



Appendix 5-B: Electrical Design Drawings
(Attached as full-sized drawings)

500MW CIDER SOLAR FARM



SCALE: NTS

		DRAWING LIST
	SHEET NUMBER	SHEET TITLE
1	G-001	TITLE SHEET
2	E-001	ELECTRICAL ABBREVIATIONS AND NOTES
3	E-002	ELECTRICAL SPECIFICATIONS
4	E-300	OVERALL COLLECTION & CROSSINGS PLAN
5	E-301	ENLARGED COLLECTIONS & CROSSINGS PLAN I
6	E-302	ENLARGED COLLECTIONS & CROSSINGS PLAN II
7	E-303	ENLARGED COLLECTIONS & CROSSINGS PLAN III
8	E-304	ENLARGED COLLECTIONS & CROSSINGS PLAN IV
9	E-400	ELECTRICAL WIRING DIAGRAM I
10	E-401	ELECTRICAL WIRING DIAGRAM II
11	E-402	ELECTRICAL WIRING DIAGRAM III
12	E-500	ELECTRICAL DETAILS I
13	E-501	ELECTRICAL DETAILS II
14	E-502	ELECTRICAL DETAILS III
15	E-503	ELECTRICAL DETAILS IV
16	E-520	ELECTRICAL LABELS I
17	E-521	ELECTRICAL LABELS II
18	E-522	ELECTRICAL LABELS III
19	E-600	ELECTRICAL EQUIPMENT CUTSHEET I
20	E-601	ELECTRICAL EQUIPMENT CUTSHEET II

PROJECT DATA	
MODULE TYPE	JINKO SOLAR JKM475M-7RL3-TV
MODULE WATTAGE (W STC)	475W
MODULE QUANTITY	1,340,200
#MODULES PER STRING	25
STRING QUANTITY	53,608
CENTER TO CENTER ROW SPACING (FT)	18.10'
INVERTER TYPE	3600kW SUNGROW SG3600U INVERTER
INVERTER QUANTITY	147
TOTAL SYSTEM SIZE (kWDC / kWAC)	636,595 / 500,000
DC/AC OVERBUILD RATIO	1.27
GROUND COVERAGE RATIO (GCR)	40.0%



SERIAL#: SER_NO ONE-CALL DATE: DATE

[illegible]

LEGEND

EXISTING	PROPOSED	DESCRIPTION
CONDUIT/CABLE INSTALLATION (* - INDICATES TYPE, SEE BELOW)		
		CABLE/WIRING WITHOUT CONDUIT
		REMOVE CABLE
		ABANDON CABLE
		REMOVE CABLE AND CONDUIT
		REMOVE CABLE, ABANDON CONDUIT
		CONDUIT, EXPOSED
		CONDUIT, CONCEALED
		CONDUIT, UNDERGROUND
		CONDUIT, CONCRETE ENCASED
		CABLE, OVERHEAD
CONDUIT/CABLE TYPES		
E	E	ELECTRICAL (600V OR LESS)
L	L	LIGHTING (480V OR LESS)
C	C	COMMUNICATIONS
D	D	DATA
T	T	TELEPHON
FO	FO	FIBER OPTIC
FA	FA	FIRE ALARM
LV	LV	LOW VOLTAGE (50V OR LESS)
5KV	5KV	ELECTRICAL (4160Y/2400V)
15KV	15KV	ELECTRICAL (13200Y/7620V)
26KV	26KV	ELECTRICAL (24940Y/14400V)
35KV	35KV	ELECTRICAL (34500Y/19920V)
		EQUIPMENT AS INDICATED
		EQUIPMENT TO BE REMOVED, UON
		HANDHOLE, ELECTRICAL (a,b - SIZE IN.)
		ELECTRICAL VAULT
		HANDHOLE, COMMUNICATIONS (a,b - SIZE IN.)
		MANHOLE, ELECTRICAL (a,b - SIZE IN.)
		MANHOLE, COMMUNICATIONS (a,b - SIZE IN.)
		JUNCTION BOX, SQUARE (a,b - SIZE IN.)
		JUNCTION BOX, ROUND (a,b - SIZE IN.)
		ELECTRICAL PANEL, 480Y/277V
		ELECTRICAL PANEL, 208Y/120V
		ELECTRICAL PANEL, 240/120V
		DISCONNECT SWITCH, FUSED
		DISCONNECT SWITCH, NON-FUSED
		COMBINATION MOTOR STARTER/FUSED DS
		MOTOR (x - HORSEPOWER)
SWITCHES (x - LUMINAIRE BEING CONTROLLED)		
		SINGLE POLE SWITCH
		THREE WAY SWITCH
		FOUR WAY SWITCH
		DIMMER SWITCH
		MOTOR RATED SWITCH
		KEY OPERATED SWITCH
		WALL MOUNTED OCCUPANCY SENSOR
		WALL MOUNTED OCCUPANCY SENSOR WITH INTEGRAL SWITCH
		CEILING MOUNTED OCCUPANCY SENSOR

RECEPTACLES (x - RECEPTACLE TYPE) (n - NEMA CONFIGURATION, 5-20R UON)		
ARC - ARC FAULT INTERRUPTING		
GFI - GROUND FAULT INTERRUPTING		
IG - ISOLATED GROUND		
TVSS - TRANSIENT VOLTAGE SURGE SUPPRESSION		
WP - WEATHERPROOF		
		DUPLEX RECEPTACLE
		SINGLE RECEPTACLE
		QUAD RECEPTACLE
		MULTIPOLE RECEPTACLE
		TWIST LOCK RECEPTACLE
		FLOOR MOUNTED SINGLE RECEPTACLE
		FLOOR MOUNTED DUPLEX RECEPTACLE
		FLOOR MOUNTED QUAD RECEPTACLE
		CLG MOUNTED SINGLE RECEPTACLE
		CLG MOUNTED DUPLEX RECEPTACLE
		CLG MOUNTED QUAD RECEPTACLE

COMMUNICATION OUTLETS		
(x - NO. OF TELEPHONE JACKS, 1 UON)		
(y - NO. OF DATA JACKS, 1 UON)		
(z - NO. OF CATV JACKS, 1 UON)		
		TELEPHONE OUTLET
		DATA OUTLET
		COMBINATION TELEPHONE/DATA OUTLET
		CATV OUTLET
		COMBINATION DATA/CATV OUTLET

		TIME CLOCK
		LIGHTING CONTACTOR
		CARD READER
		DOOR ALARM
		ELECTRIC DOOR STRIKE
		MAGNETIC DOOR LOCK
		SECURITY MOTION DETECTOR
		KEY PAD
		PUSHBUTTON
		ELECTRICAL HAND DRYER
		SECURITY CAMERA
		ELECTRICAL METER
		CURRENT TRANSFORMER
		ENCLOSED CIRCUIT BREAKER (AF - FRAME SIZE, AT - TRIP CURRENT RATING)
		CIRCUIT BREAKER (AF - FRAME SIZE, AT - TRIP CURRENT RATING)
		FUSED SWITCH (AS - SWITCH CURRENT RATING, AF - FUSE CURRENT RATING)
		GENERATOR (kVA - kVA RATING, kW - kW RATING)
		AUTOMATIC TRANSFER SWITCH (x - CURRENT RATING)
		GROUND BAR
		GROUND
		TRANSFORMER (a - PRIMARY VOLTAGE, b - SECONDARY VOLTAGE, c - kVA RATING)
		NORMALLY CLOSED CONTACT
		NORMALLY OPEN CONTACT

NOTES:
ALL SYMBOLS MAY NOT BE APPLICABLE FOR THIS PROJECT.

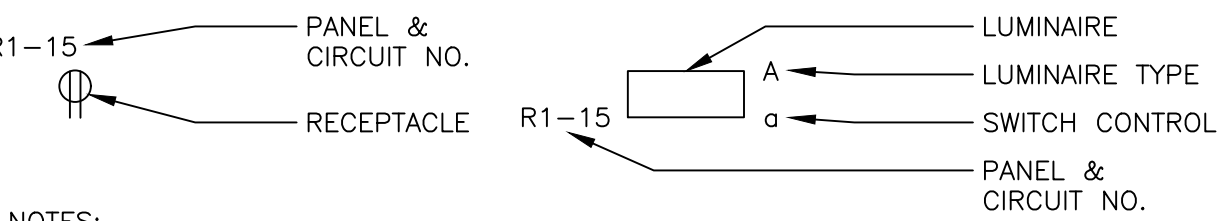
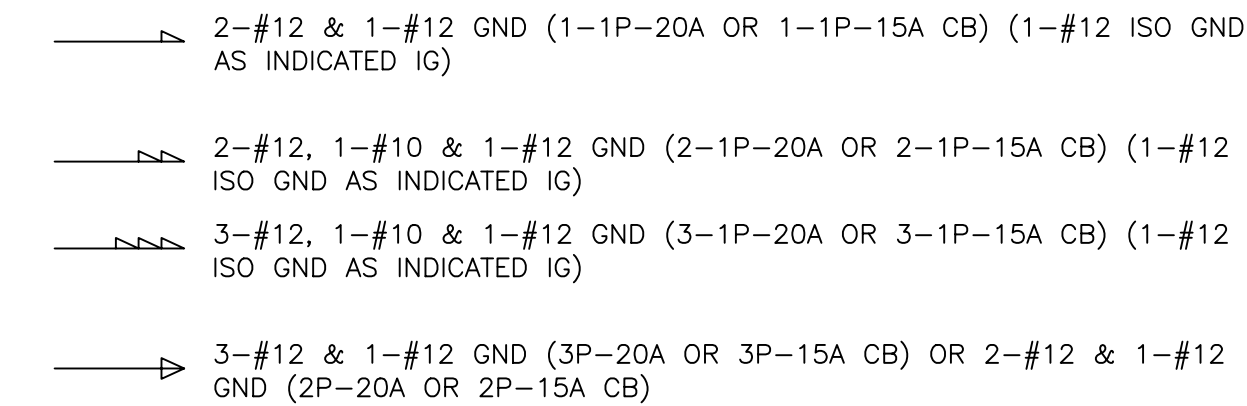
ABBREVIATIONS

#	GAUGE
/c	CONDUCTOR
A	AMPERE (S)
AC	ALTERNATING CURRENT
ACD	AC DISCONNECT SWITCH
AFF	ABOVE FINISHED FLOOR
AF	AMP FRAME
AGL	ABOVE GRADE LEVEL
AIC	AMPERE INTERRUPTING CAPACITY
AL	ALUMINUM
ARC	ARC FAULT INTERRUPTER
AS	AMPERAGE OF SWITCH
AT	AMP TRIP
ATS	AUTOMATIC TRANSFER SWITCH
AWG	AMERICAN WIRE GAUGE
BCW	BARE COPPER WIRE
BLDG	BUILDING
C,CDT	CONDUIT
CB,C/B	CIRCUIT BREAKER
CBX	COMBINER BOX
CKT	CIRCUIT
CLG	CEILING
COL	COLUMN
CT	CURRENT TRANSFORMER
CU	COPPER
DC	DIRECT CURRENT
DEM	DEMOLISH AND REMOVE
DIS	DISCONNECT SWITCH
DWG	DRAWING
EGC	EQUIPMENT GROUNDING CONDUCTOR
EMT	ELECTRICAL METALLIC TUBING
ENCL	ENCLOSURE
EX	EXISTING TO REMAIN
FA	FIRE ALARM
FL	FLOOR
FBO	FURNISHED BY OTHERS
FRE	FIBER REINFORCED EPOXY
FT	FOOT, FEET
GEC	GROUNDLED ELECTRODE CONDUCTOR
GEN	GENERATOR
GFI	GROUND FAULT INTERRUPTER
GND,G,GRD	GROUND
HP	HORSEPOWER
HVAC	HEATING VENTILATION AIR CONDITIONING
HVAC	HEATING VENTILATION AIR CONDITIONING
IG	ISOLATED GROUND
IN	INCHES
kcMil	THOUSAND CIRCULAR MILS
kVA	KILOVOLT-AMPERE
kW	KILOWATT
kWH	KILOWATT HOUR
MAX	MAXIMUM
MCB	MAIN CIRCUIT BREAKER
MIN	MINIMUM
MLO	MAIN LUG ONLY
MTS	MANUAL TRANSFER SWITCH
N	NEUTRAL
NIC	NOT IN CONTRACT
NO.	NUMBER
NTS	NOT TO SCALE
OH	OVERHEAD
P	POLE
PBO	PROVIDED BY OTHERS
PNL	PANEL
PV	PHOTOVOLTAIC
PVC	POLYVINYL CHLORIDE
PVC-RGS	POLYVINYL CHLORIDE COATED RIGID GALVANIZED STEEL

REC	RECEPTACLE
REL	REMOVE AND RELOCATE
RGS	RIGID GALVANIZED STEEL
SCH	SCHEDULE
SPD	SURGE PROTECTIVE DEVICE
SW	SWITCH(ES)
TYP	TYPICAL
UG	UNDERGROUND
UL	UNDERWRITERS LABORATORY
UON	UNLESS OTHERWISE NOTED
VIF	VERIFY IN FIELD
V	VOLT(S)
W	WATT
WP	WEATHERPROOF

NOTE:
ALL ABBREVIATIONS MAY NOT BE APPLICABLE FOR THIS PROJECT.

BRANCH CIRCUIT WIRING LEGEND



- NOTES:
- NEUTRAL CONDUCTORS SHALL BE #12 AWG MINIMUM FOR DEDICATED CIRCUITS OR #10 AWG MIN FOR MULTI-CIRCUIT HOMERUNS WITH SHARED NEUTRALS (RECEPTACLES, EQUIPMENT & NON-DIMMING LIGHTING).
 - ALL GFI & ARC CIRCUIT BREAKERS AND ALL LIGHTING FIXTURES CONTROLLED BY DIMMERS SHALL BE WIRED TO A CIRCUIT HAVING A DEDICATED NEUTRAL CONDUCTOR. STANDARD SHARED NEUTRAL HOMERUNS ARE NOT PERMITTED.
 - CIRCUITS AND HOMERUNS WITH ISOLATED GROUND RECEPTACLES SHALL CONTAIN AN ADDITIONAL #12 AWG INSULATED GROUND CONDUCTOR.
 - CONDUCTORS SHALL BE INCREASED FOR VOLTAGE DROP AND DERATING AS PER APPLICABLE ELECTRICAL CODE. FOR CIRCUITS THAT ARE BETWEEN 100' AND 150' IN LENGTH, PHASE AND NEUTRAL CONDUCTORS SHALL BE #10 AWG. FOR CIRCUITS THAT ARE BETWEEN 150' AND 225' IN LENGTH, PHASE AND NEUTRAL CONDUCTORS SHALL BE #8 AWG. FOR LENGTHS GREATER THAN 225' IN LENGTH, VERIFY CONDUCTOR SIZES WITH ENGINEER.

SOLAR PV LEGEND

PROPOSED	DESCRIPTION
	SOLAR MODULE
X-Y-Z	X - INVERTER # Y - COMBINER BOX # Z - STRING #
	STRING BOUNDARY FOR INVERTER#X
	COMBINER BOX
	12" MINIMUM WIDE SOLID BOTTOM VENTILATED CABLE TRAY(TYP.)

NOTES:
ALL SYMBOLS MAY NOT BE APPLICABLE FOR THIS PROJECT.

DEFINITION OF TERMS

- WHEREVER IN THE CONTRACT DOCUMENTS THE WORD "CLIENT" IS USED, IT SHALL BE UNDERSTOOD THAT HECATE IS INTENDED.
- WHEREVER IN THE CONTRACT DOCUMENTS THE WORD "ENGINEER" IS USED, IT SHALL BE UNDERSTOOD THAT "STANTEC CONSULTING SERVICES INC." IS INTENDED.
- "WORK" SHALL BE DEEMED TO CONSIST OF ALL LABOR AND OPERATIONS, TRANSPORTATION, HOISTING, MATERIALS, TOOLS, EQUIPMENT, SERVICES, INSPECTIONS, INVESTIGATIONS, COORDINATION AND SUPERVISION REQUIRED AND/OR REASONABLY NECESSARY TO PRODUCE THE CONSTRUCTION REQUIRED BY THE CONTRACT DOCUMENTS.
- "FURNISH" MEANS THE DESIGN, FABRICATION, PURCHASE AND DELIVERY TO THE JOB SITE.
- "INSTALL OR INSTALLATION" MEANS THE ACT OF PHYSICALLY PLACING, APPLYING, SETTING, ERECTING, ANCHORING, SECURING, ETC., CONSTRUCTION MATERIALS, EQUIPMENT, FURNISHINGS, APPLIANCES, AND SIMILAR ITEMS SPECIFIED AND FURNISHED AT THE JOB SITE. INSTALLATION OF SPECIFIED ITEMS SHALL BE COMPLETE IN ALL RESPECTS.
- "PROVIDE" MEANS TO FURNISH AND INSTALL CONSTRUCTION MATERIAL, EQUIPMENT, ETC. AS DEFINED ABOVE.
- THE FOLLOWING ARE DEFINITIONS OF SHOP DRAWING STAMP ACTIONS:
 - NO EXCEPTIONS TAKEN" MEANS THAT THE SHOP DRAWING IS CORRECT AS TO PERFORMANCE, CAPACITY, ETC. AND SUBSTANTIAL CONFORMANCE TO THE CONTRACT DRAWINGS AND SPECIFICATIONS. FABRICATION AND/OR PURCHASE MAY COMMENCE.
 - "MAKE CORRECTIONS NOTED" MEANS THAT THE SHOP DRAWING IS CORRECT AS TO PERFORMANCE, CAPACITY, ETC. AND SUBSTANTIAL CONFORMANCE TO THE CONTRACT DRAWINGS AND/OR SPECIFICATIONS, SUBJECT TO AND IN COMPLIANCE WITH THE ANNOTATIONS AND/OR CORRECTIONS INDICATED ON THE SHOP DRAWING. FABRICATION AND/OR PURCHASE MAY COMMENCE WITH THE COMMENTS ADDRESSED.
 - "AMEND AND RESUBMIT" MEANS THAT THE COMMENTS AND/OR CORRECTION ARE SO EXTENSIVE AND IMPORTANT THAT THE REVIEWER WANTS TO SEE HOW THE COMMENTS AND/OR CORRECTIONS ARE RESOLVED PRIOR TO RELEASE FOR FABRICATION AND/OR PURCHASE. FABRICATIONS AND/OR PURCHASE MAY NOT COMMENCE.
 - "REJECTED" MEANS THAT THE SHOP DRAWING DOES NOT COMPLY OR CONFORM TO THE CONTRACT DRAWINGS AND/OR SPECIFICATIONS. FABRICATION AND/OR PURCHASE MAY NOT COMMENCE.

SPECIFICATIONS

TESTS

- A. WIRE AND CABLE: PERFORM INSULATION RESISTANCE AND CONTINUITY TESTS FOR ALL CONDUCTORS. THESE SHALL BE COMPLETED PRIOR TO ENERGIZING AND WHILE NOT CONNECTED TO AN ENERGY SOURCE. INVESTIGATE AND TAKE REMEDIAL ACTION WHEN CONTINUITY VALUES EXCEED 1.0 OHM AND/OR INSULATION RESISTANCE TESTS LESS THAN 5 MEGAOHMS.
- B. ALL ELECTRICAL TESTING SHALL BE IN ACCORDANCE WITH NETA STANDARDS FOR 1500VDC RATING.
- C. GROUND RESISTANCE TESTS: RESISTANCE OF THE ELECTRICAL SYSTEM GROUNDING SHALL BE TESTED TO GROUND AT THE MAIN GROUND ELECTRODE CONNECTION AND AT THE CONNECTION TO THE BUILDING STEEL GROUND TO ENSURE THAT GROUND RESISTIVITY VALUES DO NOT EXCEED 5 OHMS.

GROUNDING

- A. COMPLY WITH REQUIREMENTS OF THE AUTHORITY HAVING JURISDICTION, NEC, UL AND IEEE STANDARDS. SIZE GROUND CONDUCTORS IN ACCORDANCE WITH THE NATIONAL ELECTRICAL CODE EXCEPT WHERE LARGER SIZES ARE INDICATED. ALL GROUND CONDUCTORS SHALL BE COPPER AND NOT SMALLER THAN NO.12 AWG. PROVIDE A COMPLETE ASSEMBLY OF MATERIALS REQUIRED FOR GROUNDING AND BONDING.
- B. GROUNDING BUSHINGS SHALL BE HOT-DIPPED GALVANIZED BODY, MOLDED PHENOLIC INSULATION, RATED AT 150 °C. WITH COPPER-TINNED LAY-IN LUG. PROVIDE FOR ALL INCOMING AND OUTGOING CONDUITS TO THE DISTRIBUTION EQUIPMENT.
- C. GROUND RODS SHALL BE STEEL CORE, COPPER JACKETED TYPE, HIGH STRENGTH STEEL ALLOY CORE WITH A MOLTEN-WELDED COVERING AND CONICAL POINT WITH CHAMFER EDGE AT TOP. DRIVING HEADS SHALL BE USED TO PROTECT TOPS OF RODS DURING DRIVING. MINIMUM SIZE ROD SHALL BE 3/4" INCH DIAMETER AND 10 FOOT LONG. GROUND RODS SHALL BE VERTICALLY DRIVEN TO THEIR FULL LENGTH BELOW DESIGN ELEVATION WITH TOPS 12" BELOW SUB-GRADE.
- D. GROUND CONNECTORS FOR CONNECTING CABLE TO PIPE SHALL BE HIGH COPPER ALLOY OR BRONZE FITTINGS. PROVIDE AN OFFSET STEEL TONGUE FOR CONNECTIONS TO STEEL AND A DRILLED TONGUE FOR CONNECTION TO COPPER BUS BAR.
- E. GROUNDING TEST WELL SHALL BE HANGER GAW910 OR APPROVED EQUAL 10" NPS BY 24" LONG CLAY TILE PIPE WITH BELLED END AND GROUND ROD. PRECAST 3000 PSI CONCRETE COVER WITH 1" DIAMETER HOLE IN CENTER AND 24" X 24" X 14" GAGE STEEL MESH SET FLUSH WITH GRADE.
- F. PARTS OF THE ELECTRICAL INSTALLATION TO BE GROUNDED AND BONDED SHALL INCLUDE BUT NOT BE LIMITED TO ELECTRICAL EQUIPMENT, RACEWAYS, BOXES, CABINETS AND OTHER NON-CURRENT CARRYING METAL PARTS OF THE WIRING SYSTEM, METAL CONDUIT, SWITCHGEAR, HOUSING AND NEUTRALS OF TRANSFORMERS, LIGHTING FIXTURES, PANEL DEVICES, FENCES AROUND ELECTRICAL EQUIPMENT AS APPLICABLE TO EQUIPMENT INSTALLED ON THIS PROJECT.
- G. USE IRREVERSIBLE CRIMPS FOR UNDERGROUND, PERMANENTLY CONCEALED AND INACCESSIBLE CONNECTIONS TO FORM SOLID METAL JOINTS. MAKE ABOVE GRADE GROUND CONNECTIONS WITH MECHANICAL PRESSURE TYPE GROUND CONNECTIONS UNLESS OTHERWISE NOTED.
- H. APPLY CORROSION-RESISTANT FINISH TO FILED-CONNECTIONS, BURIED METALLIC GROUNDING AND BONDING PRODUCTS, AND PLACES WHERE FACTORY APPLIED PROTECTIVE COATINGS HAVE BEEN DESTROYED, WHICH ARE SUBJECTED TO CORROSIVE ACTION.
- I. GALVANIZATION SHALL BE REMOVED AT ANY MECHANICAL GROUNDING POINTS TO ENSURE A SOLID GROUNDING CONNECTION.

CONDUITS AND FITTINGS

- A. ABOVE GRADE STUB UPS FROM PVC TO BE SCHEDULE 80 PVC. ABOVE GROUND: PROVIDE WEATHERPROOF CONDUIT AND FITTINGS PER NEC. CONCRETE TYPE COUPLINGS SHALL BE USED WHERE BURIED IN CONCRETE OR MASONRY. WHERE INSTALLED IN WET LOCATIONS, COUPLINGS SHALL COMPLY WITH NEC 314.15. THREADLESS COUPLINGS AND CONNECTORS SHALL NOT BE USED ON THREADED CONDUIT ENDS UNLESS LISTED FOR THE PURPOSE.
- B. JOIN RACEWAYS WITH FITTINGS DESIGNED AND APPROVED FOR THE PURPOSE AND MAKE JOINTS TIGHT. WHERE JOINTS CANNOT BE MADE TIGHT, USE BONDING JUMPERS TO PROVIDE ELECTRICAL CONTINUITY OF THE RACEWAY SYSTEM. MAKE RACEWAY TERMINATIONS TIGHT. WHERE SUBJECT TO VIBRATION OR DAMPNESS, USE INSULATION BUSHINGS TO PROTECT CONDUCTORS. CUT CONDUIT SQUARE USING SAW OR PIPE CUTTER AND DE-BURR CUT ENDS.
- C. USE CONDUIT HUBS OR SEALING LOCKNUTS TO FASTEN CONDUIT TO BOXES IN DAMP AND WET LOCATIONS.
- D. SUPPORT CONDUIT USING STEEL OR MALLEABLE IRON SINGLE OR DOUBLE HOLE CONDUIT STRAPS, LAY-IN ADJUSTABLE HANGERS, CLEVIS HANGERS AND SPLIT HANGERS AS REQUIRED. FASTEN CONDUIT SUPPORTS TO BUILDING STRUCTURE AND SURFACES. DO NOT ATTACH CONDUIT SUPPORTS TO CEILING SUPPORT WIRES, OR ANY OTHER CONDUIT, PIPE, DUCT, ETC. DO NOT SUPPORT CONDUIT WITH WIRE OR PIPE HANGER STRAPS.
- E. BELOW GRADE: PVC SCHEDULE 40 CONDUIT NEMA TC2 UL 651, WITH MATCHING FITTINGS BY SAME MANUFACTURER AS THE CONDUIT. COMPLYING WITH NEMA TC 3 AND UL 51413.
- F. CONTRACTOR SHALL USE POLYWATER FST PRODUCTS FOR CONDUIT AND RACEWAY PENETRATIONS MANUFACTURED BY AMERICAN POLYWATER CORPORATION OR APPROVED EQUAL.

WIRE AND CABLE

- A. CONDUCTOR: BARE, SOLID OR STRANDED ALUMINUM OR COPPER PER ASTM B-3 OR B-8 INSULATION. MEETS OR EXCEED ALL REQUIREMENTS OF ICEA S-66524, NEMA WC-7 AND UL STANDARD 44 AND 854. LISTED BY UL AS TYPE THHN/THWN OR XHHW-2 OR USE-2, CSA RATED RW90.
- B. ALL STRING WIRING SHALL BE XLPE COPPER. ALL CABLE RUNS FROM COMBINER BOXES TO INVERTERS SHALL BE XLPE AL. ALL MEDIUM VOLTAGE CABLE RUNS SHALL BE EPR CU OR AL. ALL OTHER LOW VOLTAGE FEEDERS SHALL BE COPPER OR ALUMINUM.
- C. PULL CONDUCTORS SIMULTANEOUSLY WITH UL LISTED PULLING COMPOUND OR LUBRICANT FOR WIRE #4 AWG AND LARGER. USE PULLING MEANS INCLUDING, FISH TAPE, CABLE, ROPE, AND BASKET WEAVE WIRE/CABLE GRIPS WHICH WILL NOT DAMAGE CABLES OR RACEWAYS.

- D. ALL WIRING SHALL BE FACTORY COLOR CODED. FOR MODIFICATIONS TO EXISTING SYSTEMS, MATCH COLOR CODING SCHEME ALREADY IN PLACE. OTHERWISE FEEDER AND BRANCH CIRCUIT CONDUCTORS SHALL BE COLOR CODED AS FOLLOWS:

PHASE	208Y/120 VOLTS	480Y/277 VOLTS
A	BLACK	BROWN
B	RED	ORANGE
C	BLUE	YELLOW
NEUTRAL	WHITE	GRAY
GROUND	GREEN	GREEN

- E. ALL WIRING IN PANELS SHALL BE NEATLY TIE-WRAPPED AND TRAINED WITHIN GUTTER SPACES.
- F. ALL WIRING ON DC SIDE TO BE BLACK FOR +V , WHITE FOR -V, AND GREEN/BARE FOR GROUND, AND INSTALLATION SHALL BE MARKED SUNLIGHT RESISTANT.
- G. WIRE SIZES SHOWN ON PLANS MAY BE OVSIZED TO ACCOMMODATE VOLTAGE DROP. CONTRACTOR MAY ELECT TO TAP DOWN WIRE SIZE WIRE AT SOURCE AND/OR APPLIANCE IN A LISTED MANNER COMPLIANT WITH THE CODE THAT MAY INCLUDE BUT NOT BE LIMITED TO THE INSTALLATION OF JUNCTION BOXES WHICH MAY NOT BE SHOWN ON THE PLAN. NO OFFSET PITTAIL ADAPTORS SHALL BE USED.

BOXES

- A. CAST-IRON OR MALLEABLE STEEL BOXES: NEMA FB 1, TYPE FD, IRON ALLOY OR MALLEABLE STEEL, WATERPROOF, WITH THREADED RACEWAY ENTRIES, GASKETED COVER BY BOX MANUFACTURER AND FEATURES AND ACCESSORIES SUITABLE FOR EACH LOCATION, INCLUDING MOUNTING EARS, THREADED SCREW HOLES FOR DEVICES AND CLOSURE PLUGS.
- B. GALVANIZED STEEL PULL BOXES: NEMA OS 1 WITH WELDED SEAMS. WHERE NECESSARY TO PROVIDE A RIGID ASSEMBLY, CONSTRUCT WITH INTERNAL STRUCTURAL STEEL BRACING, HOT-DIP GALVANIZED AFTER FABRICATION. COVER SHALL BE GASKETED, SCREWED OR BOLTED ON OF MATERIAL SAME AS BOX AND SHALL BE OF SIZE AND SHAPE TO SUIT APPLICATION. SIZES SHALL BE ADEQUATE TO MEET NEC VOLUME REQUIREMENTS, BUT IN NO CASE SMALLER THAN SIZES INDICATED. REMOVE SHARP EDGES WHERE THEY MAY COME IN CONTACT WITH WIRING OR PERSONNEL.
- C. FOR INTERIOR DRY LOCATIONS USE GALVANIZED SHEET STEEL, NEMA TYPE 1. FOR LOCATIONS EXPOSED TO WEATHER OR DAMPNESS USE CAST IRON OR MALLEABLE STEEL, NEMA TYPE 3R BOXES, FULLY GASKETED. FOR WET LOCATIONS USE NEMA TYPE 4 BOXES WITH FULLY GASKETED WEATHERPROOF COVERS.
- D. ELECTRICALLY GROUND ALL METAL BOXES TO CONDUIT SYSTEM. WHERE WIRING TO ITEMS INCLUDES A GROUNDING CONDUCTOR, ALSO PROVIDE A GROUNDING TERMINAL IN THE INTERIOR OF THE CABINET, BOX OR ENCLOSURE.

SUPPORTING DEVICES

- A. PROVIDE MATERIALS, SIZES AND TYPES OF ANCHORS, FASTENERS AND SUPPORTS TO CARRY THE LOADS OF EQUIPMENT AND CONDUIT. CONSIDER THE WEIGHT OF WIRE IN CONDUIT WHEN SELECTING PRODUCTS. ATTACHMENTS SHALL BE RATED BY AN INDEPENDENT TESTING LABORATORY FOR THE RATED LOADING WITH A SAFETY FACTOR OF FIVE. USE VIBRATION AND SHOCK-RESISTANT FASTENERS FOR ATTACHMENTS TO CONCRETE SLABS. DO NOT USE SPRING STEEL CLIPS AND CLAMPS, POWDER-ACTUATED ANCHORS, TESTING FOR CONCRETE AND STEEL ATTACHMENTS SHALL BE IN ACCORDANCE WITH TEST CRITERIA ESTABLISHED BY UL SUPPORTS, SUPPORT HARDWARE, AND FASTENERS SHALL BE PROTECTED WITH ZINC COATING OR WITH TREATMENT OF EQUIVALENT CORROSION RESISTANCE. PRODUCTS FOR USE OUTDOORS SHALL BE HOT-DIP GALVANIZED. IN CORROSIVE AREAS, PRODUCTS SHALL BE TREATED WITH 15 MIL PVC COATING. ALL PRODUCTS SHALL BE TREATED AFTER CUTTING AND THREADING.
- B. PROVIDE SUPPORTS FOR ALL RACEWAYS INCLUDING U-CHANNEL SYSTEMS, RISER CLAMPS, CONDUIT STRAPS, THREADED C-CLAMPS WITH RETAINERS AND WALL BRACKETS.
- C. STEEL SURFACES: MACHINE SCREWS, WELDED THREADED STUDS, OR SPRING-TENSION CLAMPS.
- D. PARTITIONS OF LIGHT STEEL CONSTRUCTION: SHEET METAL SCREWS.
- E. WOOD ELEMENTS: USE WOOD SCREWS.
- F. U-CHANNEL SYSTEMS: 12 GAUGE CARBON STEEL CHANNELS, WITH 9/16" X 7/8" HOLES IN TOP SURFACE, 2 INCHES ON CENTER. PROVIDE FITTINGS AND ACCESSORIES THAT MATE AND MATCH WITH U-CHANNEL AND ARE OF THE SAME MANUFACTURER. PROVIDE ANGLES AND OTHER STANDARD STRUCTURAL SHAPES. CONNECT WITH WELDS OR MACHINE BOLTS TO FORM RIGID SUPPORTS.
- G. A HANGER OR SUPPORT SHALL BE INSTALLED CLOSE TO THE POINT OF A CHANGE IN DIRECTION OF ALL CONDUIT RUNS, IN EITHER A HORIZONTAL OR VERTICAL PLANE.
- H. SPACING OF CONDUIT SUPPORTS AS PER NEC REQUIREMENTS.
- I. CABLE TIES FOR WIRE AND CABLE: PROVIDE CLIPS FROM WILEY ELECTRONICS OR APPROVED EQUAL.

IDENTIFICATION


- A. WIRE DESIGNATION MARKERS: PROVIDE FUNGUS RESISTANT, VINYL OR VINYL-CLOTH CONDUCTOR MARKERS IN OUTLET, JUNCTION AND PULL BOXES INDICATING WIRE USAGE (I.E SWITCH LEG, POWER FEED, TRAVELERS, ETC). THIS IS IN ADDITION TO WIRE CIRCUIT IDENTIFICATION REQUIREMENTS AND IS INTENDED TO CLARIFY WIRING WITHIN BOXES.
- B. CIRCUIT IDENTIFICATION: PROVIDE WIRE MARKERS ON EACH CONDUCTOR IN PANELBOARD GUTTERS, PULL BOXES, OUTLET AND JUNCTION BOXES, AND AT LOAD CONNECTION. IDENTIFY BRANCH CIRCUIT OR FEEDER NUMBER FOR POWER AND LIGHTING CIRCUITS, AND WIRE DESIGNATION INDICATED ON EQUIPMENT MANUFACTURER'S SHOP DRAWING FOR CONTROL WIRING. MAINTAIN CONSISTENCY WITH SIMILAR PREVIOUSLY ESTABLISHED IDENTIFICATION SCHEMES FOR THE FACILITY'S ELECTRICAL INSTALLATIONS.
- C. NAMEPLATES: PROVIDE ENGRAVED, MELAMINE PLASTIC LAMINATE NAMEPLATES, 1/16-INCH MINIMUM THICK FOR SIGNS UP TO 20 IN² AND 1/8" THICK FOR LARGER SIZES. PROVIDE ENGRAVED LEGEND IN BLACK LETTERS ON YELLOW (106) FOR CAUTION LABELS AND ORANGE (152) FOR WARNING LABELS. ADHESIVE MOUNTING IS TO BE PROVIDED WHEREVER NAME PLATES ARE USED IN LOCATIONS EXPOSED TO WEATHER AND THEY SHALL BE WEATHER PROOF AND DURABLE. LETTERS SHALL BE 1/2" HIGH AND STANDARD ENGRAVER'S STYLE. FASTENERS SHALL BE SELF-TAPPING STAINLESS STEEL SCREWS OR NUMBER 10/32 STAINLESS STEEL MACHINE SCREWS WITH NUTS AND FLAT AND LOCK WASHERS. PROVIDE NAMEPLATES ON ALL MAJOR EQUIPMENT INCLUDING BUT NOT LIMITED TO PANELBOARDS, CABINETS, COMBINER BOXES, TRANSFORMERS, ENCLOSURES, SWITCHGEAR, SWITCHBOARD, DISCONNECT SWITCHES, AND INVERTERS.

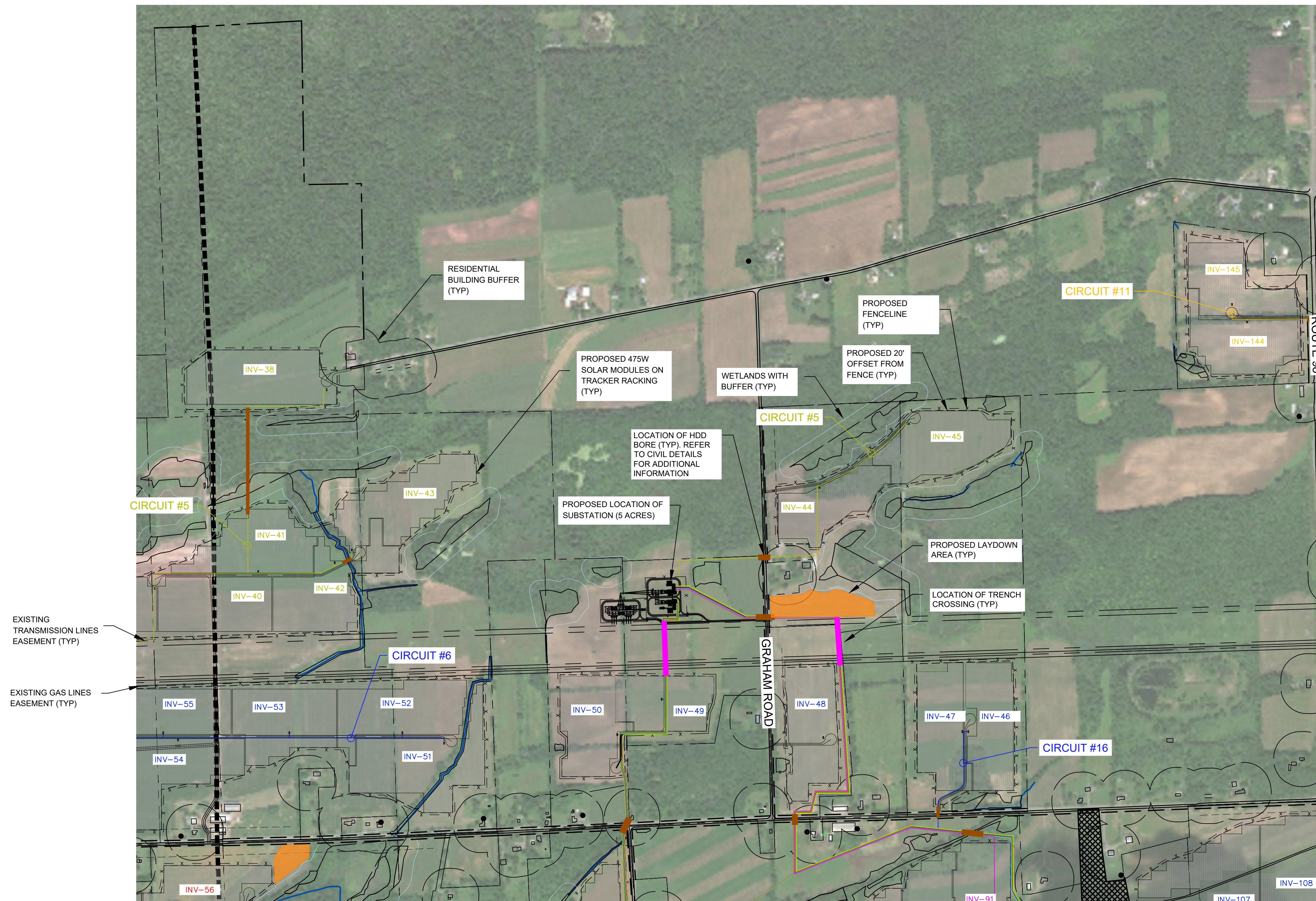
GENERAL NOTES

1. THE CONTRACTOR/INSTALLER OF THE SOLAR PV SYSTEM SHALL CONFORM TO OSHA REQUIREMENTS DURING THE CONSTRUCTION PHASE. JOB SITE SAFETY AND CONSTRUCTION PROCEDURES ARE THE SOLE RESPONSIBILITY OF THE CONTRACTOR/INSTALLER.
2. REFER TO ELECTRICAL DRAWING FOR DETAILED PANEL INFORMATION.
3. IN CASE OF CONFLICT BETWEEN THE STRUCTURAL DRAWINGS AND THE ELECTRICAL DRAWINGS, THE MOST RIGID REQUIREMENTS SHALL GOVERN.
4. THE CONTRACTOR/INSTALLER SHALL VERIFY ALL EXISTING INFORMATION SHOWN (DIMENSIONS, OBSTRUCTIONS, ETC.) AND NOTIFY THE ENGINEER OF ANY DISCREPANCIES PRIOR TO INSTALLATIONS OF THE PV SYSTEM.
5. IN CASE OF CONFLICT BETWEEN THE CONTRACT DRAWINGS AND THE SPECIFICATIONS, THE MOST RIGID REQUIREMENTS SHALL GOVERN.
6. ALL COSTS OF INVESTIGATION AND/OR REDESIGN DUE TO CONTRACTOR IMPROPER INSTALLATION OF THE PV SYSTEM OR OTHER ITEMS NOT IN CONFORMANCE WITH THE CONTRACT DOCUMENTS SHALL BE AT THE CONTRACTOR/INSTALLER'S EXPENSE.
7. ALL CONSTRUCTION IS TO BE PERFORMED IN STRICT CONFORMANCE WITH ALL APPLICABLE TOWN, COUNTY & STATE AND/OR ANY OTHER GOVERNING BODY STANDARDS.
8. DO NOT SCALE THESE DRAWINGS, USE DIMENSIONS. CONTRACTOR MUST VERIFY DIMENSIONS SHOWN ON PLAN PRIOR TO INSTALLATION. IF THERE IS A DISCREPANCY IT IS CONTRACTOR/INSTALLER'S RESPONSIBILITY TO NOTIFY THE ENGINEER IMMEDIATELY.
9. CONTRACTOR SHALL MEGGER ENTIRE SYSTEM WITH 1000 VOLTS INSTRUMENT AND SUBMIT RESULTS TO THE ENGINEER PRIOR TO COMMISSIONING. SEE ELECTRICAL SPECIFICATIONS FOR MORE INFORMATION ON TESTING.
10. PROVIDE ALL MATERIALS LABOR, EQUIPMENT AND SERVICES AND PERFORM ALL OPERATIONS IN CONNECTION WITH THE ELECTRICAL WORK. IT IS THE INTENT THAT THESE DRAWINGS PROVIDE THE WORK REQUIRED FOR AN ELECTRICAL INSTALLATION THAT IS COMPLETE IN EVERY RESPECT, READY FOR OPERATION.
11. THE DRAWINGS, AND GENERAL REQUIREMENTS CONTAINED IN THE CONTRACT, GOVERN THIS WORK. WHERE ITEMS OF GENERAL CONDITIONS ARE REPEATED HEREIN, IT IS INTENDED TO QUALIFY OR TO CALL PARTICULAR ATTENTION TO THEM; IT IS NOT INTENDED THAT ANY OTHER PARTS OF THE GENERAL CONDITIONS SHALL BE ASSUMED TO BE OMITTED.
12. ALL WORK SHALL COMPLY WITH ALL LOCAL, STATE AND FEDERAL CODES AND THE REQUIREMENTS OF ANY OTHER AUTHORITIES HAVING JURISDICTION. ALL MATERIAL AND EQUIPMENT SHALL BE UL LISTED AND SHALL BEAR THE UL INSPECTION LABEL WHEREVER STANDARDS HAVE BEEN ESTABLISHED. AT THE COMPLETION OF THE WORK, SECURE CERTIFICATES OF APPROVAL FROM THE VARIOUS AUTHORITIES HAVING JURISDICTION AND DELIVER SAME TO ("THE ENGINEER").
13. ALL WORK SHALL COMPLY WITH NECA STANDARD OF INSTALLATION (PUBLISHED BY THE NATIONAL ELECTRICAL CONTRACTORS ASSOCIATION) AND NFPA 70 – NATIONAL ELECTRICAL CODE (NEC) AND ALL APPLICABLE SAFETY STANDARDS. COMPLY WITH APPLICABLE STANDARDS THE OWNER HAS DEVELOPED AS THEY PERTAIN TO THIS WORK.
14. BEFORE SUBMITTING THE BID, VISIT EACH SITE WHERE WORK IS REQUIRED, SURVEY THE EXISTING CONDITIONS AND BECOME FAMILIAR WITH THE DIFFICULTIES WHICH WILL AFFECT THE EXECUTION AND COMPLETION OF THE WORK. INVESTIGATE THE NATURE AND LOCATION OF THE WORK, THE GENERAL AND LOCAL CONDITIONS, PARTICULARLY THOSE BEARING UPON THE WORK REQUIRED, TRANSPORTATION, DISPOSAL, HANDLING AND STORAGE OF MATERIALS, AVAILABILITY OF LABOR, WATER, ELECTRIC POWER, ROADS AND PHYSICAL CONDITIONS AT THE SITE NEEDED FOR THE PROSECUTION OF THE WORK AND ALL OTHER MATTERS UPON WHICH INFORMATION IS REASONABLY OBTAINABLE AND WHICH CAN IN ANY WAY AFFECT THE WORK OR THE COST THEREOF UNDER THE CONTRACT.
15. PROCURE AND PAY FOR ALL CERTIFICATES, FEES, TESTS, INSPECTIONS, BONDS, DEPOSITS, AND ESCROW ACCOUNTS, REQUIRED FOR COMPLETE INSTALLATION OF THE WORK. GIVE ALL NOTICES REQUIRED BY LAW, ORDINANCES, OR THE RULES AND REGULATIONS OF THE VARIOUS AUTHORITIES. COMPLY WITH ALL ORDERS OF THE LOCAL DEPARTMENT OF BUILDINGS, COUNTY DEPARTMENT OF HEALTH, FIRE MARSHAL, ETC. DELIVER TO THE OWNER'S REPRESENTATIVE ALL PERMITS AND CERTIFICATES OF APPROVAL ISSUED BY ALL TOWN, COUNTY, AND STATE AGENCIES HAVING JURISDICTION IN CONNECTION WITH THIS WORK, BEFORE THE CERTIFICATE FOR THE FINAL PAYMENT IS ISSUED.
16. NO WORK SHALL BE COVERED OVER UNTIL TESTS HAVE BEEN PERFORMED AND THE AUTHORITIES HAVING JURISDICTION HAVE EXAMINED, INSPECTED AND APPROVED THE TESTS AND THE WORK. PROVIDE ALL CONTROLLED INSPECTIONS CONTROLLED REQUIRED BY THE REGULATIONS OF TOWN, COUNTY, AND STATE. THE CONTROLLED INSPECTIONS SHALL BE MADE BY AN INSPECTOR MEETING THE PROFESSIONAL REQUIREMENTS SET FORTH BY STATE AND LOCAL LAWS AND SHALL BE CARRIED OUT IN ACCORDANCE WITH APPLICABLE TOWN, COUNTY, AND STATE BUILDING CODES.
17. TAKE OUT ALL NECESSARY INSURANCE, FREE OF EXTRA CHARGE AND AGREE TO INDEMNIFY AND SAVE HARMLESS THE PARTY CONTRACTING FOR SERVICES, AGAINST LOSS OR EXPENSE.
18. THE DRAWINGS DO NOT UNDERTAKE TO ILLUSTRATE OR SET FORTH EVERY ITEM NECESSARY FOR THE WORK, AS IT IS ASSUMED THAT WITH THIS BID SUBMISSION, THE CONTRACTOR ACKNOWLEDGES THAT HE IS EXPERT IN THE SEVERAL LINES OF THE WORK AND IS CAPABLE OF INTERPRETING THEM. WHERE NO SPECIFIED MANUFACTURER OR QUALITY OF MATERIAL IS GIVEN, A FIRST-CLASS STANDARD ARTICLE AS APPROVED BY THE ENGINEER SHALL BE FURNISHED.
19. THE DRAWINGS ARE GENERALLY DIAGRAMMATIC AND ARE INTENDED TO CONVEY THE SCOPE OF WORK AND INDICATE GENERAL ARRANGEMENT OF EQUIPMENT, CONDUITS, PANELS, FIXTURES, ETC. THE LOCATION OF ALL ITEMS SHOWN THAT ARE NOT DEFINITELY FIXED BY DIMENSIONS ARE APPROXIMATE. THE EXACT LOCATIONS NECESSARY TO SECURE THE BEST CONDITIONS AND RESULTS MUST BE DETERMINED AT THE PROJECT AND SHALL HAVE THE APPROVAL OF THE ENGINEER BEFORE BEING INSTALLED. DO NOT SCALE DRAWINGS.
20. MAINTAIN AND PROTECT ALL EQUIPMENT, MATERIALS AND TOOLS FROM LOSS OR DAMAGE FROM ALL CAUSES UNTIL FINAL ACCEPTANCE BY THE OWNER.
21. THE OWNER'S REPRESENTATIVE SHALL BE NOTIFIED, IN WRITING, WHEN INTERRUPTION OF THE PRESENTLY MAINTAINED SERVICES, MECHANICAL, ELECTRICAL, OR OTHERWISE IS REQUIRED. WRITTEN PERMISSION SHALL BE OBTAINED FROM THE OWNER'S REPRESENTATIVE PRIOR TO COMMENCING WITH THE SHUT-DOWN.

22. PROVIDE ALL NECESSARY TRAILERS, EXTENSION CORDS AND LAMPS, TO PROVIDE TEMPORARY LIGHT AND POWER FOR THE PROPER EXECUTION OF ALL WORK.
23. PROVIDE ALL SCAFFOLDING, RIGGING, HOISTING, AND SERVICES NECESSARY FOR ERECTION AND DELIVERY INTO THE PREMISES OF ANY EQUIPMENT AND APPARATUS, FURNISHED. REMOVE SAME FROM PREMISES WHEN NO LONGER REQUIRED.
24. ALL WORK SHOWN ON THE DRAWINGS THAT IS NOT SPECIFICALLY INDICATED AS BEING EXISTING SHALL BE ASSUMED TO BE NEW.
25. ALL LABELING SHALL COMPLY WITH REQUIREMENTS OF NEC 690, UL, AND NFPA 70E.
26. TEXT ON ALL LABELS SHALL BE OF ARIAL FONT-IT SHALL BE LEGIBLE AND CLEAR.
27. TEXT SIZE SHALL BE AS SHOWN BUT IN NO CASE TEXT SHALL BE SMALLER THAN 3⁄16" FOR TITLES (I.E. "WARNING") AND 3⁄16" HIGH FOR DATA.
28. THE TONE OF THE BACKGROUND COLOR SHALL BE BRIGHT TO ATTRACT ATTENTION.
29. SUBMIT ALL LABEL STENCILS WITH DIMENSIONS TO ENGINEER PRIOR TO PURCHASE.
30. LABELS SHALL BE EITHER ENGRAVED, MACHINE PRINTED OR ELECTRO-PHOTO PLATED AND BE OF METALLIC OR PLASTIC CONSTRUCTION. SIGNAGE SHALL BE WEATHERPROOF, CORROSION PROOF, UV-STABILIZED AND FADE RESISTANT.
31. LABELS SHALL BE SECURELY FASTENED TO SPECIFIED LOCATIONS BY USING A WEATHER PROOF & DURABLE ADHESIVE SUITABLE FOR THE MATERIAL OF THE LABEL & LOCATION.
32. THE LABELS SHALL BE POSTED AT THE LOCATIONS SPECIFIED. IF FOR REASONS OF REDUCED ACCESS OR SPACE, THE LABELS SHALL BE POSTED AT THE CLOSEST LOCATION THAT BEST SERVES THE INTENT OF THE LABEL. NOTIFY THE ENGINEER/SUPVISOR IN SUCH A CASE BEFORE ATTACHING.
33. ALL LABELS SHALL COMPLY WITH THE FOLLOWING COLOR SCHEMES UNLESS SPECIFICALLY INDICATED:



LABEL	TEXT	BACKGROUND
INFORMATIONAL	BLACK	WHITE
UTILITY/CAUTION	BLACK	YELLOW
WARNING	WHITE	RED

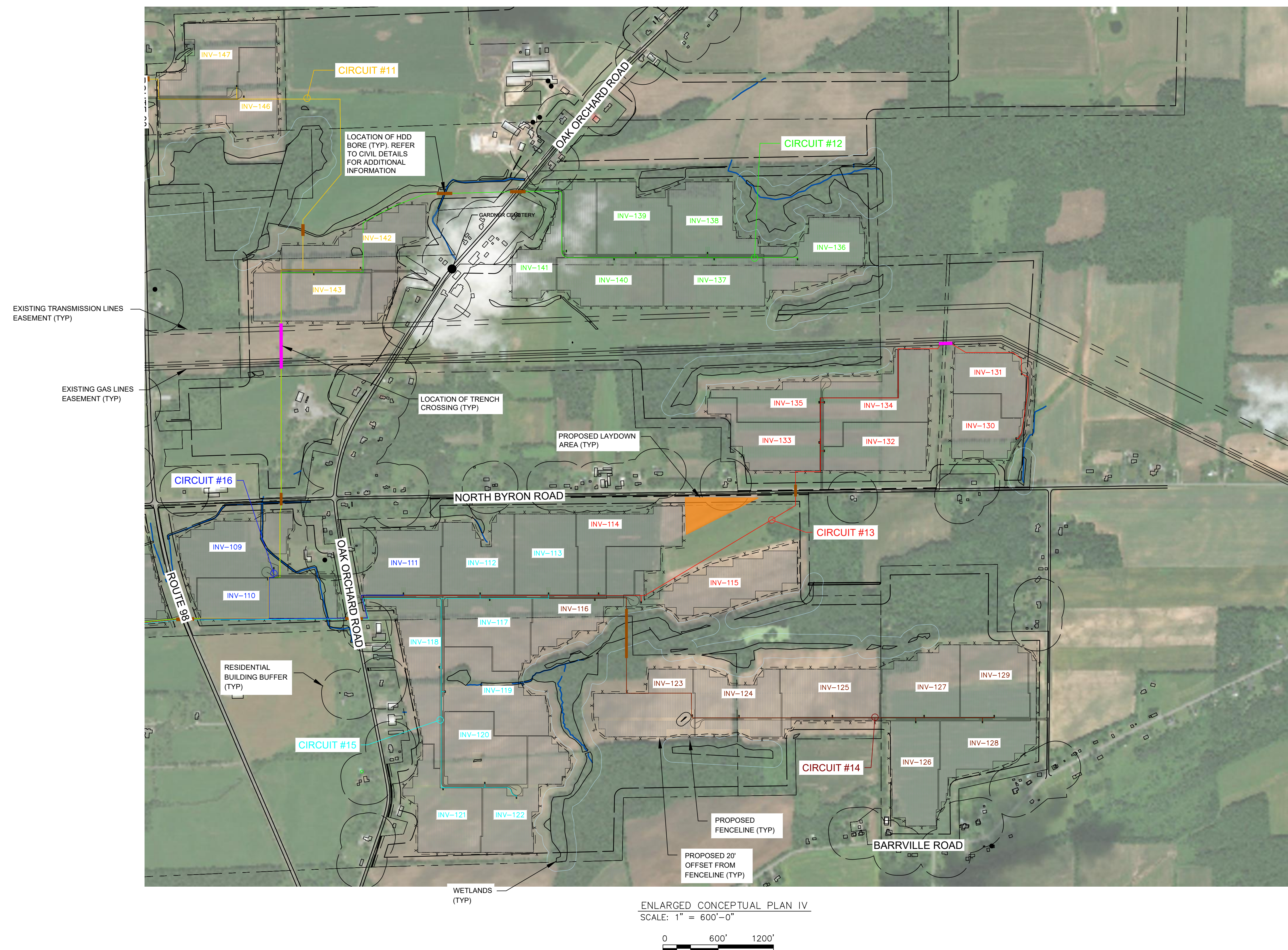
								Consultants				<div><div></div><div>1599 RT 34 Suite 3 Wall Township, NJ www.stantec.com</div><div>The Contractor shall verify and be responsible for all dimensions. DO NOT scale the drawing - any errors or omissions shall be reported to Stantec without delay. The Copyrights to all designs and drawings are the property of Stantec. Reproduction or use for any purpose other than that authorized by Stantec is forbidden.</div></div>				Client/Project HECATE ENERGY CIDER SOLAR LLC 500MW AC CIDER SOLAR FARM OAKFIELD & ELBA, NY GENESEE COUNTY, NY				Title CIDER SOLAR FARM ELECTRICAL SPECIFICATIONS															
												Project No. 190502038				Scale AS SHOWN				Revision															
Revision				By				Appd.				YY.MM.DD				Issued				By				Appd.				YY.MM.DD							
												File Name: E-002 - ELECTRICAL SPECIFICATIONS				CMA Dwn.		RM Chkd.		CMA Dsgn.		20.06.01 YY.MM.DD		E-002				3 of 20				0			



ENLARGED CONCEPTUAL PLAN II
SCALE: 1" = 600'-0"



																Client/Project HECATE ENERGY CIDER SOLAR LLC 500MW AC CIDER SOLAR FARM OAKFIELD & ELBA, NY GENESEE COUNTY, NY				Title CIDER SOLAR FARM ELECTRICAL ENLARGED COLLECTION & CROSSING PLAN II																											
																Project No. 190502038				Scale AS SHOWN																											
																Drawing No.				Sheet				Revision																							
Revision				By				Appd.				YY.MM.DD				1 EXHIBIT 5: DESIGN DRAWINGS CMA RM 21.03.31 0 CONCEPT DESIGN CMA RM 20.06.01				Issued				By				Appd.				YY.MM.DD				The Contractor shall verify and be responsible for all dimensions. DO NOT scale the drawing - any errors or omissions shall be reported to Stantec without delay. The Copyrights to all designs and drawings are the property of Stantec. Reproduction or use for any purpose other than that authorized by Stantec is forbidden.				File Name: E-302 - Enlarged Collection & Crossing Plan II CMA RM 20.06.01 Dwn. Chkd. Dsgn. YY.MM.DD				E-302 6 of 20 0			

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Client/Project

HECATE ENERGY CIDER SOLAR LLC
500MW AC CIDER SOLAR FARM

OAKFIELD & ELBA, NY
GENESEE COUNTY, NY

File Name: E-304 - Enlarged Collection & Crossing Plan	Chk Plan	IV RM	CMA	20.06.01
	Dwn.	Chkd.	Dsan.	YY.MM.DD

Title

CIDER SOLAR FARM
ELECTRICAL ENLARGED COLLECTION &
CROSSINGS PLAN IV

Project No.
190502038

Scale
AS SHOWN

Drawing No.

Sheet

Revision

E-304

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2021/05/13 4:34 PM By: Andrews, Chris



Hecate Energy



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File Name: E-400 - ELECTRICAL WIRING DIAGRAM	CMA	RM	CMA	20.06.01
	Dwn.	Chkd.	Dsgn.	YY.MM.DD

E-400 9 of 20 0



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File Name: E-401 ELECTRICAL WIRING DIAGRAM	CMA	RM	CMA	20.06.01
	Dwn.	Chkd.	Dsgn.	YY.MM.DD

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1
E-501

MV TRENCH SECTION DETAIL
N.T.S.



PARALLEL SPEARATION	
# PARALLEL CIRCUITS	TOTAL TRENCH WIDTH
2	20'-0"
3	30'-0"
4	40'-0"
5	50'-0"
6	60'-0"
7	70'-0"
8	80'-0"
9	90'-0"
10	100'-0"

[illegible]

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Client/Project

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500MW AC CIDER SOLAR FARM

OAKFIELD & ELBA, NY
GENESEE COUNTY, NY

File Name: E-501 - ELECTRICAL DETAILS II

CMA

RM

CMA

20.06.01

Title

CIDER SOLAR FARM ELECTRICAL DETAILS II

Project No.
190502038

Drawing No.

E-501

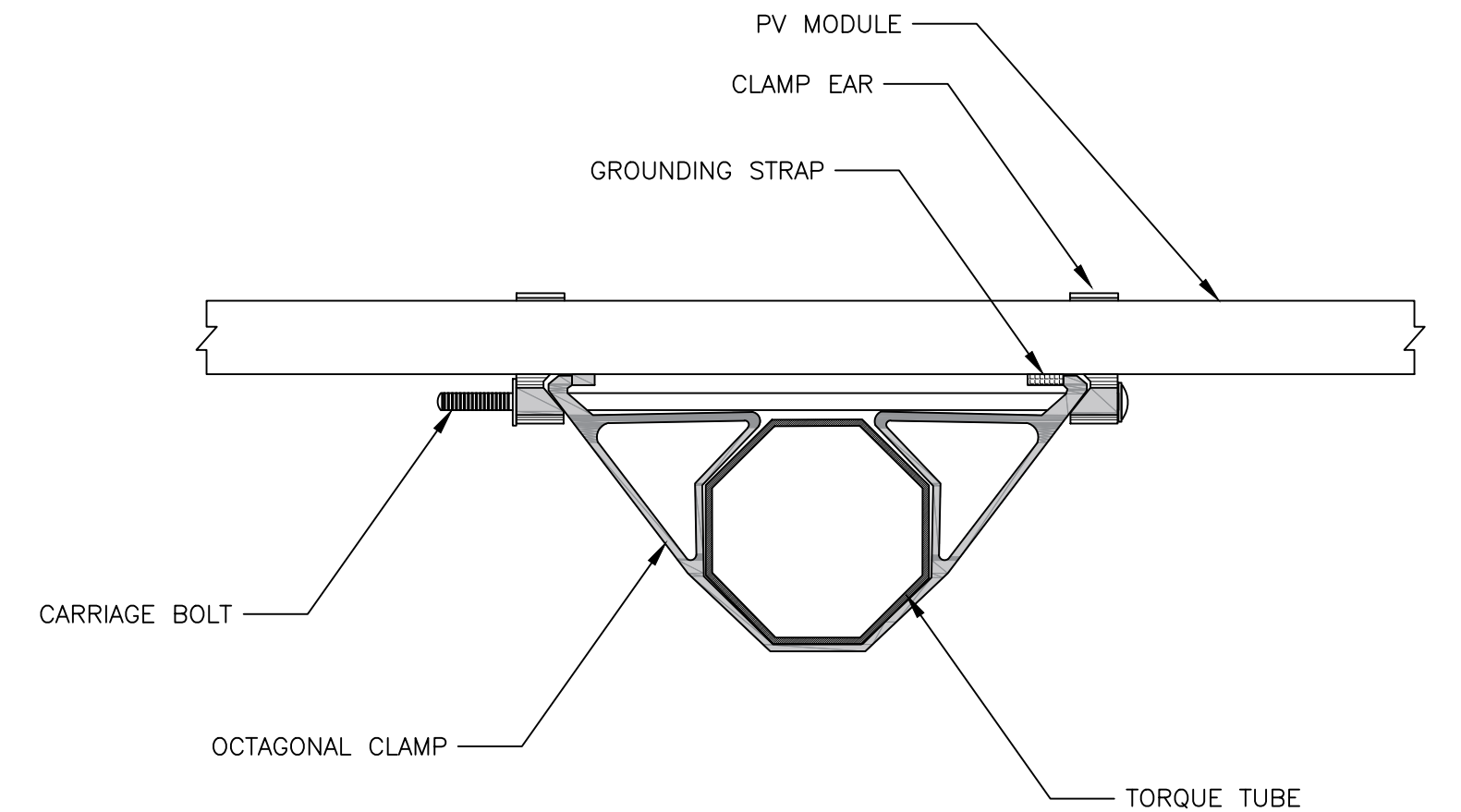
Scale
AS SHOWN

Sheet

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Revision

0



MODULE GROUNDING DETAIL
N.T.S.

- NOTES:**
1. CONCRETE: 5,000 PSI MINIMUM AFTER 28 DAYS.
 2. STEEL REINFORCEMENT - ASTM A615, GRADE 60.
MINIMUM STEEL COVER - 1 INCH.
 3. DESIGN LOADING - AASHTO HS20-44.
 4. DESIGN SPECIFICATIONS - ACI 318 & AASHTO LOAD
FACTOR DESIGN METHOD.
 5. JOINT SEALED WITH 1" DIA BUTYL RUBBER.
 6. MANUFACTURED BY SHEA CONCRETE, OLD CASTLE
OR APPROVED EQUAL

SECTION B-B

NOTE: CONTRACTOR SHALL UTILIZE VAULTS AS NEEDED

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[illegible]

A warning sign with a red background. At the top left is a white triangle containing a black exclamation mark. To its right, the word "WARNING" is written in large, bold, white capital letters. Below this, the text "ARC FLASH HAZARD" is written in smaller white capital letters. Underneath that, "APPROPRIATE PPE REQUIRED" is written in white capital letters. At the bottom, "FAILURE TO COMPLY CAN RESULT IN DEATH OR SEVERE INJURY" is written in white capital letters. The sign is bordered by a thin white line.

ARIAL FONT SHALL BE
.25 HT.

A red rectangular warning sign with a black border. At the top left is a black triangle containing a white exclamation mark. To the right of the triangle, the word "WARNING" is written in large, bold, black capital letters. A horizontal black line is positioned below "WARNING". Below the line, the words "HIGH VOLTAGE" are written in large, bold, black capital letters. At the bottom of the sign, the text "DO NOT ENTER" is written in bold, black capital letters, followed by "FOR QUALIFIED" and "PERSONNEL ONLY" on separate lines, and "(PHOTOVOLTAIC INSTALLATION)" in parentheses on the final line.

**PHOTOVOLTAIC
DC COMBINER BOX
CB-X-X**

INPUTS	
RATED MAX. POWER POINT CURRENT	--- ADC
RATED MAX. POWER POINT VOLTAGE	---- VDC
MAX. SYSTEM VOLTAGE	---- VDC
SHORT CIRCUIT CURRENT	--- ADC

UTILITY COMPANY:

UTILITY FAULT CURRENT:

ENGINEER: STANTEC CONSULTING SERVICES, INC.

ENGINEER: STANTEC CONSULTING SERVICES, INC.



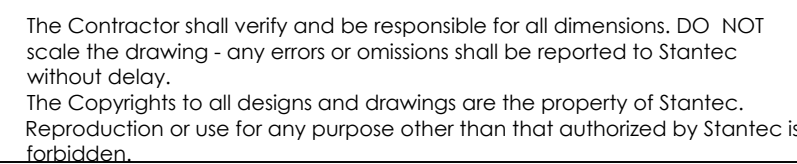
DANGER

**HIGH VOLTAGE
NO TRESPASSING**

**IN CASE OF EMERGENCY CONTACT
VERIFY CONTACT NUMBER WITH OWNER**

[illegible]

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File Name: E-520 - ELECTRICAL LABELS I

File Name: E-520 - ELECTRICAL LABELS I	CMA	RM	CMA	20.06.01
	Dwn.	Chkd.	Dsgn.	YY.MM.DD

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A red rectangular warning sign with a white border. On the left side, there is a white triangle containing a black exclamation mark. To the right of the triangle, the word "WARNING" is written in large, bold, black capital letters. Below "WARNING", the text "ELECTRICAL SHOCK HAZARD" is written in smaller, bold, black capital letters. Underneath that, the text "IF A GROUND FAULT IS INDICATED," is written in bold, black capital letters. Finally, at the bottom, the text "NORMALLY GROUNDED CONDUCTORS MAY BE UNGROUNDED AND ENERGIZED" is written in bold, black capital letters.

LAMICORD SHALL BE: 4"x6"

 **CAUTION**

POWER TO THIS SERVICE IS ALSO
SUPPLIED FROM ON-SITE
PHOTOVOLTAIC GENERATION

 <h1 style="margin: 0; font-size: 48px;">WARNING</h1>
<p>ARC FLASH HAZARD</p> <p>APPROPRIATE PPE REQUIRED</p> <p>FAILURE TO COMPLY CAN RESULT IN DEATH OR SEVERE INJURY</p>
NOMINAL SYSTEM VOLTAGE _____ ARC FLASH BOUNDARY _____ AVAILABLE INCIDENT ENERGY _____ WORKING DISTANCE _____ MINIMUM ARC RATING OF CLOTHING _____ LEVEL OF PPE _____ LIMITED APPROACH _____ RESTRICTED APPROACH _____ LOCATION ID _____ STUDY COMPLETED BY _____ STUDY COMPLETED ON _____


[illegible]

LAMICORD SHALL BE: 4"x6"

 **WARNING**

ELECTRICAL SHOCK HAZARD IF A
GROUND FAULT IS INDICATED,
NORMALLY GROUNDED CONDUCTORS
MAY BE UNDERGROUND AND
ENERGIZED

LAMICORD SHALL BE: 6"x5"


 **WARNING**

IDENTIFICATION OF MULTIPLE
SERVICE DISCONNECTS

A SECOND POWER SOURCE IS
PRESENT IN THIS EQUIPMENT
PV SYSTEM DISCONNECT LOCATED


A yellow rectangular warning label with a black border. On the left is a black triangle containing a large exclamation mark. To the right of the triangle, the word "WARNING" is printed in large, bold, black capital letters. Below "WARNING", the text "ELECTRICAL SHOCK HAZARD" is printed in smaller, bold, black capital letters. Below that, the text "THE DC CONDUCTORS OF THIS PHOTOVOLTAIC SYSTEM ARE" is printed in smaller, bold, black capital letters. At the bottom, the text "UNGROUNDING AND MAY BE ENERGIZED" is printed in smaller, bold, black capital letters.

LAMICORD SHALL BE: 4"x6"

 **WARNING**

**INVERTER OUTPUT CONNECTION
DO NOT ADD LOADS TO THIS
SWITCHBOARD**

LAMICORD SHALL BE: 4"x6"

 **CAUTION**

**SOLAR ARRAY'S ARE PRESENT ON THIS
SWITCHBOARD**

The Stantec logo is displayed, consisting of a circular emblem on the left and the word "Stantec" in a bold, sans-serif font on the right. The emblem is a black circle containing a white, stylized, curved shape that resembles a drop or a flame. The word "Stantec" is in a large, bold, black, sans-serif font.

PHOTOVOLTAIC kW INVERTER

THE INVERTER INTERCONNECTS AT NEW
POLE ON LINE V-XXX THROUGH A DEDICATED
POLE MOUNTED GANG OPERATED LOAD
BREAK SWITCH.

INVERTER IDENTIFICATION LABELS
LAMICORD SHALL BE: 1 1/2"x6"
TEXT SIZE SHALL BE 1/2"
(1 PER INVERTER)

INVERTER #X

AC VISIBLE DISCONNECT IDENTIFICATION LABEL
LAMICORD SHALL BE: 6"x5"
(1 PER DISCONNECT)

CAUTION
SOLAR GENERATION
UTILITY AC
DISCONNECT
ELECTRIC SHOCK HAZARD.
DO NOT TOUCH TERMINALS. TERMINALS
ON BOTH THE LINE AND LOAD SIDES MAY
BE ENERGIZED IN THE OPEN POSITION
INTERACTIVE SOLAR PV SYSTEM RATINGS

MAX. OPERATING CURRENT	--- AMPS
OPERATING VOLTAGE	34.500 VAC

[illegible][illegible]

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HECATE ENERGY CIDER SOLAR LLC
500MW AC CIDER SOLAR FARM

OAKFIELD & ELBA, NY
GENESEE COUNTY, NY

File Name: E-521 - ELECTRICAL LABELS II

CMA

Dwn.

RM

Chkd.

CMA

Dsan.

20.06.01
YY.MM.DD

CIDER SOLAR FARM ELECTRICAL LABELS II

Project No.
190502038

Drawing No.

E-521

Scale
AS SHOWN

Sheet

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Revision

0

WARNING

TO BE POSTED AT ALL COMBINER BOXES

MEDIUM VOLTAGE TRANSFORMER X

TO BE POSTED AT THE
TRANSFORMER 1

 **CAUTION**
UNGROUND
AC SYSTEM

TO BE POSTED AT EACH MEDIUM VOLTAGE TRANSFORMER
& INVERTER ON THE LOW VOLTAGE SIDE

NOTICE

THE PHOTOVOLTAIC
OUTPUT IS
CONNECTED TO THE
LOW VOLTAGE SIDE
OF THIS TRANSFORMER

NOTICE

PHOTOVOLTAIC ELECTRIC SYSTEM DISCONNECT

TO BE POSTED AT MAIN SERVICE DISCONNECT

WARNING

SHOCK, ARC FLASH,
AND ARC BLAST HAZARD
APPROPRIATE PPE REQUIRED
FAILURE TO COMPLY CAN RESULT
IN INJURY OR DEATH
REFER TO UFC 3-560-01

TO BE POSTED AT EACH COMBINER
BOX AND RECOMBINER AND INVERTER

NOTICE

PHOTOVOLTAIC AC
DISCONNECT
VOLTAGE =
CURRENT =

TO BE POSTED AT THE INVERTER 1 DISCONNECT

⚠ WARNING

DO NOT OPEN, REMOVE OR
REPLACE FUSES UNDER LOAD

TO BE POSTED AT ALL COMBINER BOXES AND
ALL OTHER FUSED LOCATIONS

NOTICE



AUTHORIZED PERSONNEL
ONLY

TO BE POSTED AT THE GATES


LAMICORD SHALL BE: 4"x6'

DATA ACQUISITION CABINET X

TO BE POSTED AT THE DAS CABINETS

																Client/Project HECATE ENERGY CIDER SOLAR LLC 500MW AC CIDER SOLAR FARM OAKFIELD & ELBA, NY GENESEE COUNTY, NY				Title CIDER SOLAR FARM ELECTRICAL LABELS III							
												1599 RT 34 Suite 3 Wall Township, NJ www.stantec.com															
												The Contractor shall verify and be responsible for all dimensions. DO NOT scale the drawing - any errors or omissions shall be reported to Stantec without delay. The Copyrights to all designs and drawings are the property of Stantec. Reproduction or use for any purpose other than that authorized by Stantec is forbidden.															
												File Name: E-522 - ELECTRICAL LABELS III				CMA Dwn.		RM Chkd.		CMA Dsgn.		20.06.01 YY.MM.DD					
Revision				By				Appd.				YY.MM.DD				Project No. 190502038				Scale AS SHOWN							
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																E-522				18 of 20				0			
1 EXHIBIT 5: DESIGN DRAWINGS				CMA				RM				21.03.31															
0 CONCEPT DESIGN				CMA				RM				20.06.01															
Issued				By				Appd.				YY.MM.DD															

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THE MOST DEPENDABLE SOLAR BRAND

EAGLE 78TR G4b

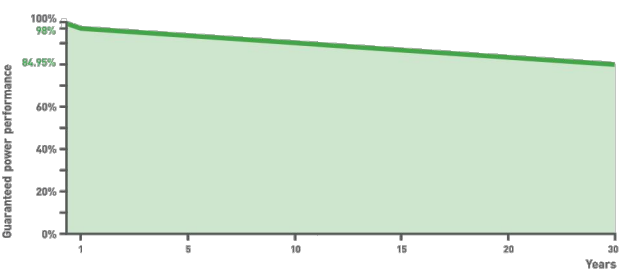
455-475 WATT
TILING RIBBON BIFACIAL
MONOCRYSTALLINE MODULE

Positive power tolerance of 0~+3%






- NYSE-listed since 2010, Bloomberg Tier 1 manufacturer
- Best-selling panel globally for last 4 years
- Top performance in the strictest 3rd party labs
- 99.9% on-time delivery
- Automated manufacturing utilizing artificial intelligence
- Vertically integrated, tight controls on quality
- Premium solar panel factories in USA and Malaysia

LINEAR PERFORMANCE WARRANTY

30-Year Performance Warranty



KEY FEATURES


-  **TR Technology**
TR technology eliminates cell gaps to increase module efficiency and power
-  **Bifacial Power Gain**
Bifacial cell architecture allows backside bonus and more lifetime power yield
-  **Transparent Backsheet**
Easier installation and lower balance of system cost than dual glass solution
-  **Designed for Long Life**
Uses the same DuPont protective film as the Space Station, Mars Lander, and jetliners. 30-year warranty
-  **Shade Tolerant**
Twin array design allows continued performance even with shading by trees or debris
-  **Protected Against All Environments**
Certified to withstand humidity, heat, rain, marine environments, wind, hailstorms, and packed snow

Technical Specifications
JINKO SOLAR 78TR G4b
Model: JKM455M-78L3-TV
Dimensions: 2255x1032x40mm (88.81x40.63x1.57in)
Weight: 26.5kg (58.42lbs)

UL1741 IEC 61215 IEC 61730 CE

- ISO9001:2015 Quality Standards
- ISO14001:2015 Environmental Standards
- IEC61215, IEC61730 certified products
- ISO45001:2018 Occupational Health & Safety Standards
- UL61730 certified products

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ENGINEERING DRAWINGS



Length: ± 2mm
Width: ± 2mm
Height: ± 1mm
Row Pitch: ± 2mm

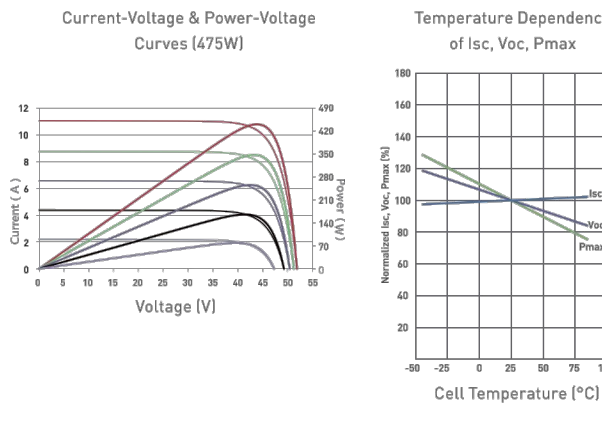
MECHANICAL CHARACTERISTICS

Cells	Bifacial Monocrystalline Cell
No. of Half Cells	156 (2x78)
Dimensions	2255x1032x40mm (88.81x40.63x1.57in)
Weight	26.5kg (58.42lbs)
Front Glass	3.2mm, Anti-Reflection Coating High Transmission, Low Iron, Tempered Glass
Frame	Anodized Aluminum Alloy
Junction Box	IP67 Rated
Output Cables	12 AWG, 1400mm (55.12in) or Customized Length
Fire Type	Type I
Pressure Rating	5400Pa (Snow) & 2400Pa (Wind)

TEMPERATURE CHARACTERISTICS

Temperature Coefficients of Pmax	-0.35%/°C
Temperature Coefficients of Voc	-0.28%/°C
Temperature Coefficients of Isc	0.048%/°C
Nominal Operating Cell Temperature (NOCT)	45±2°C
Refer. Bifacial Factor	70±5%

ELECTRICAL PERFORMANCE & TEMPERATURE DEPENDENCE



MAXIMUM RATINGS

Operating Temperature (°C)	-40°C ~ +85°C
Maximum System Voltage	1500VDC (UL and IEC)
Maximum Series Fuse Rating	25A

PACKAGING CONFIGURATION

(Two pallets = One stack)
27pcs/pallet, 54pcs/stack, 540pcs/40' HQ Container

BIFACIAL OUTPUT-REARSIDE POWER GAIN

5%	Maximum Power (Pmax)	478Wp	483Wp	489Wp	494Wp	499Wp
	Module Efficiency (%)	20.99%	21.23%	21.46%	21.69%	21.92%
15%	Maximum Power (Pmax)	523Wp	529Wp	535Wp	541Wp	546Wp
	Module Efficiency (%)	22.99%	23.25%	23.50%	23.75%	24.01%
25%	Maximum Power (Pmax)	569Wp	575Wp	581Wp	586Wp	591Wp
	Module Efficiency (%)	24.99%	25.27%	25.54%	25.82%	26.09%

ELECTRICAL CHARACTERISTICS

Module Type	JKM455M-78L3-TV	JKM460M-78L3-TV	JKM465M-78L3-TV	JKM470M-78L3-TV	JKM475M-78L3-TV					
STC	NOCT	STC	NOCT	STC	NOCT	STC	NOCT	STC	NOCT	
Maximum Power (Pmax)	455Wp	339Wp	440Wp	342Wp	445Wp	344Wp	470Wp	350Wp	475Wp	353Wp
Maximum Power Voltage (Vmp)	43.25V	39.73V	43.32V	39.84V	43.38V	39.95V	43.44V	40.05V	43.50V	40.11V
Maximum Power Current (Imp)	10.52A	8.52A	10.42V	8.59A	10.72A	8.66A	10.82V	8.73A	10.92A	8.81A
Open-circuit Voltage (Voc)	51.80V	48.89V	51.90V	48.99V	52.00V	49.08V	52.10V	49.18V	52.16V	49.23V
Short-circuit Current (Isc)	11.26A	9.09A	11.35A	9.17A	11.44A	9.24A	11.53A	9.31A	11.63A	9.39A
Module Efficiency STC (%)	20.00%		20.21%		20.43%		20.65%		20.87%	

*STC: ☀ Irradiance 1000W/m²
NOCT: ☀ Irradiance 800W/m²
☁ AM = 1.5
☁ AM = 1.5
🌬 Wind Speed 1m/s

*Power measurement tolerance: ±2%

The company reserves the final right to explain any of the information presented. JKM455-475M-78L3-TV-A2-US

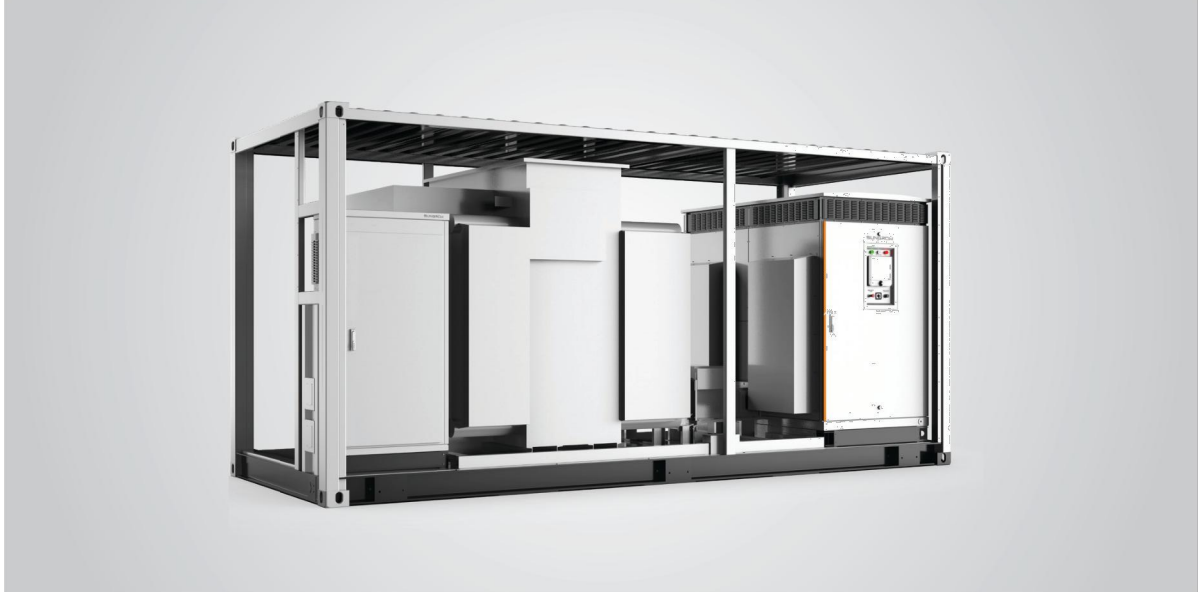
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SG3425UD-MV/ SG3600UD-MV

Preliminary

Turnkey Station for North America 1500 Vdc System - MV
Transformer Integrated



HIGH YIELD

- Advanced three-level technology, max. efficiency 98.9%
- Full power operation at 45 °C (113 °F)
- Effective cooling, wide operation temperature
- Max. DC/AC ratio up to 2.0

SMART O&M

- Integrated current, voltage and MV parameters monitoring function for online analysis and trouble shooting
- Modular design, easy for maintenance

SAVED INVESTMENT

- Low transportation and installation cost due to 20-foot container size design
- DC-coupled storage interface and charging power from the grid, low system cost
- Integrated MV transformer and LV auxiliary power supply
- Q at night optional

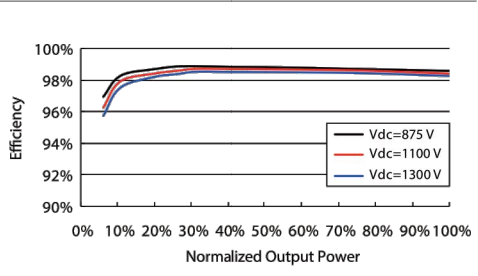
GRID SUPPORT

- Compliance with standards:UL1741,UL1741 SA, IEEE 1547, Rule 21 and NEC code
- Low / High voltage ride through (L/HVRT), L/HFRT, soft start/stop
- Active & reactive power control and power ramp rate control

CIRCUIT DIAGRAM



EFFICIENCY CURVE (SG3425UD)



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SG3425UD-MV/SG3600UD-MV		
Type designation	SG3425UD-MV	SG3600UD-MV
Input (DC)	1500 V	
Max. PV input voltage	1500 V	
Min. PV input voltage / Startup input voltage	875 V / 915 V	915 V / 955 V
Available DC fuse sizes	250A, 315A, 400A, 450A, 500A	
MPP voltage range	875 ~ 1300 V	915 ~ 1300 V
No. of independent MPP inputs	1	
No. of DC inputs	20 (optional: 22 / 24 / 26 / 28)	
Max. DC short-circuit current	10000 A	
PV array configuration	Negative grounding or floating	
Output (AC)		
AC output power	3425 kVA @ 45 °C (113 °F), 3083 kVA @ 50 °C (122 °F)	3600 kVA @ 45 °C (113 °F), 3240 kVA @ 50 °C (122 °F)
Nominal grid frequency / Grid frequency range	50 Hz / 45 ~ 55 Hz, 60 Hz / 50 ~ 66 Hz	
Harmonic (THD)	< 3 % [at nominal power]	
Power factor at nominal power / Adjustable power factor	> 0.99 / 0.8 leading ~ 0.8 lagging	
Efficiency		
Inverter Max. efficiency	98.9 %	
Inverter CEC efficiency	98.5 %	
Transformer		
Transformer rated power	3425 kVA	3600 kVA
Transformer max. power	3425 kVA	3600 kVA
LV / MV voltage	0.6 kV / (12 ~ 35) kV	0.63 kV / (12 ~ 35) kV
Transformer vector	Dy1 or Dy11	
Transformer cooling type	ONAN (Optional: KXAN)	
Protection		
DC input protection	Load break switch + fuse	
Inverter output protection	Circuit breaker	
AC-MV output protection	Load break switch + fuse	
Overvoltage protection	DC Type II / AC Type II	
Grid monitoring / Ground fault monitoring	Yes / Yes	
Insulation monitoring	Yes	
Overheat protection	Yes	
General Data		
Dimensions (W*H*D)	6058 * 2896 * 2438 mm 238.5" * 114.0" * 96.0"	
Weight	18000 kg 39683.2 lbs	
Degree of protection	NEMA 4X (Electronic for Inverter) / NEMA 3R(Others)	
Auxiliary power supply	3kVA, 120Vac/240Vac; Optional: 30kVA, 480Vac/277Vac	
Operating ambient temperature range	-35 to 60 °C (> 45 °C derating) / optional: -40 to 60 °C (> 45 °C derating) -22 to 140 °F (> 113 °F derating) / optional: -40 to 140 °F (> 113 °F derating)	
Allowable relative humidity range	0 ~ 100 %	
Cooling method	Temperature controlled forced air cooling	
Max. operating altitude	1000 m (Standard) / > 1000 m (Customized) (3280.8 ft (Standard) / > 3280.8 ft (Customized))	
DC-coupled storage interface	Optional	
Charging power from the grid	Optional	
Communication	Standard: RS485, Ethernet; Optional: optical fiber	
Compliance	UL1741, IEEE 1547, UL1741 SA, NEC 2017, CSA C22.2 No.1071-01	
Grid support	Q at night function (optional), L/HVRT, L/HFRT, Active & reactive power control and power ramp rate control, Volt-var, Frequency-watt	

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Revision				By				Appd.				YY.MM.DD			
1				EXHIBIT 5: DESIGN DRAWINGS				CMA				RM			
0				CONCEPT DESIGN				CMA				RM			
Issued								By				Appd.			

