

## **TASK ORDER NO. 10**

### **Distribution Planning Services – 6<sup>th</sup> Avenue Substation & Southeast Quadrant of Electrical Service Area**

THIS TASK ORDER ("Task Order") is made on the \_\_\_\_\_, 2021, between the **City of Lake Worth Beach**, a Florida municipal corporation located at 7 North Dixie Highway, Lake Worth, Florida 33460 ("City") and **E.C.Fennell, PA**, a Florida corporation ("Consultant").

#### **1.0 Project Description:**

The City desires the Consultant to provide those services as identified herein and generally described as: **Distribution Planning Services for 6<sup>th</sup> Avenue Substation & SE Quadrant of Service Area** (the "Project"). The Project is described in the consultant's proposal, dated November, 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 **180** 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 **\$97,812.00.** 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 Tarek El-Sadek, phone: 561-471-4029 x 247; email: [telsadek@ecfconsultants.com](mailto:telsadek@ecfconsultants.com) ; and, the Project Manager for the City is Paul Nicholas, phone: 561-533-7353; email: [Pnicholas@LakeWorthBeachfl.gov](mailto: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 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 between the City of Lake Worth and the Consultant, dated **March 16<sup>th</sup>, 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.

IN WITNESS WHEREOF the parties hereto have made and executed this Task Order No. 10 on the day and year first above written.

**CITY OF LAKE WORTH BEACH, FLORIDA**

By: \_\_\_\_\_  
Betty Resch, Mayor

ATTEST:

By: \_\_\_\_\_  
Deborah M. Andrea, City Clerk

APPROVED AS TO FORM AND  
LEGAL SUFFICIENCY:

By: \_\_\_\_\_  
Glen J. Torcivia, City Attorney

APPROVED FOR FINANCIAL  
SUFFICIENCY

By: \_\_\_\_\_  
Bruce T. Miller, Financial Services Director

CONTRACTOR: E.C. Fennell, PA

[Corporate Seal]

By: Jolie Gonzalez  
Print Name: Jolie Gonzalez  
Title: Manager

STATE OF FLORIDA  
COUNTY OF BROWARD

The foregoing instrument was acknowledged before me this 10<sup>th</sup> day of NOV, 2021, by JOLIE GONZALEZ who was physically present, as MANAGER (title), of E.C. Fennell, PA, a Florida Corporation, which is authorized to do business in the State of Florida, and who is personally known to me or who has produced the following DL as identification.

Notary Public

Print Name: JOSEANGEL GONZALEZ  
My commission expires: \_\_\_\_\_



**Joseangel Gonzalez**  
Comm. #GG925527  
Expires: October 23, 2023  
Bonded Thru Aaron Notary

**EXHIBIT "1"**  
**Contractors Proposal**

# **Voltage Conversion & Network Reconfiguration – Phase A**

## **Distribution Planning Proposal**

Prepared for

**City of Lake Worth Beach**  
**7 North Dixie Hwy**  
**Lake Worth Beach, FL 33460-3725**

Prepared by

**E.C. Fennell P.A.**  
**701 Northpoint Parkway Suite 110**  
**West Palm Beach, FL 33407**

**November, 2021**



**ENGINEERING**  
**CONSULTANTS**

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**City of Lake Worth Beach**  
Procurement Department  
7 North Dixie Highway  
Lake Worth Beach, FL 33460



Re: Request for Proposal for distribution planning analysis pertaining to Voltage Conversion and associated Network Reconfiguration

Dear City of Lake Worth Beach:

This letter serves to formally inform you and the review/ranking committee members for the City of Lake Worth Beach, of E.C. Fennell P.A. (ECF Engineering Consultants), intent to express interest in providing professional engineering services to CLWB for Distribution Planning Support.

ECF Engineering Consultants is a Minority Owned multi-disciplined consulting firm established in West Palm Beach, Florida and incorporated as a corporation in 2002. ECF since its conception, has provided consultation and technical solutions to a number of engineering markets worldwide. ECF's core business is to serve Public Municipal Agencies, Private Development Projects and Utility Companies on an array of projects offering planning, investigative, design and construction administration services. Our expertise is in value engineering and providing a comprehensive engineering solution to exceed our clients' expectations. Our services are tailored to meet industry guidelines, technological advances, and most importantly client, project and system needs.

In this proposal, ECF has provided to the City of Lake Worth Beach Procurement Department all the required information necessary to be considered highly qualified to fulfill CLWB's distribution study needs. Our firms' history shall demonstrate ECF's ability over an extended period of time to provide technical leadership in the areas the CLWB is requesting services. Our team member's resumes are exemplary. ECF has assembled a team with extensive knowledge and experience in many aspects of electric utilities.

Our team has the ability to get the job done effectively and meet CLWB's project objectives. We are confident that once the information presented in this proposal has been examined, you shall recognize the added value ECF Engineering Consultants can bring to City of Lake Worth Beach.

Please accept this letter as ECF's official intent to assist the City of Lake Worth Beach towards achieving its objective of maintaining and improving its facilities.

Sincerely.

**Shauna Fennell Hawkins**

President

ECF Engineering Consultants

701 Northpoint Parkway

Suite 110

West Palm Beach, FL 33407

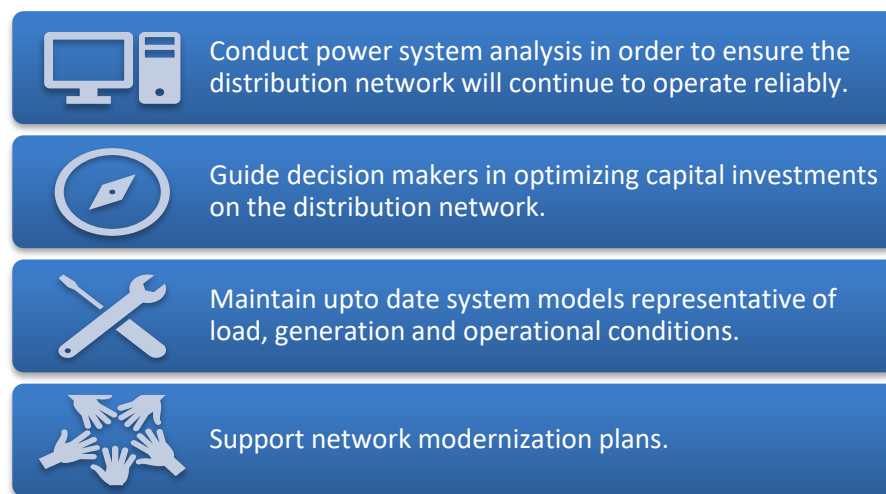
efennell@ecfconsultants.com



# 1 Background Information

The City of Lake Worth Electric Utility (CLWU) is a non-profit and citizen owned utility providing power to 27,000 customers with a peak demand of 97MW. The local load is served through approximately 80MW of conventional generation, 2MW via a solar PV plant, 1.5MW through net-metering rooftop solar PV and the rest via an interconnection to FPL.

Since the primary objective of distribution system planning is to maintain grid safety and reliability at a reasonable cost, as the grid continues on evolving, the CLWU has requested a proposal from ECF Engineering Consultants, LLC (ECF) to perform a distribution planning study on their 26kV and 4.16kV system spanning a four-square mile area, focusing on the southeast quadrant of the city. Distribution planning in any utility covers multiple critical responsibilities as shown below in Figure 1.



**Figure 1 - Typical Distribution Planning Responsibilities**

Furthermore, the distribution planning study will support and optimize capital decisions pertaining to voltage conversion and network reconfiguration. The analysis will be an ongoing effort to model planned and proposed voltage conversion at 6<sup>th</sup> Ave substation, identify potential synergy in converting close by 4kV feeders, load-serving reliability, and sub-transmission reinforcement. During the span of the study, ECF will act as CLWU's in-house distribution planner with ongoing staff interaction, discussion and analysis.

In addition, the study will focus on the following main tasks:

1. Analysis of exiting loads on the 4kV House, 12 Ave S, 15 Ave S circuits and studying the best approach to convert its current feeders to 26kV.
2. Assess the need for a 4 vs 8 configuration at 6<sup>th</sup> Ave substation including studying N-1

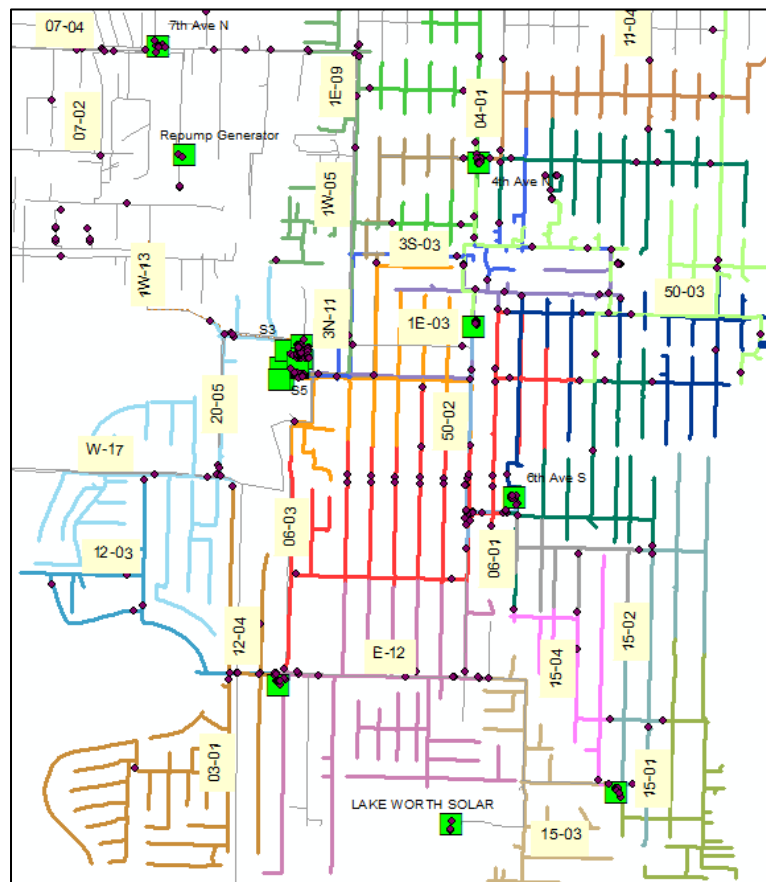
contingencies and voltage drop at tail end of feeders.

3. Update system model, provided by Milsoft, as needed to include accurate feeder loads, voltages, fuses, relays, and other equipment.
4. Analyze appropriate path and source for distribution substations to have redundant sub-transmission supply.
5. Analysis of current loads fed from sub-transmission feeders and moving these loads to 26kV distribution feeders.

## 2 Study Proposal

The CLWU has started the process of converting 4kV feeders to 26kV, allowing for more thermal capabilities and load serving on the conductors. The conversion process is no easy task and requires well a planned approach to achieve the level of reliability thought after.

In addition, the CLWU is currently focusing its conversion efforts on the southeast quadrant of the city's electric network, as shown below in Figure 2. This area consists of both sub-transmission and distribution substations, and feeder lines.



**Figure 2 – CLWU Southeast Quadrant Electric Network**

The hardening and conversion design is close to completion for the 6<sup>th</sup> Ave substation. The 6<sup>th</sup> Ave substation is located within a close proximity to the 4kV House, Main 26 Yard Sub, 12<sup>th</sup> Ave Sub, 15<sup>th</sup> Ave Sub, East Switching Station and the 4<sup>th</sup> Ave North Sub. A critical element to the hardening of 6<sup>th</sup> Ave is determining the number of recloser bays to be utilized, 4 or 8 recloser bays. Having spare recloser bays allows for N-1 contingency load serving for faults at the station level.

Also, the 4kV House is planned for decommissioning which will require its feeders a new source, namely 3N-11, 3N-12, 3N-13, 3S-03, 3S-04 and 3S-05. These 4kV feeders will be converted to 26kV and tied to adjacent feeders and/or routed to a new source. These planned activities will require analysis to ascertain thermal capability of conductors/equipment and acceptable power quality, specifically voltage drop at tail ends of feeders.

Sub-transmission station Main 26 Yard Sub is the main source feeding distribution substations in the area. As the 4kV feeders were overloaded and as the voltage conversion occurs, the sub-transmission station feeders were utilized to serve load directly or through distribution feeder tie-in. These source feeders need to regain their initial intent by serving distribution substations. The study, will analyze other avenues to clear load off the source feeders through load reallocation.

Currently, distribution substations are sometimes feed from other distribution subs or from a single sub-transmission feed. A contingency scenario where a single sub-transmission feeder or station is faulted can cause cascading blackouts over a wide serving area. To mitigate such adverse impacts, the study will explore redundant sub-transmission feeding of distribution substations. This could occur by tying-in to sub-transmission feeders and finding alternate paths through usage of existing distribution feeders or adding new circuits on the distribution feeder poles.

### **3 Scope of work**

The below high-level scope of work will be utilized to achieve the study goals

#### **3.1 Model Tuning**

Prior to conducting planning studies with the newly created model, by Milsoft, the model's performance has to be indexed against operational data recorded by CLWU. Operational data including short circuit levels, voltage levels and loading levels at specific feeders will be monitored for consistency with the model, by ECF. Any missing fusing data, conductor sizing, etc will need to be manually modelled by ECF. Also, recloser and substation over current relays will be modeled with their appropriate settings, by ECF.

### **3.2 Load Modelling**

In order to confirm thermal loadings and spare capacity on feeders and transformers, an accurate representation of the network's loading condition needs to be modeled. As discussed with the CLWU team, AMI readings or manual probing of circuits will be required, by CLWU. After loading data is gathered, a conversion of loads from 4kV to 26kV will be calculated and modeled on the laterals they represent, by ECF.

### **3.3 Power Flow Analysis**

ECF will perform power flow analyses to calculate KW, KVar, Voltage and Current flows on the feeder circuits. Different tie-ins and joining of feeders, adding a feeder to another feeder, will then occur and simulations will be carried out, while observing system conditions for any adverse impacts. If adverse impacts are found, mitigative measure will be proposed and discussed with CLWU including low voltage issues, capacitor placement, etc. Moreover, different switching scenarios and sub-transmission routes will be studied by ECF. The list of feeder tie-in and switching scenarios will be provided by CLWU. ECF will deliver powerflow diagrams and tabulations of analyses results. Powerflow analyses will only be conducted on 26kV circuits and not secondary circuits.

### **3.4 Short Circuit Analysis**

ECF will carry out short circuit simulations for all affected feeders to ensure convergence and gauge the model readiness to perform fuse coordination studies. Short circuit current levels will be documented for equipment on the feeders including over-head and underground conductors, switches, devices, and electrical nodes. Short circuit analyses will only be conducted on 26kV circuits and not secondary circuits.

### **3.5 Fuse Coordination Analysis**

Coordination of protection devices in a complex distribution system is an ongoing activity that requires updated system data and a protection philosophy. The CWLU fusing guidelines will be reviewed, compared to the installed fuse banks and coordinated with updated short circuit data. ECF will conduct coordination analysis and deliver coordination curves for 26kV circuits only.

## **4 Required Data**

A distribution system model utilizes a large amount of data to accurately depict each asset's behavior during normal and abnormal system conditions. Study simulations require data to be as true as possible so resulting datapoints aren't inherently skewed. Moreover, system planners strive

to build accurate desktop models while knowing that a percent error will always linger, nonetheless must be minimized.

ECF will work with CLWU personnel to acquire the data needed for modelling and subsequent studies. As a minimum, and to serve as a reference, the below list of data will be needed by the study kickoff date.

#### **4.1 Lines (Sub-transmission & Distribution)**

- a. Overhead/Underground
- b. Conductor Types
- c. Tower Configurations
- d. Distance
- e. Conductor Spacing
- f. Single, Two, or Three Phase Labels

#### **4.2 Distribution Transformer & In-Line Transformers**

- a. Location
- b. KVA, Voltage Ratings, and impedance
- c. Connections

#### **4.3 Shunt Capacitors**

- a. Location
- b. kVAR & Voltage Rating
- c. Phase Connections

#### **4.4 Voltage Regulators/LTC**

- a. Location
- b. Phase Connections
- c. Single Phase or Three Phase Regulation
- d. Type A or B

#### **4.5 Switches**

- a. Location
- b. Normal Operating Position – NO or NC

#### **4.6 Loading Information**

- a. Location
- b. System
- c. Substations
- d. Transformers

- e. Consumers
- f. Peak/Light/Forecasted

#### 4.7 Generation Sources

- a. Location
- b. MVA, PF
- c. Impedance

#### 4.8 Protection

- a. Fusing guide lines and charts
- b. Relay type, model and settings
- c. Operational reference data including fault data and trips

## 5 Cost Proposal

### 5.1 Time and Material (Not to Exceed) Proposal

ECF is providing a proposal for services indicated in Section 2 “Study Proposal” and outlined in this document in the form of time and material not to exceed.

Task	Planning Engineer Hours
1. Analysis of exiting loads on the 4kV House, 12 Ave S, 15 Ave S circuits and studying the best approach to convert its current feeders to 26kV.	163.2
2. Assess the need for a 4 vs 8 configuration at 6th Ave substation including studying N-1 contingencies and voltage drop at tail end of feeders.	13.8
3. Update system model, provided by Milsoft, as needed to include accurate feeder loads, voltages, fuses, relays, and other equipment.	64.8
4. Analyze appropriate path and source for distribution substations to have redundant sub-transmission supply.	156
5. Analysis of current loads fed from sub-transmission feeders and moving these loads to 26kV distribution feeders.	100.8
ECF’s Time and Material (Not to Exceed) offer for the services defined in this document is: <b>\$97,812.00</b>	514.8

**Table 1 – Time and Material (Not to Exceed) Proposal**

## **5.2 Out of Scope Support Cost Plus Offer**

Fees for services rendered beyond those indicated in this document will be invoiced on a cost plus basis. Prior to executing a request, the scope of work, anticipated duration and pay rate of said task would be agreed to by all parties. ECF shall be paid at the man-hour rates indicated below for resources used in completing out of scope work, plus any Reimbursable Expenses, which shall, for the purposes of this proposal, mean the actual, direct, out-of-pocket expenses consisting of (i) costs incurred for drawing reproduction, travel is requested by Company, and related car rental, lodging and meals of Consultant, and (ii) costs for

## **5.3 Payment Schedule**

The payment schedule for the project will be based on a monthly invoice submittal.

## **5.4 Invoices**

Payment of invoices shall be mailed to the following:

**Attn: Ms. Shauna E. Hawkins**

**E. C. Fennell, P.A.**

**701 Northpoint Parkway, Suite #110 West Palm Beach, FL 33407**

# Thank You

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For Considering ECF Engineering Consultants

