



LETTER OF AGREEMENT BETWEEN
SAN FRANCISCO PUBLIC UTILITIES COMMISSION /
POWER ENTERPRISE
AND
THE DEPARTMENT OF PUBLIC WORKS /
BUREAU OF BUILDING REPAIR
FOR
NORTH BEACH LIBRARY
11.5 kW SOLAR ELECTRIC PROJECT

This LETTER OF AGREEMENT (LOA) between the SAN FRANCISCO PUBLIC UTILITIES COMMISSION'S POWER ENTERPRISE (**POWER**), and the DEPARTMENT OF PUBLIC WORKS BUREAU OF BUILDING REPAIR (**DPW/BBR**), formalizes the roles and responsibilities, project scopes, costs, and other terms associated with the CONSTRUCTION SERVICES to be provided by DPW/BBR to POWER for the above named project.

The purpose of this LOA is for POWER to secure project management, construction, and procurement services from DPW/BBR to support the construction phase of the project as is further defined below, for the 11.5 kW solar electric project to be located at the North Beach Library (NBL). DPW/BBR shall become the construction entity on behalf of the project owner, POWER.

RECITALS

The "North Beach Library Solar Electric Project" is a clean distributed generation resource to be developed on NBL's property; promoting sustainability and good stewardship of our resources. This project will put to good use the available roof space at NBL to generate cost effective renewable energy in accordance with the Mayor's Executive Directive 05-107 (Roof Tops for Municipal Solar), dated October 26, 2005.

The resulting renewable greenhouse gas-free electric energy will serve the City's municipal loads as served by POWER.

And whereas,

1. POWER oversees energy policy and energy trading and strives to increase the City's Renewables Portfolio Standard (RPS) qualifying energy generation; and, as such, typically funds, develops, and owns renewable generation projects, and;
2. POWER has, at the date of execution of this LOA, sufficient funding in place to cover project development, design engineering, and construction.
3. Whereas the essence of the agreement between DPW/BBR and POWER is:
 - a. POWER will fully fund the solar electric plant.
 - b. POWER will plan, design, permit, and provide project engineering support for the project.
 - c. DPW/BBR will perform all aspects of the construction of the project.
 - d. POWER shall retain ownership of the project, and the energy benefits, i.e. capacity, energy, and renewable energy certificates, per the Memorandum

Edwin M. Lee
 Mayor

Vince Courtney
 President

Ann Moller Caen
 Vice President

Francesca Vietor
 Commissioner

Anson Moran
 Commissioner

Art Torres
 Commissioner

Harlan L. Kelly, Jr.
 General Manager



ROLES AND RESPONSIBILITIES OF PARTIES

Roles and responsibilities of the parties shall be in accordance with the Project Scope of Services (see **Attachment A** -- Scope of Services, February 27, 2014). Attachment A spells out the detailed plan for the project.

More generally,

- SFPUC shall be considered the Project Owner, and Power the Project Manager, and shall perform design engineering, permitting, and project engineering support.
- NBL shall be considered the Host with its primary focus on design and construction activity approval.
- DPW/BBR shall be considered the General Contractor for construction, with assistance from POWER in providing project engineering and technical support.

SCOPES OF WORK AND BUDGETS

The Cost for DPW/BBR construction services to be provided herein shall not exceed \$74,281.36. The services are explained, estimated, and itemized per **DPW/BBR Service Order – 437110 (Attachment B)** and are based on the Scope of Services document, Attachment A. Any change orders to the cost proposal, as submitted by DPW/BBR, shall be reviewed and approved by POWER prior to any work being performed. DPW/BBR shall submit its Change Order Request with the scope of services described, cost estimate, and reason for change or deviation from the original scope of work.

POWER may also submit a Change Order Request to DPW/BBR for work requested by POWER which is a change from the base scope of work. DPW/BBR will submit its proposal for this requested change with cost, schedule, and other information to POWER for approval prior to proceeding with the work.

TERM

This LOA shall become effective on the date of execution by all parties. Termination of this LOA shall be upon the completion of the solar electric plant and project acceptance by POWER as defined in the Scopes of Services, Attachment A.

MISCELLANEOUS

A. Communication: The parties shall communicate at all times to support the work effectiveness of the project team. A POWER and DPW/BBR organization chart and a list of all staff / project team personnel with roles and contact information shall be developed at the start of the work and updated as necessary.

Routine progress reports shall be shared and project and progress meetings held.

B. Documentation Control: DPW/BBR shall follow typical POWER documentation control procedures and requirements in the execution of this work. Details will be worked out between the parties at the beginning of the project.

C. Payment: SFPUC will establish an interdepartmental reallocation for the project based on the following payment schedule:

- a. Project Initiation (Executed LOA) 50% Contract Labor Value and 100% Materials and Equipment Rental Value
- b. Payment #2 – 50% Contract Value due at 50% completion of the Work Changes in cost shall be approved prior to any work being performed. DPW/BBR shall provide bi-weekly project reports covering labor hours expended to date, tasks accomplished, costs expended, and updated schedule. DPW/BBR shall charge to that account as needed. However, should the project work stop or be canceled by POWER, POWER may request DPW/BBR to itemize and calculate actual work completed, and reimburse POWER the unspent balance whether or not remaining in the project reallocation index fund.

D. Notices: All notices and principal communications shall be directed to the following:

SFPUC -- Power Enterprise:
 Jamie Seidel, Project Manager
 SFPUC – Power Enterprise
 525 Golden Gate Avenue, 7th Floor
 San Francisco, CA 94103

DPW/ BBR:
 Sue Black, Superintendent
 DPW/BBR
 2323 Cesar Chavez Street
 San Francisco, CA 94124

ACCEPTED:



3/11/14

SFPUC Power Enterprise, Barbara Hale, Assistant General Manager Date

DPW/BBR, Sue Black, Superintendent

 Date 3/14/14

**Department of Public Works
Operations**

ATTACHMENT B



Estimate Report (Detail): Service Order 437110

Internal Report Name: Estimate_Detail_Phase

Date Sent

Valid Until

Status

Project Name

Project Location

DPW Lead Approved
SFPL North Beach Branch Solar Panel Install. Estimate
Facility Not Listed (route to DPW-BBR)

Requester's Dept

Requested By

Site Contact

PUC
Jaime Seidel 554-1537

Estimator

Bureau Lead

DPW Lead

Maintenance Dept

JOSE CHAVEZ

DPW-BBR

Priority

Problem Code

Request Start Date

4 - Non Urgent

Electrical Issue

SCOPE OF WORK

City & County of San Francisco Department of Public Works Site Location: North Beach Library PV Project DPW BBR Electric Shop: 1. Furnish and Install conduits per AEPC engineering drawings.

2. Install PUC provided PV supports per AEPC engineering drawings.
 3. Install PUC provided PV solar panels per AEPC engineering drawings.
 4. Install PUC provided PV inverter and disconnect per AEPC engineering drawings.
 5. Furnish and Install Meter socket enclosure per AEPC engineering drawings.
 6. Furnish and install PV wire and feeders per AEPC engineering drawings.
- Deliverables
1. Conduit, fasteners, Meter box enclosure
 2. Lateral conduit support for PV brackets
 3. Crane service by Sheedy
- Scope Acceptance Criteria1. Materials list provided by AEPC
- Scope Exclusions1. Permits and Fees
2. Roof flashing over supports
 3. Patching of surfaces
 4. Hazmat abatement
- Constraints1. Work area is under construction
2. Noise restrictions
 3. Layout area protection
 4. As built drawings not provided
 5. Work stoppages due to disturbances
 6. Impact delays due to contractors
- Assumptions 1. Work to be performed during normal working hours of 7:am to 3:30 pm
2. Existing conduit from roof to MSB is intact without obstructions
 3. Construction site to accommodate lay down area

ESTIMATE BY PHASE AND SHOP

PHASE	SHOP	LABOR COST	MATERIAL COST	TOTAL COST
00 NONE	ELE	\$58,997.68	\$12,000.00	\$70,997.68
	ENG	\$3,283.68	\$0.00	\$3,283.68
Totals		\$62,281.36	\$12,000.00	\$74,281.36

IN HOUSE COSTS

PHASE	CRAFT NAME	RATE	HOURS	LABOR COST
00 NONE	ELE(01)-Electrician Supervisor II (7276) - City Normal Rate	\$157.33	8	\$1,258.65
	ELE(02)-Electrician Supervisor I (7238) - City Normal Rate	\$141.39	40	\$5,655.53
	ELE(03)-Electrician (7345) - City Normal Rate	\$125.20	416	\$52,083.50
	ENG(06)-General Laborer (7514) -City Normal Rate	\$82.09	40	\$3,283.68
Totals				\$62,281.36

OTHER COSTS

No Other Cost Reported

TOTALS

COST	TOTAL
Total Labor Cost	\$62,281.36
Total Material Cost	\$12,000.00
Total Other Cost	\$0.00
Total Estimate Cost	\$74,281.36

Department of Public Works
Operations
Estimate Report (Detail): Service Order 437110
Internal Report Name: Estimate_Detail_Phase



APPROVALS

Deputy Director Approval

Date

Deputy Director Signature (optional if Approved in CMMS)

Bureau Approval

Date

Bureau Head Signature (optional if Approved in CMMS)

Client Approval

Date

Client Approver Signature (optional if Approved in CMMS)

NOTE: This estimate does not include the cost of abatement and/or removal of any hazardous materials that may present at your facility or job site unless otherwise indicated. If asbestos or other hazardous materials are discovered, delays in completion of project may occur, and additional abatement costs will be the responsibility of the requesting agency.

*Contingency funds will not be expended without client department approval. Unexpended contingency funds to be credited back to client department.

**On project work supervision is required and listed accordingly.



San Francisco Water Power Sewer

Services of the San Francisco Public Utilities Commission

ATTACHMENT A
North Beach Library 11.5 kW Solar Electric Project
Scope of Services
February 27, 2014

Attached Documents:

- Appendix A – Power Enterprise Solar Material Scope
- Appendix B – DPW Supplied Material Scope
- Appendix C – North Beach Library -- PV Project Design Drawings – DBI Permit Set

1. SUMMARY OF PROJECT

The goal and intent of this Scope of Services is for the Department of Public Works – Bureau of Building Repair (DPW/BBR) to provide project management, procurement, construction, and commissioning services for the 11.5kW solar electric system (the “PV System”) to be installed at the North Beach Library (NBL) located at 850 Columbus Avenue – San Francisco, CA. DPW/BBR shall project manage, procure, construct, and commission such measurers in accordance with the design drawings and bill of materials provided by the San Francisco Public Utilities Commission – Power Enterprise – Renewables (Power).

This Scope of Services is the controlling document for all matters relating to the specific work and services to be provided by the DPW/BBR in accordance with the terms and conditions of the Letter of Agreement (LOA). DPW/BBR will perform this work and provide these services in a good and workmanlike manner, to the satisfaction of Power. The DPW/BBR shall furnish all labor, DPW materials and equipment not provided by Power in its design drawings and bill of materials. Costs and fees shall be included in the agreed upon Contract Sum for the Scope of Services delineated in this attachment and such work and services shall be provided within the Contract Time.

2. SCOPE OF WORK

The scope of work responsibilities will be shared between three parties: Power, DPW/BBR, and the Roofing Contractor.

Power will provide design engineering, procurement of solar materials (modules, inverter, racking, etc.), electrical materials, and project management. See specific details in Section 2.B.

The scope of work for the Roofing Contractor will include the flashing for the seismic stanchion attachment. DPW is responsible for attaching the stanchion and coordinating with the Roofing Contractor for temp weatherproofing and flashing. See specific details in Section 2.C.

DPW/BBR will be responsible for the items detailed below in Section 2.A

2.A – WORK AND SERVICES BY DPW/BBR

DPW/BBR shall furnish all labor, materials not purchased by Power, tools, transportation, and equipment not yet identified to perform work as listed herein, as shown on drawings and all work related to provide the specified structure, ready for inspection and acceptance by Power and other Authorities having jurisdiction. This includes but is not limited to, the following list of work items.

DPW/BBR must thoroughly read all notes on drawings and build accordingly.

DPW/BBR must coordinate and schedule work with all other trades on job site.

DPW/BBR will provide Power with a thorough and detailed list of activities, project progress meetings, and timeline as soon as possible.

Provide appropriate staging and lifting equipment, and qualified operating, rigging, and traffic control personnel to load roof and if necessary, remove debris and excess materials at the end of construction activities. Power will pay for required crane service and will coordinate with DPW/BBR to determine schedule. DPW will issue the PO for the crane.

All wires installed and/or terminated by DPW/BBR shall be properly labeled.

All cores to be coordinated and arranged by DPW/BBR. DPW/BBR must coordinate this work accordingly and schedule in advance.

If roof is damaged in any way, DPW/BBR will notify Power.

DPW/BBR must red line any changes to construction drawings.

Complete all work required to layout and construct the solar racking system, including but not limited to:

- Coordinate with Roofing Contractor for stanchion/baseplate flashing
- Construct racking system per drawings and manufacturer instructions
- Mount solar modules per drawings

Complete all work required for array wiring (solar modules to string inverters), including but not limited to:

- Install wire tray and conduit for homerun routes
- Make Multi-contact (MC) connections and assemble homerun wires
- Label homeruns in color sequence accordingly

- Array grounding per drawings
- Install safety signage

Complete all electrical work from string inverters to tie-in point (electrical room), including but not limited to:

- Install rooftop string inverters, disconnects, & load center per drawings
- Make wire terminations at string inverters
- Install conduit and wire from string inverters to tie-in point (electrical room)
- Perform tie-in to existing to NBL switchboard designated in drawings
- Install and wire inverters, disconnect switches, meter cabinet and socket as per drawings and test for proper operation
- Install safety signage

Arrange for and be on-site during electrical inspection of the system.

- Install equipment
- Install Weather Station

Startup system, including tests for open circuit voltage, amperage, temperature, meggering, phase rotation, and utility compatibility.

At such time as DPW/BBR determines that the project is completed, notification shall be given to Power for the scheduling of the final inspection and testing of the system.

Remove from the site all construction materials.

- Crane lift for material removal, if necessary, to be coordinated with Power
- DPW/BBR to unpackage "crates" containing individual panels, reducing damage as much as possible and remove from site for transport to Power designated location

Conduct initial Operations and Maintenance training.

Clean site and prepare for turnover to Power.

Schedule a final inspection meeting.

Testing of the PV Solar System shall include the following:

- System testing of installed PV array shall be performed on all strings of modules, including open circuit voltage, DC amperage, and meggering. This data will then be recorded in the Operation and Maintenance manual (provided by Power) in a clear tabular format.
- Each voltage measurement will include the following ancillary data: the date, time of day, sample panel temperature, ambient temperature, and the solar irradiation at the time in coordination with Power staff.
- After inverter startup, current shall be recorded for each string, each sub-array, and the entire array. Each current measurement will also include the same ancillary data as taken above during voltage measurements.

2.B – WORK AND SERVICES BY POWER

- Construction drawings and engineering design
- PG&E Interconnection Agreement
- PG&E Shut Down and Coordination
- Technical Support
- Special Inspection
- Refer to Section 3 – Material Procurement for material to be supplied by Power

2.C – WORK AND SERVICES BY ROOFING CONTRACTOR

- Flashing of seismic stanchion attachment

3. MATERIAL PROCUREMENT

All material required for the Work, except those materials specifically designated as furnished by Power or the Roofing Contractor, regardless of whether or not it is specifically mentioned herein or listed on the Drawings, shall be furnished by DPW/BBR. DPW/BBR will be reimbursed for any materials or equipment purchased for project. DPW/BBR will submit material and/or equipment needs for prior approval by Power before purchasing or acquiring same.

Power-Supplied Materials:

Solar Modules/Racking
 Solar Inverters
 Additional Solar Material:
 See Appendix A – Power Solar and Electrical Material
 (Bid Sheet)

Roofing Contractor-Supplied Materials:

Flashing material for roof penetrations

[REDACTED]

DPW/BBR-Supplied Materials:

See Appendix B – DPW/BBR-Supplied Material

[REDACTED]

DPW/BBR shall review packing slips for all Power supplied materials loaded on to roof by others to determine any non-conforming or missing items as soon as possible. Upon review of Power supplied packing slips and conducting an inventory of materials and equipment, DPW/BBR will accept materials and diligently work with Power to resolve any field discrepancies to move the project forward and meet the construction schedule. DPW/BBR shall be responsible for all such material and equipment once accepted by DPW/BBR. DPW/BBR shall take all necessary precautions to ensure its safe handling, storage and installation at the Site.

DPW/BBR shall be responsible for coordinating all shipments of DPW/BBR-supplied equipment and materials.

DPW/BBR shall take delivery of Power-supplied materials and equipment and Roofing Contractor-supplied materials, as well as its own materials. Materials and equipment shall be inspected and signed for, with any damage listed and reported without undue delay.

DPW/BBR shall provide all required general tools and materials for its work. Power will reimburse DPW/BBR for any materials not previously provided by Power at cost and with Power's prior approval before purchase.

4. QUALITY OF WORK

DPW/BBR shall furnish and perform the work to the highest quality standard. All work shall conform to the detailed requirements specified herein. Where specific instructions are not given, the work shall be performed to the best practices known to the trade. All Work shall be done by skilled and experienced workers for the appropriate trade, and shall be of the highest possible caliber throughout. DPW/BBR shall adhere to equipment manufacturer's instructions and recommendations.

5. SYSTEM INSPECTION AND TESTING

Power will inspect the work regularly.

At various stages of completion, DPW/BBR shall ask Power to inspect and review the work. Additionally, Power may wish to inspect the work at any time during construction. DPW/BBR shall allow reasonable time for Power to perform work inspections.

DPW/BBR shall work in coordination with the Authority having jurisdiction (Department of Building Inspection -- DBI) to obtain final approvals.

Any work found to be not satisfactory to the Inspector, and within the responsibility of DPW/BBR unless performed in accordance to the project requirements and drawings, shall be redone at DPW/BBR's sole expense.

6. PROTECTION OF EXISTING FACILITY, EQUIPMENT, AND PERSONNEL

The work is to be performed at North Beach Library, and DPW/BBR shall exercise extreme caution at all times to avoid damage to existing facilities and landscaping or to jeopardize their safety or continuity of operation

Power reserves the right to require DPW/BBR to modify or eliminate any construction techniques or methods, which may endanger personnel or adversely affect any existing infrastructure and or equipment.

7. CLEAN UP

During the Work, DPW/BBR shall be responsible, on a daily basis, for the sanitary and physical cleanliness of the area affected by its work. All debris, tools, hoses, ladders, and unused construction materials shall be gathered up by the end of each shift and/or stored in proper areas or receptacles. DPW/BBR's work areas should be kept continuously clean and orderly to prevent accidents or unwarranted use of material, tools, etc. that are for use in the Work. Upon completion of the Work, DPW/BBR's area shall be cleared of all equipment, surplus material, and debris. The Roofing Contractor is responsible for clearing all of its equipment, surplus materials, and debris. Such material shall be disposed of in a manner acceptable to Power and SFWMPAC. DPW/BBR's work shall be subject to stoppage by Power if DPW/BBR does not correct any of its "housekeeping" deficiencies or violations to the satisfaction of Power within 24 hours of receipt from Power of a non-conformance report identifying such deficiencies or violations.

8. INFORMATION REQUIRED AFTER COMPLETION OF WORK

Following completion of the work, DPW/BBR shall provide red line notes and field changes from the original drawings.

These noted changes shall include, but not be limited to, changes in location, changes in elevation, changes in size, changes in adjustments or settings, changes in equipment, and changes in materials

DRAWINGS

The engineering and construction drawings (here in referred to as the drawings – Appendix C of Attachment A) are incorporated into and made part of this Scope of Services by this reference.

Where there are any apparent conflicts between the drawings, this Scope of Services, specifications and latest applicable codes, standards and specifications, provisions specifically set forth in the contract shall generally govern. However, DPW/BBR shall bring the matter to the attention of Power for resolution.

TECHNICAL SPECIFICATIONS

9. REFERENCE STANDARD

This PV System project shall be designed and constructed in accordance with the applicable codes including but not limited to the following list of codes and standards. The codes and standards utilized shall be the latest editions in effect on the date of this proposal.

A.	American Concrete Institute	ACI
B.	American Institute of Steel Construction	AISC
C.	American National Standards Institute	ANSI
D.	American Society for Testing Materials	ASTM
E.	American Society of Mechanical Engineers	ASME
F.	American Welding Society	AWS
G.	Division of State Architect	DSA
H.	Institute of Electrical & Electronic Engineers IEEE	
I.	Instrument Society of America	ISA
J.	National Electric Code	NEC
K.	Occupation Safety and Health Administration	OSHA
L.	National Fire Protection Agency	NFPA
M.	Uniform Building Code	UBC
N.	City and County of San Francisco Administrative Code	
O.	City and County of San Francisco Building Code	
P.	City and County of San Francisco Plumbing Code	
Q.	City and County of San Francisco Electrical Code	
R.	City and County of San Francisco Mechanical Code	
S.	California Building Code	
T.	Concrete Reinforcing Steel Institute	CRSI
U.	PG&E Power Producers Handbook Requirements	

10. SYSTEM SPECIFICATION

Circuit Disconnects Switches and Enclosures:

- Enclosures shall be surface mounted type, unless otherwise noted, and of NEMA type 4X stainless steel, waterproof.
- Disconnect switches shall be heavy duty, AC or DC-rated as required and with appropriate ampere ratings. They shall be UL listed and of NEMA type 4X stainless steel, waterproof, meet proper AIC requirements, and be "load-break" capable.
- Disconnects and enclosures must be properly supported and braced to Seismic Zone 4 requirements, where required.
- All mounting hardware (strut), fasteners, and miscellaneous parts shall be high grade stainless steel. Roof-mounted conduit supports to be UV resistant and use recycled rubber.

- When used for disconnecting, disconnects for branch circuit protection shall be located as near as practical to the supply end of the conductors being protected.
- Power will provide the meter cabinet specification.

Fuses:

- All fuses for disconnects must be current limiting UL Ccs J, RK1, or RK5 and of the appropriate voltage, delay or non-delay characteristic, and current rating to provide both complete short circuit and overload protection per NEC sections regarding component protection.
- Fuses in the combiner boxes protecting PV string branch circuits must be UL Class CC midget-type, be in "touch safe" type fuse holders, providing load break disconnect capabilities when changing fuses. Midget fuses and fuse holders used in these circuits must be fully DC-rated, have adequate DC short circuit withstand capability, and must be provided for all power situations including "back-fed" conditions.
- All fuses and other protective devices and holders must be engineered to safely protect system components under "worst case" expected field conditions including temperature extremes. Appropriate temperature derate factors must be used.
- PV panel strings must be individually protected from short circuit conditions that may originate within the panels themselves.

Wiring and Connectors:

- Wire shall be copper and sizes referred to on the drawings refer to copper wire sizes.
- For conductors 600V or less, the minimum size shall be #12AWG.
- Insulation types are as follows:
 - Use "PV-WIRE", #12 or appropriate size for DC exposed locations for wiring of modules to combiner boxes.
 - #12 to #1AWG: THWN or XHHW for wet or underground locations and THHN or XHHW for dry locations.
 - #1/0 through #4/0AWG: XHHW, THHN, or THWN.
 - #250MCM and larger, XHHW, THHN, or THWN.
 - When installed in underground conduits, use THWN or THWN-2.
- For signal and communications circuits, use wires and cables as shown in manufacturer's specifications.

- Install copper wires, cables, and connection devices in accordance with the manufacturer's instructions and CEC-2001, Part 3. Do not bend cables to a smaller radius than is recommended by the manufacturer.
- Quick connect, multi-contact connectors will be used where appropriate and all DC wiring including PV strings in the combiner boxes shall be clearly labeled.
- Voltage drop must be limited to 2% on main AC circuit and 2% on DC circuits.

Raceways:

- Outdoor conduit shall be RGC
- Indoor conduit shall be EMT

Connections to Existing Circuit Breakers:

- Circuit breakers of the appropriate phase and voltage with the required AIC rating (rms symmetrical amperage short circuit rating) shall be utilized and this breaker rating along with the available short circuit available at the breaker bus bar shall be noted on the one line diagram.

Grounding:

- Provide driven ground rod and provide green equipment ground conductors sized in accordance with NEC on main AC power circuit and DC collector circuits. Ground rods shall be copper-clad steel 3/4-inch x 10 feet unless otherwise indicated on one-line diagram.
- In the case of roof-mounted inverters, the proper size ground wire shall be used to connect to the ground system per NEC and manufacturer guidelines.
- Appropriate tie in and grounding of the entire PV system, including roof-mounted components, shall be per NEC-250 requirements.

Operational Identification and Warnings:

- Install engraved signs for instruction or warning identifying that a solar PV system is operational on the premises at appropriate locations and that are potentially multiple power sources on the premises.
- Provide identification of all DC power circuits on switches and clearly identify individual module strings in DC combiner boxes. Use appropriate wire color codes (i.e. Red & Black) for negative and positive circuits.
- PV panels must include serial numbers on the frame and be easily viewed from the topside of the panel.

- Install any additional signage as required by code or PG&E.

Signage:

- Install signage as required by the PG&E Interconnection Application such as, but not limited to the following:
 - If the AC Disconnect Switch location is not near Point of Common Coupling, permanent signage must be installed providing a clear description of the location of the device. Switchgear must be accessible.
 - The location of the AC Disconnect Switch is acceptable as long as it is accessible 24/7. If the revenue meter is inside a locked room, install one sign on the pad mount transformer and one sign on the door to the electrical room identifying the presence of a generator and describing with a map the location of the AC Disconnect Switch.
 - The AC Disconnect Switch signs are as follows (Letter size, etc. should be ½-inch engraved on plastic sign with a red background):
 - At the AC Disconnect Switch: "*GENERATOR DISCONNECT SWITCH*"
 - On the electric room door and at the transformer: "*PV GENERATOR DISCONNECT SWITCH LOCATED _____*"
- The AC Disconnect Switch should only de-energize PV units. The AC Disconnect Switch should not be the "main breaker" and de-energize applicant's resident load. A single AC Disconnect Switch should isolate all the PV units.
- Install signage identified on the Commissioning Checklist, including but limited to the following signs and locations:
 - "Data Acquisition System (DAS)" sign posted on the outside of the enclosure.
 - "Meter – High Voltage Inside" sign posted.
- Signs shall be maintained in good condition for the duration of the Agreement. Signs shall be promptly cleaned of graffiti and other defacements, cleaned semi-annually of dirt and grime, and replaced if damaged or stolen.

APPENDIX A
 North Beach Library - 850 Columbus Avenue
 Photovoltaic Project - Parts List
 Power Enterprise

= shows Rev3 changes

Bid Line #	Item Description	Manufacturer	Model# / Item#	Est. Qty. (HIDE THIS COLUMN)	Add Spares (HIDE THIS COLUMN)	Qty.	Unit	Unit Price	Extended Price	Notes:
1	PHOTOVOLTAIC RACKING COMPONENTS Unirac UL-A and SolarMount (or Equivalent) for the PV System Arrays designed for the North Beach Library PV Project. Includes the following:						EA.			
1.1	End Clamp F (Required 4 per PV panel); Material: Aluminum	Unirac	302006C	144	16	160	EA.			Require 144; Order Pro packs (20 per pack) 8 packs=160
1.2	SolarMount Standard Rail - 5M Rail: 208" length; Material: Aluminum, Clear Anodized Finish	Unirac	310208C	24	2	26	EA.			Require 24; Available in packs of 8 (pro-pack). So order 4 packs of 8 = 32; other option is to just ask for 24 + 2 spare = 26 in the parts order.
1.3	Universal Rail Bracket /ULA Rail Bracket, 2", Aluminum	Unirac	403213C	144	6	150	EA.			Require 144; order 150 (6 spare)
1.4	ULA Brace, 2" (cross brace) @ 7' long, Aluminum	Unirac	403200C	11	3	14	EA.			Require 11, order 3 spare: Total = 14; (Note: Short bracing - cut in half for field use at 22 locations, N-S)
1.5	ULA Brace, 2" (cross brace) @ 10.5' long, Aluminum	Unirac	403201C	10	2	12	EA.			Require 10, order 2 spare: Total = 12 (Note: Long bracing, used E-W, 10 locations)
1.6	ULA Slider - 2" Aluminum (with hardware)	Unirac	403215C	42	4	46	EA.			Require 42 (22 for N-S, and 20 for E-W); add 4 spare: Total = 46
1.7	ULA Rear Cap - 2" Aluminum (with hardware)	Unirac	403214C	22	3	25	EA.			Require 22, add 3 spare: Total = 25
1.8	ULA Front Cap - 2" Aluminum (with hardware)	Unirac	403211C	22	3	25	EA.			Require 22, add 3 spare: Total = 25
1.9	ULA Threaded Foot - 2", Zinc Plated Steel (base plate)	Unirac	403216S	44	3	47	EA.			Require 44, add 3 spare: Total = 47
1.1	SolarMount ground clip, UGC-1; Material: Stainless Steel	Unirac	308001S	40	20	60	EA.			Need one per PV panel, as each one is mounted individually on the 2" pipes using 2 SM rails per panel
1.11	Ground Weebug #1	Unirac	008002S	36	4	40	EA.			Need one per PV panel, as each one is mounted individually on the 2" pipes using 2 SM rails per panel
1.12	T-bolt and nut, 1/4" X 2.5", CLR	Unirac	330003C	36	4	40	EA.			Need to install Weebug on SolarMount rail.

Bid Line #	Item Description	Manufacturer	Model# / Item#	Est. Qty. (HIDE THIS COLUMN)	Add Spares (HIDE THIS COLUMN)	Qty.	Unit	Unit Price	Extended Price	
2	PHOTOVOLTAIC MODULES									
2.1	SunPower E20 COMMERCIAL 327 watt high efficiency photovoltaic module	SunPower	E20-327-COM	36	2	38	EA.			

Bid Line #	Item Description	Manufacturer	Model# / Item#	Est. Qty. (HIDE THIS COLUMN)	Add Spares (HIDE THIS COLUMN)	Qty.	Unit	Unit Price	Extended Price	
3	PHOTOVOLTAIC - INVERTER									
3.1	Power-One AURORA PVI-10.0-1 3 phase, grid-tied inverter 10kW, 208VAC, 3 phase, 60Hz, with DC Switch and DC Fuses, 2 MPPT, 10 year warranty RS-485, NEMA 4X Enclosure	Power-One	PVI-10.0-1-OUTD-S1-US-208-NG	1		1	EA.			Note: This inverter does not currently have 2013 CEC compliant DC arc fault protection, so we are ordering the "standard model", without DC switch and DC string fuses, and will provide this functionality in a 2013-CEC compliant combiner box w/ DC disconnect capability. Per 2/21 phone call, we are excluding AFCI combiner and ordering inverter w/ DC Switch and DC fuses.

Bid Line #	Item Description	Manufacturer	Model# / Item#	Est. Qty. (HIDE THIS COLUMN)	Add Spares (HIDE THIS COLUMN)	Qty.	Unit	Unit Price	Extended Price
5	PHOTOVOLTAIC - ELECTRICAL COMPONENTS								
5.2	Square D AC Disconnect (Visible AC disconnect required for PV system by PG&E) 60 amp AC disconnect, non-fusible, heavy duty, rated 600V AC/DC; Enclosure Finish: NEMA 4X Stainless Steel	Square D	HU362DS	1		1	EA.		

Bid Line #	Item Description	Manufacturer	Model# / Item#	Est. Qty. (HIDE THIS COLUMN)	Add Spares (HIDE THIS COLUMN)	Qty.	Unit	Unit Price	Extended Price
6	WARRANTY								
6.1	Option: Power-One Inverters - Extended warranty option: 15 years (total, inclusive of base 10 year warranty)	Power-One	EXTENDED WARRANTY: 15 YEARS	1		1	EA.		

BID ITEM LINE 1 - TOTAL (BID ITEMS 1 - XXX)									\$0.00
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EA = EACH; LF = LINEAR FOOT

END OF ATTACHMENT C

APPENDIX B
North Beach Library - 850 Columbus Avenue
Photovoltaic Project - DPW Parts List

=shows Rev3 Changes

Item #	Description			Est. Qty. (HIDE THIS COLUMN)	Add Spares (HIDE THIS COLUMN)	Qty.	Unit	Unit Price	Extended Price	Notes
	Item	Manufacturer	Model# / Item#							
1	MISC. COMPONENTS FOR RACKING, GROUNDING RELATED ITEMS						EA.			
1.1	1/4" 316 Stainless Steel Flat Washer (pack of 50)	Fastenal	1178013	36	14	50	EA.			For use w/ T-Bolt to install Weebug; now not available thru Unirac, so order separately.
1.2	1/4" Stainless Steel Lock Washer (pack of 50)	Fastenal	1178063	36	14	50	EA.			For use w/ T-Bolt to install Weebug; now not available thru Unirac, so order separately.
1.3	Hex head lag screw: 5/16" diameter x 4" length; galvanized steel (pack of 25 screws)	Fastenal	1122149	176	24	200	EA.			Require 176; spares:24 (to attach UL-A base plate to sleeper)
1.4	5/16" Hot Dipped Galvanized Finish USS Flat Washer (pack of 100)	Fastenal	1133181	176	24	200	EA.			Require 176; spares:24 (to attach UL-A base plate to sleeper)
1.5	Blackburn Ground Clamp, for pipe size 2"; material: cast bronze	Thomas & Betts (or equal - DPW can suggest)	J2D	8	2	10	EA.			Use for every horizontal 2" conduit (4 rows x 2 conduits / row) for better grounding connection for the conduits. Currently 2" horizontal conduit has grounding continuity only by contact w/ Universal Rail bracket, and that contact is maintained in place by U-bolt. (MOVE TO DPW PARTS LIST) DPW can install a pipe grounding bushing and run the ground wire from it.
1.6	Basepl. Shim plates 1/16"x2x0'-2 3/4" : Material: Steel Schedule 40 galvanized			528	0	528				To level the UL-A base plates. (Two locations per base plate, 6 shim plates / location; total 44 baseplates)
2	CONDUIT RELATED ITEMS:									
2.1	Conduit Supports (Recyled Rubber) --- to support Combiner box and electrical rigid conduits (string home runs to C.Box, DC conduit from C.Box to inverter)	Cooper B-Line	Dura-Block DB series --- item #s tbd by DPW				EA.			DPW to estimate qty. based upon take offs
2.2	Coupling pipe splice (for 2" Ø pipe) for E-W racking conduit runs ; Material: ASTM A36 Galvanized Steel			8	2	10				DPW to determine based upon their take-offs and length of 2" pipe they are using for the E-W runs.
2.3	2" Ø schedule 40 pipe - Galvanized, Rigid pipe; Material: ASTM A36 Galvanized Steel.			370	30	400				Est: 280' horizontal and 88' vertical pipe required. DPW to do take-offs and order per their estimate.
2.4	Galvanized rigid conduits : 3/4", 1" and 2"									DPW to estimate qty. based upon take-offs
2.5	Others type, water-tight conduit fittings --- to connect the six(6) 3/4" string home run conduits to the NEMA-4X Combiner box Wiring Trough, NEMA Type 12 and BR, and the 2" DC output home run conduit from Combiner box (to inverter)	Thomas & Betts (or equal - DPW can select)	H200-TB (for 2" conduit); H075-TB (for 3/4" conduit)							DPW to confirm and select and estimate qty. based upon take-offs appropriate fittings.

APPENDIX B

North Beach Library - 850 Columbus Avenue

Photovoltaic Project - DPW Parts List

=shows Rev3 Changes

Item #	Description			Est. Qty. (HIDE THIS COLUMN)	Add Spares (HIDE THIS COLUMN)	Qty.	Unit	Unit Price	Extended Price	Notes
	Item	Manufacturer	Model# / Item#							
3	WIRING RELATED ITEMS:									
3.1	Ground Wire #8G --- ground wire from PV strings to combiner box, inverter, meter socket, ac disconnect and to switchboard for ground tie-in.	DPW to select								DPW to estimate qty. based upon take-offs
3.2	#12 PV wire, 600 V rated, XLPE insulation ---- for string wiring from strings to combiner box	Encore wire or equal								DPW to estimate qty. based upon take-offs
3.3	DC wire, #12 -- from combiner box to inverter	DPW to select								DPW to estimate qty. based upon take-offs
3.4	AC wire, #8 --- from inverter to Meter Socket to AC Disconnect and to Breaker at Main Switchboard (pt. of interconnection)	DPW to select								DPW to estimate qty. based upon take-offs
3.5	MC4 connector with Boot (Female) - connector for +ve PV lead -- MC4 connector with Boot for 3 to 6 mm OD wire, Female (+)	Multi-Contact	32.0014P0001-UR	100	0	100				#12 PV wire rated at 600V with XLPE insulation has an O.D. of 5.37 mm (using Encore wire); others could be a bit higher, but will be less than 6 mm
3.6	MC4 connector with Boot (Male) - connector for -ve PV lead -- MC4 connector with Boot for 3 to 6 mm OD wire, Female (+)	Multi-Contact	32.0015P0001-UR	100	0	100				
3.7	Wiring Trough, NEMA Type 12 and 3R; material: Fiberglass, trough size: 6" x 6" x 24" L (nom.) : To combine the six (6) string home run (in 3/4" conduits) and route into one DC conduit towards inverter.	Hoffman	F6624FG	1	0	1				
4	METER RELATED ITEMS:									
4.1	Meter Socket --- for installation of SFPUC revenue meter	Milbank	U9320-RXL	1	0	1	EA.			Jamie: Please confirm acceptability of specified meter socket w/ SFPUC metering group prior to ordering.
	Milbank, 125 amp, 7 terminal, ringless, 3 phase 4 wire, with non-jaw clamping lever bypass									

TOTAL:	\$0.00
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EA = EACH; LF = LINEAR FOOT

END OF ATTACHMENT ____

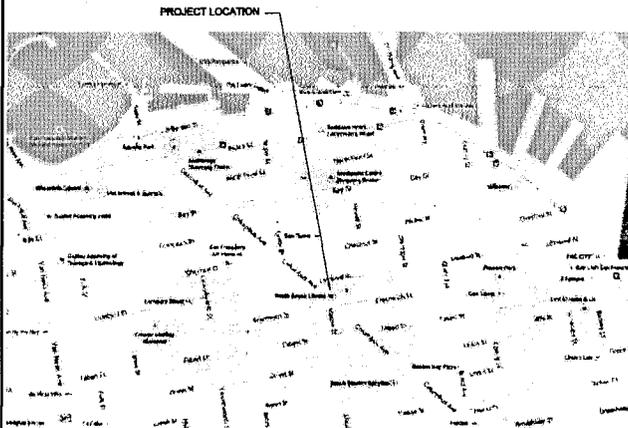
NORTH BEACH LIBRARY PHOTOVOLTAIC (PV) PROJECT

850 COLUMBUS AVENUE, SAN FRANCISCO, CA 94133

APPENDIX C

LOCATION MAP

DRAWING INDEX



PROJECT TO INSTALL A 11.77 KW PHOTOVOLTAIC (PV) SYSTEM AT 850 COLUMBUS AVENUE - NORTH BEACH LIBRARY.

THE PV INSTALLATION WILL BE ON THE ROOF OF NORTH BEACH LIBRARY. HIGH EFFICIENCY SUNPOWER E20/S27 PV MODULES WILL BE ATTACHED TO A LUMINO UL-A RACKING SYSTEM FOR THIS PROJECT. THE PV ARRAYS WILL BE HELD IN PLACE USING POSITIVELY ATTACHED ANCHORS. TRIANGULAR ARCHITECTURAL PV SCREENS WILL BE ATTACHED AT THE END OF EACH PV ROW (BY OTHERS).

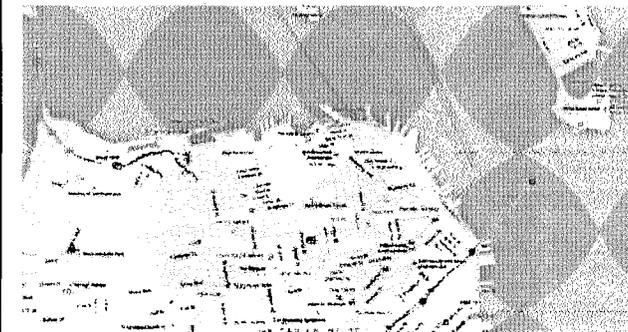
ELECTRICAL OUTPUT (DC) FROM THE PV SYSTEM WILL BE ROUTED TO AN INVERTER TO CONVERT DC TO AC POWER. THE INVERTER AC OUTPUT WILL BE ROUTED THROUGH A SEPARATE METER TO A MISCIBLE UTILITY AC DISCONNECT. FINALLY THE AC POWER WILL BE FED TO THE FACILITY'S MAIN ELECTRICAL SWITCHBOARD 'MS' LOCATED IN THE GROUND FLOOR MAIN ELECTRICAL ROOM VIA A LOAD SIDE ELECTRICAL CONNECTION.

- GENERAL**
T0.1 TITLE SHEET
- STRUCTURAL**
S.0 GENERAL NOTES AND DETAILS
S.1 RACK LAYOUT
S.2 RACK DETAILS
- ELECTRICAL**
E0.1 SYMBOLS, GENERAL NOTES, ABBREVIATIONS
E0.2 SPECIFICATIONS
E3.1 ELECTRICAL WIRING PLAN
E3.2 ELECTRICAL GROUNDING PLAN
E3.1 SINGLE LINE DIAGRAM & STRING CALCULATIONS
E7.1 DETAILS

SITE MAP

APPLICABLE CODES AND STANDARDS

PROJECT TEAM



1. 2013 CALIFORNIA BUILDING CODE (CBC), VOLUMES #1 AND #2 (PART 2, TITLE 24, CBC) WITH 2013 SAN FRANCISCO BUILDING CODE AMENDMENTS
2. 2013 CALIFORNIA ELECTRICAL CODE (PART 3, TITLE 24, CC4) WITH 2013 SAN FRANCISCO ELECTRICAL CODE AMENDMENTS
3. 2013 CALIFORNIA ENERGY CODE (PART 8, TITLE 24, CC0)
4. ASCE 7-10 MINIMUM DESIGN LOADS FOR BUILDINGS AND OTHER STRUCTURES

OWNER:
SAN FRANCISCO WATER, POWER & SEWER SERVICES OF THE SAN FRANCISCO PUBLIC UTILITIES COMMISSION
RENEWABLE ENERGY GENERATION
POWER ENTERPRISE
525 GOLDEN GATE AVENUE, 7TH FLOOR
SAN FRANCISCO, CA 94102

CONTACTS:
LOUI MITCHELL, PE, LEED AP
RENEWABLE ENERGY GENERATION, PHONE: (415) 554-3283
JAMES ANDREWS
RENEWABLE ENERGY GENERATION, PHONE: (415) 554-1587
JANE SCORL
RENEWABLE ENERGY GENERATION, PHONE: (415) 554-1537

PROJECT ADDRESS:
NORTH BEACH LIBRARY
850 COLUMBUS AVENUE
SAN FRANCISCO, CA 94133

CONTACT:
DENNIS GATES, DPM PROJECT MANAGER
PHONE: (415) 261-1232

- 1) AEPC GROUP, LLC
5000 EXECUTIVE PARKWAY, SUITE 475
SAN RAMON, CA 94583
- 2) TONNEBAUM MARSHALL ENGINEERS (TME)
414 HAYDEN STREET, SUITE 605
SAN FRANCISCO, CA 94102
- 3) PROJECT MANAGER: VENK MANI, PE
PHONE: 825-277-3010
FAX: 825-824-0102

ELECTRICAL ENGINEER: ALI KHAN, PE
PHONE: 825-277-3058
FAX: 825-824-0102

STRUCTURAL ENGINEER: MANNY TONNEBAUM, PE (TME)
PHONE: 415-772-8881
FAX: 415-772-8883



NORTH BEACH LIBRARY
PHOTOVOLTAIC (PV) PROJECT

STAFF REVIEW	01/31/14	0
ISSUED FOR PERMIT	02/21/14	1



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Rev	01-3-2013 SFPA-12110
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Checked	AK/PM
Scale	AS SHOWN

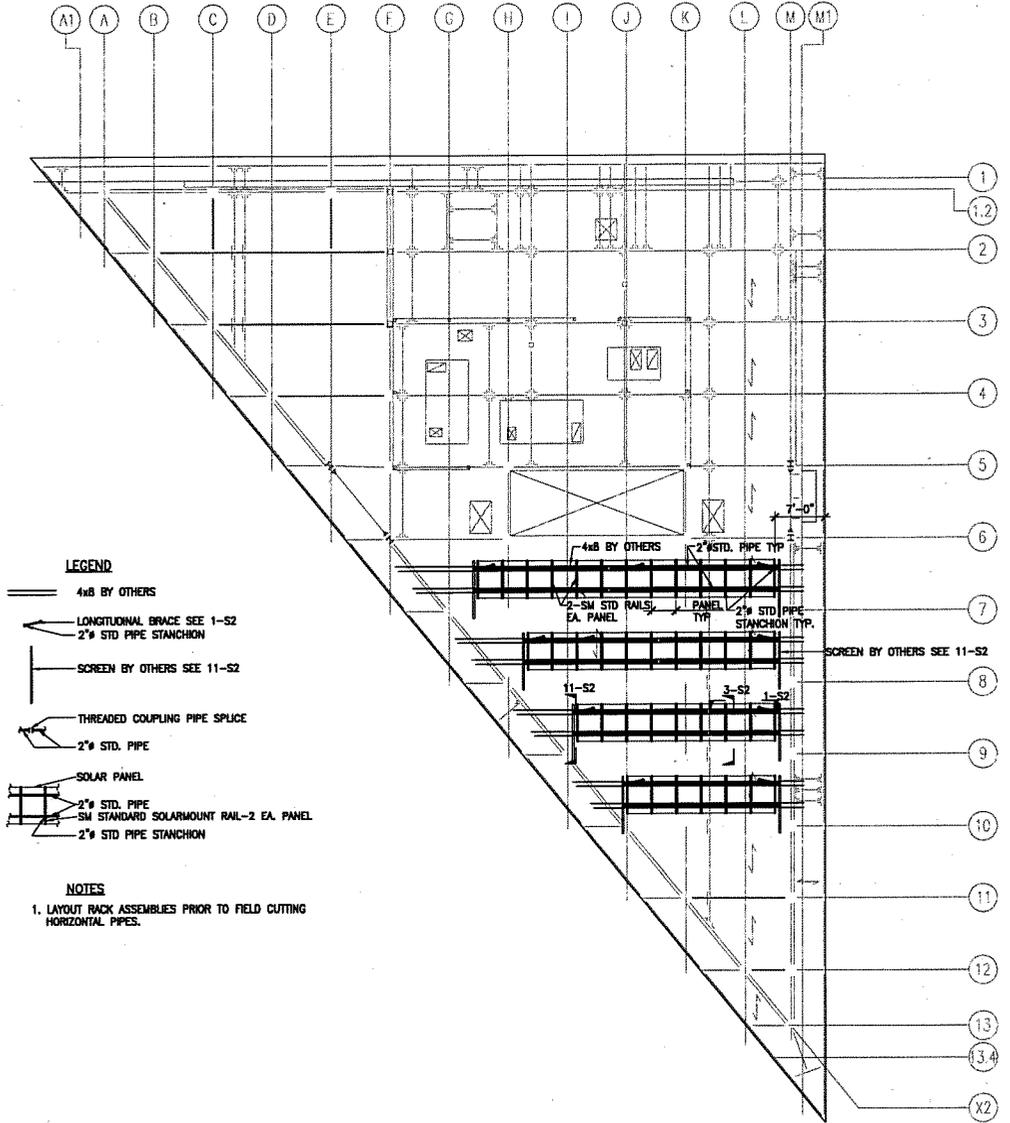
TITLE SHEET

T0.1

OF SHEETS

ALL DRAWINGS SHALL BE PRINTED ON 24" X 36" ARCH PAPER UNLESS OTHERWISE SPECIFIED. DATE: 01/31/14. 11:58 AM. BECTHWALTY

**NORTH BEACH LIBRARY
 PHOTOVOLTAIC (PV) PROJECT**



- LEGEND**
- 4x8 BY OTHERS
 - LONGITUDINAL BRACE SEE 1-S2
 - 2x STD PIPE STANCHION
 - SCREEN BY OTHERS SEE 11-S2
 - THREADED COUPLING PIPE SPLICE
 - 2x STD. PIPE
 - SOLAR PANEL
 - 2x STD. PIPE SM STANDARD SOLARMOUNT RAIL-2 EA. PANEL
 - 2x STD PIPE STANCHION

NOTES
 1. LAYOUT RACK ASSEMBLIES PRIOR TO FIELD CUTTING HORIZONTAL PIPES.

SPFU REVIEW	01/31/14	0
ISSUED FOR PERMIT	02/21/14	1

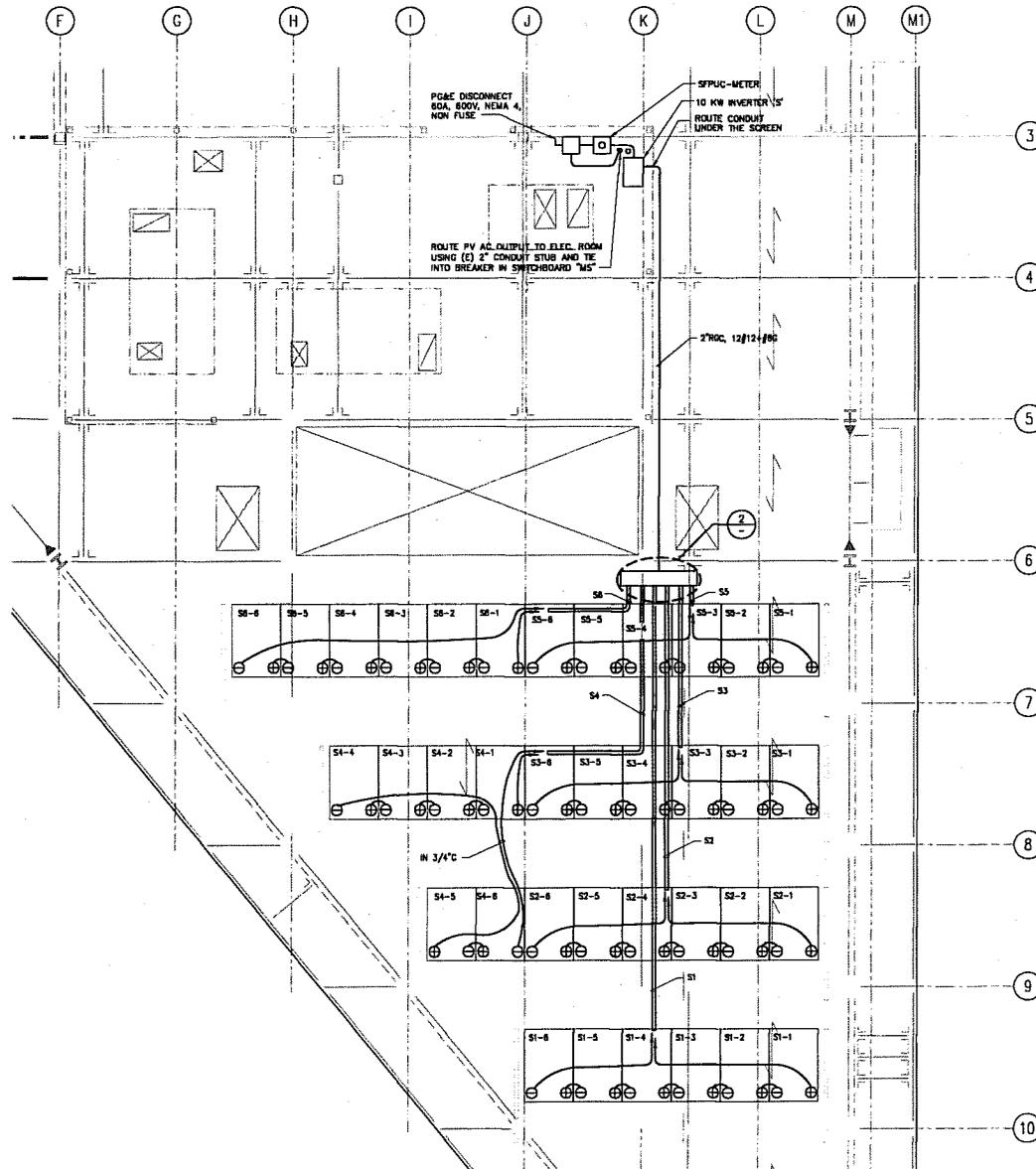
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Drawn	en
Checked by	nt

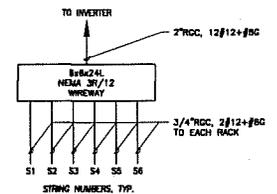
**RACK
 LAYOUT**

S1

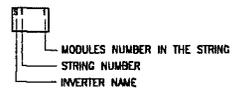
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ELECTRICAL -WIRING PLAN
 SCALE: 1/4" = 1'-0"



WIREWAY DETAIL
 SCALE: NTS



AEPCCorp, LLC
 North Beach Library
 1415 Ocean Street, Suite 100
 San Francisco, CA 94112
 Telephone: 415.772.2881
 Fax: 415.772.2882

TM
 Mechanical Design and Engineering
 1415 Ocean Street, Suite 100
 San Francisco, CA 94112
 Tel: 415.772.2881
 Fax: 415.772.2882

JOB TITLE

REVISED

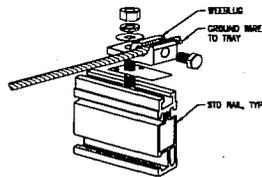
REVIEW	DATE	BY
GFPM REVIEW	01/31/14	D
ISSUED FOR PERMIT	02/21/14	I



SHEET INFORMATION	
Date:	12/03/13
Job:	03-2-10 SFPU-12120
Scale:	AS SHOWN
Drawn by:	FJC
Checked by:	AK

ELECTRICAL WIRING PLAN

SHEET
E3.1
 OF 12

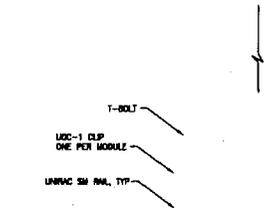


- NOTES:
 1. ONE WEERLUG PER MODULE.
 2. INSTALL WEERLUG USING UNIRAC T-BOLT, ALONG WITH LOCK WASHER, FLAT WASHER (PER UNIRAC MFR. INSTRUCTIONS).

PV MODULE GROUNDING DETAIL

SCALE: NONE

3

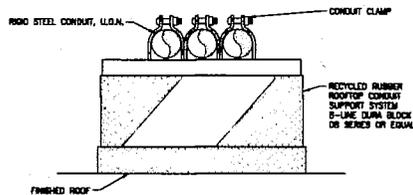


NOTE: 4 END CLAMPS FOR EACH MODULE.

P.V. PANEL MOUNTING DETAIL

SCALE: NONE

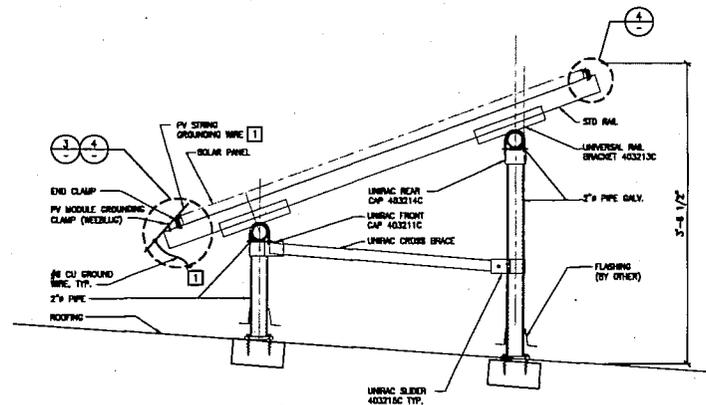
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CONDUIT ON RUBBER SUPPORT ON ROOF

SCALE: NONE

5



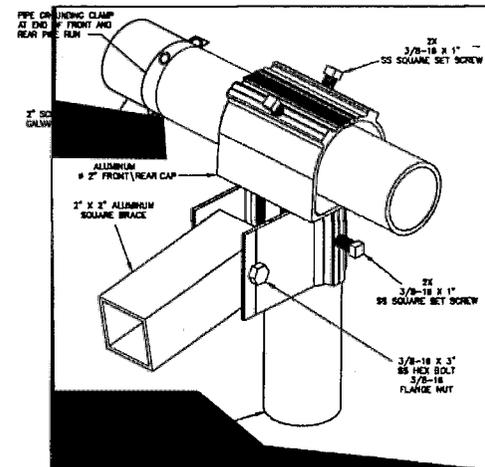
NOTE:

1 SEE SHEET E3.2 FOR ROUTING OF GROUNDING WIRE.

UNIRAC U-LA CROSS SECTION

SCALE: NTS

1



1 SEE SHEET E3.2 FOR ROUTING OF GROUNDING WIRE.

U-LA FRONT/REAR PIPE GROUNDING DETAIL

SCALE: NONE

2

DATE	REVISION	BY	CHKD
01/21/14	0		
02/21/14	1		



SHEET INFORMATION	
DATE	12/13/13
BY	AS NOTED
CHKD	FMC
DATE	08
BY	AK

ELECTRICAL DETAILS

E7.1