



CITY OF ORLAND

INCORPORATED 1909

815 Fourth Street
Orland, CA 95963
Telephone (530) 865-1600
Fax (530) 865-1632

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 roof mount PV system complies with wind loads.
6. Bonding details including manufacturers installation instructions and details for the type of bonding clamps to be used.
7. 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 PV system.
8. Provide a string diagram showing all arrays and how they are wired together. (See attached example of a string diagram)

9. Provide a line diagram of the proposed PV system which clearly shows:
 - Module type and model
 - Inverter type and model
 - Size of the system in kilowatts
 - Size of strings and numbers 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
10. Warning label sheet which shows exact verbiage and locations of all required warning label stickers.
11. Manufacturers technical data sheets for the PV modules and the inverter(s).

Orland Building Department
815 Fourth Street
Orland, CA 95963
(530) 865-1606
orlandbuilding@cityoforland.com

Address/Location: _____

Name of Applicant: _____

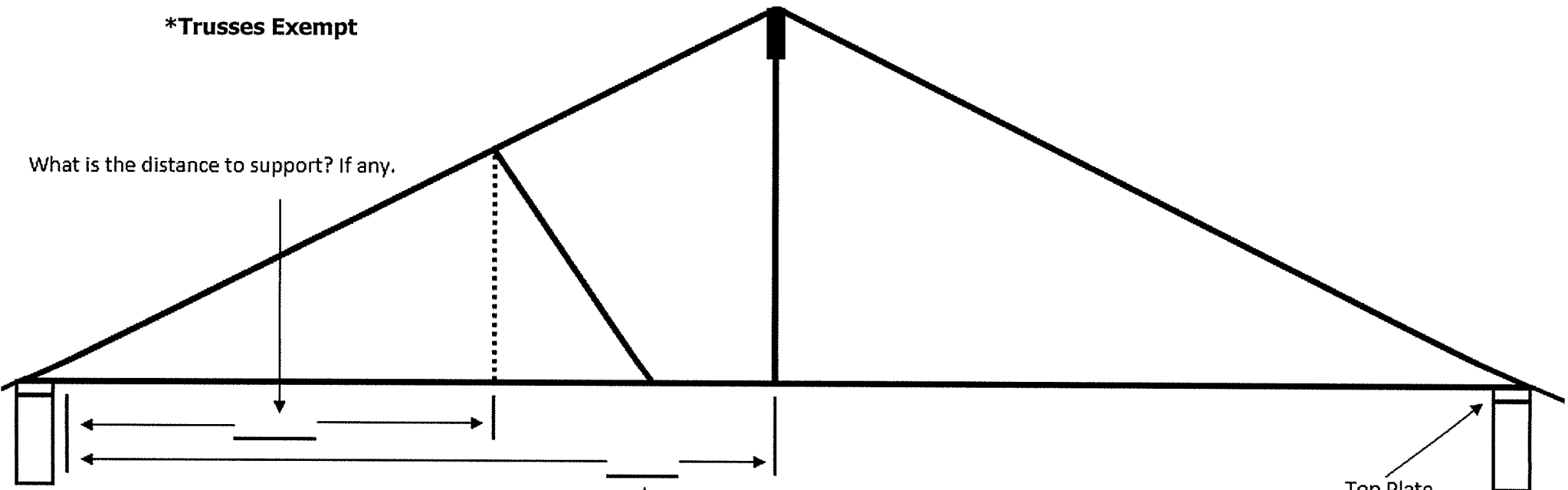
Signature: _____

Circle One That Applies:

- | <u>Size</u> | <u>Spacing</u> |
|-------------|----------------|
| 2 x 4 | 16" OC |
| 2 x 6 | 24" OC |

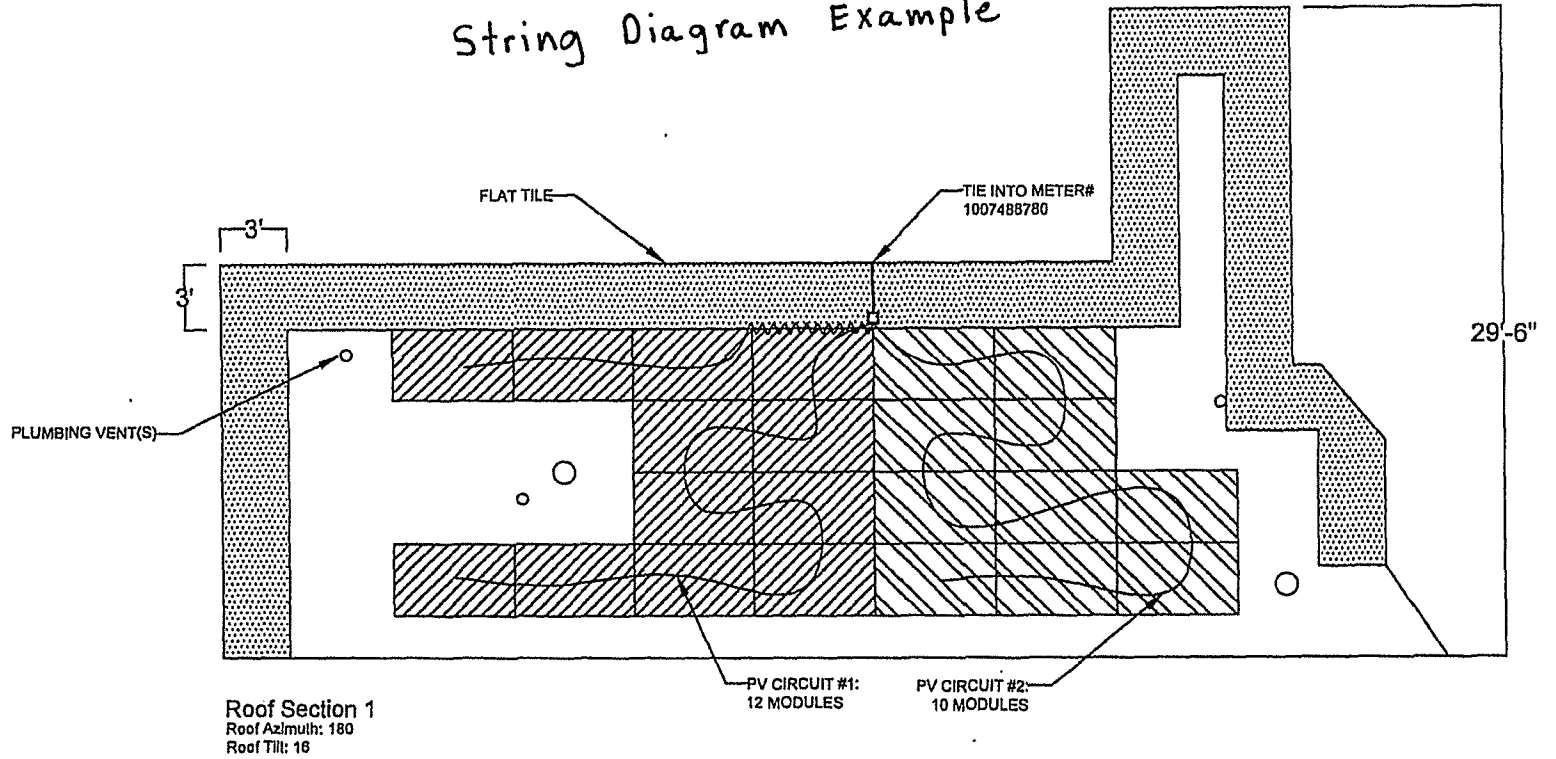
***Trusses Exempt**

What is the distance to support? If any.



What is the distance to the ridgeline?

String Diagram Example



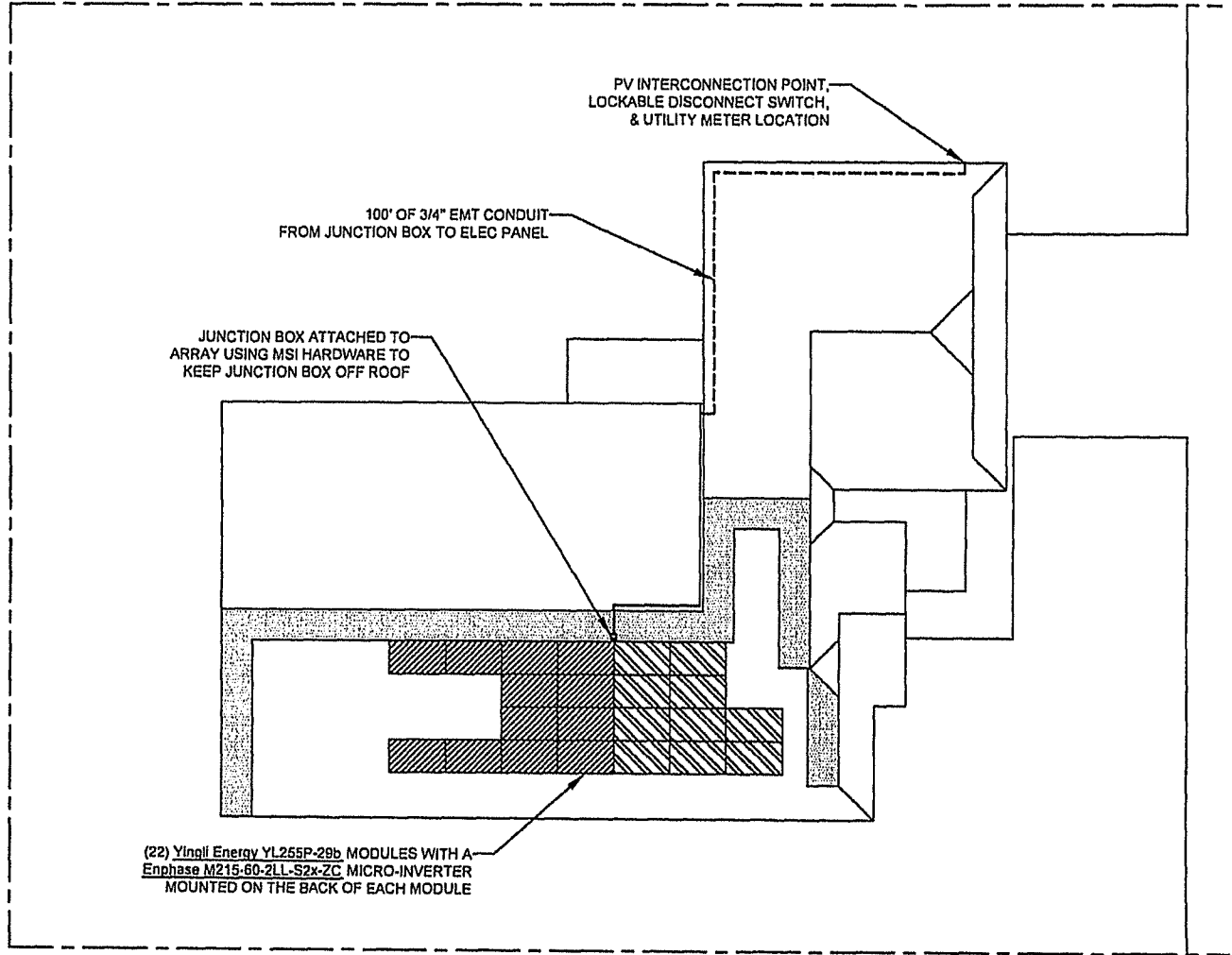
PV SYSTEM ROOF PL

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




PV SYSTEM SIZE:
5.61 kW DC

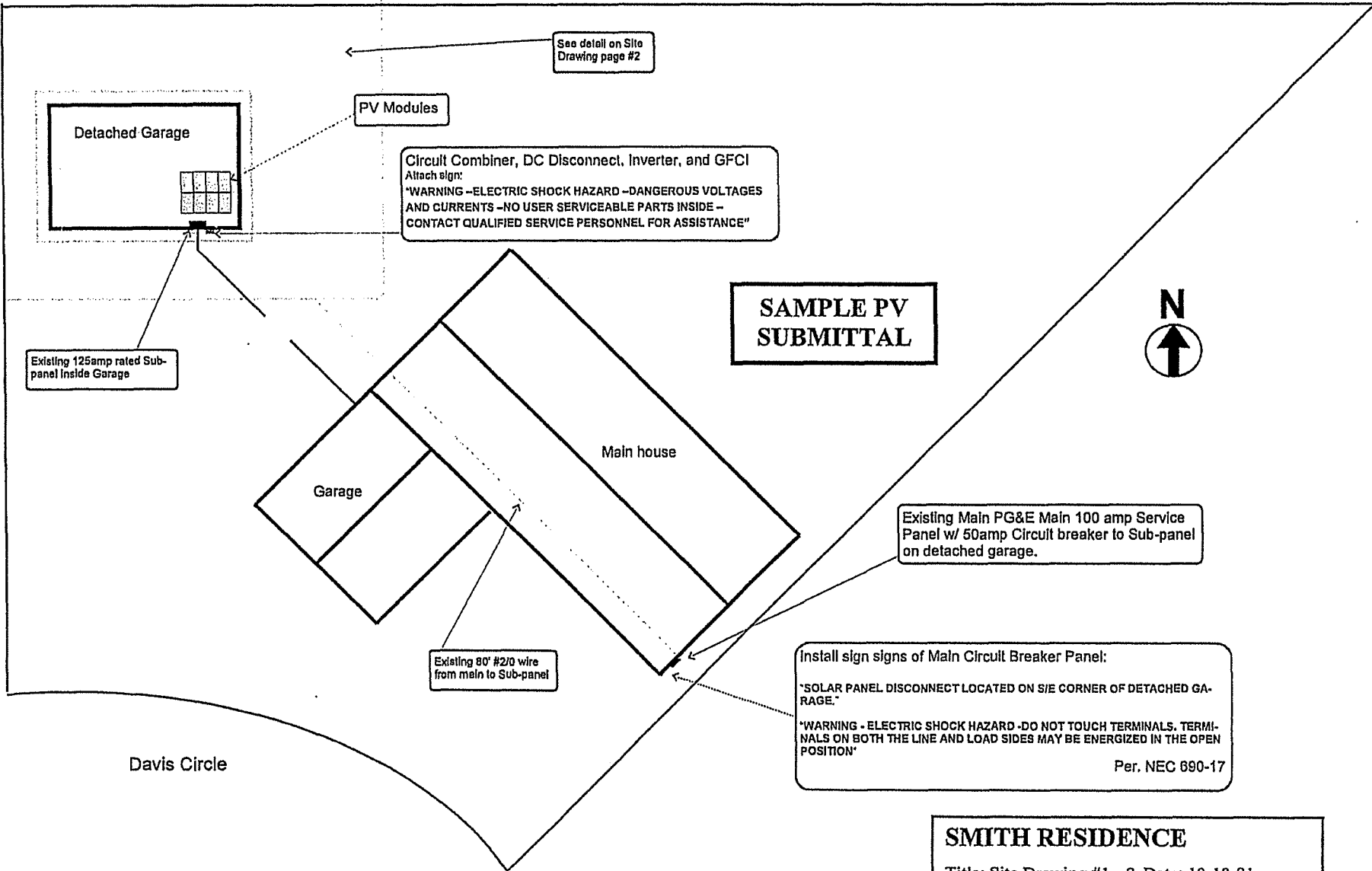
Fire Setbacks Example



(22) Yinall Eneray YL255P-20b MODULES WITH A
Enphase M215-60-2LL-S2x-ZC MICRO-INVERTER
MOUNTED ON THE BACK OF EACH MODULE

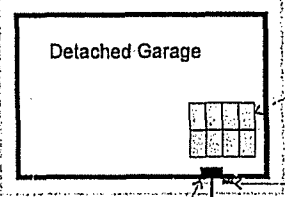
 - 3' OFFSET FOR
ROOF ACCESS

PV SYSTE
SCALE: 1/16"



See detail on Site Drawing page #2

PV Modules



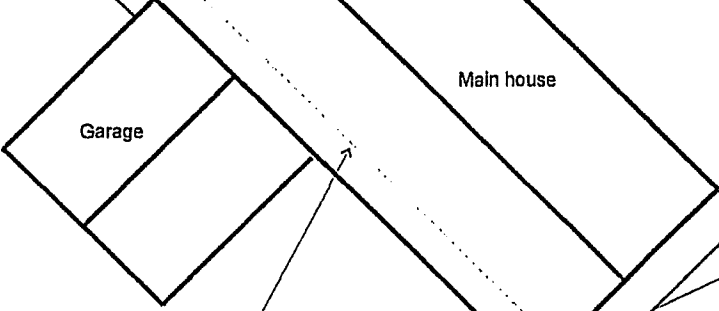
Detached Garage

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 125amp rated Sub-panel Inside Garage



Main house

Garage

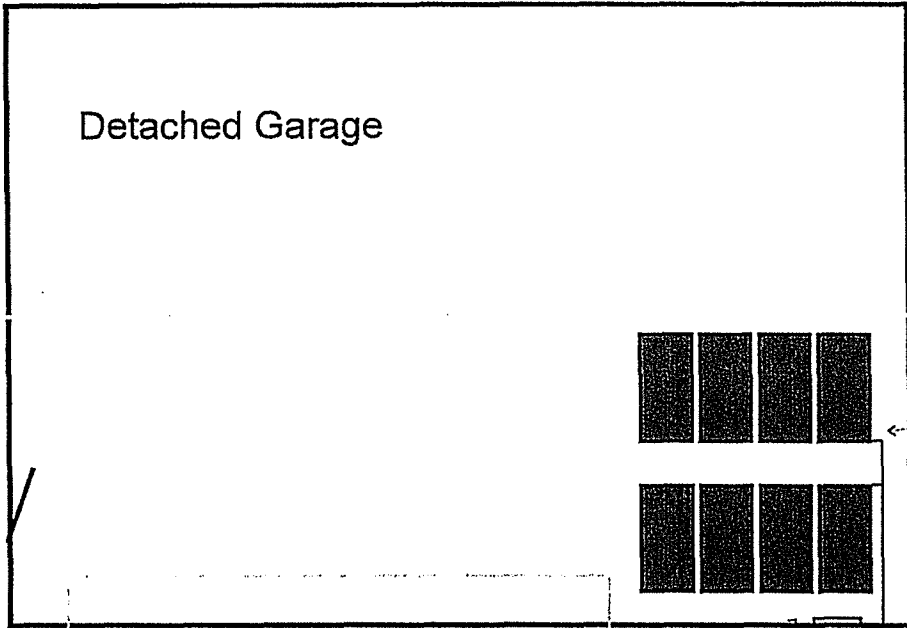
Existing Main PG&E Main 100 amp Service Panel w/ 50amp Circuit breaker to Sub-panel on detached garage.

Existing 80' #2/0 wire from main to Sub-panel

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

Davis Circle

SMITH RESIDENCE
 Title: Site Drawing #1 or2 Date: 10-18-01
 Scale: N/A
 4718 Sun Ray Lane, Rohnert Park
 Project: Installation of Photovoltaic Panel System



Detached Garage



8- 120 Watt 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 sq/ft)

Modules wired w/ #10AWG THWN-2 rated conductor in rated sunlight resistance flex conduit through panel mounted rain light (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 lugged 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."

Existing Sub-Panel inside of garage:
 Cutler-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"

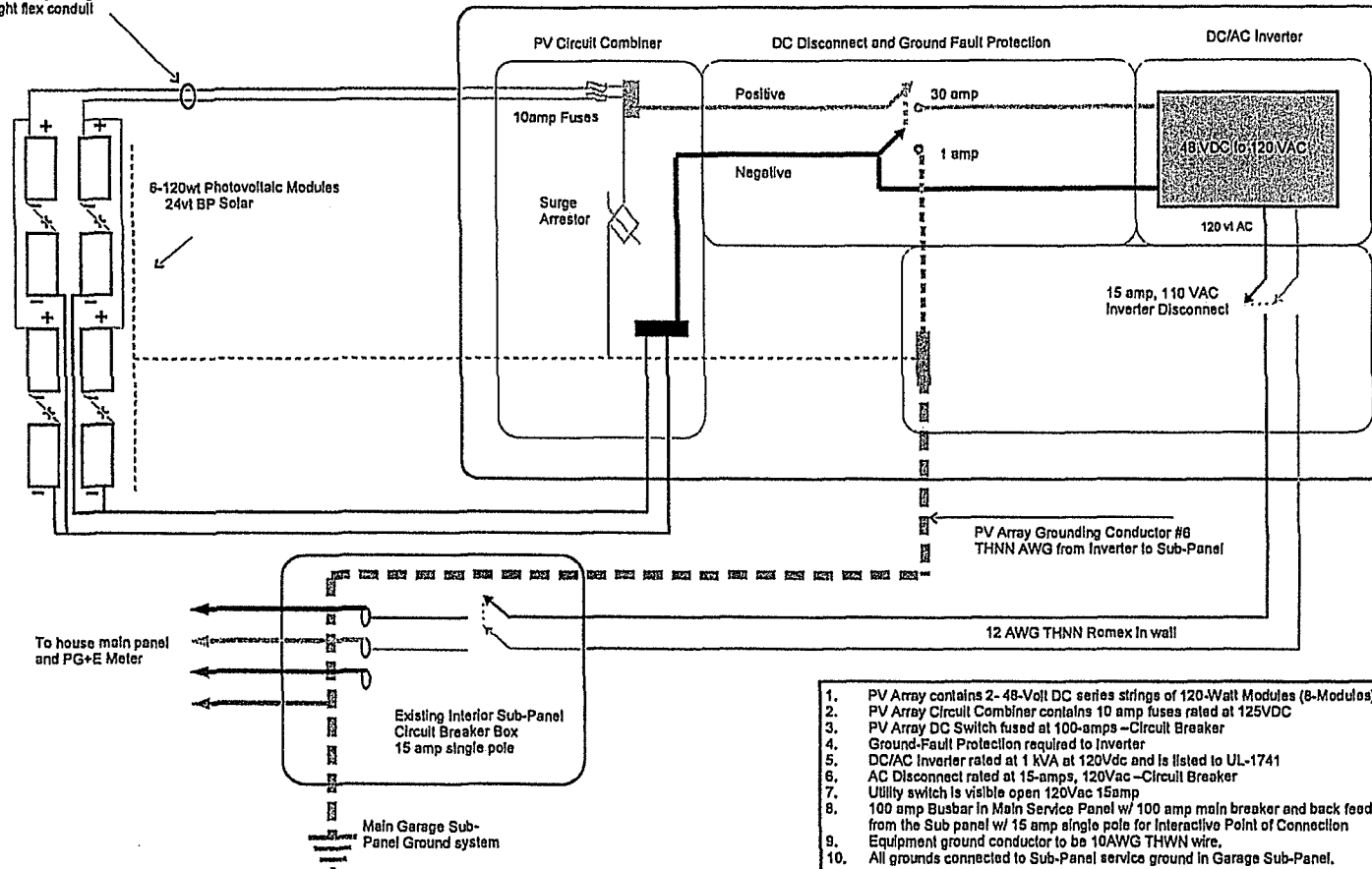
Existing #2/0 wire from Sub-panel to main 100 amp Service Panel

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

Utility Inter-tie inverter w/ GFCI & Disconnects



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-amps -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-amps, 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.

- Notes:
1. NEC Array Open Circuit Voltage = 84.2 Volts DC
 2. Maximum Short Circuit Array Current = 15.5 amps
 3. AC output (860Wt 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)*(2) 4 units in series)
 5. Advanced Energy Inc. Utility inverter model #GC-1000 48-Volt DC, 110-Volt AC inverter, UL 1471 listed.

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 x 1.1= D factor = 3.3 for 3% Voltage Drop
 Maximum for 10 AWG wire is 3,9 (d) Factor

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