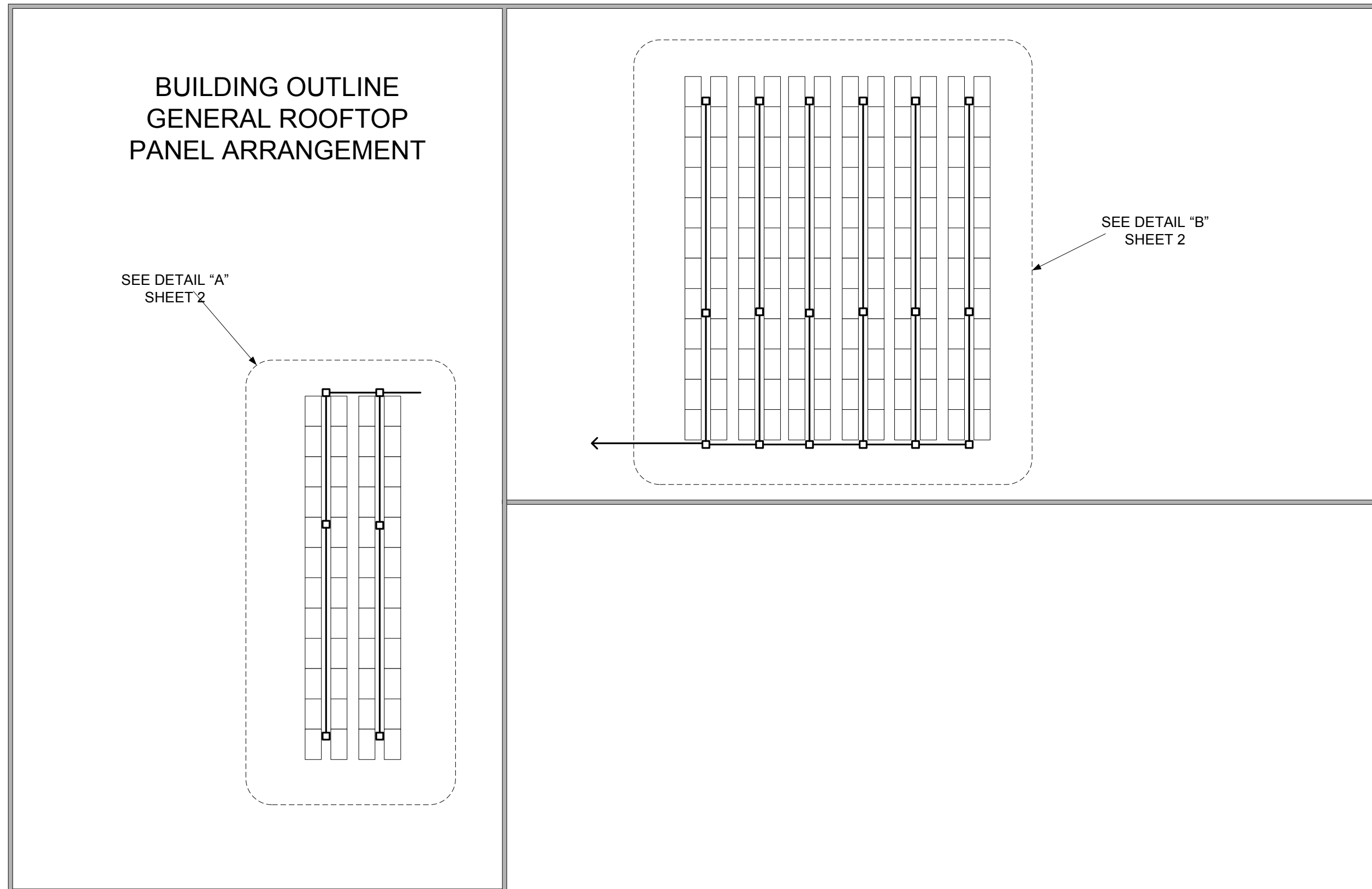


| REVISION HISTORY | | | |
|------------------|--|----------|-----------|
| REV | DESCRIPTION | APPROVED | DATE |
| ORIG | Original issue. | JPC | 21 APR 09 |
| A | All sheets - Overall drawing reformat, moved general information and rooftop outline to sheet 1, moved wire list to separate sheet. Zone D6 - Max voltage per 2008 NEC was 509.9. | | |



Design Notes (continued):

- Voltage drop calculations:
 - PV Source Circuits: See calculation on this sheet. Use #10 AWG for all source circuits with one-way distance greater than 100 feet.
 - Inverter AC output circuits: Estimate 30 ft one way, 30 A, #8 AWG: $30 \text{ ft} \times 2 \times 0.778 \text{ m}\Omega \times 30 \text{ A} = 1.4 \text{ V}$ (0.5% of 277 V)
 - AC combiner output circuits: Estimate 25 ft one way, 104 A, #1 AWG, single pole: $25 \text{ ft} \times 0.154 \text{ m}\Omega \times 104 \text{ A} = 0.4 \text{ V}$ (0.15% of 277 V)
- Inverter ambient temperature consideration:
 - Inverter efficiency: 96%
 - Inverter power: 7000 W
 - Inverter power dissipation: $7000 \times 0.04 = 280 \text{ W}$
 - Total dissipation into room: $280 \text{ W} \times 6 \text{ inverters} = 1,680 \text{ W}$

SUNPOWER PHOTOVOLTAIC PANEL 215

Electrical Data:
(Measured at Standard Test Conditions (STC): irradiance of 1000/m², air mass 1.5g, and cell temperature 25 deg C)

| | | |
|--------------------------------|------------------|---------------|
| Peak Power (+/-5%) | P _{max} | 215 W |
| Rated Voltage | V _{mp} | 39.8 V |
| Rated Current | I _{mp} | 5.40 A |
| Open Circuit Voltage | V _{oc} | 48.3 V |
| Short Circuit Current | I _{sc} | 5.80 A |
| Maximum System Voltage IEC, UL | | 1000 V, 600 V |

Temperature Coefficients:

| | |
|---------------|----------------|
| Power | -0.38% /degC |
| Voltage (Voc) | -132.5 mV/degC |
| Current (Isc) | 3.5 mA/degC |

Series Fuse Rating: 15 A
Peak Power per Unit Area: 173 W/m², 16.1 W/ft²
CEC PTC Rating: 198.5 W

Mechanical Data:

| | |
|---------------|---|
| Solar Cells | 72 SunPower all-back contact monocrystalline |
| Front Glass | 3.2 mm (1/8 in) tempered |
| Junction Box | IP-65 rated with 3 bypass diodes |
| Output Cables | 900mm length cable / Multi-Contact connectors |
| Frame | Anodized aluminum alloy type 6063 |
| Weight | 15 kg, 33 lbs |

Design Notes:

- Calculations based on ambient temperatures from -35°C (-30°F) to 50°C (120°F).
- Electrical design to meet the following specifications: NEC 2005 unless otherwise noted
- Calculated panel parameters at minimum and maximum temperatures:

| | | | |
|------------------------|---------|--------|--------|
| | -35°C | 25°C | 50°C |
| Open Circuit Voltage: | 56.25 V | 48.3 V | - |
| Short Circuit Current: | -- | 5.80 A | 5.89 V |
- Array Configuration:
 - Source Circuit: Eight PV modules in series
 - Max Voltage per 2005 NEC 690.7(A): $8 \times 48.3 \times 1.25 = 483 \text{ V}$
 - Max Voltage per 2008 NEC 690.7(A): $8 \times 56.25 = 450 \text{ V}$
 - Max Current per NEC 690.8(A)(1): 7.36 A
- Wire size calculations:
 - PV Source Circuits: Required conductor ampacity calculated per NEC 690.8(B)(1): $7.36 \text{ A} \times 125\% = 9.20 \text{ A}$
 - Load current adjusted per NEC Table 310.16 for THWN-2 @ 50°C: $9.20 \text{ A} \times 0.82 = 11.21 \text{ A}$
 - THWN-2 conductor size: NEC Table 310.16 (3 or less per raceway): #18 AWG (use #12 AWG)
 - Ampacity adjustment for multiple conductors in raceway: 31 - 40 conductors: $11.21 \times 0.40 = 28 \text{ A}$, THWN-2 AWG 12
- Inverter AC Circuit:
 - Continuous output current rating: 30 A
 - 1.25% Adjustment per NEC 690.8(B)(1): 37.5 A
 - Required THWN-2 (3 or less per raceway): #10 AWG
 - Required THWN-2 (4 - 6 per raceway): #8 AWG
- Inverter AC Combiner Output Circuit:
 - Total phase current with two inverters per phase: $30 \times 2 \times \sqrt{3} = 104 \text{ A}$
 - 1.25% Adjustment per NEC 690.8(B)(1): 130 A
 - Standard circuit breaker size: 150 A
 - Required wire size THWN-2 (3 or less per raceway): #1 AWG
 - Required conduit size (ØA, ØB, ØC, N, GND): 1½"
- Conduit Fill:

| | #12 AWG | #10 AWG | #8 AWG |
|--------------|---------|---------|--------|
| ¾" Conduit: | 16 | 10 | 6 |
| 1" Conduit: | 26 | 16 | 9 |
| 1¼" Conduit: | 45 | 28 | 16 |
| 1½" Conduit: | 61 | 38 | 22 |

SMA SUNNYBOY 7000US INVERTER

Input data:

| | |
|---|-------------|
| MPP-voltage range | 250 - 480 V |
| Max. input voltage | 600 V |
| Maximum input current | 30 A |
| Internal GFDI, Neg ground, Four circuit fused combiner in optional AC/DC disconnect | |

Output data:

| | |
|--|--------|
| Maximum continuous output power | 7000 W |
| Phases | 1 |
| Nominal AC output voltage | 277 V |
| Maximum output current per phase | 25 A |
| Maximum overcurrent protection per phase | 25 A |
| Efficiency | 96% |

General data:

| | |
|--------------------------------|----------------------|
| Enclosure Rating | NEMA 3R |
| Size (h x w x d) | 21.4" x 18.4" x 9.5" |
| Weight | 141 lb. |
| Admissible ambient temperature | -13 to +113 °F |

VOLTAGE DROP CALCULATIONS

Load current (Isc x 1.25): Iload := 7.33 Amperes
Wire resistance from Table 8, Chapter 9, NEC:

| | |
|-------------------------------|---------------------------|
| Resistance of AWG 12 solid: | R12 := 1.93 Ω per 1000 ft |
| Resistance of AWG 10 solid: | R10 := 1.21 Ω per 1000 ft |
| Resistance of AWG 8 stranded: | R8 := 0.778 Ω per 1000 ft |

"d" is length of run from PV array connections to inverter. Must be doubled for circuit, i.e.: power and return conductors. Total voltage drop (sum of drop in both pos and neg circuit conductors) as a function of distance "d" is calculated from the following equations for AWG 8, 10, and 12.

$$\text{AWG12}(d) := \text{Iload} \cdot R12 \cdot \frac{2d}{1000} \text{ Volts}$$

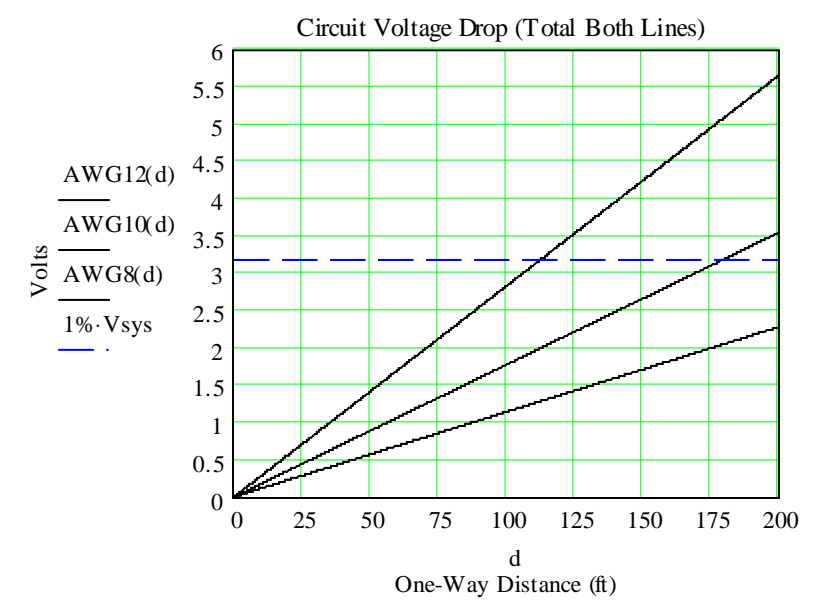
$$\text{AWG10}(d) := \text{Iload} \cdot R10 \cdot \frac{2d}{1000} \text{ Volts}$$

$$\text{AWG8}(d) := \text{Iload} \cdot R8 \cdot \frac{2d}{1000} \text{ Volts}$$

One percent of circuit voltage is calculated as follows:

| | |
|-------------------------------------|--------------------|
| PV Module voltage at maximum power: | Vmp := 39.8 Volts |
| Number of modules in series: | n := 8 |
| System voltage at maximum power: | Vsys := Vmp n |
| | Vsys = 318.4 Volts |

V := 39.88 Onepercent := V/0.01



| SHEET NO. | CONTENT |
|-----------|---|
| SHEET 8 | GRID CONNECTION |
| SHEET 7 | INVERTER CIRCUITS 5 & 6 |
| SHEET 6 | INVERTER CIRCUITS 3 & 4 |
| SHEET 5 | INVERTER CIRCUITS 1 & 2 |
| SHEET 4 | WIRE LIST |
| SHEET 3 | ELECTRIC ROOM EQUIPMENT ARRANGEMENT |
| SHEET 2 | ROOFTOP EQUIPMENT ARRANGEMENT |
| SHEET 1 | DESIGN CALCULATIONS AND GENERAL INFORMATION |
| SHEET NO. | CONTENT |

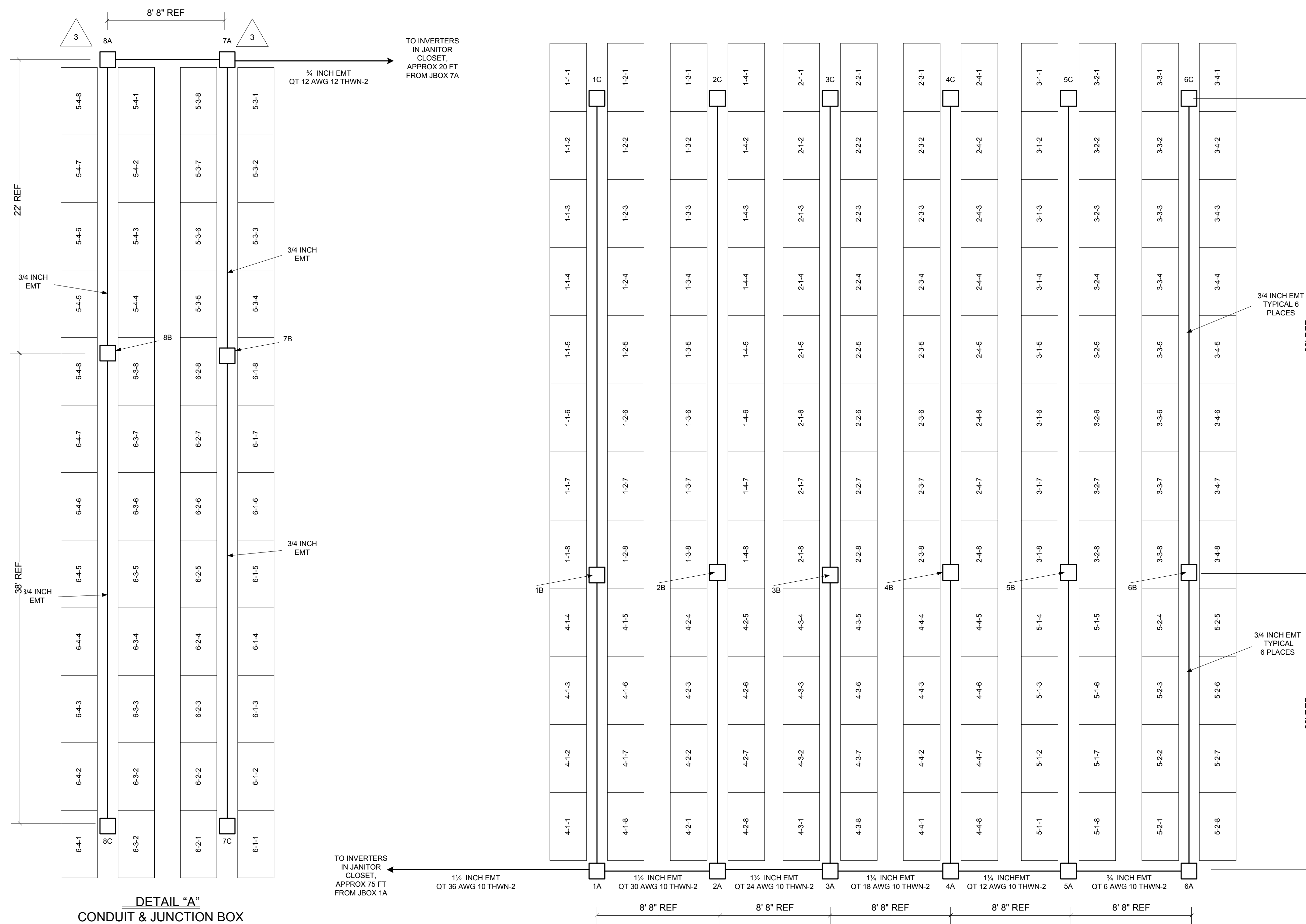
SHEET INDEX

CLEVENSTINE ENGINEERING

PHOTOVOLTAIC INSTALLATION, ELECTRICAL
CUSTOMER ADDRESS

| | | | |
|-------|---------|--------|--------|
| SIZE | FSCM NO | DWG NO | REV |
| D | | 09002 | A |
| SCALE | N/A | SHEET | 1 OF 8 |

| REVISION HISTORY | | | |
|------------------|-----------------|----------|-----------|
| REV | DESCRIPTION | APPROVED | DATE |
| ORIG | Original issue. | JPC | 21 APR 09 |
| A | See sheet 1. | | |



- NOTES:**
- UNLESS OTHERWISE INDICATED, ALL DIMENSIONS ARE REFERENCE DIMENSIONS ONLY. JUNCTION BOXES AND CONDUIT ARE TO BE LOCATED RELATIVE TO THE INSTALLED LOCATION OF THE PHOTOVOLTAIC PANELS.
 - INSTALLER TO DETERMINE SUITABLE USE OF CONDUIT INSTALLATION HARDWARE SUCH AS SUPPORT BRACKETS, PULL BOXES, AND CONDUITES (Lb, Li, Lc).
 - ENGRAVED ID PLATES SHALL BE APPLIED TO THE OUTSIDE OF EACH JUNCTION BOX. ID PLATE TO INCLUDE THE IDENTIFICATION NUMBER (E.G.: 1A) SHOWN ON DRAWING.

DETAIL "A"
CONDUIT & JUNCTION BOX
ARRANGEMENT

DETAIL "B"
CONDUIT & JUNCTION BOX
ARRANGEMENT

ROOFTOP

CLEVENSTINE ENGINEERING

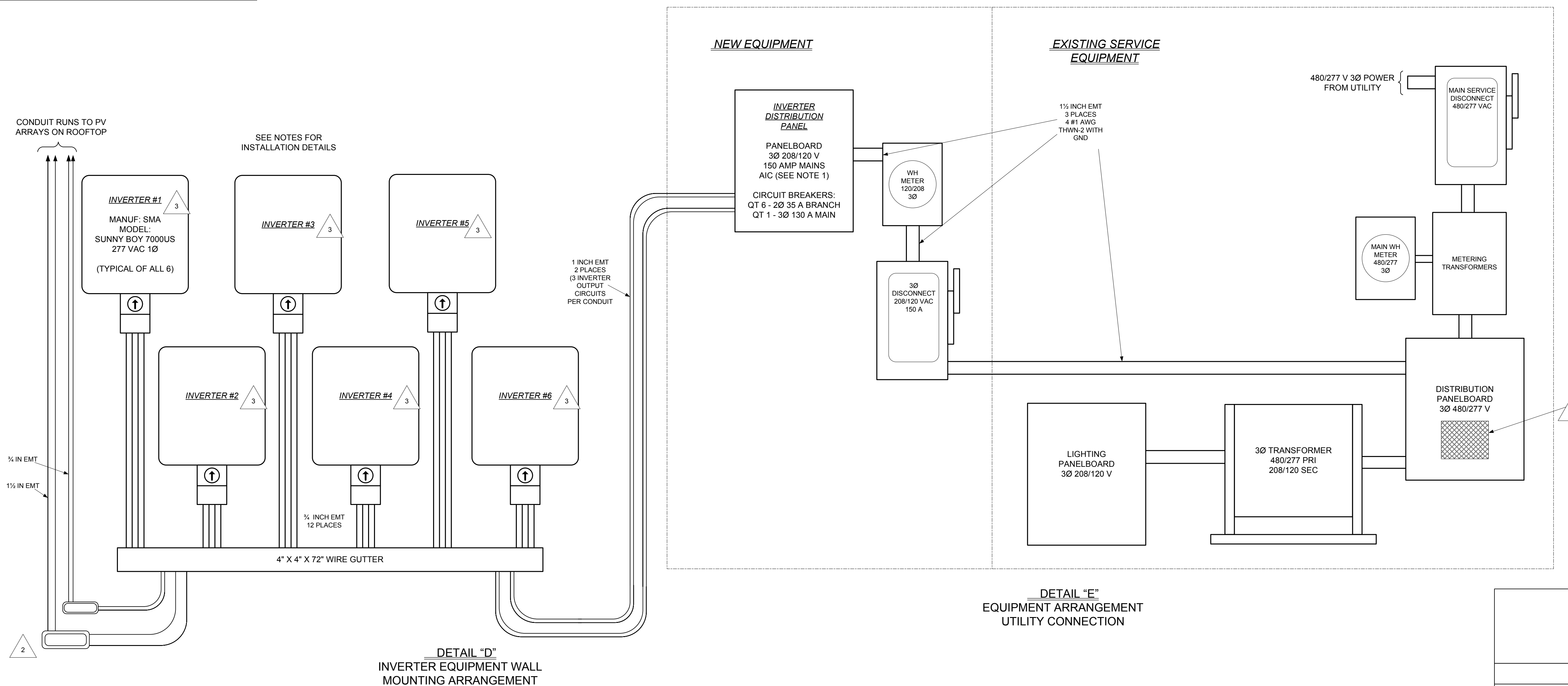
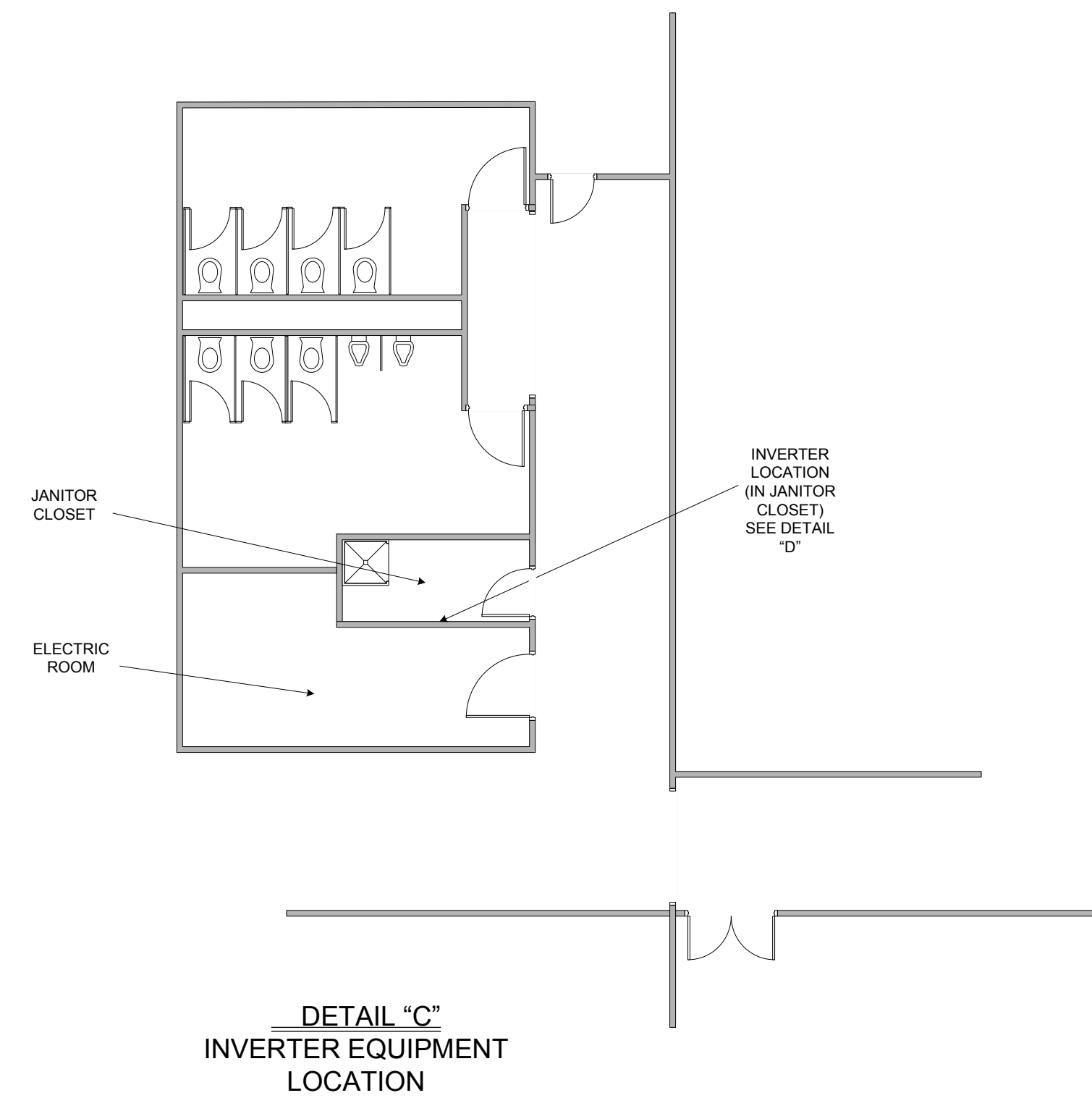
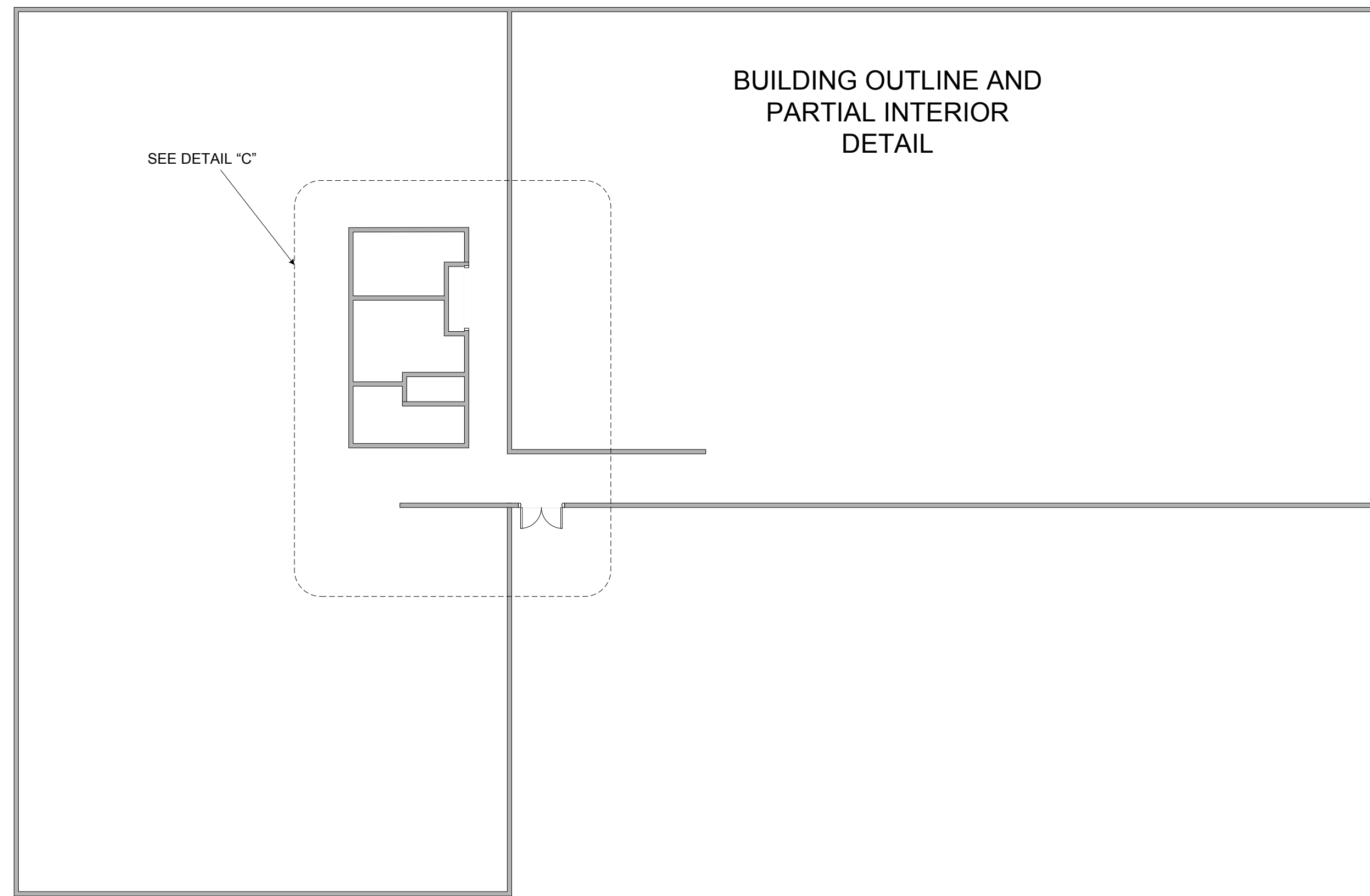
PHOTOVOLTAIC INSTALLATION, ELECTRICAL
CUSTOMER ADDRESS

| | | | |
|-------|---------|--------|--------|
| SIZE | FSCM NO | DWG NO | REV |
| D | | 09002 | A |
| SCALE | N/A | SHEET | 2 OF 8 |

| REVISION HISTORY | | | |
|------------------|--|----------|-----------|
| REV | DESCRIPTION | APPROVED | DATE |
| ORIG | Original issue. | JPC | 21 APR 09 |
| A | See sheet 1. Zone 7A: Change "TROUGH" to "GUTTER". Zone 2B: Added information plate to distribution panel. Added note 4. | | |

NOTES:

- INVERTERS ARE TO BE LOCATED A MINIMUM OF 36 INCHES FROM FLOOR. SPACING ON SIDES, TOP, AND BOTTOM OF INVERTERS SHALL BE NO LESS THAN 8 INCHES.
- INSTALLER TO DETERMINE SUITABLE USE OF CONDUIT INSTALLATION HARDWARE SUCH AS SUPPORT BRACKETS, PULL BOXES, AND CONDUITS (Lb, LI, Lc).
- ENGRAVED ID PLATES SHALL BE APPLIED TO THE OUTSIDE OF EACH INVERTER. ID PLATE TO INCLUDE THE IDENTIFICATION (E.G.: INVERTER #1) SHOWN ON DRAWING.
- ENGRAVED OR ETCHED NAMEPLATE TO BE ATTACHED TO EXISTING 480/277 VOLT DISTRIBUTION PANEL WITH THE FOLLOWING INFORMATION: "CAUTION: BUS SUPPLIED FROM MULTIPLE SOURCES. IN ADDITION TO MAIN SUPPLY, THIS BUS IS ALSO SUPPLIED WITH POWER SUPPLIED TO THE LOAD SIDE OF SOLAR PHOTOVOLTAIC POWER SYSTEM BRANCH BREAKER."
- STRUCTURAL CONSIDERATION: INSTALLER TO DETERMINE THE STRUCTURAL ADEQUACY OF JANITOR CLOSET WALL TO SUPPORT THE WEIGHT OF THE SIX INVERTERS WEIGHT (WEIGHT LISTED ON SHEET 1).
- THERMAL CONSIDERATION: INSTALLER TO DETERMINE THE ABILITY OF THE JANITOR CLOSET TO HANDLE AND REMOVE APPROXIMATELY 1680 WATTS OF HEAT (280 PER INVERTER) FROM THE INVERTERS



ELECTRIC ROOM

CLEVENSTINE ENGINEERING

PHOTOVOLTAIC INSTALLATION, ELECTRICAL
CUSTOMER ADDRESS

| SIZE | FSCM NO | DWG NO | REV |
|-------|---------|--------|--------|
| D | | 09002 | A |
| SCALE | N/A | SHEET | 3 OF 8 |

| WIRE NUMBER | FROM | TO | TYPE | SIZE | LENGTH | COLOR | CIRCUIT | REMARKS |
|-------------|---------------|----------------|--------|---------|--------|-------|----------------|------------------------------|
| 1-1-P | INVERTER #1 | JB 1B | THWN-2 | #10 AWG | 97 | BLK | INVERTER #1 DC | MARKER ON BOTH ENDS (NOTE 1) |
| 1-1-N | INVERTER #1 | JB 1C | THWN-2 | #10 AWG | 135 | WHT | INVERTER #1 DC | MARKER ON BOTH ENDS (NOTE 1) |
| 1-2-P | INVERTER #1 | JB 1B | THWN-2 | #10 AWG | 97 | BLK | INVERTER #1 DC | MARKER ON BOTH ENDS (NOTE 1) |
| 1-2-N | INVERTER #1 | JB 1C | THWN-2 | #10 AWG | 135 | WHT | INVERTER #1 DC | MARKER ON BOTH ENDS (NOTE 1) |
| 1-3-P | INVERTER #1 | JB 2B | THWN-2 | #10 AWG | 105.5 | BLK | INVERTER #1 DC | MARKER ON BOTH ENDS (NOTE 1) |
| 1-3-N | INVERTER #1 | JB 2C | THWN-2 | #10 AWG | 143.5 | WHT | INVERTER #1 DC | MARKER ON BOTH ENDS (NOTE 1) |
| 1-4-P | INVERTER #1 | JB 2B | THWN-2 | #10 AWG | 105.5 | BLK | INVERTER #1 DC | MARKER ON BOTH ENDS (NOTE 1) |
| 1-4-N | INVERTER #1 | JB 2C | THWN-2 | #10 AWG | 143.5 | WHT | INVERTER #1 DC | MARKER ON BOTH ENDS (NOTE 1) |
| 2-1-P | INVERTER #2 | JB 3B | THWN-2 | #10 AWG | 114 | BLK | INVERTER #2 DC | MARKER ON BOTH ENDS (NOTE 1) |
| 2-1-N | INVERTER #2 | JB 3C | THWN-2 | #10 AWG | 152 | WHT | INVERTER #2 DC | MARKER ON BOTH ENDS (NOTE 1) |
| 2-2-P | INVERTER #2 | JB 3B | THWN-2 | #10 AWG | 114 | BLK | INVERTER #2 DC | MARKER ON BOTH ENDS (NOTE 1) |
| 2-2-N | INVERTER #2 | JB 3C | THWN-2 | #10 AWG | 152 | WHT | INVERTER #2 DC | MARKER ON BOTH ENDS (NOTE 1) |
| 2-3-P | INVERTER #2 | JB 4B | THWN-2 | #10 AWG | 122.5 | BLK | INVERTER #2 DC | MARKER ON BOTH ENDS (NOTE 1) |
| 2-3-N | INVERTER #2 | JB 4C | THWN-2 | #10 AWG | 160.5 | WHT | INVERTER #2 DC | MARKER ON BOTH ENDS (NOTE 1) |
| 2-4-P | INVERTER #2 | JB 4B | THWN-2 | #10 AWG | 122.5 | BLK | INVERTER #2 DC | MARKER ON BOTH ENDS (NOTE 1) |
| 2-4-N | INVERTER #2 | JB 4C | THWN-2 | #10 AWG | 160.5 | WHT | INVERTER #2 DC | MARKER ON BOTH ENDS (NOTE 1) |
| 3-1-P | INVERTER #3 | JB 5B | THWN-2 | #10 AWG | 131 | BLK | INVERTER #3 DC | MARKER ON BOTH ENDS (NOTE 1) |
| 3-1-N | INVERTER #3 | JB 5C | THWN-2 | #10 AWG | 169 | WHT | INVERTER #3 DC | MARKER ON BOTH ENDS (NOTE 1) |
| 3-2-P | INVERTER #3 | JB 5B | THWN-2 | #10 AWG | 131 | BLK | INVERTER #3 DC | MARKER ON BOTH ENDS (NOTE 1) |
| 3-2-N | INVERTER #3 | JB 5C | THWN-2 | #10 AWG | 169 | WHT | INVERTER #3 DC | MARKER ON BOTH ENDS (NOTE 1) |
| 3-3-P | INVERTER #3 | JB 6B | THWN-2 | #10 AWG | 139.5 | BLK | INVERTER #3 DC | MARKER ON BOTH ENDS (NOTE 1) |
| 3-3-N | INVERTER #3 | JB 6C | THWN-2 | #10 AWG | 177.5 | WHT | INVERTER #3 DC | MARKER ON BOTH ENDS (NOTE 1) |
| 3-4-P | INVERTER #3 | JB 6B | THWN-2 | #10 AWG | 139.5 | BLK | INVERTER #3 DC | MARKER ON BOTH ENDS (NOTE 1) |
| 3-4-N | INVERTER #3 | JB 6C | THWN-2 | #10 AWG | 177.5 | WHT | INVERTER #3 DC | MARKER ON BOTH ENDS (NOTE 1) |
| 4-1-P | INVERTER #4 | JB 1A | THWN-2 | #10 AWG | 75 | BLK | INVERTER #4 DC | MARKER ON BOTH ENDS (NOTE 1) |
| 4-1-N | INVERTER #4 | JB 1A | THWN-2 | #10 AWG | 75 | WHT | INVERTER #4 DC | MARKER ON BOTH ENDS (NOTE 1) |
| 4-2-P | INVERTER #4 | JB 2A | THWN-2 | #10 AWG | 83.5 | BLK | INVERTER #4 DC | MARKER ON BOTH ENDS (NOTE 1) |
| 4-2-N | INVERTER #4 | JB 2A | THWN-2 | #10 AWG | 83.5 | WHT | INVERTER #4 DC | MARKER ON BOTH ENDS (NOTE 1) |
| 4-3-P | INVERTER #4 | JB 3A | THWN-2 | #10 AWG | 92 | BLK | INVERTER #4 DC | MARKER ON BOTH ENDS (NOTE 1) |
| 4-3-N | INVERTER #4 | JB 3A | THWN-2 | #10 AWG | 92 | WHT | INVERTER #4 DC | MARKER ON BOTH ENDS (NOTE 1) |
| 4-4-P | INVERTER #4 | JB 4A | THWN-2 | #10 AWG | 100.5 | BLK | INVERTER #4 DC | MARKER ON BOTH ENDS (NOTE 1) |
| 4-4-N | INVERTER #4 | JB 4A | THWN-2 | #10 AWG | 100.5 | WHT | INVERTER #4 DC | MARKER ON BOTH ENDS (NOTE 1) |
| 5-1-P | INVERTER #5 | JB 5A | THWN-2 | #10 AWG | 109 | BLK | INVERTER #5 DC | MARKER ON BOTH ENDS (NOTE 1) |
| 5-1-N | INVERTER #5 | JB 5A | THWN-2 | #10 AWG | 109 | WHT | INVERTER #5 DC | MARKER ON BOTH ENDS (NOTE 1) |
| 5-2-P | INVERTER #5 | JB 6A | THWN-2 | #10 AWG | 117.5 | BLK | INVERTER #5 DC | MARKER ON BOTH ENDS (NOTE 1) |
| 5-2-N | INVERTER #5 | JB 6A | THWN-2 | #10 AWG | 117.5 | WHT | INVERTER #5 DC | MARKER ON BOTH ENDS (NOTE 1) |
| 5-3-P | INVERTER #5 | JB 7A | THWN-2 | #12 AWG | 20 | BLK | INVERTER #5 DC | MARKER ON BOTH ENDS (NOTE 1) |
| 5-3-N | INVERTER #5 | JB 7A | THWN-2 | #12 AWG | 20 | WHT | INVERTER #5 DC | MARKER ON BOTH ENDS (NOTE 1) |
| 5-4-P | INVERTER #5 | JB 8A | THWN-2 | #12 AWG | 28.5 | BLK | INVERTER #5 DC | MARKER ON BOTH ENDS (NOTE 1) |
| 5-4-N | INVERTER #5 | JB 8A | THWN-2 | #12 AWG | 28.5 | WHT | INVERTER #5 DC | MARKER ON BOTH ENDS (NOTE 1) |
| 6-1-P | INVERTER #6 | JB 7B | THWN-2 | #12 AWG | 42 | BLK | INVERTER #6 DC | MARKER ON BOTH ENDS (NOTE 1) |
| 6-1-N | INVERTER #6 | JB 7C | THWN-2 | #12 AWG | 80 | WHT | INVERTER #6 DC | MARKER ON BOTH ENDS (NOTE 1) |
| 6-2-P | INVERTER #6 | JB 7B | THWN-2 | #12 AWG | 42 | BLK | INVERTER #6 DC | MARKER ON BOTH ENDS (NOTE 1) |
| 6-2-N | INVERTER #6 | JB7C | THWN-2 | #12 AWG | 80 | WHT | INVERTER #6 DC | MARKER ON BOTH ENDS (NOTE 1) |
| 6-3-P | INVERTER #6 | JB 8B | THWN-2 | #12 AWG | 50.5 | BLK | INVERTER #6 DC | MARKER ON BOTH ENDS (NOTE 1) |
| 6-3-N | INVERTER #6 | JB 8C | THWN-2 | #12 AWG | 88.5 | WHT | INVERTER #6 DC | MARKER ON BOTH ENDS (NOTE 1) |
| 6-4-P | INVERTER #6 | JB 8B | THWN-2 | #12 AWG | 50.5 | BLK | INVERTER #6 DC | MARKER ON BOTH ENDS (NOTE 1) |
| 6-4-N | INVERTER #6 | JB 8C | THWN-2 | #12 AWG | 88.5 | WHT | INVERTER #6 DC | MARKER ON BOTH ENDS (NOTE 1) |
| 1-L | INVERTER #1 | AC COMB PNL | THWN-2 | #8 AWG | 30 | BLK | INVERTER #1 AC | MARKER ON BOTH ENDS (NOTE 1) |
| 1-N | INVERTER #1 | AC COMB PNL | THWN-2 | #8 AWG | 30 | WHT | INVERTER #1 AC | MARKER ON BOTH ENDS (NOTE 1) |
| GND | INVERTER #1 | AC COMB PNL | BARE | #8 AWG | 30 | | INVERTER #1 AC | |
| 2-L | INVERTER #2 | AC COMB PNL | THWN-2 | #8 AWG | 30 | BLK | INVERTER #2 AC | MARKER ON BOTH ENDS (NOTE 1) |
| 2-N | INVERTER #2 | AC COMB PNL | THWN-2 | #8 AWG | 30 | WHT | INVERTER #2 AC | MARKER ON BOTH ENDS (NOTE 1) |
| GND | INVERTER #2 | AC COMB PNL | BARE | #8 AWG | 30 | | INVERTER #2 AC | |
| 3-L | INVERTER #3 | AC COMB PNL | THWN-2 | #8 AWG | 30 | BLK | INVERTER #3 AC | MARKER ON BOTH ENDS (NOTE 1) |
| 3-N | INVERTER #3 | AC COMB PNL | THWN-2 | #8 AWG | 30 | WHT | INVERTER #3 AC | MARKER ON BOTH ENDS (NOTE 1) |
| GND | INVERTER #3 | AC COMB PNL | BARE | #8 AWG | 30 | | INVERTER #3 AC | |
| 4-L | INVERTER #4 | AC COMB PNL | THWN-2 | #8 AWG | 30 | BLK | INVERTER #4 AC | MARKER ON BOTH ENDS (NOTE 1) |
| 4-N | INVERTER #4 | AC COMB PNL | THWN-2 | #8 AWG | 30 | WHT | INVERTER #4 AC | MARKER ON BOTH ENDS (NOTE 1) |
| GND | INVERTER #4 | AC COMB PNL | BARE | #8 AWG | 30 | | INVERTER #4 AC | |
| 5-L | INVERTER #5 | AC COMB PNL | THWN-2 | #8 AWG | 30 | BLK | INVERTER #5 AC | MARKER ON BOTH ENDS (NOTE 1) |
| 5-N | INVERTER #5 | AC COMB PNL | THWN-2 | #8 AWG | 30 | WHT | INVERTER #5 AC | MARKER ON BOTH ENDS (NOTE 1) |
| GND | INVERTER #5 | AC COMB PNL | BARE | #8 AWG | 30 | | INVERTER #5 AC | |
| 6-L | INVERTER #6 | AC COMB PNL | THWN-2 | #8 AWG | 30 | BLK | INVERTER #6 AC | MARKER ON BOTH ENDS (NOTE 1) |
| 6-N | INVERTER #6 | AC COMB PNL | THWN-2 | #8 AWG | 30 | WHT | INVERTER #6 AC | MARKER ON BOTH ENDS (NOTE 1) |
| GND | INVERTER #6 | AC COMB PNL | BARE | #8 AWG | 30 | | INVERTER #6 AC | |
| ΦA | AC COMB PNL | PV METER | THWN-2 | #1 AWG | 5 | BLK | AC OUTPUT | MARKER ON BOTH ENDS (NOTE 1) |
| ΦB | AC COMB PNL | PV METER | THWN-2 | #1 AWG | 5 | BLK | AC OUTPUT | MARKER ON BOTH ENDS (NOTE 1) |
| ΦC | AC COMB PNL | PV METER | THWN-2 | #1 AWG | 5 | BLK | AC OUTPUT | MARKER ON BOTH ENDS (NOTE 1) |
| N | AC COMB PNL | PV METER | THWN-2 | #1 AWG | 5 | WHT | AC OUTPUT | MARKER ON BOTH ENDS (NOTE 1) |
| GND | AC COMB PNL | PV METER | BARE | #1 AWG | 5 | | AC OUTPUT | |
| ΦA | PV METER | PV DISCONNECT | THWN-2 | #1 AWG | 5 | BLK | AC OUTPUT | MARKER ON BOTH ENDS (NOTE 1) |
| ΦB | PV METER | PV DISCONNECT | THWN-2 | #1 AWG | 5 | BLK | AC OUTPUT | MARKER ON BOTH ENDS (NOTE 1) |
| ΦC | PV METER | PV DISCONNECT | THWN-2 | #1 AWG | 5 | BLK | AC OUTPUT | MARKER ON BOTH ENDS (NOTE 1) |
| N | PV METER | PV DISCONNECT | THWN-2 | #1 AWG | 5 | WHT | AC OUTPUT | MARKER ON BOTH ENDS (NOTE 1) |
| GND | PV METER | PV DISCONNECT | BARE | #1 AWG | 5 | | AC OUTPUT | |
| ΦA | PV DISCONNECT | EXIST DIST PNL | THWN-2 | #1 AWG | 12 | BLK | AC OUTPUT | MARKER ON BOTH ENDS (NOTE 1) |
| ΦB | PV DISCONNECT | EXIST DIST PNL | THWN-2 | #1 AWG | 12 | BLK | AC OUTPUT | MARKER ON BOTH ENDS (NOTE 1) |
| ΦC | PV DISCONNECT | EXIST DIST PNL | THWN-2 | #1 AWG | 12 | BLK | AC OUTPUT | MARKER ON BOTH ENDS (NOTE 1) |
| N | PV DISCONNECT | EXIST DIST PNL | THWN-2 | #1 AWG | 12 | WHT | AC OUTPUT | MARKER ON BOTH ENDS (NOTE 1) |
| GND | PV DISCONNECT | EXIST DIST PNL | BARE | #1 AWG | 12 | | AC OUTPUT | |

| REVISION HISTORY | | | |
|------------------|--|----------|-----------|
| REV | DESCRIPTION | APPROVED | DATE |
| ORIG | Original issue. | JPC | 21 APR 09 |
| A | See sheet 1. TABLE: Added "Remarks" column to table. Added requirement for wire markers to table and add Note 1 to specify wire markers. | | |

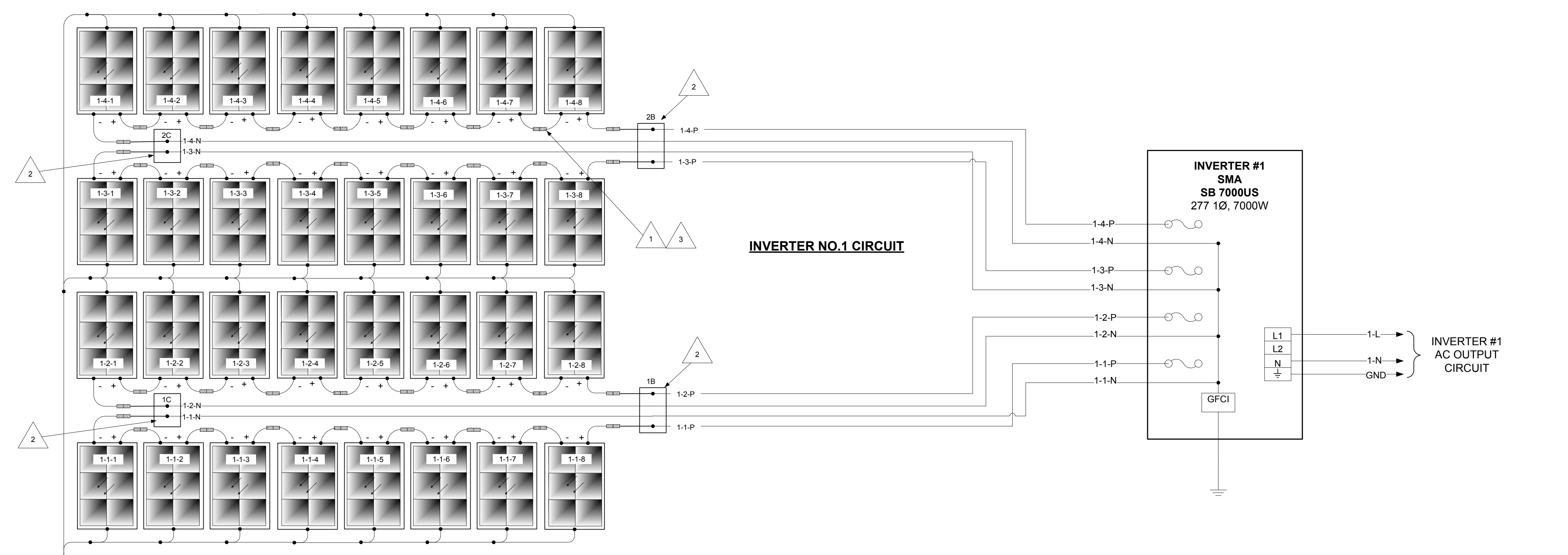
NOTES:

1. WIRE MARKERS TO BE OF PRINTED SLEEVE TYPE. EITHER FREE FLOATING OR SHINK TYPE IS ACCEPTABLE (BRADY PERMASLEEVE OR EQUIVALENT).

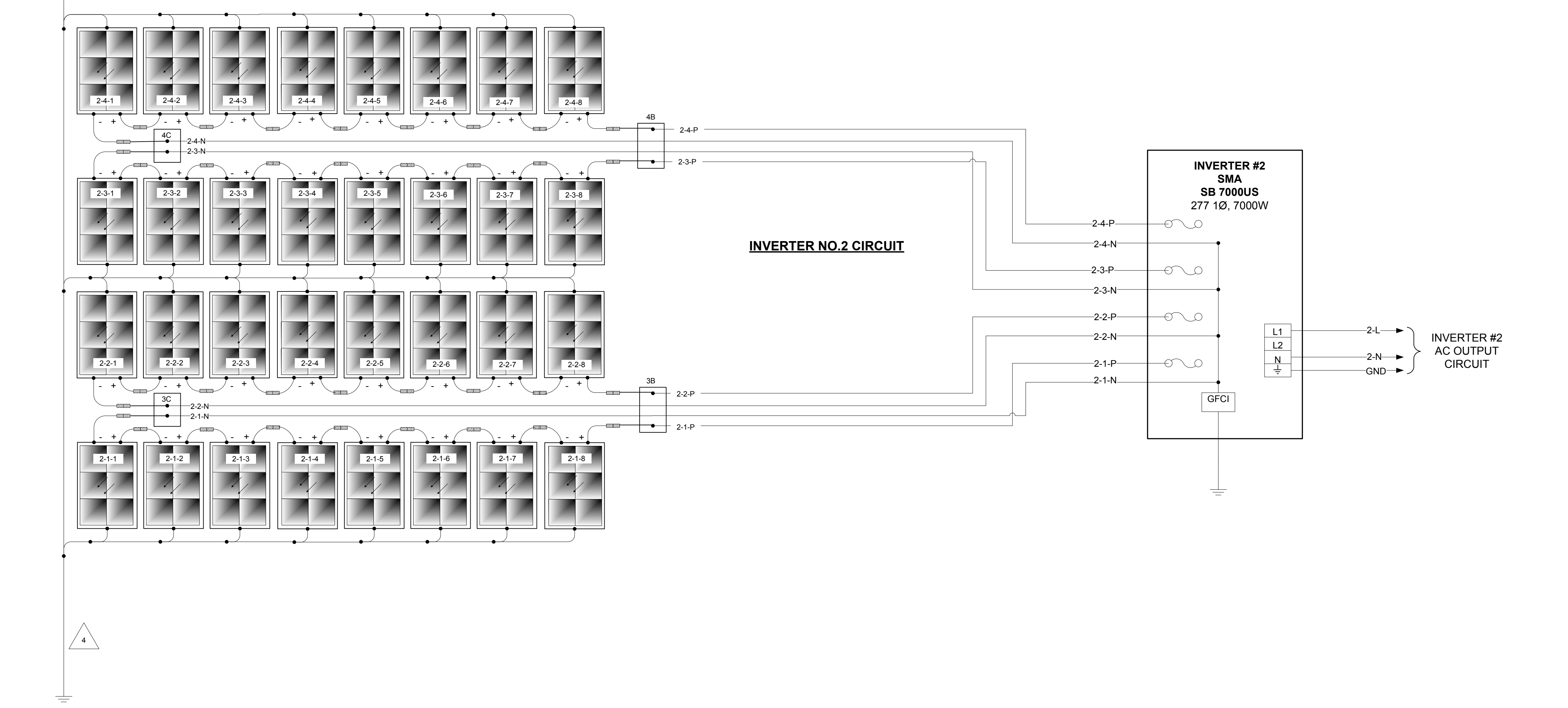
WIRE LIST

| | | | |
|---|---------|-----------------|----------|
| <i>CLEVENSTINE ENGINEERING</i> | | | |
| PHOTOVOLTAIC INSTALLATION, ELECTRICAL CUSTOMER ADDRESS | | | |
| SIZE D | FSCM NO | DWG NO 09002 | REV A |
| SCALE N/A | | SHEET 1 | 4 OF 8 |

| REVISION HISTORY | | | |
|------------------|-----------------|----------|-----------|
| REV | DESCRIPTION | APPROVED | DATE |
| ORIG | Original issue. | JPC | 21 APR 09 |
| A | See sheet 1. | | |



- NOTES:**
1. PHOTOVOLTAIC PANELS SUPPLIED WITH INTEGRAL OUTPUT CABLES AND CONNECTORS. PANEL-TO-PANEL CONNECTIONS MADE VIA INTEGRAL CABLES.
 2. JUNCTION BOX TO CONTAIN TRANSITION FROM CONCEALED THWN-2 TYPE WIRE TO EXPOSED TYPE USE-2 WIRE. GAUGE OF TYPE USE-2 TO BE CONSISTENT WITH TYPE THWN-2 WIRE. TRANSITION BETWEEN TYPE THWN-2 AND TYPE USE-2 TO BE MADE WITH SPLICE CONNECTORS SUITABLE FOR THE PURPOSE.
 3. ALL EXPOSED WIRES AND CONNECTORS ARE TO BE SUPPORTED TO MINIMIZE CONTACT WITH ROOF AND EXPOSURE TO MOISTURE AND SUNLIGHT.
 4. PHOTOVOLTAIC PANEL FRAMES TO BE GROUNDED VIA #6 AWG GROUNDING CONDUCTOR TO NEW GROUNDING ELECTRODE, INDEPENDENT FROM GROUNDING ELECTRODE AND GROUNDING ELECTRODE CONDUCTOR OF EXISTING BUILDING UTILITY SERVICE.

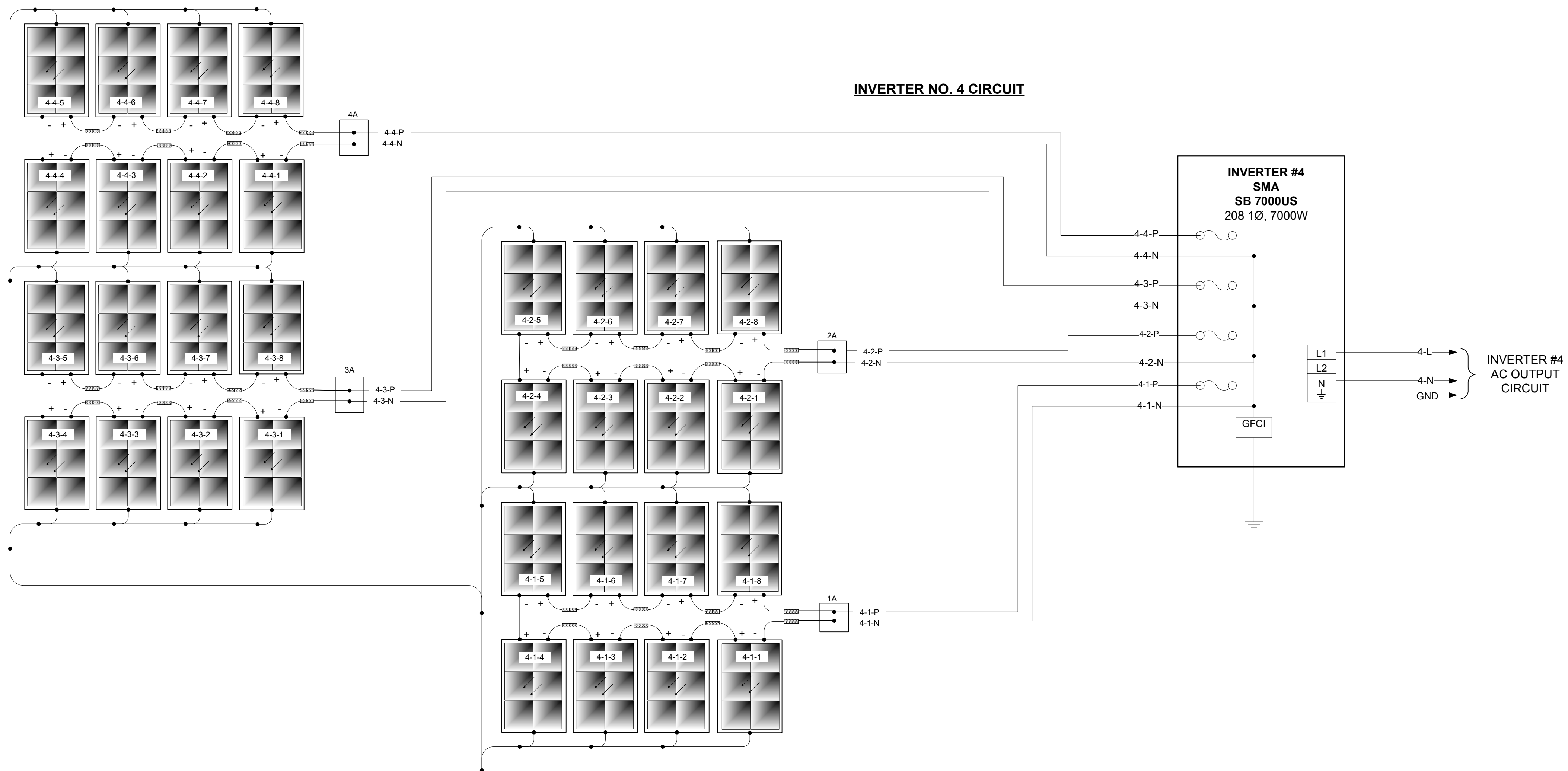
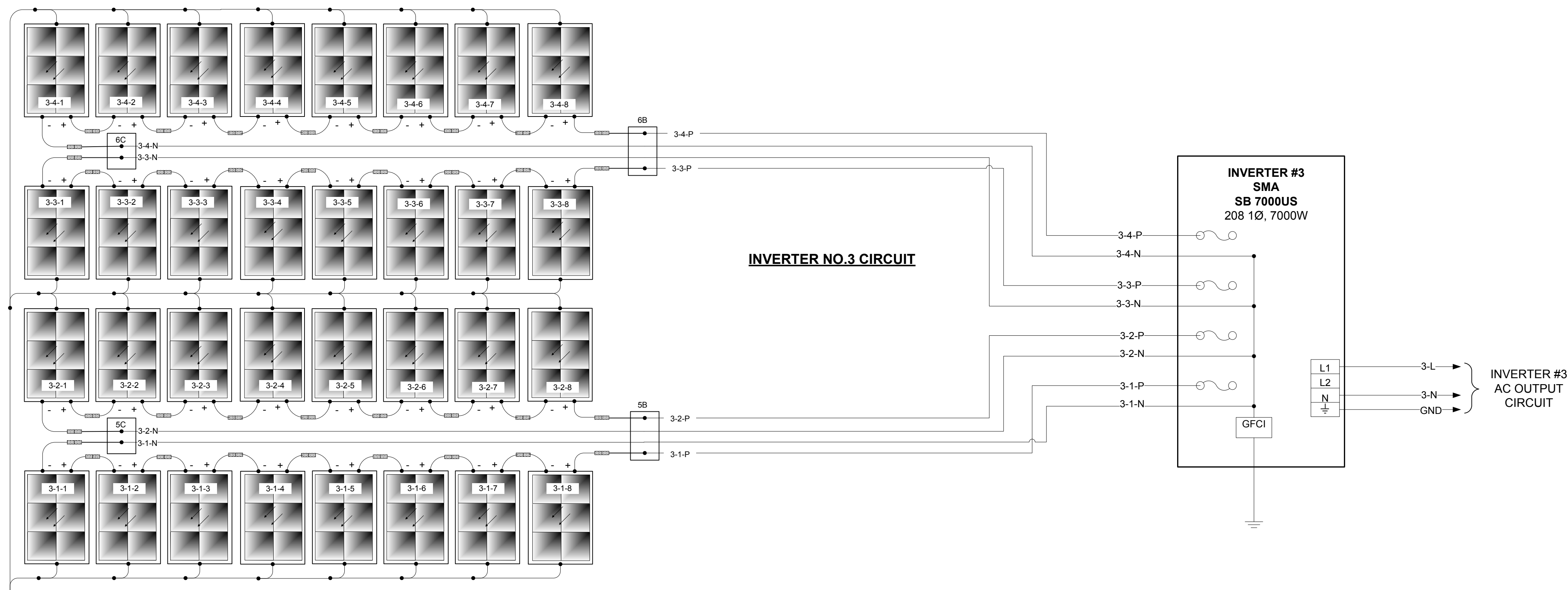


INVERTER CIRCUITS 1 & 2

| | | | |
|---|----------------|-----------------|----------|
| <i>CLEVENSTINE ENGINEERING</i> | | | |
| PHOTOVOLTAIC INSTALLATION, ELECTRICAL CUSTOMER ADDRESS | | | |
| SIZE D | FSCM NO N/A | DWG NO 09002 | REV A |
| SCALE | N/A | SHEET | 5 OF 8 |

| REVISION HISTORY | | | |
|------------------|-----------------|----------|-----------|
| REV | DESCRIPTION | APPROVED | DATE |
| ORIG | Original issue. | JPC | 21 APR 09 |
| A | See sheet 1. | | |

NOTES:
 1. FOR INSTALLATION NOTES, SEE INVERTER CIRCUIT #1.



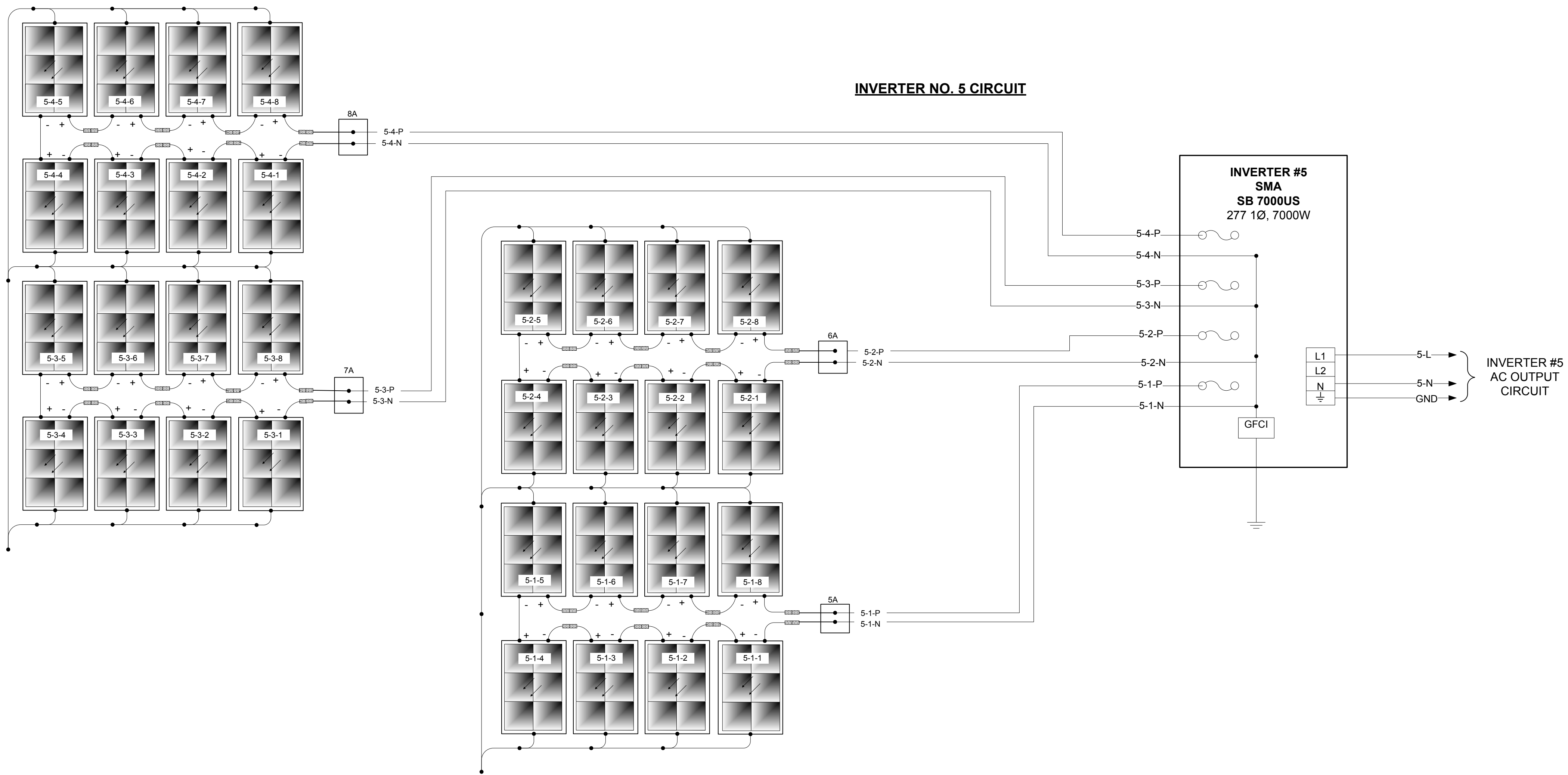
INVERTER CIRCUITS 3 & 4

| | | | |
|---|---------|-----------------|----------|
| <i>CLEVENSTINE ENGINEERING</i> | | | |
| PHOTOVOLTAIC INSTALLATION, ELECTRICAL CUSTOMER ADDRESS | | | |
| SIZE D | FSCM NO | DWG NO 09002 | REV A |
| SCALE N/A | | SHEET | 6 OF 8 |

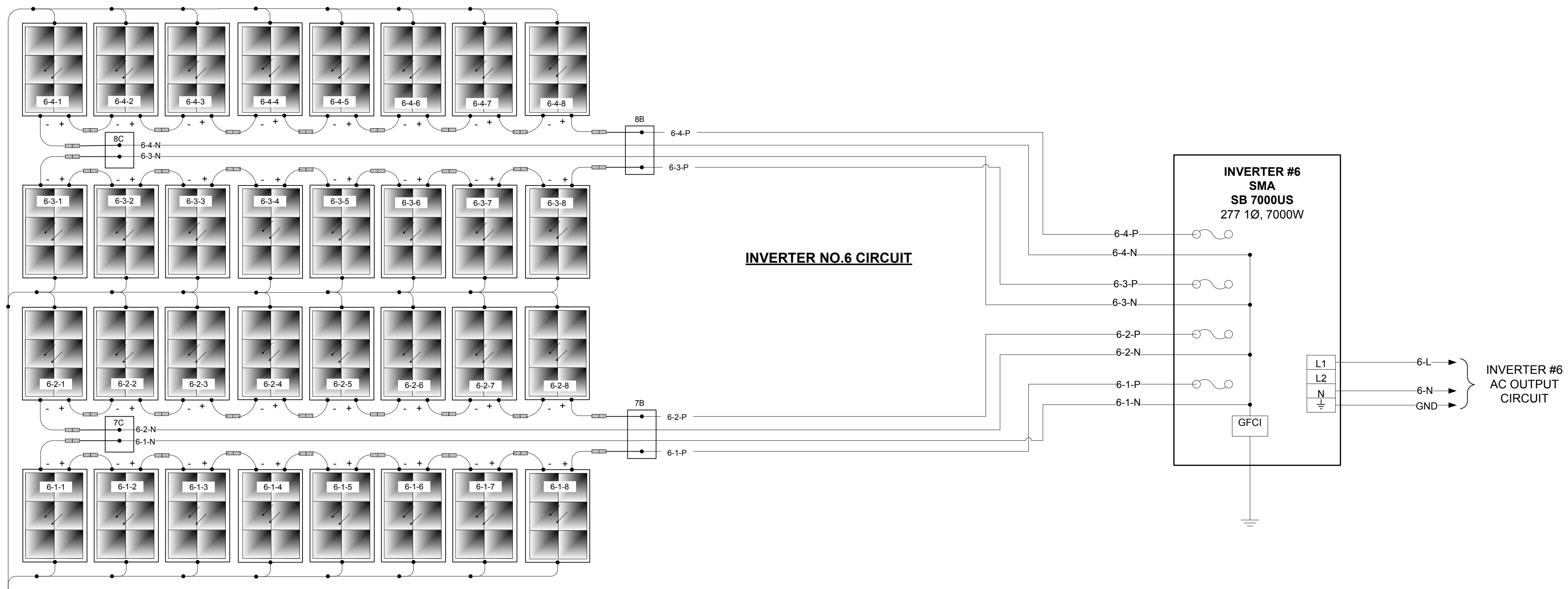
| REVISION HISTORY | | | |
|------------------|-----------------|----------|-----------|
| REV | DESCRIPTION | APPROVED | DATE |
| ORIG | Original issue. | JPC | 21 APR 09 |
| A | See sheet 1. | | |

- NOTES:**
- FOR INSTALLATION NOTES, SEE INVERTER CIRCUIT #1.

INVERTER NO. 5 CIRCUIT



INVERTER NO. 6 CIRCUIT



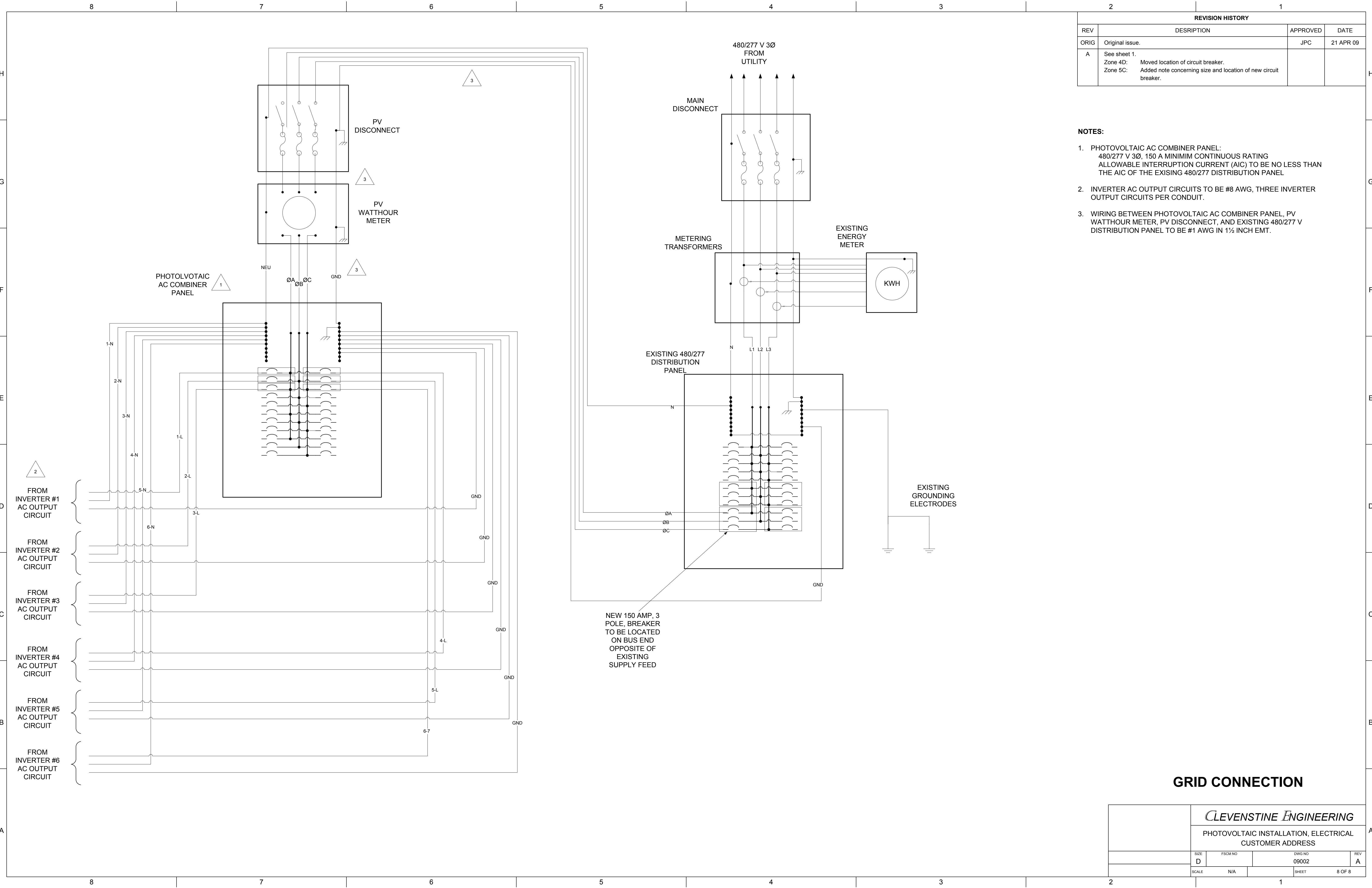
INVERTER CIRCUITS 5 & 6

| | | | |
|---|---------|-----------------|----------|
| CLEVENSTINE ENGINEERING | | | |
| PHOTOVOLTAIC INSTALLATION, ELECTRICAL CUSTOMER ADDRESS | | | |
| SIZE D | FSCM NO | DWG NO 09002 | REV A |
| SCALE N/A | | SHEET 1 | 7 OF 8 |

| REVISION HISTORY | | | |
|------------------|---|----------|-----------|
| REV | DESCRIPTION | APPROVED | DATE |
| ORIG | Original issue. | JPC | 21 APR 09 |
| A | See sheet 1. Zone 4D: Moved location of circuit breaker. Zone 5C: Added note concerning size and location of new circuit breaker. | | |

NOTES:

- PHOTOVOLTAIC AC COMBINER PANEL:
480/277 V 3Ø, 150 A MINIMUM CONTINUOUS RATING
ALLOWABLE INTERRUPTION CURRENT (AIC) TO BE NO LESS THAN
THE AIC OF THE EXISTING 480/277 DISTRIBUTION PANEL
- INVERTER AC OUTPUT CIRCUITS TO BE #8 AWG, THREE INVERTER
OUTPUT CIRCUITS PER CONDUIT.
- WIRING BETWEEN PHOTOVOLTAIC AC COMBINER PANEL, PV
WATTHOUR METER, PV DISCONNECT, AND EXISTING 480/277 V
DISTRIBUTION PANEL TO BE #1 AWG IN 1½ INCH EMT.



GRID CONNECTION

| | | | |
|---|---------|--------|--------|
| <i>CLEVENSTINE ENGINEERING</i> | | | |
| PHOTOVOLTAIC INSTALLATION, ELECTRICAL CUSTOMER ADDRESS | | | |
| SIZE | FSCM NO | DWG NO | REV |
| D | | 09002 | A |
| SCALE | N/A | SHEET | 8 OF 8 |