



CITY OF ORLAND

Incorporated 1909

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Orland California 95963
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Roof-mount Photo Voltaic Submittal Requirements for the City of Orland

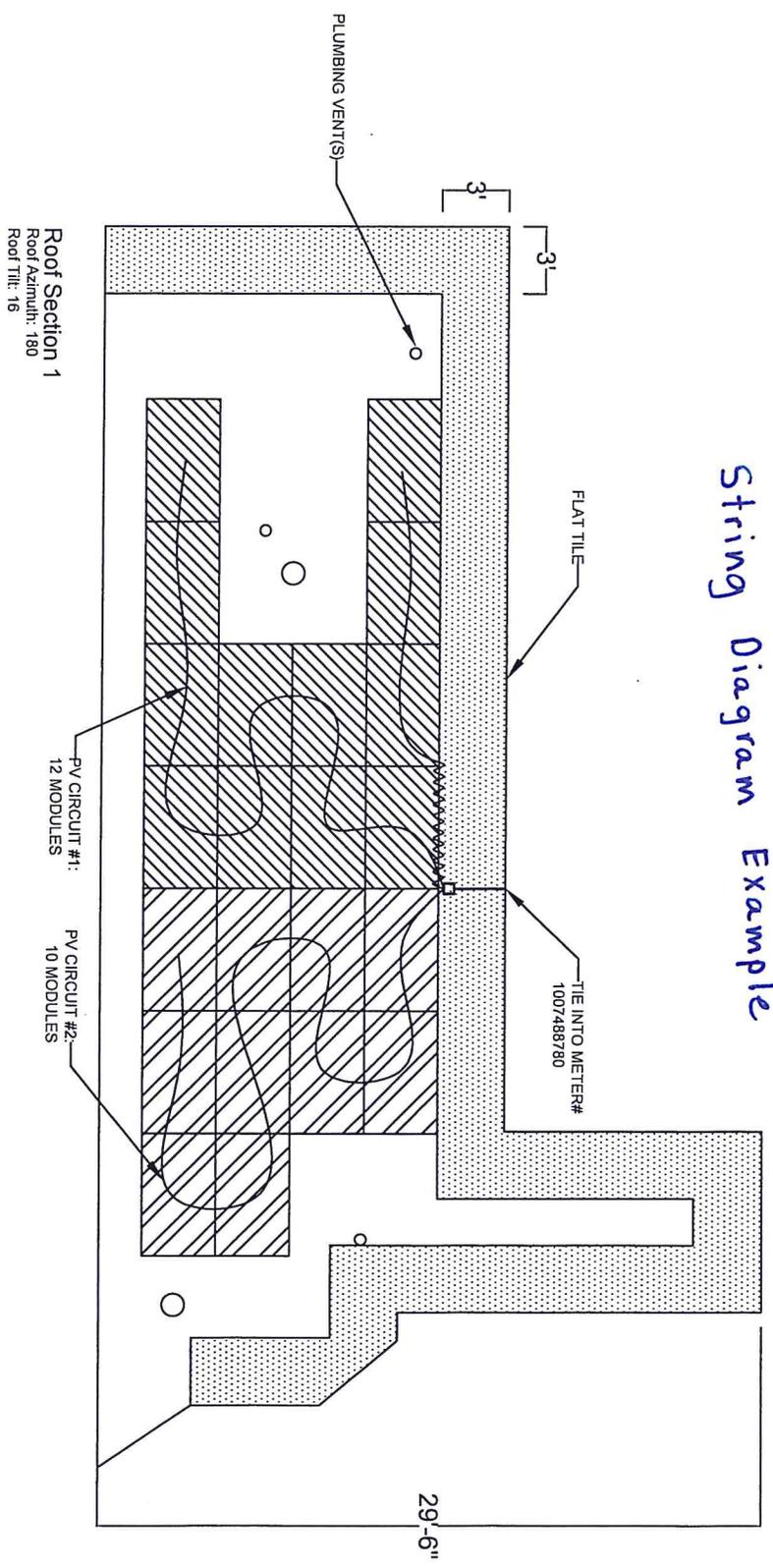
- 1.) Completed building permit application. Project description shall include size of the system in kilowatts.
- 2.) Site plan showing number of solar modules. Site plan shall also show building roof layout, roof sections, and ridge and eave and valley fire setbacks. (see attached sample submittal)
- 3.) Roof plan showing existing roof covering. (example: comp shingle, flat tile, Spanish tile, metal etc...)
- 4.) Mounting, racking and flashing details for how the system will be mounted onto the roof. Include manufacturers installation instructions for all mounting, racking and flashing systems.
- 5.) Wet stamped structural analysis report showing the roofmount PV system complies with wind loads.
- 6.) Bonding details including manufacturers installation instructions and details for type of bonding clamps to be used.
- 7.) Pictures of the existing roof framing which clearly show the existing structural roof framing method. (example: Pre-engineered trusses or rafters: See attached picture examples)
- 8.) If the existing structural roof framing is pre-engineered trusses a 20lb per square foot roof live load can be assumed.
- 9.) If the existing structural roof framing is rafters, the submitter shall provide size of members, species, span and on center spacing of all rafters which will be subject to the added dead load of the new roof mount P.V. system.

- 10.) Provide a string diagram showing all arrays and how they are wired together. (see attached example of a string diagram)
- 11.) Provide a line diagram of the proposed P.V. system which clearly shows;
 - Module type and model
 - Inverter type and model
 - Size of the system in kilowatts
 - Size of strings and number of arrays
 - Wiring size and method including ground wire AWG
 - Conduit type and size
 - Junction box locations
 - Subpanel ratings and locations
 - All overcurrent protection device ratings and locations
 - Locations and types of all disconnecting means
 - Location and type of system grounding electrode
 - Ampacity rating of the existing main electrical panel
 - Ampacity rating of the main service disconnect
- 12.) Warning label sheet which shows exact verbiage and locations of all required warning label stickers.
- 13.) Manufacturers technical data sheets for the P.V. modules and the inverter(s).

Sincerely,

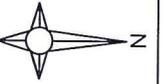
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Orland Building Official
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530-865-1606
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String Diagram Example



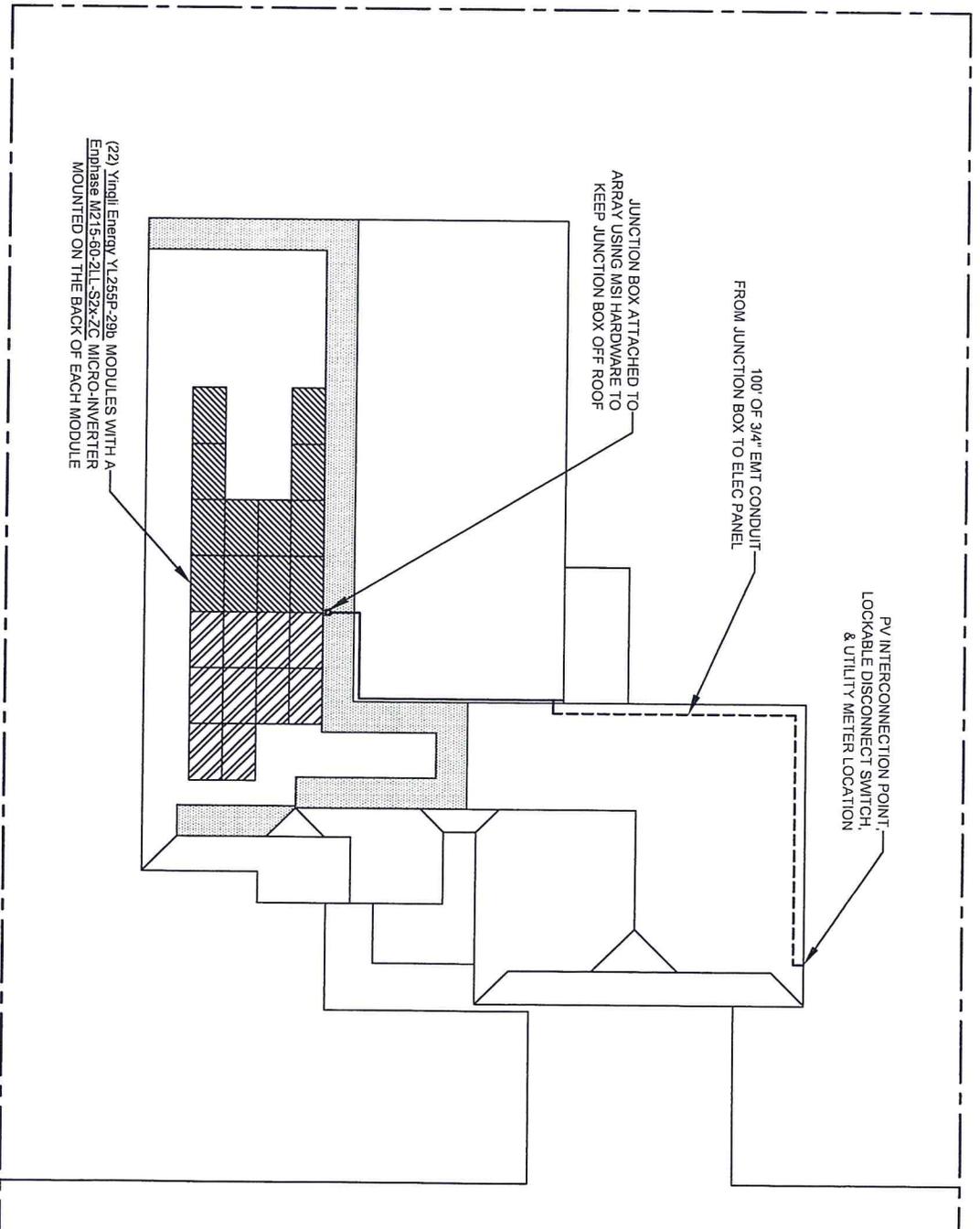
PV SYSTEM ROOF PL

SCALE: 1/8" = 1'-0"

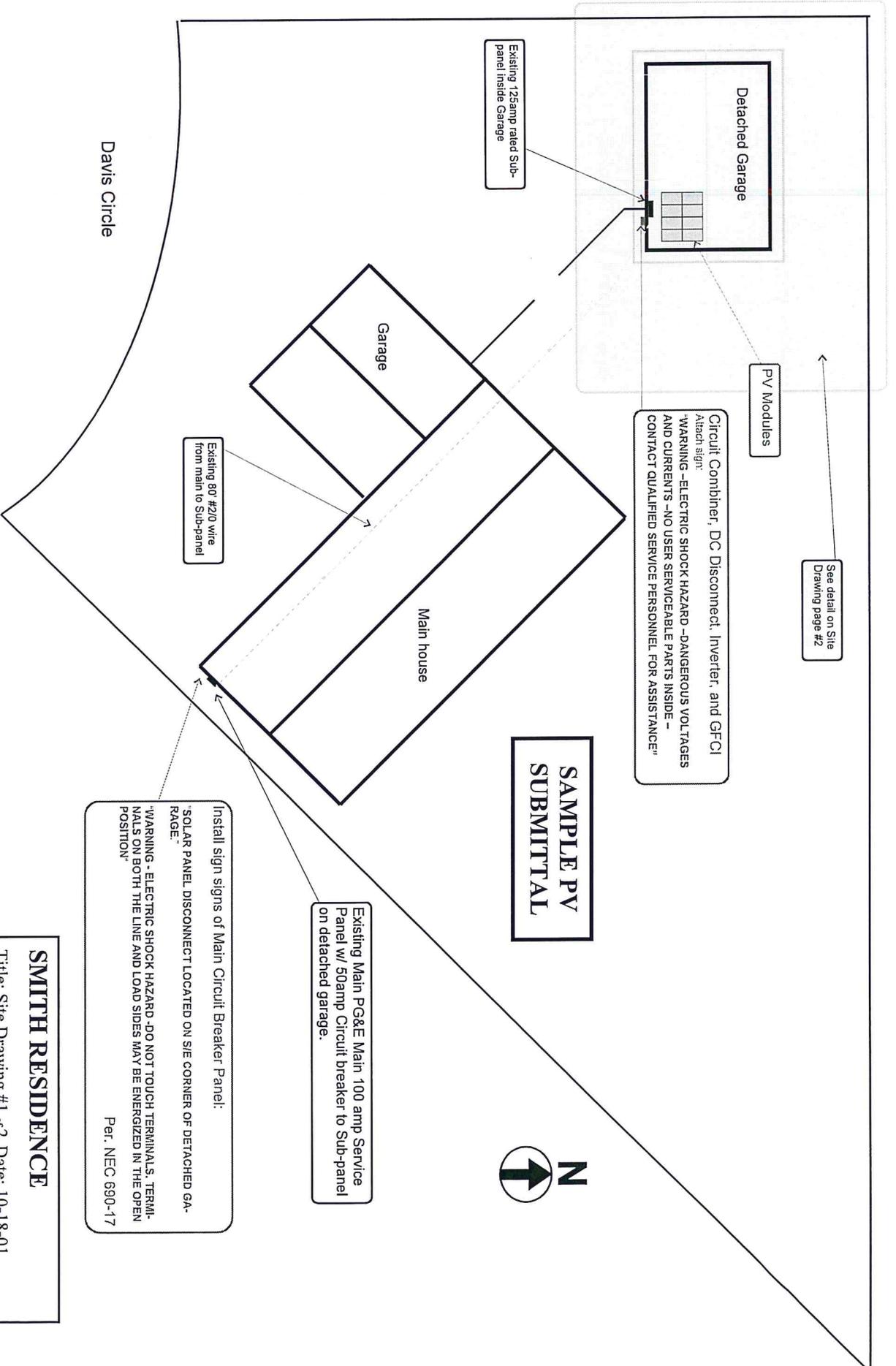


PV SYSTEM SIZE:
5.61 KW DC

Fire Setbacks Example



PV SYSTEM
SCALE: 1/16" =



See detail on Site Drawing page #2

Circuit Combiner, DC Disconnect, Inverter, and GFCI
 Attach sign:
 *WARNING -ELECTRIC SHOCK HAZARD -DANGEROUS VOLTAGES AND CURRENTS -NO USER SERVICEABLE PARTS INSIDE - CONTACT QUALIFIED SERVICE PERSONNEL FOR ASSISTANCE"

SAMPLE PV SUBMITTAL

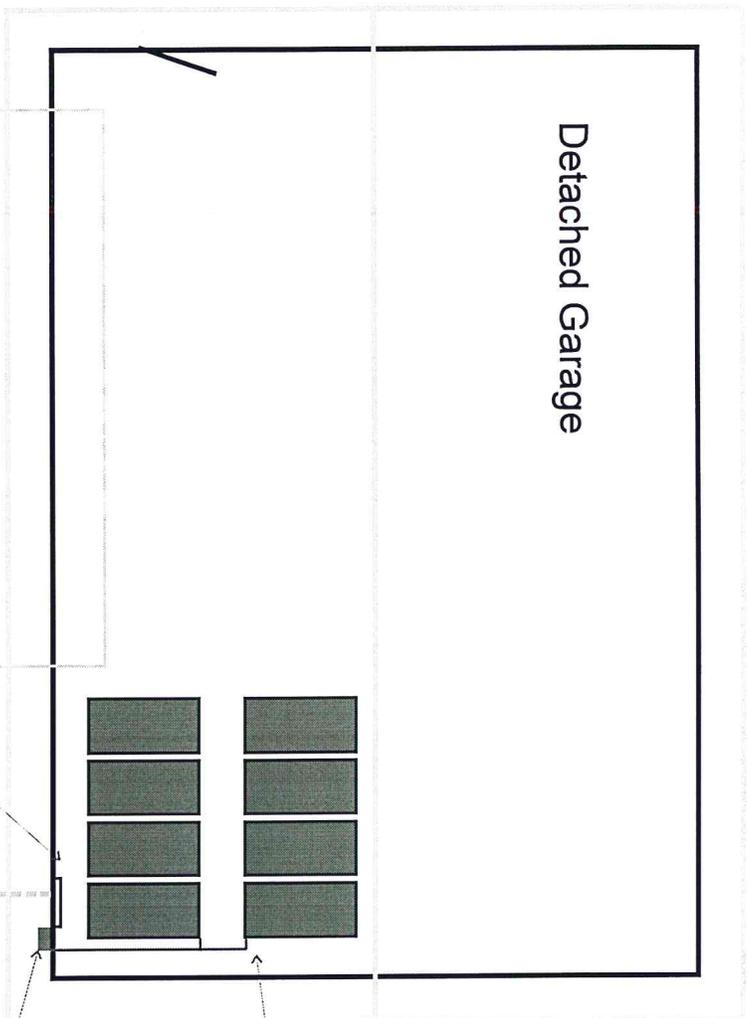


Existing Main PG&E Main 100 amp Service Panel w/ 50amp Circuit breaker to Sub-panel on detached garage.

Install sign signs of Main Circuit Breaker Panel:
 SOLAR PANEL DISCONNECT LOCATED ON S/E CORNER OF DETACHED GARAGE.
 WARNING - ELECTRIC SHOCK HAZARD -DO NOT TOUCH TERMINALS, TERMINALS ON BOTH THE LINE AND LOAD SIDES MAY BE ENERGIZED IN THE OPEN POSITION
 Per. NEC 690-17

SMITH RESIDENCE
 Title: Site Drawing #1 of 2 Date: 10-18-01
 Scale: N/A
 4718 Sun Ray Lane, Rohnert Park
 Project: Installation of Photovoltaic Panel System

Detached Garage



Existing Sub-Panel inside of garage:
Cutter-Hammer brand 125 amp rated box.
Install new 15 amp single pole 120 volt Circuit breaker. Connect to Inverter 120 volt output
Label door:
"WARNING -ELECTRICAL SHOCK HAZARD -DO NOT TOUCH TERMINALS. TERMINALS ON BOTH THE LINE AND LOAD SIDES MAY BE ENERGIZED IN THE OPEN POSITION"

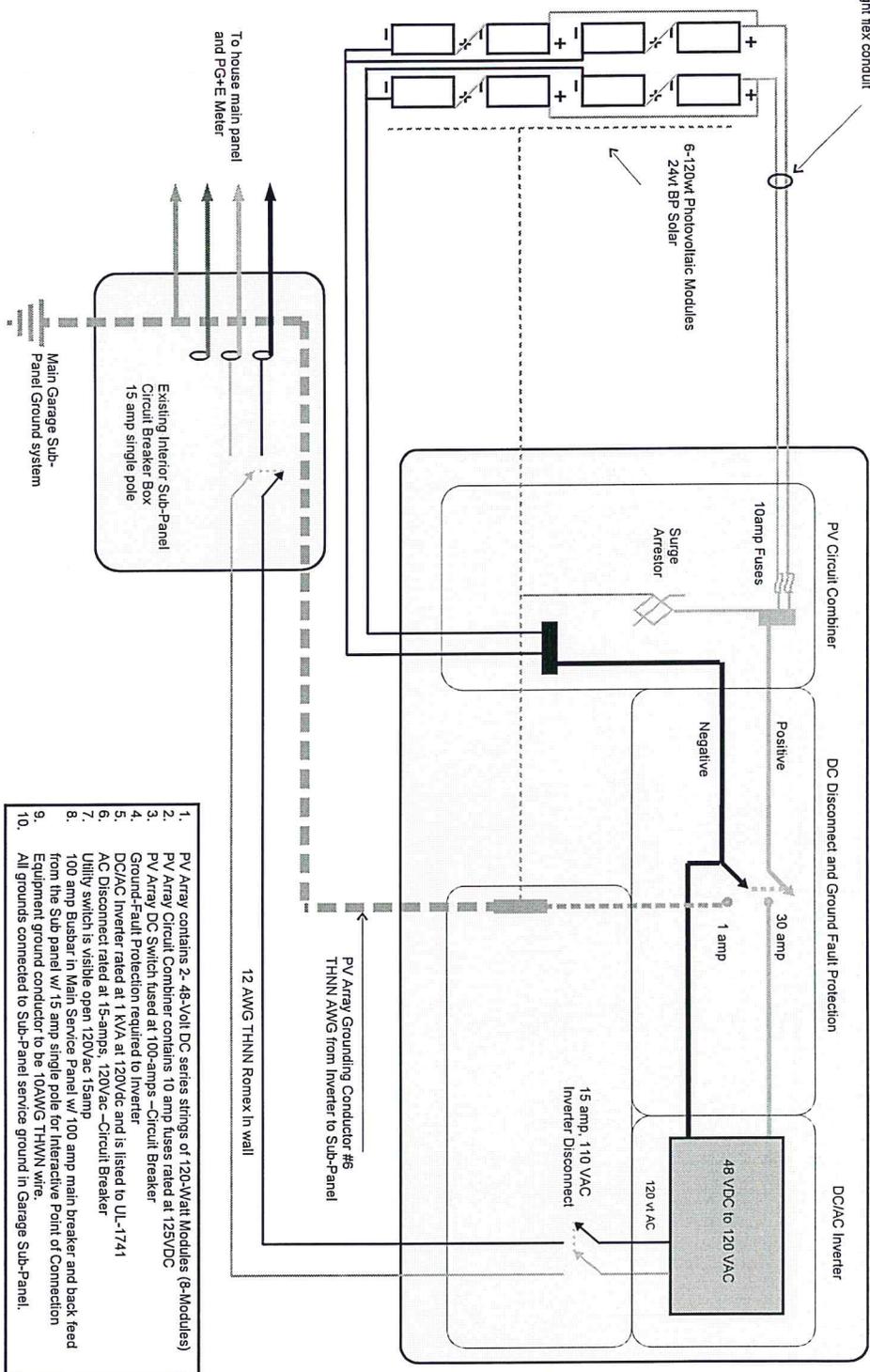
Existing #2/0 wire from Sub-panel to main 100 amp Service Panel

8- 120 Volt PV Modules mounted on the roof structure. The panels are fastened to aluminum cross bars that are lag bolted through the metal roofing into existing roof trusses. (Total weight approx: 250 pounds over 100 s/f)
Modules wired w/ #10AWG THHN-2 rated conductor in rated sunlight resistance flex conduit through panel mounted rain tight (IP54 rated) junction box. Wire run is 20' long 7.75 amps (open circuit voltage) @ 84.2 volts x (2) (short-circuit current). # 10 ground wire lagged to each module.

DC/AC Inverter w/ PV Array Circuit Combiner, DC disconnect, and Ground Fault protection
Label outside:
"WARNING -ELECTRICAL SHOCK HAZARD -DANGEROUS VOLTAGES AND CURRENTS -NOUSER SERVICABLE PARTS INSIDE -CONTACT QUALIFIED SERVICE PERSONNEL FOR ASSISTANCE."

SMITH RESIDENCE
Title: Site Drawing #2 of 3 Date: 10-18-01
Scale: N/A
4718 Sun Ray Lane, Rohnert Park
Project: Installation of Photovoltaic Panel System

#10-2 AWG THWN-2 conductors for all Array wiring in 1/2" water tight flex conduit

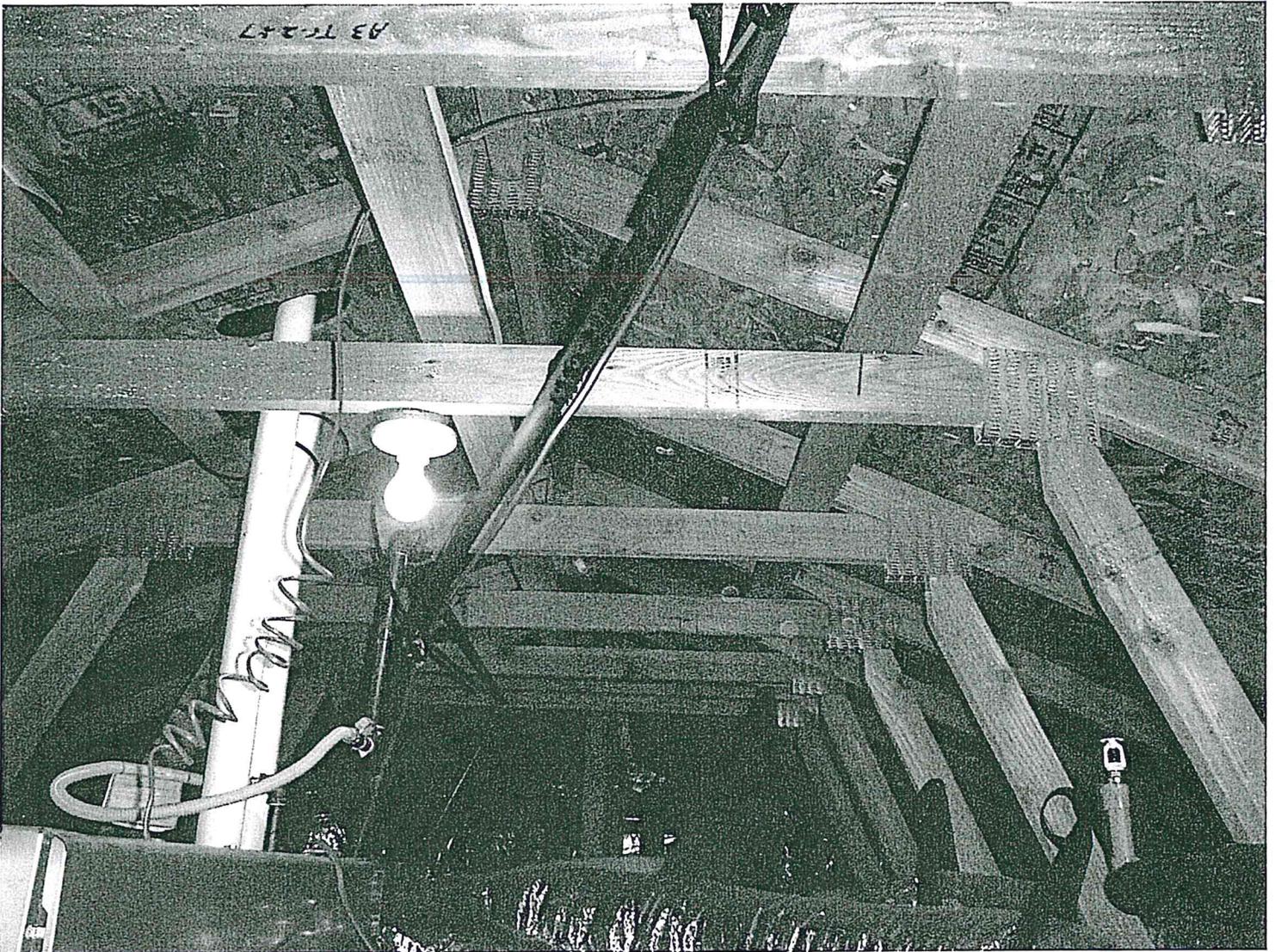


1. PV Array contains 2- 48-Volt DC series strings of 120-Watt Modules (8-Modules)
2. PV Array Circuit Combiner contains 10 amp fuses rated at 125VDC
3. PV Array DC Switch fused at 100-amperes -Circuit Breaker
4. Ground-Fault Protection required to Inverter
5. DC/AC Inverter rated at 1 kVA at 120Vdc and is listed to UL-1741
6. AC Disconnect rated at 15-amperes, 120VAc -Circuit Breaker
7. Utility switch is visible open 120VAc 15amp
8. 100 amp Busbar in Main Service Panel w/ 100 amp main breaker and back feed from the Sub panel w/ 15 amp single pole for Interactive Point of Connection
9. Equipment ground conductor to be 10AWG THWN wire.
10. All grounds connected to Sub-Panel service ground in Garage Sub-Panel.

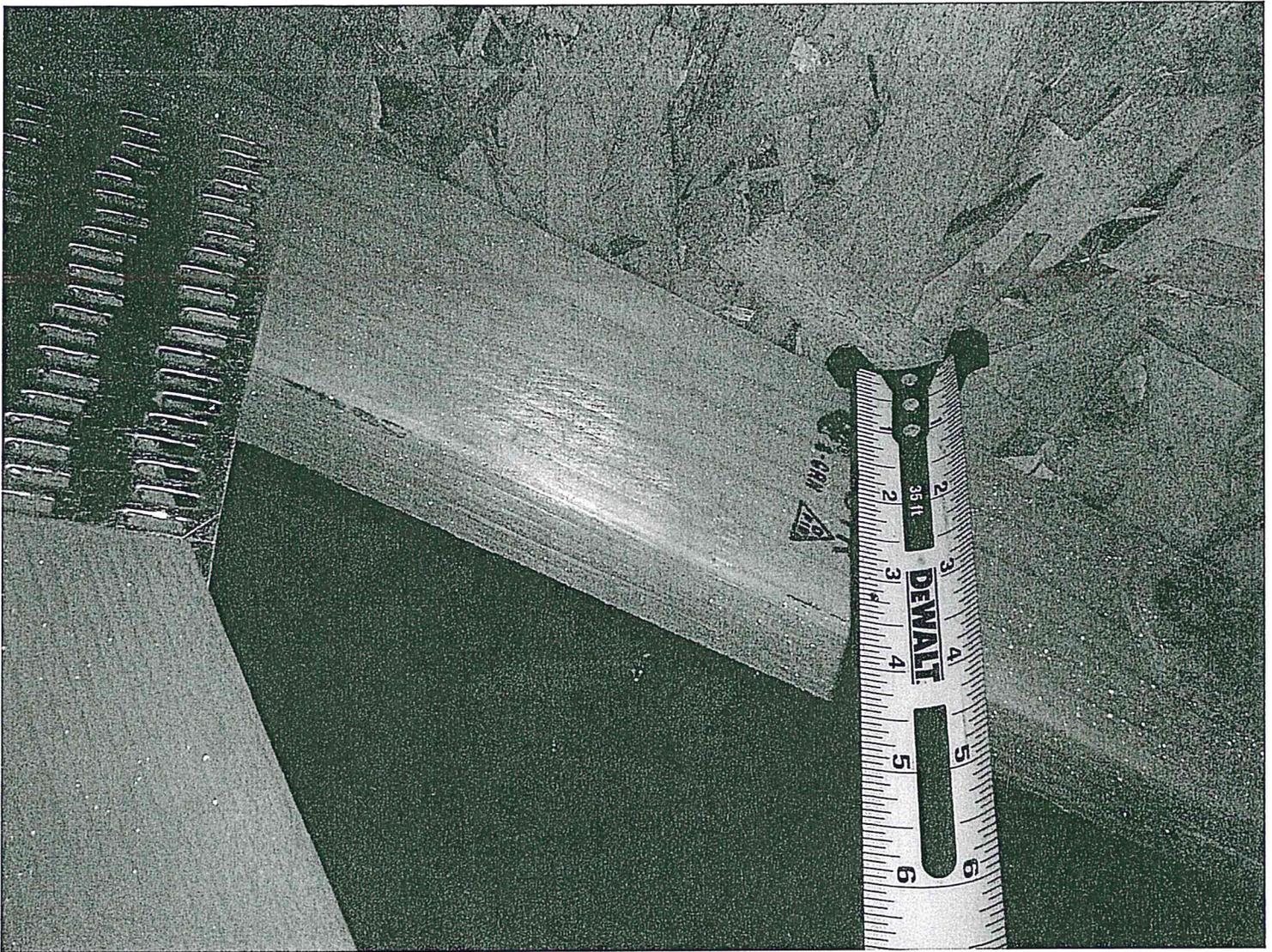
Voltage Drop Calculations for DC conductor:
 Copper THWN-2 Wet wire roof mounted Modules:
 48 Volts 7.45amps 20 ft—D factor = 1.1 for 1% Voltage Drop
 $3 \times 1.1 =$ D factor = 3.3 for 3% Voltage Drop
 Maximum for 10 AWG wire is 3.9 (d) Factor

- Notes:
1. NEC Array Open Circuit Voltage = 84.2 Volts DC
 2. Maximum Short Circuit Array Current = 15.5 amps
 3. AC output (960W DC x 93% efficiency) = 893 Watts
 4. PV modules are BP Solar SX 120 UL1703 Listed (Total array consists of 8 modules 2 parallel sets of (2)x(2) 4 units in series)
 5. Advanced Energy Inc. Utility Inverter model #GC-1000 48-Volt DC, 110-Volt AC Inverter, UL 1471 listed.

SMITH RESIDENCE
 Title: Electrical Line Drawing # 3 of 3 Date: 10-25-01
 Scale: N/A
 4718 Sun Ray Lane, Rohnert Park
 Project: Installation of Photovoltaic Panel System



Roof Framing Example Picture



Roof Framing Picture Example



Roof Framing Picture Example