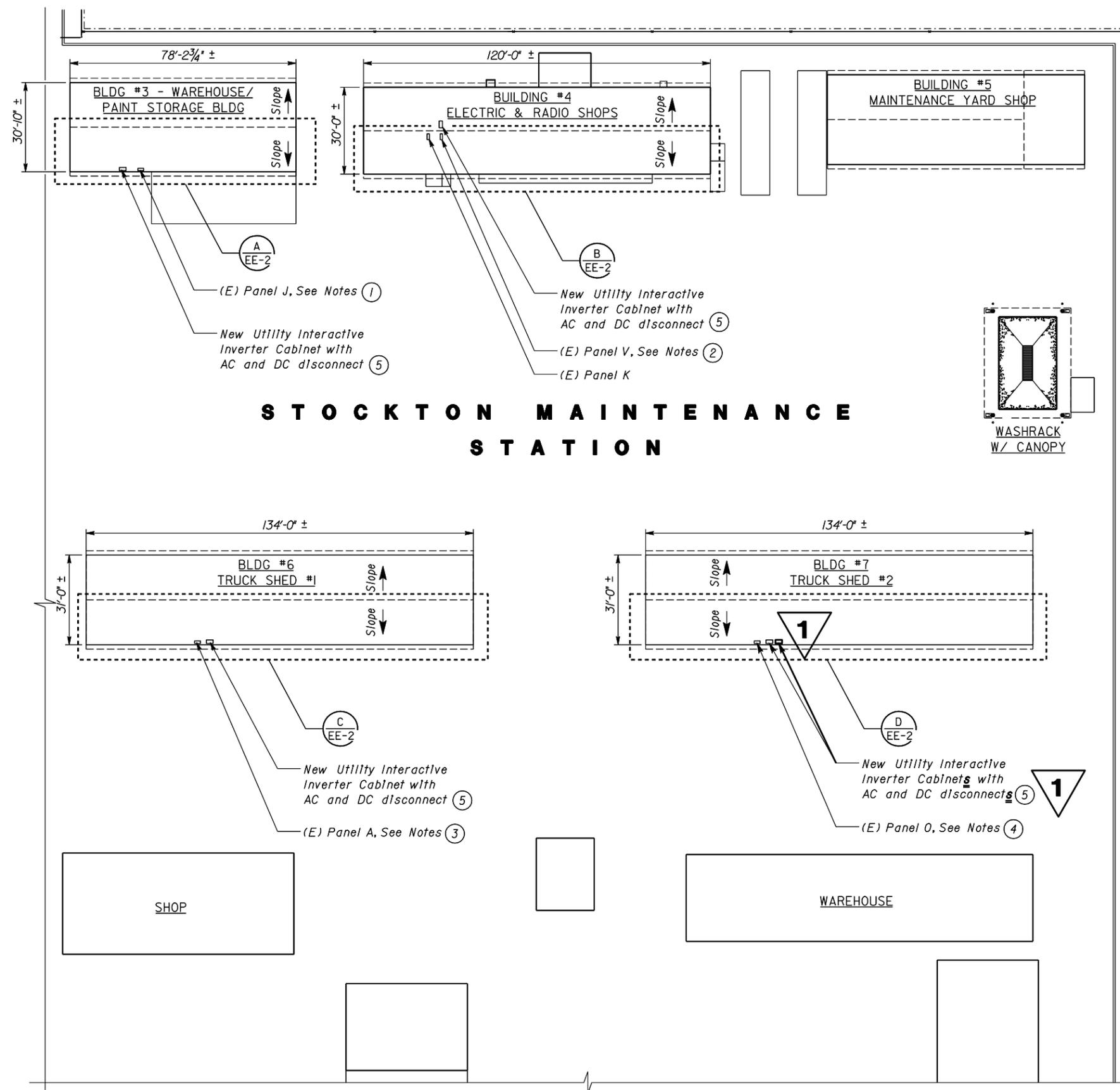


DIST.	COUNTY	LOCATION CODE	POST MILES TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
10	SJ	5721		3	7

REGISTERED ELECTRICAL ENGINEER
 DATE 11-16-09
 JIM TORKELOSON
 No. E 13742
 Exp. 6-30-11
 ELEC
 STATE OF CALIFORNIA

04-08-10
 PLANS APPROVAL DATE

The State of California or its officers or agents shall not be responsible for the accuracy or completeness of electronic copies of this plan sheet.



- Notes:**
- (E) Panel J is a wall mounted 100-Ampere, 120/240-volt, single-phase panelboard fed from Panel K in Building #4. There is a 100-Ampere fused disconnect switch mounted next to Panel J. Replace the (E) disconnect switch with a new 100-Ampere fused, two-pole disconnect switch with the required multiple load side lugs to feed (E) Panel J and the new Utility Interactive System. See sheet ~~EE-3~~ EE-4
 - (E) Panel V is a wall mounted 125-Ampere, 120/240-volt, three-phase panelboard fed from Panel K in Building #4. Intercept the conduit feeding Panel V and install a new 100-Ampere, three-pole fused disconnect switch with the required multiple load side lugs to feed (E) Panel V and the new Utility Interactive System. See sheet EE-3.
 - (E) Panel A is a wall mounted 100-Ampere, 120/240-volt, three-phase panelboard fed from Panel K in Building #4. Intercept the conduit feeding Panel A and install a new 100-Ampere, three-pole fused disconnect switch with the required multiple load side lugs to feed (E) Panel A and the new Utility Interactive System. See sheet EE-3.
 - (E) Panel O is a wall mounted 125-Ampere, 120/240-volt, single-phase panelboard fed from Panel K in Building #4. Intercept the conduit feeding Panel O and install a new 100-Ampere, two-pole fused disconnect switch with the required multiple load side lugs to feed (E) Panel V and the two new Utility Interactive Systems. See sheet ~~EE-3~~ EE-4
 - Install the new Utility Interactive Inverter Cabinets on the wall at Buildings #3 and #7 using the available space near the (E) Panelboard. The Utility Interactive Inverter Cabinet at building #4 and #6 shall be floor mounted, if required. Route the conduit up the wall and penetrate the roof for connection to the new PV Array Circuit Combiner Box.

1 REVISED PER ADDENDUM No. 1 DATED AUGUST 25, 2010



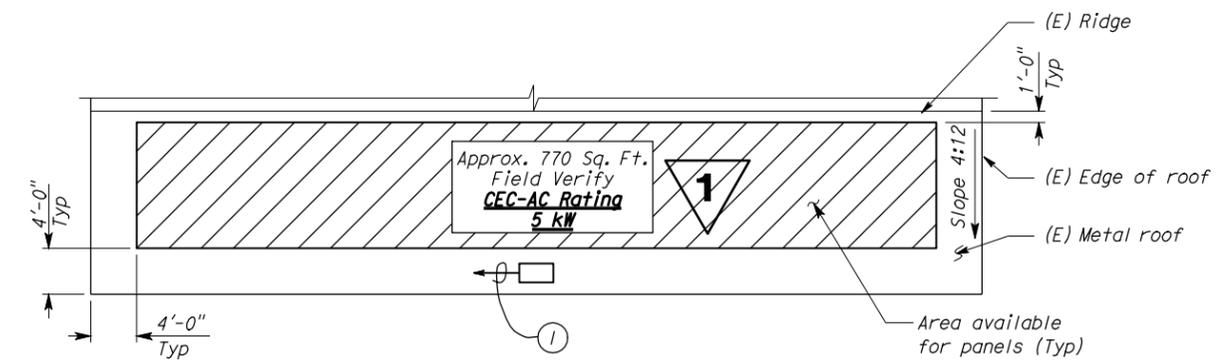
PARTIAL SITE PLAN
SCALE 1" = 20'-0"

THIS DRAWING ACCURATE FOR ELECTRICAL WORK ONLY.

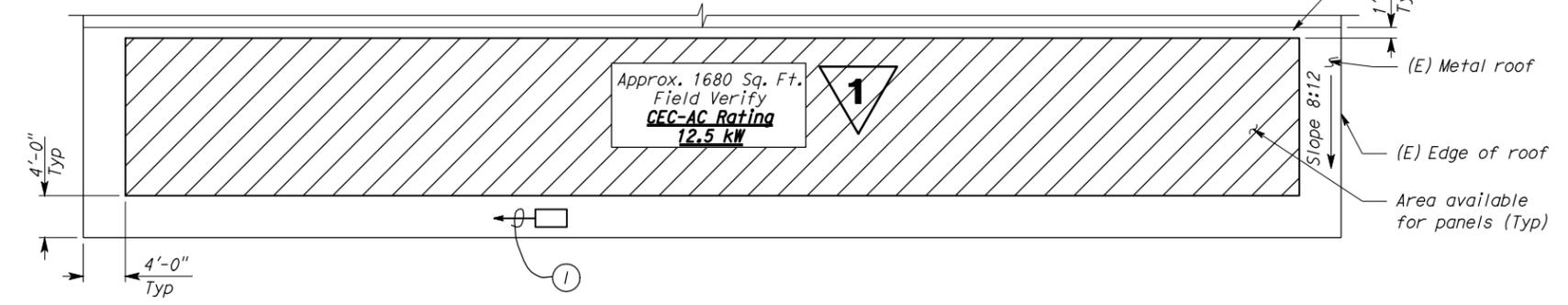
DESIGN BY J. Torkelson	CHECKED Tech Ngov	STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	DIVISION OF ENGINEERING SERVICES ELECTRICAL-MECHANICAL-WATER AND WASTEWATER DESIGN	BRIDGE NO.	STOCKTON MAINTENANCE STATION PHOTOVOLTAIC SYSTEM	SHEET EE-1
				29M5721		
DETAILS BY J. Kwong	CHECKED Tech Ngov	ORIGINAL SCALE IN INCHES FOR REDUCED PLANS	CU 10116 EA 0AA001	POST MILE	PARTIAL SITE PLAN	SHEET OF
QUANTITIES BY J. Torkelson	CHECKED Alan Torres			-		
DOES SD Imperial Rev. 10/09		0 1 2 3		REVISION DATES (PRELIMINARY STAGE ONLY)		24-AUG-2010 16:11
				DISREGARD PRINTS BEARING EARLIER REVISION DATES		ee_01.dgn

DIST.	COUNTY	LOCATION CODE	POST MILES TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
10	SJ	5721		4	7

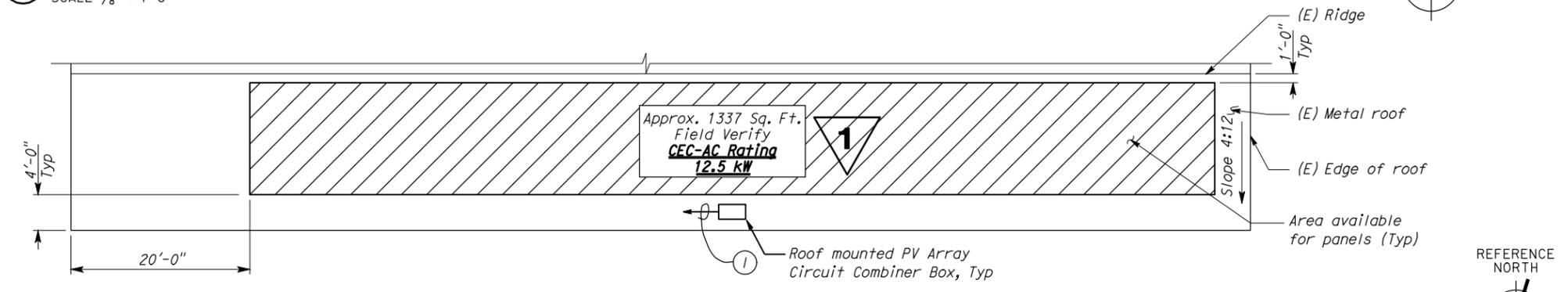
CALIFORNIA STATE FIRE MARSHAL APPROVED Approval of this plan does not authorize or approve any omission or deviation from applicable regulations. Final approval is subject to field inspection. One set of approved plans shall be available on the project site at all times. Reviewed by: <u>JASON D. DeWITT</u> Approval date: <u>01-21-10</u>		11-16-09 REGISTERED ELECTRICAL ENGINEER DATE DATE
04-08-10 PLANS APPROVAL DATE		
The State of California or its officers or agents shall not be responsible for the accuracy or completeness of electronic copies of this plan sheet.		



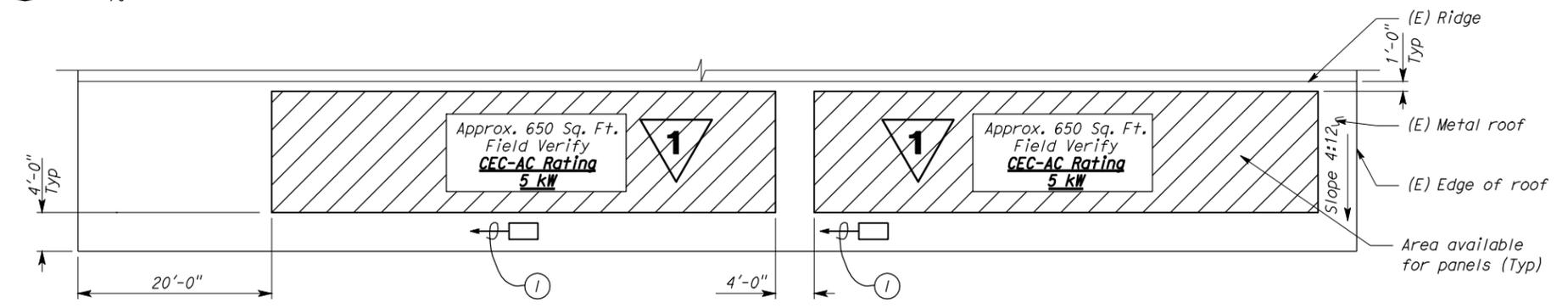
A ROOF PLAN - BUILDING #3
SCALE 1/8" = 1'-0"



B ROOF PLAN - BUILDING #4
SCALE 1/8" = 1'-0"



C ROOF PLAN - BUILDING #6
SCALE 1/8" = 1'-0"



D ROOF PLAN - BUILDING #7
SCALE 1/8" = 1'-0"

Note:
 ① 2" C, with DC conductors and equipment grounding conductor to Utility Interactive System, see Sheet EE-1.

General Note:
 A. Mount all PV arrays parallel to roof.

Project
 CEC-AC Rating
 Total: 40 kW

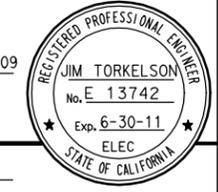
1 REVISED PER ADDENDUM No. 1
 DATED AUGUST 25, 2010

THIS DRAWING ACCURATE FOR ELECTRICAL WORK ONLY.

DOES SD Imperial Rev.10/09	DESIGN	BY J. Torkelson	CHECKED Tech Ngov	STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	DIVISION OF ENGINEERING SERVICES ELECTRICAL-MECHANICAL-WATER AND WASTEWATER DESIGN	BRIDGE NO.	29M5721	STOCKTON MAINTENANCE STATION PHOTOVOLTAIC SYSTEM	SHEET EE-2
	DETAILS	BY J. Kwong	CHECKED Tech Ngov			POST MILE	-		
	QUANTITIES	BY J. Torkelson	CHECKED Alan Torres	CU 10116 EA 0AA001	DISREGARD PRINTS BEARING EARLIER REVISION DATES			SHEET OF	

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DIST.	COUNTY	LOCATION CODE	POST MILES TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
10	SJ	5721		5	7

	
 REGISTERED ELECTRICAL ENGINEER	11-16-09 DATE
04-08-10 PLANS APPROVAL DATE	
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Photovoltaic Module

PV modules shall be polycrystalline silicon cell type module, with interconnection connectors rated for 90°C. PV modules shall be UL 1703 listed, with a maximum system voltage of 600 VDC. PV module manufacturer shall be one of those manufacturers listed as an eligible California Solar Initiative (CSI) PV module manufacturer.

Photovoltaic Array Circuit Combiner Box

PV array circuit combiner box shall be factory assembled, 600 VDC rated combiner box, with fused input circuits, two isolated DC bus bars, ground bus bar, all enclosed inside NEMA 3R lockable hinged cover enclosure. The combiner box shall be UL 1741 listed.

PV array circuit combiner box shall have the following components:

- DIN rail mounted touch safe fuse holders with fuse.
- Positive DC bus bar, negative DC bus bar and ground bus bar.
- DIN rail mounted Grid-Tie surge arrester: The surge arrester shall be rated to withstand 20 kA (8/20 micro second) induced transient surge type, and compatible to use with grounded PV arrays.

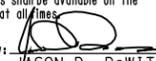
Utility Interactive Inverter Cabinet

Utility Interactive Inverter cabinet shall be outdoor type, factory assembled cabinet consisting of the following equipment:

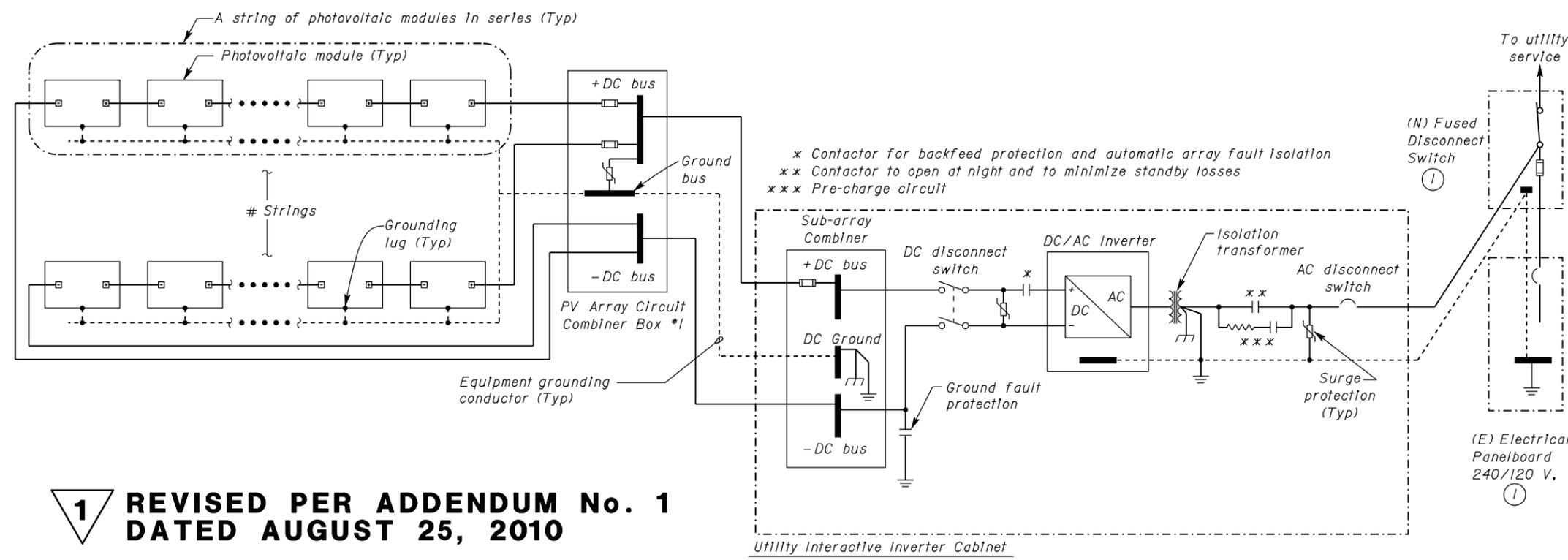
- DC/AC Inverter:
 - DC/AC Inverter rated at maximum continuous output power of 13 kW (13 kVA), 240/120 V, 3-phase, 4-wire, at a power factor of 0.99 or greater, efficiency 95.5%, with input operating voltage range between 225 to 380 VDC, and maximum DC input current shall be 60 A. Inverter shall be capable of operating at ambient temperature range (Full power) of -4°F to +122°F. DC/AC Inverter manufacturer shall be one of those manufacturers listed as an eligible California Solar Initiative (CSI) DC/AC Inverter manufacturer.
- Fused sub-array combiner, with minimum of 4 array inputs for positive DC, negative DC, and DC ground bus bars. Positive array inputs fuse size to match loading.
- Built-in DC and AC disconnect switches, size to match loading.
- Integrated ~~15~~ 15 kVA, 240/120 V, 3-phase, 4-wire, output isolation type transformer.
- Ground fault protection.
- Integrated AC and DC surge protections.
- Integrated AC and DC contactors.
- Pre-charge circuit.
- Human Machine Interface (HMI):
 - AC/DC Inverter's HMI shall be equipped with LCD and keypad displaying main menu. HMI main menu shall display system monitoring, status and faults, and operation. Monitoring menu shall display system status, metering, daily, weekly and monthly energy production. Status and faults menu shall display status messages, system output, and number of faults. Operation menu shall display control and settings.
- Local and remote monitoring systems capabilities.
- AC ground bus bars.
- NEMA 3R enclosure:
 - Enclosure shall be NEMA 3R, 14-gauge, and powder-coated standard factory finish steel enclosure. All screws, latches, hinge pins and similar hardware shall be stainless steel. HMI, AC and DC disconnect switches and equipment rating labels shall be mounted on the exterior door. Exterior door shall have interlock switch and be lockable with a padlock. The cabinet shall have MEV13 rated filtered, top entry forced air cooling system with one fan, sloped roof, and shall be suitable for Seismic Design Category D compliance.

CALIFORNIA STATE FIRE MARSHAL APPROVED

Approval of this plan does not authorize or approve any omission or deviation from applicable regulations. Final approval is subject to field inspection. One set of approved plans shall be available on the project site at all times.

Reviewed by: 
 Jason D. DeWitt
 Approval date: 01-21-10

- General Notes:**
- Provide and install all necessary warning labels/markings, per Article 690 of California Electrical Code (CEC), and the State Fire Marshal's guideline for solar PV installation.
 - Solar PV installation shall comply with the latest guideline from California Department of Forestry & Fire Protection, Office of the State Fire Marshal and latest Program Handbook from California Solar Initiative (CSI).
- Notes:**
- See sheet EE-1 for specific details.



Photovoltaic System Requirements

Photovoltaic system complete design and installation details, inclusive of all engineering calculations signed by an Professional Engineer of the respective field (both Electrical and Civil Engineering) in the State of California, shall be submitted for approval by the Contractor. The PV design shall meet or exceed the following requirements:

- Total designed capacity of photovoltaic system at existing Building shall have CEC-AC rating of ~~12.5~~ 12.5 kW. Number of PV modules per string shall be arranged in a manner to meet or exceed the following:
 - Maximum system voltage based on lowest expected ambient temperature at the site (Voc maximum on coldest day) shall be no less than 1% of the Inverter's maximum input DC voltage range.
 - Maximum system power voltage, based on highest continuous ambient temperature at the site (Vmp on warmest day), shall be 20% greater than the Inverter's minimum input DC voltage range.
- Photovoltaic system module row spacing shall be designed to prevent shading from adjacent module.
- All wiring, except at module interconnection, shall be concealed inside conduit system.
- Photovoltaic system modules structural support system shall be designed to withstand wind forces of 85-mile per hour.
- Photovoltaic system wiring and protective devices shall meet or exceed the requirements of all applicable codes.
- PV Array Circuit Combiner Boxes locations as shown are arbitrary only. Contractor shall install the combiner boxes at locations that best suit the photovoltaic system strings layout.

1 REVISED PER ADDENDUM No. 1 DATED AUGUST 25, 2010

DESIGN	BY J. Torkelson	CHECKED Tech Ngov	STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	DIVISION OF ENGINEERING SERVICES	BRIDGE NO. 29M5721	STOCKTON MAINTENANCE STATION PHOTOVOLTAIC SYSTEM SINGLE LINE DIAGRAM - BLDG #4 & #6	SHEET
DETAILS	BY J. Kwong	CHECKED Tech Ngov		ELECTRICAL-MECHANICAL-WATER AND WASTEWATER DESIGN	POST MILE -		EE-3
QUANTITIES	BY J. Torkelson	CHECKED Alan Torres		CU 10116 EA 0AA001	DISREGARD PRINTS BEARING EARLIER REVISION DATES		10/2/09

DOES SD Imperial Rev. 10/09 ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

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DIST.	COUNTY	LOCATION CODE	POST MILES TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
10	SJ	5721		6	7

REGISTERED ELECTRICAL ENGINEER	DATE 11-16-09
PLANS APPROVAL DATE 04-08-10	
The State of California or its officers or agents shall not be responsible for the accuracy or completeness of electronic copies of this plan sheet.	

Photovoltaic Module

PV modules shall be polycrystalline silicon cell type module, with interconnection connectors rated for 90°C. PV modules shall be UL 1703 listed, with a maximum system voltage of 600 VDC. PV module manufacturer shall be one of those manufacturers listed as an eligible California Solar Initiative (CSI) PV module manufacturer.

Photovoltaic Array Circuit Combiner Box

PV array circuit combiner box shall be factory assembled, 600 VDC rated combiner box, with fused input circuits, two isolated DC bus bars, ground bus bar, all enclosed inside NEMA 3R lockable hinged cover enclosure. The combiner box shall be UL 1741 listed.

PV array circuit combiner box shall have the following components:

- DIN rail mounted touch safe fuse holders with fuse.
- Positive DC bus bar, negative DC bus bar and ground bus bar.
- DIN rail mounted Grid-Tie surge arrester: The surge arrester shall be rated to withstand 20 kA (8/20 micro second) induced transient surge type, and compatible to use with grounded PV arrays.

CALIFORNIA STATE FIRE MARSHAL APPROVED

Approval of this plan does not authorize or approve any omission or deviation from applicable regulations. Final approval is subject to field inspection. One set of approved plans shall be available on the project site at all times.

Reviewed by: JASON D. DeWITT
Approval date: 01-21-10

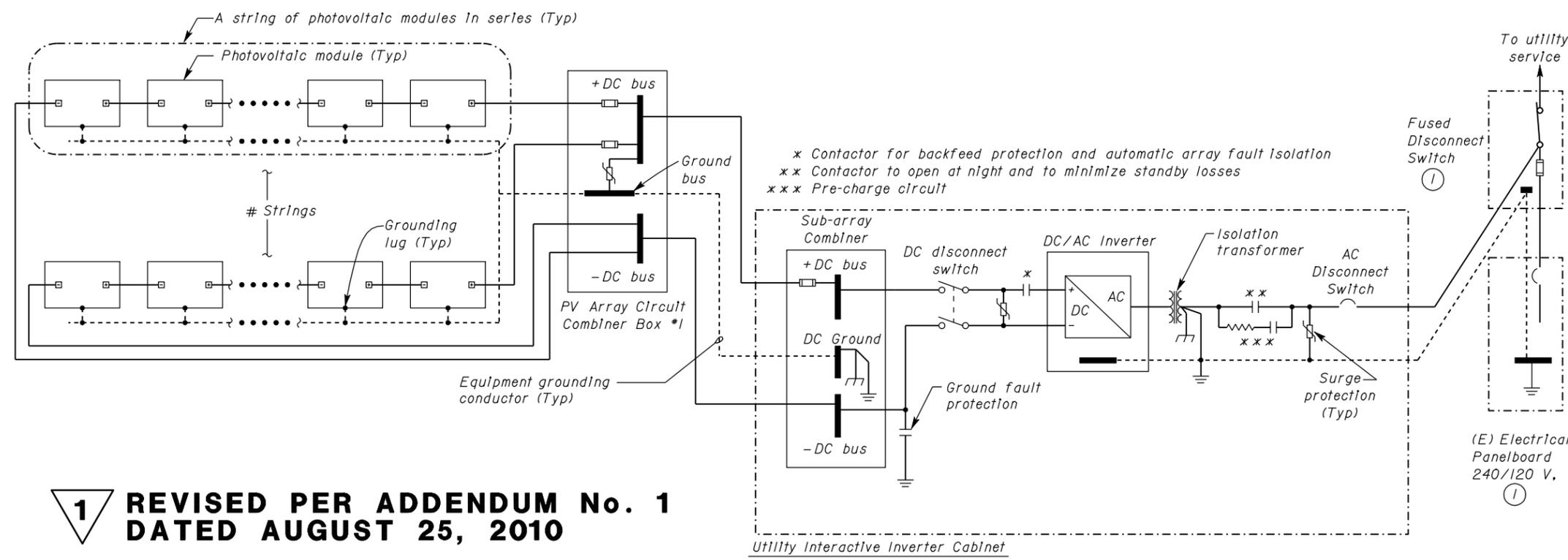
Utility Interactive Inverter Cabinet

Utility Interactive Inverter cabinet shall be outdoor type, factory assembled cabinet consisting of the following equipment:

- DC/AC Inverter: DC/AC Inverter rated at maximum continuous output power of 5kW (5 kVA), 240/120 V, 1-phase, 3-wire, at a power factor of 0.99 or greater, efficiency 95.5%, with input operating voltage range between 212 to 264 VDC, and maximum DC input current shall be 22 A. Inverter shall be capable of operating at ambient temperature range (Full power) of -4°F to +122°F. DC/AC Inverter manufacturer shall be one of those manufacturers listed as an eligible California Solar Initiative (CSI) DC/AC Inverter manufacturer.
- Fused sub-array combiner, with minimum of 4 array inputs for positive DC, negative DC, and DC ground bus bars. Positive array inputs fuse size to match loading.
- Built-in DC and AC disconnect switches, size to match loading.
- Integrated 5kVA, 240/120 V, ~~3-phase~~, **1-phase, 3-wire**, output Isolation type transformer.
- Ground fault protection.
- Integrated AC and DC surge protections.
- Integrated AC and DC contactors.
- Pre-charge circuit.
- Human Machine Interface (HMI): AC/DC Inverter's HMI shall be equipped with LCD and keypad displaying main menu. HMI main menu shall display system monitoring, status and faults, and operation. Monitoring menu shall display system status, metering, daily, weekly and monthly energy production. Status and faults menu shall display status messages, system output, and number of faults. Operation menu shall display control and settings.
- Local and remote monitoring systems capabilities.
- AC ground bus bars.
- NEMA 3R enclosure: Enclosure shall be NEMA 3R, 14-gauge, and powder-coated standard factory finish steel enclosure. All screws, latches, hinge pins and similar hardware shall be stainless steel. HMI, AC and DC disconnect switches and equipment rating labels shall be mounted on the exterior door. Exterior door shall have interlock switch and be lockable with a padlock. The cabinet shall have MEV13 rated filtered, top entry forced air cooling system with one fan, sloped roof, and shall be suitable for Seismic Design Category D compliance.



- General Notes:**
- Provide and install all necessary warning labels/markings, per Article 690 of California Electrical Code (CEC), and the State Fire Marshal's guideline for solar PV installation.
 - Solar PV installation shall comply with the latest guideline from California Department of Forestry & Fire Protection, Office of the State Fire Marshal and latest Program Handbook from California Solar Initiative (CSI).
 - Building #7 will have two identical 5 kW Utility Interactive Systems fed from the new Fusible Disconnect Switch.**
- Notes:**
- See sheet EE-1 for specific details at different locations



Photovoltaic System Requirements

Photovoltaic system complete design and installation details, inclusive of all engineering calculations signed by an Professional Engineer in the State of California, shall be submitted for approval by the Contractor. The PV design shall meet or exceed the following requirements:

- Total designed capacity of photovoltaic system at existing Building shall have CEC-AC rating of 5 kW. Number of PV modules per string shall be arranged in a manner to meet or exceed the following:
 - Maximum system voltage based on lowest expected ambient temperature at the site (Voc maximum on coldest day) shall be no less than 1% of the Inverter's maximum input DC voltage range.
 - Maximum system power voltage, based on highest continuous ambient temperature at the site (Vmp on warmest day), shall be 20% greater than the Inverter's minimum input DC voltage range.
- Photovoltaic system module row spacing shall be designed to prevent shading from adjacent module.
- All wiring, except at module interconnection, shall be concealed inside conduit system.
- Photovoltaic system modules structural support system shall be designed to withstand wind forces of 85-mile per hour.
- Photovoltaic system wiring and protective devices shall meet or exceed the requirements of all applicable codes.
- PV Array Circuit Combiner Boxes locations as shown are arbitrary only. Contractor shall install the combiner boxes at locations that best suit the photovoltaic system strings layout.

1 REVISED PER ADDENDUM No. 1 DATED AUGUST 25, 2010

DESIGN BY J. Torkelson CHECKED Tech Ngov	STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	DIVISION OF ENGINEERING SERVICES ELECTRICAL-MECHANICAL-WATER AND WASTEWATER DESIGN	BRIDGE NO. 29M5721	STOCKTON MAINTENANCE STATION PHOTOVOLTAIC SYSTEM	SHEET
			POST MILE -		SINGLE LINE DIAGRAM - BLDG #3 & #7
DETAILS BY J. Kwong CHECKED Tech Ngov	ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3	CU 10116 EA 0AA001	DISREGARD PRINTS BEARING EARLIER REVISION DATES	REVISION DATES (PRELIMINARY STAGE ONLY)	SHEET OF
QUANTITIES BY J. Torkelson CHECKED Alan Torres				11/16/09 12/09 1/10	

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