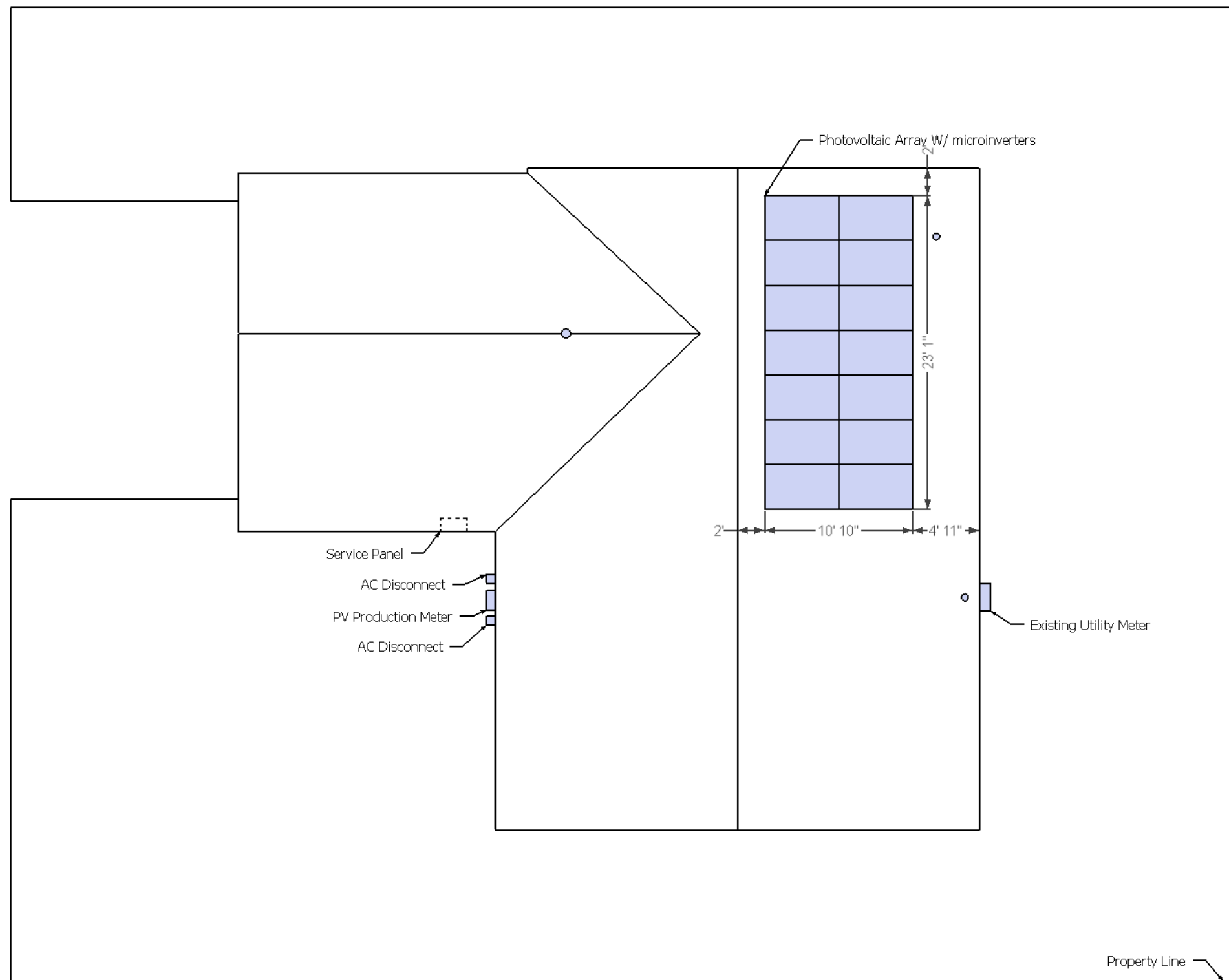


E. 29th St.

Rio Vista Cir.



GENERAL NOTES:

THIS IS A 2.99 kW-AC, 3.43 kW-DC SOLAR ELECTRIC SYSTEM USING (14) YINGLI GREEN ENERGY 245p-29b 245W-STC PHOTOVOLTAIC MODULES.

THIS IS A ROOF-MOUNTED SYSTEM (252.7 SQFT), ADDING 2.7 lbs/sqft. FINISHED ROOF SURFACE IS COMPOSITION SHINGLE (1-LAYER)

Total module (42.1 lbs each), inverter (3.5 lbs. each) and rail (.561 lbs/ft) weight: 679.17 lbs
Number of attachments: 28 >> At least 2 per module
Weight/attachment point: 24.25 lbs < 40 lbs >> OK
Area: 252.7 sqft
Distributed area: 2.7 lbs/sqft < 3.5 lbs/sqft >> OK

DESIGN COMPLYING WITH THE 2011 NEC, 2009 IBC AND ALL LOCAL ORDINANCES AND POLICIES.

THE HOUSE IS 1.5 STORY(IES) TALL. THE RAFTERS ARE 2 x 4 AND 24 INCHES ON CENTER.

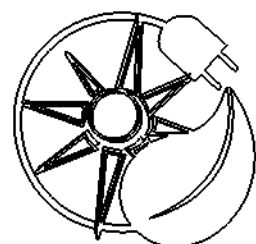
THIS SYSTEM WILL NOT BE INTERCONNECTED UNTIL APPROVAL FROM THE LOCAL JURISDICTION AND THE UTILITY IS OBTAINED.

THIS SYSTEM IS GRID-INTERTIED VIA UL-LISTED POWER CONDITIONING MICROINVERTERS, (14) Enphase Energy M215-60-2LL-S2 (240V). THIS SYSTEM HAS NO UPS, NO BATTERIES.

THE SOLAR PHOTOVOLTAIC INSTALLATION SHALL NOT OBSTRUCT ANY PLUMBING, MECHANICAL OR BUILDING ROOF VENTS.

IF THE EXISTING MAIN SERVICE PANEL DOES NOT HAVE VERIFIABLE GROUNDING ELECTRODE, IT IS THE CONTRACTOR'S RESPONSIBILITY TO INSTALL A SUPPLEMENTAL GROUNDING ELECTRODE.

EACH MODULE WILL BE GROUNDED USING THE SUPPLIED CONNECTIONS POINTS IDENTIFIED ON THE MODULE AND THE MANUFACTURER'S INSTALLATION INSTRUCTIONS.



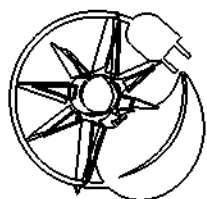
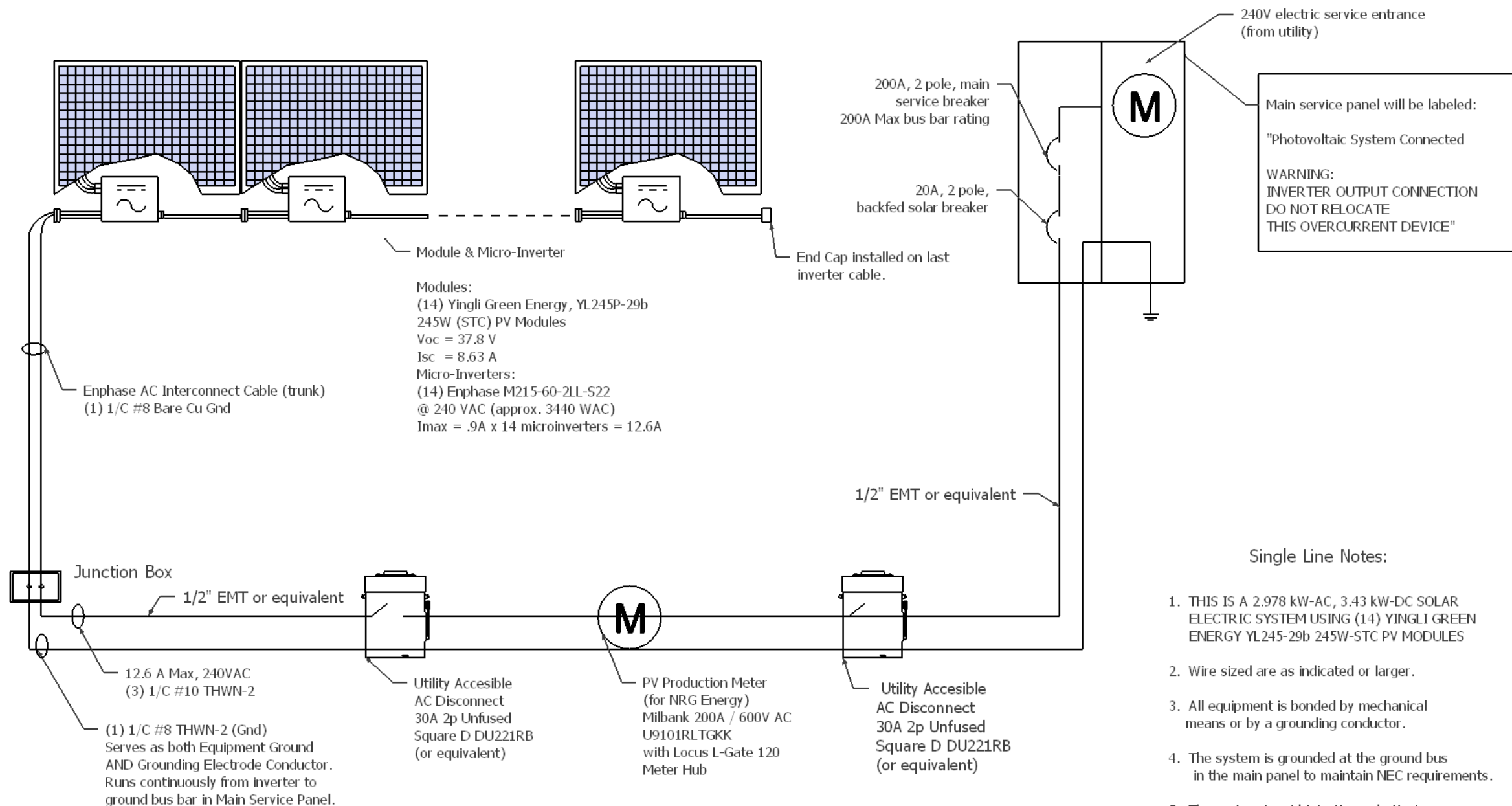
GRID Alternatives Colorado, Inc.
CO Electrical License: EC. 0100224
1120 W. 12th Ave.
Denver, CO 80204

Roof Plan
Address: [REDACTED]
Durango, CO 81301
[REDACTED]

Drawn By: Rob T
Date: 5/20/14

Revised By:
Rev Date:
Scale: 1/2" = 4' 6"

1



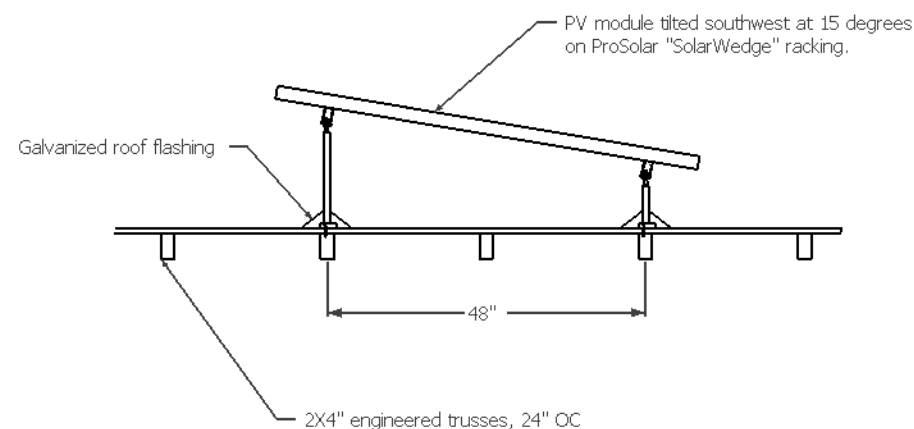
GRID Alternatives Colorado Inc.
Electrical License: EC. 0100224
1120 W. 12th Ave.
Denver, CO 80204

Single Line
Address: [REDACTED]
Durango, CO 81301
[REDACTED]

Drawn By: Rob T
Date: 5/27/14
Scale - NTS

2

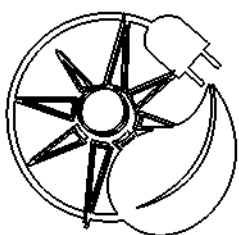
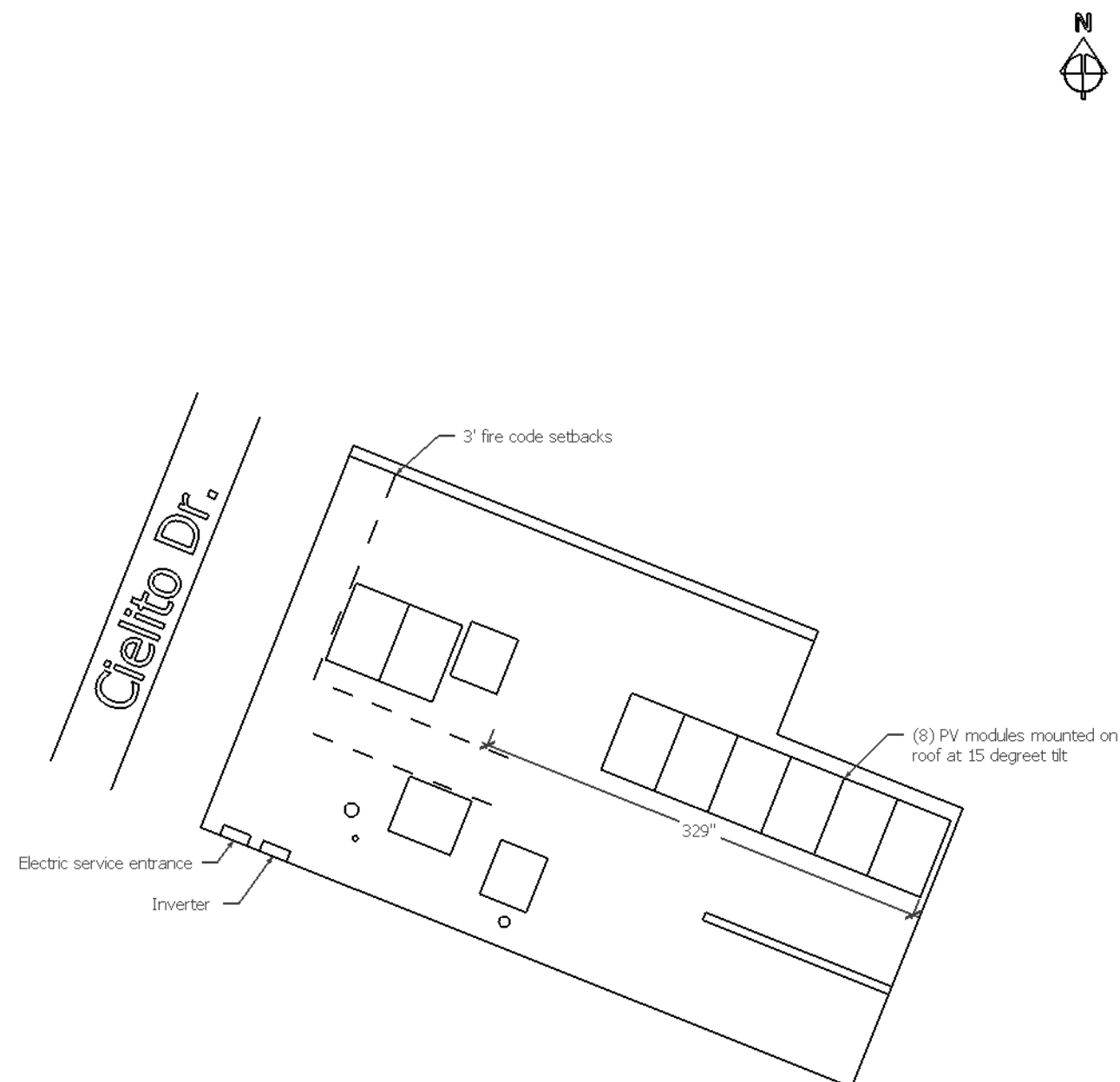
Attachment Detail



Notes

1. THIS IS A 2.3 kW SOLAR ELECTRIC SYSTEM USING (8) SUNPOWER SPR-327NE-WHT-D (327W STC) PHOTOVOLTAIC MODULES.
2. THIS SYSTEM IS GRID-INTERTIED VIA A UL-LISTED POWER CONDITIONING INVERTER PV POWERED PVP2500 (240 VAC).
3. THIS SYSTEM HAS NO UPS, NO BATTERIES.
4. THIS IS A ROOF-MOUNTED SYSTEM, ADDING 2.68 LB/sqFT. ROOF IS (1) LAYER COMPOSITION SHINGLE (ROOF SLOPE IS 0:12)
5. ROOF JOISTS ARE 2X8" ENGINEERED TRUSSES AT 32" O.C. SPACING.
6. LAG SCREWS ARE 5/16" x 3.5" AT 72" O.C. MAX, W/2.5" INTO FRAMING.
7. BUILDING IS (2) STORIES.

Roof Plan



GRID Alternatives
1171 Ocean Avenue, Suite 200
Oakland, CA 94608

Title: Roof Plan

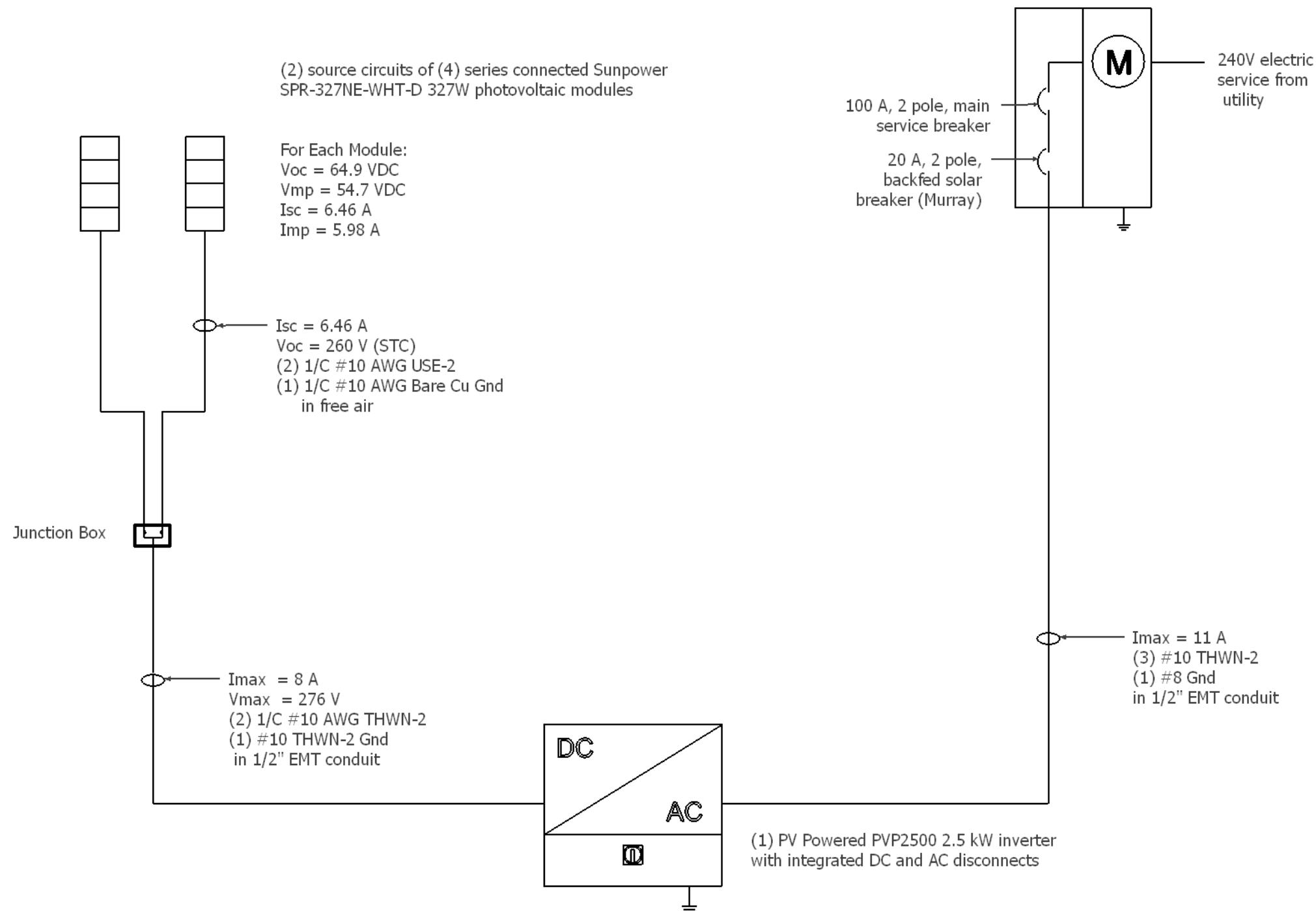
Address: [REDACTED]
[REDACTED]

Drawn By: EVH

Date: 5/30/13

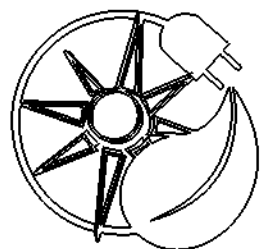
Scale - 1" = 10'

1



NOTES:

1. THE PV SOURCE CIRCUIT IS NEGATIVELY GROUNDED.
2. WIRE AND SIZES ARE AS INDICATED OR LARGER.
3. ALL EQUIPMENT IS BONDED BY MECHANICAL MEANS OR BY A GROUNDING CONDUCTOR.
4. CIRCUIT CALCULATIONS PROVIDED ON SEPARATE SHEET.
5. EQUIPMENT LABELS PROVIDED ON SEPARATE SHEET.



GRID Alternatives
 1171 Ocean Avenue, Suite 200
 Oakland, CA 94608

Title: Single-Line Drawing

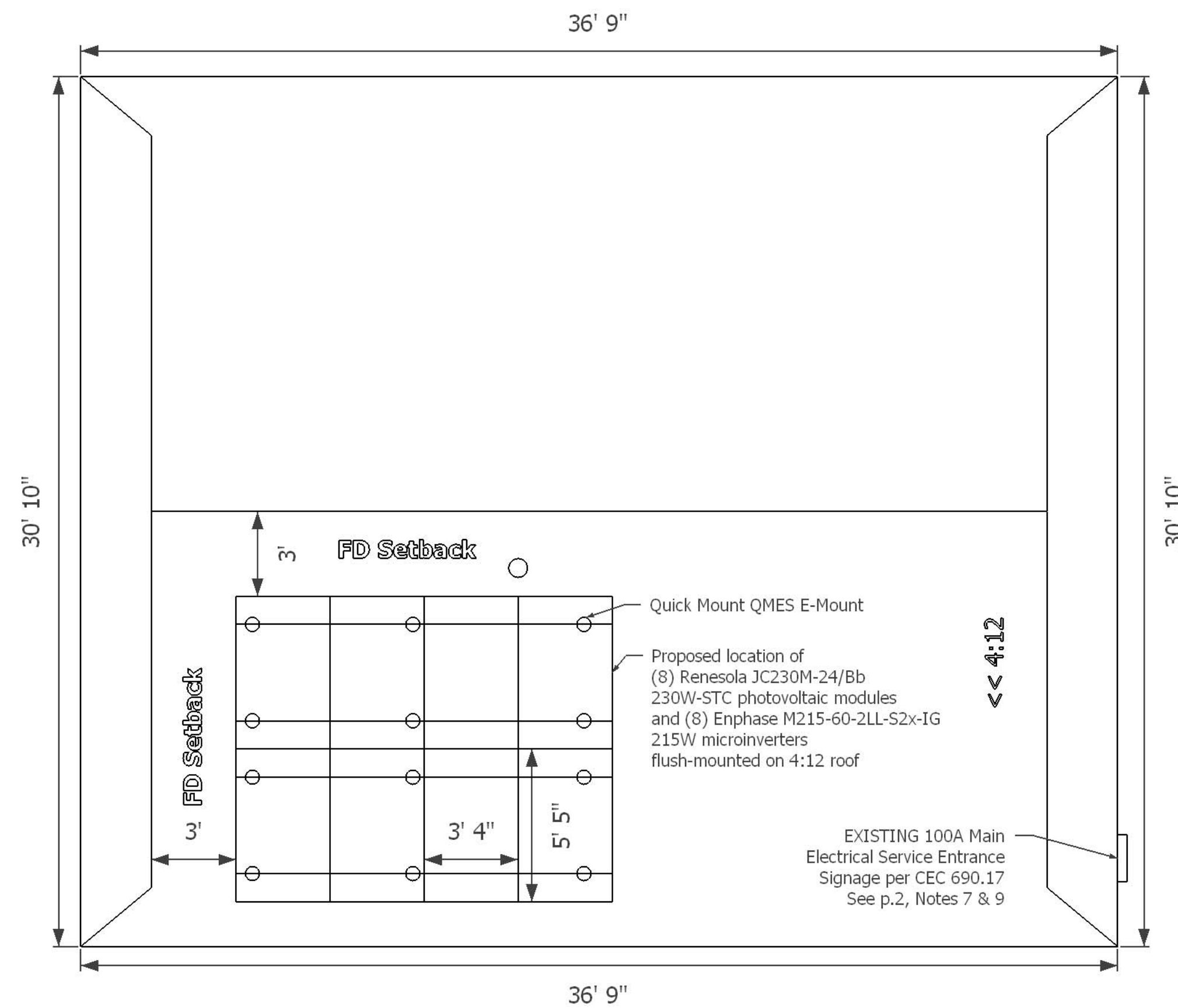
Address: [REDACTED]

Drawn By: EVH

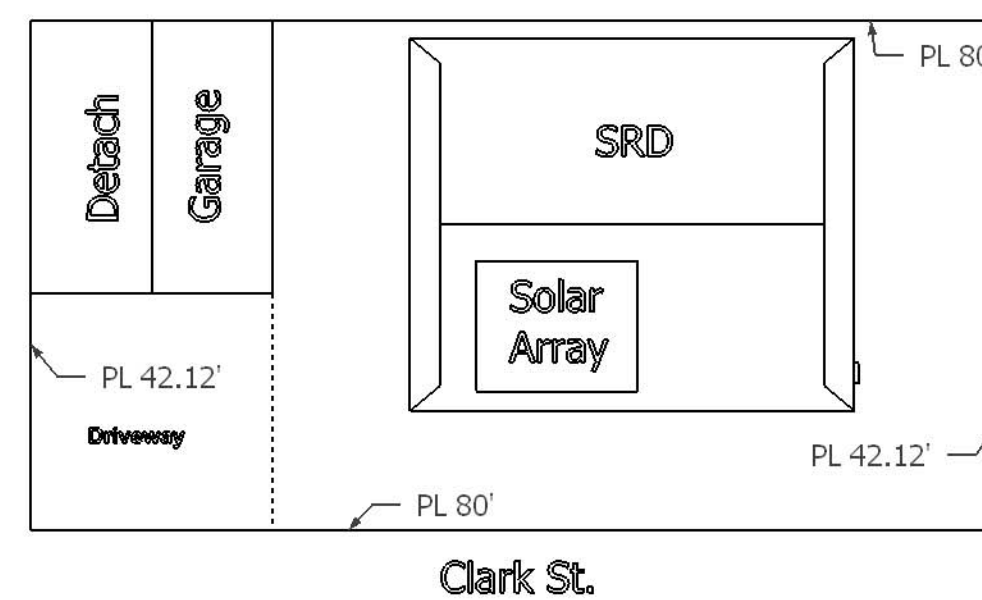
Date: 5/30/13

Scale - NTS

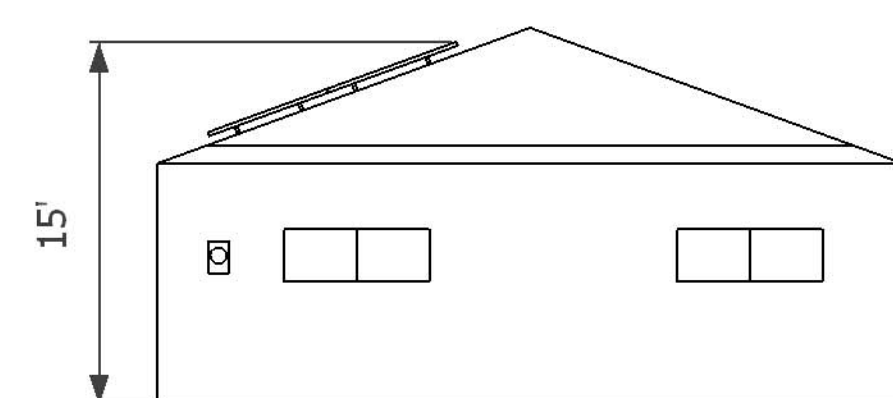
2



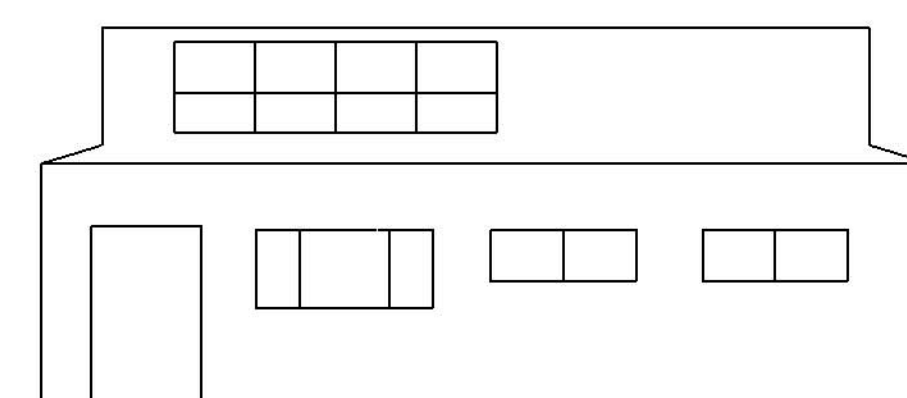
ROOF PLAN
SCALE 1/4" = 1'-0"



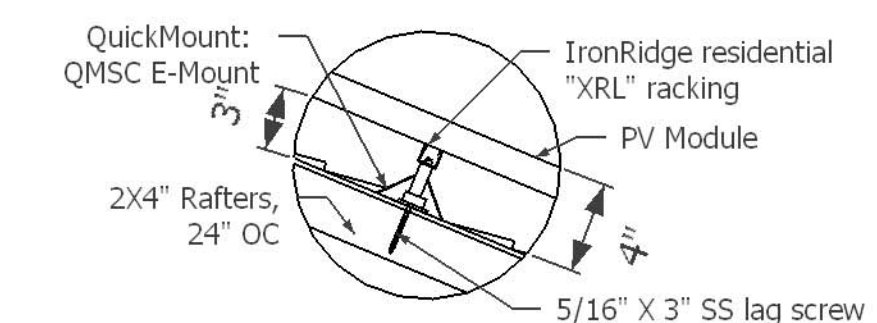
PLOT PLAN
SCALE 1/16" = 1'-0"



EAST ELEVATION
SCALE 1/8" = 1'-0"



SOUTH ELEVATION
SCALE 1/8" = 1'-0"



ROOF ATTACHMENT DETAIL
SCALE: NTS

NOTES: Complies with CEC2013, CBC2013 and NEC2014

1. THIS IS A 1.6 kW-AC SOLAR ELECTRIC SYSTEM USING (8) RENESOLA : JC230M-24/Bb 230W-STC PHOTOVOLTAIC MODULES.
2. THIS SYSTEM IS GRID-INTERTIED VIA UL-LISTED POWER CONDITIONING MICROINVERTERS, (8) ENPHASE ENERGY M215-60-2LL-S2x-IG 215W-STC THIS SYSTEM HAS NO UPS, NO BATTERIES.

3. THIS IS A ROOF-MOUNTED SYSTEM 150.0 SQFT, ADDING 2.5 lbs/sqft. FINISHED ROOF SURFACE IS COMPOSITION SHINGLE (1-LAYER). Less than 50% of roof space.

Total module (44.1 lbs each), Microinverter (3.4 lbs each) and Rails (0.52 lbs/ft)
weight: 380.7 lbs
Number of attachments: 12
Weight/attachment point: 31.7 lbs < 40 lbs >> OK
Area: 150.0 sqft
Distributed area: 2.5 lbs/sqft < 4.0 lbs/sqft >> OK

4. STANDARD WOOD ROOF CONSTRUCTION WITH 2x4 Rafters AT 24" OC TO FORM 4:12 ROOF. BUILDING IS (1) STORIES.

5. LAG SCREWS ARE 5/16" x 3-1/2" STAINLESS STEEL AT 72" OC MAX WITH MIN 3" INTO FRAMING.

6. ROOF PENETRATIONS ARE SEALED WITH GEOCEL 2300 AND ALUMINUM SOLAR FLASHINGS.

7. MECHANICAL AND PLUMBING VENTS WILL NOT BE COVERED THROUGH THE ROOF WITH THE MODULES.

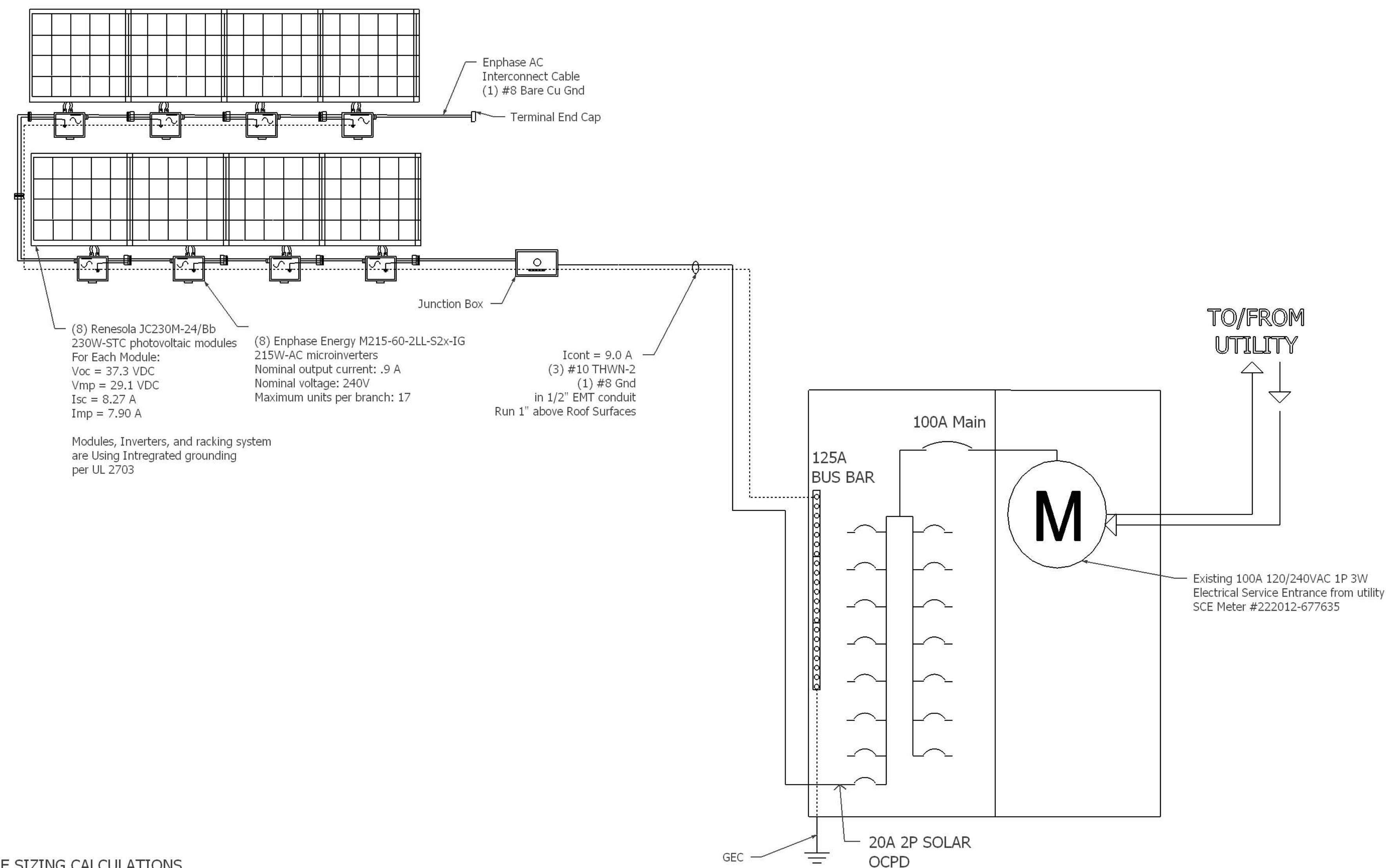


GRID Alternatives - Greater Los Angeles
950 Dovlen Pl, Suite B, Carson, CA 90746
310-735-9762 (p) | 310-388-0288 (f)
CLC C-10, C-46 #867533

Designed By: V. Fuentes
Date: 05/05/2014
Scale:

Roof Plan, Plot Plan, and Elevation Views

Address: [REDACTED]



NOTES: Complies with CEC2013 and NEC2014

1. NET SYSTEM INFORMATION:
INVERTER MFG & MODEL NO: (8) Enphase Energy M215-60-2LL-S2x-IG
EFFICIENCY RATING: 96.5%
PV MODULES PER UNIT: 1
NET NAME PLATE RATING = NModules x CEC Rating x Eff (%) = 8 x 208.9 W x 96.5% = 1.6 kW

2. THE SYSTEM IS A NEGATIVELY GROUNDING ARRAY.

3. WIRE AND CONDUIT SIZES ARE AS INDICATED OR LARGER.

4. ALL EQUIPMENT IS BONDED BY MECHANICAL MEANS OR BY A GROUNDING CONDUCTOR.

5. THE GROUNDING ELECTRODE CONDUCTOR SHALL BE #8 AWG COPPER GROUND WIRE AND BONDED TO THE EXISTING GROUNDING ELECTRODE SYSTEM.

6. ALL MARKING SHALL BE WHITE LETTERING ON RED BACKGROUND, ALL CAPITALS, ARIAL OR SIMILAR FONT, NON-BOLD, 3/8" MINIMUM LETTER HEIGHT, REFLECTIVE, WEATHER RESISTANT MATERIAL.

7. PHOTOVOLTAIC DISCONNECT FOR UTILITY OPERATIONS

CAUTION: SOLAR ELECTRIC SYSTEM

WARNING: ELECTRIC SHOCK HAZARD. DO NOT TOUCH TERMINALS. TERMINALS ON BOTH THE LINE AND LOAD SIDES MAY BE ENERGIZED IN THE OPEN POSITION.

Max AC Operating Current: 9.0 A
Operating AC Voltage: 240V

8. THE MAIN SERVICE ENTRANCE WILL BE CLEARLY LABELED WITH A MAP PLACARD SAYING:

CAUTION: POWER TO THIS BUILDING IS ALSO SUPPLIED FROM THE FOLLOWING SOURCES WITH DISCONNECTS LOCATED AS SHOWN

9. PROVIDE MARKING FOR ALL CONDUITS AND CABLES (MARKED EVERY 10 FEET), ENCLOSURES, JUNCTION BOXES, ETC. INDICATING THAT THEY ARE PART OF A SOLAR PHOTOVOLTAIC SYSTEM:

CAUTION: SOLAR CIRCUIT

WIRE SIZING CALCULATIONS

AC SIDE:

$$\text{Continuous Current} = I_{\text{max}} \times 1.25 \\ = 0.9 \text{ A} \times 8 \times 1.25 = 9.0 \text{ A}$$

$$\text{Derate Ampacity} = 90\text{deg Rating of Conductor (T-310.16)} \times 90\text{deg Temp Correction Factor (T-310.16)} \times \text{Conduit Fill Factor (T-310.15(B)(2)(a))} \\ = 40\text{A} \times .71 \times 1.00 = 28.4 \text{ A}$$

So that, Derate Ampacity > Continuous Current

$$28.4 \text{ A} > 9.0 \text{ A} >> \text{OK}$$

And, Derate Ampacity > Overcurrent Device Rating

$$28.4 \text{ A} > 20 \text{ A} >> \text{OK}$$

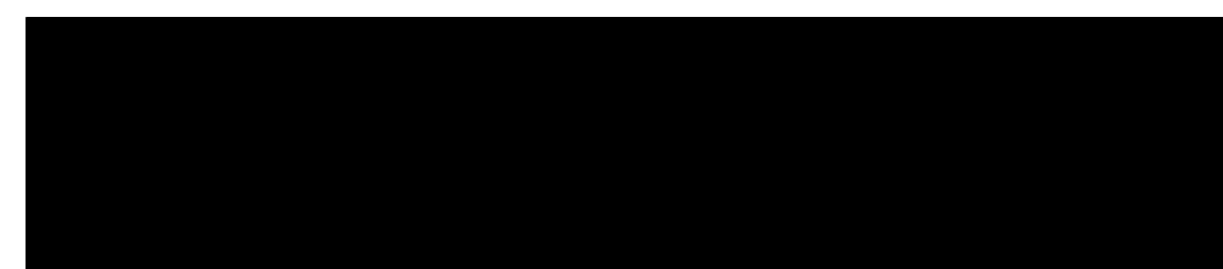
$$\text{Voltage Drop \%} = I_{\text{max}} \times \text{ohms/kft (T-8)} \times \text{One-Way Distance} \times 2 / 1000 / V_{\text{min}} \times 100 \\ = 7.2 \text{ A} \times 1.29 \text{ ohms/kft} \times 50 \text{ ft} \times 2 / 1000 / 216 \text{ VAC} \times 100 = .43\% < 1\% >> \text{OK}$$



GRID Alternatives - Greater Los Angeles
950 Dovlen Pl, Suite B, Carson, CA 90746
310-735-9762 (p) | 310-388-0288 (f)
CLC C-10, C-46 #867533

Designed By: V Fuentes
Date: 05/05/2014
Scale:

Single-Line Electrical Drawing and Wire Sizing Calculations



2