Eric Fryson

From: Pat Pottle [ppottle@ausley.com]
Sent: Friday, January 27, 2012 9:10 AM
To: Filings@psc.state.fl.us
Subject: TECO Petition
Attachments: VA Petition.pdf

Electronic filing

a. Person responsible for this electronic filing:

James D. Beasley
Ausley & McMullen
P.O. Box 391 (32302)
227 S. Calhoun Street
Tallahassee, FL 32301
850 425-5485
jbeasley@ausley.com

b. Docket No. 120032-EQ; In re: Petition for Approval of Post-Interconnection Study Charges to Interconnect Customer-Owned Renewable Generation by Tampa Electric Company

c. The document is being filed on behalf of Tampa Electric Company

d. There is a total of 14 pages, plus cover letter

e. The document attached for electronic filing is a cover letter and Petition for Approval of Post-Interconnection Study Charges to Interconnect Customer-Owned Renewable Generation by Tampa Electric Company

James D. Beasley
Ausley & McMullen
(850) 425-5485
(850) 222-7952 (FAX)

jbeasley@ausley.com

AUSLEY & MCMULLEN
ATTORNEYS AND COUNSELORS AT LAW
123 SOUTH CALHOUN STREET
P.O. BOX 391 (ZIP 32302)
TALLAHASSEE, FLORIDA 32301
(850) 224-9115 FAX (850) 222-7560

January 27, 2012

VIA: ELECTRONIC FILING

Ms. Ann Cole, Director
Division of Commission Clerk
Florida Public Service Commission
2540 Shumard Oak Boulevard
Tallahassee, FL 32399-0850

120032-EQ

Re: Petition for Approval of Post-Interconnection Study Charges to Interconnect Customer-Owned Renewable Generation by Tampa Electric Company

Dear Ms. Cole:

Enclosed for filing in the above-styled matter is a Petition for Approval of Post-Interconnection Study Charges to Interconnect Customer-Owned Renewable Generation by Tampa Electric Company.

Thank you for your assistance in connection with this matter.

Sincerely,

James D. Beasley

JDB/pp
Enclosure

BEFORE THE FLORIDA PUBLIC SERVICE COMMISSION

In re: Petition for Approval of Post-Interconnection Study Charges To Interconnect Customer-Owned Renewable Generation by Tampa Electric Company	DOCKET NO. 120032-EQ FILED: January 27, 2012

PETITION

Tampa Electric Company ("Tampa Electric" or "the company"), pursuant to Chapter 366.06, Florida Statutes, and Rule 25-6.065(4)(h), Florida Administrative Code, files this Petition for Approval of Post-Interconnection Study Charges to Interconnect Customer-Owned Renewable Generation, and in support thereof states:

1. Tampa Electric is an investor-owned electric utility operating under the jurisdiction of this Commission and serving retail customers in Hillsborough and portions of Polk, Pinellas and Pasco Counties. The company's principal offices are located at 702 North Franklin Street, Tampa, Florida 33602.

2. The persons to whom all notices and other documents should be sent in connection with this docket are:

James D. Beasley
J. Jeffry Wahlen
Ausley & McMullen
Post Office Box 391
Tallahassee, Florida 32302
(850) 224-9115
(850) 222-7560 (fax)

Paula Brown
Administrator, Regulatory Coordination
Tampa Electric Company
Post Office Box 111
Tampa, Florida 33601
(813) 228-1444
(813) 228-1770 (fax)

3. In this petition, Tampa Electric seeks Commission approval of post-interconnection study charges to interconnect a total of 1.4 MW of customer-owned solar photovoltaic (PV) generation to Tampa Electric's distribution system as required under Rule 25-6.065(4)(h), F.A.C. and the company's Standard Interconnection Agreement for Tier 3 Renewable Generator Systems. Exhibit "A", attached hereto, contains a breakdown of proposed interconnection charges.

Background

4. Tampa Electric currently serves two parking facilities (hereinafter "Freedom" and "Liberty") owned by the James A. Haley Veterans' Hospital ("the VA") upon which the VA is installing a total of 1.35 MW of PV modules mounted on elevated canopies above the parking spaces (i.e., solar carports) thus enabling the VA's parking facilities to be eligible for service under Tampa Electric's Net Metering tariff. These PV modules and elevated canopies are being installed for the VA by SunPower Corp. ("SunPower") under contract to the VA, and Sunpower is obligated under the contract to pay for any interconnection costs.

5. Per Rule 25-6.065(4), F.A.C., Customer Qualifications and Fees, to qualify for expedited interconnection, customer-owned renewable generation must have a gross power rating that:

1. Does not exceed 90% of the customer's utility distribution service rating; and
2. Falls within one of the following ranges:

Tier 1 - 10 kW or less;

Tier 2 – greater than 10 kW and less than or equal to 100 kW; or

Tier 3 – greater than 100 kW and less than or equal to 2 MW.

The gross power rating of the PV generation is 587 kW at Freedom and 763 kW at the Liberty which facility within the Tier 3 range; however, the gross power rating of each exceeds 90% of the existing distribution service rating at each parking facility. An interconnection study was required to determine what utility distribution facilities would be required to bring the distribution service rating at each parking facility up to the level at which it would exceed the gross rating of the PV generation by at least 10% thus meeting the requirements of the Rule and what addition facilities would be required to safely and reliably accommodate the export of this power onto Tampa Electric's distribution system.

6. The interconnection study, attached hereto as Exhibit "B", was completed by Tampa Electric and provided to the VA and SunPower. Below are brief descriptions of the required distribution system improvements/modifications and associated costs identified by the interconnection study.

a. Distribution system modifications (Cost: $91,400):

- Two 1,000 KVA distribution transformer will be installed, one at each parking facility, to allow export of the solar energy to Tampa Electric's distribution system.
- A three-phase primary line will be extended to the Liberty lot.
- Two terminal poles, one at each parking facility, will be constructed and underground conduit and primary cable will be installed from the terminal poles to the new transformers.
- The existing 120/240 VAC single-phase service at each parking facility will be replaced with a 480 VAC underground three-phase service.
- One overhead transformer and service cable for public street lighting will be relocated to a new three-phase tangent pole which will replace an existing tangent pole that cannot accommodate the relocated equipment.
- Tree-trimming will be required to accommodate new overhead lines and equipment.

b. Supervisory Control and Data Acquisition ("SCADA") system (Cost: $57,900):

- New smart-metering will be installed at each parking lot to measure instantaneous power, voltage, current, direction of power flow, and power factor data;
- Fiber-optic cable will be installed from each parking facility to the control house in Tampa Electric's distribution substation where the cable terminations will be made.
- Fiber-to-serial converters will be installed at the substation and at each parking facility to enable the transmittal of data on a real-time basis over the

fiber-optic cable to Tampa Electric's system operators;

- The SCADA system will be reconfigured to accept the new data points, tested, backed-up, etc.; and
- New remote operator screens will be created.

c. System commissioning (Cost: $5,900)

- The entire new system will require operational testing and evaluation;
- TEC operating procedures must be developed for this new system; and
- TEC system operators and operations personnel must be trained for this new system.

Request

7. Rule 25-6.065(4)(h), F.A.C., and Tampa Electric's Standard Interconnection Agreement for Tier 3 Renewable Generator Systems paragraph 11(b) provide that no post-interconnection study charges shall be assessed for interconnecting customer-owned renewable generation without prior Commission approval. Tampa Electric is requesting Commission approval to charge the hospital $155,200 for the distribution system modifications identified by the interconnection study to safely and reliably enable the export of the excess solar energy generated by the new PV generation at Freedom and Liberty. Commission approval of these charges, and their payment by SunPower, will prevent other Tampa Electric customers from subsidizing the interconnection costs for the VA's new PV generation.

8. Neither the VA nor SunPower has disputed the interconnection study results or the associated costs of the required system modifications, and SunPower has requested an invoice from Tampa Electric so that payment can be made and work can commence on these distribution improvements.

9. Tampa Electric knows of no disputed issues of material fact relative to the interconnection charges proposed herein.

WHEREFORE, Tampa Electric requests that this Commission approve the requested post-interconnection study charges as set forth in Exhibit "A".

DATED this 27th day of January, 2012.

Respectfully submitted,

JAMES D. BEASLEY
J. JEFFRY WAHLEN
Ausley & McMullen
Post Office Box 391
Tallahassee, FL 32302
(850) 224-9115

ATTORNEY FOR TAMPA ELECTRIC COMPANY

EXHIBT A

Breakdown of Interconnection Charges

	Cost ($)
SCADA Communications	
• Installation and programming for 2 smart-meters to provide instantaneous power, voltage, current direction of power flow and power factor data	31,500
• Installation of 2 meter cabinets and 2 meter pedestals	3,000
• Substation labor (i.e., makeup cable terminations , reconfiguration /reprogram existing equipment to accept new data points; pretest; back-up; schedule	4,600
• Install 2 fiber-to-serial converters at interconnection sites	5,900
• Install 1 fiber-to-serial converter at substation	4,300
• Install fiber-optic cable from control house in substation to 2 metering cabinets	5,300
• Labor to create remote operator screens	3,300
	57,900
Distribution Transformers	
• Install 2 three-phase pad-mounted transformers (1,000 kVA)	67,100
	67,100
Other Distribution Improvements	
• Install terminal poles with three-phase terminationsand cutouts for underground primary take-offs at each parking facility.	15,200
• Install a 60-foot three-phase OH span to new terminal pole at Liberty lot.	300
• Install 60feet of 1/0 3C underground cable in 4" conduit requiring hand-digging for the trench	2100
• Prepare two (10' x 10') sites for installation of concrete pads for 3-phase transformers	400
• Change-out 3-phase tangent pole to accommodate relocated transformer	2600
• Relocate OH transformer at Liberty lot.	1,700
• Install new service to public street lighting from relocated transformer, remove old service	600
• Install anchors and down-guys at new terminal and tangent poles	900
• Tree-trimming	500
	24,300
System Commissioning	
• Develop operating procedures for line crew	1,300
• Operational testing and evaluation of data	4,600
	5,900
Total Charge	**$155,200**

EXHIBIT B

CUSTOMER-OWNED RENEWABLE GENERATION INTERCONNECTION STUDY

FOR THE JAMES A. HALEY VETERANS HOSPITAL

January 2012

Distribution Engineering
Tampa Electric
P.O. Box 111
Tampa, Florida 33601

TABLE OF CONTENTS

I. PROJECT OVERVIEW

The **James A. Haley Veterans Hospital** ("the hospital") has communicated to Tampa Electric Company's ("TEC") its plans to install up to 4 MW of customer-owned solar photovoltaic ("PV") renewable generation. PV panels mounted on elevated canopies will be installed in multiple parking lots owned by the hospital. The kW ratings of the systems fall within the Tier 3 scale, greater than 100 kW and less than or equal to 2 MW. The names of the parking lots are listed below.

Freedom Parking Lot (Net meter)	691	kW dc	587	kW ac
Liberty Parking Lot (Net meter)	897	kW dc	763	kW ac
Romeo Parking Lot (Tied into main hospital elec. system)	1,088	kW dc	925	kW ac
	2,676	kW dc	2,275	kW ac

The PV output will be interconnected to TEC's distribution system at three separate points of common coupling ("PCC"). The three PCC's are on separate distribution feeders. The output from the Romeo parking lot system will cross a public road and connect to the electrical system in the main hospital building. In the future, additional PV panels outputting 458 kW dc (389 kW ac) are planned for installation in a parking area immediately surrounding the main hospital. The design documentation was not available at time of this study, but the System Designer said the additional PV systems will be connected to the main hospital's electrical system.

II. PROJECT LOCATION AND EXISTING FACILITIES

The address of the main hospital building is 13000 Bruce B Downs Boulevard, Tampa, FL 33612. The Liberty parking lot is located across 131st Ave north of the main hospital building. The Freedom parking lot is located two blocks north of the hospital.

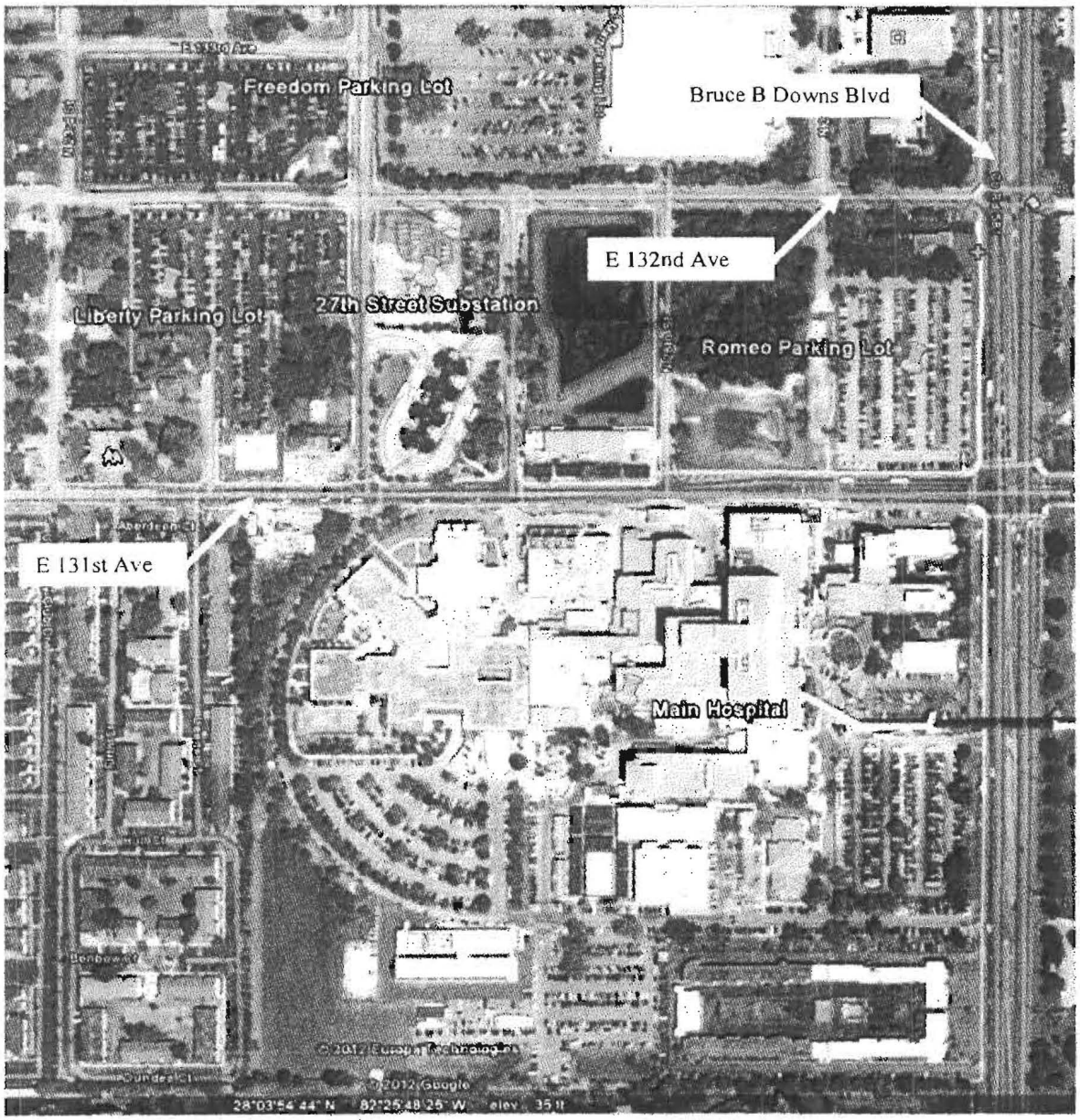

Figure A – Aerial View

The main hospital is served by four TEC feeders, two preferred circuits with an additional alternate "backup" circuit for each. Customer-owned "relay" switchgear has the capability to automatically transfer from the preferred to the alternate circuit. The hospital has a Non-export Parallel Operator agreement with TEC to allow them to exercise 12 MW of backup diesel generation by paralleling TEC's service. The relay gear serving the hospital has reverse power protection preventing the backup generation from back feeding TEC's utility grid.

The existing single phase 120/240 VAC service for the Liberty parking lot is served by TEC from a single phase 37 kVA transformer on circuit 13352. The transformer supplies Customer-owned lighting fixtures and public streetlight fixtures.

The existing single phase 120/240 VAC service for the Freedom parking lot supplies Customer-owned lighting and is served by a single phase 50 kVA TEC transformer on circuit 13348.

TABLE I

Substation / Transformer	Circuit	Circuit Load Peak	Service Point	RGS DC Power Rating / AC Rating[2]
46th St. / East Transformer (16.8 MVA)	Circuit 13499 (Preferred)	7.2 MW	Main Hospital Relay Service - N2	1,088 kW / 925 kW[1]
McKinley / East Transformer (16.8 MVA)	Circuit 13055 (Alternate)	3.0 MW		
McKinley / West Transformer (16.8 MVA)	Circuit 13844 (Preferred)	9.7 MW	Main Hospital Relay Service – N1	
27th St. / North Transformer (28 MVA)	Circuit 13350 (Alternate)	6.2 MW		
27th St. / South Transformer (28 MVA)	Circuit 13348	4.4 MW	Freedom Parking Lot	691 kW / 587 kW
27th St. / North Transformer (37 MVA)	Circuit 13352	5.8 MW	Liberty Parking Lot	897 kW / 763 kW

Table Notes

1. Customer electrical switchgear has the capability to connect the 925 kW ac of RGS output to either N1 or N2 service.
2. The AC Rating value was calculated by multiplying the DC generating capacity by .85 to account for losses during the conversion from DC to AC.

III. INTERCONNECTION PREFERENCES AND ALTERNATIVES

The hospital's preference was to use the PV facilities to provide the main hospital building with energy that would otherwise be provided by TEC under the General Service Demand-time-of-day (GSDT) rate schedule; however, in so doing, the hospital would exceed the 20% self-generation threshold at which the hospital would be required to take service under one of TEC's standby service tariff schedules. Firm standby service is required for all self-generating customers whose generating capacity in kilowatts (exclusive of emergency generation equipment) exceeds 20% of their site load in kilowatts and who take firm service from the utility. The main hospital's maximum demand is approximately 7.5 MW and the hospital's total PV generation has a gross power rating of approximately 2.3MW, resulting in 30.7% of self-generation. To reduce the amount of self- generation behind the hospital meter, and thus avoid the standby service requirement; the hospital has opted to interconnect a portion of the PV generation behind the meters at two parking facilities.

The output from the PV inverters mounted in the Romeo parking lot is transformed by the Customer from 480 VAC to 4,160 VAC and connected to the main hospital electrical system through an underground cable crossing 131st Ave. The main hospital service does not require a bi-directional net meter because exporting of power to TEC is not allowed under the Non-export Parallel Operator agreement for the Customer-owned 12 MW of backup diesel generation. The PV system design drawings specify an "interlock relay that upon sense of normal power failure, and prior to starting generators, tie-in circuit breaker shall automatically shut off. PV system shall only operate when normal power system is on."

The PV system engineer requested separate interconnection PCCs for the PV systems in the Freedom and Liberty parking lots. Each parking lot will have two utility interactive inverters with 480 VAC three phase output. TEC will serve the lots at 277/480 VAC and provide the required transformation necessary to interconnect to the 13.2 kV distribution circuits. The Customer will execute Tier III interconnection agreements for the parking lots, allowing the services to be net-metered with a bi-directional meter.

IV. POTENTIAL SYSTEM IMPACTS

A. Islanding

The inverters specified for the project are utility interactive, UL 1741 [1] and IEEE 1547 [2] compliant. The guidelines defined by these standards require utility interactive systems to have anti-islanding protection. The inverters are required to cease output when the voltage of the utility grid falls outside of predefined limits. The inverters specified in the "100% submittal" construction prints were Satcon PVS-500 and PVS-350 models. The manufacturer of the inverters stated they utilize frequency based anti-islanding detection with an adjustable setting initially set to a default value of 160 milliseconds. Frequency based anti-islanding detection is utilized by other inverter manufacturers and is a reliable method to prevent islanding.

Should the inverter malfunction and fail to disconnect from the utility grid, the 480 VAC switchgear in each parking lot contains a load break, visible blade disconnect switch, lockable in the open position which TEC can use to manually separate the PV generation from the circuit.

B. Substation Breaker Reclosing

Tampa Electric's distribution circuit breakers reclose two times before locking out. The first reclose in approximately 0.3 to 1.0 seconds, and the second within 17 seconds of a fault condition. The Satcon inverters cease output in 0.13 to 0.19 seconds, which is earlier than the reclose of the utility circuit breaker. The Satcon inverters are also designed and tested to withstand 170% voltage spikes, which would reduce the likely hood of damage should the inverters fail to cease output before the utility system recloses. Therefore protective relaying between the inverters and the utility circuit is not required.

C. Voltage

Tampa Electric utilizes voltage tap changers located in the substation to regulate voltage on distribution circuits. The voltage tap changers monitor the circuit current and respond to changes in the current to maintain the voltage within required guidelines under varying circuit loads. UL 1741 requires that the distributed generation "shall not actively regulate the voltage at the PCC"[1] and "shall not cause the area EPS to fall outside of ANSI C84.1-1995, Range A"[1]. Although this requirement is within TEC's normal voltage limits of +/- 5% for residential service and +/- 7 ½% for commercial service, the additional generation is expected to impact circuit voltage during both normal operation and when responding to system disturbances.

The circuits interconnected with the PV systems are summarized in Table I above. The output from the PV systems is approximately 13% of the peak load of the circuits. Because the current sensors for the voltage tap changers will not be able to see the current supplied to the circuit by the PV system, the tap changer response will be based on a portion of the circuit load, not the entire load. The configuration settings of the tap changers will need to be modified and refined over time as the effects of the PV system are observed.

D. Overcurrent Protection

1. Fault Current Contribution

The maximum fault current rating of the inverters is;
PVS-500 – 1800 amps @ 4 ms @ 480 VAC
PVS-250 – 1080 amps @ 5.5 ms @ 480 VAC

The fault current at 13,200 VAC would be approximately 65.5 amps & 39.3 amps respectively. The additional fault current from the PV system does not cause the available short circuit on the circuit to exceed the rating of the distribution equipment.

2. Overcurrent Protection Coordination

The additional fault current from the PV system does not significantly impact overcurrent protection coordination for the circuit.

E. Power Quality

The UL 1741 listing of the inverters indicates compliance with the voltage flicker and harmonics requirements of IEEE 1547. It is not anticipated that the PV system will introduce power quality issues for the hospital or other Customers.

F. SCADA Communications

The loads at both lots are less than 10% of PV system output; therefore the PV systems will be exporting close to the entire amount of power produced onto TEC's utility grid continuously during daylight hours. As mentioned in Voltage Section C above, the output from the PV systems is approximately 13% of the peak load of the circuits. The additional generation is expected to impact circuit voltage. To ensure the safe and reliable operation of TEC's system, it is necessary for TEC to know in real time how much power the two PV systems are exporting, and the voltage at the PCC.

The instantaneous power, voltage, current, direction of power flow, and power factor data from each generation system can be obtained on a real time basis by utilizing intelligent meters with

communications capability for the utility billing meter (net meter) at the Liberty and Freedom parking lots. TEC's Supervisory Control and Data Acquisition (SCADA) system will communicate with the meters and allow the system operators to view the information.

The SCADA monitoring also allows system operators to verify the inverters have successfully ceased output and are not islanding during system restoration activities.

The existing relay gear for the main hospital service has SCADA monitoring and control through fiber optic cable providing switch status, MW, MVAR, PF, Amps ABC and Volts ABC for each circuit. No modifications to the existing relay gear SCADA interface is required.

V. DISTRIBUTION FACILITY MODIFICATIONS

The existing service for the Liberty parking lot will need to be upgraded to 480 VAC, three phase, 1,600 Amps to support the output from the 897 kW dc solar generation. A dedicated 1000 kVA pad mounted transformer will need to be installed. A new pole with an underground takeoff and 30 feet of underground conductor will be required. Althougb the existing overhead transformer will no longer feed the lot, it needs to be relocated to another pole, and the service cable for a street light will need to be upgraded.

The existing service for the Freedom parking lot will need to be upgraded to 480 VAC, three phase, 1,200 Amps to support the output from the 691 kW dc solar generation. A dedicated 1000 kVA pad mounted transformer will need to be installed. A new pole with an underground takeoff and 30 feet of underground conductor will be required. The existing overhead transformer feeding the lot will need to be removed.

Fiber optic cables will need to be installed from TEC's 27th Street distribution substation to the meters at the Liberty and Freedom lots. The cables will be attached to poles, and transition underground for the distance from the pole located in the right of way next to the street to the metering cabinets.

VI. SUMMARY OF PROFESSIONAL TIME

Meetings	18 Hours
Engineering Analysis	23 Hours
Report Preparation	19 Hours

VII. BIBLIOGRAPHY

1. Underwriter Laboratories Inc., UL 1741 Inverter, Converters, Controllers and Intereonnection System Equipment for Use With Distributed Energy Resources. Underwriter Laboratories Inc., May 7, 1999.
2. Institute of Electrical and Electronics Engineers, IEEE Standard 1547 Standard for Interconnecting Distributed Resources with Electric Power Systems. The Institute of Electrical and Electronics Engineers, July 28, 2003.
3. American National Standards Institute, ANSI C84.1-1995. American National Standards Institute, 2006.