches (manual and automated), conductors, guy wires, anchoring, grounding assemblies, and any other associated components.

Most of the construction along this line segment consists of concrete monopole structures with some interspersed wood guyed monopoles structures along HWY PR-2. This line primarily traverses urban areas between Victoria TC substation and Quebradillas Sect.

Project Scope

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

The scope of work for Line 2700 from Victoria TC to Quebradillas Sect.will consist of the repair restoration, or replacement of damaged elements and functionally interdependent non-damaged elements of the overhead portions of these lines as allowed by FEMA Public Assistance Alternative Procedures (Section 428).

In certain circumstances, transmission structures may need to be replaced to meet applicable codes and standards. The transmission lines will undergo modeling and analysis to validate design criteria, including electrical clearances and mechanical loading requirements. The engineering team will perform field assessments of overhead facilities and document damaged assets to be repaired or replaced. The results of this detailed assessments will be used to define the scope of work. Field surveys to locate existing alignment and property boundaries as well as geotechnical investigations may also be performed to assist in the scoping efforts.

The repair or replacement of a transmission structure and components may include: Replacing insulators with polymer type; repairing, replacing, or adding guy wires; repairing or replacing anchors, structure connections, structure foundations, or portions of the foundations; restoring the integral ground of the structure and overhead ground conductor; restoring communications associated with the transmission line; replacing conductor spans when broken with splices, bird cages, pitting, burns, kinks, or stretched conductors; repairing or adding vibration and/or drag dampers or armor rods; and other repairs necessary to conform with codes and standards based upon engineering design specifications and requirements.

In order to comply with codes and standards and to allow for construction access, vegetation removal will be considered in the scope of work. The scope of vegetation removal will be defined during the preliminary engineering phase.

The preliminary engineering phase may also dictate a need for soil boring or testing to evaluate suitability for installation of structures/poles or underground cable systems. When possible, facilities will remain along their existing route and within the existing right-of-way.

The final SOW (plans and specifications) will be completed by Q2 2022 and construction work will be completed by 2024

Type of Project

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
This work will be in compliance with FEMA (Public Assistance Alternative Procedures (Section 428) Guide for Permanent Work FEMA-4339-DR-PR February 2020)

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.

Preliminary Engineering

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

Yes

Codes and Standards

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

The following will be referenced when applying specific codes, specifications, and standards to the project design:

1. Consensus-based codes, per FEMA (Public Assistance Alternative Procedures (Section 428) Guide for Permanent Work FEMA-4339-DR-PR February 2020).
2. Industry standards per FEMA Recovery Policy FP-104-009-5, Version 2, Implementing Section 20601 of the 2018 Bipartisan Budget Act through the Public Assistance Program.
3. FEMA Recovery Interim Policy FP-104-009-11 Version 2.1, Consensus-Based Codes, Specifications, and Standards for Public Assistance.
4. LUMA's latest Design Criteria Document (DCD) which aggregates the design considerations of the vast majority of the consensus-based codes, specifications, and standards listed in FEMA Recovery Interim Policy 104-009-11 Version 2.1 (December 20, 2019).

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

Industry Standards

Yes If yes, describe how incorporated below.
Applicable codes and standards will be identified and incorporated into the plans and specifications.

Estimate

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.

Estimated Budget for Architectural & Engineering Design:	**$ 2.27 M**
Estimated Budget for Construction & Procurement:	**$39.00 M**
Estimated Overall Budget for the Project:	**$ 41.27 M**

406 Hazard Mitigation Proposal

406 Mitigation Opportunity Scope of Work

During the preliminary design phase, LUMA will develop 406 Hazard Mitigation proposals consistent with the damages. These proposals will be supported with BCAs.

406 Mitigation Opportunity Cost Estimate

Estimated Budget for Architectural & Engineering to Design:	**Unknown at this time**
Estimated Budget for Procurement:	**Unknown at this time**
Estimated Budget for Construction:	**Unknown at this time**
Estimated Overall Budget for the Project:	**Unknown at this time**

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

Environmental & Historic Preservation Requirements

EHP considerations will be identified and evaluated during the preliminary 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.

Attachments

Document Name	Description
<N/A>	Project Cost Estimates
<N/A>	Engineering Studies and Designs
<N/A>	Location Maps and Site Picture

Document Name:

FEMA Project Scope of Work

Project Name:

Line 2800 Aguadilla Hospital Distrito Sect to T-Bone TO

Revision: 0

Date: 20AUG2021

APPROVALS

The signatures below formally approve the FEMA Project Scope of Work Template.

Grant Manager's Name	Signature	Date
Hernando Gee, IEM		8/22/2021
Department VP's Name	**Signature**	**Date**
Don Cortez		8/23/21

Document Change Control

This table contains a history of the revisions made to this document

Rev.	Date of Issue	Brief Description of Change
REV. 0	August 20, 2021	Issued for Use

Contents

Overview

Project Name:	Line 2800 Aguadilla Hospital Distrito Sect to T-Bone TO
Region:	Mayaguez
Damage Number:	206253
Damaged Inventory/Asset Category:	Island Wide Transmission Line System
FEMA Project Number: *(Formerly Project Worksheet)*	<Provided by FEMA>

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.

LUMA Energy provides the Operations and Maintenance of the electric service to the entire island of Puerto Rico. Puerto Rico Electric Power Authority (PREPA) is the agency that owns the facilities, sites, and systems identified in this Scope of Work that are eligible as critical services facilities as defined in the PAAP (Section 428) and BBA 2018 guidance documents.

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

Facilities

Facilities List

The facilities listed below are part of the 1.5 circuit miles of overhead transmission line for 38kV Line 2800 from Aguadilla Hospital Distrito Sect. and T-Bone TO substation. This line is a Near-Term priority identified by LUMA.

Name	Number	GPS Start	GPS End	Voltage Level (kV)
Aguadilla Hospital Distrito Sect to T-Bone TO	2800	18.444233, -67.147644	18.460865, -67.148033	38kV

Facilities Description

The specific facilities included in this proposed project are structures (including their foundations), framing and insulators, load break switches (manual and automated), conductors, guy wires, anchoring, grounding assemblies, and any other associated components.

Most of the construction along this line segment consists of wood monopole guyed structures with some interspersed self-supporting steel and concrete monopoles. This line primarily traverses forested and urban areas between Aguadilla Hospital Distrito Sect and T-Bone TO substation.

Project Scope

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

The scope of work for Line 2800 from Aguadilla Hospital Distrito Sect. and T-Bone TO substation will consist of the repair restoration, or replacement of damaged elements and functionally interdependent non-damaged elements of the overhead portions of these lines as allowed by FEMA Public Assistance Alternative Procedures (Section 428).

In certain circumstances, transmission structures may need to be replaced to meet applicable codes and standards. The transmission lines will undergo modeling and analysis to validate design criteria, including electrical clearances and mechanical loading requirements. The engineering team will perform field assessments of overhead facilities and document damaged assets to be repaired or replaced. The results of this detailed assessments will be used to define the scope of work. Field surveys to locate existing alignment and property boundaries as well as geotechnical investigations may also be performed to assist in the scoping efforts.

The repair or replacement of a transmission structure and components may include: Replacing insulators with polymer type; repairing, replacing, or adding guy wires; repairing or replacing anchors, structure connections, structure foundations, or portions of the foundations; restoring the integral ground of the structure and overhead ground conductor; restoring communications associated with the transmission line; replacing conductor spans when broken with splices, bird cages, pitting, burns, kinks, or stretched conductors; repairing or adding vibration and/or drag dampers or armor rods; and other repairs necessary to conform with codes and standards based upon engineering design specifications and requirements.

In order to comply with codes and standards and to allow for construction access, vegetation removal will be considered in the scope of work. The scope of vegetation removal will be defined during the preliminary engineering phase.

The preliminary engineering phase may also dictate a need for soil boring or testing to evaluate suitability for installation of structures/poles or underground cable systems. When possible, facilities will remain along their existing route and within the existing right-of-way.

The final SOW (plans and specifications) will be completed by Q2 2022 and construction work will be completed by 2024

Type of Project

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
This work will be in compliance with FEMA (Public Assistance Alternative Procedures (Section 428) Guide for Permanent Work FEMA-4339-DR-PR February 2020)

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.

Preliminary Engineering

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

Yes

Codes and Standards

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

The following will be referenced when applying specific codes, specifications, and standards to the project design:

1. Consensus-based codes, per FEMA (Public Assistance Alternative Procedures (Section 428) Guide for Permanent Work FEMA-4339-DR-PR February 2020).
2. Industry standards per FEMA Recovery Policy FP-104-009-5, Version 2, Implementing Section 20601 of the 2018 Bipartisan Budget Act through the Public Assistance Program.
3. FEMA Recovery Interim Policy FP-104-009-11 Version 2.1, Consensus-Based Codes, Specifications, and Standards for Public Assistance.
4. LUMA's latest Design Criteria Document (DCD) which aggregates the design considerations of the vast majority of the consensus-based codes, specifications, and standards listed in FEMA Recovery Interim Policy 104-009-11 Version 2.1 (December 20, 2019).

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.

Industry Standards

Yes If yes, describe how incorporated below.
Applicable codes and standards will be identified and incorporated into the plans and specifications.

Estimate

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.

Estimated Budget for Architectural & Engineering Design:	**$ 0.17 M**

Estimated Budget for Procurement and Construction:	**$ 2.97 M**
Estimated Overall Budget for the Project:	**$ 3.14 M**

406 Hazard Mitigation Proposal

406 Mitigation Opportunity Scope of Work

During the preliminary design phase, LUMA will develop 406 Hazard Mitigation proposals consistent with the damages. These proposals will be supported with BCAs.

406 Mitigation Opportunity Cost Estimate

Estimated Budget for Architectural & Engineering to Design:	**Unknown at this time**
Estimated Budget for Procurement:	**Unknown at this time**
Estimated Budget for Construction:	**Unknown at this time**
Estimated Overall Budget for the Project:	**Unknown at this time**

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

Environmental & Historic Preservation Requirements

EHP considerations will be identified and evaluated during the preliminary 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.

Attachments

Document Name	Description
<N/A>	Project Cost Estimates
<N/A>	Engineering Studies and Designs
<N/A>	Location Maps and Site Picture

Document Name:

FEMA Project Scope of Work

Project Name:

Line 3600 Monacillos TC to Martin Peña TC

Revision: 0

Date: 20AUG2021

APPROVALS

The signatures below formally approve the FEMA Project Scope of Work Template.

Grant Manager's Name	Signature	Date
Hernando Gee, IEM		8/20/2021
Department VP's Name	**Signature**	**Date**
Don Cortez		8/23/21

Document Change Control

This table contains a history of the revisions made to this document

Rev.	Date of Issue	Brief Description of Change
REV. 0	August 20, 2021	Issued for Use

Contents

Overview

Project Name:	Line 3600 Monacillos TC to Martin Peña TC
Region:	Carolina
Damage Number:	206253
Damaged Inventory/Asset Category:	Island Wide Transmission Line System
FEMA Project Number: *(Formerly Project Worksheet)*	<Provided by FEMA>

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.

LUMA Energy provides the Operations and Maintenance of the electric service to the entire island of Puerto Rico. Puerto Rico Electric Power Authority (PREPA) is the agency that owns the facilities, sites, and systems identified in this Scope of Work that are eligible as critical services facilities as defined in the PAAP (Section 428) and BBA 2018 guidance documents.

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

Facilities

Facilities List

The facilities listed below are part of the 19.6 circuit miles of overhead transmission line for 38kV Line 3600 from Monacillos TC substation and Martin Peña TC substation. This line is a Near-Term priority identified by LUMA

Name	Number	GPS Start	GPS End	Voltage Level (kV)
Monacillos TC to Martin Peña TC	3600	18.372793, -66.072998	18.434713, -66.060226	38kV

Facilities Description

The specific facilities included in this proposed project are structures (including their foundations), framing and insulators, load break switches (manual and automated), conductors, guy wires, anchoring, grounding assemblies, and any other associated components.

Most of the construction along this line segment consists of self-supporting steel and concrete monopoles. This line primarily traverses urban areas between Monacillos TC substation and Martin Pena TC substation.

Project Scope

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

The scope of work for Line 3600 from Monacillos TC substation and Martin Peña TC substation l will consist of the repair restoration, or replacement of damaged elements and functionally interdependent non-damaged elements of the overhead portions of these lines as allowed by FEMA Public Assistance Alternative Procedures (Section 428).

In certain circumstances, transmission structures may need to be replaced to meet applicable codes and standards. The transmission lines will undergo modeling and analysis to validate design criteria, including electrical clearances and mechanical loading requirements. The engineering team will perform field assessments of overhead facilities and document damaged assets to be repaired or replaced. The results of this detailed assessments will be used to define the scope of work. Field surveys to locate existing alignment and property boundaries as well as geotechnical investigations may also be performed to assist in the scoping efforts.

The repair or replacement of a transmission structure and components may include: Replacing insulators with polymer type; repairing, replacing, or adding guy wires; repairing or replacing anchors, structure connections, structure foundations, or portions of the foundations; restoring the integral ground of the structure and overhead ground conductor; restoring communications associated with the transmission line; replacing conductor spans when broken with splices, bird cages, pitting, burns, kinks, or stretched conductors; repairing or adding vibration and/or drag dampers or armor rods; and other repairs necessary to conform with codes and standards based upon engineering design specifications and requirements.

In order to comply with codes and standards and to allow for construction access, vegetation removal will be considered in the scope of work. The scope of vegetation removal will be defined during the preliminary engineering phase.

The preliminary engineering phase may also dictate a need for soil boring or testing to evaluate suitability for installation of structures/poles or underground cable systems. When possible, facilities will remain along their existing route and within the existing right-of-way.

The final SOW (plans and specifications) will be completed by Q2 2022 and construction work will be completed by 2024

Type of Project

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
This work will be in compliance with FEMA (Public Assistance Alternative Procedures (Section 428) Guide for Permanent Work FEMA-4339-DR-PR February 2020)

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.

Preliminary Engineering

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

Yes

Codes and Standards

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

The following will be referenced when applying specific codes, specifications, and standards to the project design:

1. Consensus-based codes, per FEMA (Public Assistance Alternative Procedures (Section 428) Guide for Permanent Work FEMA-4339-DR-PR February 2020).
2. Industry standards per FEMA Recovery Policy FP-104-009-5, Version 2, Implementing Section 20601 of the 2018 Bipartisan Budget Act through the Public Assistance Program.
3. FEMA Recovery Interim Policy FP-104-009-11 Version 2.1, Consensus-Based Codes, Specifications, and Standards for Public Assistance.
4. LUMA's latest Design Criteria Document (DCD) which aggregates the design considerations of the vast majority of the consensus-based codes, specifications, and standards listed in FEMA Recovery Interim Policy 104-009-11 Version 2.1 (December 20, 2019).

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.

Industry Standards

Yes If yes, describe how incorporated below.
Applicable codes and standards will be identified and incorporated into the plans and specifications.

Estimate

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.

Estimated Budget for Architectural & Engineering Design:	**$ 2.20 M**
Estimated Budget for Procurement and Construction:	**$37.78 M**
Estimated Overall Budget for the Project:	**$ 39.98 M**

406 Hazard Mitigation Proposal

406 Mitigation Opportunity Scope of Work

During the preliminary design phase, LUMA will develop 406 Hazard Mitigation proposals consistent with the damages. These proposals will be supported with BCAs.

406 Mitigation Opportunity Cost Estimate

Estimated Budget for Architectural & Engineering to Design:	**Unknown at this time**
Estimated Budget for Procurement:	**Unknown at this time**
Estimated Budget for Construction:	**Unknown at this time**
Estimated Overall Budget for the Project:	**Unknown at this time**

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

Environmental & Historic Preservation Requirements

EHP considerations will be identified and evaluated during the preliminary 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.

Attachments

Document Name	Description
<N/A>	Project Cost Estimates
<N/A>	Engineering Studies and Designs
<N/A>	Location Maps and Site Picture

Document Name:

FEMA Project Scope of Work

Project Name:

Line 13300 Bayamon TC to Plaza del Sol

Revision: 0

Date: 20AUG2021

APPROVALS

The signatures below formally approve the FEMA Project Scope of Work Template.

Grant Manager's Name	Signature	Date
Hernando Gee, IEM		8/20/2021
Department VP's Name	**Signature**	**Date**
Don Cortez		8/23/21

Document Change Control

This table contains a history of the revisions made to this document

Rev.	Date of Issue	Brief Description of Change
REV. 0	August 20, 2021	Issued for Use

Contents

Overview

Project Name:	Line 13300 Bayamon TC to Plaza del Sol
Region:	Bayamon
Damage Number:	206253
Damaged Inventory/Asset Category:	Island Wide Transmission Line System
FEMA Project Number: *(Formerly Project Worksheet)*	<Provided by FEMA>

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.

LUMA Energy provides the Operations and Maintenance of the electric service to the entire island of Puerto Rico. Puerto Rico Electric Power Authority (PREPA) is the agency that owns the facilities, sites, and systems identified in this Scope of Work that are eligible as critical services facilities as defined in the PAAP (Section 428) and BBA 2018 guidance documents.

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

Facilities

Facilities List

The facilities listed below are part of the 2.7 circuit miles of overhead transmission line for 38kV Line 13300 from Bayamon TC to Plaza del Sol. Circuit starts at Bayamon TC and runs parallel to Rio Bayamon about 0.5 miles northwest until it crosses over the river. From there continue westbound approximately 2 miles crossing over urban areas and Plaza del Sol mall. This line is a Near-Term priority identified by LUMA.

Name	Number	GPS Start	GPS End	Voltage Level (kV)
Bayamon TC to Plaza del Sol	13300	18.398363, -66.141258	18.408098, -66.163506	38kV

Facilities Description

The specific facilities included in this proposed project are structures (including their foundations), framing and insulators, load break switches (manual and automated), conductors, guy wires, anchoring, grounding assemblies, and any other associated components.

Most of the construction along this line segment consists of self-supporting steel and concrete monopoles.

Project Scope

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

The scope of work for Line 13300 from Bayamon TC to Plaza del Sol will consist of the repair restoration, or replacement of damaged elements and functionally interdependent non-damaged elements of the overhead portions of these lines as allowed by FEMA Public Assistance Alternative Procedures (Section 428).

In certain circumstances, transmission structures may need to be replaced to meet applicable codes and standards. The transmission lines will undergo modeling and analysis to validate design criteria, including electrical clearances and mechanical loading requirements. The engineering team will perform field assessments of overhead facilities and document damaged assets to be repaired or replaced. The results of this detailed assessments will be used to define the scope of work. Field surveys to locate existing alignment and property boundaries as well as geotechnical investigations may also be performed to assist in the scoping efforts.

The repair or replacement of a transmission structure and components may include: Replacing insulators with polymer type; repairing, replacing, or adding guy wires; repairing or replacing anchors, structure connections, structure foundations, or portions of the foundations; restoring the integral ground of the structure and overhead ground conductor; restoring communications associated with the transmission line; replacing conductor spans when broken with splices, bird cages, pitting, burns, kinks, or stretched conductors; repairing or adding vibration and/or drag dampers or armor rods; and other repairs necessary to conform with codes and standards based upon engineering design specifications and requirements.

In order to comply with codes and standards and to allow for construction access, vegetation removal will be considered in the scope of work. The scope of vegetation removal will be defined during the preliminary engineering phase.

The preliminary engineering phase may also dictate a need for soil boring or testing to evaluate suitability for installation of structures/poles or underground cable systems. When possible, facilities will remain along their existing route and within the existing right-of-way.

The final SOW (plans and specifications) will be completed by Q2 2022 and construction work will be completed by 2024

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.
Restoration to Codes and Standards
This work will be in compliance with FEMA (Public Assistance Alternative Procedures (Section 428) Guide for Permanent Work FEMA-4339-DR-PR February 2020)

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.

Preliminary Engineering

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

Yes

Codes and Standards

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

The following will be referenced when applying specific codes, specifications, and standards to the project design:

1. Consensus-based codes, per FEMA (Public Assistance Alternative Procedures (Section 428) Guide for Permanent Work FEMA-4339-DR-PR February 2020).
2. Industry standards per FEMA Recovery Policy FP-104-009-5, Version 2, Implementing Section 20601 of the 2018 Bipartisan Budget Act through the Public Assistance Program.
3. FEMA Recovery Interim Policy FP-104-009-11 Version 2.1, Consensus-Based Codes, Specifications, and Standards for Public Assistance.
4. LUMA's latest Design Criteria Document (DCD) which aggregates the design considerations of the vast majority of the consensus-based codes, specifications, and standards listed in FEMA Recovery Interim Policy 104-009-11 Version 2.1 (December 20, 2019).

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.

Industry Standards

Yes If yes, describe how incorporated below.
Applicable codes and standards will be identified and incorporated into the plans and specifications.

Estimate

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.

Estimated Budget for Architectural & Engineering Design:	**$ 0.30 M**
Estimated Budget for Procurement and Construction:	**$5.09 M**
Estimated Overall Budget for the Project:	**$ 5.39 M**

406 Hazard Mitigation Proposal

406 Mitigation Opportunity Scope of Work

During the preliminary design phase, LUMA will develop 406 Hazard Mitigation proposals consistent with the damages. These proposals will be supported with BCAs.

406 Mitigation Opportunity Cost Estimate

Estimated Budget for Architectural & Engineering to Design:	**Unknown at this time**
Estimated Budget for Procurement:	**Unknown at this time**
Estimated Budget for Construction:	**Unknown at this time**
Estimated Overall Budget for the Project:	**Unknown at this time**

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

Environmental & Historic Preservation Requirements

EHP considerations will be identified and evaluated during the preliminary 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.

Attachments

Document Name	Description
<N/A>	Project Cost Estimates
<N/A>	Engineering Studies and Designs
<N/A>	Location Maps and Site Picture

Document Name:

FEMA Project Scope of Work

PRIMARY AND SECONDARY

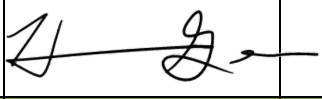
CONTROL CENTERS:

Revision: 1

Date: 20AUG2021

Approvals

The signatures below formally approve the FEMA Project Scope of Work Template.

Grant Manager's Name	Signature	Date
Hernando Gee, IEM		8/20/2021
Department VP's Name	**Signature**	**Date**
Don Cortez		8/23/21

Document Change Control

This table contains a history of the revisions made to this document.

Rev.	Date of Issue	Brief Description of Change
0	03AUG2021	Issued for Revision
1	20AUG2021	Issued for Use

Contents

Overview

Project Name:	Primary and Secondary Control Centers
Region:	San Juan / Southwest PR
Damage Number:	223318
Damaged Inventory/Asset Category:	Island wide Telecommunication System
FEMA Project Number: *(formerly Project Worksheet)*	<Provided by FEMA>

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.

LUMA Energy provides the Operations and Maintenance of the electric service to the entire island of Puerto Rico. Puerto Rico Electric Power Authority (PREPA) is the agency that owns the facilities, sites, and systems identified in this Scope of Work that are eligible as critical services facilities as defined in the PAAP (Section 428) and BBA 2018 guidance documents.

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

Facilities

Facilities List

Name	Number	GPS Start	GPS End
Proposed New Primary Control Center		TBD	TBD
Proposed New Secondary Control Center		TBD	TBD

Facilities Description

The facilities being described in this scope of work are replacing the existing Monacillo Primary Control Center, Ponce Secondary Control Center and the Distribution Control Room sites in Monacillo, Ponce, Caguas and Mayaguez. These are LUMA's primary and secondary control centers for Generation, Transmission, and Distribution. LUMA's System Operations team's vision is to operate the reconstructed electric grid with a new Energy Management System (EMS) from one Primary location and one Secondary location providing improved management, oversight and functionality of the electric power grid. Several of the current control center facilities including Ponce, Caguas and Mayaguez are located in flood plains or in areas where access is gravely impacted by flooding and need to be relocated to provide for adequate contingency operation. The new Control Center site locations are to be determined as part of the initial planning phase of the Scope of Work.

LUMA requires a new Primary Control Center (PCC) and Secondary Control Center (SCC) to support the implementation of the new Energy Management System (EMS) and provide Real-time System Operators and Operations Support Personnel with industry best practice facilities to operate the electric system in a safe, reliable and economic manner.

LUMA is currently operating in six (6) Control Centers with varying degrees of redundancy / resiliency, console configurations with ergonomic deficiencies, minimal or no visual situational awareness display to operate the power grid. LUMA plans to consolidate T&D operations in two (2) dedicated facilities (main and back up) for efficiency. Upgrading the existing Primary Control Center is not feasible due to constraints of existing equipment, building configuration, existing substation equipment in the building and risk to the existing EMS equipment operation during a phased renovation / reconfiguration project. Upgrading the existing Secondary Transmission Control Room is not feasible due to existing location in FEMA flood plain, size, existing substation equipment in the building and proximity to other existing buildings. Existing facilities are not in compliance with current applicable codes including the Puerto Rico Building Code with the latest wind speed criteria, and other standards applicable to mission critical Infrastructure. LUMA plans to deploy the new control centers in compliance of all present applicable codes and standards in facilities outside the FEMA flood plains.

The primary goals of the Control Center Projects are to:

1. Provide State-of-the-Art Control Centers to support the implementation of a new Energy Management System (EMS) within industry best practice for mission critical facilities, deployed outside of flood plains, and In compliance with applicable codes and standards including the PR Building Code.
2. Provide Control Rooms with ergonomically designed operator consoles to support System Operations reliability, resiliency and 24/7 operation of the restored power grid.
3. Consolidate System Operations into one facility that has visualization and control over the entire rebuilt power grid.

4. Provide situational awareness to the operators that will enhance the management of the power grid.
5. Create a new Data Center to house the new EMS with industry best practice resiliency / redundancy for mechanical, electrical, telecommunications and fire protection systems.
6. Provide sufficient flexibility within the design to support the continued evolution of LUMA's operation of the power grid and the targeted improvements including but not limited to increased renewables, microgrids and minigrids.

The Primary and Secondary Control Centers in the scope of this project include, but are not limited to, hardened buildings to house the following – Data Center including the new Energy Management System (EMS), Supervisory Control & Data Acquisition (SCADA) Master Station, consoles within Transmission, Generation and Distribution Control Rooms with state-of-the-art AV systems, offices and workstations for management / support teams. The building systems will include redundant Mechanical, Electrical, Plumbing and Fire Protection systems including but not limited to: emergency secondary generator with fuel tank, uninterruptable power supplies, battery plant, fire detection / protection systems, HVAC equipment and access control / camera monitoring systems.

The buildings will facilitate reliable, sustained operational support for maintenance, construction, and emergency restoration activities of the rebuilt power grid on a 24/7 basis. The communications networks between these two facilities will be designed to provide sufficient capacity for data server synchronization and resiliency for future storms and events.

The preliminary space requirements for System Operations, IT/OT, Security and Facilities departments within the Primary and Secondary Control Centers have been Identified. The existing LUMA occupied facilities have been reviewed for existing conditions. The target region of the PCC is the greater San Juan Region. The target region for the SCC is the Southwest side of the Island between Yabucoa and Mayaguez. Refer to the area map in Figure 1 below. Review of the existing PREPA owned properties in the target regions for the new PCC and SCC is on-going.

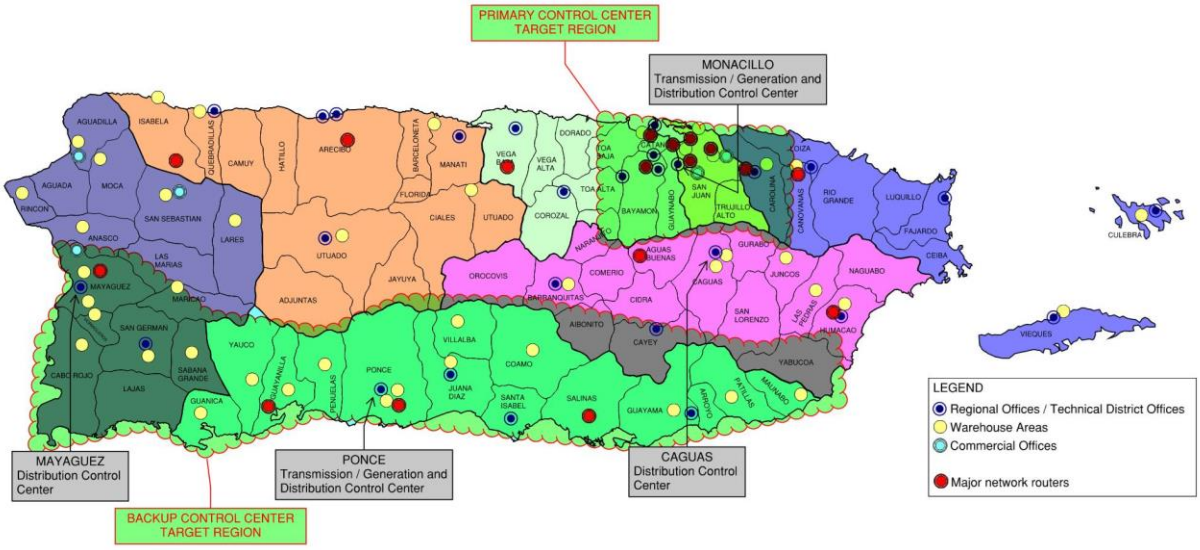


Figure 1 - LUMA Existing Control Center location and target region for new facilities

Project Scope

The Scope of Work is organized into three phases that align with the required review / approval prior to proceeding with the next phase of the project. The scope of work organization is structured to update, inform and obtain approval at major procurement milestones.

The first phase creates a Basis of Design (BOD) document along with the RFP documents required to select a Design Professional Team of Record. Bidding and analyzing the RFP responses will be completed in accordance with LUMA Procurement Policies and in conjunction with LUMA project stakeholders including procurement representatives. The Schematic Design of the buildings will be completed at this stage in order to develop a Class 3 budget for submission to FEMA for approval and funding obligation.

The second phase includes the Design Development of the two buildings, creation of the Construction Documents and ultimately issuance of RFP documents required to bid the construction portion of the project. An analysis of the RFP responses and selection of the construction team will be completed in conformance with LUMA Procurement Policies.

The third phase includes the construction of the buildings, installation / commissioning of the building systems, and move-in / startup / testing required to allow System Operations to take occupancy. The following outlines the Project Phases with a breakdown of the major efforts within each phase.

Scope of Work Description

PHASE ONE:

Preliminary Project Requirements / Basis of Design Document

The Basis of Design (BOD) document defines the target:

- Building sizes and occupants
- Functional adjacencies
- Preliminary sizes / capacities for Mission Critical Building Systems
- Building Criteria
- Site Criteria
- Security Criteria

The Basis of Design document will minimize the unknown and ambiguous nature of the project at the early conceptual stage. Project stakeholders, including representatives from System Operations, IT / OT, Security and Facilities, will be engaged to review / approve the BOD document. The Building and Site Criteria included in the BOD shall be used to develop critical, prioritized evaluation criteria for the site option analysis / selection efforts.

PCC Site Option Analysis / Selection

The target location for the PCC is within the greater San Juan region, preferably on existing PREPA owned land. The following efforts will be completed in order to identify a recommended site location for the PCC.

1. Evaluate the existing PREPA owned sites in the preferred PCC regional area. Locations In flood plains or with access gravely Impacted by flooding are to be excluded.
2. Create an evaluation criteria scoring matrix for the potential PCC sites.
3. Evaluate the site options identified with input / approval from LUMA project stakeholders.
4. Recommend a site for the PCC
5. Identify additional site investigation to be completed by vendors / professionals including but not limited to site survey (boundary / topographic / structure / utility), geotechnical investigation, environmental phase 1 study and / or archeological Phase 1 study.

SCC Site Option Analysis / Selection

The focus area for the SCC is in the Southwest side of the island from Yabucoa to Mayaguez, on existing PREPA owned land. The following efforts will be completed in order to identify a recommended site location for the SCC.

1. Evaluate the existing PREPA owned sites in the preferred SCC regional area. Locations In flood plains or with access gravely Impacted by flooding are to be excluded.
2. Create an evaluation criteria scoring matrix for the potential SCC sites.
3. Evaluate the site options identified with input / approval from project stakeholders.
4. Recommend a site for the SCC
5. Identify additional site investigation to be completed by vendors / professionals including but not limited to site survey (boundary / topographic / structure / utility), geotechnical investigation, environmental phase 1 study and / or archeological Phase 1 study.

Design Professional Team of Record (DPTR) RFP Development

Along with the BOD document, a detailed scope of work matrix will be created to identify the required efforts / responsibilities for the Design Professional Team of Record. The scope will follow industry standard American Institute of Architects scope of work outlined in the standard form of agreement between Owner and Architect refined to meet the unique criteria of a Control Center facility. The DPTR will be responsible for project design including but not limited to the following:

1. Site Design including municipal approval and permitting
2. Building Design including obtaining the building permit
3. Structural Design
4. Mechanical / Electrical / Plumbing / Fire Protection / Structured Cabling Design
5. Sustainable Design
6. Acoustical Design
7. Audio Visual System Design (not including video graphics design)
8. Security Design including coordination with LUMA security representatives

Commercial terms and conditions for the RFP defined by LUMA procurement and contracts representatives will be incorporated into the Request for Proposal (RFP) document. The RFP will be coordinated with the project stakeholders and associated LUMA workstreams.

DPTR RFP – Issue / Response / Analysis / Selection

The DPTR RFP will be published by LUMA procurement. The procurement will follow a typical RFP process that will include a pre-bid meeting to review the RFP with vendors; question / response issuance; and receipt of proposals.

The project team including project stakeholders and LUMA procurement will create a weighted, prioritized evaluation criteria matrix, identify project team members to be on an evaluation committee, manage the RFP evaluation / scoring process and recommend a Design Professional Team of Record to be selected.

Schematic Design Stage

The Schematic Design stage will establish the overall concept for the building configuration / orientation; site layout including vehicular traffic patterns, utility pathways, stormwater management approach; and building systems to be considered for the building. The Schematic Design efforts include:

1. Prepare building, site and building system Schematic Design options for review / approval by project stakeholders
2. Evaluate industry best practices to be incorporated into the design
3. Review / evaluate environmental and historic preservation (EHP) requirements
4. Complete a sustainability charette to establish a target LEED certification level and the strategies to achieve the certification target
5. Develop recommended strategy for Construction Delivery Method
6. Create a project budget in accordance with FEMA Class 3 requirements
7. Create an outline project schedule
8. Prepare updated submission to FEMA for review / approval and obtain funding obligation

PHASE TWO:

Design Development Stage

The Design Development stage will refine the concepts created in the Schematic Design stage and increase the level of detail resolved for building envelope systems; material types and extents (exterior and interior); site engineering calculations; municipal approval requirements; and building system configurations, pathways and resiliency. The Design Development Stage efforts include:

1. Recommend materials, system configurations and construction details
2. Evaluate systems based on Mission Critical industry best practices and applicable codes and standards Including the PR Building Code.
3. Evaluate progress related to sustainability strategies to achieve targeted certification levels
4. Update / evaluate project budget
5. Update / evaluate project schedule
6. Prepare Design Development Documents

Construction Document Stage

The Construction Document stage will create the finalized project drawings and specifications defining the building, site and building systems to be constructed. The Construction Document stage provides the final opportunity to refine the project scope and quality to ensure the project is within the established budget and schedule. The Construction Document stage efforts include:

1. Preparation of Construction Documents.
2. Evaluation of the Construction Documents / Details based on Mission Critical industry best practices
3. Finalize approach / details related to sustainability strategies to achieve targeted certification levels
4. Review / evaluate project budget
5. Review / evaluate project schedule
6. Obtain municipal approvals for the building projects

Construction Team (CT) RFP Development

Along with the Construction Documents created above, a detailed scope of work matrix will be created to identify the required efforts / responsibilities for the Construction Team. The scope will follow industry standard American Institute of Architects scope of work outlined in the AIA standard form of agreement between Owner and Contractor refined to meet the unique criteria of a Control Center facility.

Commercial terms and conditions for the RFP defined by LUMA procurement and contracts representatives will be incorporated into the Request for Proposal (RFP) document. The RFP will be coordinated with the project stakeholders and associated LUMA workstreams.

CT RFP - Issue / Response / Analysis / Selection

The Construction Team (CT) RFP will be published by LUMA procurement. The procurement process will follow a typical RFP process that will include a pre-bid meeting to review the RFP with vendors, question / response issuance and receipt of proposals.

The project team including project stakeholders and LUMA procurement will create a weighted, prioritized evaluation criteria matrix, identify project team members to be on an evaluation committee, manage the RFP evaluation / scoring process and recommend a Construction Team to be selected.

PHASE THREE:

Construction / Construction Administration Stage

The Construction / Construction Administration stage will include the physical construction of the buildings, site improvements and building systems. The Construction / Construction Administration Stage efforts include:

1. Preparation / review / processing of submittals, requests for information, change orders, applications for payment and other construction industry standard documents
2. Construction of the buildings, site improvements and mission critical building systems in accordance with the Construction Documents
3. Preparation / submission / review of test reports, comments from the DPTR and Field Observation reports
4. Identifying potential issues to be investigated, evaluated and resolved
5. Evaluating proposed changes and obtaining direction from project stakeholders
6. Interfacing with project stakeholders to ensure understanding of the evolution of the project
7. Coordinating efforts or milestones with other LUMA workstreams
8. Managing and balancing the competing agendas of a multi-disciplined, mission critical project

Commissioning

Review of the commissioning plan developed in the Design stages of the project and refined by the Construction Team subcontractors. Completion of the commissioning and testing. Review of the reports generated as part of the commissioning process will evolve into a Commissioning Checklist that will be created, evaluated and signed off.

Move In / Startup

Coordination of LUMA staff relocation, dual operation of the Control Rooms and building startup will be completed. Additional items requiring resolution will be identified, assigned and monitored. The DPTR and CT teams will perform project close out tasks.

The project schedule impacts the implementation of the new EMS project and therefore, the buildings need to be completed and available as soon as possible. The most expeditious schedule will minimize the time the new EMS system is in a temporary location and diminish the duration the Systems Operation team is in multiple locations with differing levels of visualization of the power grid. The preferred approach is to find an existing building and / or property that PREPA currently owns to eliminate the need for a lengthy acquisition process which will lengthen the overall schedule and duration of operation under non-ideal conditions.

The final SOW (plans and specifications) will be completed by Q1 2022 and construction will be completed by Q3 2025.

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.
Alternate: The objective of this project is to consolidate the operation from six control and dispatch building locations to two state of the art facilities to improve efficiencies of communication and operation of the power grid, and also to relocate buildings currently in flood plains. The new buildings will be designed in compliance of applicable codes and standards for mission critical infrastructure to withstand environmental impacts, and have spaces designed to enable operators to shelter in place.
This work will be in compliance with FEMA (Public Assistance Alternative Procedures (Section 428) Guide for Permanent Work FEMA-4339-DR-PR February 2020)

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.

Preliminary Engineering

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

Yes

Codes and Standards

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

The following will be referenced when applying specific codes, specifications, and standards to the project design:

1. Consensus-based codes, per FEMA (Public Assistance Alternative Procedures (Section 428) Guide for Permanent Work FEMA-4339-DR-PR February 2020).
2. Industry standards per FEMA Recovery Policy FP-104-009-5, Version 2, Implementing Section 20601 of the 2018 Bipartisan Budget Act through the Public Assistance Program.
3. FEMA Recovery Interim Policy FP-104-009-11 Version 2.1, Consensus-Based Codes, Specifications, and Standards for Public Assistance.

4. LUMA's latest Design Criteria Document (DCD) which aggregates the design considerations of the vast majority of the consensus-based codes, specifications, and standards listed in FEMA Recovery Interim Policy 104-009-11 Version 2.1 (December 20, 2019).

Codes, Specifications, and Standards

Yes If yes, describe how incorporated below.
Applicable building codes and reference standards will be identified and incorporated into the project requirements. This Includes the PR Building Code with Its updated wind speed criteria for buildings.

Industry Standards

Yes If yes, describe how incorporated below.
The current industry standards utilized by many mainland utilities will be leveraged for this project. These include provisions for physical separation of primary and secondary computer systems, secondary power generation and fuel storage, physical security, internal security of control room and data center spaces, and other critical infrastructure (CIPS) requirements. Mission Critical Industry standards will be incorporated into the project requirements.

Estimate

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.

Estimated Budget for Architectural & Engineering to Design:	**$8M**
Estimated Budget for Procurement & Construction:	**$76M**
Estimated Overall Budget for the Project:	**$84M**

Note: *The above Cost Estimates do not include property acquisition.*

406 Hazard Mitigation Proposal

406 Mitigation Opportunity Scope of Work

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

406 Mitigation Opportunity Cost Estimate

Estimated Budget for Architectural & Engineering to Design:	**Unknown at this time**

Estimated Budget for Procurement:	**Unknown at this time**
Estimated Budget for Construction:	**Unknown at this time**
Estimated Overall Budget for the Project:	**Unknown at this time**

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

Environmental & Historic Preservation Requirements

EHP considerations will be identified and evaluated during the preliminary 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.

Attachments

Document Name	Description
<N/A>	Project Cost Estimates
<N/A>	Engineering Studies and Designs

Document Name:

FEMA Project Scope of Work

ENERGY MANAGEMENT SYSTEM (EMS)

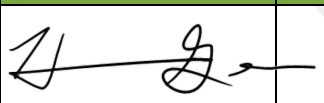
IT/OT TELECOM:

Revision: 0

Date: 19AUG2021

APPROVALS

The signatures below formally approve the FEMA Project Scope of Work Template.

Grant Manager's Name	Signature	Date
Hernando Gee, IEM		8/20/2021
Department VP's Name	**Signature**	**Date**
Don Cortez		8/23/21

Document Change Control

This table contains a history of the revisions made to this document.

Rev.	Date of Issue	Brief Description of Change
0	19AUG2021	Issue for Use

Contents

Overview

Project Name:	Energy Management System (EMS)
Region:	San Juan / Southwest PR
Damage Number:	223318
Damaged Inventory/Asset Category:	Island wide Telecommunication System
FEMA Project Number: *(formerly Project Worksheet)*	Project is included in: PREPA Consolidated 428 Grant FEMA DR-4339-PR Grants Manager Project 136271 Damage Inventory 223318 PREPA Telecommunications and IT Eligible Amount: $685,928,720.98 Attachment 5 Total amount for EMS System = $42,528,623.19 (CEF A-H)

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.

LUMA Energy provides the Operations and Maintenance of the electric service to the entire island of Puerto Rico. Puerto Rico Electric Power Authority (PREPA) is the agency that owns the facilities, sites, and systems identified in this Scope of Work that are eligible as critical services facilities as defined in the PAAP (Section 428) and BBA 2018 guidance documents.

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

Facilities

Facilities List

Name	Number	GPS Start	GPS End
Proposed New Primary Control Center		TBD	TBD
Proposed New Secondary Control Center		TBD	TBD

Facilities Description

The facilities listed will be the data centers at the primary and Secondary electrical control centers. A separate project is currently planning the siting and development of these new centers and GPS coordinates will be available in Q4 2021.

The EMS is the primary tool for monitoring and controlling the generation, transmission and distribution facilities that comprise the power grid. The EMS is one of the most urgent and crucial elements in maintaining power delivery and improving grid resilience. The EMS provides operators with the ability to identify and respond to potential reliability issues and outage conditions. It is also the primary vehicle for ensuring supply-demand balance in real time.

Hurricane Maria damaged and destroyed a number of transmission and sub-transmission substations. These substations are being modernized as part of their reconstruction. This modernization will include the substation automation and protection equipment, including the apparatus and electronics that communicates with the EMS. New types of monitored points (synchro-phasors) as well as additional monitored points (three phase MW, MVAR, amps instead of one single phase amp value as was past practice) are planned. The existing EMS will be unable to communicate with the new apparatus and will be unable to handle the additional data types and volume. Thus, as part of the substation reconstruction a new, modern EMS is required.

Project Scope

The scope of the work consists of the planning, design, procurement, and implementation of a new modern EMS with the additional capabilities required to provide monitoring and control of the reconstructed substations as well as to meet the operational requirements of Puerto Rico legislation and Puerto Rico Energy Bureau (PREB) orders around goals for 100% renewable energy, high resilience, and other Initiatives

The EMS is a redundant system and will be deployed in new primary and secondary facilities specifically deployed for mission critical operation. Final siting will be determined as an early step in the Primary and Secondary Control Centers Modernization & Hardening Project.

The replacement of the EMS will entail two stages, with each stage comprised of multiple phases. Stage 1 will concentrate on the replacement the base EMS applications. Stage 2 efforts will focus on enhancements required to meet Puerto Rico legislation and PREB orders to do with achieving the island goals for 100% renewable energy, high resilience, high penetrations of distributed generation, and other initiatives, to fully modernize the replacement EMS.

- **Project Management (along all stages of the project).** The project management task includes oversight and management of budget, schedule, and deliverables. It includes reporting to LUMA management and supporting LUMA reporting to regulatory authorities and other stakeholders identified by LUMA. It includes problem identification and resolution, development of action items and follow up. It also Includes coordination with other LUMA projects and departments, plus coordination with relevant DOE initiatives especially with DOE technologies planned for inclusion in the EMS in the short and near term. Project management will work closely with LUMA procurement, legal, IT OT, Systems Operations, and Capital Programs.

Stage 1, Phase I – Planning. Determining business requirements, high level functionality specification, and cost benefit justification as required.

- RFI Development
  - An RFI Is developed for posting on the LUMA procurement site and for transmission to established EMS suppliers (including but not limited to Siemens, ABB, ACS, OSI, GE) as well as 3rd party application providers for specific applications.
    - The RFI will include questions around available EMS features, specific functionality to do with operating an electrically islanded power system with high renewables and distributed generation, and around recent vendor EMS projects including scope and schedule performance. It will also address questions around compliance to industry standards, cyber security provisions, and other related matters. To the extent allowed by FEMA and LUMA procurement procedures vendor budgetary information will be obtained.
- Vendor response
  - Vendors will be provided one month to respond. During this time the LUMA EMS project team may elect to visit selected utility control centers identified as peers to LUMA to gain additional knowledge and Information. (such may be done virtually to reduce time/expense)
- Vendor Response Analyzed
  - Vendor RFI responses will be analyzed against draft RFP requirements to identify which detailed functionality can be made mandatory w/o jeopardizing sufficient responsive proposals, what additional capabilities EMS vendors can deliver that are of value to LUMA, and so on.

Stage 1, Phase II – Design - RFP Development and Procurement.

- RFP Development
  - A detailed RFP is developed for the EMS and for any separately procured components such as wallboard support or synchro-phasor applications. A typical EMS RFP is several hundred pages long and serves as the basis for a contract as well as the start of EMS system functional requirements (software specifications, ex.) development. The RFP covers:
    - EMS technical / functional requirements
    - EMS support tools and capabilities
    - Utility and IT industry standards
    - Factory and Field acceptance testing
    - Field installation
    - Commercial terms and conditions
    - Warranty and ongoing support
    - Training and documentation
    - Other requirements as determined
- Vendor response and selection. A criterion is developed for evaluating proposals and selecting the lowest evaluated proposal. This criterion meets LUMA procurement and FEMA requirements and is used to determine the first ranked vendor selected for contract negotiations.
- FEMA fund obligation process. A class 3 budget will be produced for FEMA funds obligation processing.
- Award Justification. A justification is prepared in conjunction with all involved parties for the vendor contract and selection for the EMS acquisition and implementation.
- Vendor Negotiations (after the vendor selection and FEMA approval of funding). Together with LUMA stakeholders (System Operations, IT, OT, purchasing, legal, and others as determined) a final contract Is negotiated with the vendor based on the RFP, LUMA Terms and Conditions, the vendor proposal, and any supplemental information provided by the vendor during the selection process.

Stage 1, Phase III. Implementation and Commissioning. The steps described below are best practice in the EMS industry today. The only atypical steps listed are the potential move from a temporary facility to the new control center facilities when available, and the coordination with US DOE around selected DOE initiatives.

- Functional Specs Agreed. Detailed system functional specifications are developed by the selected vendor for review and approval by LUMA EMS team in a series of review meetings.
- DB & Display Conversion (Siemens to Vendor). If technically feasible and proposed by the selected vendor, the existing Siemens EMS data base and displays will be converted to the new EMS platform by the vendor. The LUMA team supports this process, reviews / edits / approves the end product.
- DB & Display Manual Entry. If not automated, the LUMA team will be responsible for preparing the system data bases and displays using the selected vendor's data base management and display creation tool sets.
- Wall-board Design. EMS controls the graphics displayed on the control room wall board. The design of the graphics is done to work with the wallboard controller and allow operator adjustment of what is displayed as needed operationally.
- RTU Dual Porting. The existing PREPA RTU Include older CDC 500 type II RTU with a serial protocol. This Is not supported by most EMS vendors today, but various technical solutions exist to connect these to modern EMS. A methodology is selected and implemented.
- Data and Displays for Applications new to LUMA. Some EMS functionality required, especially for renewables or for controlling legacy generation under new PPOA, are new to System Operations. New data bases and displays are created for the new EMS to support these.

- Development / Test. The LUMA team supports the selected vendor with review and approval of design specifications, unit test results, revisions to functionality as required, and so on.
- Factory Test. The LUMA EMS team conducts EMS System Factory acceptance testing supported by the vendor. The vendor develops factory test plans and procedures for LUMA review and approval. LUMA executes the test procedures, including functional testing, system performance testing, system unstructured operational testing, and variance correction revision testing.
- Field Installation. The LUMA team, (Including IT OT, facilities, and telecoms) works with the vendor to install the EMS system in Puerto Rico in the finally planned temporary or new/permanent control center and data center facilities, and to check out telecommunications and RTU operations. Due to the time needed for deployment of the corresponding primary and redundant control center buildings, it is foreseen that the new EMS will need to be deployed on a temporary facility where it is expected to reliably support operations until it is finally migrated to the new permanent facilities. The final system move will part of the scope negotiated with the vendor.
- Field Test. The Factory Test is repeated in the Field, with additional unstructured testing and temporary cutover to the new EMS for actual operations. A long-term availability test is also conducted.
- Training & Documentation / Cutover. The LUMA team works with the vendor to deliver final user documentation to System Operations and maintenance instructions to IT OT. The LUMA team and System Operations develop and conduct operator training.
- DOE Initiative Coordination and Integration. The LUMA EMS team will include a senior staff member assigned to coordinate selected DOE initiatives with the new EMS implementation
- Program Management. The LUMA EMS effort will include a portion of the time of a senior program manager responsible for coordinating the EMS activities with other LUMA projects such as substation automation, microgrid development, telecommunications.

Stage 2 – Advanced Applications

In this Stage additional EMS applications will be identified, planned, designed, procured, and implemented as required to meet Puerto Rico legislation and PREB orders to do with achieving island goals for 100% renewable energy, high resilience, high penetrations of distributed generation, and other initiatives. These applications cannot in general be procured and implemented in Phase I today as they are beyond the current state of the EMS industry in most cases, limiting potential suppliers, and may require additional analysis and design work before implementation can be begun.

Stage 2 will be structured with Phases (Planning, Design, Implementation) and tasks like those in Stage 1. Business requirements will be identified, RFPs developed, and applications procured, developed, tested, and implemented.

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.
Improved Project Deployment of a new Energy Management System with adequate functionality to support the communications and the data types and volume acquisition abilities of new substation apparatus. Implementation of advanced applications to support Puerto Rico legislation and PREB orders related to renewable energy targets, resilience, penetrations of distributed generation, and other initiatives.
This work will be in compliance with FEMA (Public Assistance Alternative Procedures (Section 428) Guide for Permanent Work FEMA-4339-DR-PR February 2020)

Preliminary Engineering

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

Yes

Codes and Standards

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

The following will be referenced when applying specific codes, specifications, and standards to the project design:

1. Consensus-based codes, per FEMA (Public Assistance Alternative Procedures (Section 428) Guide for Permanent Work FEMA-4339-DR-PR February 2020).
2. Industry standards per FEMA Recovery Policy FP-104-009-5, Version 2, Implementing Section 20601 of the 2018 Bipartisan Budget Act through the Public Assistance Program.
3. FEMA Recovery Interim Policy FP-104-009-11 Version 2.1, Consensus-Based Codes, Specifications, and Standards for Public Assistance.
4. LUMA's latest Design Criteria Document (DCD) which aggregates the design considerations of the vast majority of the consensus-based codes, specifications, and standards listed in FEMA Recovery Interim Policy 104-009-11 Version 2.1 (December 20, 2019).

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.

Industry Standards

Yes If yes, describe how incorporated below.
Applicable industry standards will be identified and incorporated into the plans and specifications.

Estimate

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, management, and contingencies.

Planning, Design and Engineering	**$4M**
Implementation	**$38M**
Estimated Overall Budget for the Project:	**$42M**

Note: *The above Cost Estimates do not include property acquisition.*

406 Hazard Mitigation Proposal

406 Mitigation Opportunity Scope of Work

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

406 Mitigation Opportunity Cost Estimate

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

Environmental & Historic Preservation Requirements

N/A

Attachments

Document Name	Description

Document Name:

FEMA Project Scope of Work

Project Name:

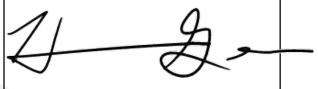
115 kV Transmission Priority Poles and Structures Replacements

Revision: 0

Date: 03AUG2021

Approvals

The signatures below formally approve the FEMA Project Scope of Work Template.

Grant Manager's Name	Signature	Date
Hernando Gee, IEM		8/20/2021
Department VP's Name	**Signature**	**Date**
Don Cortez		8/23/21

Document Change Control

This table contains a history of the revisions made to this document

Rev.	Date of Issue	Brief Description of Change
REV 0	03AUG2021	Issued for Use

Contents

Overview

Project Name:	115 kV Transmission Priority Poles and Structures Replacements
Region:	All
Damage Number:	206253
Damaged Inventory/Asset Category:	Island Wide Transmission Line System
FEMA Project Number: *(formerly Project Worksheet)*	<Provided by FEMA>

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.

LUMA Energy provides the Operations and Maintenance of the electric service to the entire island of Puerto Rico. Puerto Rico Electric Power Authority (PREPA) is the agency that owns the facilities, sites, and systems identified in this Scope of Work that are eligible as critical services facilities as defined in the PAAP (Section 428) and BBA 2018 guidance documents.

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

Facilities

Facilities List

While assessing the transmission system, it is anticipated that issues on poles and structures will be identified that need immediate repair to avoid safety hazards, violations of federal or local ordinance, and imminent equipment failures that could cause wide-spread power outages. Specifics on the types of hazards are outlined in the System Remediation Plan (SRP). Depending on the magnitude of SRP work identified during field assessments, work may be completed in an accelerated manner to allow for faster processing and repair. The facilities addressed in this project are the 115 kV sub transmission systems in the Puerto Rico grid power system.

Name	Number	GPS Start	GPS End	Voltage Level (kV)
		Provided after High Level Assessment (HLA) are completed	Provided after High Level Assessment (HLA) are completed	115

Facilities Description

The specific facilities included in this project are: poles and structures (including their foundations), framing and insulators, conductors, guy wires, anchoring, grounding assemblies and any other associated components.

Project Scope

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

The engineering team will perform evaluations based on field assessments of overhead facilities and document damaged poles or structures that are deemed to represent a serious safety hazard, violation of federal or local ordinance, and imminent equipment failures that could cause wide-spread power outages, and as a result require immediate repair or replacement.

The scope of work for sub transmission line structures from the 115 KV transmission system will consist of the repair, restoration or replacement of damaged structures of the overhead portions of this system as allowed by FEMA Public Assistance Alternative Procedures (Section 428). This project will be designed and constructed to be in compliance with associated codes and standards referenced below.

In certain circumstances, transmission structures may need to be replaced to meet applicable codes and standards. The transmission pole or structure will undergo modeling and analysis to validate design criteria, including electrical clearances and mechanical loading requirements. The engineering team will perform assessments of overhead structures or poles and document damaged assets to be repaired or replaced. The results of these assessments will be used to define the scope of work. Field surveys to locate existing alignment and property boundaries as well as geotechnical investigations may also be performed to assist in the scoping efforts.

The repair or replacement of a 115 kV sub transmission structures, poles and components may include: replacing insulators with polymer type; repairing, replacing, or adding guy wires; repairing or replacing anchors, structure connections, structure foundations, or portions of the foundations; restoring the integral ground of the structure and overhead ground conductor; restoring communications associated with the transmission line; replacing conductor spans when broken with splices, bird cages, pitting, burns, kinks, or stretched conductors; repairing or adding vibration and/or drag dampers or armor rods; and other repairs necessary to conform with codes and standards based upon engineering design specifications and requirements.

In order to comply with codes and standards and to allow for construction access, vegetation removal will be considered in the scope of work. The scope of vegetation removal will be defined during the preliminary engineering phase.

The preliminary engineering phase may also dictate a need for soil boring or testing to evaluate suitability for installation of structures/poles. Facilities will remain along their existing route and within the existing right-of-way.

The final SOW and construction work will be completed after High Level Assessments (HLA) are concluded.

Type of Project

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.
Restoration to Codes/Standards
This work will be in compliance with FEMA (Public Assistance Alternative Procedures (Section 428) Guide for Permanent Work FEMA-4339-DR-PR February 2020)

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.

Preliminary Engineering

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

Yes

Codes and Standards

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

The following will be referenced when applying specific codes, specifications, and standards to the project design:

1. Consensus-based codes, per FEMA (Public Assistance Alternative Procedures (Section 428) Guide for Permanent Work FEMA-4339-DR-PR February 2020).
2. Industry standards per FEMA Recovery Policy FP-104-009-5, Version 2, Implementing Section 20601 of the 2018 Bipartisan Budget Act through the Public Assistance Program.
3. FEMA Recovery Interim Policy FP-104-009-11 Version 2.1, Consensus-Based Codes, Specifications, and Standards for Public Assistance.
4. LUMA's latest Design Criteria Document (DCD) which aggregates the design considerations of the vast majority of the consensus-based codes, specifications, and standards listed in FEMA Recovery Interim Policy 104-009-11 Version 2.1 (December 20, 2019).

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

Industry Standards

Yes If yes, describe how incorporated below.
Applicable codes and standards will be identified and incorporated into the plans and specifications.

Estimate

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.

Estimated Budget for Architectural & Engineering Design	**$ 92.5 M**
Estimated Budget for Procurement & Construction:	**$ 226.3 M**
Estimated Overall Budget for the Project:	**$ 318.8M**

406 Hazard Mitigation Proposal

406 Mitigation Opportunity Scope of Work

LUMA/IEM will develop 406 Hazard Mitigation proposals consistent with the damages. These proposals will be supported with BCAs.

406 Mitigation Opportunity Cost Estimate

Estimated Budget for Architectural & Engineering to Design:	**Unknown at this time**
Estimated Budget for Procurement:	**Unknown at this time**
Estimated Budget for Construction:	**Unknown at this time**
Estimated Overall Budget for the Project:	**Unknown at this time**

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

Environmental & Historic Preservation Requirements

Environmental & Historic Preservation considerations will be identified and evaluated for during the preliminary 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.

Attachments

Attachments will be provided after High Level Assessments (HLA) are completed.

Document Name	Description
N/A	Project Cost Estimates
N/A	Engineering Studies and Designs

Document Name	Description
N/A	Location Maps and Site Picture

FEMA Project Scope of Work

230 kV Transmission Priority Poles and Structures Replacements

Revision: 0

Date: 03AUG2021

Approvals

The signatures below formally approve the FEMA Project Scope of Work Template.

Grant Manager's Name	Signature	Date
Hernando Gee, IEM		8/20/2021
Department VP's Name	**Signature**	**Date**
Don Cortez		8/23/21

Document Change Control

This table contains a history of the revisions made to this document

Rev.	Date of Issue	Brief Description of Change
REV 0	03AUG2021	Issued for Use

Contents

Overview

Project Name:	230 kV Transmission Priority Poles and Structures Replacements
Region:	All
Damage Number:	206253
Damaged Inventory/Asset Category:	Island Wide Transmission Line System
FEMA Project Number: *(formerly Project Worksheet)*	<Provided by FEMA>

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.

LUMA Energy provides the Operations and Maintenance of the electric service to the entire island of Puerto Rico. Puerto Rico Electric Power Authority (PREPA) is the agency that owns the facilities, sites, and systems identified in this Scope of Work that are eligible as critical services facilities as defined in the PAAP (Section 428) and BBA 2018 guidance documents.

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

Facilities

Facilities List

While assessing the transmission system, it is anticipated that issues on poles and structures will be identified that need immediate repair to avoid safety hazards, violations of federal or local ordinance, and imminent equipment failures that could cause wide-spread power outages. Specifics on the types of hazards are outlined in the System Remediation Plan (SRP). Depending on the magnitude of SRP work identified during field assessments, work may be completed in an accelerated manner to allow for faster processing and repair. The facilities addressed in this project are the 230 kV sub transmission systems in the Puerto Rico grid power system.

Name	Number	GPS Start	GPS End	Voltage Level (kV)
		Provided after High Level Assessment (HLA) are completed	Provided after High Level Assessment (HLA) are completed	230

Facilities Description

The specific facilities included in this project are: poles and structures (including their foundations), framing and insulators, conductors, guy wires, anchoring, grounding assemblies and any other associated components.

Project Scope

The engineering team will perform evaluations based on field assessments of overhead facilities and document damaged poles or structures that are deemed to represent a serious safety hazard, violation of federal or local ordinance, and imminent equipment failures that could cause wide-spread power outages, and as a result require immediate repair or replacement.

The scope of work for sub transmission line structures from the 230 KV transmission system will consist of the repair, restoration or replacement of damaged structures of the overhead portions of this system as allowed by FEMA Public Assistance Alternative Procedures (Section 428). This project will be designed and constructed to be in compliance with associated codes and standards referenced below.

In certain circumstances, transmission structures may need to be replaced to meet applicable codes and standards. The transmission pole or structure will undergo modeling and analysis to validate design criteria, including electrical clearances and mechanical loading requirements. The engineering team will perform assessments of overhead structures or poles and document damaged assets to be repaired or replaced. The results of these assessments will be used to define the scope of work. Field surveys to locate existing alignment and property boundaries as well as geotechnical investigations may also be performed to assist in the scoping efforts.

The repair or replacement of a 230 kV sub transmission structures, poles and components may include: replacing insulators with polymer type; repairing, replacing, or adding guy wires; repairing or replacing anchors, structure connections, structure foundations, or portions of the foundations; restoring the integral ground of the structure and overhead ground conductor; restoring communications associated with the transmission line; replacing conductor spans when broken with splices, bird cages, pitting, burns, kinks, or stretched conductors; repairing or adding vibration and/or drag dampers or armor rods; and other repairs necessary to conform with codes and standards based upon engineering design specifications and requirements.

In order to comply with codes and standards and to allow for construction access, vegetation removal will be considered in the scope of work. The scope of vegetation removal will be defined during the preliminary engineering phase.

The preliminary engineering phase may also dictate a need for soil boring or testing to evaluate suitability for installation of structures/poles. Facilities will remain along their existing route and within the existing right-of-way.

The final SOW and construction work will be completed after High Level Assessments (HLA) are concluded.

Type of Project

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.
Restoration to Codes/Standards
This work will be in compliance with FEMA (Public Assistance Alternative Procedures (Section 428) Guide for Permanent Work FEMA-4339-DR-PR February 2020)

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.

Preliminary Engineering

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

Yes

Codes and Standards

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

The following will be referenced when applying specific codes, specifications, and standards to the project design:

1. Consensus-based codes, per FEMA (Public Assistance Alternative Procedures (Section 428) Guide for Permanent Work FEMA-4339-DR-PR February 2020).
2. Industry standards per FEMA Recovery Policy FP-104-009-5, Version 2, Implementing Section 20601 of the 2018 Bipartisan Budget Act through the Public Assistance Program.
3. FEMA Recovery Interim Policy FP-104-009-11 Version 2.1, Consensus-Based Codes, Specifications, and Standards for Public Assistance.
4. LUMA's latest Design Criteria Document (DCD) which aggregates the design considerations of the vast majority of the consensus-based codes, specifications, and standards listed in FEMA Recovery Interim Policy 104-009-11 Version 2.1 (December 20, 2019).

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

Industry Standards

Yes If yes, describe how incorporated below.
Applicable codes and standards will be identified and incorporated into the plans and specifications.

Estimate

Estimated Budget for Architectural & Engineering to Design and Pre-construction activities:	**$ 9.1M**
Estimated Budget for Procurement & Construction:	**$ 22.2M**
Estimated Overall Budget for the Project:	**$ 31.3M**

406 Hazard Mitigation Proposal

406 Mitigation Opportunity Scope of Work

LUMA/IEM will develop 406 Hazard Mitigation proposals consistent with the damages. These proposals will be supported with BCAs.

406 Mitigation Opportunity Cost Estimate

Estimated Budget for Architectural & Engineering to Design:	**Unknown at this time**
Estimated Budget for Procurement:	**Unknown at this time**
Estimated Budget for Construction:	**Unknown at this time**
Estimated Overall Budget for the Project:	**Unknown at this time**

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

Environmental & Historic Preservation Requirements

Environmental & Historic Preservation considerations will be identified and evaluated for during the preliminary 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.

Attachments

Attachments will be provided after High Level Assessments (HLA) are completed.

Document Name	Description
N/A	Project Cost Estimates

Document Name	Description
N/A	Provided after High Level Assessments (HLA) are completed
N/A	Provided after High Level Assessments (HLA) are completed

FEMA Project Scope of Work

38 kV Transmission Priority Poles and Structures Replacements

Revision: 0

Date: 03AUG2021

Approvals

The signatures below formally approve the FEMA Project Scope of Work Template.

Grant Manager's Name	Signature	Date
Hernando Gee, IEM		8/20/2021
Department VP's Name	**Signature**	**Date**
Don Cortez	Don Cortez	8/23/21

Document Change Control

This table contains a history of the revisions made to this document

Rev.	Date of Issue	Brief Description of Change
REV 0	03AUG2021	Issued for Use

Contents

Overview

Project Name:	38 kV Transmission Priority Poles and Structures Replacements
Region:	All
Damage Number:	206253
Damaged Inventory/Asset Category:	Island Wide Transmission Line System
FEMA Project Number: *(formerly Project Worksheet)*	<Provided by FEMA>

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.

LUMA Energy provides the Operations and Maintenance of the electric service to the entire island of Puerto Rico. Puerto Rico Electric Power Authority (PREPA) is the agency that owns the facilities, sites, and systems identified in this Scope of Work that are eligible as critical services facilities as defined in the PAAP (Section 428) and BBA 2018 guidance documents.

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

Facilities

Facilities List

While assessing the transmission system, it is anticipated that issues on poles and structures will be identified that need immediate repair to avoid safety hazards, violations of federal or local ordinance, and imminent equipment failures that could cause wide-spread power outages. Specifics on the types of hazards are outlined in the System Remediation Plan (SRP). Depending on the magnitude of SRP work identified during field assessments, work may be completed in an accelerated manner to allow for faster processing and repair. The facilities addressed in this project are the 38 kV sub transmission systems in the Puerto Rico grid power system.

Name	Number	GPS Start	GPS End	Voltage Level (kV)
		Provided after High Level Assessment (HLA) are completed	Provided after High Level Assessment (HLA) are completed	38

.

Facilities Description

The specific facilities included in this project are: poles and structures (including their foundations), framing and insulators, conductors, guy wires, anchoring, grounding assemblies and any other associated components.

Project Scope

The engineering team will perform evaluations based on field assessments of overhead facilities and document damaged poles or structures that are deemed to represent a serious safety hazard, violation of federal or local ordinance, and imminent equipment failures that could cause wide-spread power outages, and as a result require immediate repair or replacement.

The scope of work for sub transmission line structures from the 38 KV transmission system will consist of the repair, restoration or replacement of damaged structures of the overhead portions of this system as allowed by FEMA Public Assistance Alternative Procedures (Section 428). This project will be designed and constructed to be in compliance with associated codes and standards referenced below.

In certain circumstances, transmission structures may need to be replaced to meet applicable codes and standards. The transmission pole or structure will undergo modeling and analysis to validate design criteria, including electrical clearances and mechanical loading requirements. The engineering team will perform assessments of overhead structures or poles and document damaged assets to be repaired or replaced. The results of these assessments will be used to define the scope of work. Field surveys to locate existing alignment and property boundaries as well as geotechnical investigations may also be performed to assist in the scoping efforts.

The repair or replacement of a 38 kV sub transmission structures, poles and components may include: replacing insulators with polymer type; repairing, replacing, or adding guy wires; repairing or replacing anchors, structure connections, structure foundations, or portions of the foundations; restoring the integral ground of the structure and overhead ground conductor; restoring communications associated with the transmission line; replacing conductor spans when broken with splices, bird cages, pitting, burns, kinks, or stretched conductors; repairing or adding vibration and/or drag dampers or armor rods; and other repairs necessary to conform with codes and standards based upon engineering design specifications and requirements.

In order to comply with codes and standards and to allow for construction access, vegetation removal will be considered in the scope of work. The scope of vegetation removal will be defined during the preliminary engineering phase.

The preliminary engineering phase may also dictate a need for soil boring or testing to evaluate suitability for installation of structures/poles. Facilities will remain along their existing route and within the existing right-of-way.

The final SOW and construction work will be completed after High Level Assessments (HLA) are concluded.

Type of Project

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.
Restoration to Codes/Standards
This work will be in compliance with FEMA (Public Assistance Alternative Procedures (Section 428) Guide for Permanent Work FEMA-4339-DR-PR February 2020)

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.

Preliminary Engineering

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

Yes

Codes and Standards

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

The following will be referenced when applying specific codes, specifications, and standards to the project design:

1. Consensus-based codes, per FEMA (Public Assistance Alternative Procedures (Section 428) Guide for Permanent Work FEMA-4339-DR-PR February 2020).
2. Industry standards per FEMA Recovery Policy FP-104-009-5, Version 2, Implementing Section 20601 of the 2018 Bipartisan Budget Act through the Public Assistance Program.
3. FEMA Recovery Interim Policy FP-104-009-11 Version 2.1, Consensus-Based Codes, Specifications, and Standards for Public Assistance.
4. LUMA's latest Design Criteria Document (DCD) which aggregates the design considerations of the vast majority of the consensus-based codes, specifications, and standards listed in FEMA Recovery Interim Policy 104-009-11 Version 2.1 (December 20, 2019).

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

Industry Standards

Yes If yes, describe how incorporated below.
Applicable codes and standards will be identified and incorporated into the plans and specifications.

Estimate

Estimated Budget for Architectural & Engineering to Design and Pre-construction activities:	**$ 109.9 M**
Estimated Budget for Procurement & Construction:	**$ 268.9 M**
Estimated Overall Budget for the Project:	**$ 378.8 M**

406 Hazard Mitigation Proposal

406 Mitigation Opportunity Scope of Work

LUMA/IEM will develop 406 Hazard Mitigation proposals consistent with the damages. These proposals will be supported with BCAs.

406 Mitigation Opportunity Cost Estimate

Estimated Budget for Architectural & Engineering to Design:	**Unknown at this time**
Estimated Budget for Procurement:	**Unknown at this time**
Estimated Budget for Construction:	**Unknown at this time**
Estimated Overall Budget for the Project:	**Unknown at this time**

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

Environmental & Historic Preservation Requirements

Environmental & Historic Preservation considerations will be identified and evaluated for during the preliminary 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.

Attachments

Attachments will be provided after High Level Assessments (HLA) are completed.

Document Name	Description
N/A	Project Cost Estimates
N/A	Provided after High Level Assessments (HLA) are completed
N/A	Provided after High Level Assessments (HLA) are completed

Document Name	Description

Document Name:

FEMA Project Scope of Work

Project Name:

Distribution Feeders - Arecibo Short Term Group 2

Revision: 0

Date: 08AUG2021

Approvals

The signatures below formally approve the FEMA Project Scope of Work Template.

Grant Manager's Name	Signature	Date
Hernando Gee, IEM		8/20/2021
Department VP's Name	**Signature**	**Date**
Don Cortez		8/23/21

Document Change Control

This table contains a history of the revisions made to this document.

Rev.	Date of Issue	Brief Description of Change
0	08AUG2021	Issued for Use

Contents

Overview

Project Name:	Distribution Feeders - Arecibo Short Term Group 2
Region:	Arecibo
Damage Number:	250081
Damaged Inventory/Asset Category:	Island Wide Distribution
FEMA Project Number: *(formerly Project Worksheet)*	<Provided by FEMA>

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.

LUMA Energy provides the Operations and Maintenance of the electric service to the entire island of Puerto Rico. Puerto Rico Electric Power Authority (PREPA) is the agency that owns the facilities, sites, and systems identified in this Scope of Work that are eligible as critical services facilities as defined in the PAAP (Section 428) and BBA 2018 guidance documents.

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

Facilities

Facilities List

The facilities listed below are part of the feeder systems in the Arecibo Region. PREPA's interconnected and inter-functional distribution feeders (sites) establish the electrical distribution system. The feeders all originate from a substation (start) and serve customers along a route to various locations (end). GPS Coordinates for the start and end point of each electrical feeder project are noted in the table below and depicted on the attached feeder maps. These feeders are a subset of projects identified in the Distribution Feeders – Arecibo Short Term projects in the PREPA 10-Year Infrastructure Plan.

Name	Number	GPS Start	GPS End	Voltage Level (kV)
Utuado Pueblo	8101-03	18.26873 -66.69765	18.24571 -66.66392	4.16
Caguana	8103-01	18.28284 -66.76298	18.29441 -66.79914	4.16
Caguana	8103-02	18.28284 -66.76298	18.27490 -66.72613	4.16
Yahuecas	8203-02	18.19755 -66.79175	18.17757 -66.81363	8.32
Jayuya	8301-03	18.21788 -66.60406	18.22899 -66.50927	4.16
Jayuya II	8302-05	18.21786 -66.60419	18.16729 -66.65149	4.16

Note: *GPS coordinates are required for all facilities.*

Facilities Description

The specific facilities included in this project are: poles and structures (including their foundations), framing and insulators, load break switches (manual and automated), capacitor banks, voltage regulators, transformers (including lightning arresters and fuse cut-outs), conductors, guy wires, anchoring, grounding assemblies, underground cable, underground cable systems, fault interrupting equipment (fuses, reclosers, and sectionalizers), and any other associated components

Project Scope

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

Feeders will undergo comprehensive distribution modeling, analysis, and simulation to validate planning criteria such as: conductor loading, voltage parameters, power factor, reliability metrics, distribution automation device placement, and coordination of protective devices. The engineering team will perform assessments of overhead facilities and document damaged assets to be repaired or replaced. The results of these assessments will help define the scope of restoration to industry standards. Note that this project is based on a damage assessment sample that was extrapolated across the entire distribution system, therefore existing documentation of hurricane damage may not be available. For both overhead and underground facilities, the engineering team will conduct a route study to verify underground cable system routing, identify conflicts with foreign utilities, test subsurface conditions, research right-of-way and easement availability, identify environmental and cultural impact, and identify highway/rail/waterway crossings.

Structure foundations will be designed and engineered to confirm structural soundness and stability. Damaged structures/poles will be replaced with higher class (strength) structures/poles made of steel, concrete, or fiberglass composite. Damaged crossarms will be replaced with composite, galvanized, or stainless steel crossarms. Porcelain insulators and any other damaged insulator will be replaced with silicone rubber insulators.

Missing or damaged grounding assemblies will be replaced to fulfill system grounding integrity. Damaged conductor spans will be replaced between poles and re-sagged per codes and standards. Damaged structure guying elements will be repaired or replaced, such as slack guy wires or pulled anchors.

In order to comply with codes and standards and to allow for construction access, vegetation removal will be considered in the scope of work. The scope of vegetation removal will be defined during the preliminary engineering phase. The preliminary engineering phase may also find that soil boring or testing is needed to make sure conditions are suitable for installation of structures/poles or underground cable systems. When possible, facilities will remain along their existing route and within the existing right-of-way.

The final SOW (plans and specifications) will be completed by Q2 2022 and construction will be completed by 2023.

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.
Restoration to Codes and Standards
This work will be in compliance with FEMA (Public Assistance Alternative Procedures (Section 428) Guide for Permanent Work FEMA-4339-DR-PR February 2020)

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.

Preliminary Engineering

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

Yes

Codes and Standards

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

The following will be referenced when applying specific codes, specifications, and standards to the project design:

1. Consensus-based codes, per FEMA (Public Assistance Alternative Procedures (Section 428) Guide for Permanent Work FEMA-4339-DR-PR February 2020).
2. Industry standards per FEMA Recovery Policy FP-104-009-5, Version 2, Implementing Section 20601 of the 2018 Bipartisan Budget Act through the Public Assistance Program.
3. FEMA Recovery Interim Policy FP-104-009-11 Version 2.1, Consensus-Based Codes, Specifications, and Standards for Public Assistance.
4. LUMA's latest Design Criteria Document (DCD) which aggregates the design considerations of the vast majority of the consensus-based codes, specifications, and standards listed in FEMA Recovery Interim Policy 104-009-11 Version 2.1 (December 20, 2019).

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.

Industry Standards

Yes If yes, describe how incorporated below.
Applicable codes and standards will be identified and incorporated into the plans and specifications.

Estimate

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.

Estimated Budget for Architectural & Engineering to Design:	**$3.85M**
Estimated Budget for Procurement & Construction:	**$70.05M**
Estimated Overall Budget for the Project:	**$73.91M**

406 Hazard Mitigation Proposal

406 Mitigation Opportunity Scope of Work

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

406 Mitigation Opportunity Cost Estimate

Estimated Budget for Architectural & Engineering to Design:	**Unknown at this time**
Estimated Budget for Procurement:	**Unknown at this time**
Estimated Budget for Construction:	**Unknown at this time**
Estimated Overall Budget for the Project:	**Unknown at this time**

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

Environmental & Historic Preservation Requirements

EHP considerations will be identified and evaluated during the preliminary 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.

Attachments

Document Name	Description
<N/A>	Project Cost Estimates
<N/A>	Engineering Studies and Designs
Arecibo Short Term Group 2 (Distributio	Location Maps and Site Picture

Document Name:

FEMA Project Scope of Work

Project Name:

Distribution Feeders - San Juan Short Term Group 3

Revision: 0

Date: 08AUG2021

Approvals

The signatures below formally approve the FEMA Project Scope of Work Template.

Grant Manager's Name	Signature	Date
Hernando Gee, IEM		8/20/2021
Department VP's Name	**Signature**	**Date**
Don Cortez		8/23/21

Document Change Control

This table contains a history of the revisions made to this document.

Rev.	Date of Issue	Brief Description of Change
0	08AUG2021	Issued for Use

Contents

Overview

Project Name:	Distribution Feeders - San Juan Short Term Group 3
Region:	San Juan
Damage Number:	250081
Damaged Inventory/Asset Category:	Island Wide Distribution
FEMA Project Number: *(formerly Project Worksheet)*	<Provided by FEMA>

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.

LUMA Energy provides the Operations and Maintenance of the electric service to the entire island of Puerto Rico. Puerto Rico Electric Power Authority (PREPA) is the agency that owns the facilities, sites, and systems identified in this Scope of Work that are eligible as critical services facilities as defined in the PAAP (Section 428) and BBA 2018 guidance documents.

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

Facilities

Facilities List

The facilities listed below are part of the feeder systems in the San Juan Region. PREPA's interconnected and inter-functional distribution feeders (sites) establish the electrical distribution system. The feeders all originate from a substation (start) and serve customers along a route to various locations (end). GPS Coordinates for the start and end point of each electrical feeder project are noted in the table below and depicted on the attached feeder maps. These feeders are a subset of projects identified in the Distribution Feeders – San Juan Short Term projects in the PREPA 10-Year Infrastructure Plan.

Name	Number	GPS Start	GPS End	Voltage Level (kV)
Santurce Planta #2	1117-11	18.45423 -66.07596	18.45464 -66.06627	13.2
Llorens Torres 13kV	1118-10	18.44631 -66.04468	18.43840 -66.05996	13.2
Berwind 13kV	1336-06	18.41013 -66.01139	18.42733 -66.01189	13.2
Berwind 13kV	1336-08	18.41013 -66.01139	18.39861 -66.03990	13.2
Parque Escorial	1620-02	18.39685 -65.99249	18.38063 -65.99878	13.2

Note: *GPS coordinates are required for all facilities.*

Facilities Description

The specific facilities included in this project are: poles and structures (including their foundations), framing and insulators, load break switches (manual and automated), capacitor banks, voltage regulators, transformers (including lightning arresters and fuse cut-outs), conductors, guy wires, anchoring, grounding assemblies, underground cable, underground cable systems, fault interrupting equipment (fuses, reclosers, and sectionalizers), and any other associated components

Project Scope

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

Feeders will undergo comprehensive distribution modeling, analysis, and simulation to validate planning criteria such as: conductor loading, voltage parameters, power factor, reliability metrics, distribution automation device placement, and coordination of protective devices. The engineering team will perform assessments of overhead facilities and document damaged assets to be repaired or replaced. The results of these assessments will help define the scope of restoration to industry standards. Note that this project is based on a damage assessment sample that was extrapolated across the entire distribution system, therefore existing documentation of hurricane damage may not be available. For both overhead and underground facilities, the engineering team will conduct a route study to verify underground cable system routing, identify conflicts with foreign utilities, test subsurface conditions, research right-of-way and easement availability, identify environmental and cultural impact, and identify highway/rail/waterway crossings.

Structure foundations will be designed and engineered to confirm structural soundness and stability. Damaged structures/poles will be replaced with higher class (strength) structures/poles made of steel, concrete, or fiberglass composite. Damaged crossarms will be replaced with composite, galvanized, or stainless steel crossarms. Porcelain insulators and any other damaged insulator will be replaced with silicone rubber insulators.

Missing or damaged grounding assemblies will be replaced to fulfill system grounding integrity. Damaged conductor spans will be replaced between poles and re-sagged per codes and standards. Damaged structure guying elements will be repaired or replaced, such as slack guy wires or pulled anchors.

In order to comply with codes and standards and to allow for construction access, vegetation removal will be considered in the scope of work. The scope of vegetation removal will be defined during the preliminary engineering phase. The preliminary engineering phase may also find that soil boring or testing is needed to make sure conditions are suitable for installation of structures/poles or underground cable systems. When possible, facilities will remain along their existing route and within the existing right-of-way.

The final SOW (plans and specifications) will be completed by Q2 2022 and construction will be completed by 2023.

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.
Restoration to Codes and Standards
This work will be in compliance with FEMA (Public Assistance Alternative Procedures (Section 428) Guide for Permanent Work FEMA-4339-DR-PR February 2020)

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.

Preliminary Engineering

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

Yes

Codes and Standards

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

The following will be referenced when applying specific codes, specifications, and standards to the project design:

1. Consensus-based codes, per FEMA (Public Assistance Alternative Procedures (Section 428) Guide for Permanent Work FEMA-4339-DR-PR February 2020).
2. Industry standards per FEMA Recovery Policy FP-104-009-5, Version 2, Implementing Section 20601 of the 2018 Bipartisan Budget Act through the Public Assistance Program.
3. FEMA Recovery Interim Policy FP-104-009-11 Version 2.1, Consensus-Based Codes, Specifications, and Standards for Public Assistance.
4. LUMA's latest Design Criteria Document (DCD) which aggregates the design considerations of the vast majority of the consensus-based codes, specifications, and standards listed in FEMA Recovery Interim Policy 104-009-11 Version 2.1 (December 20, 2019).

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.

Industry Standards

Yes If yes, describe how incorporated below.
Applicable codes and standards will be identified and incorporated into the plans and specifications.

Estimate

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.

Estimated Budget for Architectural & Engineering to Design:	**$1.42M**
Estimated Budget for Procurement & Construction:	**$25.86M**
Estimated Overall Budget for the Project:	**$27.28M**

406 Hazard Mitigation Proposal

406 Mitigation Opportunity Scope of Work

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

406 Mitigation Opportunity Cost Estimate

Estimated Budget for Architectural & Engineering to Design:	**Unknown at this time**
Estimated Budget for Procurement:	**Unknown at this time**
Estimated Budget for Construction:	**Unknown at this time**
Estimated Overall Budget for the Project:	**Unknown at this time**

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

Environmental & Historic Preservation Requirements

EHP considerations will be identified and evaluated during the preliminary 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.

Attachments

Document Name	Description
<N/A>	Project Cost Estimates
<N/A>	Engineering Studies and Designs
 San Juan Short Term Group 3 (Distri	Location Maps and Site Picture

FEMA Project Scope of Work

Project Name: El Yunque 2305-01 Supply

Revision: 0

Date: 22JUL2021

APPROVALS

The signatures below formally approve the FEMA Project Scope of Work Template.

Grant Manager's Name	Signature	Date
Hernando Gee, IEM		8/20/2021
Department VP's Name	**Signature**	**Date**
Don Cortez		8/23/21

Document Change Control

This table contains a history of the revisions made to this document

Rev.	Date of Issue	Brief Description of Change
0	22JULY2021	

Contents

Overview

Project Name:	El Yunque 2305-01 Supply
Region:	Caguas
Damage Number:	250081
Damaged Inventory/Asset Category:	Island Wide Distribution
FEMA Project Number: *(formerly Project Worksheet)*	<Provided by FEMA>

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.

LUMA Energy provides the Operations and Maintenance of the electric service to the entire island of Puerto Rico. Puerto Rico Electric Power Authority (PREPA) is the agency that owns the facilities, sites, and systems identified in this Scope of Work that are eligible as critical services facilities as defined in the PAAP (Section 428) and BBA 2018 guidance documents.

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

Facilities

Facilities List

The facilities listed below are part of the feeder 2305-01. The distribution feeder (site) establishes the electrical distribution system being refurbished and extended to supply the two peaks in El Yunque. The feeder originates from Palmer TC substation and serves customers along a route to various locations. The backbone and three-phase sections of the feeder will be repaired and hardened as follows:

- Repair and/or hardening of approximately 2 miles of the feeder backbone.
- Underground cable replacement of approximately 1.6 miles of single-phase underground cable that will need to be converted to three-phase to allow extending to the critical loads.
- An underground extension of approximately 3.2 miles will be built to serve the two locations in El Yunque as well as other services.
- An existing 3.1-mile overhead section near Pico Del Yunque will be converted to underground. This will tie into the existing FAA-owned underground cable, assuming it is rated 15kV

In summary, the project will entail about 2 miles of reconstruction/hardening, 1.6 miles of underground cable replacement (single- to three-phase), 3.2 miles of new underground cable, and 3.1 miles of overhead to underground conversion. Protective devices (a new three-phase fault interrupter and potentially additional single-phase protective devices, depending on the recommendations of a planning study) will be installed. All existing service transformers (estimated 12) will need to be replaced, including the two Pico (peaks) loads. These customers are served by 8.32 kV supplies and their service transformers will need to be replaced with units having a high voltage side of 13.2kV. It is assumed the FAA-owned underground cable will be retained. The GPS coordinate are noted in the table below and depicted on the attached feeder map.

Name	Number	GPS Start	GPS End	Voltage Level
Palmer TC	2305-01	18.3642 -65.770406	18.268322 - 65.758428	13.2 kV

Note: GPS coordinates are required for all facilities.

Facilities Description

The specific facilities included in this project are: poles and structures (including their foundations), framing and insulators, load break switches (manual and automated), capacitor banks, voltage regulators, transformers (including lightning arresters and fuse cut-outs), conductors, guy wires, anchoring, grounding assemblies, underground cable, underground cable systems, and fault interrupting equipment (fuses, reclosers, and sectionalizers), and any other associated components.

Project Scope

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

The feeder will undergo comprehensive distribution modeling, analysis, and simulation to validate planning criteria such as: conductor loading, voltage parameters, power factor, reliability metrics, distribution automation device placement, and coordination of protective devices (the studies will be conducted by LUMA and the recommendations provided to the A&E contractor). The engineering team will perform evaluations based on field assessments of overhead facilities and document damaged assets to be repaired or replaced. The results of this detailed assessment will help define the scope of restoration and upgrades to applicable codes and standards. Note that this project is based on a damage assessment sample that was extrapolated across the entire distribution system, therefore existing documentation of hurricane damage may not be available. For both overhead and underground facilities, the engineering team will conduct a route study to verify underground cable system routing, identify conflicts with foreign utilities, test subsurface conditions, research right-of-way and easement availability, identify environmental and cultural impact, and identify highway/rail/waterway crossings.

This project will be designed and constructed to be in compliance with applicable codes and standards.

Structure foundations will be designed and engineered to confirm structural soundness and stability. Damaged structures/poles will be replaced with higher class (strength) structures/poles made of steel, concrete, or fiberglass composite. Damaged crossarms will be replaced with composite, galvanized, or stainless steel crossarms. Porcelain insulators and any other damaged insulator will be replaced with silicon rubber insulators.

Missing or damaged grounding assemblies will be replaced to fulfill system grounding integrity. Damaged conductor spans will be replaced between poles and re-sagged per codes and standards. Damaged structure guying elements will be repaired or replaced, such as slack guy wires or pulled anchors.

In order to comply with applicable codes and standards and to allow for construction access, vegetation removal will be considered in the scope of work. The scope of vegetation removal will be defined during the 30% engineering phase. The 30% engineering phase may also find that soil boring or testing is needed to make sure conditions are suitable for installation of structures/poles or underground cable systems. When possible, facilities will remain along their existing route and within the existing right-of-way.

The final SOW (plans and specifications) will be completed by Q1 2022 and construction will be completed by 2024.

Type of Project

Choose One (Restoration, Improved or Alternate) If improved, provide the changes in facility size, capacity, dimension, or footprint. If alternate, provide rationale for recommendation.
Restore to Codes and Standards
This work will be in compliance with FEMA (Public Assistance Alternative Procedures (Section 428) Guide for Permanent Work FEMA-4339-DR-PR February 2020)

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.

Preliminary Engineering

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

Yes

Codes and Standards

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

The following will be referenced when applying specific codes, specifications, and standards to the project design:

1. Consensus-based codes, per FEMA (Public Assistance Alternative Procedures (Section 428) Guide for Permanent Work FEMA-4339-DR-PR February 2020).
2. Industry standards per FEMA Recovery Policy FP-104-009-5, Version 2, Implementing Section 20601 of the 2018 Bipartisan Budget Act through the Public Assistance Program.
3. FEMA Recovery Interim Policy FP-104-009-11 Version 2.1, Consensus-Based Codes, Specifications, and Standards for Public Assistance.
4. LUMA's latest Design Criteria Document (DCD) which aggregates the design considerations of the vast majority of the consensus-based codes, specifications, and standards listed in FEMA Recovery Interim Policy 104-009-11 Version 2.1 (December 20, 2019).

Industry Standards

Yes If yes, describe how incorporated below.
Applicable industry standards will be identified and incorporated into the plans and specifications.

Estimate

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.

Estimated Budget for Architectural & Engineering Design:	$1.3M
Estimated Budget for Procurement and Construction:	$13.3M
Estimated Overall Budget for the Project:	$14.6M

406 Hazard Mitigation Proposal

406 Mitigation Opportunity Scope of Work

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

406 Mitigation Opportunity Cost Estimate

Estimated Budget for Architectural & Engineering to Design:	**Unknown at this time**
Estimated Budget for Procurement:	**Unknown at this time**
Estimated Budget for Construction:	**Unknown at this time**
Estimated Overall Budget for the Project:	**Unknown at this time**

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

Environmental & Historic Preservation 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.

Attachments

Document Name	Description
Alimentador Palmer 2305_01.pdf	Location Maps

FEMA Project Scope of Work

Project Name:

Fiber Optic Replacement

Revision: 0

Date: 20AUG2021

Approvals

The signatures below formally approve the FEMA Project Scope of Work Template.

Grant Manager's Name	Signature	Date
Hernando Gee, IEM		8/22/2021
Department VP's Name	**Signature**	**Date**
Don Cortez		8/23/21

Document Change Control

This table contains a history of the revisions made to this document

Rev.	Date of Issue	Brief Description of Change
REV 0	20AUG2021	Issued for Use

Contents

Overview

Project Name:	Fiber Optic Replacement
Region:	All Regions
Damage Number:	223318
Damaged Inventory/Asset Category:	Island-Wide telecommunications System
FEMA Project Number: *(formerly Project Worksheet)*	<Provided by FEMA>

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.

LUMA Energy provides the Operations and Maintenance of the electric service to the entire island of Puerto Rico. Puerto Rico Electric Power Authority (PREPA) is the agency that owns the facilities, sites, and systems identified in this Scope of Work that are eligible as critical services facilities as defined in the PAAP (Section 428) and BBA 2018 guidance documents.

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

Facilities

Facilities List

Name	Number	GPS Start	GPS End
Offices, generation facilities, substations, and radio sites with existing network infrastructure	*Not Applicable*	*Not Applicable*	*Not Applicable*
Control Centers	*Not Applicable*	*Not Applicable*	*Not Applicable*
Intelligent devices located along distribution lines	*Not Applicable*	*Not Applicable*	*Not Applicable*
Transmission Fiber Cable (OPGW)	Multiple segments Islandwide	See note	See note
Distribution Fiber cable	Multiple segments Islandwide	See note	See note

Note: GPS coordinates will be confirmed during initial assessment.

Facilities Description

Due to hurricane damage, fiber optic cable needs to be replaced or repaired in both the transmission and distribution networks.

The transmission fiber optic network consists of Optical Ground Wire (OPGW) fiber optic cable that is installed on the Transmission 115kV and 230kV overhead power lines. Two main functions of the OPGW are to provide a medium of communication for the IT/OT Transport network, and for the electrical grid, to provide a ground and protection of the High-voltage lines from electrical discharge. Fiber is the physical component of the optical system to support electronic hardware/software equipment based on industry protocols for actual data transport, such as Synchronous Optical Networking (SONET) or Multi-protocol label switching (MPLS) to transmit large amounts of data over relatively large distances. With the use of SONET or MPLS, multiple digital data streams area transferred at the same time over the optical fiber.

The distribution fiber optic network consists of a fiber optic cable lashed underbuilt supported on a strand running along 80% of sub-transmission lines (38KV lines). This network is used in the substation controls. It allows for remote monitoring and operation of breakers located in substations, remote billing metering, telephone communication, etc. This is achieved using remote terminal units (RTU) and supervisory control and data acquisition (SCADA).

Damages:

- 337 miles of transmission fiber optic cable (OPGW) were damaged by hurricane winds
- 141 miles of distribution fiber optic cable (lashed and ADSS fiber) were damaged by hurricane winds

Project Scope

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

Replacement or repair of fiber includes the following scope:

- 371 linear miles (337 + 10% sag and loops) of transmission overhead optical ground wire (OPGW) will be replaced in kind on 230 KV and 115 KV transmission Lines.
- 155 linear miles (141.2 + 10% sag and loops) of distribution fiber optic cable underbuild will be replaced in kind on 38 KV lines.

The fiber replacement project includes all the fiber and associated engineering, installation, splicing, and mounting hardware to operate the fiber system. OPGW installation must be performed in coordination with the transmission department, since the ground wire itself (In OPGW) is an integral part of the electrical network. The scope of work will include an initial assessment of all the fiber routes to determine their status and condition and to verify and document the status and condition of the fiber and other associated components of the existing Fiber system. Further elements of the SOW and plan for replacement and/or repair will include the following:

1. Assessment of existing transmission and distribution fiber, operating performance, supporting poles and mounting hardware, and associated replacement requirements. Develop RFP for assessment and evaluation by third party if necessary.

2. In conjunction with WAN Transport SOW, develop RFP for engineering study to establish and validate the future topology of the OT data network. This study will consider fiber optic availability required to restore facilities and in conjunction with the WAN transport network, quantity of fiber strands required on each fiber route, propose licensed and unlicensed MW links and their requirements for capacity, redundancy, and reliability in design of a resilient network utilizing fiber backbone and redundancy.

3. Develop RFP for OPGW and distribution fiber replacement or repair. The RFP will include services for installation and testing of fiber strands to establish baseline performance parameters such as attenuation, dispersion loss, and component losses.

Fiber deployment will be based on a prioritized schedule to alleviate some of the possible issues on how other program needs such as Substation, Transmission, and Distribution affect network scheduling.

The final SOW (plans and specifications) will be completed by Q4 2022. Fiber implementation will be in coordination with other projects such as the transmission and distribution lines, substations, and WAN transport network which is dependent on the availability of fiber for its implementation.

Type of Project

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.
Restoration to Codes/Standards
This work will be in compliance with FEMA (Public Assistance Alternative Procedures (Section 428) Guide for Permanent Work FEMA-4339-DR-PR February 2020)

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.

Preliminary Engineering

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

Yes

Codes and Standards

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

The following will be referenced when applying specific codes, specifications, and standards to the project design:

1. Consensus-based codes, per FEMA (Public Assistance Alternative Procedures (Section 428) Guide for Permanent Work FEMA-4339-DR-PR February 2020).
2. Industry standards per FEMA Recovery Policy FP-104-009-5, Version 2, Implementing Section 20601 of the 2018 Bipartisan Budget Act through the Public Assistance Program.
3. FEMA Recovery Interim Policy FP-104-009-11 Version 2.1, Consensus-Based Codes, Specifications, and Standards for Public Assistance.
4. LUMA's latest Design Criteria Document (DCD) which aggregates the design considerations of the vast majority of the consensus-based codes, specifications, and standards listed in FEMA Recovery Interim Policy 104-009-11 Version 2.1 (December 20, 2019).

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

Industry Standards

Yes If yes, describe how incorporated below.
Applicable codes and standards will be identified and incorporated into the plans and specifications.

Estimate

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.

Estimated Budget for Architectural & Engineering Design:	35.0M
Estimated Budget for Construction & Procurement	194.5M
Estimated Overall Budget for the Project:	229.5M

406 Hazard Mitigation Proposal

406 Mitigation Opportunity Scope of Work

LUMA/IEM will develop 406 Hazard Mitigation proposals consistent with the damages. These proposals will be supported with BCAs.

406 Mitigation Opportunity Cost Estimate

Estimated Budget for Architectural & Engineering to Design:	**Unknown at this time**
Estimated Budget for Procurement:	**Unknown at this time**
Estimated Budget for Construction:	**Unknown at this time**
Estimated Overall Budget for the Project:	**Unknown at this time**

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

Environmental & Historic Preservation Requirements

Environmental & Historic Preservation considerations will be identified and evaluated for during the preliminary 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.

Attachments

Attachments will be provided after High Level Assessments (HLA) are completed.

Document Name	Description
N/A	Project Cost Estimates
N/A	Engineering Studies and Designs
N/A	Location Maps and Site Picture

Document Name	Description

FEMA Project Scope of Work

Project Name: Two-Way Land Mobile Radio Network

Revision: 0

Date: 20AUG2021

Approvals

The signatures below formally approve the FEMA Project Scope of Work Template.

Grant Manager's Name	Signature	Date
Hernando Gee, IEM		8/22/2021
Department VP's Name	**Signature**	**Date**
Don Cortez		8/23/21

Document Change Control

This table contains a history of the revisions made to this document

Rev.	Date of Issue	Brief Description of Change
REV 0	20AUG2021	Issued for Use

Contents

Overview

Project Name:	Two-Way Land Mobile Radio Network
Region:	All Regions
Damage Number:	223318
Damaged Inventory/Asset Category:	Island-Wide Telecommunications System
FEMA Project Number: *(formerly Project Worksheet)*	<Provided by FEMA>

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.

LUMA Energy provides the Operations and Maintenance of the electric service to the entire island of Puerto Rico. Puerto Rico Electric Power Authority (PREPA) is the agency that owns the facilities, sites, and systems identified in this Scope of Work that are eligible as critical services facilities as defined in the PAAP (Section 428) and BBA 2018 guidance documents.

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

Facilities

Facilities List

Name	Number	GPS Start	GPS End
Aguirre		17.95161, -66.22822	
Cerro Punta		18.17244, -66.59072	
Atalaya		18.31126, -67.18224	
La Santa		18.1105, -66.05153	
Isabela Planta		18.45767, -67.01094	
Ponce Hostos -1		18.00053, -66.61239	
Manati TC		18.43189, -66.45803	
Arecibo		18.46772, -66.70672	
Santa Ana (FCC ID 1526)		18.14772, -66.98294	
Monacillo TC		18.37217, -66.07322	
Yauco 2		18.05606, -66.88489	
El Yunque		18.3105, -65.79183	
El Gato		18.26939, -66.39767	
Yabucoa			
Arecibo Tecnica			

Note: The GPS coordinates listed are the most accurate available at this time.

Facilities Description

The Puerto Rico Electric Power Authority (PREPA) two-way voice radio system, also known as the Land Mobile Radio system (LMR), suffered severe damage from Hurricane Maria and must be replaced. PREPA is currently licensed by the FCC to operate three separate LMR systems using different equipment and different frequency bands. The FCC license database lists a 15-site LMR system for the 800 MHz band with repeater sites positioned to service the entire island of Puerto Rico. The FCC license database also lists a 2-site LMR system for the 450-460 MHz band, which is used for local communications at the generation plants. It also lists a 9-site LMR system for the 153-175 MHz band providing a regional LMR system.

The existing 800 MHz LMR system incurred significant damage and must be replaced to restore LMR services to its previous full and reliable operational status. The current LMR system consists of a mixture of an Enhanced Digital Access Communication System (EDACS) Motorola MotoTrbo radio system and other legacy radio systems, which are all incompatible with each other. Given the existing PREPA LMR technology is outdated, unrepairable, and incompatible with any modern replacement LMR systems, it will need to be completely replaced with a modern Trunked LMR system that will provide better reliability along with greater capabilities to provide a single comprehensive island-wide coverage system. Also a portion of base, mobile, and handheld radios may need to be replaced on a cycle program as well to ensure compatibility with the replacement system. Ideally, the system

should be designed to allow utility workers to intercommunicate with other first responders as well as off island EMAC (Emergency Management Assistance Compact) and power industry personnel when needed in a disaster situation. The radio devices need to meet extreme operational demands such as intrinsically safe, operability in all weather conditions, and have enhanced features to allow for "Emergency Notifications" with the push of a button.

Project Scope

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

The overall goal of the LMR system is to provide an integrated and highly reliable voice communication system connecting field crew members with each other and with dispatch operators. The planning and assessment process for the replacement LMR system will determine which sites will provide adequate coverage for a single contiguous system. The terrain of mountainous regions is a challenge and may require additional sites to be built. A detailed engineering study will fully evaluate the repeater site requirements to implement a fully integrated LMR system that will provide the required operational coverage. Coverage solutions need to include evaluation of existing dead spots, in-building coverage issues to meet or exceed NFPA 1221 Sections 9.6.7.5 thru 9.6.8.2 standards for DAQ (Digital Audio Quality), and consideration for solutions to identified DAQ issues such as in-building repeaters. Included in the study should be the evaluation of potential technology platforms to meet operational and coverage requirements. The alternative of migrating to P25 vs DMR (with a gateway for interoperability) will also be evaluated.

The Scope of Work will include:

- Assess and repair existing system sufficient to support operations and replacement efforts for two years or until new LMR Trunked system is operational.
- Develop and perform engineering studies of island-wide outdoor and indoor coverage area requirements.
- Perform requirements analysis to determine system capacity, performance, interoperability, and user requirements, and associated Trunked LMR system requirements.
- Perform technology solution assessment to meet requirements
- Develop detailed engineering design and consolidated implementation plan.
- Coordinate consolidated plan with all supporting entities.
- Develop according to federal, state and FEMA procurement statutory regulations, an RFP for system installation and integration and submit to candidate vendors and select winning vendor(s).
- Implement the new LMR system.
- Test, validate, and activate the new LMR system.

The project to replace the PREPA LMR system will adhere to applicable industry and regulatory codes and standards and will follow best industry practices and approaches.

The final SOW (plans and specifications) will be completed by Q1 2022 and construction will be completed by 2028.

Type of Project

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.
Restoration to Codes/Standards
This work will be in compliance with FEMA (Public Assistance Alternative Procedures (Section 428) Guide for Permanent Work FEMA-4339-DR-PR February 2020)

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.

Preliminary Engineering

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

Yes

Codes and Standards

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

The following will be referenced when applying specific codes, specifications, and standards to the project design:

1. Consensus-based codes, per FEMA (Public Assistance Alternative Procedures (Section 428) Guide for Permanent Work FEMA-4339-DR-PR February 2020).

2. Industry standards per FEMA Recovery Policy FP-104-009-5, Version 2, Implementing Section 20601 of the 2018 Bipartisan Budget Act through the Public Assistance Program.

3. FEMA Recovery Interim Policy FP-104-009-11 Version 2.1, Consensus-Based Codes, Specifications, and Standards for Public Assistance.

4. LUMA's latest Design Criteria Document (DCD) which aggregates the design considerations of the vast majority of the consensus-based codes, specifications, and standards listed in FEMA Recovery Interim Policy 104-009-11 Version 2.1 (December 20, 2019).

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. • FEMA DR-4339-PR - Industry Standards for Facilities Providing Communication Services in All Sectors – July 12, 2019 • Memorandum for Jacqueline Heyliger and Alex Amparo Outlining – Additional Industry Standards - Communications – October 16,2019 • ANSI/ TIA-120 Series - Telecommunications Land Mobile communications (APCO/Project 25) • DMR 3.0 • ETSI TR 102 398 • ESTI TS 102 361 • ANSI / TIA 607 • ANSI TIA 102 • 2003 - Homeland Security Presidential Directive 7: Critical Infrastructure Identification, Prioritization and Protection • 2013- Directive on Critical Infrastructure Security and Resilience Presidential Policy Directive/PPD- 21 • 2015 - Communications Sector-Specific Plan an Annex to the NIPP 2013 • 2015 - Energy Sector-Specific Plan • 2018 – U.S. Department of Homeland Security Cybersecurity Strategy • 2019 – Department Homeland Security Puerto Rico Communications/IT Solutions Based Team (SBT) (Participants FCC, CISA, NICA) • Manual of Regulations and Procedures for Federal Radio Frequency Management (ak a “The Red Book”). • NIST Special Publication 800-82 Guide to Supervisory Control and Data Acquisition (SCADA) and Industrial Control Systems Security • ANSI/NECA/BICSI 607-2011, Standard for Telecommunications Bonding and Grounding Planning and Installation Methods for Commercial Buildings • TDMM 14th Edition – 2020, Telecommunications Distribution Methods Manual • OSPDRM 6th Edition – 2018, Outside Plant Design Reference Manual • ITSIMM 7th Edition – 2017, Information Technology System Installation Methods • R56, Motorola Standards and Guidelines for Communication Sites. Manual for guidelines and requirements for the installation of communications equipment, infrastructure, and facilities. • TIA • BICSI

Industry Standards

Yes If yes, describe how incorporated below.
Applicable industry standards will be identified and incorporated into the plans and specifications.

Estimate

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.

Estimated Budget for Architectural & Engineering Design	3.0M
Estimated Budget for Construction & Procurement	43.2M
Estimated Overall Budget for the Project:	46.2M

Attachments

Document Name	Description
<insert file name>	Project Cost Estimates (Future)
<insert file name>	Engineering Studies and Designs (Future)
<insert file name>	Preliminary Location Maps and Site Picture 

Document Name:

FEMA Project Scope of Work

Project Name:

Distribution Pole & Conductor Replacement

Revision: 0

Date: 03AUG2021

Approvals

The signatures below formally approve the FEMA Project Scope of Work Template.

Grant Manager's Name	Signature	Date
Hernando Gee, IEM		8/20/2021
Department VP's Name	**Signature**	**Date**
Don Cortez		8/23/21

Document Change Control

This table contains a history of the revisions made to this document

Rev.	Date of Issue	Brief Description of Change
REV 0	03AUG2021	Issued for Use

Contents

Overview

Project Name:	Distribution Pole & Conductor Replacement
Region:	All Regions
Damage Number:	250081
Damaged Inventory/Asset Category:	Island Wide Distribution Line Systems
FEMA Project Number: *(formerly Project Worksheet)*	<Provided by FEMA>

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.

LUMA Energy provides the Operations and Maintenance of the electric service to the entire island of Puerto Rico. Puerto Rico Electric Power Authority (PREPA) is the agency that owns the facilities, sites, and systems identified in this Scope of Work that are eligible as critical services facilities as defined in the PAAP (Section 428) and BBA 2018 guidance documents.

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

Facilities

While assessing the distribution system, it is anticipated that issues will be identified that require immediate repair to avoid safety hazards, violations of federal or local ordinance, and imminent equipment failures that could cause wide-spread power outages. Specifics on the types of hazards are outlined in the System Remediation Plan (SRP). Depending on the magnitude of SRP work identified during field assessments, work may be completed in an accelerated manner to allow for faster processing and repair. The facilities addressed in this project are the distribution feeder systems in the Puerto Rico grid in all regions.

Facilities Description

The specific facilities included in this project are: poles and structures (including their foundations), framing and insulators, load break switches (manual and automated), capacitor banks, voltage regulators, transformers (including lightning arresters and fuse cut-outs), conductors, guy wires, anchoring, grounding assemblies, underground cable, underground cable systems, fault interrupting equipment (fuses, reclosers, and sectionalizers), and any other associated components.

Project Scope

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

The engineering team will perform evaluations based on field assessments of overhead facilities and document damaged assets that are deemed to represent a serious safety hazard, violation of federal or local ordinance, and imminent equipment failures that could cause wide-spread power outages, and as a result require immediate repair or replacement.

The scope of work for the distribution system will consist of the repair, restoration or replacement of damaged structures of the overhead portions of this system as allowed by FEMA Public Assistance Alternative Procedures (Section 428). This project will be designed and constructed to be in compliance with associated codes and standards referenced below.

Structure foundations will be designed and engineered to confirm structural soundness and stability. Damaged structures/poles will be replaced with higher class (strength) structures/poles made of steel, concrete, or fiberglass composite. Damaged crossarms will be replaced with composite, galvanized, or stainless steel crossarms. Porcelain insulators and any other damaged insulator will be replaced with silicone rubber insulators.

Missing or damaged grounding assemblies will be replaced to fulfill system grounding integrity. Damaged conductor spans will be replaced between poles and re-sagged per codes and standards. Damaged structure guying elements will be repaired or replaced, such as slack guy wires or pulled anchors. In order to comply with codes and standards and to allow for construction access, vegetation removal will be considered in the scope of work.

Given the urgent nature of the identified hazards, repairs will be completed as soon as possible. Assessments are starting in June 2021 and completion of this activity will be at or before June 2024.

The final SOW and construction work will be completed after High Level Assessments (HLA) are concluded.

Type of Project

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.
Restoration to Codes/Standards
This work will be in compliance with FEMA (Public Assistance Alternative Procedures (Section 428) Guide for Permanent Work FEMA-4339-DR-PR February 2020)

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.

Preliminary Engineering

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

Yes

Codes and Standards

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

The following will be referenced when applying specific codes, specifications, and standards to the project design:

1. Consensus-based codes, per FEMA (Public Assistance Alternative Procedures (Section 428) Guide for Permanent Work FEMA-4339-DR-PR February 10, 2020).

2. Industry standards per FEMA Recovery Policy FP-104-009-5, Version 2, Implementing Section 20601 of the 2018 Bipartisan Budget Act through the Public Assistance Program.

3. FEMA Recovery Interim Policy FP-104-009-11 Version 2.1, Consensus-Based Codes, Specifications, and Standards for Public Assistance.

4. LUMA's latest Design Criteria Document (DCD) which aggregates the design considerations of the vast majority of the consensus-based codes, specifications, and standards listed in FEMA Recovery Interim Policy 104-009-11 Version 2.1 (December 20, 2019).

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.

Industry Standards

Yes If yes, describe how incorporated below.
Applicable codes and standards will be identified and incorporated into the plans and specifications.

Estimate

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.

Estimated Budget for Architectural & Engineering to Design:	$31.3M
Estimated Budget for Procurement and Construction:	$568.7
Estimated Overall Budget for the Project:	$600M

406 Hazard Mitigation Proposal

406 Mitigation Opportunity Scope of Work

LUMA will develop and propose 406 Hazard Mitigation proposals consistent with the damages. These proposals will be supported with BCAs.

406 Mitigation Opportunity Cost Estimate

Estimated Budget for Architectural & Engineering to Design:	**Unknown at this time**
Estimated Budget for Procurement:	**Unknown at this time**
Estimated Budget for Construction:	**Unknown at this time**
Estimated Overall Budget for the Project:	**Unknown at this time**

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

Environmental & Historic Preservation Requirements

Environmental & Historic Preservation considerations will be identified and evaluated for during the preliminary 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.

Attachments

Attachments will be provided after High Level Assessments (HLA) are completed.

Document Name	Description
N/A	Project Cost Estimates
N/A	Engineering Studies and Designs
N/A	Location Maps and Site Picture

FEMA Project Scope of Work

Project Name:

Substation Minor Repairs

Revision: 0

Date: 20AUG2021

Approvals

The signatures below formally approve the FEMA Project Scope of Work Template.

Grant Manager's Name	Signature	Date
Hernando Gee, IEM		8/20/2021
Department VP's Name	**Signature**	**Date**
Don Cortez		8/23/21

Document Change Control

This table contains a history of the revisions made to this document

Rev.	Date of Issue	Brief Description of Change
0	20AUG2021	Issued for Use

Contents

Overview

Project Name:	Substation Minor Repairs
Region:	All
Damage Number:	223189
Damaged Inventory/Asset Category:	Island Wide Substations
FEMA Project Number: *(formerly Project Worksheet)*	<Provided by FEMA>

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.

LUMA Energy provides the Operations and Maintenance of the electric service to the entire island of Puerto Rico. Puerto Rico Electric Power Authority (PREPA) is the agency that owns the facilities, sites, and systems identified in this Scope of Work that are eligible as critical services facilities as defined in the PAAP (Section 428) and BBA 2018 guidance documents.

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

Facilities

Facilities List

While assessing substations, it is anticipated that issues with substation facilities and equipment will be identified that need immediate repair to avoid safety hazards, violations of federal or local ordinance, and imminent equipment failures that could cause wide-spread power outages. Specifics on the types of hazards will be identified during field assessments and work may be completed in an accelerated manner to allow for faster processing and repair. The facilities addressed in this project are the transmission and distribution substations in the Puerto Rico grid power system.

GPS Coordinates will be provided after High Level Assessments (HLA) are completed.

Facilities Description

The above substation facilities are composed of transformers, circuit breakers, disconnect switches, control houses, steel structures, poles, lights, and any other components, all enclosed with a perimeter fence. Hurricane Maria's flood currents, high force winds, and flying debris damaged control houses, enclosures, structures, fences, poles, lighting fixtures, and other components. The objective is to replace these components based on LUMA and industry standards, improve system resiliency, and alleviate safety hazards and environmental concerns.

Project Scope

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

Scope of work will vary per substation and may include the following:

- Remove vegetation, level earth, and replace yard gravel.
- Repair/Replace ground grid.
- Add Spill Prevention, Control, and Countermeasure (SPCC) to transformers.
- Replace broken perimeter fence and gates including Physical Security issues.
- Clean, strip, and paint control room.
- Replace external lights of the control room and outdoor structures.
- Replace battery charger and batteries.
- Replace leaning or broken poles.
- Replace eyewash/shower station.
- Detailed substation assessments and develop long-term capital investment plan (future state). The intent is to bring the substation to the minimum viability and operability for the next ten years.

The final SOW (plans and specifications) and construction dates will be completed as assessments are completed. Dates will be finalized upon the preparation of detailed project schedules.

Type of Project

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

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.
Restoration to Codes and Standards
This work will be in compliance with FEMA (Public Assistance Alternative Procedures (Section 428) Guide for Permanent Work FEMA-4339-DR-PR February 2020)

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.

Preliminary Engineering

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

Yes

Codes and Standards

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

The following will be referenced when applying specific codes, specifications, and standards to the project design:

1. Consensus-based codes, per FEMA (Public Assistance Alternative Procedures (Section 428) Guide for Permanent Work FEMA-4339-DR-PR February 2020).

2. Industry standards per FEMA Recovery Policy FP-104-009-5, Version 2, Implementing Section 20601 of the 2018 Bipartisan Budget Act through the Public Assistance Program.

3. FEMA Recovery Interim Policy FP-104-009-11 Version 2.1, Consensus-Based Codes, Specifications, and Standards for Public Assistance.

4. LUMA's latest Design Criteria Document (DCD) which aggregates the design considerations of the vast majority of the consensus-based codes, specifications, and standards listed in FEMA Recovery Interim Policy 104-009-11 Version 2.1 (December 20, 2019).

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.

Industry Standards

Yes If yes, describe how incorporated below.
Applicable industry standards will be identified and incorporated into the plans and specifications.

Estimate

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.

Estimated Budget for Architectural & Engineering Design:	$56M
Estimated Budget for Construction & Procurement:	$344M
Estimated Overall Budget for the Project:	$400M

406 Hazard Mitigation Proposal

406 Mitigation Opportunity Scope of Work

During the preliminary design phase, LUMA will develop 406 Hazard Mitigation proposals consistent with the damages. These proposals will be supported with BCAs.

406 Mitigation Opportunity Cost Estimate

Estimated Budget for Architectural & Engineering to Design:	**Unknown at this time**
Estimated Budget for Procurement:	**Unknown at this time**
Estimated Budget for Construction:	**Unknown at this time**
Estimated Overall Budget for the Project:	**Unknown at this time**

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

Environmental & Historic Preservation Requirements

EHP considerations will be identified and evaluated during the base 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.

Attachments

Attachments will be provided after High Level Assessments (HLA) are completed.

Document Name	Description
N/A	Project Cost Estimates
N/A	Engineering Studies and Designs
N/A	Location Maps and Site Picture

FEMA Project Scope of Work

Project Name:

Distribution Streetlighting

Revision: 0

Date: 20AUG2021

APPROVALS

The signatures below formally approve the FEMA Project Scope of Work Template.

Grant Manager's Name	Signature	Date
Hernando Gee, IEM		8/20/2021
Department VP's Name	**Signature**	**Date**
Don Cortez		8/23/21

Document Change Control

This table contains a history of the revisions made to this document

Rev.	Date of Issue	Brief Description of Change
REV. 0	August 20, 2021	Issued for Use

Contents

Overview

Project Name:	Distribution Streetlighting
Region:	All Regions
Damage Number:	250081
Damaged Inventory/Asset Category:	Island Wide Distribution Lines System
FEMA Project Number: *(formerly Project Worksheet)*	<Provided by FEMA>

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.

LUMA Energy provides the Operations and Maintenance of the electric service to the entire island of Puerto Rico. Puerto Rico Electric Power Authority (PREPA) is the agency that owns the facilities, sites, and systems identified in this Scope of Work that are eligible as critical services facilities as defined in the PAAP (Section 428) and BBA 2018 guidance documents.

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

Facilities

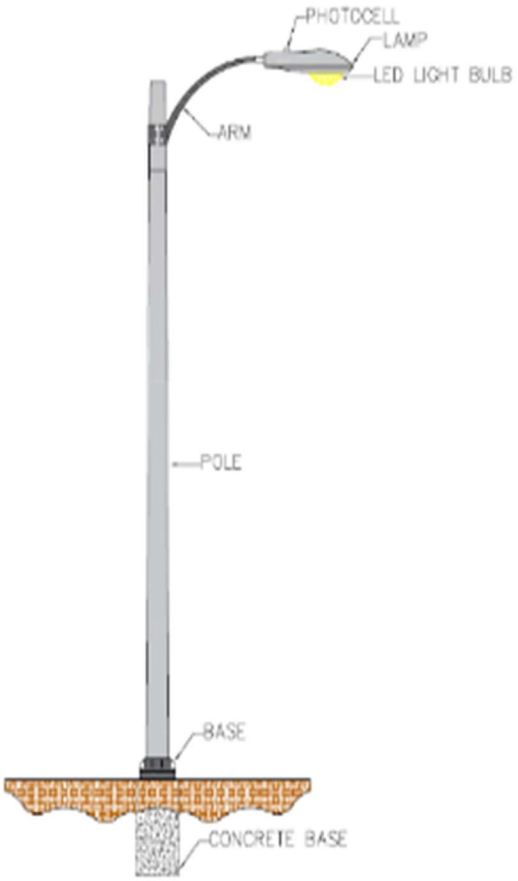
Facilities List

There are an estimated 500,000 streetlights in Puerto Rico that are owned by Puerto Rico Electric Power Authority "PREPA" and serviced by LUMA. While assessing the distribution streetlighting system, it is anticipated that numerous damaged streetlights will be identified that require immediate repair to avoid safety hazards, violations of federal or local ordinance, and imminent equipment failures. The facilities addressed in this project are the distribution streetlighting systems throughout Puerto Rico.

Name	Number	GPS Start	GPS End
		Provided after assessments are completed	Provided after assessments are completed

Facilities Description

The following illustration represents a typical basic streetlighting pole:



Additional descriptions of typical components of a streetlight system are described below:

- Pole – This can be either a standalone structure intended to house a streetlight, or a utility pole shared with other overhead utilities
- Arm – A piece of hardware affixed to a pole to which a luminaire is mounted. The arm serves to position the streetlight over the street for optimal lighting
- Luminaire/Light Bulb – The light emitting part of a streetlight
- Light controller (e.g. photocell) – A hardware device affixed to the luminaire which controls the operating mode
- Communication network – A wired or wireless system that allows the smart streetlight to communicate with other devices and the control system
- Technology control system – A software platform that allows a remote operator to set the operating parameters for the smart streetlight or manually override the parameter if needed

Project Scope

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

This program deals with distribution streetlights that are a physical safety hazard and need of repair or replacement based on their criticality. Along with increasing the number of distribution streetlights in service, this program will also include LED replacements, as well as the evaluation and implementation of a smart streetlighting system.

As a result of Hurricane Maria, it was estimated that 70% of the ~ 500,000 streetlights in Puerto Rico were damaged because of this event. Many of these damaged streetlights (estimated at ~343,000) require repair or replacement to bring up to applicable Codes and Standards. Damages include, but are not limited to, broken or missing lighting (luminaires), broken or damaged electrical pipes, pipe connectors, junction boxes and grounding rods that ensure grid capacity, broken poles and pole arms, broken or missing photocells, streetlighting wiring, circuit contactors and circuit breakers and their corresponding electric housing for powering supply line.

As per Puerto Rico Energy Public Policy Law No. 17 (April 11, 2019), all existing high-pressure sodium (HPS) lamps must be replaced with LEDs by 2030. The OMA also requires that public lighting be maintained and improved and that the operations and maintenance of these lights, including installation of LED lighting, be in accordance with Prudent Utility Practice and applicable law.

Scope includes performing condition assessments, preparing work scopes, and performing the necessary repairs, including disposal of debris and hazardous material for damaged bulbs. Non-LED luminaires will be replaced with LED luminaires. Smart streetlighting will be evaluated and implemented where it makes sense for the resiliency and efficiency of the system (Hazard Mitigation initiative).

The Smart Streetlighting project is a critical component of the plan to build back a more reliable and resilient grid in Puerto Rico. The project will require a multi-part approach to repair the broken streetlights throughout the island followed by a permanent smart streetlight solution. Aside from the damages made by the hurricanes, the current streetlighting situation in Puerto Rico raises serious concerns regarding safety, reliability, asset tracking, and billing. The smart streetlighting solution will essentially eliminate these concerns and provide additional benefits such as: increased resiliency, energy and cost savings, platform for additional smart city technologies, economic development, enhanced billing structure, and improved relationships with municipalities.

The final SOW and construction work will be completed after assessments are concluded.

Type of Project

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.
Restoration to Codes/Standards
This work will be in compliance with FEMA (Public Assistance Alternative Procedures (Section 428) Guide for Permanent Work FEMA-4339-DR-PR February 2020)

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.

Preliminary Engineering

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

Yes

Codes and Standards

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

The following will be referenced when applying specific codes, specifications, and standards to the project design:

1. Consensus-based codes, per FEMA (Public Assistance Alternative Procedures (Section 428) Guide for Permanent Work FEMA-4339-DR-PR February 2020).

2. Industry standards per FEMA Recovery Policy FP-104-009-5, Version 2, Implementing Section 20601 of the 2018 Bipartisan Budget Act through the Public Assistance Program.

3. FEMA Recovery Interim Policy FP-104-009-11 Version 2.1, Consensus-Based Codes, Specifications, and Standards for Public Assistance.

4. LUMA's latest Design Criteria Document (DCD) which aggregates the design considerations of the vast majority of the consensus-based codes, specifications, and standards listed in FEMA Recovery Interim Policy 104-009-11 Version 2.1 (December 20, 2019).

5. Puerto Rico regulations (as a result of law #57) mandate that beginning on March 1st, 2017, every plan of electrical infrastructure that is presented for endorsement or recommendation of PREPA, which includes public lighting, and that will be transferred to PREPA, must only include LED luminaires. This regulation further optimizes the amount of energy/cost savings and public safety benefits and paves the way for a smart streetlighting solution that includes the implementation of smart streetlighting compatible LED lighting fixtures.

6. Puerto Rico regulations, because of Law #218 of 2008, mandate that the public streetlights must have efficient use of energy, while minimizing light pollution, glare, and light trespassing. The law establishes a transition period of 10 years, beginning in 2014, for the 5 geographic areas identified as special classes and 20 years for the rest of the classes.

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

Industry Standards

Yes If yes, describe how incorporated below.
Applicable codes and standards will be identified and incorporated into the plans and specifications.

Estimate

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.

Estimated Budget for Architectural & Engineering Design:	**$65M**
Estimated Budget for Procurement and Construction:	**$1,155M**
Estimated Overall Budget for the Project:	**$1,220M**

406 Hazard Mitigation Proposal

406 Mitigation Opportunity Scope of Work

LUMA/IEM will develop 406 Hazard Mitigation proposals consistent with the damages. These proposals will be supported with BCAs.

406 Mitigation Opportunity Cost Estimate

Estimated Budget for Architectural & Engineering to Design:	**Unknown at this time**
Estimated Budget for Procurement:	**Unknown at this time**
Estimated Budget for Construction:	**Unknown at this time**
Estimated Overall Budget for the Project:	**Unknown at this time**

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

Environmental & Historic Preservation Requirements

Environmental & Historic Preservation considerations will be identified and evaluated for during the preliminary 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.

Attachments

Attachments will be provided after High Level Assessments (HLA) are completed.

Document Name	Description
N/A	Project Cost Estimates
N/A	Engineering Studies and Designs
N/A	Location Maps and Site Picture