

TASK ORDER NO. 3

Design Services – 138kV Canal Switchyard

THIS TASK ORDER ("Task Order") is made on _____, between the **City of Lake Worth**, a Florida municipal corporation located at 7 North Dixie Highway, Lake Worth, Florida 33460 ("City") and **Power Engineers, Inc.**, a Florida corporation ("Consultant").

1.0 Project Description:

The City desires the Consultant to provide those services as identified herein and generally described as: Engineering and design services for a new 138kV Canal Switchyard. (the "Project"). The Project is described in the consultant's proposal, dated March 4th, 2021, and is attached hereto as **Exhibit "1"** and incorporated herein.

2.0 Scope

Under this Task Order, the Consultant will provide professional services to the City as detailed in the **Consultant's proposal attached hereto and incorporated herein as Exhibit "1"**.

3.0 Schedule

The services to be provided under this Task Order shall be completed within 548 calendar days from the City's approval of this Task Order or the issuance of a Notice to Proceed.

4.0 Compensation

This Task Order is issued for a Time and Expense, not to exceed amount of \$ 1,138,439. The attached proposal identifies all costs and expenses anticipated in the Time and Expense, not to exceed amount.

5.0 Project Manager

The Project Manager for the Consultant is Ivette Sanchez, phone: 407-341-6907; email: ivette.sanchez@powereng.com; and, the Project Manager on behalf of the City is Carl Turner, P.E.; with the Florida Municipal Power Agency, phone: 321-239-1054; email: Carl.Turner@fmpa.com; and the Project Manager for the City is Paul Nicholas, phone: 561-533-7353; email: Pnicholas@lakeworthbeachfl.gov

6.0 Progress Meetings

The Consultant shall schedule periodic progress review meetings with the City Project Manager as necessary but every 30 days as a minimum.

7.0 Limitation of Liability

The City agrees to limit CONSULTANT's liability, to the City and to those under contract with the City to perform the work under the scope of the Project, for insurable events arising from the CONSULTANT's performance under this Task Order to Two Million Five Hundred Thousand Dollars (\$2,500,000.00). Except for the CONSULTANT's agreement and obligation to indemnify and hold harmless under the Agreement, the CONSULTANT's liability for non-insurable events including breach of contract shall not exceed \$1,138,439

under the proposed Task Order for this project.

8.0 Authorization

This Task Order is issued in compliance with the Consultants' Competition Negotiation Act, section 287.055, Florida Statutes, and pursuant to the Agreement for Professional Services for Electric Transmission and Generation Options between the City of Lake Worth and the Consultant, dated May 1st, 2018 ("Agreement" hereafter). If there are any conflicts between the terms and conditions of this Task Order and the Agreement, the terms and conditions of the Agreement shall prevail; however, the specific scope of services set forth in this Task Order shall take precedence over any other more general description of services.

9.0 Confidentiality

The information provided to the Consultant under this Task Order by the City will contain proprietary business information, trade secret information and information that is otherwise confidential and/or exempt from public disclosure under Florida law. Accordingly, the Consultant shall keep confidential, and shall not disseminate to any third party or use for any purpose other than the performance of this Task Order (except with the written authorization from the City), any information received from the City arising from or related to the performance of this Task Order. If Consultant receives a request and/or legal process to disclose any City information, the Consultant shall promptly notify the City and provide the City an opportunity to take appropriate action to address the request and/or legal process.

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IN WITNESS WHEREOF the parties hereto have made and executed this Task Order on the day and year first above written.

CITY OF LAKE WORTH BEACH, FLORIDA

ATTEST:

By: _____
Deborah M. Andrea, City Clerk

By: _____
Pam Triolo, Mayor

APPROVED AS TO FORM AND
LEGAL SUFFICIENCY:

APPROVED FOR FINANCIAL
SUFFICIENCY

By: _____
Glen J. Torcivia, City Attorney

By: _____
Bruce T. Miller, Financial Services Director

CONTRACTOR: Power Engineers, Inc.

[Corporate Seal]

By: _____
Print Name: Alan Sowell
Title: _____

Digitally signed by Alan Sowell
DN: C=US,
E=alan.sowell@powereng.com,
O=POWER Engineers, Inc.,
OU=VP Project Management,
CN=Alan Sowell
Date: 2021.03.05 13:24:04-05'00'

STATE OF Florida
COUNTY OF Orange

The foregoing instrument was acknowledged before me this 5 day of March, 2021, by Alan Sowell, who was physically present, as VP Project Management (title), of Power Engineers, Inc., which is authorized to do business in the State of Florida, and who is personally known to me or who has produced the following _____ as identification.

Notary Public

Lizette Martinez
Print Name: Lizette Martinez
My commission expires: 07-27-23



Exhibit 1
(Consultants Proposal)



POWER ENGINEERS, INC.
1060 MAITLAND CENTER COMMONS
SUITE 110
ORLANDO, FL 32751 USA

PHONE 207-869-1200
FAX 207-869-1299

March 04, 2021

Paul Nicholas
Engineering Manager - Special Projects
City of Lake Worth Beach
1900 2nd Avenue North
Lake Worth Beach, FL 33461

Subject: New 138kV Canal Switchyard Substation Proposal – Revised

Dear Mr. Nicholas:

We are pleased to provide you with our proposal to City of Lake Worth Beach (CLWB) to provide design and engineering services for your upcoming Canal four (4) breaker ring bus 138 kV switchyard substation project. We have revised our proposal submitted on February 26, 2021, based on CLWB feedback obtained during our conference call on March 3, 2021.

The proposal revisions entail the inclusion of the physical substation design including material and construction specifications, material purchasing support and pertinent protection and control for only the 138kV rated portion of the future Distribution switchyard.

POWER's proposed pricing for this project is outlined in tabular form later in this proposal. Pricing provided is predicated on a time and materials approach with billing rates governed by our existing POWER's Electric Transmission and Generation Options Services Agreement (RFQ No. 18-302) with City of Lake Worth Beach.

If you have any questions, please contact me at 407-341-6907. Our team is available to meet with you anytime to discuss our approach and proposal in detail. Thank you once again for this opportunity to work with City of Lake Worth Beach.

Sincerely,

A handwritten signature in blue ink, appearing to read 'Ivette Sanchez'.

Ivette Sanchez, PMP
Project Manager

NEW 138KV CANAL SWITCHYARD WORK PLAN

PROJECT DESCRIPTION

Provide engineering services for the following projects:

Substation Engineering:

- New Canal four (4) breaker ring bus 138kV switchyard.
 - Site preparation design (to include area of Canal Distribution Station).
 - Environmental permitting (to include area of Canal Distribution Station).
 - Site permitting (to include area of Canal Distribution Station).
 - Physical substation design including material and construction specifications and material purchasing support.
 - Substation protection and control design.
 - Relay settings.
 - SCADA Integration.
 - Engineering support during construction.
 - Record drawings and project closeout.
- New 138kV/25kV Distribution switchyard.
 - Physical substation design including material and construction specifications and material purchasing support for only the 138kV rated portion of the switchyard. This includes two dead-end towers, (4) 138kV breakers and associated disconnect switches, (1) 138kV bus disconnect switch, and 138kV bus and associated equipment
 - Grounding, conduit, control enclosure, lightning protection designs are not included in this scope of work.
 - Substation protection and control design for one (1) 138kV bus protection scheme. Transformer protection and 25kV equipment protection is not included in this scope.
- Addition of fiber shielding wire to Canal-Main and Main-Hypoluxo transmission lines.
 - Substation conduit design for new fiber.
 - Fiber splice enclosure design.
 - Relay settings.

Transmission Line Engineering: OPGW Install

- Replace the existing 7 No. 8 Alumoweld shield with new OPGW (fiber count pending) from Main to Canal and Main to Hypoluxo.
 - The Main to Canal section will go under I-95 via existing underground conduit.
 - The Main to Hypoluxo section will cross over I-95.
- Coordinate with the CLWB to determine a minimum fiber optic count for design and coordinate with OPGW supplier(s) to design a cable with similar properties as the existing 7 No. 8 Alumoweld shield wire.
- This proposal assumes all existing structures will have adequate capacity to support the new OPGW.
- Structure modifications and/or replacements designs are not part of the scope of this proposal.
- Evaluate the clearance between the existing transmission conductor and the OPGW.
- Develop a reduced construction package to support the information required to install the new OPGW.
- Develop an OPGW material bid specification based on industry standards.

Transmission Line Engineering: Line Reroute

- Relocate the existing Main-Canal 138kV Transmission line starting at existing structure 3/7 into the new Canal 138kV Transmission Switchyard.
 - Four (4) new direct embed concrete poles to be installed.
- Design two (2) new transmission tie lines from the new Canal transmission switchyard to the existing Canal distribution substation.
 - One (1) new direct embed concrete pole to be installed.
 - The south tie line with be strain bus (i.e. no poles required)
- Provide support to coordinate with FPL for two (2) new 138kV transmission lines into the new Canal transmission switchyard.
- Provide support to coordination with POWER/CLWB distribution for all under-built distribution lines impacting new transmission line designs
- Develop complete construction packages to support the new tie lines and line re-route.
- Development of hardware material specifications are not part of the scope of this proposal.
 - Hardware assembly drawings will be created specifying vendor part numbers and quantities.
- Develop a concrete pole specification based on industry standards and the Rural Utility Service guidelines.

PROJECT MILESTONES

The following milestones have been proposed for this project:

MILESTONE	DATE
Begin Detailed Design	3/22/2021
Substation Site Development Package (Issued For Permitting) (Substation Physical 30%)	6/4/2021
Permitting Complete (Assuming 6 Months, Allows for 2 months of float)	12/3/2021
Major Substation Equipment Procurement (Bid)	5/3/2021
Major Substation Equipment Procurement (Award date)	6/7/2021
Substation Physical 60% IFR	7/12/2021
Substation Physical 100% IFC	8/9/2021
T-Line Concrete Pole & OPGW Procurement (Bid)	7/12/2021
T-Line Concrete Pole & OPGW Procurement (Award)	8/16/2021
T-Line 90% IFB Package	8/23/2021
T-Line & Substation Construction Bids (Bid)	9/6/2021
T-Line & Substation Construction Bids (Award)	Dec 2021
Substation P&C Design 60% IFR (Schematics)	7/30/2021
Substation P&C Design 90% IFR (Wiring & Connection Diagrams)	10/8/2021
Substation P&C Design 100% IFC	11/19/2021
T-Line 100% IFC Package	12/6/2021
Start Substation Construction	2/1/2022
Substation Construction Complete	9/1/2022

POWER'S WORK PLAN FOR THIS PROJECT

This section presents our work plan prepared specifically for your project. Our work plan does the following:

- Defines the scope of work so you know exactly what we intend to do.
- Lists the deliverables that you will receive.
- Identifies your key project concerns and our proposed solutions.
- Serves as a ready-made project control system when the project begins.
- Becomes the foundation for project scheduling and budgeting throughout the project life.

A BASIS FOR PROJECT REPORTING

With this work plan, we can track tasks, subtasks and deliverables throughout the life of the project. Project status reports and project review checklists assist us in communicating and coordinating internally throughout the project.

CLWB AND POWER REVIEW

We invite you to review and revise this document with us before the project starts. This joint review will provide optimum coordination among all involved parties as the project progresses.

TASK OUTLINE

Task 0 Project Management

Subtask 0.1 Project Supervision and Control

Task 1 Substation Initiation

Subtask 1.1 Data Acquisition
 1.2 One-Line Diagram
 1.3 General Arrangement Plan
 1.4 Design Criteria
 1.5 Preliminary Package Design Review
 1.6 CLWB Review Preliminary Design
 1.7 Geotechnical Report
 1.8 Soil Resistivity Report
 1.9 Topographic Survey
 1.10 Permitting Support
 1.11 Drawing Re-creation

Task 2 Major Equipment Specifications

Subtask 2.1 Technical Specifications
 2.2 Equipment Purchase Recommendations
 2.3 Submittal Review
 2.4 Factory Test Report Review

Task 3 Physical Design

Subtask 3.1 Plans and Sections
 3.2 Grounding and Fence
 3.3 Conduit and Cable Trench
 3.4 Conduit and Cable Schedule
 3.5 Lightning Protection Design
 3.6 Physical Design Review
 3.7 Supporting Documentation

Task 4 Civil/Structural Design

Subtask 4.1 Site Preparation
 4.2 Foundation Design
 4.3 Structure Design
 4.4 Oil Containment Requirements
 4.5 Civil/Structural Design Review
 4.6 Access Road Design
 4.7 Landscape Plan
 4.8 SWPPP Plan/Civil Permitting
 4.9 Aesthetic Design
 4.10 Audible Noise Characterization and Mitigation

Task 5 Control and Relaying Schematics

Subtask 5.1 Protective Relaying One-Line Diagram
 5.2 Three-Line Diagrams
 5.3 Protective Relaying Schematics

	5.4	Breaker Schematics
	5.5	Alarm Schematic
	5.6	SCADA and Automation
	5.7	Protective Relaying Design Review
Task	6	Wiring Diagrams
Subtask	6.1	Switchboard Panel Layout
	6.2	Switchboard Panel Wiring
	6.3	Outdoor Equipment Wiring
	6.4	RTU Wiring
	6.5	Communications Interface
	6.6	Wiring Diagram Design Review
	6.7	Supporting Documentation
Task	7	Protective Relay Settings & Studies
Subtask	7.1	Data Acquisition
	7.2	Short Circuit Study
	7.3	Project Studies
	7.4	SCADA Integration
	7.5	Protective Relaying Criteria
	7.6	Protective Relay Settings
	7.7	Relay Test Procedures
	7.8	Commissioning Support
Task	8	Control Building
Subtask	8.1	Control Equipment Enclosure Plan and Sections
	8.2	AC Station Service
	8.3	DC Station Service
	8.4	Control Building Lighting & HVAC
	8.5	Supporting Documentation
Task	9	Pre-Construction Activities
Subtask	9.1	Construction Specification
	9.2	Bid Unit Schedule
	9.3	Construction Bid Package
	9.4	Contractor Selection Activities
Task	10	Construction Activities
Subtask	10.1	“Issued for Construction” Documents
	10.2	Pre-Construction Meeting
	10.3	Engineering Support during Construction
Task	11	Post-Construction Activities
Subtask	11.1	Record Drawings
	11.2	Project Close-Out Documentation
	11.3	Lessons-Learned Review
Task	12	Commissioning
Subtask	12.1	Substation Commissioning Procedures
	12.2	Substation Commissioning

- 12.3 Substation Energization
- 12.4 Final Commissioning Report

Task 13 T-Line Pre-Design Activities

- Subtask 13.1 Data Acquisition
- 13.2 Design Criteria

Task 14 T-Line Field Activities

- Subtask 14.1 Line Survey: Conventional
- 14.2 Structure Staking/Field Review
- 14.3 Geotechnical Evaluation

Task 15 T-Line Right of Way Activities

- Subtask 15.1 Easement Requirements

Task 16 T-Line Permitting Activities

- Subtask 16.1 Crossing Permits

Task 17 T-Line Design

- Subtask 17.1 PLS-CADD* Line Modeling
- 17.2 Conductor Design
- 17.3 Structure Design
- 17.4 Foundation Design
- 17.5 Design Review and Documentation
- 17.6 Project Coordination Meetings

Task 18 T-Line Material Procurement

- Subtask 18.1 Material List
- 18.2 Long-Lead Material
- 18.3 Miscellaneous Material

Task 19 T-Line Construction Drawings

- Subtask 19.1 Plan and Profile Drawings
- 19.2 Structure Drawings
- 19.3 Foundation Drawings
- 19.4 Clearing Drawings
- 19.5 Supplemental Drawings

Task 20 T-Line Quality Assurance

- Subtask 20.1 PLS-CADD Model Review
- 20.2 Procurement Review
- 20.3 Structural Design Review
- 20.4 Construction Package Review

* PLS-CADD, PLS-POLE and TOWER are trademark products of Power Line Systems, Inc.®

Task 21 T-Line Pre-Construction Activities

- Subtask 21.1 Construction Specifications
- 21.2 Bid Unit Schedule
- 21.3 Construction Bid Package
- 21.4 Contractor Selection Activities

Task 22 T-Line Construction Activities

- Subtask 22.1 “Issued For Construction” Documents
- 22.2 Pre-Construction Meeting
- 22.3 Engineering Support During Construction

Task 23 T-Line Post-Construction Activities

- Subtask 23.1 Record Drawings

TASK 0

PROJECT MANAGEMENT

Objective(s):

- To manage POWER's scope of services per City of Lake Worth Beach (CLWB)'s expectations and POWER's procedures.
- To coordinate with CLWB and to direct the smooth flow of project communications.
- To manage the work plan, schedule, and budgets for on-time completion of the project within approved parameters.

Prerequisite(s):

- Purchase Order (P.O.)
- Notice to Proceed

SUBTASK 0.1 PROJECT SUPERVISION AND CONTROL

Responsibility: POWER

Deliverable(s):

- Supervision Management

Communicate, supervise and coordinate project participants (within POWER's purview) to complete all tasks and activities as outlined in the approved scope of work. Establish and maintain with CLWB the project schedule for engineering related tasks. Track deliverables progress and completion relative to schedule. Monitor the work and budget and document work scope variances, if there are any, for CLWB's review. Prepare a Monthly Status Report to be attached to the Monthly Invoice which will summarize the status of deliverables, schedule and cost. Summarize the work performed in the reported billing period as well as work expected to be performed in the next billing period. Address problems, risks, trends and/or delays and the actions being taken to bring those areas back on schedule or budget.

Direct and coordinate POWER's project team with emphasis on:

- Compliance with CLWB's stated procedures and standards
- Adherence to budget, scope, and schedule
- Compliance with the Project Procedures and Design Criteria
- Adherence to POWER's Quality Control and Quality Assurance procedures.

Assumption(s):

- Project duration of 18 months (3/2021 through 9/2022).
- Budget includes project team members' attendance at one (1) hour project progress bi-weekly conference calls for the duration of the project.
- Meeting agendas and notes will be prepared to run meetings effectively.

TASK 1

SUBSTATION INITIATION

Objective(s):

- To prepare the Preliminary Design Package and develop the Design Criteria that will serve as the basis for detailed design.

Prerequisite(s):

- Purchase Order (P.O.)
- Notice To Proceed

SUBTASK 1.1 DATA ACQUISITION

Responsibility: POWER/CLWB

Deliverable(s):

- Data Requests
- Meeting Minutes

Schedule and attend a project initiation meeting in CLWB's office to gather and review available project data. Interview key CLWB engineering, operations, and maintenance personnel to determine key concerns to be addressed during the design. Conduct a project site visit to identify existing features and conditions that will be considered in the design. Forward data requests and a proposed meeting agenda sufficiently in advance to allow CLWB to gather requested data and prepare for the meeting. Summarize the meeting minutes and route copies to all concerned parties for review.

Review existing studies and reports and conduct additional research as required to identify and confirm the design requirements. Coordinate with CLWB to ensure compatibility with the existing system

Gather information required for preliminary engineering. Include the following:

- Meteorological information
- Existing reports or studies concerning the project
- CLWB's preferred materials and designs
- CLWB operating constraints and practices that may affect the project design
- Any additional information that will aid in design
- CLWB and agency specifications and requirements
- Project maps
- Environmental data

Review, organize and file the information for use by POWER's project team.

Assumption(s):

- CLWB will provide a survey of the property associated with Canal distribution substation including siting of all the transmission and distribution line poles and top and bottom wire elevations of these lines.
- CLWB will provide a topographic map of the Canal distribution property.
- CLWB will provide soil resistivity data association with the Canal distribution property.
- CLWB will provide geotechnical information associated with the Canal distribution property.
- Preliminary engineering including one lines, substation layouts, and initial transmission line routing was provided under another project.

SUBTASK 1.2 ONE-LINE DIAGRAM**Responsibility:** POWER**Deliverable(s):**

- One-Line Diagram

Prepare the One-Line Diagram for the substation. Illustrate the general bus arrangement, interconnection of relaying, metering, relaying communications, transformers, circuit breakers, and other devices. Determine metering and relaying locations and requirements and indicate such on the drawing by the location of the instrument transformers. Identify major equipment ratings on the drawing.

Assumption(s):

- The details of the protective relaying schemes will be fully developed under the Protective Relaying One-Line Diagram subtask.
- Preliminary engineering of the one lines was completed under another project.

SUBTASK 1.3 GENERAL ARRANGEMENT PLAN**Responsibility:** POWER**Deliverable(s):**

- General Arrangement Plan

Prepare the General Arrangement Plan. Depict the physical bus arrangement and configuration, line entries and exits, transformer, circuit breaker and switch locations, cable trench location, access roads, substation baselines and control building location. Identify and note bus connections and phasing on the drawing.

Assumption(s):

- Preliminary engineering of the general layout was completed under another project.

SUBTASK 1.4 DESIGN CRITERIA

Responsibility: POWER

Deliverable(s):

- Design Criteria Document

Review available data, and compile and issue the Design Criteria for CLWB's review, revision and approval. Summarize proposed analysis and design procedures and criteria. Include the following:

- | | |
|-------------------------|-----------------------|
| • General Description | • Grounding |
| • Site Criteria | • Conductor |
| • Controlling Codes | • Bus |
| • Access Requirements | • Insulation |
| • Electrical Loading | • Shielding |
| • Mechanical Loading | • Material Types |
| • Major Equipment | • Foundations |
| • Electrical Clearances | • Surfacing |
| • Drainage | • Operating Voltages |
| • Control House | • SCADA |
| • Communications | • Substation Lighting |
| • Metering | • DC Station Service |
| • AC Station Service | • Substation Layout |
| • Number of Terminals | • Relaying |
| • Structures | • Reclosing |

The scope and content of this document, as approved by CLWB, will serve as the basis for the detailed design engineering.

Assumption(s):

- POWER's standard design criteria document will be completed and submitted to CLWB for review.

SUBTASK 1.5 PRELIMINARY PACKAGE DESIGN REVIEW

Responsibility: POWER

Deliverable(s):

- Preliminary Design Package

Assemble a complete set of all preliminary design drawings and documents and all supporting data. Perform a detailed independent review of all documents to be included in the Preliminary Design Package. Address each of the reviewer's comments and incorporate changes into the drawings and documents as appropriate.

Assumption(s):

- Preliminary engineering of the design review was completed under another project.

SUBTASK 1.6 CLWB REVIEW PRELIMINARY DESIGN

Responsibility: POWER

Deliverable(s):

- CLWB-Approved Preliminary Design Package

Schedule and attend a meeting at CLWB's office to review the Preliminary Design materials. Provide the One-Line Diagram, General Arrangement Plan, and Design Criteria one week in advance of the meeting to allow for CLWB review. Incorporate changes requested by CLWB that are in conformance with the scope of work contained in this Work Plan.

Secure CLWB approval of the Preliminary Design package. Final design will be based on the agreement reached during this review process. Summarize the meeting minutes and route copies to all concerned parties for review.

Assumption(s):

- Ongoing phone conferences have been provided to discuss the preliminary design. Final acceptance by CLWB of the preliminary one lines, general arrangement, and transmission line routing to be provided prior to start of detailed engineering.

SUBTASK 1.7 GEOTECHNICAL REPORT

Responsibility: CLWB

Deliverable(s):

- Geotechnical Specification
- Geotechnical Report

Specifications for the geotechnical field evaluation and soil analysis shall contain detailed soil data for the design of the structure footings/foundations for the substation. The geotechnical report shall include consideration of axial capacity, lateral load resistance, settlement, and corrosion due to soil conditions and shall develop recommendations for the foundation design parameters. A boring plan detailing the location of the required borings shall be provided. Quantities and depths of borings including field and laboratory sampling and testing procedures in general accordance with ASTM procedures.

Local drilling and laboratory firms shall be identified. Obtain quotations, and select, subcontract, and schedule a local drilling subcontractor and soils laboratory subcontractor.

CLWB to review the geotechnical report submitted by the hired subcontractor for adherence to the geotechnical specification. File geotechnical report for use by POWER's project team.

Assumption(s):

- CLWB will provide access to the site for the soil testing contractor.
- CLWB will issue Purchase Order (P.O.) to the soil testing contractor.

SUBTASK 1.8 SOIL RESISTIVITY REPORT

Responsibility: CLWB

Deliverable(s):

- Soil Resistivity Specification
- Soil Resistivity Report

Perform field resistivity tests at the substation site. Determine ground resistance parameters representative of the major soil type encountered. Note the weather and soil conditions that could affect the ground resistivity at the time the readings were taken. Evaluate the field resistivity data and develop resistivity profile for each test location. Incorporate the analysis of the field data into the design of the grounding for the station.

Assumption(s):

- CLWB will provide all data for the soil resistivity testing.

SUBTASK 1.9 TOPOGRAPHIC SURVEY

Responsibility: CLWB

Deliverable(s):

- Topographic Survey Data

Perform a topographical survey of the substation site. Define the existing contours using a grid system based on the precision required for final grade. Represent the results of the survey on a map with 1-foot contour intervals.

Establish the baseline monuments and gather all planimetric data within the impact zone of the substation. Locate section and/or quarter corners and property corners that lie within or adjacent to the site and can be located after a reasonable search. Monument property corners for use by construction contractor in establishing locations for construction.

Field inspect and inventory existing facilities and equipment to gather reliable data for inclusion in the final design. Tabulate the data on existing facilities that may be included in the final design and include pertinent information such as manufacturer, model and rating.

Plot and identify the substation baselines and baseline monuments. Show all planimetric features within the substation impact zone. Include the location of roads, fences, trees, drainage features, railroads, canals, buildings, foundation remains, existing power and/or communication lines (all structures), rock outcrops, rock slides, swamps, rivers, and other permanent features.

Assumption(s):

- CLWB will provide files of the topographic survey in AutoCAD format.

SUBTASK 1.10 PERMITTING SUPPORT

Responsibility: POWER

Deliverable(s):

- Permit Applications
- Permit Authorizations from applicable Agencies

Provide CLWB the required support to acquire the necessary permits to complete the project.

Contact the applicable county/city/government agency to determine the required permits for the project. Identify the necessary support information required to submit the permit application. Collect or develop the necessary support information, complete the permit application, and submit to the appropriate agency.

Follow up with the city/county/government agency to confirm that the permit application has been received and is being processed.

Anticipated permits that will be required include:

- South Florida Water Management District – Environment Resource Management Permit;
- Palm Beach County – Building Permit;
- CLWB Drainage District – Notification and Concurrence of Development

Assumption(s):

- Any applicable Application and/or Permit Fees for the above listed agencies will be remitted by CLWB.
- No wetland permit(s), Threatened and Endangered Species or Migratory Birds Review will be required.
- Attendance in any public meetings to support the permit approval process is not included within this scope.
- No trips to visit city/county/government agency are anticipated.
- POWER will address two (2) rounds of review and comments from the Permitting Agencies if needed.

SUBTASK 1.11 DRAWING RE-CREATION

Responsibility: POWER

Deliverable(s):

- Vector Drawings

Identify which existing drawings are not in vector format. Determine which drawings would provide sufficient benefit to support the cost of redrawing and submit this list to CLWB for review. Through discussions with CLWB, determine which drawings will be redrawn and submit a change request notification to complete this additional work.

Create combination vector/raster drawings from the original paper or mylar drawings. Create the drawings in AutoCAD® format. Scan the original drawings into a tif/cit format and insert into the correct project border. Update the drawing title blocks with the pertinent information and make minor modification to the raster file to give the drawing a clean appearance.

- **Note:** This task does not address the technical verification of the design details represented on the drawings.

Assumption(s):

- If during the course of the project, it is determined that drawings need to be redrawn; POWER will submit a change order notification to document the additional cost. (This should only affect the Main substation)

TASK 2

MAJOR EQUIPMENT SPECIFICATIONS

Objective(s):

- To support CLWB in purchasing major long-lead-time equipment and materials.

Prerequisite(s):

- CLWB approved Preliminary Design Package

SUBTASK 2.1 TECHNICAL SPECIFICATIONS

Responsibility: POWER

Deliverable(s):

- Material and Equipment Specifications

Develop Technical Specifications for each piece of major equipment identified based on the CLWB approved Design Criteria. Specify design, performance requirements, fabrication and manufacturing requirements, operational and maintenance features, field service engineer requirements, warranty, assembly drawings, compliance submittals, protective coating, and shipping and delivery by the manufacturer. Develop an equipment-specific list of qualified vendors.

Assumption(s):

- CLWB will provide a list of equipment currently under blanket contracts.
- Technical specifications will be developed for the following:

- | | |
|--------------------------------|---|
| > Circuit Breakers | > Steel Structures Design and Fabrication |
| > Disconnect Switches | > Circuit Switcher |
| > CVTs | > Battery Charger & Batteries |
| > Control Building | > Line Trap |
| > Control Panels | > Metering Units |
| > Station Service Transformers | > SCADA RTU |

SUBTASK 2.2 EQUIPMENT PURCHASE RECOMMENDATIONS

Responsibility: POWER

Deliverable(s):

- Material and Equipment Purchase Recommendations

Review and evaluate manufacturer/vendor, material and equipment proposals. Evaluate proposals according to requirements as outlined in the Technical Specifications. Request bid clarifications from vendors as

required to thoroughly evaluate proposals. Prepare purchase recommendations based on compliance to the specifications and other factors that could contribute to the quality and delivery of the material or equipment. Compile evaluation criteria in spreadsheet form. Include analysis and data generated as part of the review.

Assumption(s):

- Purchase recommendations will be provided for material and equipment specified in the Technical Specifications subtask.

SUBTASK 2.3 SUBMITTAL REVIEW

Responsibility: POWER

Deliverable(s):

- Review of Approval Drawings
- Review of Data Submittals

Review the Manufacturer's Approval Drawings and Data Submittals. Verify manufacturer compliance with the technical specifications, outline drawings, and technical submittals. To expedite delivery, return Approval Drawings directly to the manufacturer and copies of the Approval Drawings to CLWB.

Provide additional information for the vendor as needed to clarify specifications. Provide technical support to CLWB during manufacture. Compare the technical specifications with vendor information and identify known problems that may arise during installation. Coordinate the resolution of any problems associated with the equipment during installation.

Assumption(s):

- Review of submittals will be provided for materials and equipment specified in the Technical Specifications subtask.

SUBTASK 2.4 FACTORY TEST REPORT REVIEW

Responsibility: POWER

Deliverable(s):

- Review of Factory Test Reports

Review Equipment Test Reports prior to installation. Verify that the equipment is performing as specified in the Technical Specifications, based on manufacturer's test results, and that all required tests have been performed.

Provide for design personnel to witness factory testing of equipment at CLWB's request. Prepare a trip report on the results of the testing and resolution of any problems found.

Assumption(s):

- Review of test reports will be provided for materials and equipment specified in the Technical Specifications subtask.
- Witnessing factory testing will be provided on a time-and-expense basis and not included in this proposal.

TASK 3

PHYSICAL DESIGN

Objective(s):

- To develop a functional, reliable, and cost-effective design for the physical portion of the substation.

Prerequisite(s):

- CLWB approved Preliminary Design Package
- Information from the Data Acquisition subtask

SUBTASK 3.1 PLANS AND SECTIONS

Responsibility: POWER

Deliverable(s):

- Station Plan Drawing
- Section and Elevation Drawings
- Miscellaneous Detail Drawings
- Rigid Bus Calculations
- Flex Bus Calculations

Layout and design the Substation Plan. Prepare a detailed overhead view of the bus arrangement. Show all buses, insulator locations, equipment (transformers, switches, circuit breakers, etc.), structures, control building, and auxiliary equipment.

Prepare the Elevation and Section Drawings. Show the equipment, structures, rigid bus, flexible buswork, and connections to scale for the station. Locate and uniquely identify material and hardware. Expand significant details for clarity. Dimension critical clearances and other special concerns. Show adequate detail to accomplish construction and to support maintenance. Incorporate a drawing-specific legend and notes.

Perform necessary bus calculations to determine maximum bus spans based on the environmental conditions, bus size and insulator type outlined in the design criteria.

Assumption(s):

- 138kV portion of the New Canal Distribution switchyard up to but not including the 138/25kV transformers is included in this proposal.

SUBTASK 3.2 GROUNDING AND FENCE

Responsibility: POWER

Deliverable(s):

- Grounding and Fence Plan Drawing
- Grounding and Fence Details Drawings
- Grounding Analysis Report based on IEEE Std 80

Perform grounding system analysis within the area enclosed by the grounding system out to four (4) feet beyond the substation fence and any outward opening gates, based on the provided layout, fault and soil resistivity data. Grounding calculations will be performed using a computer model and design software package and based on IEEE Std 80 requirements. Produce a grounding analysis report in PDF with a single recommended design for the new grounding system area for use.

Prepare the Grounding and Fence Plan Drawing. Show the approximate locations of the underground conductor. Represent conductor sizes, connections, ground rod locations, equipment and structure grounding leads, operating platforms, and fence and gate grounding locations. Expand significant details for clarity and for ease of interpretation. Extend the grid four (4) feet outside of the fence as well as four (4) feet past the swing of the gate(s).

Lay out the substation fence. Include dimensions for corner posts and gates. Show locations of fence mounted equipment such as “Danger High Voltage” and “Hard Hat Area” signs and hot stick storage canister. Incorporate drawing-specific legend and notes.

Assumption(s):

- No unusual site conditions that require atypical grounding will be encountered. Typical grounding system design will consist of grounding conductor in 20’-40’ grid patterns and driven 10’-20’ long ground rods.
- Grounding and fence design of the new Canal Distribution Switchyard is not included in this scope of work.

SUBTASK 3.3 CONDUIT AND CABLE TRENCH

Responsibility: POWER

Deliverable(s):

- Conduit and Cable Trench Plan Drawing
- Conduit and Cable Trench Details Drawing

Determine the preliminary control and substation service cabling requirements based upon the Design Criteria, Major Equipment Specifications, SCADA requirements, and the preliminary one-line diagram. Identify the devices to be interconnected, the number of conductors per cable, cable type and conductor size with sufficient accuracy to size the conduit and cable trench.

Prepare the Conduit and Cable Trench Drawing, based on the Foundation Plan. Locate and identify each conduit route and riser with a unique station-specific descriptor. Provide dimensional data for the contractor to purchase the pre-cast cable trench. Determine the cable trench size, layout, and location as dictated by the unique requirements of the station. Include drive sections as required. Incorporate the routing of the cable trench on the drawing.

Assumption(s):

- Schedule 40 PVC pipe will be used for all underground and above-grade conduit applications.
- Cable trench will be “drive” rated in particular locations only.
- Conduit design of the new Canal Distribution Switchyard is not included in this scope of work.

SUBTASK 3.4 CONDUIT AND CABLE SCHEDULE**Responsibility:** POWER**Deliverable(s):**

- Conduit and Cable Schedule
- Voltage Drop Calculations

Prepare the Cable Schedule. Specify cable number, cable type, insulation level, conductor quantity and size, cable destinations, brief description of cable usage, and cable routing. Size the conductor wires to accommodate NEC designated amperages. Review long cable runs and/or high current circuits for voltage drop concerns. Complete voltage drop calculations for circuits with potential unacceptable voltage drop levels.

Evaluate available cable types and select control and power cables based on application, voltage, insulation, operating and ambient temperatures, and CLWB’s requirements.

Prepare a Conduit Schedule. Include conduit designation, conduit material, associated cables, and destination. Size each conduit in accordance with allowable fill percentages defined by NEC.

Assumption(s):

- Standard cables specified will be #10 and #12 of various number of conductors and unshielded.
- Standard conduits specified will be 1”, 2”, 3” and 4” depending on application.
- Conduit design of the new Canal Distribution Switchyard is not included in this scope of work.

SUBTASK 3.5 LIGHTNING PROTECTION DESIGN**Responsibility:** POWER**Deliverable(s):**

- Lightning Protection Design
- Lightning Protection Calculations

Lay out the lightning protection. Incorporate lightning protection into structures designated for other use as much as practical. Locate additional lightning protection structures and shield wires where needed to achieve adequate protection.

Assumption(s):

- The Rolling Sphere method of lightning protection design will be used. (ref IEEE 998-2012)
- Static wires attached to static masts will be utilized to provide adequate lightning protection.
- Adequacy of the lightning protection will be verified for new equipment only.
- Lightning protection design of the new Canal Distribution Switchyard is not included in this scope of work.

SUBTASK 3.6 PHYSICAL DESIGN REVIEW**Responsibility:** POWER**Deliverable(s):**

- Physical Design Package

Assemble a complete set of all physical design drawings and documents and all supporting data. Perform a detailed independent review of all documents to be included in the Physical Design Package. Utilize standardized drawing checklists and the design criteria document to ensure the design parameters and interfaces have been confirmed and meet the project requirements. Address each of the reviewer's comments and incorporate changes into the drawings and documents as appropriate.

SUBTASK 3.7 SUPPORTING DOCUMENTATION**Responsibility:** POWER**Deliverable(s):**

- Physical Equipment Catalog Cuts
- Physical Equipment Material List
- Physical Equipment Nameplate List

Compile and present the following supporting documentation:

Catalog Cuts are photocopies from vendor catalogs showing materials and equipment that will be used for the project. They are compiled for reference during design and construction and cross-referenced to the Material List. In addition, the catalog cuts will be used to ensure that the correct material has been procured and expedite receiving.

The Material List includes quantity, brief description, manufacturer, and part number, if applicable, for each item. It is cross-referenced to the design drawings.

The Nameplate List contains quantity, text specifications, and required wording for the nameplates to be used on each item. The list is cross-referenced to the design drawings.

TASK 4

CIVIL / STRUCTURAL DESIGN

Objective(s):

To develop a functional, reliable, and cost effective civil/structural design for the substation.

Prerequisite(s):

- CLWB Approved Preliminary Design Package
- Information from the Data Acquisition subtask

SUBTASK 4.1 SITE PREPARATION

Responsibility: POWER

Deliverables(s):

- Site Preparation Plan Drawing
- Site Preparation Detail Drawing
- Erosion Control Plan and Details
- Stormwater Details

Prepare the Site Preparation Plan Drawing based on the Design Criteria, Geotechnical Report, and Topographic Survey Report. Show the original contours as dashed lines and the final grade contours as solid lines. Consider cut-and-fill quantities and balance, if possible. Show details for the drainage facilities such as oil containment, drainage ditches, water diversions, culverts, and other significant drainage control features. Show finish surfacing and landscaping requirements, berms, retaining walls, and other significant design features. Expand significant details for clarity and ease of interpretation. Incorporate a drawing-specific legend and notes. Show erosion control details on plans.

Assumption(s):

- The substation site will not require tiers or retaining walls to accommodate adequate drainage.
- The substation access roads will not be paved.
- Exact quantities of cut and fill will not be provided to the contractor.
- Site permitting efforts will be handled by POWER.
- Geotechnical report and topographic survey report will be provided by CLWB.
- Environmental studies will be provided by POWER.
- Site preparation will include area of new 8-bay distribution yard north of the existing Canal Distribution station.

SUBTASK 4.2 FOUNDATION DESIGN

Responsibility: POWER

Deliverables(s):

- Foundation Plan Drawing

- Foundation Detail Drawings
- Foundation Calculations

Prepare the Foundation Plan Drawing based on the substation Plan Drawing. Locate, with centerline dimensions and spacing, each foundation that is required for the supporting steel structures, equipment, and control building. Dimension the Foundation Plan from the substation baselines. Identify each foundation with a unique station-specific alphanumeric descriptor. Indicate the orientation and elevation for the foundations.

Evaluate the structure and equipment loading requirements and design the foundations using data contained in the Geotechnical Report and Design Criteria. Determine the type of foundation to be used for each type of structure or equipment. Document all analysis and calculations.

Prepare the Foundation Detail Drawing. Show the foundations required to support the substation structures, equipment, and control building. Identify each foundation with an alphanumeric descriptor. Show the dimensions, the approximate neat line volume of concrete, the anchor bolt requirements, and the type of rebar.

Show a typical cross section and a plan view for each type of foundation. Show the projection and position of the anchor bolts and the arrangement of the rebar. Indicate sizes for all rebar.

Assumption(s):

- The construction contractor will be responsible for determining quantities for rebar, concrete, and miscellaneous anchor bolts (including hardware).
- The substation will have an 8' high perimeter precast wall with vehicular gates and pedestrian door openings (wall design will be by precast wall vendor). POWER will be responsible for designing the foundations for the precast wall, coordinating with the precast wall vendor, and developing a performance specification that the precast wall vendor will use to design the wall.
- Control equipment enclosure base loads will be provided by the CEE vendor.
- Foundations of all 138kV equipment except for 138/25kV transformers in new Canal Distribution Switchyard are included in this scope of work. Foundations will match foundation design of the 138kV equipment in the new 138kV Canal Transmission Switchyard.

SUBTASK 4.3 STRUCTURE DESIGN

Responsibility: POWER/Supplier

Deliverable(s):

- Structure Outline Drawings

Prepare structure outline drawings for steel design and fabrication based on the Design Criteria and the Plan and Section Drawings. Show equipment and conductor loads and where they are applied. Show dimensional configurations, and mounting locations for switches, insulators, or other devices that are to be mounted on the structures.

Perform all calculations and provide final detailed steel fabrication and assembly drawings for manufacture. Document all analyses and calculations.

Assumption(s):

- Galvanized wide flanged structures will be used for substation equipment.
- Galvanized tubular steel structures will be used for dead-end structures.
- Structures of all 138kV equipment except for 138/25kV transformers in new Canal Distribution Switchyard are included in this scope of work. Structures will match structure design of the 138kV equipment in the new 138kV Canal Transmission Switchyard.

SUBTASK 4.4 OIL CONTAINMENT REQUIREMENTS

Responsibility: N/A

Deliverable(s):

- Oil Containment Plan
- Oil Containment Detail Drawing
- Oil Containment Calculations

Perform preliminary site evaluation considering the following parameters:

- Site drainage
- Proximity to waterways
- Soil permeability
- Depth to ground water
- Volume of oil

Select the oil containment design method for the transformer that best suits the site, considering the above listed project site conditions. Oil containment types that will be considered are: concrete basin, general site berming, basin with spray-on liner and fabric liner. Prepare an Oil Containment Plan and Details Drawing showing critical dimensions and details. Incorporate catch basins, collection system, piping, separator valves and other details as required.

Assumption(s):

- Oil containment requirements will not be evaluated for existing equipment.
- Oil containment for new equipment will not be required.
- No SCADA monitoring of the oil containment will be required.

- A complete SPCC plan will not be developed for this project.
- Oil containment design for the new Canal Distribution Switchyard is not included in this scope of work.

SUBTASK 4.5 CIVIL/STRUCTURAL DESIGN REVIEW

Responsibility: POWER

Deliverable(s):

- Civil/Structural Design Package

Assemble a complete set of all civil/structural design drawings and documents and all supporting data. Perform a detailed independent review of all documents to be included in the Civil/Structural Design Package. Utilize the site survey, geotechnical evaluation, design criteria, boring logs and any other applicable data to confirm that the civil design meets the site conditions and the project requirements. Address each of the reviewer's comments and incorporate changes into the drawings and documents as appropriate.

SUBTASK 4.6 ACCESS ROAD DESIGN

Responsibility: POWER

Deliverables(s):

- Access Road Plan Drawing
- Access Road Detail Drawing

Prepare the Access Road Plan and Profile Drawing. Show existing features, items to be installed or constructed (culverts and drainage ditches, etc.) and final elevations.

Prepare Access Road Detail Drawing. Specify the roadway width, show road cross-sections, surfacing sections, culvert specifications, drainage ditches, water bar details, and typical cut and fill sections. Identify materials to be used for construction.

Assumption(s):

- Access road will be designed as a 20' (twenty-foot)-wide, gravel-topped road.
- Access road will be estimated at 200' (two hundred feet), for design purposes.
- Any required permits, such as Curb Cutting Permits, will be provided by POWER.

SUBTASK 4.7 LANDSCAPE PLAN

Responsibility: POWER

Deliverable(s):

- Landscape Plan

If required prepare a Landscape Plan for the substation to provide visual shielding from potential development in the vicinity of the substation. Utilize natural contours and vegetation to the extent possible. New landscaping required will consist of berms and native vegetation. Show location and dimensions of berms, location and type of trees, shrubs and other vegetation required. Incorporate a drawing-specific legend and notes.

Assumption(s):

- Landscaping will consist of simple berms and plants. Extensive landscaping will not be required.
- Design of an automatic or manual irrigation system will not be required.
- Professional stamp from a licensed Landscape Architect will not be required on the design.
- POWER will coordinate with the governing agency to determine approved and acceptable plant species.

SUBTASK 4.8 SWPPP PLAN/CIVIL PERMITTING

Responsibility: POWER

Deliverable(s):

- Stormwater Pollution Prevention Plan
- Stormwater Management Report

POWER will develop a Stormwater Pollution Prevention Plan (SWPPP) in accordance with Florida Department of Environmental Protection (FDEP) NPDES Generic Permit requirements for land disturbances over 1 Acre. Post-construction stormwater management is anticipated as the station installation will increase the stormwater runoff from the project site. POWER will design all post-construction stormwater management features in accordance with FDEP, Palm Beach County and Lake Worth Drainage District requirements. POWER will attend any meetings via teleconference to support the SWPPP approval process.

Assumption(s):

- Zoning determination and support are not included in this scope of work.
- Building permit support associated with the DICM is not included in this scope of work.
- Soil disturbance will be greater than one (1) acre requiring a SWPPP submitted to FDEP and post-development stormwater management design per local and county requirements.
- No in-person local agency meetings will be required, and all correspondence can be handled via phone calls or emails.

- Application fees to all review agencies are not included in this scope of work. This proposal assumes POWER will be reimbursed for any related fees.

SUBTASK 4.9 AESTHETIC DESIGN

Responsibility: N/A

**SUBTASK 4.10 AUDIBLE NOISE
CHARACTERIZATION AND
MITIGATION**

Responsibility: N/A

TASK 5

CONTROL AND RELAYING SCHEMATICS

Objective(s):

To develop a functional, reliable and cost-effective control and relay design for the station.

Prerequisite(s):

- CLWB Approved Preliminary Design Package
- Information from the Data Acquisition subtask

SUBTASK 5.1 PROTECTIVE RELAYING ONE-LINE DIAGRAM

Responsibility: POWER

Deliverable(s):

- Protective Relaying One-Line Diagram

Review the protection, control, and metering schemes outlined in the Design Criteria and the Preliminary One-Line Diagram. Check that the schemes will coordinate with the system, the proposed equipment and the known CLWB operating procedures. Select protective and auxiliary relay types.

Review the proposed substation equipment ratings to determine that equipment will support the protection and metering schemes. Check the current rating (continuous and interrupting), instrument transformer accuracy class and burden, overload capabilities, and auxiliary features.

Show instrument transformer locations and ratings. Show equipment (relays, control switches, etc.) identified by standard ANSI device function numbers. Show metering, indicating instruments, and control devices. Show the instrument transformer secondary circuit connections to devices. Use dashed lines to show the protection, control and metering functions. Incorporate a drawing-specific legend and notes.

Assumption(s):

- No corrections to the existing equipment locations and ratings will be required.
- No corrections to the interface points will be required to these drawings.
- No modifications will be required to the existing protective relaying at Main for the Canal-Main line relaying.
- No modifications will be required to the existing protective relaying at Main or Hypoluxo for the Main to Hypoluxo line relaying.
- Temporary one line will be created for the new Canal Distribution switchyard that includes only the 138kV portion of the switchyard.

SUBTASK 5.2 THREE-LINE DIAGRAMS

Responsibility: POWER

Deliverable(s):

- Three-Line Diagrams

Prepare the Three-Line Diagrams. Show the interconnection of the instrument transformer metering, relaying, and control circuits. Include the relays, meters, transducers, indicating instruments, test switches, cable and fiber connections and AC panel interconnections. Show the transducer input connections to the SCADA RTU. Incorporate a drawing-specific legend and notes.

Assumption(s):

- No corrections will be required to the existing three-line representations.
- Only new equipment and interface points will be added to these drawings.
- Three line diagrams for the 138kV portion of the new Canal Distribution switchyard will be included in the scope of work.

SUBTASK 5.3 PROTECTIVE RELAYING SCHEMATICS

Responsibility: POWER

Deliverable(s):

- Protective Relaying Schematic Diagrams

Prepare the Protective Relaying Schematic Diagrams. Show the interconnections of the relaying and control circuits. Include relays, control switches, control contacts, SCADA RTU control and status connections, and DC panel interconnections. Show contact developments of the control switches and relays indicating the terminal connections and state of the contacts for each position. Prepare drawings for each line position or relay function. Incorporate a drawing-specific legend and notes.

Assumption(s):

- The existing protective relaying schematics will only be modified if equipment is being replaced or added.
- FPL lines will have a line panel per line with a SEL-421 as primary relay and SEL-311L as secondary relay. DCB scheme over PLC for the SEL-421 relay. Step distance for SEL-311L.
- Canal to Main line will have a line panel with a SEL-421 as primary relay and SEL-311L as secondary relay. DCB over fiber for the SEL-421 relay. Differential over fiber for SEL-321 with control to disable differential if normally open switch in Canal Distribution Substation is closed.

- Canal Transmission to Canal Distribution line will have a line panel with a SEL-421 as primary relay and SEL-311L as secondary relay. Step distance for the SEL-421 and SEL-311L with zones that reach Main.
- Main and Hypoluxo substation relaying will not be changed. Only relay setting changes at these substation will be required.
- At new Canal Distribution switchyard, a 138kV bus differential scheme with a SEL-487B that will encompass the for 138kV breakers at new Canal Distribution switchyard.

SUBTASK 5.4 BREAKER SCHEMATICS

Responsibility: POWER

Deliverable(s):

- Circuit Breaker Control Schematic Diagrams
- Motor Operated Disconnect Control Schematic Diagrams

Prepare the Interrupting Device Control Schematic Diagrams. Show the interconnections of the relaying and control circuits. Include relays, control switches, control contacts, SCADA RTU control and status connections, and DC panel interconnections. Show contact developments of the control switches and relays indicating the terminal connections and state of the contacts for each position. Prepare drawings for each interrupting device. Incorporate a drawing-specific legend and notes.

Assumption(s):

- The only modifications to the existing interrupting device control schematics will be to reflect the addition or replacement of new control switches and/or relays associated directly with this project.
- Breaker failure will be integrated in SEL-421 relay (one breaker per relay)
- Four 138kV breakers at new Canal Distribution switchyard will be included.

SUBTASK 5.5 ALARM SCHEMATIC

Responsibility: POWER

Deliverable(s):

- Alarm Schematic Diagram
- RTU Schematic Diagram

Prepare the Alarm and RTU Schematic Diagram(s). Show the interconnection of the alarm contacts with the alarm indicating device (annunciator, light, buzzer, etc.) and/or SCADA input, reset devices, conditional status contacts, and the alarm circuit power supply. Show interposing relays where required. Incorporate a drawing-specific legend and notes.

Assumption(s):

- One (1) RTU will be required for CLWB. Size to be determined at later date.
- One (1) RTU will be required for and provided by FPL.
- SCADA will implement RTAC and poll all relays with communication over Serial/fiber.
- SCADA at the new Canal Distribution switchyard is not included in this scope of work.

SUBTASK 5.6 SCADA AND AUTOMATION**Responsibility:** POWER**Deliverable(s):**

- SCADA Points List

Prepare the SCADA Points List, including the control, status, analog, and pulse accumulator points required for the substation. Identify addresses of networked equipment and location of data, protocol used and scaling as required. Specify the integration of the SCADA system with the total substation control. Determine if interposing relays are required.

Assumption(s):

- The substation SCADA system will be implemented using DNP 3.0 communication between the equipment and the RTU.
- SCADA at the new Canal Distribution switchyard is not included in this scope of work.

SUBTASK 5.7 PROTECTIVE RELAYING DESIGN REVIEW**Responsibility:** POWER**Deliverable(s):**

- Control and Relay Schematics

Assemble a complete set of all control and relay schematic drawings and all supporting data. Perform a detailed independent review of all documents to be included in the Control and Relay Schematic Package. Confirm the design against the design criteria and client comments to the preliminary design package. Utilize standardized drawing checklists to ensure that the design parameters and interfaces have been reviewed and confirmed. Address each of the reviewer's comments and incorporate changes into the drawings and documents as appropriate.

TASK 6

WIRING DIAGRAMS

Objective(s):

- To design an efficient substation wiring system.

Prerequisite(s):

- Control and Relay Schematics
- Information from the Data Acquisition subtask

SUBTASK 6.1 SWITCHBOARD PANEL LAYOUT

Responsibility: POWER

Deliverable(s):

- Switchboard Panel Layout Drawings

Review the Design Criteria and determine the control panel arrangement. Lay out the control switchboard panels. Determine the placement (logically, operationally, and electrically) of all control, protection, and metering devices on the panels.

Prepare Switchboard Panel Layout Drawings. Show plan and elevation details, control devices, metering, relays, and indicating lights. Locate and uniquely identify material and hardware. Incorporate a drawing-specific legend and notes.

Assumption(s):

- The only modifications to the existing switchboard panel layout drawings will be to reflect the removal/addition of equipment associated directly with this project.
- The switchboard manufacturer will provide the detail design for the switchboard panel steel.
- One (1) 138kV differential panel at the new Canal Distribution switchyard is included as well as control for four breakers.

SUBTASK 6.2 SWITCHBOARD PANEL WIRING

Responsibility: POWER

Deliverable(s):

- Switchboard Panel Wiring Diagrams

Prepare Switchboard Panel Wiring Diagrams. Organize the required terminal blocks by panels and function (CT shorting type, voltage input, breaker contacts, trip circuits, close circuits, auxiliary circuits, RTU circuits, etc.) Show wiring terminations required for each panel. Clearly designate the destination of the wire at each terminal. Place wiring from yard equipment or from other panels on one side of the terminal block and all wiring to the panel devices on the other side as much as is

practical. Show a maximum of two (2) terminations per terminal. Designate the panel name or number at the top of each page.

Assumption(s):

- The only modifications to the existing switchboard panel wiring diagrams will be to reflect the removal/addition of new equipment or terminations as required to interface with substation modifications associated directly with this project.
- One (1) 138kV differential panel at the new Canal Distribution switchyard is included as well as control for four breakers.

SUBTASK 6.3 OUTDOOR EQUIPMENT WIRING

Responsibility: POWER

Deliverable(s):

- Circuit Breaker Wiring Diagrams
- Motor Operated Disconnect Wiring Diagrams
- Instrument Transformer Wiring Diagrams
- External Junction Box Wiring Diagrams

Prepare Wiring Diagrams for the outdoor equipment. Show external terminal block connections, jumpers, and internal wiring changes to the manufacturer's wiring. Show grouping of individual conductors into cables, reference cable designations and indicate remote end destination. The manufacturer's internal wiring will not be reproduced except where wiring changes are necessary.

Assumption(s):

- Vendor drawings will be redrawn to the extent necessary to show the exterior connections for the new cabling.
- All 138kV equipment at the new Canal Distribution switchyard is included in this scope of work.

SUBTASK 6.4 RTU WIRING

Responsibility: POWER

Deliverable(s):

- RTU Wiring Diagrams

Prepare RTU Wiring Diagrams for the substation equipment. Show external terminal block connections, jumpers, and internal wiring changes to the manufacturer's wiring. Show grouping of individual conductors into cables, reference cable designations and indicate remote end destination. Show communication interfaces to IEDs including protocols. The manufacturer's internal wiring will not be reproduced except where wiring changes are necessary.

Assumption(s):

- The primary function of the RTU wiring diagrams will be to clarify the external connections to the RTU control, status, analog and accumulator cards from the substation equipment. Component to component wiring is expected to have been done by the RTU vendor.
- FPL to provide point assignments and internal wiring for FPL provided RTU.
- RTU at new Canal Distribution switchyard is not included in this scope of work.

SUBTASK 6.5 COMMUNICATIONS INTERFACE**Responsibility:** POWER**Deliverable(s):**

- Communications Interface Drawing

Define the interface requirements for relaying and SCADA communications to the remote substations or remote facilities. Define relaying and SCADA hardware and software requirements and communication equipment located in the substation. Show the communications requirements as a one-line block representation on a Communications Interface Drawing. Indicate specific interfaces between equipment and provide notes for clarity.

Develop performance specifications for the communications equipment located in the substation to be compatible with the defined communication system.

Assumption(s):

- The communication interfaces are defined for the substation only. Remote sites are not included.
- Communications at new Canal Distribution switchyard is not included in this scope of work.

SUBTASK 6.6 WIRING DIAGRAM DESIGN REVIEW**Responsibility:** POWER**Deliverable(s):**

- Switchboard Panel and Wiring Design Package

Assemble a complete set of all switchboard panel and wiring drawings and all supporting data. Perform a detailed independent review of all drawings to be included in the Switchboard Panel and Wiring Design Package. Confirm the design against the design criteria, NEC conductor ampacities and standard accepted design practices. Utilize standardized drawing checklists to ensure that the design parameters and interfaces have been reviewed and confirmed. Address each of the reviewer's comments and incorporate changes into the drawings and documents as appropriate

SUBTASK 6.7 SUPPORTING DOCUMENTATION**Responsibility:** POWER**Deliverable(s):**

- Switchboard Panel Catalog Cuts
- Switchboard Panel Material List
- Switchboard Panel Nameplate List

Compile and present the following supporting documentation:

- Catalog Cuts: are photocopies from vendor catalogs showing items that will be used for the project. They are compiled for reference during design and construction and cross-referenced to the Material List. In addition, the catalog cuts will be used to ensure that the correct material has been procured and expedite receiving.
- Material List: includes quantity, brief description and part number for each item. It is cross-referenced to the design drawings.
- Nameplate List: contains quantity, text specifications, and required wording for the nameplates to be used on each item. The list is cross-referenced to the design drawings.

TASK 7**PROTECTIVE RELAY SETTINGS & STUDIES****Objective(s):**

To develop, document, and support protective relay settings, studies, and SCADA Integration in accordance with CLWB's protection and operations practices. Includes meeting the basic objectives of protective relaying (i.e. dependability, security, selectivity, speed, and simplicity).

Prerequisite(s):

- Issued-for-Construction Electrical Drawings
- Data requested from CLWB
- Up-to-date and usable ASPEN short circuit data base of the interconnected FPL system.

SUBTASK 7.1 DATA ACQUISITION

Responsibility: POWER

Deliverable(s):

- Information necessary to prepare settings

Prepare a written data request and submit to CLWB. Request CLWB's protective relaying standards or guidelines, example settings, CT data, database for short circuit studies in ASPEN, settings for relays that must be coordinated with, settings for remote end relays, system single line drawings, loading for tapped substations, all transmission line rating data, and other pertinent information.

Gather applicable "Issued for Construction" drawings, including meter and relay single line drawings, DC schematic drawings, AC three-line drawings, and panel drawing from POWER's design team.

Review data received and communicate with CLWB and POWER's design team to clarify information and/or request additional information.

Organize data in electronic and paper files.

Assumption(s):

- CLWB's protection engineer will be available to assist in interpreting the data provided.
- CLWB's provided information will be assumed as up-to-date.
- "Issued for Construction" drawings will be available.
- Documentation of final configurations at remote terminals will be available.
- CLWB's assigned engineer will communicate with FPL for all needed information.

SUBTASK 7.2 SHORT CIRCUIT STUDY

Responsibility: POWER/CLWB

Deliverable(s):

- An ASPEN model of new Canal transmission substation and transmission system, up to 3 buses away, to be used for short circuit study. Model will be limited to 138kV system and interconnected generation. This model will be based on up-to-date model from FPL. (Draft and “Issued for Implementation”)

Perform short circuit studies using the database provided by CLWB. Run the following cases:

- Maximum and low (using an agreed upon contingency case) 138kV bus fault currents.
- Close-in and end-of-line fault currents for maximum and low fault current cases.
- Interim faults, as needed, in order to identify/remedy any terminals where coordination cannot be achieved with upstream/downstream devices.

Results from study will be recorded and utilized in the calculation workbooks for clarity and reference.

Assumption(s):

- Up-to-date FPL model will be requested by CLWB for POWER to revise for use on this project.
- All provided transmission line data, transformer data, etc. needed for modeling will be up-to-date and reflective of existing conditions.
- POWER revised model will be submitted and approved for use by CLWB prior to settings development.

SUBTASK 7.3 PROJECT STUDIES

Responsibility: POWER/CLWB

Deliverable(s):

- Grounding study (Draft and “Issued for Implementation”)
- OPGW Thermal Rating study (Draft and “Issued for Implementation”)

Perform studies as detailed below, or in accordance with CLWB standards when available:

- Gather site information and develop an optimized soil model from the provided soil resistivity measurements using the RESAP module of the CDEGS software. Create a grounding system model based on the drawings provided of the station. Complete a grounding study using the MALZ module of CDEGS software to analyze the substation grounding system and verify that it will meet compliance requirements

- based on IEEE Standard 80 (IEEE Guide for Safety in AC Substation Grounding) touch and step voltage criteria. Produce a grounding report summarizing the analysis, results, and provides suggested mitigation
- Create base case ATP model for use in evaluating OPGW heating during fault scenarios including single contingency failures such as an open in the adjacent shield wire or failure of primary protection systems. Include the effect of fault current DC offset. Evaluate required OPGW thermal capacity (KA^2) rating for faults immediately outside the substation and at increasing distances from the substation. Develop recommendations for OPGW thermal capacity for the first segment outside of the substation, the distance of the first segment, and the OPGW thermal capacity for the remainder of the line. Document the analysis and recommendations in a report.

Results from study will be recorded and utilized in the calculation workbooks for clarity and reference.

Assumption(s):

- Grounding Study:
 - No unusual site conditions will be encountered. Typical ground grid design will consist of grounding conductor in 10'-20' long ground rods.
 - Fault current distribution will be approximated using charts provided in IEEE 80, Appendix C.
 - The grounding analysis is not connected to any other ground systems.
- OPGW Thermal Rating Study:
 - OPGW will not be insulated and segmented
 - Switching transient analysis is authorized

SUBTASK 7.4 SCADA INTEGRATION

Responsibility: POWER/CLWB

Deliverable(s):

- SEL-RTAC configuration files, SCADA points list, and Integration One-Line Drawing (Draft and "Issued for Implementation").
- Support for SCADA related settings inside of protective relays.

Develop SCADA point assignment list, Integration One-Line drawing and configuration files for SEL-RTAC per CLWB's standard SCADA application. This includes confirming SCADA related settings inside of protective relays.

Assumption(s):

- CLWB will provide up-to-date SCADA application standards for reference.
- CLWB SCADA subject matter experts will be available for support.
- One (1) review cycle per each SCADA deliverable has been provided in estimate.

- HMI development, including alarm annunciation screen(s), is not included with POWER's scope of work. Local station HMI can be included upon CLWB request with change request.
- SCADA estimate includes integration of up to 10 Intelligent Electronic Devices (IED) connecting via industry standard interfaces and protocols.
- SCADA Point Lists and RTAC configuration will be limited to up to two (2) SCADA off-taker data maps with a maximum of 250 total point count each.
- SCADA at the new Canal Distribution switchyard is not included in this scope of work.

SUBTASK 7.5 PROTECTIVE RELAYING CRITERIA

Responsibility: POWER/CLWB

Deliverable:

- Protective Relaying Criteria Document (Draft and "Issued for Implementation")

Review information received from CLWB and from POWER's design team to determine relay functionality required and setting guidelines that will need to be followed. Review single line, DC schematic, and AC three line drawings to verify relay inputs and output assignments, trip and control circuits, and instrument transformer inputs to the relays.

Review protection scheme and provide any comments or suggestions for CLWB consideration. In particular, consider system operation in case failure of any single device or piece of equipment.

Prepare a draft Protective Relaying Criteria Document consisting of:

- Introduction including discussion of project, description of work, and document organization.
- Discussion of protection scheme review and any comments/suggestions for CLWB's consideration.
- Meter and relay single line diagram.
- System Level Protection Description that provides an overview of the protection system by identifying the protective relaying elements that provide primary and backup protection for each protection zone and/or piece of major equipment. Include discussion of protection during abnormal switching.
- Protective Relaying and Setting Specification that includes relay part number, instruction manual references, CT and VT data, DC inputs, contact outputs, communications port settings, description of relay logic, elements to be set, and guidelines for setting elements.
- Short circuit study results.
- Selected CLWB-provided information.

Submit a PDF copy of the draft Protective Relaying Criteria to CLWB for review. Discuss the draft document with CLWB in a tele-conference.

Make agreed upon changes to the document and re-submit a PDF copy “Issued for Implementation.”

Assumption(s):

- A PDF copy of the draft Protective Relaying Criteria document will be submitted.
- A PDF copy of the “Issued for Implementation” Protective Relaying Criteria document will be submitted.
- Relays, elements, logic, and features included are:
 - > (2) SEL-421 (step distance, DCB over PLC, ground overcurrent, breaker control, and breaker failure protection).
 - > (2) SEL-421 (step distance, DCB over FO, ground overcurrent, breaker control, and breaker failure protection).
 - > (2) SEL-311L (step distance, differential over FO, ground overcurrent).
 - > (3) SEL-311L (step distance, ground overcurrent).
 - > (1) SEL-421 (step distance, ground overcurrent).
 - > (1) SEL-487B (138kV differential at the new Canal Distribution switchyard, split zones).
- Custom relay logic is limited to that necessary to implement the relay elements, logic, and features listed above. Relay programming to perform non-protection functions (e.g. replace control switch and lockout relay functions, substation automation, custom displays, and so on) is not provided unless specifically included in the scope of work.

SUBTASK 7.6 PROTECTIVE RELAY SETTINGS

Responsibility: POWER/CLWB/FPL

Deliverable:

- Protective Relay Settings and Supporting Documentation (Draft and “Issued for Implementation”)
- Drafted Logic Diagrams (Draft and “Issued for Implementation”)

Perform calculations using CLWB-provided templates, POWER calculations templates (typically on Excel spreadsheets), or hand calculations. Calculate overcurrent pickup values, the reach of distance elements, over/under frequency settings, time delays, time current curves and time dials, differential element sensitivity and slopes, and other relay parameters using the guidelines and short circuit study from the “Issued for Implementation” Protective Relaying Criteria.

Prepare time current curves (TCCs) if time overcurrent coordination is required. Prepare curves using SKM Power Tools for Windows (PTW) or similar agreed-upon software (e.g. ASPEN).

Use ASPEN as a design aid and to confirm distance and ground relay coordination for transmission line relays. Consider intact system cases and the contingency cases defined in the Protective Relaying Criteria.

Prepare logic to implement the relay functionality defined in the “Issued for Implementation” Protective Relaying Criteria document. This may include functions such reclosing, breaker close control, breaker failure scheme, pushbutton functionality, and logic to interface with the substation monitoring and control system.

Prepare relay settings files in applicable electronic format (e.g. SEL AcSELeRator software).

Prepare a draft basis document that includes settings calculations, TCCs, printouts of settings, and logic diagrams.

Submit an electronic copy of the draft basis document to CLWB for review. Discuss the draft document with CLWB in a telephone conference. Make agreed-upon changes to the document and re-submit a PDF and native settings files, as “Issued for Implementation.”

Provide a formal document detailing the correspondence and agreed-upon philosophies for setting protection elements guarding tie-lines between neighboring utilities, per PRC-001 requirements. This document will be reviewed and approved by project personnel from, both, CLWB and FPL.

Assumption(s):

- A PDF copy of the draft basis document will be prepared and submitted.
- A PDF copy of the “Issued for Implementation” copy of the basis document will be prepared and submitted.
- New and existing devices included in this scope:
 - > Line protection at new Canal transmission substation on Canal distribution substation (primary and backup) line.
 - > Line protection at new Canal transmission substation on Main substation (primary and backup) line.
 - > Line protection at Main substation on Canal transmission substation (primary and backup) line.
 - > Existing Line protection at Main substation on Hypoluxo substation (primary and backup) line.
 - > Existing Line protection at Hypoluxo substation on Main substation (primary and backup) line.
 - > Line protection at new Canal transmission substation on both FPL tie lines (primary and backup).
 - > Differential protection at new Canal Distribution switchyard (primary only)

SUBTASK 7.7 RELAY TEST PROCEDURES

Responsibility: CLWB

Deliverable(s):

- Completed Relay Test Procedures Forms

Modify existing CLWB Power Relay Test Procedures Form to create test procedures forms for the relays. Confer with CLWB if specific questions regarding CLWB's normal testing practices and capabilities of their test equipment arise.

Submit an electronic copy of the Relay Test Procedures "Issued for Implementation."

SUBTASK 7.8 COMMISSIONING SUPPORT

Responsibility: POWER/CLWB

Deliverable(s):

- Technical support during commissioning
- Protective Relaying Criteria and Protective Relay Settings and Supporting Documentation (record copy)

Answer questions about the relay settings and logic during the testing and commissioning of the relays.

Review the "as left" settings provided after testing and commissioning. Identify differences (if any) between the "Issued for Implementation" settings and the "as left" settings and document them. Discuss any identified differences with CLWB and document the agreed-upon follow-up.

Prepare a record copy of the Protective Relaying Criteria, relay settings and all supporting documentation, and Relay Test Procedure documents that includes any changes resulting from information provided to POWER after testing and commissioning.

Assumption(s):

- The relays will be wired and applied as shown in the "Issued for Construction" drawings and "Issued for Implementation" copies of the Protective Relaying Criteria and relay settings.
- A PDF record copy of the Protective Relaying Criteria and relay basis documentation, including logic diagrams, will be prepared and submitted.
- Any changes to the relay settings from "Issued for Implementation" version will be discussed, documented, and approved by POWER SAS engineer and/or CLWB prior to implementation.

TASK 8

CONTROL BUILDING

Objective(s):

- To design and specify a functional substation control building.

Prerequisite(s):

- Switchboard Panel Design
- CLWB-approved Preliminary Design Package

SUBTASK 8.1 CONTROL EQUIPMENT ENCLOSURE PLAN AND SECTIONS

Responsibility: POWER and Control Equipment Enclosure (CEE) Vendor

Deliverable(s):

- CEE Plan Drawing
- CEE Section and Detail Drawing

Prepare the Control Equipment Enclosure Plan and Section Drawings. Show the dimensioned location of the equipment within the Control Equipment Enclosure. Integrate the access and operational requirements with equipment considerations to establish the Equipment Enclosure layout and size. Assess the environmental loading, weather conditions, and aesthetic considerations to determine the type of structure to be specified. Determine the requirements of the cable routing system and entrance (floor trench or overhead cable tray). Show the Control Equipment Enclosure grounding requirements. Expand significant details for clarity and ease of interpretation. Incorporate a drawing-specific legend and notes. Prepare Control Equipment Enclosure Foundation Plan and Detail Drawings.

Assumption(s):

- Enclosure will be a self-framing or modular-type pre-engineered steel building.
- CEE supplier will perform detailed engineering for the building.
- CEE permitting will be handled by POWER.
- Time is budgeted for one new CEE at new Canal Transmission Substation.
- CEE at new Canal Distribution switchyard is not included in this scope of work.

SUBTASK 8.2 AC STATION SERVICE

Responsibility: POWER

Deliverable(s):

- AC Station Service Drawing
- AC Station Load Calculations

Determine the substation AC load, including substation lighting, building heating and cooling, equipment auxiliary loads (heaters, fans, pumps, convenience outlets, etc.), special load requirements (oil processing, welders, etc.), and construction loads. Size the AC equipment and provide for AC automatic transfer switch (ATS) when required.

Prepare the AC Supply Drawing. Show the AC substation service transformer fusing, substation service transformer, and AC panel layout. Identify the loads served from the AC panel. Include spare breakers on each panel. Size the breakers and conductors to the loads served by each circuit per NEC requirements. Show the connection to the battery charger.

Assumption(s):

- AC station service transformer will be connected from one of the local distribution feeders.
- Backup AC station service source will be connected from a separate local distribution feeder.
- Pad mount transformer and overhead distribution transformers are both valid options. Determination of type to be determined during design.
- Automatic Transfer Switch will be located in the CEE.
- AC station service design at new Canal Distribution switchyard is not included in this scope of work.

SUBTASK 8.3 DC STATION SERVICE

Responsibility: POWER

Deliverable(s):

- DC Station Service Drawing
- DC Station Service Calculations

Analyze the substation DC requirements. Determine the substation DC load, including the operation of protective equipment (power circuit breakers, circuit switchers, reclosers, etc.) and motor-operated disconnects, control circuits, emergency lighting, equipment power supplies, and indicating and alarm equipment. Based on all identified loads and the Design Criteria requirements, calculate the required battery system and battery charger from the preliminary design; determine if battery system will be designed for future expansion.

Prepare the DC Supply Drawing. Show the battery charger, battery bank, and DC panel layout. Identify the loads served from the DC panel. Size breakers to the loads served by each circuit in accordance with NEC requirements. Include spare breakers in each panel. Incorporate a drawing-specific legend and notes.

Assumption(s):

- Battery system will be sized for the load requirements of the substation equipment only.

- Four breaker ring bus for Canal Transmission substation is the ultimate design and any expansion will not be included in these calculations.
- DC station service design at new Canal Distribution switchyard is not included in this scope of work.

SUBTASK 8.4 CONTROL BUILDING LIGHTING AND HVAC

Responsibility: CEE Vendor; Reviewed by POWER

Deliverable(s):

- Control Building Power, Lighting and HVAC Drawing

Review the design of the building HVAC system is not included.

Review the design of the building power and lighting system. Review that the design considers the location and use of all equipment and designs for lighting levels as determined in the design specification. The design should provide for switched AC lighting and a light over the door operated by a photo cell. The design should include emergency DC lights if required per the specification. Confirm that the drawings locate AC and DC light switches, photo cell controls and AC convenience power outlets for the building. Confirm that the drawing shows a legend and notes to clarify the design.

Assumption(s):

- Design provided by CEE Vendor.

SUBTASK 8.5 SUPPORTING DOCUMENTATION

Responsibility: POWER

Deliverable(s):

- Control Building Catalog Cuts
- Control Building Material List

Compile and present the following supporting documentation:

- Catalog Cuts: are photocopies from vendor catalogs showing items that will be used for the project. They are compiled for reference during design and construction and cross-referenced to the Material List. In addition, the catalog cuts will be used to ensure that the correct material has been procured and expedite receiving.
- Material List: includes quantity, brief description and part number for each item. It is cross-referenced to the design drawings.

TASK 9

PRE-CONSTRUCTION ACTIVITIES

Objective(s):

- To develop the documents that will be required during the construction bidding phase of the project.

Prerequisite(s):

- Construction Drawings

SUBTASK 9.1 CONSTRUCTION SPECIFICATION

Responsibility: POWER

Deliverable(s):

- Construction Specification

Prepare a Construction Specification for the substation. Include general requirements as well as specific sections on site work, concrete, structure erection, insulation, painting, equipment installation, control building erection, switches and fuses, conduit and fittings, wire and cable, buswork connections, instrumentation, grounding, and testing.

Incorporate readily available site-specific environmental conditions and CLWB's requirements that will affect the method or sequence of construction.

Include a copy of CLWB's Work Rules or Safety Standards.

Compile and assemble one (1) reproducible copy of the Construction Specifications and Drawings Document. This document will include the Construction Specifications, Construction Drawings, and Reference Drawings.

Assumption(s):

- Any modifications to the construction specifications between bid and construction will be handled with addenda in lieu of re-issuing entire specification.
- Construction specification for the new Canal Distribution switchyard is not included in this scope of work.

SUBTASK 9.2 BID UNIT SCHEDULE

Responsibility: POWER

Deliverable(s):

- Bid Unit Descriptions
- Bid Unit Tabulations

Develop the Construction Bid Unit Descriptions required for the Construction Contract. Briefly categorize and describe the particular work element and payment basis.

Prepare the Construction Bid Unit Schedule. Tabulate and identify the bid units by alphanumeric descriptor and title. Identify the quantity (per unit or per lot) of each unit and allow for the inclusion of construction unit labor costs, material costs, and labor and material cost extensions.

Assumption(s):

- Standard RUS bid units will be used.

SUBTASK 9.3 CONSTRUCTION BID PACKAGE

Responsibility: POWER

Deliverable(s):

- Construction Bid Package
- Physical Construction Bid Package
- Protection & Control Bid Package

Prepare a general description of the overall project scope and schedule. Assemble a construction bid package to include the following:

- | | |
|-------------------------------|---------------------------------|
| • General Project Description | • Construction Schedule |
| • Bid Unit Schedule | • Construction Specification |
| • Material List | • Geotechnical Report |
| • Plan and Section Drawings | • Control & Protection Drawings |
| • Foundation Drawings | • Switchboard Drawings |
| • Miscellaneous Drawings | • Wiring Diagrams |

Incorporate site-specific environmental constraints and clarify outage limitations and equipment delivery that could affect the method or sequence of construction.

Assumption(s):

- One (1) hard copy and one (1) electronic copy of the Construction Bid Package will be prepared and submitted to CLWB.
- CLWB will provide their standard terms and conditions to use in the bid contract.
- Only one construction bid package will be assembled and issued for all work that will be contracted.
- Construction specification for the new Canal Distribution switchyard is not included in this scope of work.

SUBTASK 9.4 CONTRACTOR SELECTION ACTIVITIES

Responsibility: POWER/CLWB

Deliverable(s):

- Contractor Bid List
- Construction Pre-Bid Meeting Minutes
- Construction Cost Estimate
- Bid Evaluation

Prepare a list of Contractors who will be invited to bid on the subject project.

Schedule, attend, and document Construction Pre-Bid Meeting. Issue Pre-Bid Meeting Minutes. Issue any applicable Addendums to the Construction Bid Package.

Provide technical support during the addendum/clarification phase (bid window) of the bidding phase.

Prepare Engineer's Construction Cost Estimate from the construction bid unit schedule.

Include unit prices for labor and material individually, both CLWB-furnished and/or contractor-furnished. Develop an extension based on the quantity required for each unit.

Analyze and evaluate the contractor proposals received and make recommendation to CLWB for the award of Contract. Include back-up data, calculations, assumptions, and any necessary explanations. Review contractor submitted substitution requests and make recommendation to CLWB relative to acceptance.

Assumption(s):

- Three (3) POWER representatives will attend construction pre-bid meeting.
- CLWB will prepare Contract document and execute with Contractor.

TASK 10

CONSTRUCTION ACTIVITIES

Objective(s):

- To develop the documents that will be required during the construction phase of the project.
- To provide engineering support during the construction phase.

Prerequisite(s):

- Pre-Construction Activities
- Outage and Energization Plan

SUBTASK 10.1 “ISSUED FOR CONSTRUCTION” DOCUMENTS

Responsibility: POWER

Deliverable(s):

- “Issued For Construction” Drawings

Update the Construction Bid Package drawings. Modify the bid issue drawings to include any changes that have occurred in the design during the bidding process.

Assumption(s):

- One (1) hard copy and one (1) electronic copy of the “Issued For Construction” Drawings will be prepared and submitted to CLWB.
- The construction specification will not be re-issued.

SUBTASK 10.2 PRE-CONSTRUCTION MEETING

Responsibility: POWER

Deliverable(s):

- Pre-Construction Meeting Minutes

Schedule, attend, and document a Pre-Construction Meeting between CLWB, Contractor and POWER. Review the construction documents, project schedule, project contacts for involved parties and the detailed scope of the project. Issue Pre-Construction Meeting Minutes. Issue any applicable changes to the Contract documents.

Assumption(s):

- Two (2) POWER representative will attend construction pre-construction meeting.

SUBTASK 10.3 ENGINEERING SUPPORT DURING CONSTRUCTION

Responsibility: POWER

Deliverable(s):

- Engineering Support During Construction

Provide technical support to the Contract Administrator and Construction Inspectors during construction.

Review material test reports for required material and coordinate the resolution of any problems associated with the material tests.

Assumption(s):

- Up to forty (40) hours of engineer time to provide office support for construction activities will be budgeted.
- Up to two (2) full day field trips will be budgeted in the event that is needed during construction progress.
- Field trips and/or hours required in excess of the limit specified above will be performed on a time-and-expense basis.

TASK 11

POST-CONSTRUCTION ACTIVITIES

Objective(s):

- To update the construction drawings with any changes that occurred during construction.
- To assist CLWB with project close-out documentation.

Prerequisite(s):

- Construction Completion

SUBTASK 11.1 RECORD DRAWINGS

Responsibility: CLWB/POWER

Deliverable(s):

- Construction Drawings “Issued For Record”

Incorporate the changes received during construction and furnish a complete set of drawings to reflect the "record drawing" condition when the project is completed.

Assumption(s):

- A set of red-lined drawings, depicting construction changes, will be submitted to POWER by CLWB or their representative.
- One (1) hard copy and one (1) electronic copy of the Record Issue Construction Drawings will be prepared and submitted to CLWB.
- A field trip to walk through the completed project, if required, will be performed on a time-and-expense basis.

SUBTASK 11.2 PROJECT CLOSE-OUT DOCUMENTATION

Responsibility: CLWB/POWER

Deliverable(s):

- Project Close-Out Documentation

Review the completed project with CLWB. Summarize and reconcile project payments and the final scope of work. Prepare a final payment recommendation for CLWB’s consideration.

Prepare and submit any required CLWB or agency documents closing out the construction activities. Summarize the information to allow CLWB to incorporate total facility and component costs in CLWB’s accounting system. Prepare a final report summarizing unresolved issues.

Assumption(s):

- Project close-out documentation, if required, will be performed on a time-and-expense basis.

TASK 12

COMMISSIONING

Objective(s):

- To provide verification of construction per design, acceptance testing of apparatus, protection systems and controls, and assist in energization of the substation.

Prerequisite(s):

- Protective Relaying One-Line Diagram
- Completed Wiring Schematics
- Preliminary outage and energization schedule
- Relay Settings
- Substation equipment installed and wiring in progress

SUBTASK 12.1 SUBSTATION COMMISSIONING PROCEDURES

Responsibility: CLWB

SUBTASK 12.2 SUBSTATION COMMISSIONING

Responsibility: CLWB

SUBTASK 12.3 SUBSTATION ENERGIZATION

Responsibility: CLWB

SUBTASK 12.4 FINAL COMMISSIONING REPORT

Responsibility: CLWB

TASK 13**T-LINE PRE-DESIGN ACTIVITIES****Objective(s):**

- To identify, define, and secure CLWB approval of the parameters necessary to proceed with the line design for the project.

Prerequisite(s):

- Notice to Proceed

SUBTASK 13.1 DATA ACQUISITION**Responsibility:** CLWB/POWER**Deliverable(s):**

- Data Requests
- Meeting Minutes

Attend a project initiation in-person meeting with CLWB to kick-off the project. Gather and review available project data. Forward data requests and proposed meeting agenda sufficiently in advance to allow CLWB to gather requested data and prepare for the meeting. Compile the meeting minutes and route copies to all concerned parties for review. Initiate coordination with underbuild utilities, including distribution to determine the preferred configurations, tensions, etc.

Assumption(s):

- CLWB will provide existing design information for all transmission infrastructure to support the scope of work.
- Two (2) transmission line engineers from POWER's team will attend the kickoff meeting. Additional meetings will be invoiced on a time and expense basis.

SUBTASK 13.2 DESIGN CRITERIA**Responsibility:** POWER**Deliverable(s):**

- Design Criteria

Review the information from the Project Initiation Meeting and Data Acquisition. Compile and issue the project Design Criteria for CLWB review, revision, and approval. Maintain and update the Design Criteria, during the life of the project.

Assumption(s):

- POWER will follow the historic CLWB design philosophy and industry standards.

TASK 14**T-LINE FIELD ACTIVITIES****Objective(s):**

- To field locate and monument the project centerline, field survey the established centerline and develop the topographic and planimetric data required for project line design.
- To explore, analyze and evaluate the route geology and develop a geotechnical database for the design of the structure foundations and embedments.

Prerequisite(s):

Notice to Proceed

SUBTASK 14.1 LINE SURVEY: CONVENTIONAL

Responsibility: CLWB

Deliverable(s):

- Ground Control Survey
- Utility Survey
- Planimetric Mapping
- CAD Generated Survey Drawing
- SUE Reports

Provide engineering and management support and input to surveyor to facilitate the acquisition of the required survey information to support LiDAR data. Provide survey feature code list to surveyor.

Perform ground control survey. Field locate existing horizontal and vertical control points. Survey section and/or quarter section corners and property corners, which lie immediately on each side of the centerline. Survey right of way monuments, mile post markers, and establish control monumentation along the transmission centerline. Record the description and location of all monumentation in the field book.

Perform utility survey to tie in overhead facilities that cross the proposed centerline or conflict with the new line. Perform utility survey to tie in underground facilities that parallel or cross the proposed transmission centerline. Request and coordinate underground utility locates at all proposed structure locations. Perform exploratory digs or soft digs at all proposed structure locations where apparent conflicts exist; all utilities encountered will be marked above ground prior to digging.

Prepare planimetric map including existing land lines, section lines, half-section lines, easement lines, right of way lines, ownership boundaries and ownership data.

Compile all planimetric mapping and survey data into one continuous electronic plan view drawing file.

Assumption(s):

- CLWB will directly contract the survey and subsurface utility exploratory contractor.
- This project will have an estimated number of five (5) exploratory digs or soft digs.
- POWER will provide location coordinates and KMZ file for the exploratory digs or soft digs.

SUBTASK 14.2 STRUCTURE STAKING / FIELD REVIEW

Responsibility: CLWB/POWER

Deliverable(s):

- Preliminary Structure Staking
- Construction Structure Staking

Provide engineering support and input to CLWB and surveyor to facilitate the staking.

Preliminary structure staking for engineering review and utility locates will be completed by CLWB contracted surveyor. Review preliminary staking with CLWB and adjust structure locations to accommodate the field conditions.

Construction staking of the proposed structures will be completed by CLWB contracted surveyor. Staking shall include structure staking and structure offset stakes at a minimum and shall comply with CLWB structure staking guidelines. Review construction staking with CLWB

Assumption(s):

- CLWB will directly contract the survey contractor.
- POWER will develop the scope and coordinate this effort.
- POWER's project engineer will review the preliminary structure staking and the construction structure staking.
- Two (2) transmission line engineers from POWER's team will attend the field staking review meetings. Additional meetings will be invoiced on a time and expense basis.

SUBTASK 14.3 GEOTECHNICAL EVALUATION

Responsibility: CLWB/POWER

Deliverable(s):

- Geotechnical Evaluation and Report

Provide engineering support and input to CLWB contracted geotechnical consultant.

Prepare soil boring map and staking coordinates.

Drill soil borings, prepare soil boring logs, perform laboratory testing, prepare engineering soil properties table and compile all data and recommendations in a geotechnical report.

Assumption(s):

- CLWB will provide existing geotechnical data, if available.
- CLWB will directly contract the geotechnical contractor.
- POWER will provide location coordinates and KMZ file for soil borings.

TASK 15**T-LINE RIGHT OF WAY ACTIVITIES****Objective(s):**

- To identify landowners along the right of way and identify any additional easement requirements.
- To work with CLWB to secure required easements.

Prerequisite(s):

- Notice to Proceed

SUBTASK 3.1 EASEMENT REQUIREMENTS

Responsibility: Not Applicable

Deliverable(s):

- No deliverables are required by POWER (This task is included to show the below assumptions).

Assumption(s):

- All poles and wires will be in road right of way or within CLWB substation property, and CLWB existing easements.
- There will be adequate road right of way for pole spotting and meeting wire blowout requirements.
- No easement acquisition will be required. If necessary, POWER can provide the information to support this effort on a time and expense basis.
- POWER will not be responsible for identifying danger trees.

TASK 16**T-LINE PERMITTING ACTIVITIES****Objective(s):**

- To identify other agencies or utilities that may be affected by the proposed project.
- To prepare drawings and documentation to aid in the securing of permits.

Prerequisite(s):

- Field Activities
- Notice to Proceed

SUBTASK 16.1 CROSSING PERMITS**Responsibility:** POWER**Deliverable(s):**

- FDOT Crossing Permit Drawings
- County Road Permit Drawings
- FAA Checks and Notifications

Prepare 8-1/2"x11" or 11"x17" permit crossing drawings for each crossing required for the project.

Assumption(s):

- Budget includes one (1) major road crossing permit drawing to install the new OPGW over I-95. Additional permit drawings will be performed on a time and expense basis.
- Budget includes four (4) city/county road crossing permit drawings to install the new OPGW. Additional permit drawings will be performed on a time and expense basis.
- Budget includes FAA determination for each new structure being installed using the Notice Criteria Tool (NTS) on their website. If additional permitting is required (such as filing and tracking for a determination), it will be performed on a time and expense basis.
- CLWB will pay all permit fees.
- Construction permits required by state and local agencies for access off highways, driveway permits, traffic control, burning, etc., will be prepared, submitted and acquired by CLWB's construction contractor.
- Maintenance of Traffic (MOT) plan will be performed by others. POWER can provide the information to support this effort.

TASK 17

T-LINE DESIGN

Objective(s):

- To determine the height, location, and type of structures and prepare Plan and Profile Drawings.
- To compile the constraining factors that determine the final line design, and use this information to establish the final structure, conductor and foundation configurations to suit the specific requirements for the line.
- To prepare and document the design for the structures, conductors and foundations.

Prerequisite(s):

- Design Criteria
- Line Survey

SUBTASK 17.1 PLS-CADD LINE MODELING

Responsibility: POWER

Deliverable(s):

- PLS-CADD Model

Input the line survey and design criteria data, including clearance requirements, crossing checks, sag-tension limits, etc., into the PLS-CADD model. Select the PI locations and determine the centerline alignment. Create TIN model to further define the terrain. Select left and right profile offsets. Identify prohibitive zones and structure locations that must remain fixed. Develop Method 4 structures with the appropriate geometry, allowable span limits, line angle limits and swing angle limits.

Model distribution and other transmission lines, which cross or tap the project line. Add annotations as required to identify conductors and other basic features on the profile. Attach aerial background photos, substation general arrangement drawings, drawing border, and other available .dxf files to supplement the PLS-CADD/AutoCAD plan-profile.

Assumption(s):

- The line relocation into the new canal yard will start at existing structure 3/7 and extend to structure 3/11.
- A PLS CADD model will only be developed for the line relocations at Canal. A model will not be developed for the shield wire replacement/OPGW install.
- This proposal assumes all existing structures will have adequate capacity to support the new OPGW.

- Structure modifications and/or replacements designs are not part of the scope of this proposal, except as required to complete the line relocation at Canal.

SUBTASK 17.2 CONDUCTOR DESIGN

Responsibility: POWER

Deliverable(s):

- Sag and Tension Data
- Stringing Sag Tables
- Aeolian Vibration Analysis

Generate conductor and overhead ground wire Sag and Tension Data within the PLS-CADD software. Generate conductor and overhead ground wire Stringing Sag Tables within the PLS-CADD software per CLWB's current design philosophy. Evaluate the damping requirements and select the damping hardware, based on CLWB vibration criteria.

Assumption(s):

- NA

SUBTASK 17.3 STRUCTURE DESIGN

Responsibility: POWER

Deliverable(s):

- Selection of Standard Vendor Library Concrete Structures
- Vendor Drawings Review and Approval

Design structures to the loading conditions identified in the Design Criteria. Apply the controlling loads to each structure type in the structure family and determine and select the location and sizing for each required component or member in conformance with applicable codes and design constraints.

Utilize PLS-CADD to determine ground line reactions of direct embedded concrete poles. Determine equivalent pole tip load and select a vendor standard library structure to be utilized.

Assumption(s):

- POWER will design for a single circuit vertical configuration matching the existing conductor and new OPGW loading.
- POWER assumes three (3) new single-circuit concrete dead-end poles will be required.
- POWER assumes one (1) new single-circuit concrete tangent pole will be required.
- POWER assumes one (1) new single-circuit concrete dead-end pole with distribution underbuild will be required.

- CLWB's existing standard framing drawings and assembly drawings will be utilized, as applicable.

SUBTASK 17.4 FOUNDATION DESIGN

Responsibility: POWER

Deliverable(s):

- Foundation Construction Schedule

Analyze and evaluate the foundation for lateral and vertical capacity. Utilize the appropriate overload capacity factors (OCFs), maximum allowable deflection and maximum allowable rotation limits as defined in the Design Criteria.

Perform structural design of the foundation type based on design loads and foundation/soil reactions. Prepare the Foundation Construction Schedule.

Assumption(s):

- Each new structure will require a foundation analysis.
- The foundation analysis will be performed using the EPRI FAD software utilizing direct embedded structures with rock/concrete backfill.
- No anchor bolt foundations will be required.

SUBTASK 17.5 DESIGN REVIEW AND DOCUMENTATION

Responsibility: POWER

Deliverable(s):

- Design Review Package
- PLS-CADD *.bak file
- Green Book Design Summary

Prepare and submit design review package to CLWB prior to ordering structures. Attend a conference call to review CLWB's comments on the package.

Green Book Design Summary:

Assemble project-related design data, during the course of the project, into a three-ring binder, referred to within POWER as the Green Book. Prepare cover sheets for each major set of calculations or design data included in the document as well as a table of contents summarizing the Green Book content. File the Green Book with the rest of the project records at the completion of the project.

Assumption(s):

- POWER will submit PLS *.bak file to CLWB at the completion of the project to document design.

SUBTASK 17.6 PROJECT COORDINATION MEETINGS

Responsibility: POWER

Deliverable(s):

- POWER to provide support layouts, as required.
- Meeting minutes.

Assumption(s):

- Budget includes hours for two (2) transmission line engineers to attend a one (1) hour bi-weekly project status meeting for the duration of the project.
 - Project duration of 22 months (3/2021 through 12/2022).
- Budget includes up to forty (40) hours of engineering time to provide coordination support for Distribution, Substation, FPL and underground utilities.
- Hours required in excess of the assumed will be invoiced on a time and expense basis.

SUBTASK 17.7 OUTAGE COORDINATION

Responsibility: POWER

Deliverable(s):

- Outage Sequence Plan

Outage Coordination: Support CLWB in developing outage durations and dates. Participate in regularly scheduled outage meetings. This information will be used to develop the construction sequencing diagrams.

Assumption(s):

- Budget includes up to twenty (20) hours of engineering and drafting time to develop the drawings and coordinate with the other disciplines. Hours required in excess of the assumed will be invoiced on a time and expense basis.

TASK 18**T-LINE MATERIAL PROCUREMENT****Objective(s):**

- To develop items required for the procurement phase of the project.
- To identify, specify and order long-lead items.
- To assure all project material is accounted for and arrives on time to support the project schedule.

Prerequisite(s):

- Line Design

SUBTASK 18.1 MATERIAL LIST**Responsibility:** POWER**Deliverable(s):**

- Material List

Develop a project specific bill of material.

Assumption(s):

- CLWB will provide documents detailing standard CLWB stock numbers including approved vendor part numbers.

SUBTASK 18.2 LONG LEAD MATERIAL**Responsibility:** CLWB/POWER**Deliverable(s):**

- Pole Order
- Tracking and Expediting
- Concrete Pole Specification

Review project schedule, material lead times and identify materials which need to be ordered in advance.

Assumption(s):

- POWER will develop a technical concrete specification.
- CLWB will provide commercial conditions, solicit bids, and award contract for structures.

SUBTASK 18.3 MISCELLANEOUS MATERIAL**Responsibility:** CLWB/POWER**Deliverable(s):**

- Insulator and Conductor Assembly Order
- Conductor and Overhead Ground Wire Order

- Miscellaneous Material Procurement
- OPGW Specification

Select CLWB standard insulator and/or insulator assemblies along with the appropriate conductor assemblies to be used on the project. Determine appropriate quantities.

Review conductor and overhead ground wire requirements. Determine type and size of reels to be utilized. Calculate wire length to be placed on individual and matched length reels. Select CLWB standard reel lengths.

Identify miscellaneous material, including, but not limited to: attachment hardware, dampers, grounding material, etc. Determine appropriate quantities.

Assumption(s):

- Technical specifications will not be required for purchase of miscellaneous material.
- POWER will develop a technical OPGW specification.
- CLWB will provide commercial conditions, solicit bids, and award contract for structures.

TASK 19***T-LINE CONSTRUCTION DRAWINGS*****Objective(s):**

- To generate the drawings that will be required during the construction phase of the project.

Prerequisite(s):

- Line Design

SUBTASK 19.1 PLAN AND PROFILE DRAWINGS**Responsibility:** POWER**Deliverable(s):**

- Plan and Profile Drawings

Prepare final Plan and Profile Drawings at one inch equal to two hundred feet (1"=200') horizontally and one inch equal to twenty feet (1"=20') vertically (typically).

Utilize the planimetric drawings prepared with the Line Survey for the plan portion of the Plan and Profile Drawings. Draft the line centerline, structure locations, structure numbers, PI information and line angles onto the aerial photography manuscript or drafted plan.

Utilize PLS-CADD-generated Plan and Profile Drawings.

Assumption(s):

- Planimetric and land line data shown in the plan view of the drawings will be limited to the detail delivered in the Line Survey.
- PLS-CADD generated Plan and Profile Drawings will be acceptable to CLWB.
- CLWB to provide electronic versions of existing Plan and Profile Drawings.

SUBTASK 19.2 STRUCTURE DRAWINGS**Responsibility:** POWER**Deliverable(s):**

- Structure Drawings

Prepare detailed Structure Drawings for all required structures. Show front, side and top views; details necessary for clarity; material item number indicating each material location; applicable notes; and a material list with item numbers, quantities and descriptions.

Assumption(s):

- New drawings will be created utilizing information from existing CLWB drawings as applicable.

- Five (5) concrete pole boring details will be created.
- Five (5) concrete pole drawings will be created.

SUBTASK 19.3 FOUNDATION DRAWINGS

Responsibility: POWER

Deliverable(s):

- Foundation Drawings

Prepare Foundation Drawings. Identify the type and purpose of the foundation.

Assumption(s):

- All foundations will be direct embedded concrete with concrete or rock backfill.

SUBTASK 19.4 CLEARING DRAWINGS

Responsibility: Not Applicable

Deliverable(s):

- No deliverables are required by POWER (This task is included to show the below assumptions).

Assumption(s):

- No clearing drawings will be required. If necessary, this task can be performed on a time and expense basis.

SUBTASK 19.5 SUPPLEMENTAL DRAWINGS

Responsibility: CLWB/POWER

Deliverable(s):

- Anchor Drawings
- Assembly Drawings
- Drilling Drawings
- Location Maps
- Orientation Drawings
- Phasing Details
- Miscellaneous Drawings (as applicable)

Assumption(s):

- New drawings will be created utilizing information from existing CLWB drawings as applicable.

SUBTASK 19.6 CONSTRUCTION SEQUENCE DRAWINGS

Responsibility: POWER

Deliverable(s):

- Construction Sequence Diagrams

Prepare detailed line construction sequencing diagrams depicting the initial, final, and intermediate steps to complete the T-Line, Dist Line, and substation scope of work. Outage dates and durations will be based on the outage plan developed in coordination with CLWB.

Assumption(s):

- Budget includes up to forty (40) hours of engineering and drafting time to develop the drawings and coordinate with the other disciplines. Hours required in excess of the assumed will be invoiced on a time and expense basis.

TASK 20

T-LINE QUALITY ASSURANCE

Objective(s):

- To meet the quality objectives established for the project.

Prerequisite(s):

- Line Design
- Material Procurement
- Construction Drawings

SUBTASK 20.1 PLS-CADD MODEL REVIEW**Responsibility:** POWER**Deliverable(s):**

- Independent Review of PLS-CADD Model

SUBTASK 20.2 PROCUREMENT REVIEW**Responsibility:** POWER**Deliverable(s):**

- Independent Review of Material List, Specifications and Orders

SUBTASK 20.3 STRUCTURAL DESIGN REVIEW**Responsibility:** POWER**Deliverable(s):**

- Independent Review of Structure Design and Foundation Design

SUBTASK 20.4 CONSTRUCTION PACKAGE REVIEW**Responsibility:** POWER**Deliverable(s):**

- Independent Review of Construction Drawings
- Independent Review of Construction Package

TASK 21**T-LINE PRE-CONSTRUCTION ACTIVITIES****Objective(s):**

- To develop the documents that will be required during the construction bidding phase of the project.

Prerequisite(s):

- Construction Drawings

SUBTASK 21.1 CONSTRUCTION SPECIFICATIONS**Responsibility:** Not Applicable**Deliverable(s):**

- No deliverables are required by POWER (This task is included to show the below assumptions).

Assumption(s):

- CLWB's Standard Construction Specifications will be utilized.

SUBTASK 21.2 BID UNIT SCHEDULE**Responsibility:** POWER**Deliverable(s):**

- Bid Unit Descriptions
- Bid Unit Tabulations

Develop the Construction Bid Unit Descriptions required for the Construction Contract. Briefly categorize and describe the particular work element and payment basis.

Assumption(s):

- POWER will follow format of previous CLWB Bid Unit Schedules.

SUBTASK 21.3 CONSTRUCTION BID PACKAGE**Responsibility:** POWER**Deliverable(s):**

- Construction Bid Packages

Prepare general description of the overall project scope and schedule. Assemble bid packages in accordance with CLWB standards, including but not limited to the following:

- General Project Description
- Line Construction Instructions
- Bid Unit Schedule
- Material List
- Foundation Construction Schedule
- Stringing Sag Tables
- Geotechnical Report
- List of Structures
- Plan and Profile Drawings
- Structure Drawings
- Foundation Drawings
- Assembly Drawings
- Miscellaneous Drawings
- Damper Requirements
- Crossing Permits
- Environmental Permits
- Construction Specifications

Incorporate site-specific environmental constraints and CLWB, agency and/or landowner requirements and stipulations that would affect the method or sequence of construction.

Assumption(s):

- Four (4) separate Construction Bid Packages will be required.
 - Tie Line #1, Tie Line #2, Main to Canal OPGW/Relocation, & Main to Hypoluxo OPGW.
- One (1) electronic copy of each Construction Bid Package will be submitted to CLWB.

SUBTASK 21.4 CONTRACTOR SELECTION ACTIVITIES

Responsibility: CLWB

Deliverable(s):

- No deliverables are required by POWER (This task is included to show the below assumptions).

Issue any applicable Addenda to the Construction Bid Package.

Attend Construction Pre-Bid meeting at the project site.

Analyze and evaluate the contractor proposals received and make recommendation to CLWB for the award of contract.

Assumption(s):

- CLWB will prepare Contractor bid list.
- CLWB will prepare contract document and execute with Contractor.

- Two (2) transmission line engineers from POWER's team will attend the pre-bid meeting. Additional meetings will be invoiced on a time and expense basis.

TASK 22**T-LINE CONSTRUCTION ACTIVITIES****Objective(s):**

- To develop the documents that will be required during the construction phase of the project and provide engineering support.

Prerequisite(s):

- Pre-Construction Activities

SUBTASK 22.1 “ISSUED FOR CONSTRUCTION” DOCUMENTS

Responsibility: POWER

Deliverable(s):

- Construction Documents “Issued For Construction”
- Update the Construction Bid Package documents and submit them as “Issued For Construction.”

Assumption(s):

- NA

SUBTASK 22.2 PRE-CONSTRUCTION MEETING

Responsibility: POWER

Deliverable(s):

- Pre-Construction Meeting Minutes
- Schedule, attend, and document Pre-Construction Meeting.

Assumption(s):

- Two (2) transmission line engineers from POWER’s team will attend the pre-construction meeting. Additional meetings will be invoiced on a time and expense basis.

SUBTASK 22.3 ENGINEERING SUPPORT DURING CONSTRUCTION

Responsibility: POWER

Deliverable(s):

- Engineering Support During Construction

Provide technical support to CLWB’s construction inspectors during construction.

Assumption(s):

- Budget includes up to sixteen (16) hours of engineering time to provide office support for construction activities.

- Field trips and/or hours required in excess of the sixteen (16) hours assumed for the life of this project will be invoiced on a time and expense basis.

TASK 23**T-LINE POST-CONSTRUCTION ACTIVITIES****Objective(s):**

- To update the construction drawings with any changes that occurred during construction.

Prerequisite(s):

- Construction Completion
- Construction As-Built Mark-Ups

SUBTASK 23.1 RECORD DRAWINGS**Responsibility:** CLWB/POWER**Deliverable(s):**

- Construction Drawings “Issued For Record”

Incorporate the changes received during construction and furnish a complete set of drawings to reflect the "record drawing" condition when the project is completed.

Assumption(s):

- A set of red-lined drawings, depicting construction changes, will be submitted to POWER by CLWB or their representative within two (2) weeks of construction completion.
- No as-built survey will be completed.
- One (1) electronic copy of the Construction Drawings “Issued For Record” will be prepared and submitted sixty (60) days after receipt of red-lined drawings from CLWB.
- Field trips to verify construction completion will be invoiced on a time and expense basis.

ENGINEERING BUDGET

POWER proposes to perform these engineering and design services on a time and Time and Material basis, in accordance with POWER's Electric Transmission and Generation Options Services Agreement (RFQ No. 18-302) with City of Lake Worth Beach. A breakdown of our budget is as follows:

BUDGET SUMMARY BY CATEGORY AND TASK					
PROJECT MANAGEMENT					
Task	Description	Hours	Labor \$	Expense \$	Total \$
0	Project Management	244	\$46,932	\$669	\$47,601
SUB - TOTAL		244	\$46,932	\$669	\$47,601
SUBSTATION ENGINEERING					
Task	Description	Hours	Labor \$	Expense \$	Total \$
1	Project Initiation	475	\$82,572	\$420	\$80,992
2	Major Equipment Specifications	462	\$69,370	\$0	\$69,370
3	Physical Design	636	\$82,172	\$0	\$82,172
4	Civil/Structural Design	1,024	\$144,956	\$0	\$144,956
5	Control & Relaying Schematics	812	\$102,924	\$0	\$102,924
6	Wiring Diagrams	858	\$115,826	\$0	\$115,826
7	Protective Relay Settings	1,708	\$249,628	\$0	\$249,628
8	Control Building	290	\$37,090	\$0	\$37,090
9	Pre-Construction Activities	268	\$37,656	\$360	\$38,016
10	Construction Activities	104	\$14,964	\$420	\$15,384
11	Post-Construction Activities	152	\$19,480	\$0	\$19,480
12	Commissioning	0	\$0	\$0	\$0
SUB - TOTAL		6,789	\$954,638	\$ 1,200	\$955,838
TRANSMISSION LINE ENGINEERING					
Task	Description	Hours	Labor \$	Expense \$	Total \$
13	T-Line Pre-Design Activities	32	\$4,860	\$0	\$4,860
14	T-Line Field Activities	36	\$5,670	\$280	\$5,950
15	T-Line Right of Way Activities	0	\$0	\$0	\$0
16	T-Line Permitting Activities	60	\$8,944	\$0	\$8,944
17	T-Line Design	368	\$54,132	\$374	\$54,506
18	T-Line Material Procurement	42	\$6,240	\$0	\$6,240
19	T-Line Construction Drawings	132	\$19,260	\$0	\$19,260
20	T-Line Quality Assurance	16	\$2,880	\$0	\$2,880
21	T-Line Pre-Construction Activities	116	\$18,220	\$280	\$18,500
22	T-Line Construction Activities	64	\$10,120	\$560	\$10,680
23	T-Line Post-Construction Activities	20	\$3,180	\$0	\$3,180
SUB - TOTAL		886	\$133,506	\$1,494	\$ 135,000
GRAND TOTAL		7,919	\$ 1,135,076	\$3,363	\$ 1,138,439