

<b>RFP NO:2012-065-MSS</b>	<b>Buyer: Moises Salazar</b>	<b>Tel. No: 318-2626 ext. 4863</b>
----------------------------	------------------------------	------------------------------------

# **REQUEST FOR PROPOSALS**

## **Hidalgo County Precinct No. 1**

### **Solar Powered Lights -Phase II**

Contact Person:

Martha L. Salazar, CPPB, Purchasing Agent  
Hidalgo County Purchasing Department  
Physical Address 2802 So. Bus. Hwy. 281  
Postal Mailing Address: 2812 So. Bus. Hwy. 281  
(Same Building) Corner of Canton & Bus. 281  
Edinburg, Texas 78539



(956) 318-2626

Form HCPD-04

## LEGAL NOTICE

RFP NO: 2012-065-MSS

1. Proposals will be received for “**Hidalgo County Precinct No. 1- EECBG Grant –Solar Powered Lights -Phase II**” in accordance with the requirements attached hereto as Exhibit "A." Proposals should address all requirements set forth. Proposers may suggest substitutions of features which they feel would be in the best interest of Hidalgo County ("County"). Strong rationale must be presented for any deviation from the requirements. Hidalgo County reserves the right to reject the deviation and its effect on the overall proposal.
2. One (1) original and three (3) copies of all proposals are required, with the proposers name and address clearly typed/printed on upper left hand corner and the proper notation clearly typed/printed on the lower left hand corner of the envelope and/or package, "**RFP NO.: 2012-065-MSS "Hidalgo County Precinct No. 1- EECBG –Solar Powered Lights -Phase II"**" and in County's Purchasing Department, Physical Address 2802 So. Bus. Hwy. 281/Postal Mailing Address 2812 So. Bus. Hwy 281 (Same Building) Corner of Canton and Business 281, Administration Building, Edinburg, Texas, on or before, **February 2, 2012. NO LATE ARRIVALS WILL BE ACCEPTED. ANY PROPOSAL RECEIVED AFTER THAT TIME WILL NOT BE ACCEPTED AND WILL BE RETURNED. OVERNIGHT MAIL MUST ALSO BE PROPERLY LABELED ON THE OUTSIDE OF EXPRESS ENVELOPE OR PACKAGE IN REFERENCE TO PROPOSAL.** Hidalgo County reserves the right to refuse and reject any/all proposals and to waive any/all formalities or technicalities, or to accept the proposal considered the best and most advantageous to Hidalgo County.
3. Hidalgo County reserves the right to separate and accept, or eliminate any item(s) listed under this proposal that it deems necessary to accommodate budgetary and/or operational requirements. Hidalgo County also reserves the right to reject any or all proposals submitted and further reserves the right to design the evaluation criteria to be used in selecting the lowest and best proposal for approval. Receipt of any proposal shall under no circumstances obligate County to accept the lowest dollar proposal. The award of this contract shall be made to the responsible offeror whose proposal is determined to be the best evaluated offer resulting from negotiation, taking into consideration the relative importance of price and other evaluation factors as herein set forth.
4. Failure of the delivered item(s) to perform as specified, or failure to meet the stated delivery schedule shall release Hidalgo County from all obligations to the contracting party with regard to the item(s) in question. In such event, County may elect to award the contract to the next-lowest responsible proposer, or to reject all proposals and re-bid project.
5. **For work to be performed at a County owned or operated location, each proposer shall, in its sole discretion, visit the job site before preparing the proposal and thoroughly familiarize himself/herself with existing conditions. Proposer should take field dimensions and note all circumstances which affect the dollar amount of the proposal.**
6. Descriptive specifications are referenced in this document to indicate the **general** kind and quality of equipment desired by Hidalgo County. Due to various styles and models of equipment, proposers are required to include illustrations, specifications, explanation of warranties, and service data with their proposal including catalogue numbers and any necessary references.

7. No proposal may be withdrawn within sixty (60) days from the scheduled time to open proposals.
8. Proposed prices are to remain firm for a minimum of ninety (90) days after priced proposal opening.
9. Any interpretations, amendments, corrections or changes to this proposal document must be in a written addendum and signed by the County Judge or his designee. Addenda will be mailed to all who are known to have received a copy of the Request for Proposals. Proposers shall acknowledge receipt of all addenda as a part of their proposal.
10. County reserves the right to accept or reject any or all proposals.
11. Costs are to be net F.O.B., County Prepaid.
12. County is exempt from Federal Excise Tax, State Tax and Local Tax. Do Not include tax in cost figure. If it is determined that tax was included in the cost figures it will not be included in the tabulation of any awards. Tax exemption certificates will be furnished upon request.
13. Funds for this procurement have been provided through the County budget for this fiscal year only. County, on an annual basis, has the right to reconsider a contract during the budget process for ensuing years if financial resources of County are insufficient to meet the liabilities of said contract. The award of a proposal or contract hereunder will not be construed to create a debt of the County which is payable out of funds beyond the current fiscal year.
14. Upon award and prior to execution of a contract, Sole Proprietorships are required to submit a copy of their social security cards to the Hidalgo County Auditor's Office in order to establish an account with the County. All awarded vendors must submit a completed W-9 and a copy of their Federal ID Number Certificate.
15. BILLING AND PAYMENT INSTRUCTIONS:
  - . Invoices must include:
    - a) Name and address of successful proposer
    - b) Name and address of receiving department or official
    - c) Purchase Order Number (if any)
    - d) Notation "**Hidalgo County Precinct No. 1- EECBG - Solar Powered Lights - Phase II" -2012-065-MSS**
    - e) Descriptive information as to the items or services delivered, including product code, item number, quantity, etc.
  - . Discount payments will be considered when offered.

- Contact person for Billing and Payment questions:

Hidalgo County Precinct No. 1  
Martha Mena, Executive Assistant  
1902 Joe Stephens Ave.  
Weslaco, TX 78596  
Ph: (956) 968-8733

16. Schedule of Events

<b>Proposal Due Date,</b>	<b>February 2, 2012</b>
Award of Contract	, 2012
Commence Work or Deliver Products	, 2012

17. Proposer or Performance Bond and Debarment Certification; Payment under Contract:

- If the contract proposed is for the construction of public works or is for a contract for goods and services exceeding **\$100,000**, all bidders shall furnish a good and sufficient proposer bond in the amount of five percent of the total contract price. A proposer bond must be executed with a surety company authorized to do business in Texas. All proposers are also required to furnish a certification or acknowledgment stating that the contractor or vendor is free from debarment or suspension pursuant to federal regulation 45CFR76.
- Together with the signing of a contract or issuance of a purchase order following the acceptance of a proposal, and prior to commencement of the actual work, the proposer shall furnish a performance bond to the County for the full amount of the contract, if that contract exceeds **\$50,000**.
- If the contract is for **\$50,000** or less, no money will be paid to the contractor until completion and acceptance of the work or the fulfillment of the purchase obligation to the County, and, if applicable, the receipt by County of satisfactory evidence that all subcontractors and material men have been paid.
- If a contract is for the construction, alteration or repair of public buildings or public works, the contractor *shall* provide a payment bond for a contract in excess of Twenty Five Thousand Dollars (**\$25,000.00**), as required by Tex. Govt. Code Ch. 2253.
- For requirements contracts, bond requirements are determined by applying the proposed unit price to the estimated quantities included in the specifications.

18. Ethical Standards:

- It shall be a breach of ethics to offer, give or agree to give any elected official, department head or employee, or former elected official, department head or employee, of the County, or for any elected official, department head or employee or former elected official, department

head or employee of the County, to solicit, demand, accept or agree to accept from another person, entity or organization, a gratuity or an offer of employment in connection with any decision, approval, disapproval, recommendation, preparation or any part of a program requirement or purchase request, influencing the content of any specification or procurement standard, rendering of advice, investigation, auditing, or in any other advisory capacity in any proceeding or application, request for ruling, determination, claim or controversy, or other particular matter pertaining to any program requirement or a contract or subcontract, or to any solicitation or proposal therefore pending before any department or agency of the County.

- . It shall be a breach of ethics for any payment, gratuity or offer of employment to be made by or on behalf of a subcontractor under a contract to the prime contractor or higher tier subcontractor for any contract for the County, or any person associated therewith, as an inducement for the award of a subcontract or order.
- . No public official shall have an interest in a contract awarded hereunder except in accordance with Tex. Loc. Govt. Code Chapter 171.

19. **Disclosure of Conflict of Interest**

**Effective January 1, 2006, Chapter 176 of the Texas Local Government Code requires that any vendor, person, consultant or contractor considering doing business with Hidalgo County ("the County") to disclose in the Conflict of Interest Questionnaire (the "CIQ") attached as Exhibit D, the vendor, person, consultant or contractor's affiliation or business relationship that might cause a conflict of interest with the County. By law, the CIQ must be filed with the Hidalgo County Clerk's Office no later than the seventh business day after the date the person becomes aware of facts that require that statement to be filed. The disclosure requirement applies to a person or business who contracts or seeks to contract with Hidalgo County for the sale or purchase of property, goods or service. Any purchase order or contract resulting from this process shall be considered null and void if the successful bidder fails to comply with Texas Local Government Code Chapter 176. Vendors, consultants, contractors and others who desire to conduct business with Hidalgo County are encouraged to refer to Texas Local Government Code Chapter 176 for the details of this law. An offense under Texas Local Government Code Chapter 176 is a Class C Misdemeanor.**

**Please Submit completed CIQ forms to the Hidalgo County Clerk's Office located at 100 N. Closner, Edinburg, Texas 78539-Hidalgo County Courthouse**

**COMPLETION AND SUBMISSION OF FORM CIQ IS THE SOLE RESPONSIBILITY OF THE PROSPECTIVE BIDDER.**

- 20. If, during the life of any contract or proposal awarded, the successful proposer's net prices generally available to other customers for items awarded herein are reduced below the contracted price, it is understood and agreed that the benefits of such reduction shall be extended to County.
- 21. Proposals, and all goods and services provided there under, shall comply with all federal, state and

local laws concerning this type(s) of goods and/or services.

22. Minimum Standards for Responsible Prospective Proposers: A prospective proposer must affirmatively demonstrate proposer's responsibility. A prospective proposer, by submitting a proposal, represents to County that it meets the following requirements:
- . Possess and submit a Certificate of Account Status indicating bidder is in "Good Standing" with the Texas Comptroller of Public Accounts if such bidder is incorporated in the State of Texas. To secure a certificate of "Good Standing", you may access the following website: [www.window.state.tx.us/taxinfo/coasintr.html](http://www.window.state.tx.us/taxinfo/coasintr.html). If the bidder is not incorporated in Texas, the bidder must submit the appropriate evidence of filing with the Texas Secretary of State stating that the business is authorized to transact business in Texas
  - . Possess or is able to obtain adequate financial resources as required to perform under the proposal;
  - . Be able to comply with the required or proposed delivery schedule;
  - . Have a satisfactory record of performance;
  - . Have a satisfactory record of integrity and ethics;
  - . Be otherwise qualified and eligible to receive an award.
23. Successful proposer will pay or cause to be paid, without cost or expenses to County, all FICA, FUTA/SUTA and Federal Income Withholding Taxes of all employees, and all wages and benefits as required by Federal or State law. Successful proposers officers, agents and/or employees will not be entitled to any benefits of an employee or elected official of County, including, but not limited to, benefits associated with County's civil service system.
24. Any contract award to a successful proposer will be in effect until (a) the contract expires, (b) delivery and acceptance of products, and/or performance of services ordered, or (c) terminated by County with thirty (30) day's written notice prior to cancellation.
25. County reserves the right to enforce performance of any contract awarded hereunder in any manner prescribed by law or deemed to be in the best interest of the County in the event of breach or default by successful proposer; County reserves the right to terminate any contract immediately in the event a successful proposer fails to:
- A. Meet schedules;
  - B. Pay any required fees or taxes; or
  - C. Otherwise perform in accordance with the requirements.
26. Successful proposer shall defend, indemnify and save harmless County and all its elected officials, officers, agents and employees from all suits, actions, or other claims of any character, name and description brought for or on account of any injuries or damages received or sustained by any person,

persons, or property on account of any negligent act or fault of the successful proposer, or of any agent, employee, subcontractor or supplier in the execution of, or performance under, any contract which may result from proposal award. Successful proposer indemnifies and will indemnify and save harmless County from liability, claim or demand on their part, agents, servants, customers, and/or employees whether such liability, claim or demand arise from event or casualty happening or within the occupied premises themselves or happening upon or in any of the halls, elevators, entrances, stairways or approaches of or to the facilities within which the occupied premises are located. Successful proposer shall pay any judgment with costs which may be obtained against County growing out of such injury or damages, and shall, upon request, provide a defense to County by counsel reasonably acceptable to County. Successful proposers indemnity hereunder shall include, but is not limited to, claims relating to patent, copyright or trademark infringement, and the like, arising out of the goods or services provided by successful proposer.

27. Successful proposer shall warrant that all items/services shall conform with the specifications and/or all warranties provided under the Uniform Commercial Code and be free from all defects in material, workmanship and the like. Items supplied under a contract pursuant to this Request for Proposals shall be subject to County's approval. Items found to be defective or not meeting specifications shall be replaced by successful proposer within two business days at no expense to County. Items not picked up within one (1) week after notification shall be deemed a donation to County and may be used or disposed of at County's discretion and without waiver of any other rights of County as to the item's nonconformity.
28. This document and any disputes arising hereunder shall be governed and construed according to the laws of the State of Texas, and will be performable exclusively in Hidalgo County, Texas.
29. The successful proposer shall not assign, sell, transfer or convey its rights under any awarded contract, in whole or in part, without the prior written consent of County.
30. Proposers shall provide with the proposal response, a list of at least three (3) references where like services have been supplied by their firm. Include the name of the business or government, address, telephone number and name of representative or contact person.
31. Proposers must provide **all** documentation requested with this Proposal in their response. Failure to provide this information may result in rejection of the proposal as non conforming.

Proposal  
for

**Hidalgo County Precinct No. 1-  
Solar Powered Lights -Phase II (EECBG)  
RFP NO: 2012-065-MSS  
February 2, 2012**

To: Martha L. Salazar, CPPB, Purchasing Agent  
Hidalgo County Purchasing Department  
2802 So. Bus. Hwy 281  
Postal Mailing Address: 2812 So. Bus. 281  
(Same Building) Corner of Canton & Bus. 281)  
Edinburg, Texas 78539

In accordance with the Requirements, and subject to all laws and regulations of the United States and state and local laws, the undersigned bidder proposes and commits to furnish all labor, equipment, material, software and services as set forth in the documents hereinbefore mentioned. The undersigned proposer further agrees, upon acceptance of its proposal, to execute a contract and/or Purchase Order issued by Hidalgo County for performing and completing the work described in the Requirements within the time stated and for the prices proposed in the documents attached hereto and made a part hereof.

Proposer acknowledges receipt of all of the pages of the documents referenced in the Checklist presented in connection with this procurement. Proposer understands that Hidalgo County reserves the right to reject any or all proposals and further reserves the right to design the evaluation criteria to be used in selecting the lowest and best proposal.

Proposer agrees that this proposal shall be good and may not be withdrawn for a period of thirty (30) calendar days after the scheduled closing time for receiving proposals, as contained in the Requirements.

Respectfully submitted,

Proposer: Facility Solutions Group

Address: 585 S. Padre Island Dr. Corpus Christi, TX 78405

By: David Thomas - [Signature]

Printed Name: David Thomas

Title: Division Manager



HIDALGO COUNTY PURCHASING DEPARTMENT

EXHIBIT "A"

Hidalgo County Precinct No. 1

Solar Powered Lights Phase II (EECBG)

2012-065-MSS

---

PROJECT PLANS AND SPECIFICATIONS

---

## SECTION 30050

### SOLAR POWERED LIGHTS

#### 1. SCOPE OF PROJECT

**1.1 Design:** All components of the solar lighting system shall be mounted on the pole and shall not be accessible from the ground without mechanical means.

**1.2 Operation:** Lights shall be stand-alone solar powered systems and shall not be connected to grid power. Overall, the system shall operate automatically without the use of a separate photo cell. The solar panel itself shall act as a photocell. It shall sense a low light level at dusk and shall turn the light on to run full from dusk to dawn, and shall adjust automatically as the days get longer. These functions shall be regulated by the controller. There shall be no day to day maintenance or adjustment required. All of the controller settings shall be done at the factory.

**1.3 Warranty:** Proposal submitted without written warranties will be considered non-responsive. Contractor shall meet or exceed the following list of warranties.

- |                           |                                    |
|---------------------------|------------------------------------|
| * Solar panel: 25 Years   | * Aluminum Panel Backing: 20 Years |
| * Aluminum Arm: 20 Years  | * Aluminum Bracket: 20 Years       |
| * Aluminum Pole: 20 Years | * Battery Box: 20 Years            |
| * Reflector: 10 Years     | * Luminaire: 5 Years               |
| * Battery: 5 Years        | * Controller: 5 Years              |
| * LED Lamps: 5 Years      |                                    |

**1.4 Submittals:** Contractor shall submit copies of manufacturer's owner manual and maintenance manual.

**1.5 Light Levels:** Light level requirements must comply with the Illuminating Engineering Society of North America (IESNA) recommendations to determine appropriate lighting level requirements for application.

#### 2. PERFORMANCE CRITERIA AND CONSIDERATIONS.

- Solar panels shall be protected on top by tempered glass.
- Each unit shall be free standing and self-contained.
- The system shall be powered by sunlight.
- LED light source shall consist of multi-junction strip type LED's.
- 100,000 hours rated lamp life.
- 2182 lumens total output with no lens losses from LED packaging.
- 5500 Kelvin – bright white color light.

- 10 days autonomy (battery reserve) for all weather conditions.
- Advanced Power Management LED driver to extend lamp operation and conserve battery power in times of extended inclement weather.
- The system shall be mounted high on the pole for vandal resistance and no wires shall run through the pole to the ground.
- System shall be sized in accordance with United States Department Of Energy specifications for this type of system.
- System shall automatically adjust light during periods of inclement weather to ensure that the lights are constantly on.

### 3. WRITTEN SPECIFICATIONS

#### 3.1 Solar Power Unit

The solar module shall contain polycrystalline solar cells, protected on the upper surface by low iron tempered glass. The solar module shall have a rugged aluminum frame which connects to brackets for attachment to the mounting arm at a 45 degree tilt. All wiring connections shall be with weathered resistant plugs as to keep installation simple, eliminate incorrect wiring, and prevent exposure to corrosion. Stainless steel hardware shall be used throughout. Solar modules shall carry a 25 year manufacturer's warranty.

The solar module array shall exhibit the following characteristics:

Cells:	poly-crystalline silicon cells
Total Watts:	300 watts
Tilt Angle:	45 degrees
Connections:	Weather resistant plug, 4 & 2 pin, color coded

#### 3.2 Fixture

The overhead fixture shall be a die cast corrosion resistant aluminum style fixture with a glass swag lens. Fixture enclosure is to be water tight, sealed, dust and insect free with electrostatic powder-coated finish. Fixture and light source will contain no mercury or lead and present no environmental disposal issues. The electrical connection shall be with weather resistant plugs to simplify installation, eliminate reverse wiring, and prevent exposure to corrosion.

The fixture shall exhibit the following characteristics:

Type:	Die cast corrosion resistant aluminum style fixture
Finish:	Electrostatic powder-coated finish
Fixture Enclosure:	Water tight, sealed, dust and insect free
Lens:	Swag glass lens with Intrusion Protection

### 3.3 Light Source (LED Light Emitting Diode)

The light source shall be solid-state strip LED (light emitting diode) with digital driver. 100,000 hour rated lamp life, 25 watt LED, 90 lumens per watt out of fixture at rated power.

LED's should be multi-junction strip type LED's – 4 strips per quad, and 48 LED's per strip for a total of 192 LED's per quad. Each fixture shall have one quad for a total of 192 LED's. System shall have no lens losses from the LED packaging and reflector coated to prevent degradation of reflective surface with a 50G shock rating.

The light source (LED) shall exhibit the following characteristics:

Type:	Strip LED with digital driver
Rated lamp life:	100,000 hours
Lamp Lumens:	90 lumens per watt at rated power
LED:	LED 25 watt, 5500 Kelvin 50,000 hour guaranteed lamp life
Heat Removal:	LED's mounted directly to heat sinking plate
Reflector:	Reflector system captures light emitted from the LED and directs to the targeted area.
Shock Rating:	50G's
Environmental Issues:	No environmental issues. System contains no mercury or lead.
LED Drive:	Electronic driver
Capacitors:	No electrolytic capacitors shall be used.
Power Management:	Power Management shall conserve battery power in times of extended inclement weather.

### 3.4 Controller

The controller shall be a microprocessor based charge controller designed exclusively for the running of solar lighting applications. Controller shall feature automatic charge termination for batteries. Low voltage disconnect shall be set to extend battery life. Controller shall autosense system voltage and shall have weatherproof connectors. It shall be circuit protected with UL approved weather sealing and a charge current rating of 20 amps.

Controller shall be located inside the battery box. Controller shall be factory pre-set for full dusk to dawn operation (approximately 13.5 hours).

Charge/Load Controller shall exhibit the following characteristics:

Method of Charge:	Pulse width modulation charging algorithm
-------------------	---

LVD Disconnect:	Set to extend battery life
Test routines:	Built in for checking installation of solar lighting system.
Connectors:	Weatherproof connectors
Location:	Controller located inside battery box
Run time:	Factory pre-set full dusk to dawn operation (approximately 13.5 hours).

### 3.5 Battery and Battery Enclosure

Battery shall be of sealed valve, regulated gel type, requiring no maintenance, air shippable, capable of 1300 minimum cycles to 30% depth of discharge, and rated for 99 amp hours at the 100 hour rate. 10 days autonomy (battery reserve) for all weather conditions. The wire harness shall include a weather resistant ATO fuse holder and plug to eliminate system failure due to corrosion, and accommodate quick/easy installation.

The Battery enclosure shall be aluminum, vented and shaded by solar array with access door loaded from front. Battery enclosure shall house battery and controller. Entire unit shall be shaded by the panels to avoid heat and mounted high on the pole to avoid vandalism.

The battery shall exhibit the following characteristics:

Type:	Sealed valve regulated gel
Voltage:	12 volts each
Location of Box:	High on pole, under panels, avoids heat and vandalism
Enclosure:	Aluminum vented
Access Door:	Loaded from front
Battery Reserve:	10 days
Power Management:	Protects battery life in periods of bad weather
Regular Maintenance:	None

### 3.6 Brackets and Arms

The support frame shall be constructed of tubular extruded aluminum. The fixture support arm shall be constructed of aluminum tube. All hardware shall be stainless steel. The overall Effective Projected Area of the entire system including luminaire shall not exceed 28 square feet.

Solar Array Support Frame:	Side of pole
Angle of Tile:	45 degrees
Fixture Support Arm:	10 feet aluminum
Material:	Aluminum
Hardware:	Stainless Steel

### **3.7 Pole**

Standard wood pole to support proposed luminaire system shall be provided and installed by Contractor. Wood pole shall meet American National Standards Institute (ANSI) Standard Specifications for Wood Poles.

### **3.8 Wire Connections**

All wire connections shall be with weather resistant plugs, keyed to make installation quick and easy and to eliminate failure due to corrosion and incorrect wiring.

### **3.9 Concrete Base**

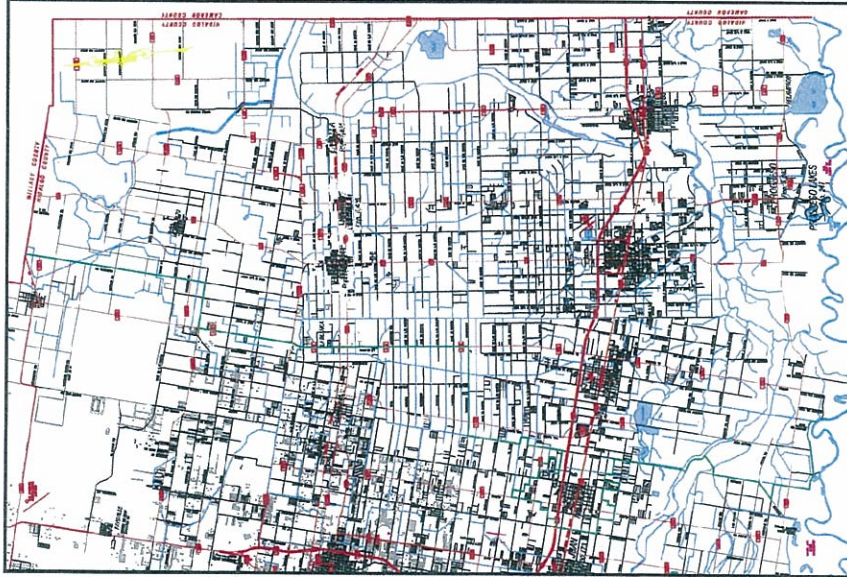
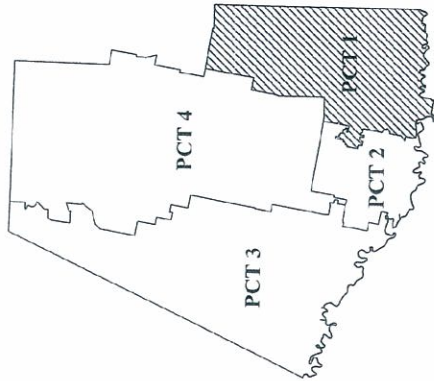
In the event that ground conditions require the use of a concrete base for the embedment of the poles, the Contractor shall provide a fixed cost to secure that the poles are anchored to support the luminaire system.

### **4.0 PAYMENT**

Compensation will be for furnishing all materials, labor, equipment, tools and incidentals required for the work in accordance with the plans and these specifications. Any incidental work incurred by contractor to accomplish said plans, specifications, and contract pay items, shall be deemed to be included in the project and therefore shall not be considered for additional compensation.

**\*\*\* END OF SECTION \*\*\***

# HIDALGO COUNTY PRECINCT No. 1 SOLAR LIGHTS PROJECT PH 2



CITY OF MERCEDES, CITY OF ELSA, CITY OF  
EDCOUCH, AND CITY OF LA VILLA

RAMON GARCIA	COUNTY JUDGE
COMMISSIONER JOEL QUINTANILLA	PRECINCT No. 1
COMMISSIONER HECTOR "TITO" PALACIOS	PRECINCT No. 2
COMMISSIONER JOE M. FLORES	PRECINCT No. 3
COMMISSIONER JOSEPH PALACIOS	PRECINCT No. 4



HIDALGO COUNTY  
PLANNING DEPARTMENT

1304 S. 25 TH. STREET  
EDINBURG TX, 78539  
TEL: (955) 318-2840 FAX: (955) 318-2644  
www.co.hidalgo.tx.us  
RAUL E. SESIN, P.E., C.F.M.  
PLANNING ADMINISTRATOR



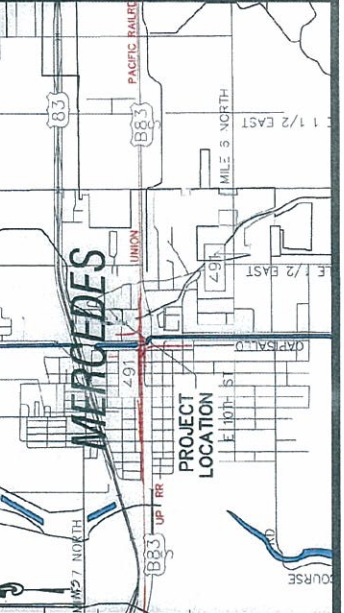
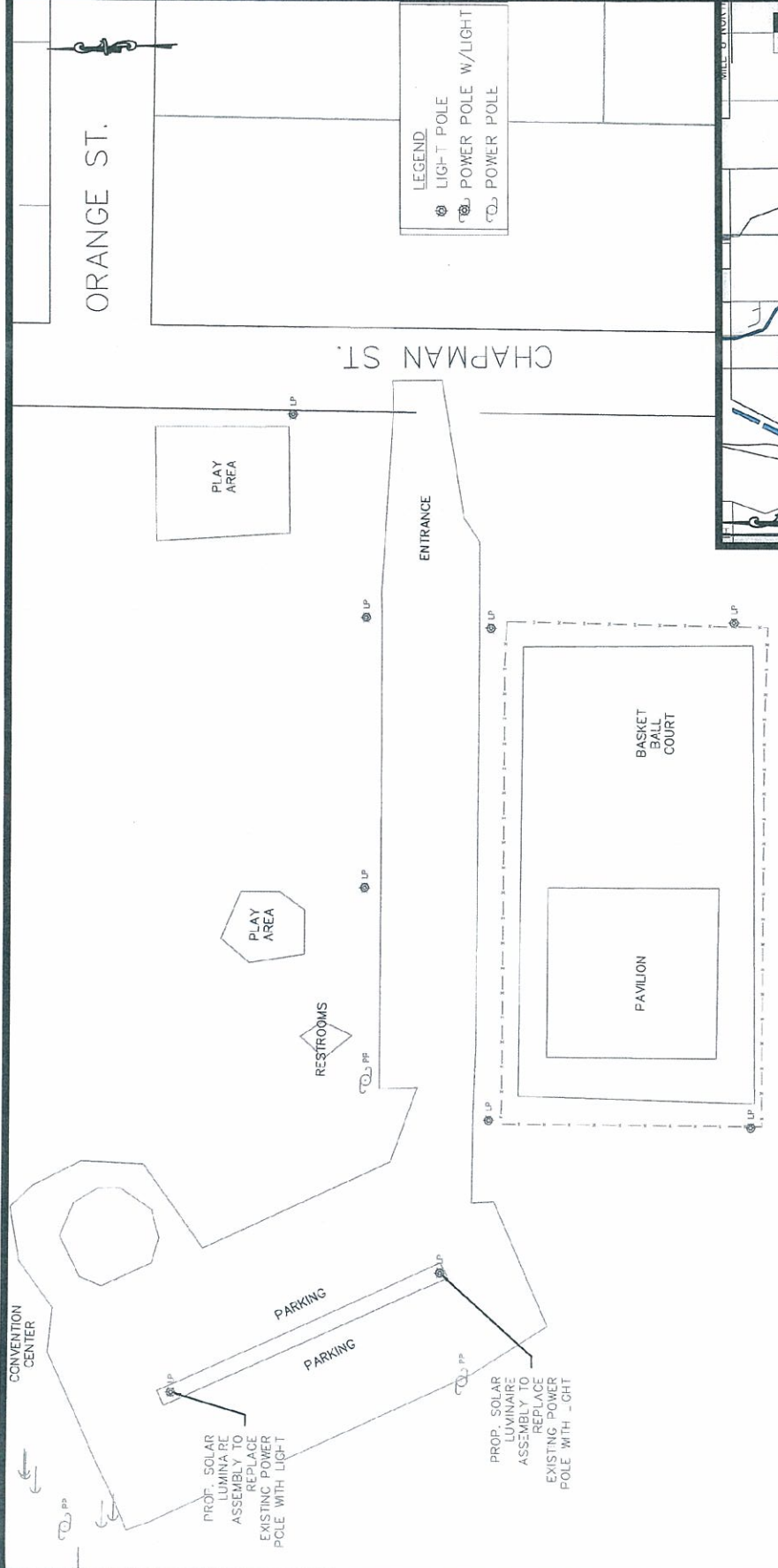
This seal appearing on this document was authorized by Raul E. Sesin, P.E., No. 83374, on the above date and for the above project.

*Raul E. Sesin*  
RAUL E. SESIN, P.E., NO. 83374  
11/21/11









**SUMMARY OF QUANTITIES**

DESCRIPTION	UNIT	QTY
FURNISH AND INSTALL SOLAR LIGHTING ASSEMBLIES (COMPLETE IN PLACE)	EA	2

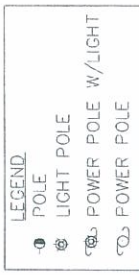
**NOTES:**  
 ALL LUMINAIRE ASSEMBLY LOCATIONS ARE TENTATIVE. THE CONTRACTOR SHALL DETERMINE THE OPTIMUM LOCATION BASED ON R.O.W. AVAILABILITY, FIELD CONDITIONS, AND MANUFACTURER'S RECOMMENDATIONS.  
 LUMINAIRE ADJUSTMENTS SUBJECT TO APPROVAL BY THE ENGINEER.  
 LUMINAIRE ARMS SHALL BE AIMED PERPENDICULAR TO THE CENTERLINE OF ROADWAY OR AS DIRECTED BY THE ENGINEER.  
 LUMINAIRE ASSEMBLY WILL BE INSTALL NEXT TO EXISTING SERVICE POLE WHEN LOCATED INSIDE ROW OR WHERE DETERMINE BY THE ENGINEER.

**NOTES:**  
 ALL LUMINAIRE ASSEMBLY LOCATIONS ARE TENTATIVE, THE CONTRACTOR SHALL DETERMINE THE OPTIMUM LOCATION BASED ON R.O.W. AVAILABILITY, FIELD CONDITIONS, AND MANUFACTURER'S RECOMMENDATIONS.

LUMINAIRE ADJUSTMENTS SUBJECT TO APPROVAL BY THE ENGINEER.

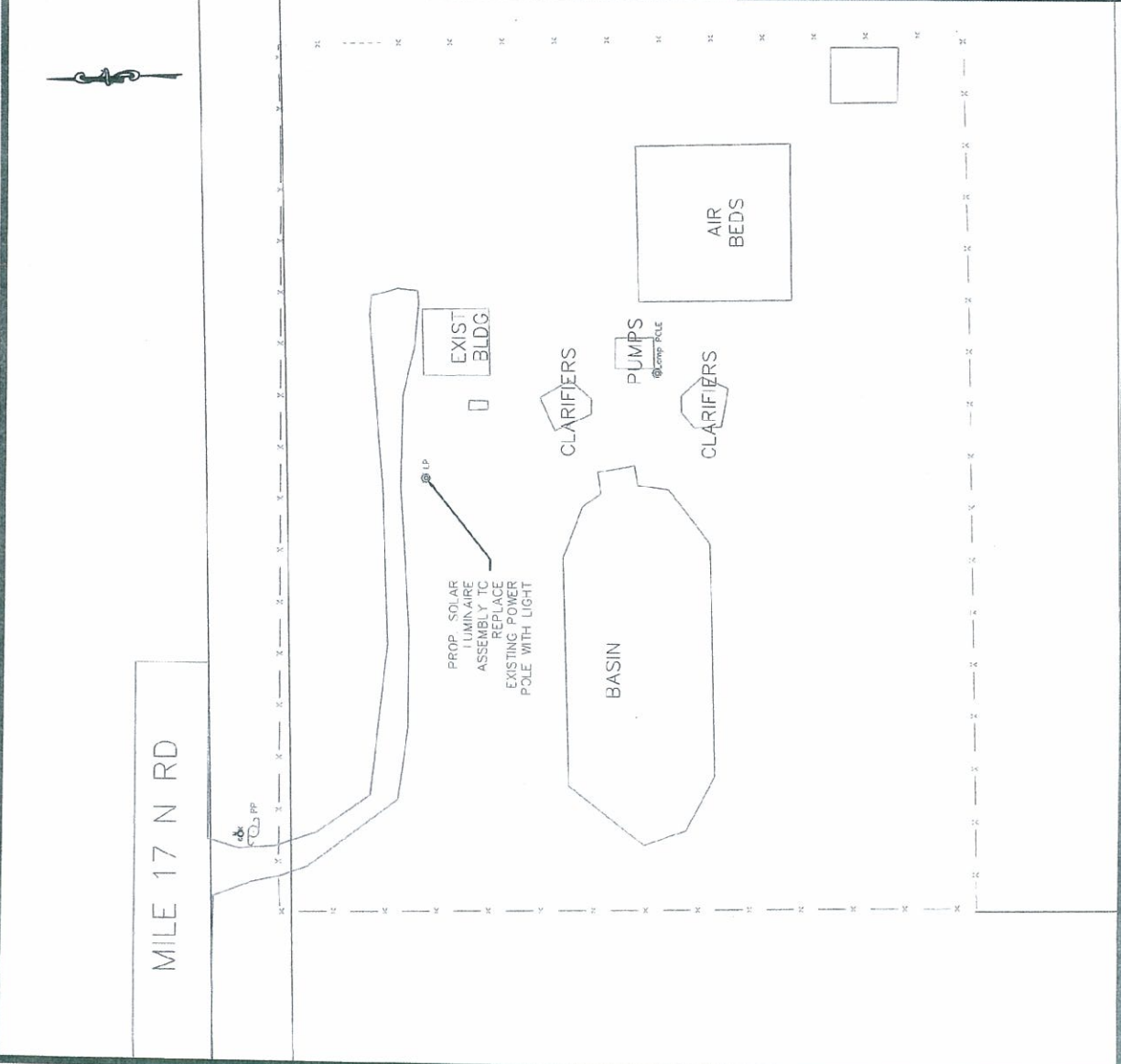
LUMINAIRE ARMS SHALL BE AIMED PERPENDICULAR TO THE CENTERLINE OF ROADWAY OR AS DIRECTED BY THE ENGINEER.

LUMINAIRE ASSEMBLY WILL BE INSTALL NEXT TO EXISTING SERVICE POLE WHEN LOCATED INSIDE ROW OR WHERE DETERMINE BY THE ENGINEER.



**SUMMARY OF QUANTITIES**

DESCRIPTION	UNIT	QTY
FURNISH AND INSTALL SOLAR LIGHTING ASSEMBLIES (COMPLETE IN PLACE)	EA	1



**NOTES:**  
ALL LUMINAIRE ASSEMBLY LOCATIONS ARE TENTATIVE; THE CONTRACTOR SHALL DETERMINE THE OPTIMUM LOCATION BASED ON R.O.W. AVAILABILITY, FIELD CONDITIONS, AND MANUFACTURER'S RECOMMENDATIONS.

LUMINAIRE ADJUSTMENTS SUBJECT TO APPROVAL BY THE ENGINEER.

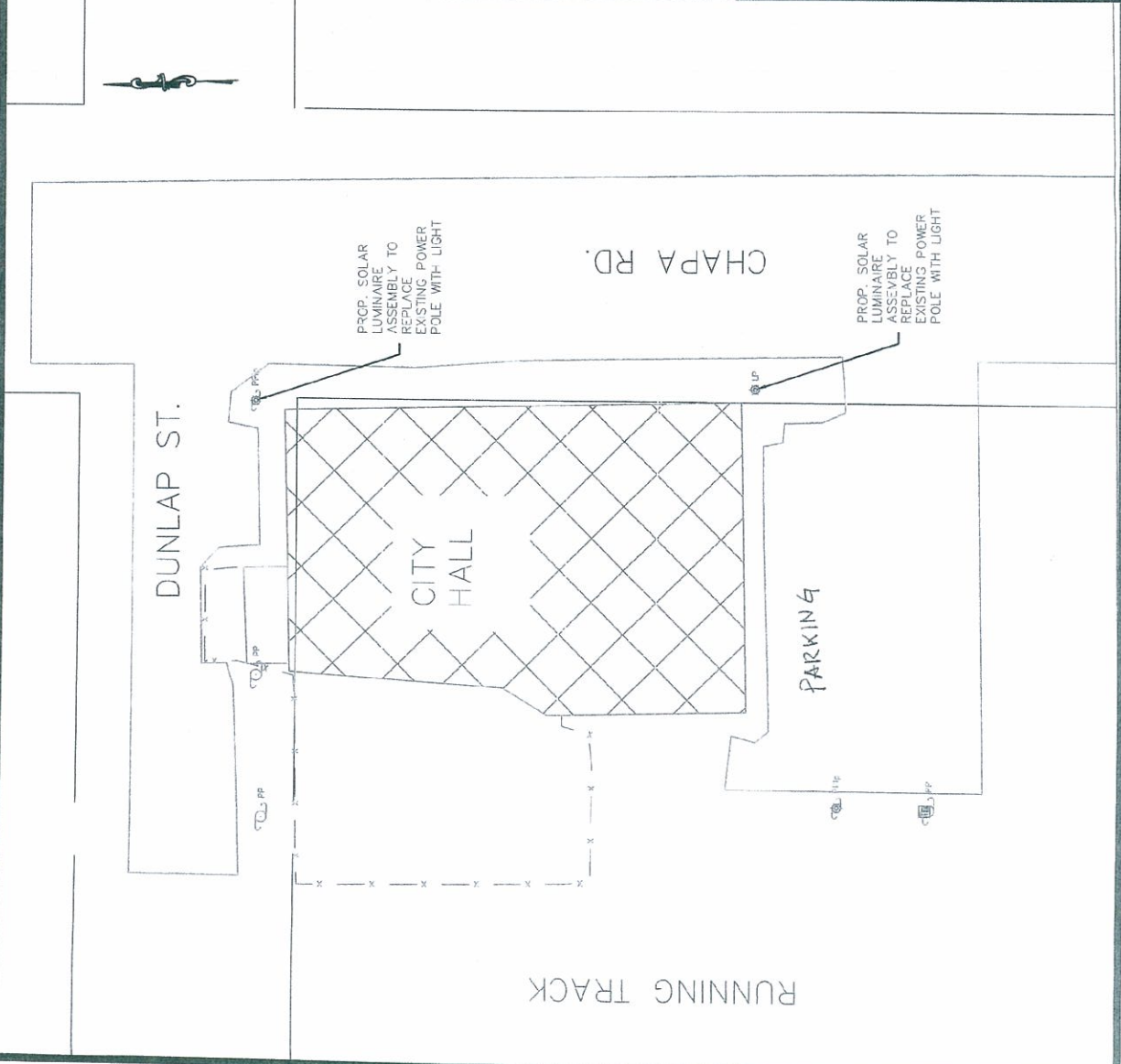
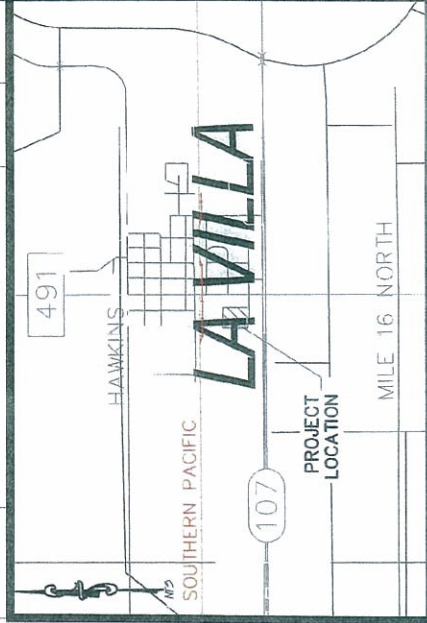
LUMINAIRE ARMS SHALL BE AIMED PERPENDICULAR TO THE CENTERLINE OF ROADWAY OR AS DIRECTED BY THE ENGINEER.

LUMINAIRE ASSEMBLY WILL BE INSTALL NEXT TO EXISTING SERVICE POLE WHEN LOCATED INSIDE ROW OR WHERE DETERMINE BY THE ENGINEER.

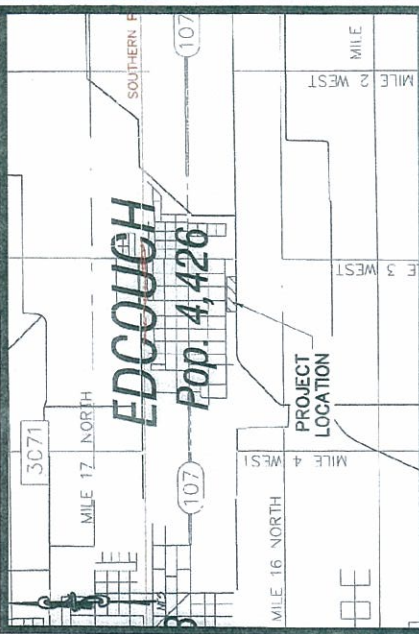
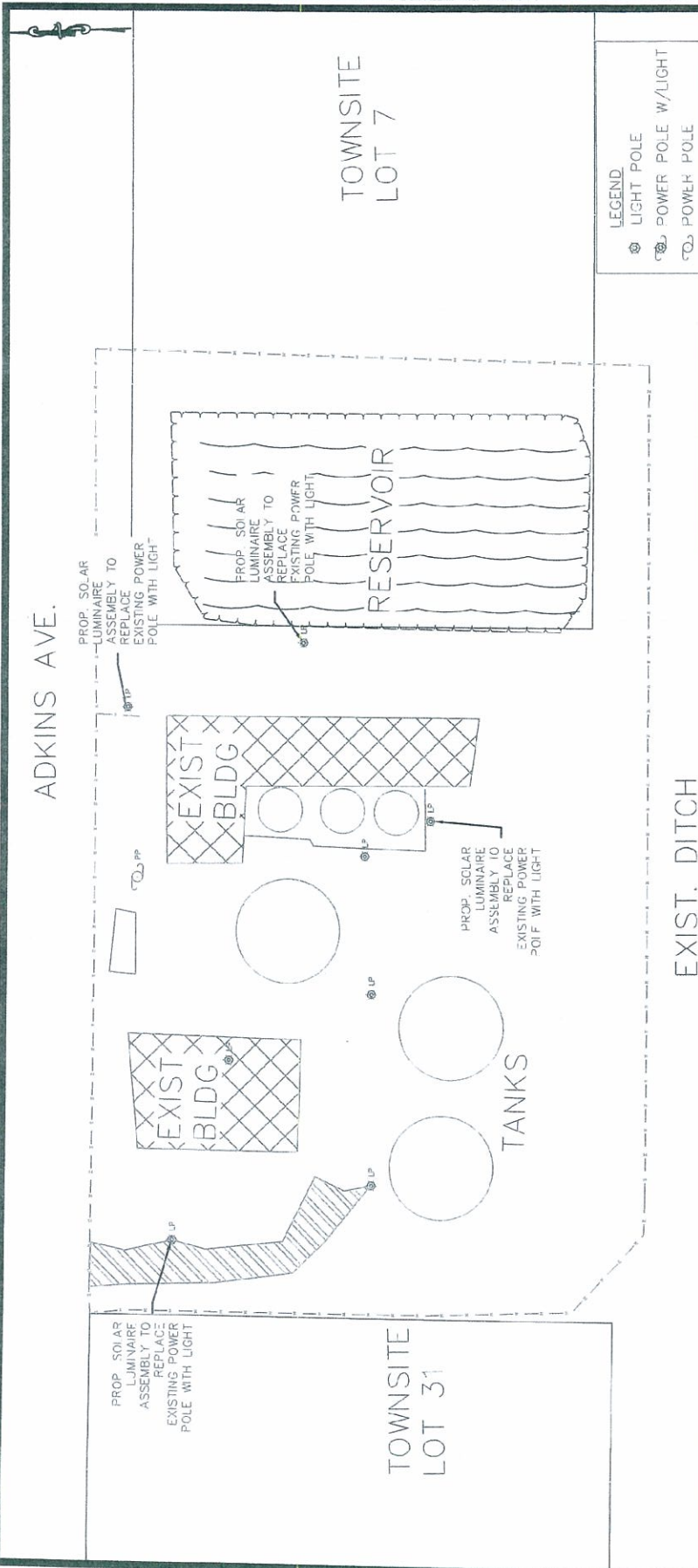


**SUMMARY OF QUANTITIES**

DESCRIPTION	UNIT	QTY
FURNISH AND INSTALL SOLAR LIGHTING ASSEMBLIES (COMPLETE IN PLACE)	EA	2



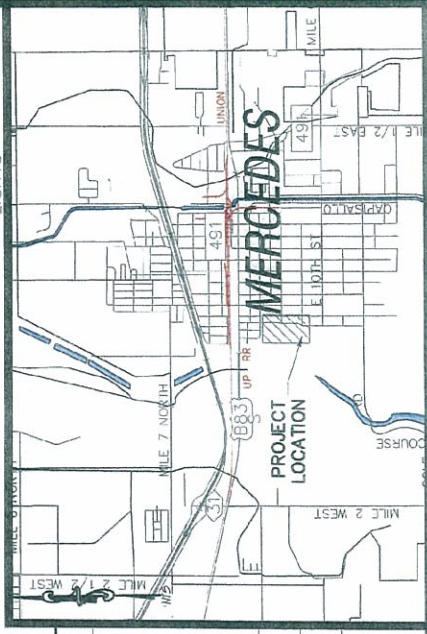
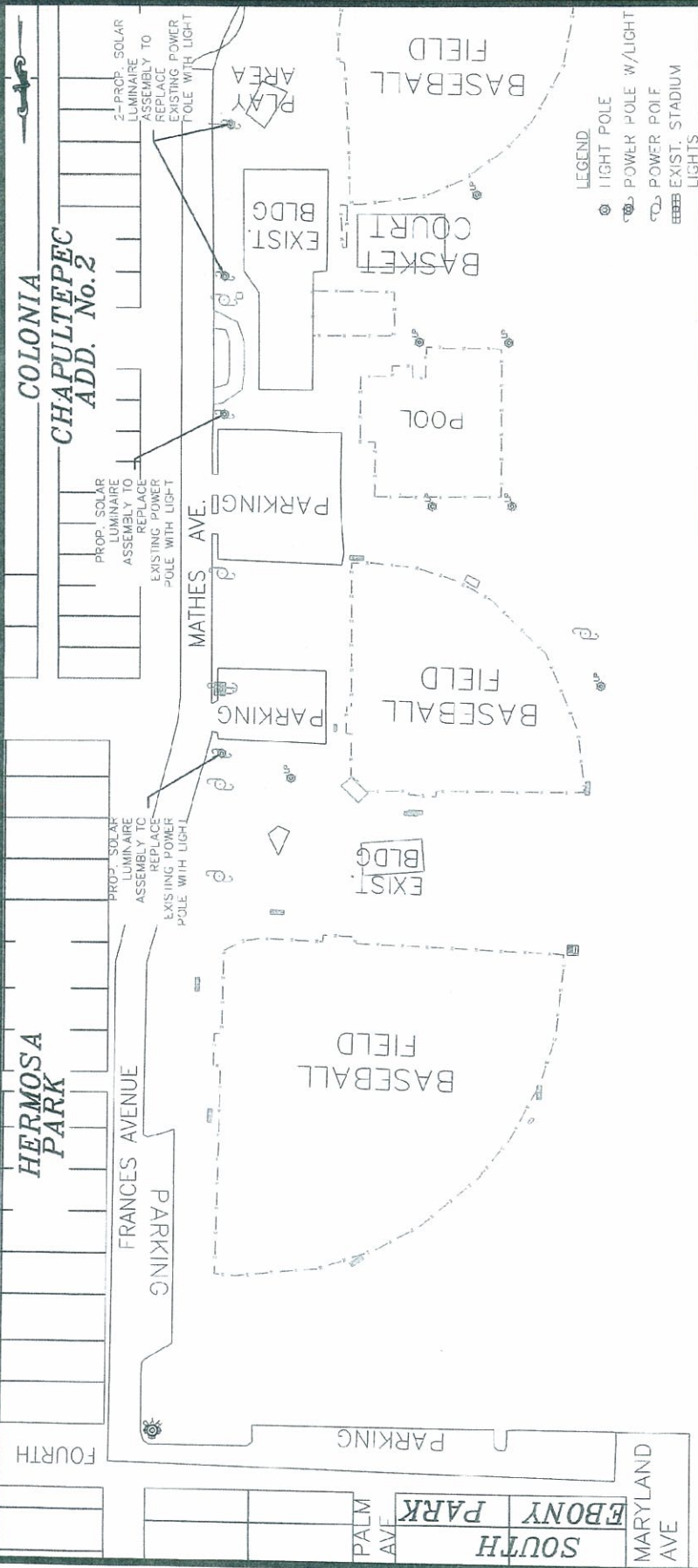
Planning & Engineering Services, Inc. 11/15/11. This drawing was created using AutoCAD 2011. All rights reserved. Printed by eplan@es.com.



**SUMMARY OF QUANTITIES**

DESCRIPTION	UNIT	QTY
FURNISH AND INSTALL SOLAR LIGHTING ASSEMBLIES (COMPLETE IN PLACE)	EA	4

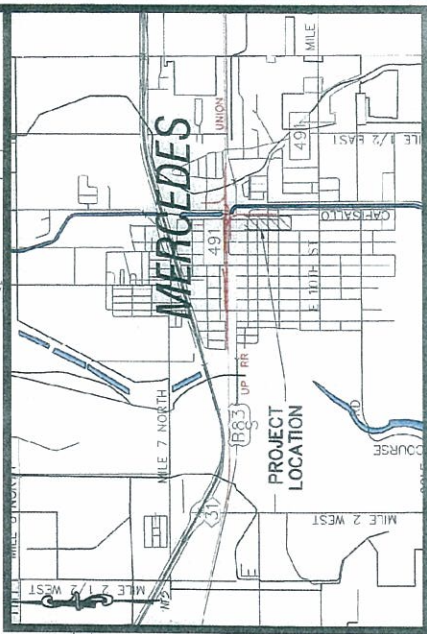
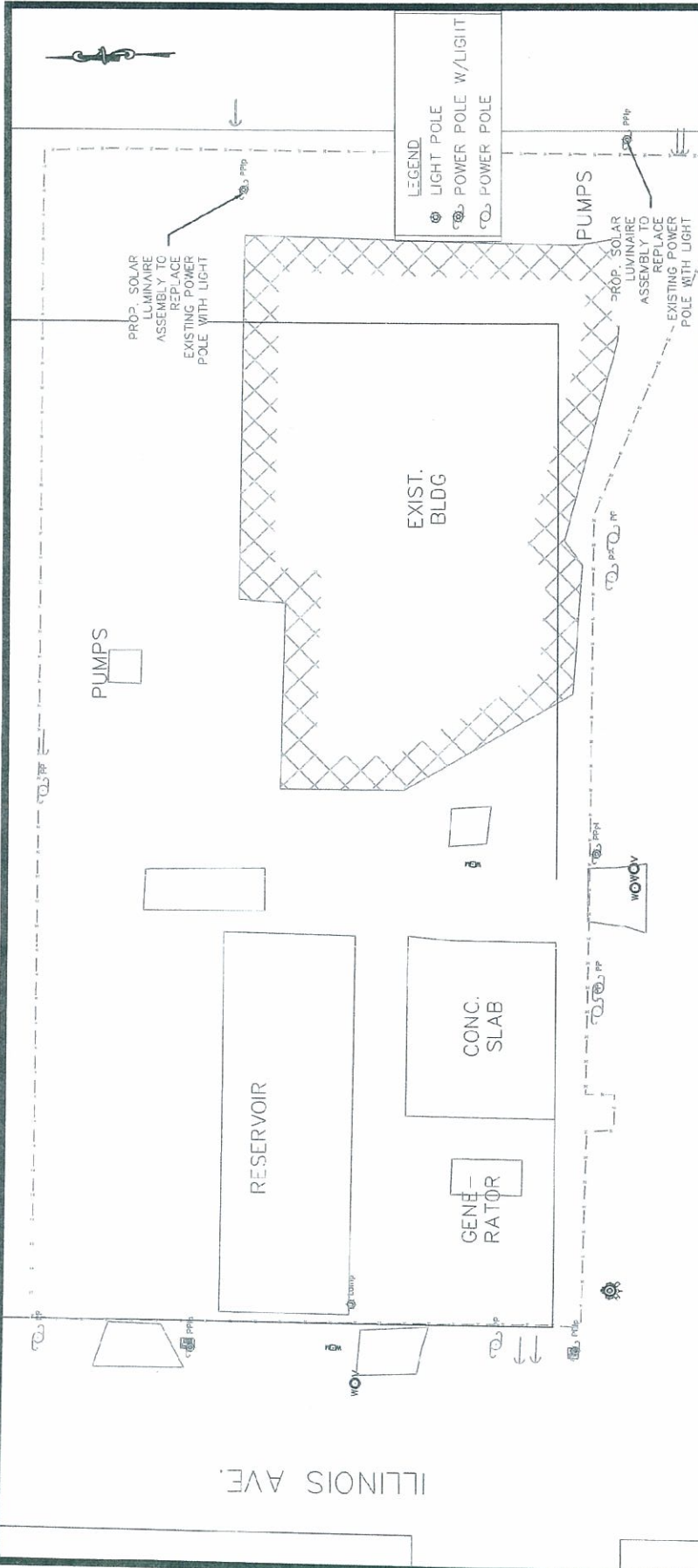
**NOTES:**  
 ALL LUMINAIRE ASSEMBLY LOCATIONS ARE TENTATIVE, THE CONTRACTOR SHALL DETERMINE THE OPTIMUM LOCATION BASED ON R.O.W. AVAILABILITY, FIELD CONDITIONS, AND MANUFACTURER'S RECOMMENDATIONS.  
 LUMINAIRE ADJUSTMENTS SUBJECT TO APPROVAL BY THE ENGINEER.  
 LUMINAIRE ARMS SHALL BE AIMED PERPENDICULAR TO THE CENTERLINE OF ROADWAY OR AS DIRECTED BY THE ENGINEER.  
 LUMINAIRE ASSEMBLY WILL BE INSTALL NEXT TO EXISTING SERVICE POLE WHEN LOCATED INSIDE ROW OR WHERE DETERMINE BY THE ENGINEER.



**SUMMARY OF QUANTITIES**

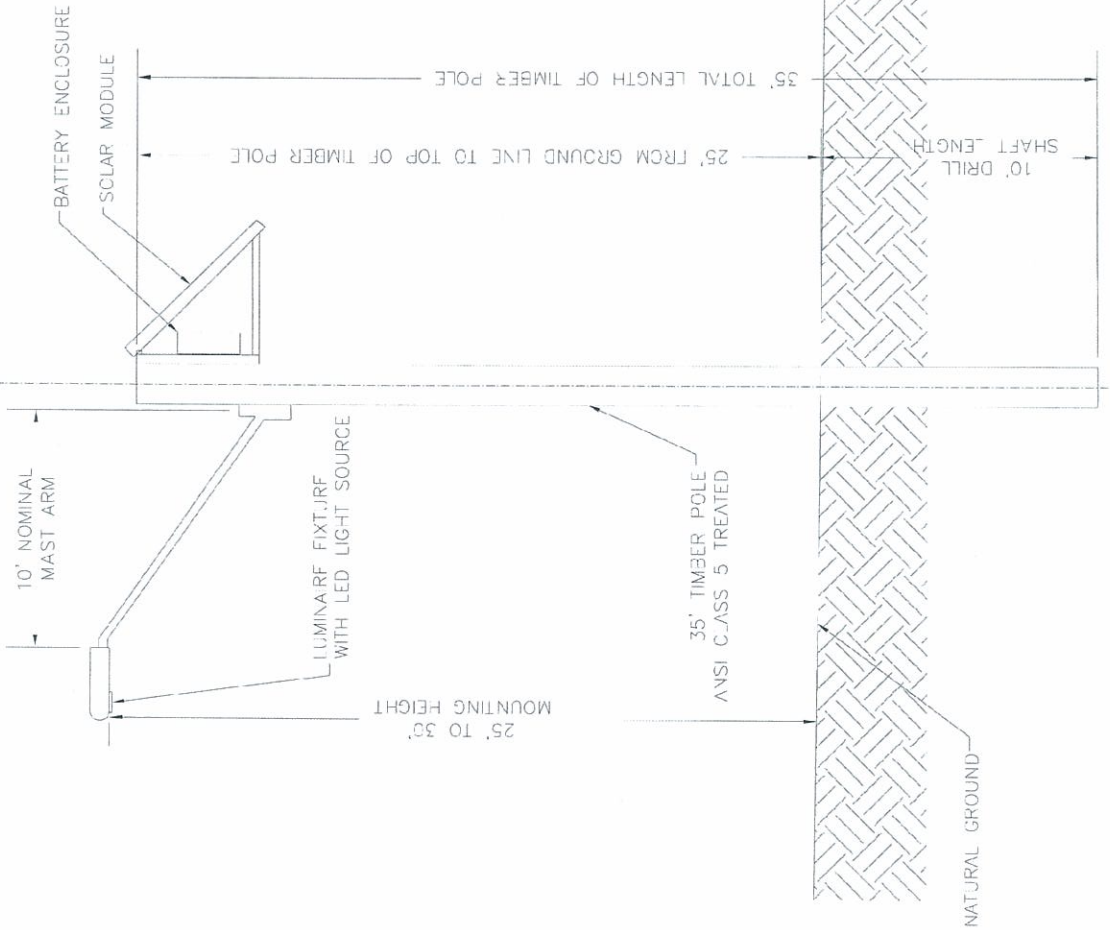
DESCRIPTION	UNIT	QTY
FURNISH AND INSTALL SOLAR LIGHTING ASSEMBLIES (COMPLETE IN PLACE)	EA	4

**NOTES:**  
 ALL LUMINAIRE ASSEMBLY LOCATIONS ARE TENTATIVE. THE CONTRACTOR SHALL DETERMINE THE OPTIMUM LOCATION BASED ON R.O.W. AVAILABILITY, FIELD CONDITIONS, AND MANUFACTURER'S RECOMMENDATIONS.  
 LUMINAIRE ADJUSTMENTS SUBJECT TO APPROVAL BY THE ENGINEER.  
 LUMINAIRE ARMS SHALL BE AIMED PERPENDICULAR TO THE CENTERLINE OF ROADWAY OR AS DIRECTED BY THE ENGINEER.  
 LUMINAIRE ASSEMBLY WILL BE INSTALLED NEXT TO EXISTING SERVICE POLE WHEN LOCATED INSIDE ROW OR WHERE DETERMINE BY THE ENGINEER.



SUMMARY OF QUANTITIES		
DESCRIPTION	UNIT	QTY
FURNISH AND INSTALL SOLAR LIGHTING ASSEMBLIES (COMPLETE IN PLACE)	EA	2

- SEQUENCE OF CONSTRUCTION**
1. CONTRACTOR TO DETERMINE OPTIMUM LOCATION OF LUMINAIRE ASSEMBLIES.
  2. ENGINEER TO REVIEW OPTIMUM LOCATION OF LUMINAIRE ASSEMBLIES AND DIRECTION OF LUMINAIRE ARMS.
  3. CONTRACTOR TO CALL FOR SPOTTING OF UTILITIES.
  4. STAKING OF R.O.W AND OR PROPERTY LINES.
  5. INSTALLATION OF LUMINAIRE ASSEMBLIES.



- GENERAL NOTES:**
1. THE CONTRACTOR SHALL INSTALL A FULLY OPERATIONAL SOLAR POWERED LUMINAIRE ASSEMBLY AT PROPOSED LOCATIONS.
  2. CONTRACTOR SHALL VERIFY ALL SOLAR MODULES ARE FREE OF ANY OBSTRUCTIONS AND ORIENTATE SOLAR PANELS FOR MAXIMUM SUN EXPOSURE.
  3. CONTRACTOR SHALL BE RESPONSIBLE TO CALL DIG TESS 48 HOURS PRIOR TO COMMENCEMENT OF WORK FOR UTILITY SPOTTING @ (1-800-DIG-TESS) AND CONTACT THE HIDALGO COUNTY IRRIGATION DISTRICT AND WATER SUPPLIERS FOR THE PROJECT AREA.
  4. CONTRACTOR SHALL STAKE R.O.W. AND OR PROPERTY LINE BY LOCATING PROPERTY PINS ON LOTS ADJACENT TO PROPOSED LUMINAIRE LOCATION.
  5. ALL WORK SHALL BE COMPLETED TO THE SATISFACTION OF THE HIDALGO COUNTY PRECINCT NO. 1
  6. ANY DAMAGES TO FENCES, WALKS, OR PRIVATE PROPERTY SHALL BE REPAIRED BY THE CONTRACTOR AT HIS EXPENSE.
  7. CONTRACTOR TO MAINTAIN ALL EQUIPMENT AND TRANSPORTATION OF SAID EQUIPMENT WITHIN THE RIGHT-OF-WAY OF THE CITY, COUNTY, OR STATE.
  8. THE CONTRACTOR SHALL BE RESPONSIBLE TO REPAIR ANY SURFACE IRREGULARITIES, AS DIRECTED BY THE ENGINEER, CAUSED BY THE CONTRACTOR'S WORKING OPERATIONS.
  9. THE CONTRACTOR SHALL CLEANUP AND RESTORE THE AREA OF OPERATIONS TO A CONDITION AS GOOD AS OR BETTER THAN THAT WHICH EXISTED PRIOR TO INSTALLATION OF ALL ITEMS TO BE CONSTRUCTED.
  10. THE PREPARATION OF THESE PLANS REFLECTS INFORMATION PROVIDED HEREON BY THE APPROXIMATE LOCATION AND EXISTENCE OF EXISTING PUBLIC AND PRIVATE UTILITY LINES AND ADJACENT PHYSICAL FEATURES. HOWEVER, THEY DO NOT IMPLY OR AFFIRM THAT ALL UTILITIES OR PHYSICAL FEATURES ARE SHOWN. GENERALLY, UTILITY SERVICE CONNECTIONS ARE NOT INDICATED ON THESE PLANS. CONTRACTOR SHALL BE RESPONSIBLE FOR NOTIFICATIONS OF THE OWNER IMMEDIATELY UPON ENCOUNTERING UNFORESEEN CONFLICTS.
  11. THE APPROXIMATE LOCATIONS OF KNOWN EXISTING PUBLIC AND PRIVATE UTILITIES ARE SHOWN. CONTRACTOR SHALL DETERMINE THE EXACT HORIZONTAL AND VERTICAL LOCATION OF ALL UTILITIES AND ADJACENT PHYSICAL FEATURES. CONTRACTOR TO BE FULLY RESPONSIBLE FOR DAMAGES WHICH MIGHT OCCUR BY HIS FAILURE TO EXACTLY LOCATE AND PRESERVE EXISTING UTILITIES

HIDALGO COUNTY PURCHASING DEPARTMENT  
**EXHIBIT "B"**

Hidalgo County Precinct No. 1  
**Solar Powered Lights- Phase II (EECBG)**  
 2012-065-MSS  
**PROPOSAL PAGE**

SAMPLE	Item No.	Estimated Quantity	Unit	Item Description	Unit Bid Price In Words	Unit Price In Figures	Total Extension In Figures
1	20	STA	Preparing ROW	Three Hundred Fifty	Dollars Cents	\$300.50	\$6,010.00

Item No.	Estimated Quantity	Unit	Item Description	Unit Bid Price In Words	Unit Price In Figures	Total Extension In Figures
1	40	EA	Solar Powered Light System including all incidental work and equipment to have the system operational.	Eight thousand one hundred Seventy Dollars AND Eight Cents	\$,172. <sup>08</sup>	326,883. <sup>24</sup>
AS PER CONTRACT No. <b>PROPOSAL TOTAL COST: \$ 326,883.20</b>						

COMPANY NAME: *Facility Solutions Group*

AUTHORIZED SIGNATURE: *[Signature]*

PRINTED NAME: *David Thomas*

TITLE: *Division Manager*

PHONE NUMBER: *361-882-5685*

E-MAIL ADDRESS: *David.Thomas@FSGI.COM*



Proposal and Specifications  
For Solar Lighting  
For Precinct # 1  
Buy Board Contract # 368-10  
Vin#383139 for the County of Hidalgo



*lighting > electrical > energy  
technology > signs*

J. Antonio Olivares  
Sales  
antonio.olivares@fsg.com

South Texas - Division > McAllen, TX >  
www.fsg.com > T 800-880-5685 > M 956.821.8648 > F 361-882-5691

# FACILITY SOLUTIONS GROUP

February 2, 2012

Joel Quintanilla  
Hidalgo County – Precinct 1  
Weslaco, Texas

Reference: Solar Lighting/Poles Installation Buy Board # 368-10 11% off list

Facility Solutions Group appreciates the opportunity to offer you a proposal to install SOL Lighting fixtures # SPM-300-3Q-CH-DOME-10' ARM-DTD on 37' direct burial ANSI 05.1 wood poles. These will be installed as specified by Hidalgo County.

(40) SOL # SPM-300-CH-DOME-10' ARM-DTD Solar light system ON 37'DIRECT BURIAL ANSI 05-1 WOOD POLE x \$ 6,605.58 EACH	= \$ 264,223.20
(40) 24.1 HOURS PER POLE LABOR INSTALLATION QUOTE PER POLE @ \$ 65.00 PER HOUR X \$ 1,566.50	= \$ 62,660.00

TOTAL PROJECT COST WILL BE \$ 326,883.20 NO TAX

\*\*\* NOTE- We are not in receipt of soil test reports or contingencies at proposed pole locations...This proposal is contingent on suitable soil test reports to facilitate the installation. If we had to slurry and or sleeve the holes for installation of the poor soil, the additional cost per pole would be \$ 490 per pole....most likely it would be minimal as this mainly occurs near the coast or where there is a high water table.

We are the selected vendor on the buyboard for SOL Lighting as well as an approved contractor for the installation of exterior lighting both listed under Reference number 368-10.

Thank you again for the opportunity to offer you this proposal and we look forward to working for you.

Sincerely,



Dave Thomas  
FSG Lighting



585 South Padre Island Drive > Corpus Christi, TX > 78405 > T 361-882-5685 > F 361-882-5691

## PM Series

PM systems features a fixed angle bracket that mounts on the side of a pole at a 45-degree angle



### SPECIFICATIONS

Panel Size	Dimensions Length x Width x Height	EPA @ 45 degrees (Effective Projected Area) Power Unit & Battery Box* (add fixture & arm below)	System Weight	Pole Tenon Size
80 watts	47.28" x 21.14" x 1.81"	5.0 sq. ft.	Approx. 145 lb.	Consult Factory
100 watts	48.69" x 26.06" x 1.81"	6.0 sq. ft.	Approx. 155 lb.	Consult Factory
125 watts	59.0" x 26.1" x 1.81"	8.0 sq. ft.	Approx. 160 lb.	Consult Factory
160 watts (2x80)	47.28" x 42.28" x 1.81"	10.0 sq. ft.	Approx. 215 lb.	Consult Factory
175 watts	62.2" x 31.8" x 1.5"	9.70 sq. ft.	Approx. 225 lb.	Consult Factory
250 watts (2x125)	59.0" x 52.2" x 1.81"	15.0 sq. ft.	Approx. 255 lb.	Consult Factory
320 watts (4x80)	47.28 x 84.56 x 1.81	20.0 sq. ft.	Approx. 455 lb.	Consult Factory
375 watts (3x125)	59.0 x 78.3 x 1.81	23.0 sq. ft.	Approx. 445 lb.	Consult Factory

Solar panel configurations may vary slightly by manufacturer.  
System weight may vary with number of fixtures and batteries.

### Fixtures and Arms Available for TPM Series

Cobrahead with 6 foot Universal Arm  
Shoebox with 6 foot Universal Arm or 2 foot Stub Arm



rev. 0810 VRK-TILT-PM-001

## PM Series

PM systems features a fixed angle bracket that mounts on the side of a pole at a 45-degree angle

SOL provides trouble-free lighting wherever it's needed including parking lots, paths, parks, perimeter security, fences, gates, remote areas, streets, private roads, driveways, docks, ramps, wildlife areas, jogging and bike paths.

### FEATURES

- The PM series features a totally integrated solar power module (SPM), which is mounted separately from the luminaire.
- The universal mounting bracket is mounted to the side of the pole at 45 degrees to optimize the capture of the sun's energy for a particular geographic location.
- Sol's intelligent lighting systems will measure battery levels at the start of every night to optimize LED performance. In periods of extended bad weather, the light dims to limit low voltage disconnect.
- Sturdy corrosive resistant aluminum and stainless steel hardware throughout.
- Maintenance free gel cell batteries.
- A typical minimum battery back-up of 5 days in case of inclement weather using Sol's intelligent lighting system.
- Standard model includes a Cobrahead or Shoebox fixture.
- System mounts on side of pole to standard pole – square, round, fiberglass, wood, steel, aluminum or concrete.
- Super efficient, bright, white light 5,500 K, state-of-the-art LED light source
- The most efficient and aesthetically pleasing white light source in this wattage range.
- Excellent color rendering optimizes human visual acuity and contrast, offering best in class night-time vision.
- "Instant-on" – no warm up or cold start issues.
- Unlike conventional lights, no risk of hazardous disposal – CF, CCFL, LPS and HPS contain mercury.
- Dark Sky compliant fixtures available - low light pollution outside of light distribution field.
- SOL's Patent Pending LED directed light provides a concentrated, uniform light pattern where it is needed, with no light pollution.
- LEDs rated at 70,000 hours (L-70).
- FivePlus™ Warranty includes 10 years on LED luminaire and electronics; 20 years on hardware and solar panel..



**Sol**<sup>®</sup>  
Reliable. Renewable. Remarkable.

### Cobrahead Dome Lens

Provides control of horizontal beam shape

#### FEATURES

Dome lens fits over cobrahead luminaire and is designed for outdoor lighting. The dome lens can be seen from afar.

Ideal for lower wattage roadway applications, including residential streets, parking lots, boat ramps, parks, and outside storage areas.

#### SPECIFICATIONS

Cobrahead luminaire design.

Engineered for use with SOL LED Quad Series light source.

Prismatic optics utilizing SOL Max-Lite® Reflector.

Die-cast aluminum with electrocoat gray paint finish.

Universal two-bolt slipfitter.

External paddle type stainless steel bail latch.

#### DATA

Approximate net weight: 11 lbs.

Overall Dimensions (L x W x H): 26" x 13-3/8" x 11-1/4"

**Finish:** Gray, UV protected.

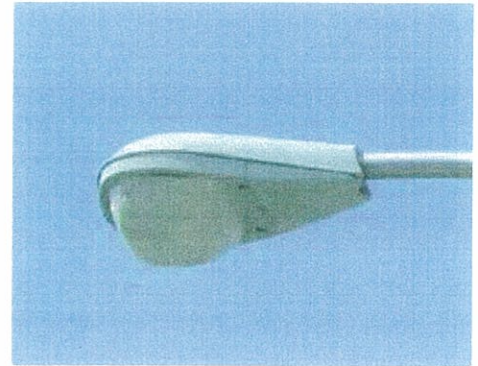
**Lens:** Lexan dome lens.

**Reflector:** High gloss Sol Max-Lite® reflector.

**Sealed Fixture:** Fully sealed, insect resistant.

**Fixture Housing:** Die-cast alloy aluminum.

**Suggested mounting height:** 12 to 30 feet.



**Sol**®

Reliable. Renewable. Remarkable.

rev. 0410 VRRKT COBRADOME-001

## ESA 400

Battery enclosure that holds up to four NRGLife™ gel cell batteries

### FEATURES

Made of Aluminum, can be powder-coated (four color choices). Optional custom powder-coating with any RAL color available.

Hinged locking front cover.

Holds up to four (4) NRGLife™ gel cell batteries.

### SPECIFICATIONS

Enclosure constructed of durable aluminum for corrosion resistance.

Vented to allow air circulation around batteries.

Easy access through removable front cover to allow quick servicing or battery replacement.

The enclosure holds up to 4 – NRGLife™ batteries requiring no maintenance.

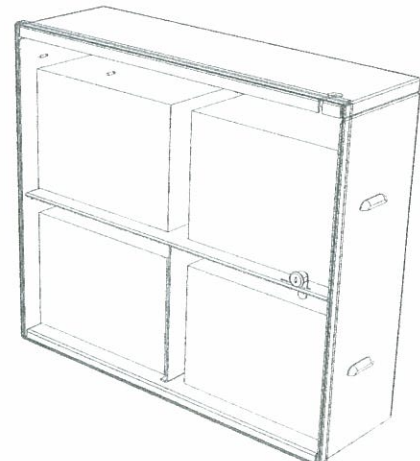
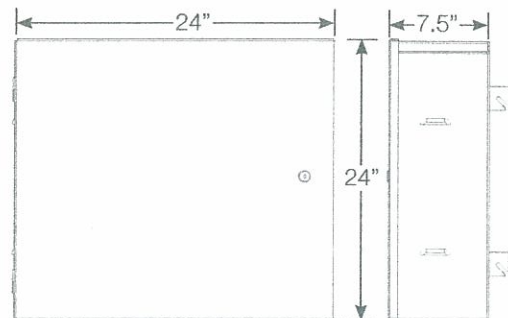
The enclosure is mounted on the main bracket and is shaded by the panels to avoid high heat.

Made in U.S.A.

### DATA

Weight: 28 pounds.

Effective projected area (EPA): 4.0 sq. ft.



**Sol**®

Reliable. Renewable. Remarkable.

rev. 0610 MKCF-SA400-011

## PM Mounting Bracket

Fixed angle bracket that mounts on the side of a pole at a 45 degree angle

### FEATURES

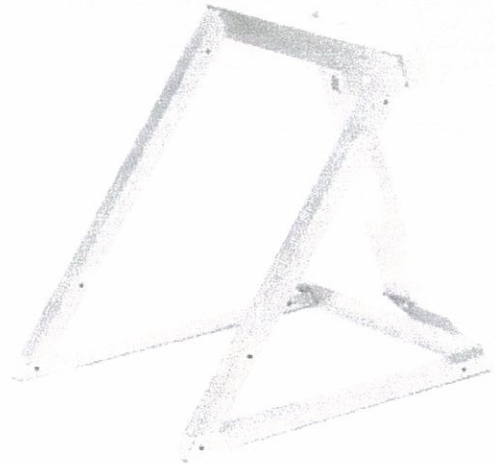
6063-T6 Aluminum

45 degrees or 15 degrees (dual angle)

Light weight

Standard wind load rating 90 MPH

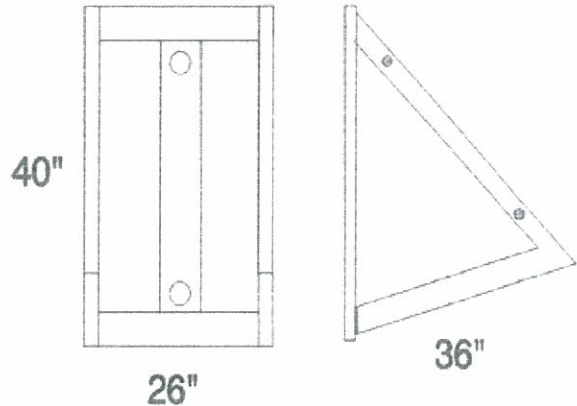
Optional high wind load brackets



### SPECIFICATIONS

Constructed of 2 inch Schedule 40 6063-T6 square aluminum tube with extruded aluminum channel.

"A" rated for corrosion resistance.



### DATA

Approximate net weight: 35 lbs.

Effective projected area (EPA): 2.1 sq. ft.

**Sol**<sup>®</sup>  
Reliable. Renewable. Remarkable.

rev. 0510 M3K1-1-MBRACKET-001

## SOL aiSUN™ Electronics Solar Light Controller / LED Driver SC300



### ADDITIONAL FEATURES

- Over Voltage Protection.
- LED Short Circuit Protection.
- Internal PV Disconnect (no external Diodes Required).
- Test button & Diagnostic LEDs.
- Reverse battery polarity protection.
- Self calibrating load, timing, and charging circuitry.

### TECHNICAL SPECIFICATIONS

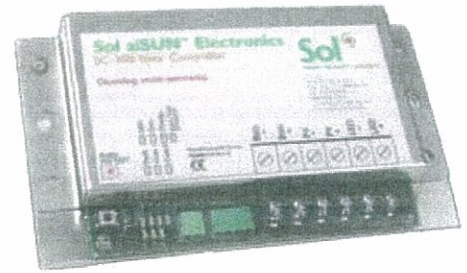
FEATURE	VALUE
<b>ELECTRICAL</b>	
Operating Voltage	12V / 24V nominal (self calibrating)
Operating Current	0-25A
LED Current	100 mA – 5.0 A
Low Voltage Disconnect	11.5 VDC, 23.0 VDC (12V/24V operation)
Charging	PWM with 3 stage for Gel and AGM batteries
LED Indicators	7 Diagnostic LEDs
Lamp Voltage	50 VDC Maximum
<b>PHYSICAL</b>	
Operating Temperature	-40F/-40C to 120F to 49C
Humidity	Up to 100%
Packaging	Aluminum
Weight	16 oz
Size (L x W x H)	6.75 x 3.75 x .88 (inches) / 171.45 x 95.25 x 22.35 (mm)

**Sol**®

Reliable. Renewable. Remarkable.

rev. 3510 MPKT-SOL-AISUN-0.1

### SOL aiSUN™ Electronics Solar Light Controller / LED Driver SC300



aiSUN™ is the Central Processing Unit of a solar light from Sol, Inc. Featuring advanced microprocessor control and a highly efficient design, aiSUN™ controls and monitors solar lights with more flexibility and capability than ever before.

aiSUN™ is an LED driver with an integrated solar charge controller. Capable of controlling and dimming one or two outdoor LED light systems, aiSUN™ is available in Sol, Inc's GreenWay™, TPM, SPM, TSL, Oasis™, and SL-Hurricane lighting systems.

#### KEY BENEFITS OF aiSUN™

- aiSUN's Multiple operating modes, light levels, and timing options ensure that Sol, Inc. can design, manufacture and deliver a solar light that works the way you want.
- Fully tested at the Sol, Inc. factory before installation and shipment to ensure reliable operation and trouble-free startup.
- Programmed by Sol, Inc. based on your projects requirements eliminating confusing and time-consuming switch and knob setting.
- Manufactured, designed, and supported in USA by SOL Inc.
- Integrated charging and LED driving system reduces system failures and reduces overall system complexity and cost.
- Integrated surge protection and noise reduction extending system life in even harsh environments.
- Temperature compensated and PWM controlled battery charging to ensure full battery life of 5 years.
- Auxiliary contact closure input seamlessly integrates manual control, motion detectors, or external control inputs.
- Full solid state design without electrolytic capacitors ensure 100,000 hour life for no maintenance control.
- Ten day/night memory averaging to ensure accurate turn on and turn off lights to prevent false response due to weather variations.
- 10 year warranty.

**Sol**®  
Reliable. Renewable. Remarkable

## SOL aiSUN™ Electronics Solar Light Controller / LED Driver SC300



### ADDITIONAL FEATURES

- Over Voltage Protection.
- LED Short Circuit Protection.
- Internal PV Disconnect (no external Diodes Required).
- Test button & Diagnostic LEDs.
- Reverse battery polarity protection.
- Self calibrating load, timing, and charging circuitry.

### TECHNICAL SPECIFICATIONS

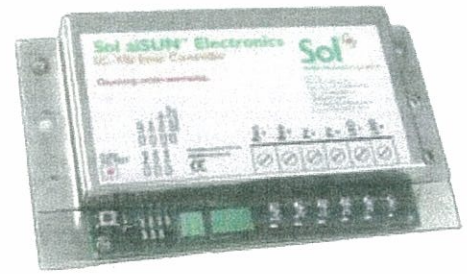
FEATURE	VALUE
<b>ELECTRICAL</b>	
Operating Voltage	12V / 24V nominal (self calibrating)
Operating Current	0-25A
LED Current	100 mA – 5.0 A
Low Voltage Disconnect	11.5 VDC, 23.0 VDC (12V/24V operation)
Charging	PWM with 3 stage for Gel and AGM batteries
LED Indicators	7 Diagnostic LEDs
Lamp Voltage	50 VDC Maximum
<b>PHYSICAL</b>	
Operating Temperature	-40F/-40C to 120F to 49C
Humidity	Up to 100%
Packaging	Aluminum
Weight	16 oz
Size (L x W x H)	6.75 x 3.75 x .88 (inches) / 171.45 x 95.25 x 22.35 (mm)



Reliable. Renewable. Remarkable.

rev. 7.510 MKT SOL AISUN 01.11

### SOL aiSUN™ Electronics Solar Light Controller / LED Driver SC300



aiSUN™ is the Central Processing Unit of a solar light from Sol, Inc. Featuring advanced microprocessor control and a highly efficient design, aiSUN™ controls and monitors solar lights with more flexibility and capability than ever before.

aiSUN™ is an LED driver with an integrated solar charge controller. Capable of controlling and dimming one or two outdoor LED light systems, aiSUN™ is available in Sol, Inc's GreenWay™, TPM, SPM, TSL, Oasys™, and SL-Hurricane lighting systems.

#### KEY BENEFITS OF aiSUN™

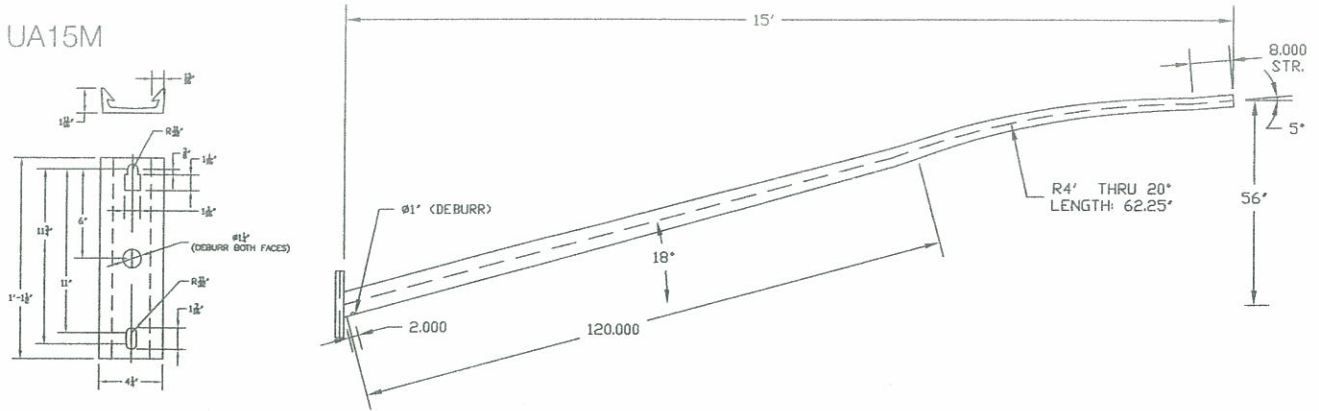
- aiSUN's Multiple operating modes, light levels, and timing options ensure that Sol, Inc. can design, manufacture and deliver a solar light that works the way you want.
- Fully tested at the Sol, Inc. factory before installation and shipment to ensure reliable operation and trouble-free startup.
- Programmed by Sol, Inc. based on your projects requirements eliminating confusing and time-consuming switch and knob setting.
- Manufactured, designed, and supported in USA by SOL Inc.
- Integrated charging and LED driving system reduces system failures and reduces overall system complexity and cost.
- Integrated surge protection and noise reduction extending system life in even harsh environments.
- Temperature compensated and PWM controlled battery charging to ensure full battery life of 5 years.
- Auxiliary contact closure input seamlessly integrates manual control, motion detectors, or external control inputs.
- Full solid state design without electrolytic capacitors ensure 100,000 hour life for no maintenance control.
- Ten day/night memory averaging to ensure accurate turn on and turn off lights to prevent false response due to weather variations.
- 10 year warranty.



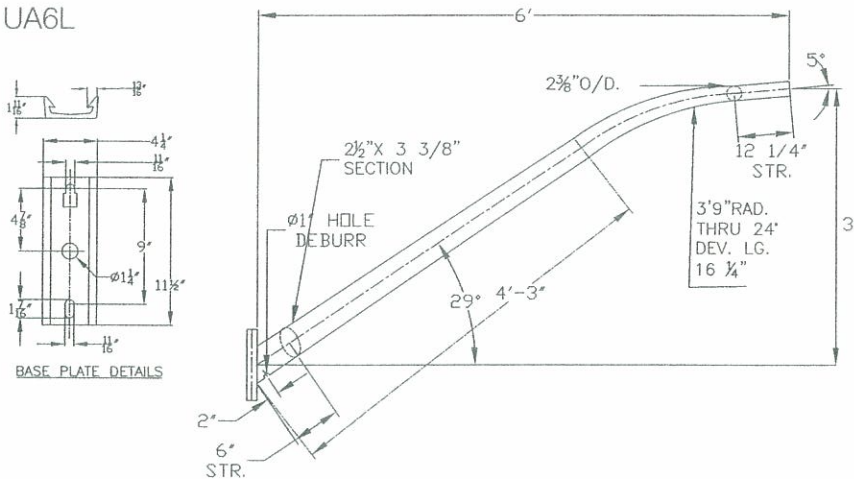
## Universal Mounting Arm

For TPM or PM Systems

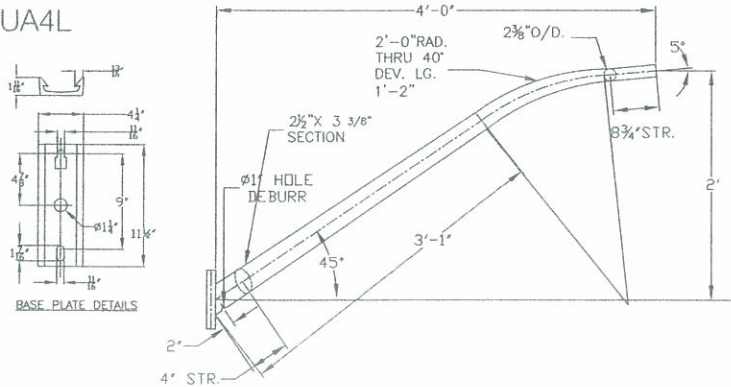
UA15M



UA6L



UA4L



**Sol**<sup>®</sup>  
 Reliable. Renewable. Remarkable.

rev. 0510 MRR-FUNIVLHSALAHM-001

## Universal Mounting Arm For TPM or PM Systems



### FEATURES

Mounting arm for shoebox and cobrahead fixtures used with TPM and PM systems.

For square and round pole mounting onto metal, wood and concrete - standard bracket used with 5/8" hardware.

For square or round fiberglass pole mounting - USS arm with 3/4" hardware.

Braces are not required.

### SPECIFICATIONS

Constructed of 2 inch Schedule 40 6063-T6 square aluminum tube with extruded aluminum channel.

Tapered elliptical satin finish.

Galvanized or Stainless Steel 3/4" bolt.

Also available in a D.O.T. approved series.

"A" Rated for corrosion resistance.

Manufactured to "ANSI C136.1".

### DATA

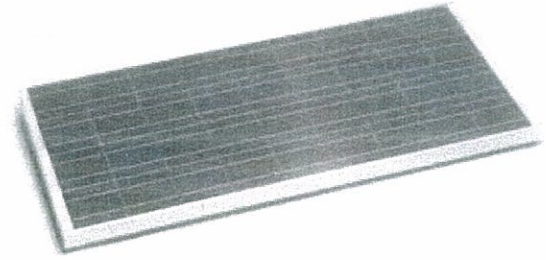
Catalog Number	Length	Rise	"C" (Degrees)	Wall Thickness	Tube Size (inches)	Bracket Weight (lbs)
UA4L	4'	2'	5°	0.125"	3"	8
UA6L	6'	3'	5°	0.125"	3"	11
UA10L	10'	46.5"	5°	0.125"	4"	23
UA6M	6'	3'	3-5°	0.125"	3.5"	16
UA8M	8'	4'	3-5°	0.125"	3.5"	20
UA10M	10'	5'	3-5°	0.154"	3.5"	26
UA12M	12'	5'	3-5°	0.154"	3.5"	30
UA15M	15'	4-8'	5°	0.188"	5"	52

All arms are supplied with Universal Aluminum Pole Plate.



**SPA 100**

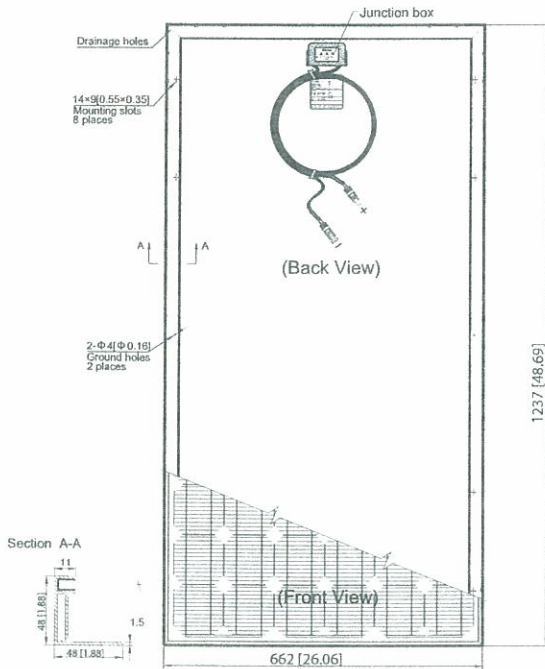
High Efficiency PV Module



**MECHANICAL SPECIFICATIONS**

Dimensions of module L x W x H	1237 mm x 662 mm x 48 mm (48.69" x 26.06" x 1.81")
Weight	11 kg (24.25 lbs.)
Cell	Poly-crystalline silicon solar cells 36 cells in a 4 x 9 matrix connected in series
Diodes	Three 10A, Schottky by-pass diodes included
Construction	Front: High-transmission 3.2mm tempered glass; Encapsulant: EVA Back: TPT
Frame	Clear anodized aluminum alloy; Color: silver

**MODULE DIAGRAM**



Note: mm[inch]

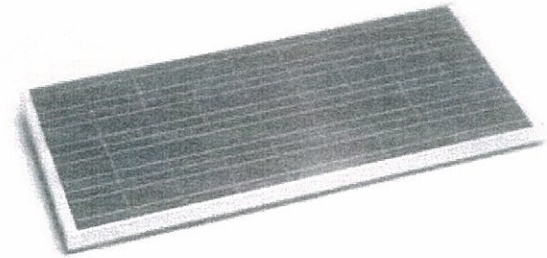


0909 MRKT-PVPANEL100-001

## SPA 100

### High Efficiency PV Module

Relying on Sol's stringent manufacturing standards and latest poly-crystalline PV technology, the module provides the highest possible energy output per watt. Conversion and exceptional low-light performance enable it to deal with the most challenging conditions of military, utility, residential and commercial installations.



### FEATURES

- Outstanding low-light performance.
- High transparent low-iron, tempered glass.
- All Aluminum anodized frame construction will not rust or corrode for long-lasting visual appeal.
- Withstands high wind-pressure and snow load.
- Unique technology ensures freezing and warping do not occur.
- Quick connect mounting hardware and wiring harness assists in fast and reliable installation.
- Design life of 25 years.
- 20 year module output limited warranty.

### ELECTRICAL SPECIFICATIONS

Maximum power at STC [Pmax]	100W
Power tolerance	± 5%
Nominal Voltage	18V
Voltage at Pmax [Vmp]	17.31V
Current at Pmax [Imp]	5.7A
Short-circuit current [Isc]	6.3A
Open-circuit voltage [Voc]	22.15V
Temperature coefficient of Isc	(0.065±0.005)%/ °C
Temperature coefficient of	-(80±10)mv/°C
Temperature coefficient of power	-(0.5±0.05)mv/°C
NOCT (Air 20°C; Sun 0.8kW/m <sup>2</sup> ; Wind 1m/s)	46°C ±2°C (114.8°F +2°F)
Operating temperature	-40°C to +85°C (-40°F to 185°F)
Maximum system voltage	1000V

**Sol**<sup>®</sup>  
Reliable. Renewable. Remarkable.

## NRGLife Gold™

12 Volts 100 Ah Gel Cell



### SPECIFICATIONS

Nominal Voltage		12 V	
Nominal Capacity		100aH	
Dimensions	Total Height	208 mm	8.19 inches
	(Inc. terminals)	----	n/a inches
	Length	305 mm	12.01 inches
	Width	168 mm	6.61 inches
Weight		28.4 kg	62.76 lbs

### CHARACTERISTICS

Capacity 20°C (68°F) To 1.7 volts	20 hour rate	89.9 Ah
	10 hour rate	80.05 Ah
	5 hour rate	56.5 Ah
	1 hour rate	36.6 Ah
	Internal Resistance	5 mOhms
Capacity correc- tion for Temperature Variations(C20)	40°C (104°F)	102%
	20°C (68°F)	100%
	0°C (32°F)	85%
	-15°C (5°F)	65%
Self-Discharge 20°C (68°F)	Capacity after 1 months storage	98%
	Capacity after 3 months storage	94%
	Capacity after 6 months storage	86%
Short Circuit Current 20°C (68°F)	2900 A	
Terminal	14mm bolt insert with M6 thread	
Charging (Constant Voltage)	Cyclic	2.35 - 2.40 VPC (20-25°C / 68-77°F)
	Float	2.27 - 2.30 VPC (15-25°C / 59-77°F)

**Sol**®

Reliable. Renewable. Remarkable.

rev. 0410 VPK NR3100-011

## NRGLife Gold™

12 Volts 100 Ah Gel Cell



### FEATURES

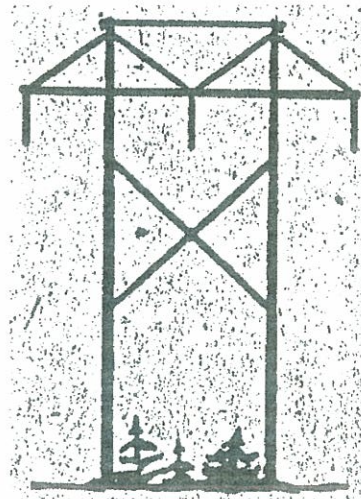
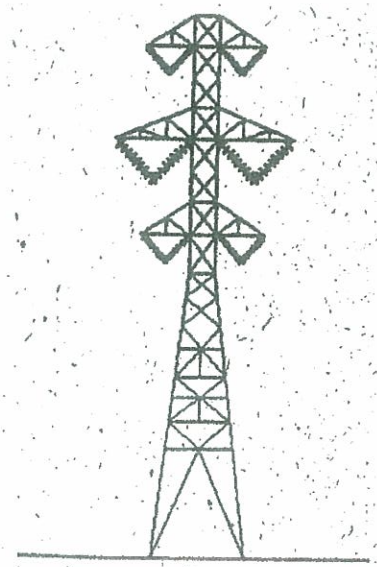
- 12 year design life for stand by power application
- Completely maintenance-free, sealed construction
- Analytical Grade electrolyte
- Spill proof / leak proof
- Valve regulated Max internal pressure 2.5 psi
- Multi-position usage (non-vertical)
- ABS Case and cover
- Low self discharge
- FAA and IATA approved as non-hazardous
- Built to comply with IEC 896-2, DIN 43534, BS 6290 Pt4, Eurobat
- UL recognized

### SPECIFICATIONS

Nominal Voltage	12 Volts
Nominal Capacity	100Ah (C20 @ 20°C / 68°F)
Design Life	12 Years
Operating Temperature	-20°C to 50°C (-4° to 122°F)
Separator	Microporous polymer
Active material	Very high purity lead
Case and cover	ABS (VO on request)
Electrolyte	Gelled Sulphuric acid Analytical grade purity
Venting Valve	EPDM Rubber 1.5 to 2 psi (10.5 - 14 KPa) release pressure. Resealing at 1psi (7 KPa)
Terminal	Epoxy sealed by extended mechanical paths
Model #	NRGLIFE-GD-100

**Sol**<sup>®</sup>  
Reliable. Renewable. Remarkable.

# 1997 Utility Pole Structures Conference and Trade Show



**November 6-7, 1997  
Nugget Hotel  
Reno / Sparks, Nevada**

**Co-sponsored by;  
Western Electric Power Institute  
Northwest Public Power Association**

J.J. Morrell, Oregon State University, Editor

# 1990 U.S. POLE PRODUCTION

US Forest Products Laboratory

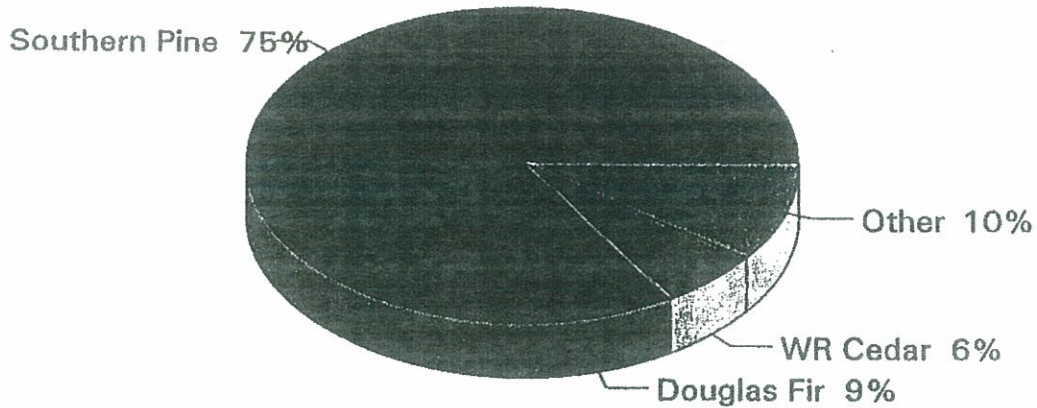


Figure 1. U.S. pole production by species. Figure based on number of poles in AWPA treating plant survey by Micklewright (17). WR is western redcedar.

## ANSI 05.1 – Material Requirements

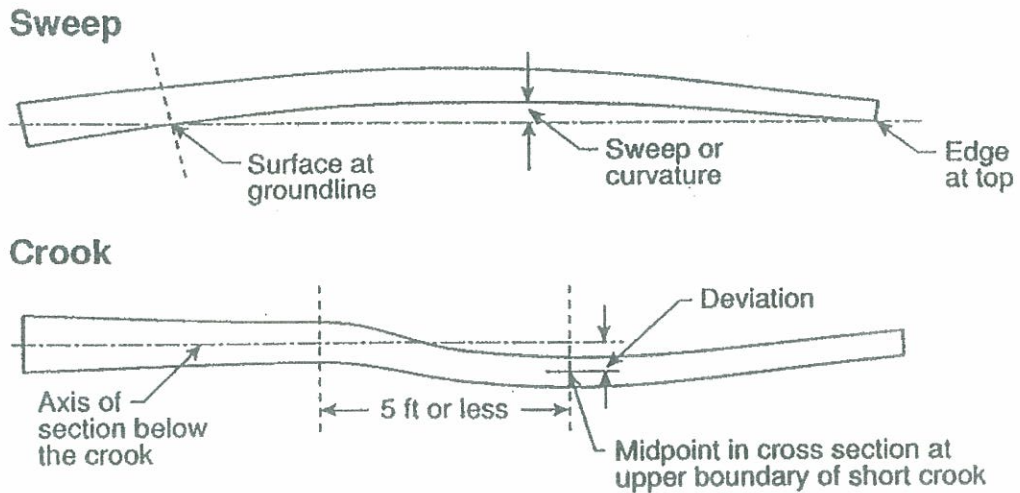


Figure 2. Pole shape limitations (1 ft - 0.3048 m).

Table 4. ANSI 05 Committee on wood poles.

Committee	Officer	Affiliation
Main committee	Russ Moody, Chair	USDA Forest Service, Forest Products Laboratory
	Alvin Lai, Secretary	Alliance for Telecommunications Industry Solutions
Subcommittee		
Material requirements	Colin McGowan, Chair	Thomasson Lumber Company
Fiber stress	Robert Kluge, Chair	Wisconsin Power and Light
Classification	Richard Leinfelder, Chair	McFarland Cascade
Crossarms	Robert Lash, Chair	Rural Utilities Services
Glulam	Steve Smith, Chair	Hughes Bros. Inc.
Structural composite lumber.	Bruce Craig, Chair	Trus-Joist McMillan

Table 5. Fiber stress for glulam and Douglas-fir solid-sawn crossarms

Product	Fiber stress (lb/in <sup>2</sup> )
Glulam	
2.5/8 to 6-3/4 inches wide, 3 to 15 inches deep	K = 2.9 <sup>a</sup>
Larger	K = 2.7 <sup>a</sup>
Douglas-fir, solid sawn	
ANSI 05.3 limitations, table 1	7,800
ANSI 05.3 limitations, table 2	7,400

<sup>a</sup>Fiber stress values obtained by multiplying design values in bending from AITC 117 (1) by this K factor.

Table 2. ANSI pole species by treatment group and corresponding fiber stress and taper values.

Treatment group	Fiber stress (lb/in <sup>2</sup> )	Circumference taper (inch/ft)
Group A (air seasoning)		
Cedar, western red	6,000	0.38
Cedar, yellow	7,400	0.20
Pine, ponderosa	6,000	0.29
Pine, jack	6,600	0.30
Pine, lodgepole	6,600	0.30
Pine, red	6,600	0.30
Douglas-fir (interior north)	8,000	0.21
Group B (Boulton drying)		
Douglas-fir, coast	8,000	0.21
larch, western	8,400	0.21
Group C (steam conditioning)		
Southern Pine <sup>a</sup>	8,000	0.25

<sup>a</sup>loblolly, longleaf, shortleaf, and slash pines.

Table 3. ANSI classification of wood poles

Pole class	Horizontal load (lb)	length range (ft)	Minimum tip circumference (inch)
H5	10,000	45-125	37
H4	8,700	40-125	35
H3	7,500	40-125	33
H2	6,400	35-125	31
H1	5,400	35-125	29
1	4,500	35-125	27
2	3,700	20-125	25
3	3,000	20-90	23
4	2,400	20-70	21
5	1,900	20-50	19
6	1,500	20-45	17
7	1,200	20-35	15
9	740	20-30	15
10	370	20-25	12

utility poles by the thermal process. ASTM D4064. ASTM, West Conshohocken, PA.

10. American Society for Testing and Materials. 1996. Standard specifications for round timber piles. Vol 4.09, ASTM D25-91. ASTM, West Conshohocken, PA.
11. American Society for Testing and Materials. 1996. Standard test methods of static tests of wood poles. Vol 4.09, ASTM D1036-96. ASTM, West Conshohocken, PA.
12. American Wood Preservers' Association. 1997. Poles—Preservative treatment by pressure process. AWWA C4-89. AWWA, Stevensville, MD.
12. Bodig, J. and R. Anthony. 1992. A strength grading concept for wood utility poles. *In* Proceedings of international conference on wood poles and piles, April 1992.
14. Electric Power Research Institute. 1985. Wood pole properties. Vol. 1. Background and southern pine data. EPRI EL-4109 Project 1352-2. Research Institute of Colorado, Ft. Collins, CO.
15. Electric Power Research Institute. 1986. Wood pole properties: Vol. 2. Douglas-fir data. Vol. 3. Western redcedar data and size effect. EPRI EL-4109 Project 1352-2. Research Institute of Colorado, Ft. Collins, CO.
16. Kressbach, J.N., L.R. Gjovik, and R.W. Wolfe. 1996. Metrification of pole standard. In Proceedings of second southeastern pole conference, Forest Products Society, Madison, WI.
17. Micklewright, J.T. 1992. Wood preservation statistics, 1990: A report to the wood-preserving industry in the United States. American Wood-Preservers' Association, Woodstock, MD.
18. Rural Electrician Administration. 1982. REA specifications for wood poles, stubs, and anchor logs. REA Bull. 44(2):345D351,
19. Wood, L.W. and L.J. Markwardt. 1965. Derivation of fiber stresses from strength values of wood poles. FPL Res. Pap. FPL-39. USDA Forest Serv., Forest Prod. Lab., Madison, WI.
20. Wood, L.W., E.C.O. Erickson, and A.W. Dohr, 1960. Strength and related properties of wood poles. Final report, ASTM wood pole research program. American Society for Testing and Materials, West Conshohocken, PA.

The Forest Products Laboratory is maintained in cooperation with the University of Wisconsin. This article was written and prepared by U.S. Government employees on official time, and it is therefore in the public domain and not subject to copyright.

Table 1. SI conversion factors.

English unit	Conversion factor	SI unit
inch	25.4	millimeters (mm)
foot (ft)	0.3048	meter (m)
pound (lb)	0.454	kilogram (kg)
pound per square inch (lb/in <sup>2</sup> )	6.894	Pascal (Pa)
temperature (°F)	(T <sub>F</sub> - 32)/1.8	°C

Douglas-fir and Southern Pine. This specification includes crossarm manufacturing, seasoning, quality limitations, treatment, marking, and storage. The latest edition includes a fiber stress value for Douglas-fir crossarms (Table 5). Efforts are underway to obtain data on Southern Pine crossarms as well.

Both ANSI 05.2 and 05.3 include procedures for determining fiber stress values for crossarms based on testing of the product. This permits the use of crossarms of various species of either solid-sawn or glulam timber. An ANSI 05 subcommittee has also been considering the technical feasibility of incorporating nondestructive evaluation (NDE) methods in the pole stress grading process. The major challenge in applying this concept is determining how it would be compatible with established utility pole markets.

### ***Metric Units Policy***

The ANSI policy on metric units is that "units of the International Systems of Units (SI) are the preferred units of measurement in American National Standards." Other standards-writing organizations such as ASTM are making concerted efforts to produce future standards in metric units and to produce dual metric/English units for existing standards. Kressbach et al. (16) have proposed several significant changes leading to metric conversion of ANSI 05.1. These changes include reducing the number of ANSI classes from 15 to 10 as well as a number of simplifications for the derivation of pole sizes. The ANSI 05 committee considered this proposal but voted not to make any changes at this time. The preferred method expressed by the Committee is to include metric equivalents in the text of the standards and include separate tables with metric units to accompany the present tables.

### ***Technology Transfer***

The ANSI 05 committee is trying to make it easier for people to communicate their concerns about the production and use of wood poles. The material requirements subcommittee is compiling a manual that depicts permitted as well as restricted wood pole characteristics. This manual will provide color photographs that should be helpful in explaining characteristics described with jargon such as bark inclusions, cat face, juvenile wood, firm red heart, and dead streaks. The Committee sponsor, ATIS, has also

developed a World Wide Web page that includes meetings schedules and minutes of the annual meetings. The Web address is

<http://www.atis.org/atIS/05/05hom.htm>

### ***Literature Cited***

1. American Institute of Timber Construction. 1993. Standard specification for glued laminated timber of softwood species. AITC-117-93-Design. AITC, Englewood, CO.
2. American National Standards Institute. 1992. Wood poles, specifications, and dimensions. ANSI 05.1. ANSI, New York.
3. American National Standards Institute. 1993. National electric safety code. ANSI C2. ANSI, New York.
4. American National Standards Institute. 1995. Solid sawn-wood crossarms and braces—specifications and dimensions. ANSI 05.3. ANSI, New York.
5. American National Standards Institute. 1996. Structural glued laminated timber for utility structures. ANSI 05.2. ANSI, New York.
6. American Society of Agricultural Engineers. 1996. Design properties of round, sawn, and laminated preservative-treated construction poles. ASAE EP388, Agricultural Engineers Handbook. ASAE, St. Joseph, MI.
7. American Society for Testing and Materials. 1996. Standard methods for establishing design stresses for round timber piles. Vol. 4.09, ASTM D2899. ASTM, West Conshohocken, PA.
8. American Society for Testing and Materials. 1996. Standard specification and methods for establishing recommended design stresses for round timber construction poles. Vol. 4.09, ASTM D3200. ASTM, West Conshohocken, PA.
9. American Society for Testing and Materials. 1996. Standard practice for preservative treatment of

actual top of the pole. As a result of the combined effects of in-service drying and pole taper, the reduction in size from required minimum (measured in green condition) to actual tip circumference could be as much as 1.25 inches, which is equivalent to about 0.4 inch in diameter. This is important in that tip diameter is used as the basis for the design of utility hardware. However, since such hardware can tolerate a 0.5-inch variation in pole diameter, this interpretation should not cause a design problem.

### **Other Pole Standards**

As mentioned earlier, a number of committees maintain standards that are specifically focused on the structural use of round timbers. These include ASTM, ASAE, and REA standards.

**ASTM Standard:** Three ASTM standards are related to wood poles. The main standard, designated D3200 (8), refers to two other standards: ASTM D25, Specifications for Round Timber Piles (10) and ASTM D2899, Establishing Design Stresses for Round Timber Piles (7). Specifications for round timber piles also apply to poles with the exception that poles are selected on the basis of butt circumference, whereas the table in ASTM D25 is set up to specify a minimum tip circumference for piles. ASTM D3200 provides a table of specified tip Circumference values for corresponding minimum butt circumference values. ASTM D2899 provides equations for deriving design stresses for poles or piles on the basis of clear wood strength and material variability.

**ASAE Standard:** The ASAE standard EP388 (6) references ANSI 05.1, AWPA, and ASTM standards. Material manufacturing and pole dimension requirements reference the ANSI standard, and the derivation of design stresses follows ASTM recommendations. The ASAE standard provides a basis for specifying and using poles in agricultural pole-frame buildings. This standard is currently under revision. Once approved, a new standard will be issued as EP560, which will no longer include glued- and mechanically laminated posts, but concentrate only on round wood construction poles.

**REA Standard:** The REA specifications for wood poles, stubs, and anchor logs (18) describe the minimum acceptable quality of poles purchased by REA borrowers. Material requirements designated by this

standard are extracted from ANSI 05. The primary differences between this standard and the ANSI standard are the pole framing details and the designation of treating time and temperatures.

### **ANSI 05 Wood Pole Committee**

The American National Standards Institute's Wood Pole Committee (ANSI 05) was originally organized in 1924. The committee is currently under the sponsorship of the Alliance for Telecommunications Industry Solutions (ATIS), and it consists of about 30 voting members, representing a balance of pole users, producers, and general interests to provide some assurance that all interests are considered. Members meet annually to review and update the following three standards of interest to the utility pole industry: ANSI 05.1—Wood Poles, Specifications and Dimensions (2), ANSI 05.2—Structural Glued Laminated Timber for Utility Structures (5), ANSI 05.3—Solid Sawn Wood Crossarms and Braces (4).

The ANSI 05 Committee meetings are open to anyone who wishes to express a concern related to the content or application of the standards. Discussion items are generally referred to one of six subcommittees (Table 4). The subcommittees on material requirements, fiber stress, and classification relate to the 05.1 standard. The structural composite lumber subcommittee is developing a new standard. Non-voting members may express concerns at meetings or by contacting the appropriate subcommittee chairman (Table 4).

### **Related Activities**

In addition to the standard specification on wood poles, the ANSI 05 committee is responsible for standards in glulam timber and wood crossarms. The ANSI standard on glued-laminated (glulam) utility structures (05.2) covers requirements for manufacturing and quality control of structural glulam timber of Douglas-fir and Southern Pine for electric power and communication structures. The latest edition of this standard includes a procedure for obtaining fiber stress values for glulam members based on design values published by the glulam industry.

The ANSI standard for solid-sawn wood crossarms and braces (05.3) includes material specifications for

bulb depression is that the total time at the high temperature will be reduced, lessening the chance for high-temperature strength reduction. There is some question, however, as to the effect of faster drying on the quality of the pole and the strength of surface fibers that are subject to these higher temperatures.

Steam conditioning is primarily used for southern pines (Table 3, treatment group C). Temperatures during this process should be kept below 245°F and steaming time held to under 17 h for poles with a circumference 137.5 inches at 6 ft from the butt. For a circumference > 37.5 inches at this distance from the butt, the steaming limit is 20 h. When Douglas-fir and western larch poles are to be treated with waterborne preservative and have not been Boulton dried, ANSI permits steam conditioning at temperatures not to exceed 240°F for 0 h provided that the initial moisture content does not exceed 25% at 2 inches from the surface. This is a slight deviation from the AWPA C4 standard, which limits steaming temperature to 225°F for 15 h.

### Marking

Identification markings are used by utilities for maintenance and life-cycle cost records. The ANSI standard requires that these markings include the following information:

- supplier's code or trademark
- plant and year of treatment
- pole species and preservative used
- circumference class and length

In addition to this information, the standard requires that the poles be marked at a set distance from the butt to ensure that the marking can be read easily after the pole is placed in service. Marking on poles  $\leq 50$  ft long must be located  $10 \text{ ft} \pm 2$  inches from the butt end. For poles  $\geq 55$  ft, the marking is located  $14 \text{ ft} \pm 2$  inches from the butt end.

### Storage

Pole suppliers will normally maintain an inventory of poles in the more popular sizes, and pole users often keep a supply of poles for emergency use. It is

important to store these poles properly to prevent any deterioration prior to use. The ANSI standard specifies adequate structural support above ground and provides guidelines for handling to minimize mechanical damage.

### Classification

The ANSI 05.1 classification system is based on pole load capacity. This system treats all poles that meet the acceptance criteria as a single grade in which strength varies only with species. Poles are classified only by the size needed to meet preset load capacity requirements for the target pole class.

Fiber stresses listed by ANSI for domestic species vary from 4,000 to 8,400 lb/in<sup>2</sup>. Table 2 lists ANSI values for the more popular pole species. These fiber stress values approximate average pole strength and are much higher than the design values that engineers use for buildings and bridges. These fiber stress values are used to determine pole class sizes for each species, and they are intended to be used with recommendations included in the ANSI C2 standard (National Electric Safety Code (NESC)) for the design of utility pole structures. Table 3 lists the 15 ANSI pole classes and their respective required load capacity, length range, and minimum tip circumference.

Minimum circumference 6 ft from the butt listed in the ANSI 05.1 standard is derived to assure that each pole has the groundline bending moment capacity required to carry its pole class load. As groundline distances vary with pole length, required circumferences are translated to a location 6 ft from the butt to facilitate pole classification. The translation from "groundline" to 6 ft assumes a linear circumference taper (Table 2).

The ANSI minimum tip circumference measurement has been a topic of discussion because of some possible confusion in interpreting the standard. The standard allows pole length to vary: poles < 50 ft long can be shorter by 3 inches or longer by 6 inches; poles  $\geq 50$  ft long can be 3 inches shorter or 12 inches longer. The top dimension requirement has been interpreted as being applicable to the "minimum length permitted" which is at a location either 3 or 6 inches less than the nominal length. This means that for a long ( $\geq 50$  ft) pole that is 12 inches longer than the specified length, the minimum tip circumference for the pole class may be measured as far as 10 inches below the

the outer 2- to 3-inches of the pole diameter could significantly affect bending strength and are therefore limited. Defects permitted by the ANSI standard include bark inclusions <2 inches deep; insect damage consisting of holes < 1/16 inch in diameter, surface scoring, or channeling; firm red heart not accompanied by decay; and hollowing in the butt (if < 10% of the butt cross-section) caused by splinter pulling when the tree is felled. Shake is permitted within limits considered to have minimal impact on strength; however, if shake occurs at the top of the pole, the ANSI 05.1 standard requires treatment of the full length of the pole. Decay is generally permitted only in very specific instances, such as hollow pith centers in poles to be treated full length. Any holes, hollow portions, or dead streaks indicative of incipient decay are prohibited.

Processing defects include splits, checks, and mechanical damage caused by mishandling. Splits and checks are an unavoidable consequence of drying round timbers. These defects rarely have a significant effect on the strength of the pole, but they do provide openings for decay and insect access to poorly treated heartwood. Splits can also cause problems for hardware connections. Generally, the ANSI 05.1 standard limits the length of splits to 12 inches when they extend from the pole top and 24 inches when extended upward from the butt. Visible damage, such as 1/4-inch-deep indentations resulting from handling slings or forklift tines, indicates that the damage may be more than superficial surface scarring and is also limited by the ANSI 05.1 acceptance criteria. Surface cuts caused by a chainsaw may be tolerated provided the reduced section still meets the required circumference for the pole class.

Manufacturing requirements are established to minimize any strength loss during the tree-to-pole conversion process and to maximize effectiveness of subsequent preservative treatment to extend the expected service life. Aspects of the manufacturing process covered by ANSI include whole tree processing, conditioning, brand marking, and storage.

Whole-tree processing involves a number of steps that affect the grading and service life of the pole. Poles must be cut to length so that they can be measured easily and properly classified. Bark removal/shaving should remove all inner bark but leave sufficient sapwood to obtain the customer's minimum requirement for preservative penetration. Finally,

proper trimming of branch stubs and overgrown knots that rise >1 inch from the surface facilitates handling.

### **Conditioning**

Proper conditioning is important for both the strength and handling of wood poles. In many cases, however, conditioning involves exposure of the pole to high temperatures for purposes of drying, sterilization, and preservative treatment. Because of differences in drying characteristics of different species and the fact that high-temperature exposure for extended periods results in wood strength loss, conditioning methods involving high temperatures cannot be applied generically. The ANSI 05.1 standard lists species by treatment group (Table 2) with designated limitations on pre- and post-treatment conditioning to address these differences. The standard includes requirements for air seasoning, Boulton drying, and kiln drying to facilitate handling and improve durability at minimal cost to pole strength. These requirements generally correspond to those given in the American Wood Preservers' Association (AWPA) standard C4.

Air seasoning is required for treatment group A (Table 2) and is permitted for all species except ponderosa pine. Pre or post-steaming is permitted for up to 4 h at 240°F. For ponderosa pine with <25% moisture content 2.5 inches from the surface, steaming may continue for 6 h.

Boulton drying is to be used with coastal Douglas-fir and western larch (treatment group B). This method should not exceed 220°F in any pretreatment process. After treatment, the poles may be steamed at temperatures not to exceed 240°F for 4 h.

Kiln drying of poles is a topic of some controversy. Some kiln operators feel increasing dry-bulb temperatures, wet-bulb depression, and airflow allows poles to tolerate faster drying. At present, dry-bulb temperature is limited to 170°F for ponderosa pine, red pine, and jack pine, and to 160°F for western redcedar. At these temperatures, ANSI recommends that the wet-bulb depression not exceed 50°F.

For Southern Pine, lodgepole pine, Douglas-fir, and larch, ANSI permits dry-bulb temperatures  $\leq$  230°F. For temperatures > 200°F, wet-bulb depression is required to exceed 50°F. The philosophy behind acceptance of higher temperature with a greater wet-

the outer 2- to 3-inches of the pole diameter could significantly affect bending strength and are therefore limited. Defects permitted by the ANSI standard include bark inclusions <2 inches deep; insect damage consisting of holes < 1/16 inch in diameter, surface scoring, or channeling; firm red heart not accompanied by decay; and hollowing in the butt (if < 10% of the butt cross-section) caused by splinter pulling when the tree is felled. Shake is permitted within limits considered to have minimal impact on strength; however, if shake occurs at the top of the pole, the ANSI 05.1 standard requires treatment of the full length of the pole. Decay is generally permitted only in very specific instances, such as hollow pith centers in poles to be treated full length. Any holes, hollow portions, or dead streaks indicative of incipient decay are prohibited.

Processing defects include splits, checks, and mechanical damage caused by mishandling. Splits and checks are an unavoidable consequence of drying round timbers. These defects rarely have a significant effect on the strength of the pole, but they do provide openings for decay and insect access to poorly treated heartwood. Splits can also cause problems for hardware connections. Generally, the ANSI 05.1 standard limits the length of splits to 12 inches when they extend from the pole top and 24 inches when extended upward from the butt. Visible damage, such as 1/4-inch-deep indentations resulting from handling slings or forklift tines, indicates that the damage may be more than superficial surface scarring and is also limited by the ANSI 05.1 acceptance criteria. Surface cuts caused by a chainsaw may be tolerated provided the reduced section still meets the required circumference for the pole class.

Manufacturing requirements are established to minimize any strength loss during the tree-to-pole conversion process and to maximize effectiveness of subsequent preservative treatment to extend the expected service life. Aspects of the manufacturing process covered by ANSI include whole tree processing, conditioning, brand marking, and storage.

Whole-tree processing involves a number of steps that affect the grading and service life of the pole. Poles must be cut to length so that they can be measured easily and properly classified. Bark removal/shaving should remove all inner bark but leave sufficient sapwood to obtain the customer's minimum requirement for preservative penetration. Finally,

proper trimming of branch stubs and overgrown knots that rise >1 inch from the surface facilitates handling.

### Conditioning

Proper conditioning is important for both the strength and handling of wood poles. In many cases, however, conditioning involves exposure of the pole to high temperatures for purposes of drying, sterilization, and preservative treatment. Because of differences in drying characteristics of different species and the fact that high-temperature exposure for extended periods results in wood strength loss, conditioning methods involving high temperatures cannot be applied generically. The ANSI 05.1 standard lists species by treatment group (Table 2) with designated limitations on pre- and post-treatment conditioning to address these differences. The standard includes requirements for air seasoning, Boulton drying, and kiln drying to facilitate handling and improve durability at minimal cost to pole strength. These requirements generally correspond to those given in the American Wood Preservers' Association (AWPA) standard C4.

Air seasoning is required for treatment group A (Table 2) and is permitted for all species except ponderosa pine. Pre or post-steaming is permitted for up to 4 h at 240°F. For ponderosa pine with <25% moisture content 2.5 inches from the surface, steaming may continue for 6 h.

Boulton drying is to be used with coastal Douglas-fir and western larch (treatment group B). This method should not exceed 220°F in any pretreatment process. After treatment, the poles may be steamed at temperatures not to exceed 240°F for 4 h.

Kiln drying of poles is a topic of some controversy. Some kiln operators feel increasing dry-bulb temperatures, wet-bulb depression, and airflow allows poles to tolerate faster drying. At present, dry-bulb temperature is limited to 170°F for ponderosa pine, red pine, and jack pine, and to 160°F for western redcedar. At these temperatures, ANSI recommends that the wet-bulb depression not exceed 50°F.

For Southern Pine, lodgepole pine, Douglas-fir, and larch, ANSI permits dry-bulb temperatures  $\leq$  230°F. For temperatures > 200°F, wet-bulb depression is required to exceed 50°F. The philosophy behind acceptance of higher temperature with a greater wet-

An important consideration in the use of different species for poles is availability. Availability means more than just the number of trees that are currently growing. To be used for poles, trees must have certain growth characteristics such as appropriate size, straightness, few large branches, and generally straight grain. Many of these properties are determined by the environment in which the tree grows rather than by genetics. Trees grown in tight stands normally grow straight and tall with few large branches, as a result of the competition for sunlight. Softwoods do much better at growing in tight single-species stands than do hardwoods and thus are likely to yield a higher percentage of "pole trees" in a given stand. Another factor that plays an important role in the acceptability of a species for structural pole applications is its ability to accept and retain chemical preservatives.

There are currently no provisions in the ANSI standards for specifying foreign species in pole classes. A task committee on foreign species within the ANSI 05 Committee developed a proposed set of requirements and procedures that were verbally approved at the Committee's 1997 meeting. This procedure is presently in the balloting process and, if approved, could become a mandatory appendix to ANSI 05.1. Proposed requirements include an evaluation of pole strength using the ASTM D1036 Static Test of Wood Poles (11) or an equivalent method. As the data are reviewed and species are approved, other species may be added to the ANSI 05.1 standard.

### Grading

The ANSI specification provides criteria for pole acceptance in four basic categories: pole shape, growth characteristics, naturally occurring defects, and processing defects. Unlike the standards for many other wood products, only one stress-graded standard is provided for poles. To qualify for the ANSI 05 designated stress classification, all poles must meet the minimum set of acceptance criteria.

**Pole shape considerations** include pole sweep and crook (Fig. 2). Sweep in one plane and one direction is limited to 1 inch from a straight line for every 10 A of length surveyed (see Table 1 for SI conversion factors). For short poles ( $\approx 50$  ft), 10% in a given lot may have a sweep deviation from a straight line of 1 inch in 6 ft; for long poles ( $\geq 55$  ft), 25% in a given lot may have this sweep deviation. For sweep in two directions and one plane (reverse sweep) or two planes (double

sweep), a straight line joining the center of the pole at groundline with the center of the top is not allowed to pass through the outer surface of the pole at any intermediate point.

**Growth characteristics** include knots, slope of grain, rate of growth, and compression wood. To set knot size limitations, poles are separated into length categories of  $\leq 45$  ft and  $\geq 50$  ft. Individual knot size limits also vary within a single pole. As one might expect, larger poles are permitted to have larger knots. What might not be quite so intuitive is the fact that a larger single knot is permitted in the upper half of the pole. Average wood strength and cross-section decrease with height in a tree. In the cantilever applications characteristic of most pole structures, the stress in the pole drops off more rapidly than the combined effects of wood strength and section property. With no change in section property, the stress at midheight would be expected to be half that at the groundline. Pole taper, however, is normally so small that at midheight the stress rarely exceeds 60% of that at the butt. If we assume a linear reduction in ultimate fiber stress to the point that tip fibers are half as strong as groundline fibers, midheight wood strength would be 75% of that at groundline. This suggests that at midheight, the pole strength/stress ratio is 25% greater than that at groundline.

For many pole species, knots occur in "clusters" or "whirls." For these cases, limits are set on the sum of diameters as measured perpendicular to the axis of the pole. The allowable sum of knots is calculated as one-third the average pole circumference at the cluster location, with the overriding limit that the circumference fall between 8 and 12 inches for poles  $\leq 45$  ft long and between 10 and 14 inches for poles  $\geq 50$  ft.

Spiral grain is limited to one complete revolution in 10, 16, or 20 ft for poles  $\geq 30$  ft, 35 to 45 ft, and  $\geq 50$  ft long, respectively. For average growth, the growth rate must be at least six rings per inch in the outer 2- or 3-inches of the pole diameter; four rings per inch is acceptable if growth rings have  $\geq 50\%$  latewood. Compression wood is not permitted in the outer 1-inch of the pole diameter as viewed from either end of the pole.

Naturally occurring defects include bark inclusions, insect and decay damage, and shake. Any defects that significantly reduce the effective section properties in

# STANDARD SPECIFICATIONS FOR WOOD POLES

Ronald Wolfe, Research General Engineer  
Russell Moody, Research General Engineer  
U.S. Department of Agriculture  
Forest Service  
Forest Products Laboratory  
Madison, WI 53705

## **Abstract**

This paper describes the standards for wood poles prepared by the American National Standards Institute (ANSI) Committee 05 and the Committee's activities in maintaining the standards. The three standards form the basis for purchasing and designing most wood utility structures in the United States. The round pole standard, ANSI 05.1, includes specifications, dimensions, and fiber stress values for design. The other two standards, ANSI 05.2 and 05.3, also address important issues for specifying material properties and deriving fiber stress. The ANSI 05 Committee meets once a year to provide an open forum for discussing concerns related to these standards.

## **Introduction**

Round timbers have been used as structural members for centuries. At the turn of the present century, the development of electric power distribution systems and telegraph and telephone communications prompted a great demand for poles. As more people became involved in converting trees to utility structures, a need arose for a common basis of understanding related to form and quality requirements of utility poles. Pole producers and users met to discuss concerns related to harvesting, processing, and designing pole structures and to reach some agreement on acceptable limits related to form and processing of utility poles. This discussion led to the formation of the American Standards Association Committee 05, which later became the American National Standards Institute (ANSI) Committee 05 as efforts were made to establish national standards. The product of this continuing effort is a nationally recognized standard that provides the basis for material specifications, classification, and engineering properties for wood utility poles. The ANSI 05 Committee provides a forum for pole producers and users that enables them to address changing market issues and maintain a needed supply of utility poles.

This committee meets on an annual basis to review and update its standards.

The objective of this paper is to describe the standards for wood poles and other wood products used in utility structures as well as the ongoing activities of ANSI Committee 05 in maintaining the three standards for wood products used in utility structures. The paper reviews other pole-related standards, but it places special emphasis on the role of the ANSI 05.1 wood pole standard specifications. Discussion of topics covered by this standard provides insight to variables considered in the production and design of utility poles as well as some perspective on the influence of the standard.

## **Development of Wood Pole Standards**

Standards written specifically for the structural applications of poles include those currently maintained by ANSI (2-5), the American Society for Testing and Materials (ASTM) (7-10), the American Society of Agricultural Engineers (ASAE) (6), and the Rural Electrification Administration (REA) (15). The ASAE and REA standards reference ANSI and/or ASTM as the basis for selecting and assigning allowable stresses to wood poles. The ASTM standard provides a method for deriving allowable stresses for round timbers used as construction poles, piles, and marine structures. The ANSI standard for wood poles applies to transmission and distribution-line applications.

## **History**

Among the first nationally recognized standards for round timbers were ASTM standard 1915 (Specifications for Round Timber Piles) and the American Standards Association (ASA) standard 05, 1924 (Wood Pole Specifications and Dimensions). These standards documented the characteristics that

April 27, 2010

RE: Compliance with ARRA funding guidelines

To Whom It May Concern,

SOL Inc. has been manufacturing solar powered light systems in the United States since 1990. We have provided lighting systems to many sectors of our government including the Department of Defense, State Department, Department of the Interior, and the National Parks Service, just to name a few.

Where possible we source materials for our systems that are manufactured in the United States. Although a very small number of materials used in our lighting systems are made outside of the USA, SOL Inc manufactured solar lighting systems are eligible for ARRA funds both because the sourced materials are components in our systems and because the sourced materials are produced by signatories to the World Trade Organization Government Procurement Agreement. Please refer to the Buy American Provisions in the American Recovery and Reinvestment Act for detailed clarification if needed.

Additionally, we know that ARRA funding has already been obtained for our solar lighting systems installed at the Gulf Island National Seashore by the National Park Service, Camp Pendleton by the U.S. Navy, and at Monroe Lake, Indiana by the Army Corps of Engineers.

As the manufacturer, SOL's systems are fully compliant and eligible for ARRA funding.

Best wishes for a successful project!

Sincerely,



Audwin W. Cash

General Manager

SOL Inc.





Reliable. Renewable. Remarkable.

BUY BOARD/FACILITIES SOLUTIONS GROUP

PO Box 400

Austin, TX 78767-0400

This is the published list price for this solar item

SPM-300-3Q-CH-DOME-10' ARM-DTD                      \$7422.00

On 37 Foot Direct Burial ANSI 05.1 Wood Pole

Thank you,

A handwritten signature in cursive script that reads "JoAnna Scarpo".

JoAnna Scarpo

Customer Care Manager

Sol Inc. 3210 SW 42<sup>nd</sup> Avenue, Palm City, Florida 34990

772.286.9461 | 800.959.1329 | 772.286.9616 fax

info@solarlighting.com | www.solarlighting.com



# The Local Government Purchasing Cooperative

For the Period 4/1/2011 to 3/31/2014

Final Award Report for Energy Saving Lighting Products #368-10

## 15 Installation of Wall Box Motion Sensor

Vendor	Vendor Brand and Model Number	Bid Price	Award
Facility Solutions Group	Installation of FSG Electric Wall Box Motion Sensor	\$25.00	Yes
Hill Country Electric Supply	Installation of SLS Wall Box Motion Sensor	\$25.90	No
Crawford Electric Supply	Installation of WattStopper Wall Box Motion Sensor	\$42.00	Yes
Xtra Light Manufacturing Partnership Ltd.	Installation of X-TRA Light Wall Box Motion Sensor	\$70.00	Yes
InLine Electric Solutions of Texas, LLC	Installation of Philips/Genlyte Wall Box Motion Sensor.	\$93.75	Yes

## 16 Installation of Ceiling Motion Sensor

Vendor	Vendor Brand and Model Number	Bid Price	Award
Hill Country Electric Supply	Installation of SLS (Mounting height 30' or less, drop ceiling only) Ceiling Motion Sensor	\$83.50	No
Crawford Electric Supply	Installation of WattStopper Ceiling Motion Sensor	\$109.00	Yes
Facility Solutions Group	Installation of FSG Electric Ceiling Motion Sensor, valid for accessible layin ceiling only.	\$115.00	Yes
Xtra Light Manufacturing Partnership Ltd.	Installation of X-TRA Light Ceiling Motion Sensor	\$157.00	Yes
InLine Electric Solutions of Texas, LLC	Installation of Philips/Genlyte Ceiling Motion Sensor.	\$387.50	Yes

## 17 Installation of Exterior Lighting

Vendor	Vendor Brand and Model Number	Bid Price	Award
Hill Country Electric Supply	Installation of SLS Exterior Lighting	\$16.50	No
Facility Solutions Group	Installation of FSG Electric Exterior Lighting	\$65.00	Yes
Facility Solutions Group	Hourly rate for Bucket Truck	\$65.00	Yes
Facility Solutions Group	Hourly rate for Crane	\$65.00	Yes
Crawford Electric Supply	Installation of Exterior Lighting per hour up to 60' height	\$70.00	Yes
Xtra Light Manufacturing Partnership Ltd.	Installation of X-TRA Light Exterior Lighting	\$70.00	Yes

## 18 Installation of All Other Products

Vendor	Vendor Brand and Model Number	Bid Price	Award
Facility Solutions Group	Hourly rate for Apprentice	\$32.00	Yes
Facility Solutions Group	Hourly rate for Journeyman	\$62.00	Yes
Crawford Electric Supply	Installation of All Other Interior Products per hour	\$65.00	Yes
Crawford Electric Supply	Installation of All Other Exterior Products per hour	\$70.00	Yes

# The Local Government Purchasing Cooperative

For the Period 4/1/2011 to 3/31/2014

Final Catalog Award Report for Energy Saving Lighting Products #368-10

## 8 Discount Off Catalog/pricelist for Solar Lighting Products

Vendor	Vendor Catalog Info	Percent Discount	Award
Crawford Electric Supply	Carmanah Pricelist	20%	Yes
Graybar Electric	Graybar BB368-10 Pricelist (No published pricelist for lighting pricing based on cost plus a maximum of 25%)	0%	No
→ Facility Solutions Group	SOL Outdoor Lighting BuyBoard Pricelist	10%	Yes

## 9 Discount Off Catalog/pricelist for Watt Stopper Sensors

Vendor	Vendor Catalog Info	Percent Discount	Award
Graybar Electric	Graybar BB368-10 Pricelist	3%	No
The Reynolds Company	Trade Service Pricelist Column 3	10%	No
Crawford Electric Supply	WattStopper Pricelist	20%	Yes
→ Facility Solutions Group	WattStopper Pricelist	12%	Yes

## 10 Discount Off Catalog/pricelist for Recycle of Lamps, Batteries and Ballasts

Vendor	Vendor Catalog Info	Percent Discount	Award
Crawford Electric Supply	Blueway Recycling Pricelist	10%	Yes
Crawford Electric Supply	Easy Pak Pricelist	10%	Yes
→ Facility Solutions Group	FSG Lighting Recycling Pricelist	0%	Yes
Graybar Electric	Graybar BB368-10 Pricelist	21%	No
Hill Country Electric Supply	Hill Country Pricelist	0%	No
Xtra Light Manufacturing Partnership	Philips PS-100-U Pricelist (Only Veolia recyclepak 4' med lamp/8' lamp/5 gal ballast)	0%	Yes
Voss Lighting	VLRSP Pricelist	88.5%	No



P.O. Box 400  
Austin, Texas 78767-0400  
512-467-0222  
800-695-2919  
Fax: 800-211-5454  
[www.buyboard.com](http://www.buyboard.com)

February 22, 2011

**Sent Via E-mail: [mikeh@fsgj.com](mailto:mikeh@fsgj.com)**

Mike Heins  
Facility Solutions Group  
610 West Powell Lane  
Austin, TX 78753

**Proposal Name & Number: Energy Saving Lighting Products #368-10**

Congratulations, your company has been successful on the above referenced proposal! This contract will be effective April 1, 2011.

To see the items your company has been awarded, please review the proposal tabulation #368-10 on the following website: [www.vendor.buyboard.com](http://www.vendor.buyboard.com). Only items marked as awarded to your company can be sold through the BuyBoard contract. In addition, on this website you will find the membership list which will provide you with the names of all entities with membership in our purchasing cooperative.

Attached to this letter you will find the following documents:

- Vendor Quick Reference Sheet
- Electronic Catalog Format Instructions

**Receipt of a purchase order directly from a Cooperative member is not within the guidelines of the coop.** Accepting orders directly from member entities may result in a violation of the State of Texas competitive bid statute and cancellation of the proposal award. Therefore, all orders must be processed through the Cooperative in order to comply. We request your assistance in immediately forwarding by fax (1-800-211-5454) to the cooperative any orders received directly from member entities. If by chance an order sent directly to you has been unintentionally processed, please fax it to the Cooperative (1-800-211-5454) and note it as **RECORD ONLY** to prevent duplication.

**Per proposal specifications, awarded vendors will have 60 days to submit their electronic catalog including pricing. If the electronic data is not provided within 60 days of notice of award, we reserve the right to inactivate any company's award information from the Buyboard until such time the electronic data is received.**

On behalf of the Texas Association of School Boards, we appreciate your interest in the Cooperative and we are looking forward to your participation in the program. If you have any questions, please contact me at 512-467-0222, ext. 7154 or 1-800-695-2919.

Sincerely,

Melonie Perry  
Bid Administrator



The Texas Local Government Purchasing Cooperative is a joint project of the  
Texas Association of School Boards, Texas Municipal League, and Texas Association of Counties