Revisions

Revisions May 10, 2011

A1-Separate A1 into two pages (A1.1 and A1.2), label inverters, added third conduit, label AC combiner “PANEL PV”
change main panel from 1200A to 2500A, added data cable conduit and lightning arrestor
A2-Make stringing numbers more visible, show DC conduit run, move DC pull box for conduit run would not have to
go over rain gutter, added notes on how to mount DC conduit and boxes
E1-Added pages to show all inverters labeled, added RHW-2/USE-2 wire label, labeled combiner boxes, labeled AC
combiner, added 200A main breaker to combiner panel, correct three pole backfed breaker,
Renamed pages E1.1, E1.2, E1.3, E1.4
E2-Updated the wire calculation page
E4-Added additional label page for DC combiners on roof, added label “PANEL PV” to AC combiner, added a Simple
Schematic and PV System Utility Disconnect Location Page and Renamed pages E4.1, E4.2, E4.3, E4.4
E5-Added additional page to make text clearer and to show location of Sunny Webbox,
Renamed pages E5.1, E5.2, E5.3
S1-Added Notes
A. PV Array (Dwg A2)
B. DC Combiner boxes (Dwg A2)
C. DC Pull Boxes (Dwg A2)
D. DC Gutter Box (Dwg A1.2)
E. Inverter/Integrated DC Disconnect (Dwg 1.2)
F. AC Gutter Box (Dwg 1.2)
G. 277/480V 200A AC Combiner Panel (Dwg 1.2)
H. AC Utility Disconnect (Dwg 1.2)
I. REC Meter (Dwg 1.2)
J. Main Service Panel (Inside Building)
K. Utility Meter (Dwg 1.2)
L. Data/Telecommunications Room (Dwg 5.3)
(297) Suniva 240W Modules in Twenty-seven Strings of (11)
(9) SMA SB 7000 US Inverters
223° Azimuth at 10° tilt
90MPH Design Windspeed and Exposure B
Roof: "T" Type Standing Seam Metal

Notes on Module Grounding:
1) Modules are grounded to each rail with lugs and bare copper
2) Rail Splices have a ground bridge lugged
3) Ground wire is lugged to each rail end

Notes:
¾" EMT Supported by S5! Clamps
Min Distance off roof 1/2"
1 ¼" EMT Supported by S5! Clamps
Min Distance off roof 3 ½"
Conduit routed over edge of roof – shall not penetrate metal roof
DC Wire Schematic 1

Strings 1,2, & 3

Strings 4, 5, & 6

Strings 7, 8, & 9

PV+ PV- PV+ PV- PV+ PV- PV+ PV- PV+ PV-

Array “A”

Array “B”

Array “C”

DC Combiner Box

SolaDeck With 15A Fuses (on roof)

DC Pull Box

(On Roof)

DC Gutter

(Above Inverters)

SB7000 “A”

SunnyBoy 7000US

277Vac/ 25A Output

NEMA 3R UL1741 2nd Ed

With attached Lightning Arrester

Delta LA602DC

SB7000 “B”

SunnyBoy 7000US

277Vac/ 25A Output

NEMA 3R UL1741 2nd Ed

With attached Lightning Arrester

Delta LA602DC

SB7000 “C”

SunnyBoy 7000US

277Vac/ 25A Output

NEMA 3R UL1741 2nd Ed

With attached Lightning Arrester

Delta LA602DC

(9) #10 AWG RHW/USE-2 Positive Wires

(9) #10 AWG RHW/USE-2 Negative Wires

With MC4 Type Connectors

(To extend Module Cables)

(3) #8 Bare Copper Wires

#6 AWG THWN-2

#8 THWN-2 Ground Wire

In 3/4” EMT Conduit

#5 AWG THWN-2

#8 THWN-2 Ground Wire

In 1 1/2” EMT Conduit

#8 AWG THWN-2

#8 THWN-2 Ground Wires

In 3/4” EMT Conduit

GridPoint F-13395

Array “A”

Array “B”

Array “C”

May 11, 2011

GridPoint F-13395

AEP

AEP

DSM

05/10/2011

PEC

E1.1

DC

Schematic 1

GRIDPOINT

DC

Schematic 1

9210 Cameron Rd. #100

Austin, TX 77754

Texas Registered

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DC Wire Schematic 3

Strings 19, 20, & 21

Strings 22, 23, & 24

Strings 25, 26, & 27

Array "G"

Array "H"

Array "I"

DC Combiner Box
SolaDeck With 15A Fuses (on roof)

DC Pull Box
(On Roof)

DC Gutter
(Above Inverters)

PV+ PV- PV+ PV- PV+ PV- PV+ PV- PV+ PV- PV+ PV- PV+ PV- PV+ PV-

PV+ PV- PV+ PV- PV+ PV- PV+ PV- PV+ PV- PV+ PV- PV+ PV- PV+ PV-

PV+ PV- PV+ PV- PV+ PV- PV+ PV- PV+ PV- PV+ PV- PV+ PV- PV+ PV-

PV+ PV- PV+ PV- PV+ PV- PV+ PV- PV+ PV- PV+ PV- PV+ PV- PV+ PV-

#6 AWG THWN-2
#8 THWN-2 Ground Wire
In 3/4" EMT Conduit

#6 AWG THWN-2
#8 THWN-2 Ground Wire
In 1 1/4" EMT Conduit

#6 AWG THWN-2
#8 THWN-2 Ground Wire
In 3/4" EMT Conduit

(9) #10 AWG RHW/USE-2 Positive Wires
(9) #10 AWG RHW/USE-2 Negative Wires
With MC4 Type Connectors
(To extend Module Cables)
(3) #8 Bare Copper Wires

SunnyBoy 7000US
277Vac/ 25A Output
NEMA 3R UL1741 2nd Ed
With attached Lightning Arrester
Delta LA602DC

SunnyBoy 7000US
277Vac/ 25A Output
NEMA 3R UL1741 2nd Ed
With attached Lightning Arrester
Delta LA602DC

SunnyBoy 7000US
277Vac/ 25A Output
NEMA 3R UL1741 2nd Ed
With attached Lightning Arrester
Delta LA602DC

DC Pull Box
(On Roof)

DC Gutter
(Above Inverters)

PV+ PV- PV+ PV- PV+ PV- PV+ PV- PV+ PV- PV+ PV- PV+ PV- PV+ PV-

PV+ PV- PV+ PV- PV+ PV- PV+ PV- PV+ PV- PV+ PV- PV+ PV- PV+ PV-

PV+ PV- PV+ PV- PV+ PV- PV+ PV- PV+ PV- PV+ PV- PV+ PV- PV+ PV-

PV+ PV- PV+ PV- PV+ PV- PV+ PV- PV+ PV- PV+ PV- PV+ PV- PV+ PV-

#6 AWG THWN-2
#8 THWN-2 Ground Wire
In 3/4" EMT Conduit

#6 AWG THWN-2
#8 THWN-2 Ground Wire
In 1 1/4" EMT Conduit

#6 AWG THWN-2
#8 THWN-2 Ground Wire
In 3/4" EMT Conduit

Array "G"

Array "H"

Array "I"

PV+ PV- PV+ PV- PV+ PV- PV+ PV- PV+ PV- PV+ PV- PV+ PV- PV+ PV-

PV+ PV- PV+ PV- PV+ PV- PV+ PV- PV+ PV- PV+ PV- PV+ PV- PV+ PV-

PV+ PV- PV+ PV- PV+ PV- PV+ PV- PV+ PV- PV+ PV- PV+ PV- PV+ PV-

PV+ PV- PV+ PV- PV+ PV- PV+ PV- PV+ PV- PV+ PV- PV+ PV- PV+ PV-

#6 AWG THWN-2
#8 THWN-2 Ground Wire
In 3/4" EMT Conduit

#6 AWG THWN-2
#8 THWN-2 Ground Wire
In 1 1/4" EMT Conduit

#6 AWG THWN-2
#8 THWN-2 Ground Wire
In 3/4" EMT Conduit

PV+ PV- PV+ PV- PV+ PV- PV+ PV- PV+ PV- PV+ PV- PV+ PV- PV+ PV-

PV+ PV- PV+ PV- PV+ PV- PV+ PV- PV+ PV- PV+ PV- PV+ PV- PV+ PV-

PV+ PV- PV+ PV- PV+ PV- PV+ PV- PV+ PV- PV+ PV- PV+ PV- PV+ PV-

PV+ PV- PV+ PV- PV+ PV- PV+ PV- PV+ PV- PV+ PV- PV+ PV- PV+ PV-

#6 AWG THWN-2
#8 THWN-2 Ground Wire
In 3/4" EMT Conduit

#6 AWG THWN-2
#8 THWN-2 Ground Wire
In 1 1/4" EMT Conduit

#6 AWG THWN-2
#8 THWN-2 Ground Wire
In 3/4" EMT Conduit

PV+ PV- PV+ PV- PV+ PV- PV+ PV- PV+ PV- PV+ PV- PV+ PV- PV+ PV-

PV+ PV- PV+ PV- PV+ PV- PV+ PV- PV+ PV- PV+ PV- PV+ PV- PV+ PV-

PV+ PV- PV+ PV- PV+ PV- PV+ PV- PV+ PV- PV+ PV- PV+ PV- PV+ PV-

PV+ PV- PV+ PV- PV+ PV- PV+ PV- PV+ PV- PV+ PV- PV+ PV- PV+ PV-

#6 AWG THWN-2
#8 THWN-2 Ground Wire
In 3/4" EMT Conduit

#6 AWG THWN-2
#8 THWN-2 Ground Wire
In 1 1/4" EMT Conduit

#6 AWG THWN-2
#8 THWN-2 Ground Wire
In 3/4" EMT Conduit

PV+ PV- PV+ PV- PV+ PV- PV+ PV- PV+ PV- PV+ PV- PV+ PV- PV+ PV-

PV+ PV- PV+ PV- PV+ PV- PV+ PV- PV+ PV- PV+ PV- PV+ PV- PV+ PV-

PV+ PV- PV+ PV- PV+ PV- PV+ PV- PV+ PV- PV+ PV- PV+ PV- PV+ PV-

PV+ PV- PV+ PV- PV+ PV- PV+ PV- PV+ PV- PV+ PV- PV+ PV- PV+ PV-

#6 AWG THWN-2
#8 THWN-2 Ground Wire
In 3/4" EMT Conduit

#6 AWG THWN-2
#8 THWN-2 Ground Wire
In 1 1/4" EMT Conduit

#6 AWG THWN-2
#8 THWN-2 Ground Wire
In 3/4" EMT Conduit

PV+ PV- PV+ PV- PV+ PV- PV+ PV- PV+ PV- PV+ PV- PV+ PV- PV+ PV-

PV+ PV- PV+ PV- PV+ PV- PV+ PV- PV+ PV- PV+ PV- PV+ PV- PV+ PV-

PV+ PV- PV+ PV- PV+ PV- PV+ PV- PV+ PV- PV+ PV- PV+ PV- PV+ PV-

PV+ PV- PV+ PV- PV+ PV- PV+ PV- PV+ PV- PV+ PV- PV+ PV- PV+ PV-

#6 AWG THWN-2
#8 THWN-2 Ground Wire
In 3/4" EMT Conduit

#6 AWG THWN-2
#8 THWN-2 Ground Wire
In 1 1/4" EMT Conduit

#6 AWG THWN-2
#8 THWN-2 Ground Wire
In 3/4" EMT Conduit
PV System Disconnect
- Accessible, Lockable, Visible Break
- Lever type Disconnect with NEMA 3R rating
- Labeled “Photovoltaic Disconnect”
- Square HU363RB
  With attached LA663 lighting arrester

Array Gutter
#6 AWG THWN-2 and #10 AWG THWN-2 Ground Wires
In Three 1” EMT Conduits

Array "A" DC
#2 AWG THWN-2
#6 AWG THWN-2 Ground
In 1 ½” EMT Conduit

Array "B" DC
#2 AWG THWN-2
#6 AWG THWN-2 Ground
In 1 ½” EMT Conduit

Array "C" DC
#2 AWG THWN-2
#6 AWG THWN-2 Ground
In 1 ½” EMT Conduit

Array "D" DC
#2 AWG THWN-2
#6 AWG THWN-2 Ground
In 1 ½” EMT Conduit

Array "E" DC
#2 AWG THWN-2
#6 AWG THWN-2 Ground
In 1 ½” EMT Conduit

Array "F" DC
#2 AWG THWN-2
#6 AWG THWN-2 Ground
In 1 ½” EMT Conduit

Array "G" DC
#2 AWG THWN-2
#6 AWG THWN-2 Ground
In 1 ½” EMT Conduit

Array "H" DC
#2 AWG THWN-2
#6 AWG THWN-2 Ground
In 1 ½” EMT Conduit

Array "I" DC
#2 AWG THWN-2
#6 AWG THWN-2 Ground
In 1 ½” EMT Conduit

AC Combiner Panel
Labeled “Panel PV”
- 200A BusBar
- 200A Main Breaker
- 600V 3Ø
- Labeled
  “Photovoltaic Combiner
  Do Not Add Breakers”

Meter is to be installed with Current
Flow in Direction as indicated
i.e. Line Side from PV System

Backfeed Breaker
- 100A, 3 pole, 600V Rated
- The sum of the Main and Solar Breakers
  are less than 120% of bus rating
- PV Breaker must be located furthest from
  main breaker on bus bar and labeled “PV
  system Do not Move”

Generator (Existing)
#6 AWG THWN-2 Ground
(2) #6 AWG THWN-2 and (1) #10 AWG THWN-2 Ground
Per Conduit in (9) 3/4” EMT Conduits

Secure Load Panel (Existing)

Service Panel (Existing)
- 2500A Main Breaker
- 2500A Main Bus
- 480 V AC

To Utility
3P 100A
2500A

Meter is to be installed with current
Flow in direction as indicated
i.e. Line Side from PV System

PV System Disconnect
- Accessible, Lockable, Visible Break
- Lever type Disconnect with NEMA 3R rating
- Labeled “Photovoltaic Disconnect”
- Square HU636R8
  With attached LA663 lighting arrester
Wire Calculations

Wire Sizing Calculations

DC Wire Sizing

1) Design current
Combined IEC of Modules: 25.7 A DC
Max Current winstallation: 32 A DC

2) Wire size
Max Temp - Roof Top Adder:
- Temp derate factor: 0.58
- Number of current wires: 2 per conduit
- Wire Temp Rating: 90 deg C
- Selected Wire Size: 8 AWG
- Insulation type: THWN-2
  - Specific wire ampacity: 44 A

3) Conduit size
Conduit specified: 3/4"
Conduit type: EMT

4) Ampacity
Selected Wire Ampacity:
- 44 A DC
- Minimum Ampacity: 40 ADC
- Requirement: 0 AWG

5) Voltage Drop
- VRmp: 325.0 V DC
- Imp: 24.4 A DC
- Longest wire distance: 200 ft
- Power Loss: 117 W

AC Wire String

1) Design current
Inverter Max Current:
- 26 A AC
- Max Current: 26 A DC

2) Wire size
Max Avg Ambient Temp:
- 104 deg F
- Number of current wires: 6 per conduit
- Max Wire Temp allowed: 90 deg C
- Selected Wire Size: 8 AWG
- Insulation type: THWN-2
  - Specific wire ampacity: 44 A

3) Conduit size
Conduit specified: 1"
Conduit type: EMT

4) Breaker size
AC OCPD Size specified:
- 36 A AC
- Voltage Rating of OCPD: 240 VAC

5) Voltage Drop
- Vnom: 277 V AC
- Imp: 25.0 A AC
- Wire distance: 10 ft
- Power Loss: 0 W

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Wire Calculations

TTWD AE Woods

DC Wire Sizing

1) Design current
Combined IEC of Modules: 25.7 A DC
Max Current winstallation: 32 A DC

2) Wire size
Max Temp - Roof Top Adder:
- Temp derate factor: 0.58
- Number of current wires: 2 per conduit
- Wire Temp Rating: 90 deg C
- Selected Wire Size: 8 AWG
- Insulation type: THWN-2
  - Specific wire ampacity: 44 A

3) Conduit size
Conduit specified: 1 1/4"
Conduit type: EMT

4) Ampacity
Selected Wire Ampacity:
- 43 A DC
- Minimum Ampacity: 40 ADC
- Requirement: 6 AWG

5) Voltage Drop
- Vnom: 325.8 V DC
- Imp: 24.4 A DC
- Longest wire distance: 100 ft
- Power Loss: 58 W

AC Wire Sizing

1) Design current
Inverter Max Current:
- 75 A AC
- Max Current: 75 A DC

2) Wire size
Max Avg Ambient Temp:
- 104 deg F
- Number of current wires: 3 per conduit
- Max Wire Temp allowed: 90 deg C
- Selected Wire Size: 2 AWG
- Insulation type: THWN-2
  - Specified wire ampacity: 104 A

3) Conduit size
Conduit specified: 1 1/2"
Conduit type: EMT

4) Breaker size
AC OCPD Size specified:
- 100 A AC
- Voltage Rating of OCPD: 500 VAC

5) Voltage Drop
- Vnom: 277 V AC
- Imp: 75.0 A AC
- Power Loss: 0 W