

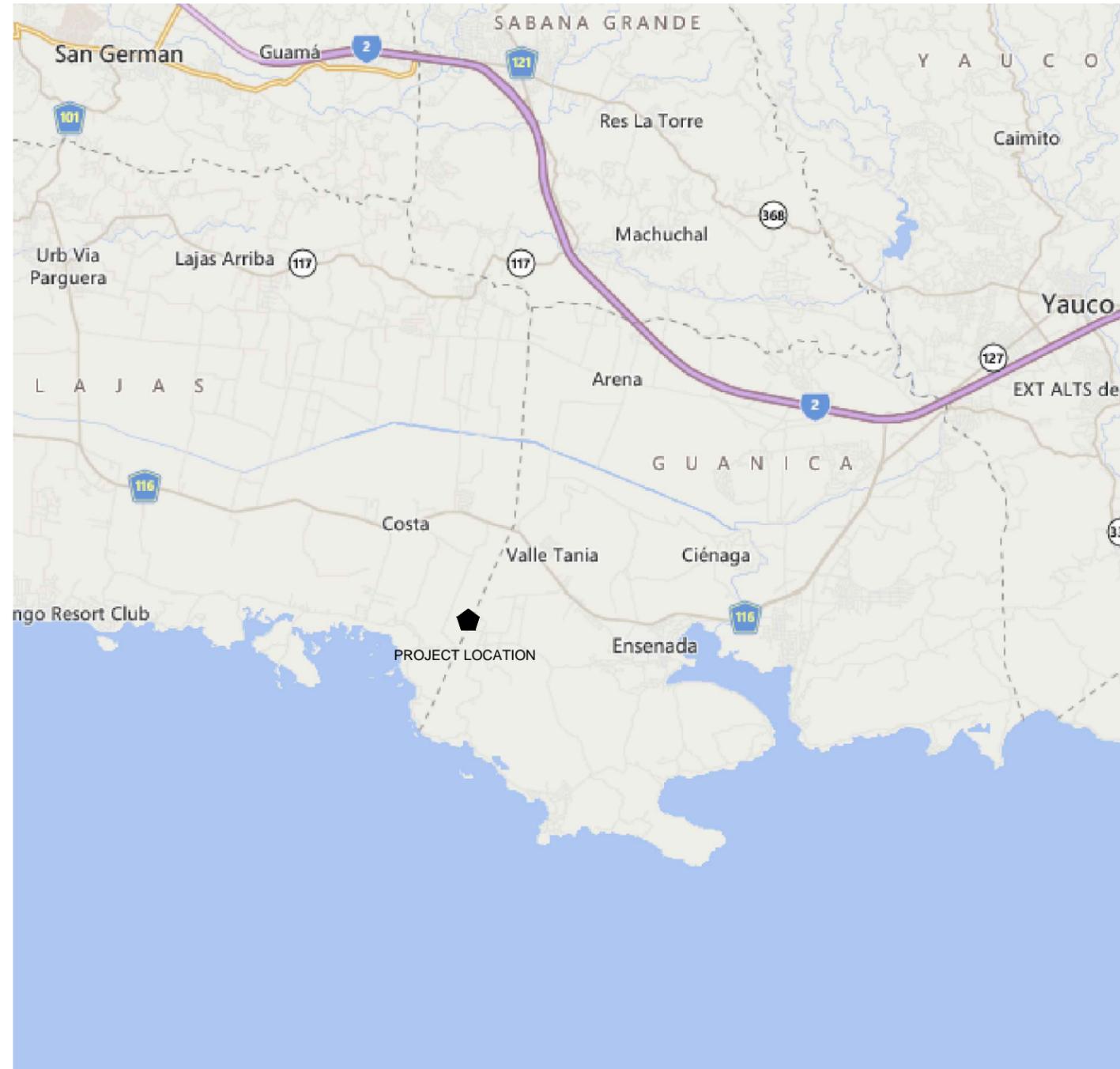
GREENBRIAR

MONTALVA SOLAR FARM

99.75 MW-AC

LAJA AND GUANICA, PUERTO RICO

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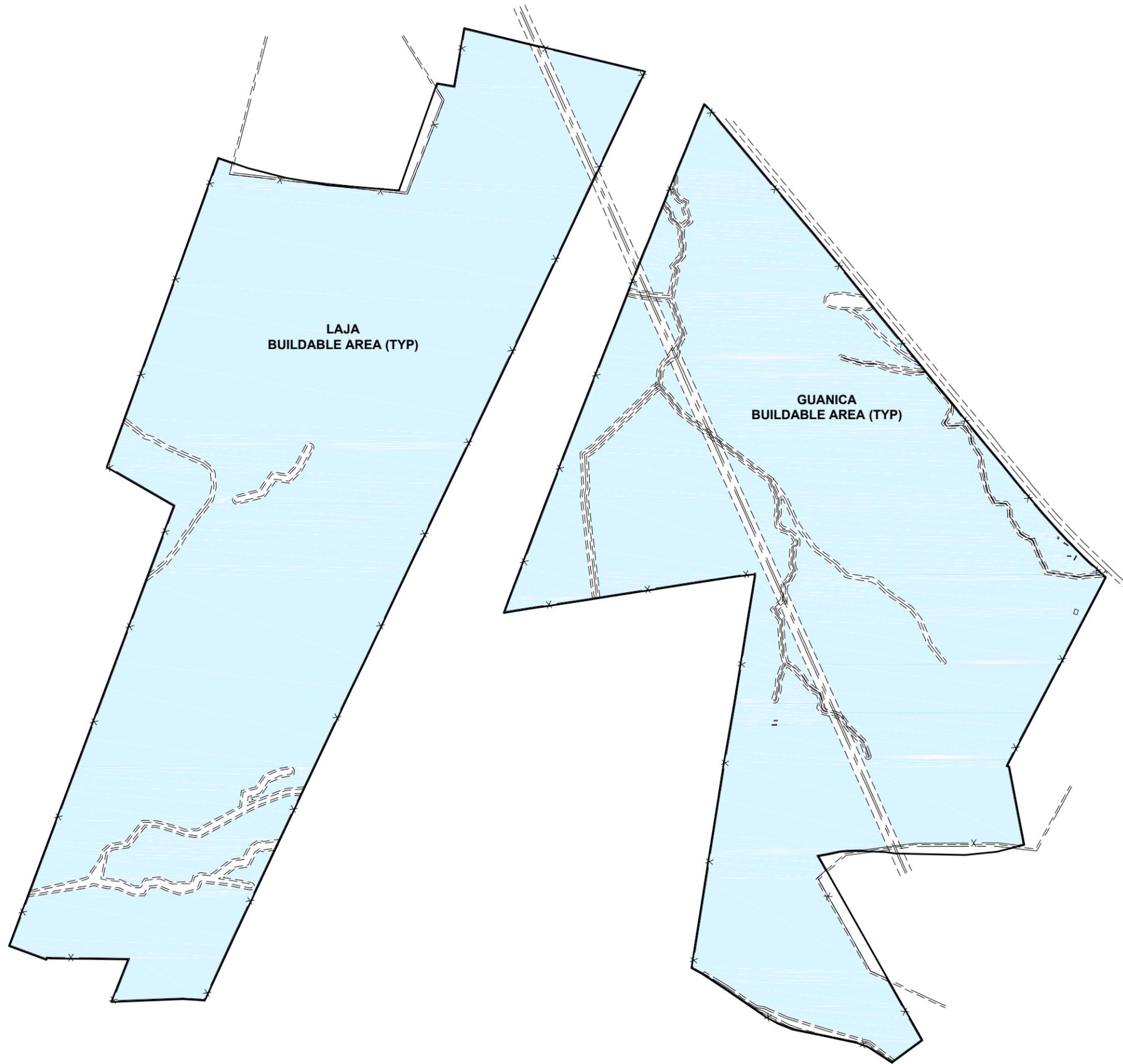
PROJECT OWNER:
GREENBRIAR
MONTALVA SOLAR FARM
 LAJA AND GUANICA, PUERTO RICO



DATE: 10-09-2014	DESIGNER: BRAD GESKE	DRAFTED BY: BG
ENGINEER: JASON OBERG P.E.		DATE:
REVISION: 0	REVISION DESCRIPTION: PRELIMINARY	10-10-2014

SHEET TITLE:
BUILDABLE AREA

SHEET NUMBER:
 CV-01



Building Code	ASCE 7-10/IBC 2012	P.R. Building Code 2011 (amended to IBC 2012)
Country	Puerto Rico	
Province/State	Guanica/Lajas	
City/Township	NA	
Snow load (psf)	0	
Ice load (design thickness - inches)	0.00	
Wind Speed (3-sec gust, mph)	155	
Risk Category	1	
Site Class	C	Extrapolated from Geotech
Seismic Load Sds (g)	0.827	
Seismic Load Sd1 (g)	0.426	
Frost Depth (ft)	0	
High temp (F)	105	
Lowest temp (F)	55	
Terrain type (Flat, rolling, steep)	Flat	
Average Grade (%)	2.0%	
Number of Bores	12	
MW/Bore		
Ground water	Yes	@ Bore MT-7 (8' down)
Bedrock	Yes- basalt & calcite cementation	@ 3' to 9' down
Soil Type (Sand/Silt/Clay/Gravel)	Lean to Fat clays underlay with gravel/hard pan calcite/basalt	
Allowable soil bearing pressure (psf)	3,500	
Boring refusal potential	High	40% direct drive, 60% pilot drill
Soil liquefaction potential	Low	Stiff Soils
Seismic Classification	Soil Class C	
Corrosive Protection	4.0 mil hot dipped zinc coating	Assumed, no corrosion tests provided.
Alta/Survey Topo (attached?)	Yes	Alta's for each site are incomplete/missing easements/restrictions. Will issue RFI's to Owner.
Site Convergence Angle (θ) (decimal degrees)	-0.166944	West of central meridian. Rotate clockwise to true north.
Site plan/Layout	Yes	Will re-design
Buildable Site Area (acres)	826	
Grading		
Jurisdictional Authority	TBD	
Stripping: 6" avg depth, re-spread topsoil	88,700	CY
Area for Hydroseeding and Final Grade (acres)	310	
Area for Site cleaning (acres)	310	
Maximum access road spacing (ft)	600' ±	Per best practice
Aggregate Depth (in)	6	Per Geotech, assumed CBRsubgrade 4.0, CBRagg 20. (no geofabric)
Road Area (Ac)	24.4	
Aggregate Volume (CY)	21,628	
Access Road (Native/Gravel/Asphalt)	Gravel	
Access Road Width (ft)	16.5	
Access Road Length (ft)	64,349	
Access Road for Inverter Access Only (ft)	16.5	
Site Excavation - Cut (CY)	605,700	Does not include Stripping or Retention Ponds
Site Excavation - Fill (CY)	603,000	Assumes 10% shrinkage
Fence (ft)	42,519	feet
Hydrology		
Wetland area(s) per National Wetland Inventory (NWI)?	Yes - approx. 1 acre	At Guanica side
100 year 24 hour storm depth (in)	16.1	per NOAA Charts
Runoff Detention (C.Y.)	27 ac-ft (6.75 ac @ 4 ft depth) @ Each Site	
Runoff Depth = Required Freeboard (ft)	1.5	
Scour Potential? (YN)	No - velocities < 2 fps	
Calculated Scour depth (ft)	NA	
Rip Rap protection	300 CY (TOTAL)	
Geofabric underlay for rip rap (SY)	900	
Culverts (ea)	8	
Culvert Size (dia. (in) x Length (ft))	36" x 30'	
Culvert Type (CMP, HDPE, RCP, PVC, CPE)	Corrugated HDPE	
Erosion Control		
Silt Fence (LF)	52,303	
Silt Sox (LF)	7,400	
Concrete		
Cement Type (I, II, III, V, I/IV), sulfate exposure, Max W/C Ratio	II	Assumed, no corrosion tests provided.
Fly Ash (C or F)	C or F	
Air Entrainment (%)	NA	
28 day strength (F _c) (psi)	3,000	
Max Aggregate Size (in)	1.5	
Foundation Type (Concrete pad/gravel base)	Concrete Pad	
Total Area within Fence Lines (acres)	827.2	
Structural		
Steel Type	A992, GR50, Corrosion Resistant, High Strength	



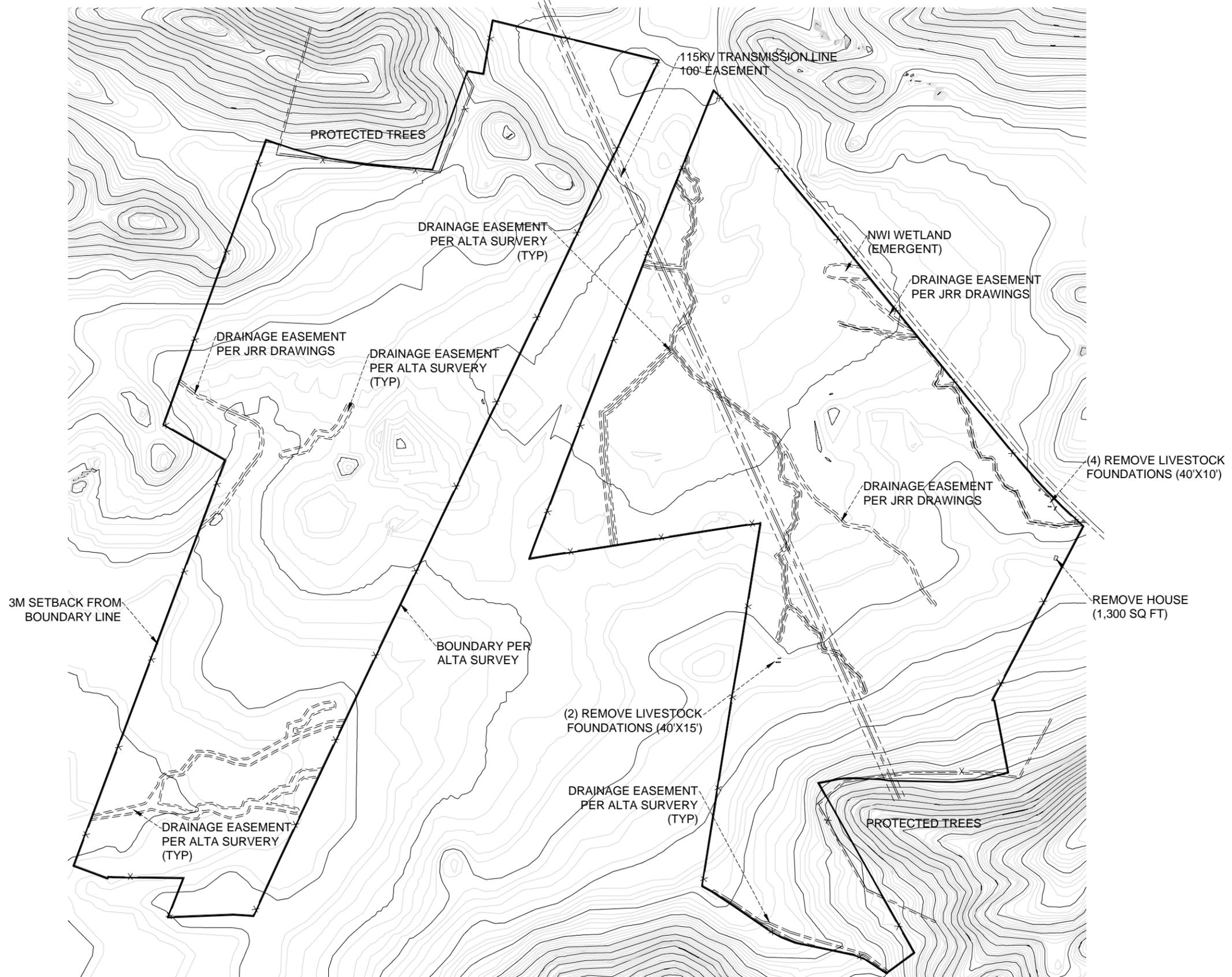
PROJECT OWNER:
GREENBRIAR
MONTALVA SOLAR FARM
 LAJA AND GUANICA, PUERTO RICO



DATE: 10-09-2014	DESIGNER: BRAD GESKE	DRAFTED BY: BG
ENGINEER: JASON OBERG P.E.		
REVISION: 0	REVISION DESCRIPTION: PRELIMINARY	DATE: 10-10-2014

SHEET TITLE:
BUILDABLE AREA

SHEET NUMBER:
 CV-01



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SHEET TITLE:
EXISTING CONDITIONS

SHEET NUMBER:
 CV-02



LEGEND

- PROPOSED GRAVELED ACCESS ROAD (16.5' WIDE)
- EXISTING ROAD TO BE REUSED
- PROPOSED SITE ACCESS
- PROPOSED RETENTION POND
- PROPOSED GRADING



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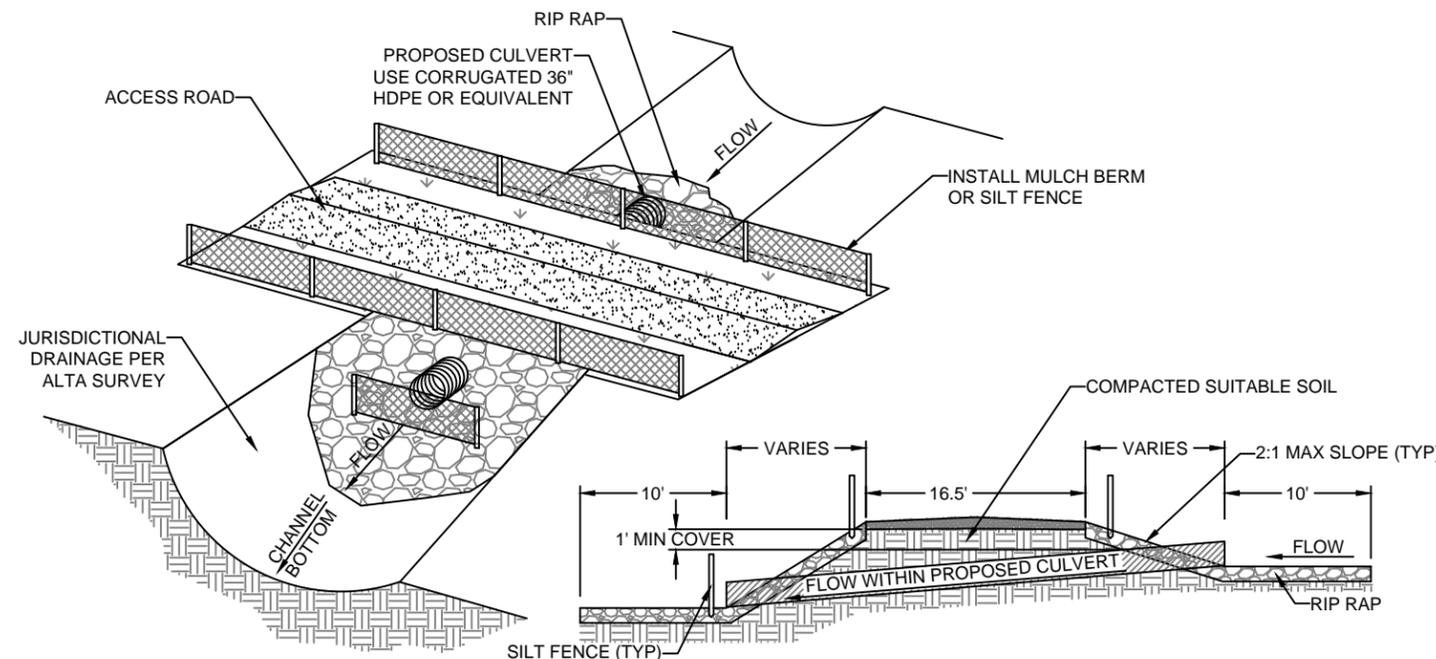
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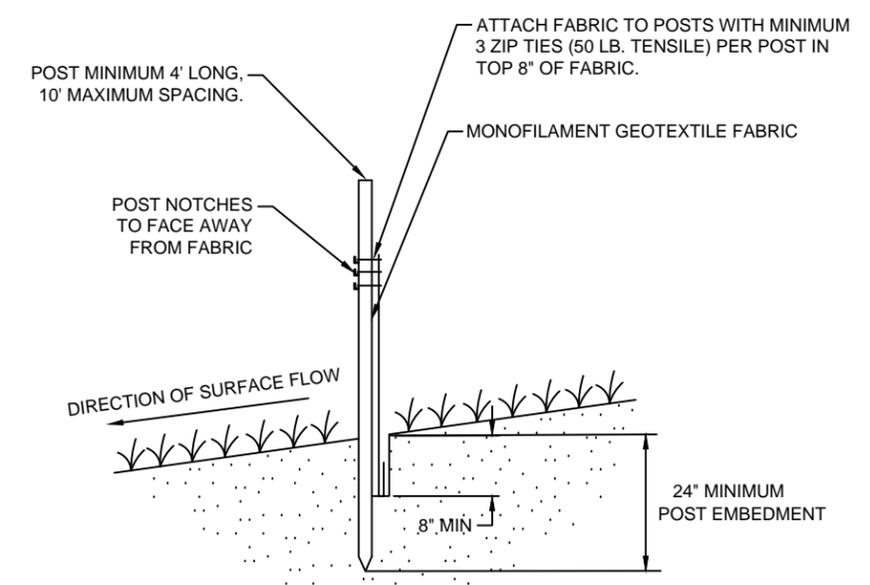
SHEET TITLE:
CIVIL LAYOUT

SHEET NUMBER:
 CV-03

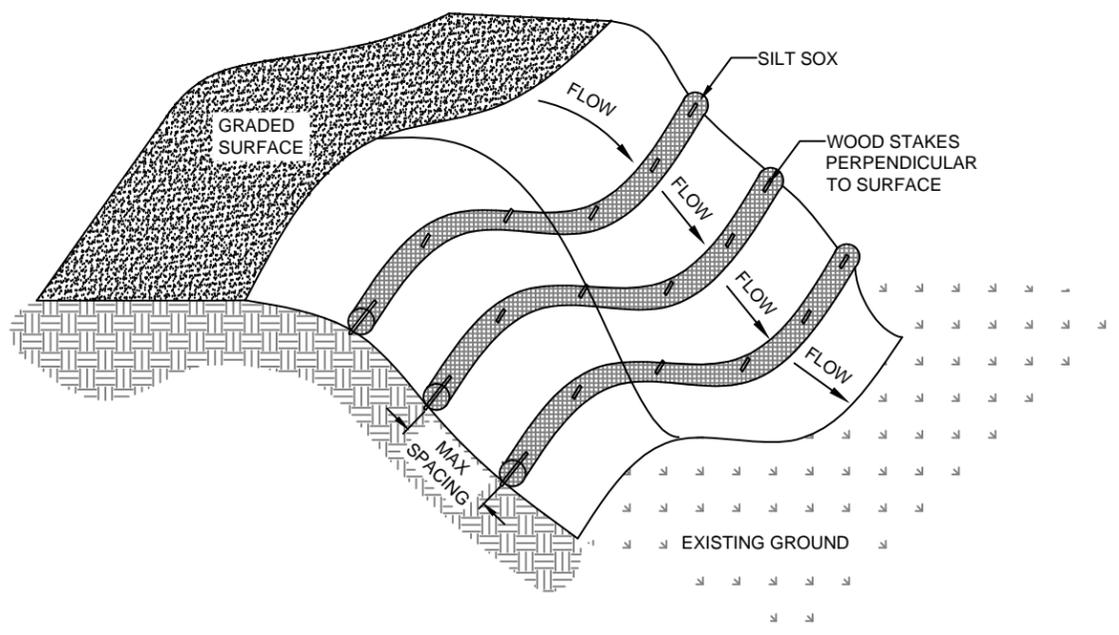


- NOTES:**
1. CULVERT INSTALLATION SHALL CONFORM WITH MANUFACTURERS RECOMMENDATION FOR INSTALLATION.
 2. MINIMIZE DISTURBANCE TO THE STREAM/DITCH DURING CULVERT INSTALLATION/REMOVAL.
 3. CORRUGATED METAL NOT ACCEPTABLE WHERE CORROSIVE SOILS ARE ENCOUNTERED.

1 PIPE CROSSING



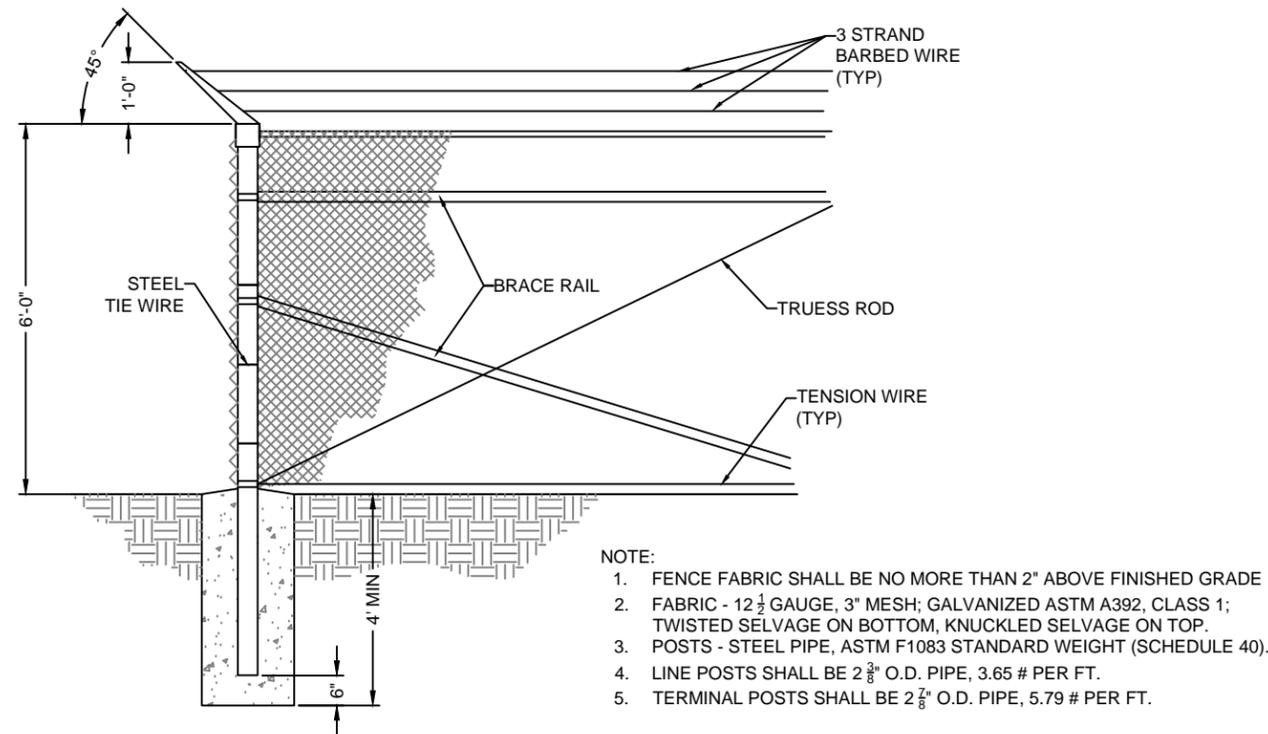
2 SILT FENCE DETAIL



3 TYPICAL SILT SOX

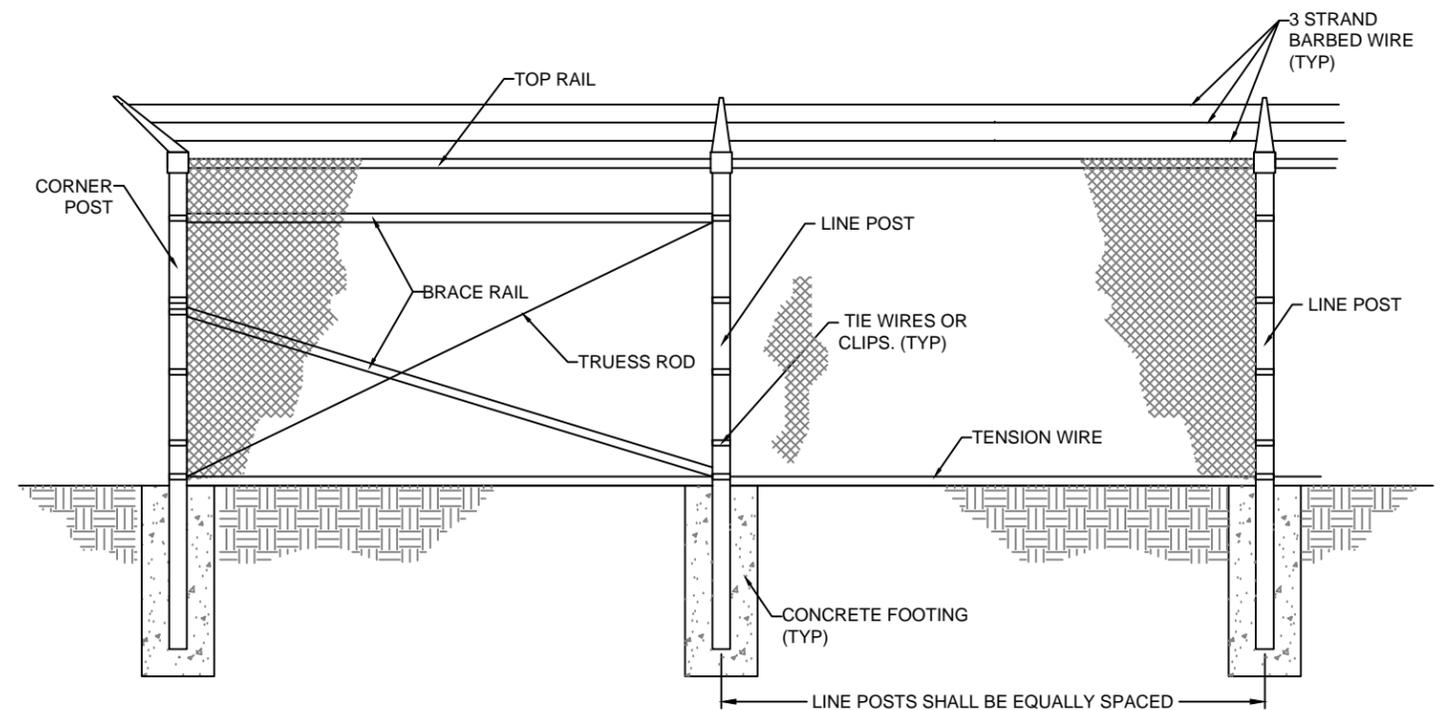
NOTE:

1. SILT SOX SHALL BE PREFABRICATED AND MADE FROM WEED FREE RISE STRAW, FLAX, OR A SIMILAR AGRICULTURAL MATERIAL BOUND INTO A TIGHT TUBULAR SOX BY NETTING.
2. STAKE SILT SOX INTO THE TRENCH. DRIVE STAKES AT THE END OF EACH SILT SOX AND SPACED 4 FEET MAXIMUM ON CENTER. USE WOOD STAKES WITH NOMINAL CLASSIFICATION OF .75 INCHES BY .75 INCHES AND A MINIMUM LENGTH OF 24 INCHES.
3. PREPARE THE SLOPES BEFORE BEGINNING THE INSTALLATION.
4. DIG SMALL TRENCHES ACROSS THE SLOPE ON THE CONTOUR. THE TRENCH SHOULD BE 1/4 TO 1/3 THE THICKNESS OF THE SOX. AND THE WIDTH SHOULD EQUAL THE SOX DIAMETER, IN ORDER TO PROVIDE AREA TO BACKFILL THE TRENCH.
5. SOXS SHALL BE INSTALLED PERPENDICULAR TO WATER MOVEMENT AND PARALLEL TO THE SLOPE CONTOUR.
6. START BUILDING TRENCHES AND INSTALLING SOXS FROM THE BOTTOM OF THE SLOPE AND WORK UP.
7. TURN THE ENDS OF THE SILT SOX UP SLOPE TO PREVENT RUNOFF FROM GOING AROUND THE SOX.
8. IF MORE THAN ONE SILT SOX IS PLACED IN A ROW, THE SOXS SHOULD BE OVERLAPPED, NOT ABUTTED.
9. SILT SOX ENCASED WITH PLASTIC NETTING ARE USED FOR A TEMPORARY APPLICATION ONLY AND SHOULD BE REMOVED FOLLOWING STABILIZATION. SILT SOX USED IN A PERMANENT APPLICATION SHALL BE ENCASED WITH A BIODEGRADABLE MATERIAL AND MAY BE LEFT IN.
10. TEMPORARY INSTALLATIONS SHOULD ONLY BE REMOVED WHEN UP GRADIENT AREAS ARE STABILIZED PER GENERAL PERMIT REQUIREMENTS, AND/OR POLLUTANT SOURCES NO LONGER PRESENT A HAZARD. THEY SHOULD ALSO BE REMOVED BEFORE VEGETATION BECOMES TOO MATURE SO THAT THE REMOVAL PROCESS DOES NOT DISTURB MORE SOIL AND VEGETATION THAN NECESSARY.
11. SILT SOX MUST BE INSPECTED IN ACCORDANCE WITH GENERAL PERMIT REQUIREMENTS FOR THE ASSOCIATED PROJECT TYPE AND RISK LEVEL. IT IS RECOMMENDED THAT A MINIMUM, THE BMPS BE INSPECTED DAILY DURING EXTENDED RAIN EVENTS, AND AFTER THE CONCLUSION OF MAJOR RAIN EVENTS.
12. REPAIRS OR REPLACE SPLIT, TORN, UNRAVELING, OR SLUMPING SILT SOX.
13. IF THE SILT SOX IS USED AS A SEDIMENT CAPTURE DEVICE, OR AS AN EROSION CONTROL DEVICE TO MAINTAIN SHEET FLOWS, SEDIMENT THAT ACCUMULATES IN THE BMP SHOULD BE PERIODICALLY REMOVED IN ORDER TO MAINTAIN BMP EFFECTIVENESS. SEDIMENT SHOULD BE REMOVED WHEN SEDIMENT ACCUMULATION REACHES THE DESIGNATED SEDIMENT STORAGE DEPTH.
14. IF SILT SOX ARE USED FOR EROSION CONTROL, SEDIMENT REMOVAL SHOULD NOT BE REQUIRED AS LONG AS THE SYSTEM CONTINUES TO CONTROL THE GRADE. SEDIMENT CONTROL BMPS WILL LIKELY BE REQUIRED IN CONJUNCTION WITH THIS TYPE OF APPLICATION.
15. REPAIR ANY DAMAGES TO BMPS PROMPTLY.

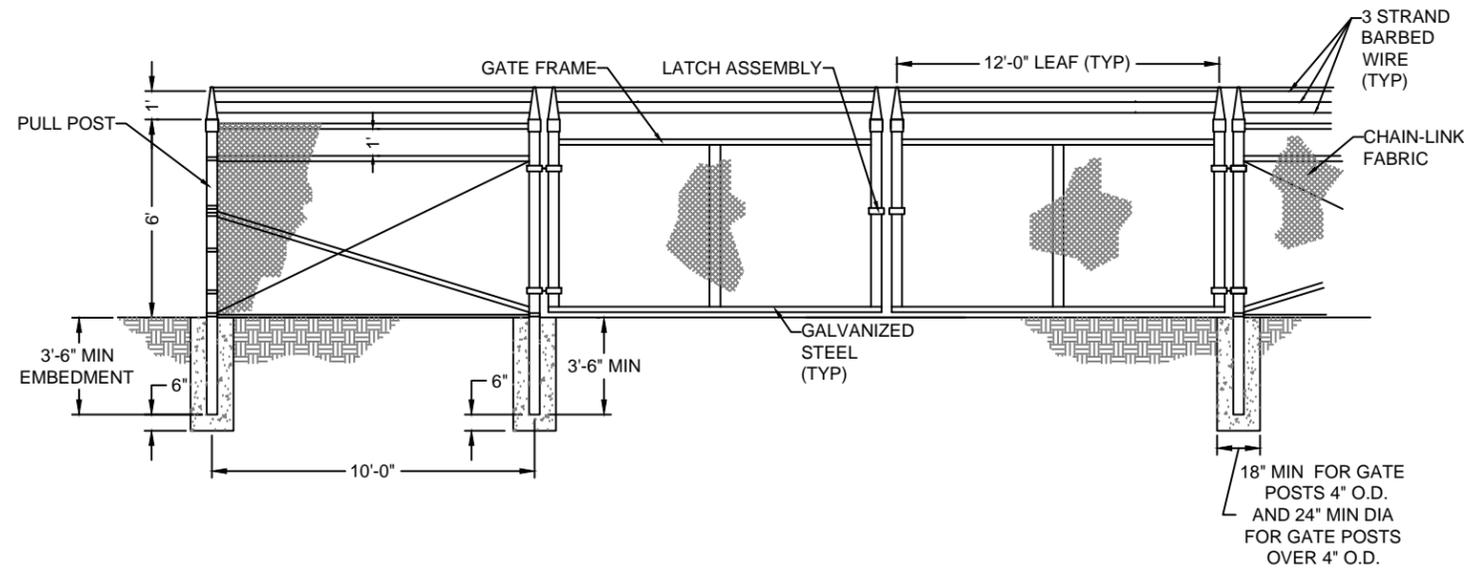


- NOTE:
1. FENCE FABRIC SHALL BE NO MORE THAN 2" ABOVE FINISHED GRADE
 2. FABRIC - 12 1/2 GAUGE, 3" MESH; GALVANIZED ASTM A392, CLASS 1; TWISTED SELVAGE ON BOTTOM, KNUCKLED SELVAGE ON TOP.
 3. POSTS - STEEL PIPE, ASTM F1083 STANDARD WEIGHT (SCHEDULE 40).
 4. LINE POSTS SHALL BE 2 3/8" O.D. PIPE, 3.65 # PER FT.
 5. TERMINAL POSTS SHALL BE 2 7/8" O.D. PIPE, 5.79 # PER FT.

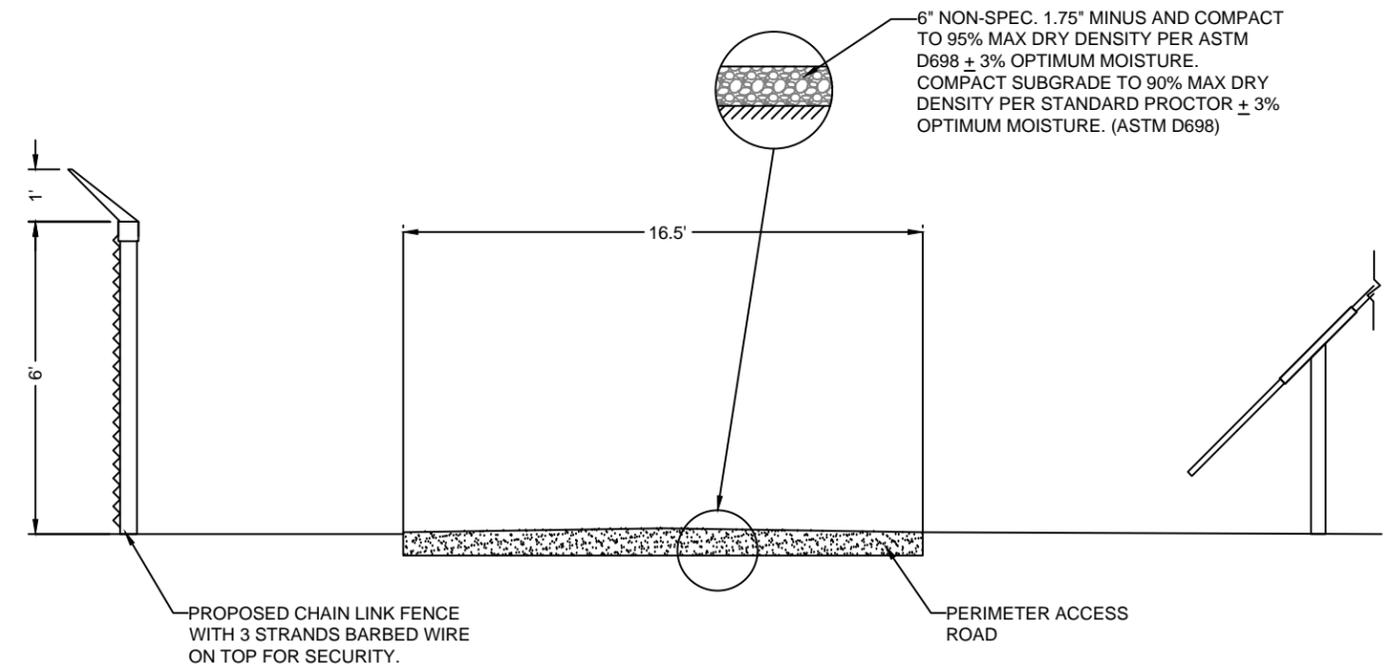
1 CORNER POST DETAIL



2 BRACE PANEL DETAIL



3 20' SWING GATE DETAIL



4 TYPICAL PERIMETER ROAD SECTION

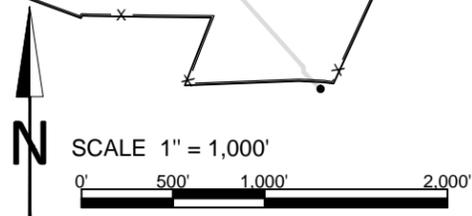


LEGEND

- ACCESS ROAD (16.5' PERIMETER AND INTERIOR)
- SUBSTATION
- x - PROPOSED FENCE
- ▭ ARRAY FOOTPRINT
- SITE ACCESS

MONTALVA OVERVIEW SUMMARY

PLANT TYPE	LAJA - 50.54 MWAC	GUANICA - 48.1 MWAC
MODULE	JINKO 310W	
INVERTER	GPTECH 750	
INVERTER RATING	666 KW	
MODULE COUNT	239,400	233,100
TOTAL MODULE COUNT	472,500	
INVERTER COUNT	76	74
TOTAL INVERTER COUNT	150	
NUMBER OF ARRAYS	38	37
DC VOLTAGE	1,000 V	
MODULES PER STRING	21	
DC POWER (PER ARRAY)	1.95 MW-DC	
AC POWER (PER ARRAY)	1.33 MW-AC	
DC/AC RATIO	1.47	
INSTALLED DC POWER	74.1 MW-DC	72.15 MW-DC
INSTALLED AC POWER	50.54 MW-AC	49.21 MW-AC
TOTAL INSTALLED DC POWER	146.25 MW-DC	
TOTAL INSTALLED AC POWER	99.75 MW-AC	
RACKING SYSTEM	FIXED MOUNTING	
RACKING TILT	15 DEGREES	



PROJECT OWNER:
GREENBRIAR
MONTALVA SOLAR FARM
 LAJA AND GUANICA, PUERTO RICO



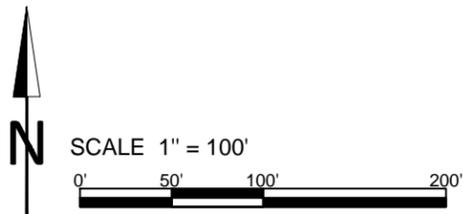
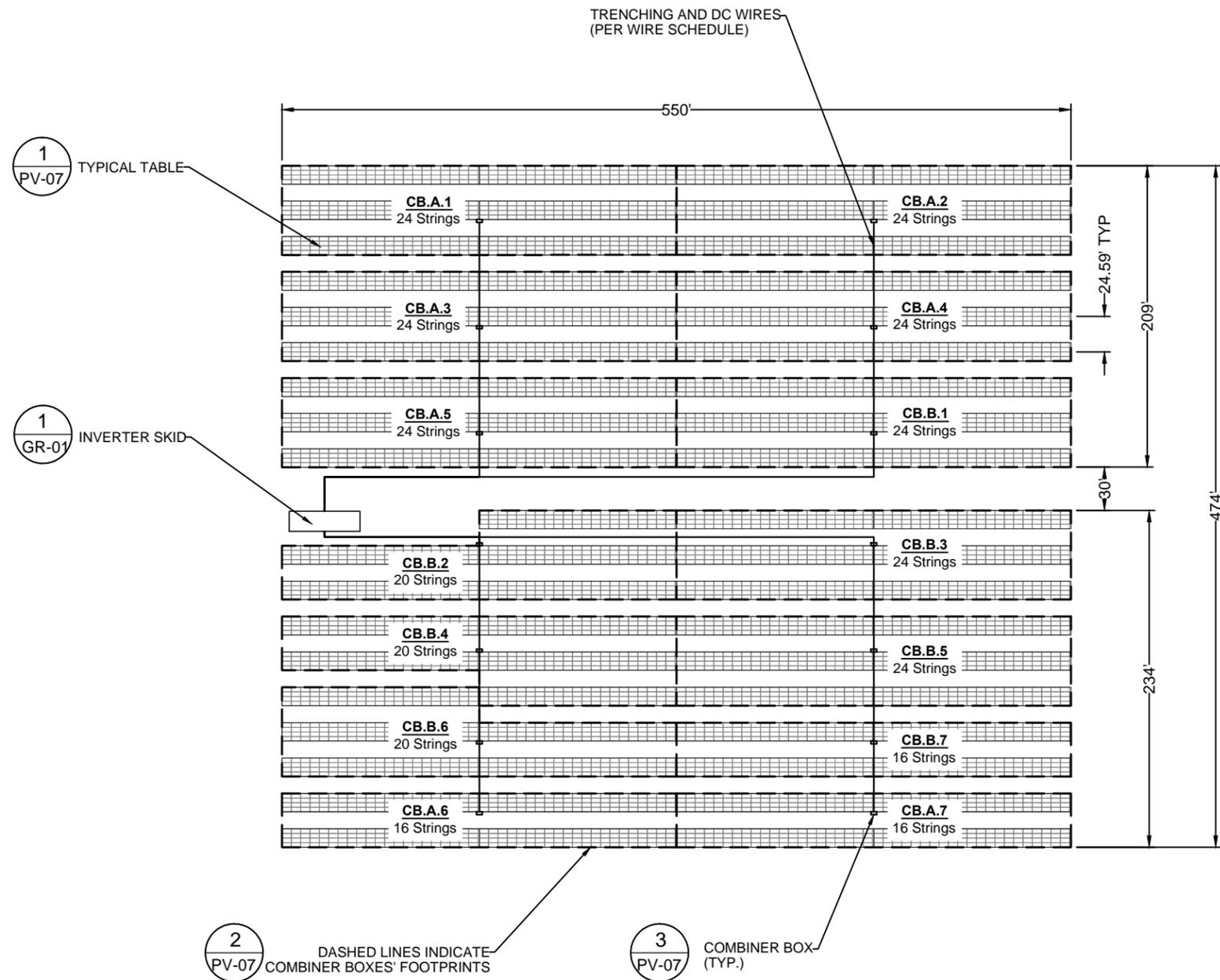
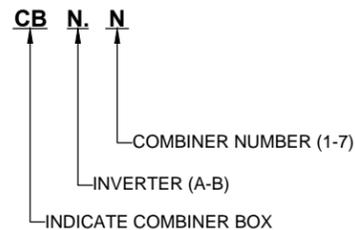
DATE: 10-08-2014	DESIGNER: MARCO PIANA E.I.T.	DRAFTED BY: BG
ENGINEER: STEVE QUADE P.E.		DATE: 10-10-2014
REVISION: 0	REVISION DESCRIPTION: PRELIMINARY	

SHEET TITLE: **SITE OVERVIEW**

SHEET NUMBER: **PV-01**

MONTALVA TYPICAL ARRAY SUMMARY	
DC POWER (PER ARRAY)	1.95 MWDC
AC POWER (PER ARRAY)	1.33 MWAC
MODULE	JINKO 310W
MODULE COUNT	6,300
DC VOLTAGE	1,000V
MODULE PER STRING	21
STRINGS PER TABLE	4
INVERTER	GPTECH 750
INVERTER RATE	666 KW
INVERTER COUNT	2
DC/AC RATIO	1.47
STRING COUNT	300
NUMBER OF TABLES	75
TRANSFORMER RATING	1707 KVA
TRANSFORMER VOLTAGE	34.5KV-355V-355V
RACKING SYSTEM	FIXED MOUNTING
RACKING TILT	15 DEGREES
TRACKER DISTANCE (ON CENTER)	24.59'

COMBINER BOX NOMENCLATURE:



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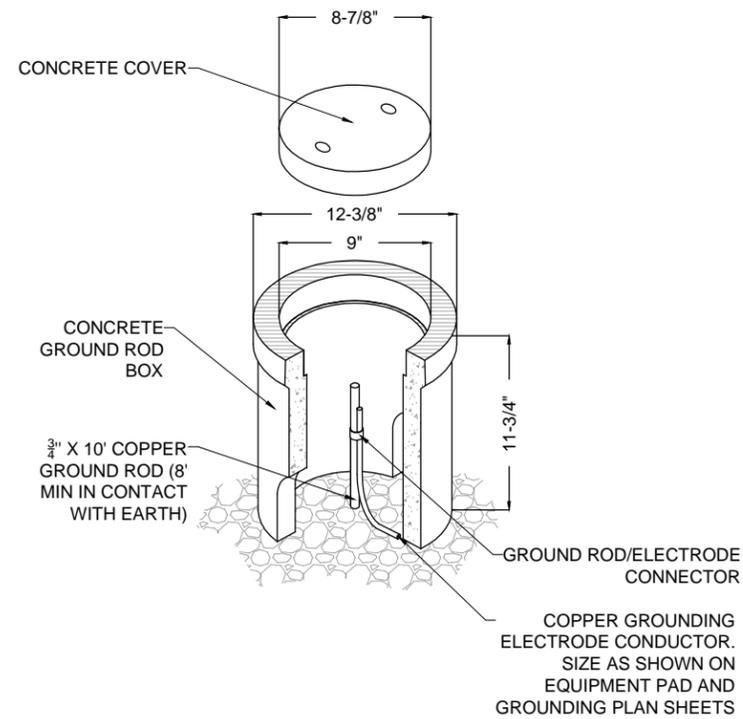
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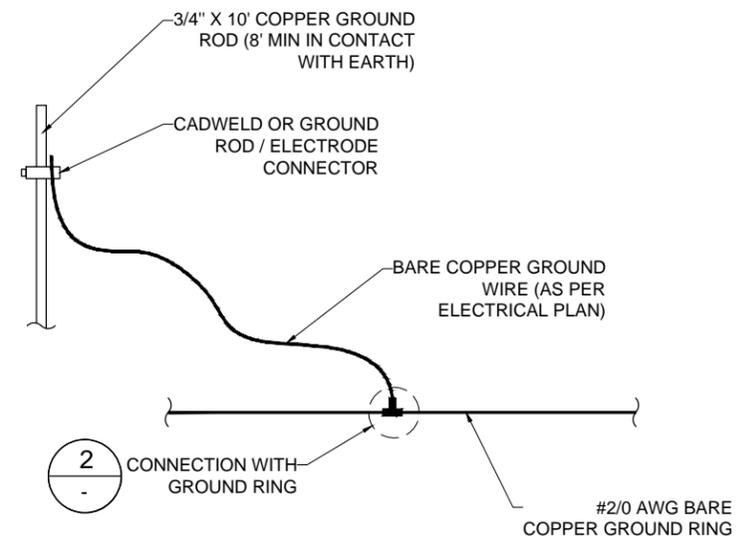
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SHEET TITLE:
TYPICAL ARRAY

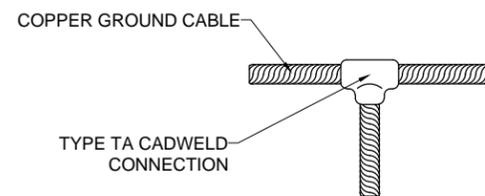
SHEET NUMBER:
 PV-04



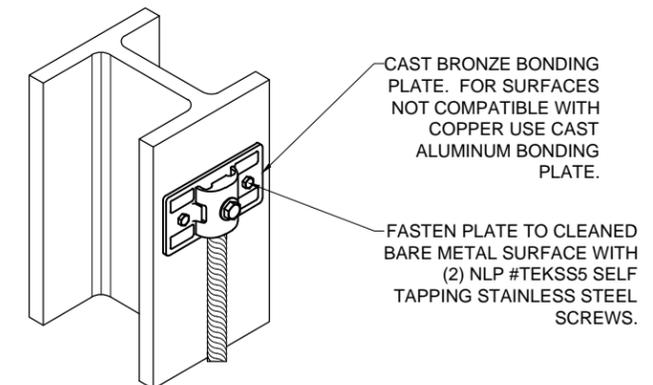
1 CONCRETE GROUND ROD BOX
NTS



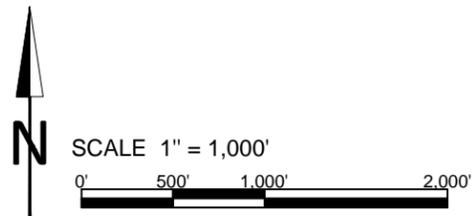
4 GROUNDING ELECTRODE
NTS



2 GROUND CONNECTION DETAIL
NTS



3 BONDING PLATE FOR STEEL STRUCTURAL MEMBERS
NTS



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DATE:	10-09-2014	DESIGNER:	CURT PLZAK E.I.T.
ENGINEER:	STEVE QUADE P.E.	DRAFTED BY:	BG
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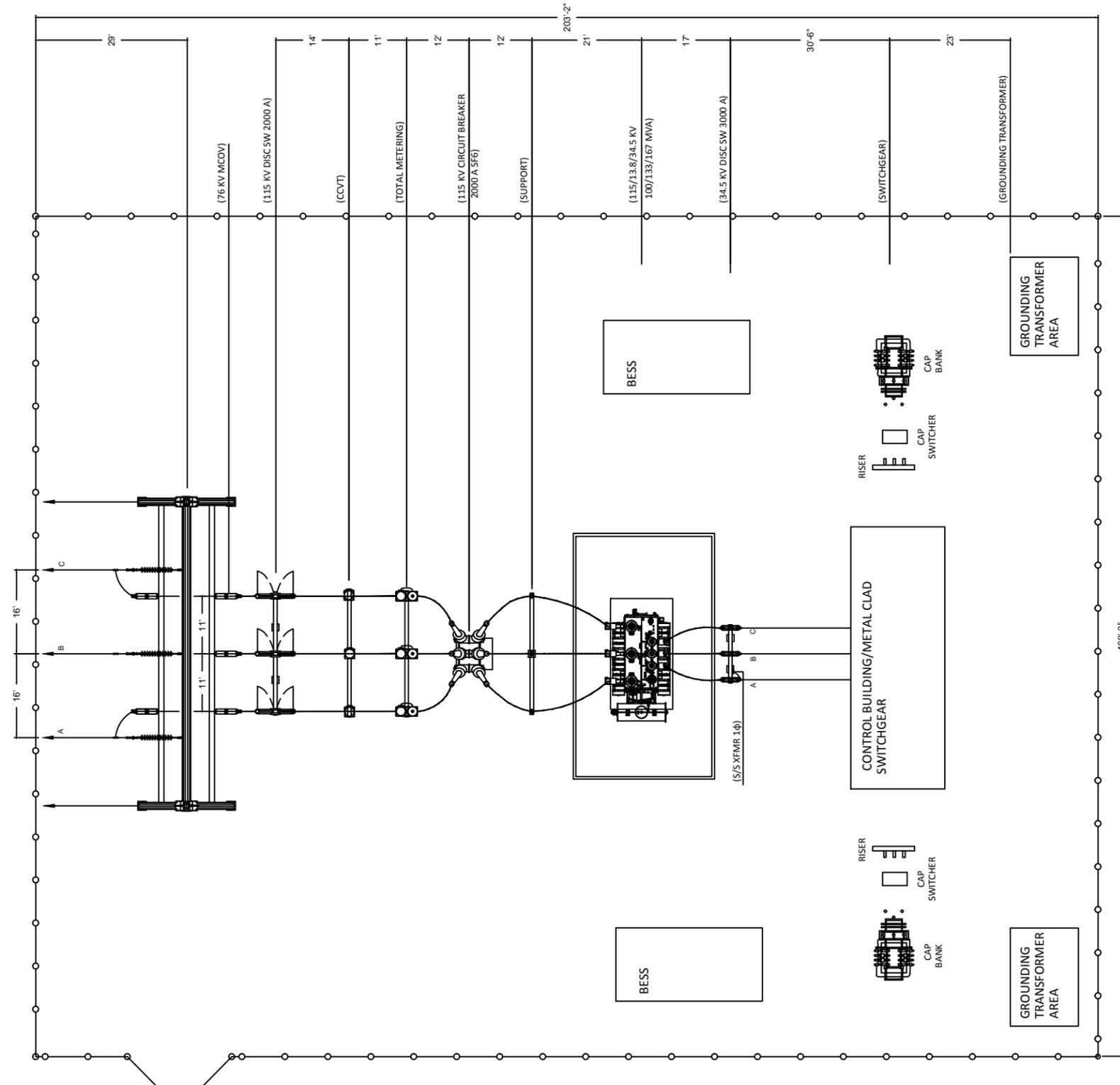
SHEET TITLE:
MEDIUM VOLTAGE LAYOUT

SHEET NUMBER:
MV-01

115 KV SUBSTATION DESIGN CRITERIA	
RATED MAXIMUM VOLTAGE	121 KV
BASIC INSULATION IMPULSE LEVEL (BIL)	550 KV
RATED CONTINUOUS CURRENT	2,000 A
SHORT CIRCUIT CAPABILITY	40,000 A
MINIMUM PHASE-TO-GROUND CLEARANCE	3'-5"
MINIMUM PHASE-TO-PHASE CLEARANCE (METAL-TO-METAL)	4'-5"
RIGID BUS PHASE SPACING	7'-0"
CLEARANCE ABOVE GRADE	12'-0"
LOW BUS ELEVATION	16'-0"
HIGH BUS ELEVATION ABOVE GRADE	25'-0"

34.5 KV SUBSTATION DESIGN CRITERIA	
RATED NOMINAL VOLTAGE	34.5 KV
BASIC INSULATION IMPULSE LEVEL (BIL)	200 KV
NOMINAL PHASE-TO-PHASE	3'-0" OR 4'-0" MANUFACTURE
MINIMUM PHASE-TO-PHASE (METAL-TO-METAL)	1' - 6"
MINIMUM PHASE-TO-GROUND CLEARANCE ABOVE GRADE	10'-0"

ITEM	QTY	UNIT	KV	RATING	DETAILED DESCRIPTION
1	1	EA	115 KV	2000 A	CIRCUIT BREAKER
2	2	SET (3)	76 KV	76 KV	MCOV, STATION CLASS
3	1	EA	115 KV	2000 A	MOTOR OPERATED, SWITCH
4	1	EA	115 KV	78/104/130 MVA	POWER TRANSFORMER
5	SET (3)	EA	34.5 KV	24.4 KV	MCOV, STATION CLASS
7	3	EA	34.5 KV	200 KV BIL	PT, SINGLE BUSHING, RATIO: 175/300:1
8	6	EA	38 KV	2 MVA	GROUNDING TRANSFORMER
9	1	EA	34.5 KV	3000 A	DISCONNECT SWITCH, GROUP OPERATED, MANUALLY OPERATED
10					FOUNDATIONS
11					GROUNDING MATS
12					METERING UNIT
13					STEEL STRUCTURES
14					TRENCH
15					GROUND GRID
16					LIGHTNING MASTS
17					SITE LIGHTS
18					GFI RECEPTACLES
19					CONTROL WIRE
20					CONTROL HOUSE
21	1			200 KV BIL, 150 KVA	STATION SERVICE TRANSFORMER
24	1				FUSED SWITCH
23					FENCE
24	1	EA	38 KV	1200 A	CIRCUIT BREAKER, TO CAP BANKS
25	2	EA	38 KV	600 A, 40 kA	CAP SWITCHER
26	2	EA	34.5 KV	TBD	CAPACITOR BANKS
27	0.75	ACRE			FENCED ACRES



This document is preliminary in nature and is not a final signed and sealed document. Drawings are not to scale and all data shown is subject to change. Drawings are not to be used for construction.



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			ENGINEER: STEVE QUADE P.E.	DRAFTED BY: LL		
			REVISION: 0	REVISION DESCRIPTION: PRELIMINARY	DATE: 10-10-2014	