PHOTOVOLTAIC SYSTEM SPECIFICATIONS

1.1 INTRODUCTION

A. INSTALL A COMPLETE AND FULLY FUNCTIONAL PHOTOVOLTAIC SYSTEM AS OUTLINED IN THE DRAWINGS, AND IN ACCORDANCE WITH INDUSTRY PRACTICE AND ALL APPLICABLE CODES.
B. CONTRACTOR MUST HAVE EXPERIENCE INSTALLING SIMILAR SYSTEMS AND MUST BE CAPABLE OF COMPLETING THIS PROJECT IN A TIMELY FASHION AND WITH THE HIGHEST QUALITY.
C. INSTALLER/CONTRACTOR MUST HAVE A NABCEP CERTIFIED PV INSTALLER ON THE INSTALLATION CREW IN SUPERVISORY ROLE.
D. FOR QUESTIONS REGARDING THIS SPECIFICATION, OBJECTIVES, AND TECHNICAL DETAILS, SUBMIT QUESTIONS THROUGH BUNCOMBE COUNTY RFP PORTAL.

1.2 GENERAL

A. THE WORK COVERED BY THESE SPECIFICATIONS CONSISTS OF FURNISHING ALL LABOR, EQUIPMENT, MATERIAL,S AND SUPPLIES AS NECESSARY FOR THE COMPLETE AND SATISFACTORY OPERATING ELECTRICAL SYSTEMS AS SHOWN ON THE PLANS.
B. ALL WORK SHALL BE IN ACCORDANCE WITH THE NATIONAL ELECTRICAL CODE, NFPA, STATE BUILDING CODE, AND ANY OTHER LOCAL REQUIREMENTS THAT MAY APPLY.
C. CONTRACTOR SHALL OBTAIN AND PAY FOR ALL PERMITS AND INSPECTION FEES.
D. ALL MATERIALS AND EQUIPMENT SHALL BE NEW AND SHALL BE LISTED BY THE UNDERWRITER'S LABORATORIES, INC. OR BY A STATE APPROVED THIRD PARTY TESTING AGENCY FOR THE USE INTENDED WHERE A STANDARD FOR SUCH MATERIALS AND USE EXISTS. ALL ITEMS OF THE SAME TYPE AND RATING SHALL BE IDENTICAL AND OF THE SAME MANUFACTURER.
E. CONTRACTOR SHALL SUBMIT SHOP DRAWINGS AND CATALOG DATA IN ELECTRONIC FORMAT (PDF) FOR ALL ELECTRICAL ITEMS IN THE SCOPE OF WORK, INCLUDING, BUT NOT LIMITED TO, RACEWAYS, BOXES, FITTINGS, CONDUCTORS, WIRING DEVICES, SAFETY SWITCHES, DISCONNECTS, TRANSFORMERS, PANELBOARDS, SWITCHBOARDS, ETC. FOR APPROVAL AS APPLICABLE FOR THE PROJECT. ONE COMPLETE SET OF APPROVED SUBMITTALS SHALL BE MAINTAINED AT THE JOB SITE.
F. ALL COST ASSOCIATED WITH SUBSTITUTED EQUIPMENT TO COMPLY WITH THE BASIS OF DESIGN, INCLUDING PROVIDING MAINTENANCE ACCESS, CLEARANCE, CONDUIT, WIRING, REPLACEMENT OF OTHER SYSTEM COMPONENTS, BUILDING ALTERATIONS, METHODS, ETC., SHALL BE INCLUDED IN THE ORIGINAL BASE BID. NO ADDITIONAL COSTS ASSOCIATED WITH SUBSTITUTED EQUIPMENT WILL BE APPROVED AFTER BIDS HAVE BEEN ACCEPTED AND ALL COSTS WILL BE THE RESPONSIBILITY OF THE CONTRACTOR. CREDITS SHALL BE GIVEN TO THE OWNER WHERE SUCH EQUIPMENT AND METHODS RESULT IN LESS EXPENSE TO THE CONTRACTOR.
G. ONE COMPLETE SET OF THE LATEST CONSTRUCTION PLANS OF ALL TRADES SHALL BE MAINTAINED AT THE JOB SITE. IN ADDITION, ALL ADDENDUMS, BULLETINS, AND/OR SKETCHES SHALL BE INCORPORATED INTO THE ON-SITE CONSTRUCTION PLANS AS THE JOB PROGRESSES.
H. COMPLETELY ADEQUATE HOUSING SHALL BE PROVIDED FOR ALL MATERIALS STORED ON JOB SITE. ONLY CONDUIT MAY BE STORED OUTSIDE, BUT NOT IN CONTACT WITH THE GROUND.
I. THE CONDUIT AND NEUTRAL SYSTEM SHALL BE GROUNDED AT THE MAIN SERVICE EQUIPMENT AS REQUIRED PER NEC.
J. WIRING SHALL BE TESTED FOR CONTINUITY AND GROUNDS BEFORE BEING ENERGIZED. FAULTY WIRING SHALL BE REPLACED AT NO ADDITIONAL EXPENSE TO THE OWNER. CONTRACTOR SHALL ENSURE COMMISSIONING REPORT IS INCLUDED AS A PART OF CLOSE OUT DOCUMENTS.
K. PROVIDE ALL CUTTING AND PATCHING FOR INSTALLATION OF WORK AND REPAIR ANY DAMAGE DONE.
N. ALL ELECTRICAL JUNCTION BOXES, SWITCHGEAR, CABLING, VOICE/DATA OUTLETS, LOW VOLTAGE CABINETS, ETC. SHALL BE LABELED ACCORDING TO PANEL/RACK AND CIRCUIT NUMBER.
O. UPON COMPLETION OF WORK, CONTRACTOR SHALL PRESENT ENGINEER WITH CERTIFICATE OF APPROVAL FROM LOCAL INSPECTOR AND/OR AUTHORITY HAVING JURISDICTION BEFORE WORK WILL BE APPROVED FOR FINAL PAYMENT.
P. CONTRACTOR SHALL GUARANTEE ALL WORK AND MATERIALS FOR A PERIOD OF FIVE YEARS EFFECTIVE THE DATE THE PROJECT IS ACCEPTED BY THE OWNER. ANY IMPERFECT MATERIALS OR WORKMANSHIP SHALL BE REPLACED WITHOUT ADDED COST TO THE PROJECT.
Q. CONTRACTOR SHALL BE RESPONSIBLE FOR FINAL FIELD VERIFICATION AND FOR PRODUCING 100% CONSTRUCTION DRAWING SET FOR PLAN REVIEW AND PERMITTING.
R. CONTRACTOR SHALL PROVIDE AS-BUILT DRAWINGS TO THE OWNER'S AGENCY AT THE END OF CONSTRUCTION.
S. IT SHALL NOT BE THE INTENT OF ISSUED PLANS AND/OR SPECIFICATIONS TO SHOW EVERY MINOR DETAIL OF CONSTRUCTION. THE CONTRACTOR IS EXPECTED TO FURNISH AND INSTALL ALL NECESSARY ITEMS FOR A COMPLETE AND OPERATING SYSTEM.
T. THE WORD "PROVIDE" MEANS THAT THIS CONTRACTOR SHALL FURNISH, FABRICATE, ERECT, CONNECT, AND COMPLETELY INSTALL SYSTEMS IN PROPER OPERATING CONDITION. ALL LABOR, PRODUCT OPTIONS, ACCESSORIES AND INCIDENTAL MATERIALS REQUIRED SHALL BE INCLUDED AS PART OF THIS WORK TO COMPLETE THE INSTALLATION.
U. THE WORD "CONNECT" MEANS THAT THIS CONTRACTOR SHALL PROVIDE (SEE DEFINITION ABOVE) ALL DISCONNECTING MEANS, OVERCURRENT PROTECTION AND WIRING REQUIRED TO PLACE THE EQUIPMENT AND SYSTEMS IN PROPER OPERATING CONDITION AND TO COMPLY WITH CODE REQUIREMENTS.
V. IF DURING THE COURSE OF WORK, THE CONTRACTOR DISCOVERS A PROBLEM WITH THE PERFORMANCE OF THE INSTALLATION RELATIVE TO THE PLANS AND SPECIFICATIONS, THE NEC, OR OTHER CODES OR REQUIREMENTS, THE CONTRACTOR SHALL IMMEDIATELY BRING THE PROBLEM TO THE ATTENTION OF THE SOLAR DESIGNER AND/OR ELECTRICAL ENGINEER FOR RESOLUTION PRIOR TO THE EXECUTION OF THE WORK.
W. WHERE THERE ARE CONFLICTS BETWEEN THE PLANS AND SPECIFICATIONS, THE CONTRACTOR SHALL BRING THE ISSUE TO THE ATTENTION OF THE ENGINEER FOR RESOLUTION PRIOR TO THE EXECUTION OF THE WORK OR ORDERING ANY MATERIALS. NO ADDITIONAL COSTS SHALL BE WARRANTED WITHOUT A CHANGE TO THE PROJECT SCOPE.
X. EXISTING ROOF WARRANTIES MUST REMAIN INTACT.
Y. FOR FACILITIES WHERE THE POINT OF INTERCONNECTION IS LOCATED DOWNSTREAM OF A GENERATOR ATS, THE PV DISCONNECT SHALL BE OPENED UPON GENERATOR START-UP. CONTRACTOR SHALL PROVIDE CONTROLS AS REQUIRED.

1.3 WORK INCLUDED

A. WORK INCLUDES ALL ENGINEERING, DESIGN, MATERIALS, LABOR, EQUIPMENT, ELECTRIC PANELS, BREAKERS, SERVICES, PERMITS, AND INCIDENTALS NECESSARY TO INSTALL COMPLETE PHOTOVOLTAIC (PV) SYSTEM AS SPECIFIED HEREINAFTER, INCLUDING, BUT NOT LIMITED TO, THE WORK INCLUDED IN THIS SPECIFICATION.
B. SCOPE OF WORK SHALL SPECIFICALLY INCLUDE RETAINING A PROFESSIONAL ENGINEER FOR FINAL SEALED PV DRAWINGS BASED ON SPECIFIC SUBMITTAL EQUIPMENT. THIS SHALL BE AT THE CONTRACTOR'S EXPENSE.

1.4 SCOPE

A. AT A MINIMUM THE SYSTEM SHALL CONSIST OF THE SUPPLY AND INSTALLATION OF AN ARRAY OF PHOTOVOLTAIC MODULES, MOUNTING STRUCTURE, TERMINAL BOX(ES), QUICK-CONNECT ELECTRICAL CONNECTORS, DC WIRING, DC DISCONNECT, GRID-CONNECTED INVERTER, AC DISCONNECT, AC WIRING ,ALL METERING EQUIPMENT, CONNECTED TO THE GRID.
B. THE SYSTEM SHALL BE DESIGNED TO MEET ALL LOCAL SEISMIC AND WIND LOAD REQUIREMENTS.
C. ALL PERMITS AND SUBMITTALS REQUIRED BY LOCAL BUILDING COMMISSIONS, AND LOCAL UTILITY.
D. CONTRACTOR IS RESPONSIBLE FOR SUBMITTING INTERCONNECTION REQUEST TO DUKE ENERGY AND FOR OBTAINING INTERCONNECTION AGREEMENT. FEES FOR THE INTERCONNECTION APPLICATION SHOULD BE INCLUDED WITH THE BID.

1.5 WARRANTIES

A. PV MODULES SHALL HAVE A MINIMUM 10-YEAR MATERIAL WARRANTY AND A MINIMUM POWER OUTPUT GUARANTEE OF 90% OF THEIR STC RATED POWER AT YEAR 10 AND 80% OF THEIR STC RATED POWER AT YEAR 25.

1.6 QUALITY ASSURANCE

A. THE PHOTOVOLTAIC MODULES SHALL BE CERTIFIED BY UNDERWRITER LABORATORIES (UL) STANDARD 1703 FOR SAFETY FOR FLAT-PLATE PHOTOVOLTAIC MODULES AND IEEE STANDARD 1262-1995 IEEE RECOMMENDED PRACTICE FOR QUALIFICATION OF PHOTOVOLTAIC (PV) MODULES AND PANELS. THE SYSTEM SHALL BE COMPRISED OF UL LISTED COMPONENTS IN CASES WHERE UL LISTED COMPONENTS ARE AVAILABLE.
B. PHOTOVOLTAIC MODULES SHALL BE TESTED IN THE FACTORY FOR DESIGN PERFORMANCE.
C. INVERTERS SHALL BE FACTORY TESTED FOR PERFORMANCE, AND RESULTS SHALL BE INCLUDED IN THE O & M MANUAL.
D. ALL INSTALLATIONS SHALL MEET OR EXCEED OSHA REQUIREMENTS.

2.1 GENERAL (MATERIALS)

A. ALL MATERIALS THAT ARE USED OUTDOORS SHALL BE SUNLIGHT AND UV RESISTANT.
B. MATERIALS SHALL BE DESIGNED TO WITHSTAND THE TEMPERATURES TO WHICH THEY ARE EXPOSED.
C. DISSIMILAR MATERIALS SHOULD BE ISOLATED FROM ONE ANOTHER USING NON-CONDUCTIVE SHIMS, WASHERS OR OTHER METHODS.
D. METALS SHALL BE HOT DIPPED GALVANIZED STEEL OR ANODIZED ALUMINUM.
E. ALUMINUM SHALL NOT BE PLACED IN DIRECT CONTACT WITH CONCRETE MATERIALS.
F. STRUCTURAL MEMBERS SHALL BE CORROSION RESISTANT ALUMINUM, 6061 OR 6063. STRUCTURAL MEMBERS SHALL BE PERMITTED TO BE STEEL AS NOTED.
G. ALL ELECTRICAL EQUIPMENT SHALL BE RATED FOR THE CURRENT AND VOLTAGE RATINGS NECESSARY FOR THE APPLICATION.
H. ALL REQUIRED OVER-CURRENT PROTECTION DEVICES WILL BE INCLUDED IN THE SYSTEM AND ACCESSIBLE FOR MAINTENANCE. EACH SHALL HAVE TRIP RATINGS NO GREATER THAT THE DE-RATED AMPERAGE OF THE CONDUCTOR IT PROTECTS.
I. ELECTRICAL CONTRACTOR WILL BE RESPONSIBLE FOR INSTALLING EXPANSION JOINTS IN CONDUIT RUNS AS NEEDED.
J. PVC CONDUIT MAY BE USED IN DIRECT BURIAL APPLICATIONS.

2.2 MOUNTING SYSTEMS

A. THE MOUNTING SYSTEM SHALL RESULT IN THE INSTALLATION OF A PV SYSTEM THAT MEETS ALL LOCAL SEISMIC AND WIND REQUIREMENTS.
B. BALLASTED SYSTEMS SHALL BE BASED ON PANEL CLAW FR10 RACKING SYSTEM. IRON-RIDGE SHALL BE AN APPROVED EQUAL MANUFACTURER. NO ADDITIONAL ALTERNATE RACKING SYSTEMS ARE ACCEPTABLE. REFER TO PLANS FOR DETAILS.
C. PITCHED ROOFTOP SYSTEMS SHALL BE BASED ON IRON-RIDGE. APPROVED ALTERNATE MANUFACTURERS ARE UNIRAC, PRE-FORMED LINE PRODUCTS, AND SNAP N RACK. NO ADDITIONAL RACKING SYSTEMS ARE ACCEPTABLE. REFER TO PLANS FOR DETAILS. ROOF SHALL BE FLASHED USING ECOFASTEN EFL-44R-1214-BLK SOLAR SLASHING.
D. CONTRACTOR SHALL ENSURE THE RACKING SYSTEM TO BE USED FOR CONSTRUCTION IS COMPATIBLE WITH THE MOUNTING REQUIREMENTS FOR THE SOLAR PANEL USED FOR CONSTRUCTION.
E. FINAL RACKING ASSEMBLY IS AT THE DISCRETION OF THE INSTALLER. ANY SIGNIFICANT ALTERATIONS TO THIS RACKING PLAN WILL REQUIRE A SUBMISSION OF DRAWINGS IN .DWG AND .PDF FORMAT TO OPTIMA ENGINEERING AND PISGAH ENERGY FOR REVIEW IN INCORPORATION TO THIS SET OF DRAWINGS.
F. MOUNTING SYSTEM SHALL COMPLY WITH ROOF MANUFACTURER'S REQUIREMENTS FOR KEEPING ROOF WARRANTY INTACT.

2.3 INVERTER

A. BASIS OF DESIGN INVERTER MANUFACTURER SHALL BE SOLAREDGE. REFER TO POWER RISER DIAGRAM FOR EXACT SPECIFICATIONS. NO SUBSTITUTIONS WILL BE ALLOWED.
B. ROOFTOP INVERTERS MUST INCLUDE MODULE LEVEL RAPID SHUTDOWN IN ACCORDANCE WITH NEC 2020.
C. ROOFTOP INVERTERS MUST INCLUDE MODULE LEVEL MONITORING AND MODULE LEVEL DC-DC OPTIMIZATION.
D. THE INVERTER SHALL HAVE A MINIMUM CEC RATED EFFICIENCY OF 95%.
E. INSTALLATION SHALL MEET ALL APPLICABLE UL 1741, IEEE STANDARD 929-2000 AND STANDARD 519, 2020 NEC CODE, AND THE LATEST APPLICABLE ANSI AND FCC STANDARDS AND ADDENDA DATED PRIOR TO THE AWARD OF THE PURCHASE ORDER FOR THIS PROCUREMENT.
F. INVERTERS ON SOUTH, EAST, AND WEST FACING WALLS SHALL BE PROVIDED WITH SHADE COVERS TO INCREASE PERFORMANCE AND COMPONENT LIFE. SHADE SPECIFICATIONS SHALL BE SUBMITTED TO OPTIMA ENGINEERING FOR REVIEW.
G. SOLAREDGE P860 OR P485 OPTIMIZERS SHALL BE USED FOR THREE PHASE SITES. NO SUBSTITUTIONS WILL BE ALLOWED. REFER TO POWER RISER DIAGRAM.
H. BASE LEVEL MONITORING FUNCTIONALITY FOR EACH INVERTER BRAND SHALL BE PROVIDED. MONITORING SYSTEM WILL BE CONNECTED TO LOCAL NETWORK VIA HARDWIRE CONNECTION.
I. CONTRACTOR SHALL INSTALL A 32" WALL-MOUNTED, WEB-ENABLED SMART TV WITH 1080P-4K RESOLUTION. FINAL LOCATION FOR SMART TV TO BE DETERMINED BY OWNER AND CONTRACTOR. CONTRACTOR SHALL PROVIDE AND INSTALL PROTECTIVE ENCLOSURE FOR LCD DISPLAY.

2.4 MODULES

A. BASIC OF DESIGN FOR PV MODULES IS BASED ON TRINA TSM-DE15M(II)-415. APPROVED ALTERNATES ARE QCELL AND MISSION SOLAR.
B. BIDDERS SHALL BE RESPONSIBLE FOR VERIFYING UP-TO-DATE DOCUMENTATION FROM MANUFACTURERS ARE BEING USED.

3.1 GENERAL MATERIAL AND INSTALLATION REQUIREMENTS

A. THE AREA SHALL BE KEPT CLEAN AND FREE OF OBSTRUCTIONS AT ALL TIMES.
B. THE INSTALLATION SHALL BE COMPLETED IN A "WORKMAN LIKE MANNER".
C. THE INSTALLATION SHALL BE COMPLETED PER THE MANUFACTURER'S INSTALLATION MANUAL.
D. THE INSTALLATION SHALL BE COMPLETED WITHOUT AFFECTING EXISTING PIPING AND/OR WIRES.
E. ALL ELECTRICAL CONNECTIONS AND TERMINATIONS SHALL BE FULLY TIGHTENED SECURED AND STRAIN RELIEVED AS APPROPRIATE.
F. ALL MOUNTING EQUIPMENT SHALL BE INSTALLED TO THE MANUFACTURER'S SPECIFICATIONS.
G. ALL CABLES, CONDUIT, EXPOSED CONDUCTORS, AND ELECTRICAL BOXES SHOULD BE SECURED AND SUPPORTED ACCORDING TO CODE REQUIREMENTS.
H. ALL NATIONAL AND LOCAL ELECTRIC AND BUILDING CODE REQUIREMENTS SHALL BE MET.
I. ALL APPLICABLE ENVIRONMENTAL REGULATIONS SHALL BE MET.
J. SYSTEM SWITCHING AND METERING EQUIPMENT SHALL HAVE CONVENIENT ACCESS FOR RESETTING OR REPAIR DURING ELECTRICAL OUTAGES, AND REGULAR MONITORING FOR DATA RETRIEVAL.
K. THE CONTRACTOR SHALL PROVIDE ALL MATERIAL AND LABOR AS REQUIRED TO COMPLY WITH THE LOCAL UTILITY REQUIREMENTS AND STANDARDS EVEN WHEN NOT SHOWN ON THESE PLANS.

3.2 SYSTEM ELECTRICAL

A. DC SERIES STRING HOME-RUN CIRCUITS MUST PAIR CONNECTORS THAT MATCH EXACTLY TO WHAT IS INSTALLED ON THE MODULES. NO "COMPATIBLE" LABELED CONNECTORS PERMITTED. ORIGINAL WARRANTY AND LISTING FROM THE CONNECTOR MANUFACTURER MUST BE MAINTAINED.
B. ADAPTER INTERCONNECTS SHALL BE PROVIDED WHERE APPLICABLE TO MATCH CONNECTORS BETWEEN MODULES AND DC OPTIMIZERS, SHOULD CONNECTORS NOT MATCH.
C. CONDUCTORS SHALL BE INSTALLED SO THAT NO CONNECTORS ARE EXPOSED TO STANDING WATER.
D. ALL WIRING SHALL BE LISTED FOR A MINIMUM OPERATION OF 1,000 VOLTS AND TEMPERATURE RATING OF 90°C WET LOCATIONS, ON THE DIRECT CURRENT SIDE. ALL CURRENT CARRYING CONDUCTORS SHALL BE ENCLOSED IN CONDUIT/RACEWAY, EXCLUDING MODULE INTERCONNECTIONS AND CONNECTIONS FROM INDIVIDUAL MODULE STRINGS TO THE COMBINER BOXES.
E. THE SYSTEM SHALL HAVE AT LEAST ONE INVERTER. FULL SPECIFICATIONS OF EACH INVERTER SHALL BE SUPPLIED AS PART OF THE SYSTEM DESIGN DOCUMENTATION SUBMITTAL.

3.3 RACEWAY

A. CONDUIT SHALL BE MANUFACTURED BY ALLIED, WHEATLAND, REPUBLIC CONDUIT, WESTERN TUBE, OR APPROVED EQUIVALENT.
B. FOR INTERIOR WORK, CONDUIT SHALL BE ZINC COATED EMT EXCEPT WHERE NOT PERMITTED BY CODE. USE SCHEDULE 40 PVC BELOW CONCRETE SLABS AND IN DUCTBANKS. SCHEDULE 40 PVC SHALL BE PERMITTED FOR EXTERIOR WORK WHERE RACEWAY IS LESS THAN 2 FEET IN LENGTH AND NOT SUBJECT TO DAMAGE. USE IMC WHERE SUBJECT TO PHYSICAL DAMAGE AND FOR ALL OTHER EXTERIOR APPLICATIONS.
C. EMT FITTINGS SHALL BE COMPRESSION GLAND TYPE, OF MALLEABLE STEEL. CONNECTORS SHALL HAVE INSULATED THROATS. CAST, SET SCREW, OR INDENTER TYPE FITTINGS ARE NOT ACCEPTABLE. ALL FITTINGS FOR EMT SHALL BE MADE OF STEEL. FITTINGS FOR OUTDOOR CONDUITS SHALL BE WATER-TIGHT.
D. ALL INTERIOR RACEWAYS SHALL RUN CONCEALED, UNLESS OTHERWISE NOTED. ALL RUNS SHALL BE NEAT AND SQUARE.
E. LOW VOLTAGE CABLING NOT SPECIFIED TO BE INSTALLED IN CONDUIT, SHALL BE INSTALLED IN A CABLE TRAY SYSTEM OR J-HOOK SYSTEM CONSISTING OF MINIMUM 2" DIAMETER HOOKS LOCATED ON 3'-0" CENTERS IN ALL ACCESSIBLE CEILINGS. WHERE THERE ARE INACCESSIBLE CEILINGS, PROVIDE CONDUIT FOR ENTIRE LENGTH OF INACCESSIBILITY.
F. RACEWAY PENETRATIONS THROUGH FLOOR SLABS AND FIRE-RATED WALLS SHALL BE FILLED WITH IMPERVIOUS, NON-SHRINK GROUT SUFFICIENTLY TIGHT TO PREVENT THE TRANSFER OF SMOKE, WATER, AND DUST. ALL ROOFTOP CONDUIT PENETRATIONS SHALL BE PROPERLY BOOTED OR FLASHED AND SHALL MEET THE ROOF MANUFACTURER'S REQUIREMENTS FOR KEEPING WARRANTIES INTACT.
G. SUPPORT ALL CONDUIT WITH STRAPS AND CLAMPS.
H. ALL CONDUIT SHALL BE RUN PARALLEL OR PERPENDICULAR TO BUILDING LINES, WHETHER EXPOSED OR NOT AND SUPPORTED FROM STRUCTURE AND PROPERLY SECURED.
I. WHERE CONDUITS PASS THROUGH A BUILDING EXPANSION JOINT, PROVIDE GALVANIZED EXPANSION FITTINGS WITH BONDING JUMPERS.
J. MINIMUM CONDUIT SIZE SHALL BE 3/4".
K. PROVIDE PULL BOXES, SUCH THAT NO SINGLE CONDUIT RUN HAS BENDS IN EXCESS OF 360°. PULL BOXES SHALL BE SUITABLE AND APPROVED FOR THE INTENDED USE.
L. ALL CONDUITS INSTALLED UNDERGROUND OR IN CONCRETE SHALL HAVE JOINTS MADE WATERTIGHT BY USE OF POLYETRA-FLUOROETHYLENE TAPE.
M. THE USE OF AC OR NM CABLE IS NOT PERMITTED.
N. LIQUID-TIGHT METAL CONDUIT SHALL ONLY BE USED FOR FINAL CONNECTION TO EQUIPMENT AND ALL OTHER ROTATING AND VIBRATING EQUIPMENT, MAXIMUM LENGTH OF 3'-0". LIQUID-TIGHT METAL CONDUIT SHALL BE PERMITTED IN CONCEALED AREAS WHERE ALLOWED PER CODE.

3.4 OUTLET BOXES

A. JUNCTION AND PULL BOXES SHALL BE CODE GAUGE GALVANIZED STEEL. ACCEPTED MANUFACTURERS SHALL BE STEEL CITY (THOMAS & BETTS), RACO, CROUSE-HINDS, APPLETON (EMERSON), OR APPROVED EQUIVALENT.
B. ALL EXTERIOR BOXES SHALL BE WATER-TIGHT.

3.5 CONDUCTORS:

A. CONDUCTORS SHALL BE MANUFACTURED BY SOUTHWIRE (SIMPULL), ENCORE (SUPERSLICK), UNITED COPPER (SLK), CERRO (SLP), OR APPROVED EQUAL, "PRE-LUBRICATED" BY THE MANUFACTURER.
B. ALL DC CONDUCTORS SHALL BE COPPER, RATED 90° C WET/DRY EXCEPT WHERE OTHERWISE NOTED OR REQUIRED BY U.L. OR OTHER CODES. ALUMINIMUM CONDUCTORS SHALL BE ALLOWED FOR AC CONDUCTORS UNLESS OTHERWISED NOTE.
C. ALL AC COPPER CONDUCTORS SHALL BE SINGLE INSULATED CONDUCTOR, THHN/THWN-2. SIZES #10 AWG AND SMALLER SHALL BE SOLID, SIZES #8 AWG AND LARGER SHALL BE STRANDED. ALL DC CONDUCTORS SHALL BE PV WIRE STRANDED FOR #10 AWG.
D. BRANCH CIRCUITS SHALL NOT BE SMALLER THAN #12 AWG. CONTROL WIRING MAY BE #14 AWG.
E. AC CONDUCTORS SHALL BE COLOR CODED BLACK/RED/BLUE FOR 120/208 VOLT SYSTEMS AND BROWN/ORANGE/YELLOW FOR 277/480 VOLT SYSTEMS FOR A, B, AND C PHASES, RESPECTIVELY. NEUTRAL SHALL BE WHITE FOR 120/208 VOLT SYSTEMS AND NATURAL GRAY FOR 277/480 VOLT SYSTEMS. GROUND CONDUCTOR SHALL BE GREEN ON ALL SYSTEMS. DC CONDUCTORS SHALL BE COLOR CODED RED/BLACK/GREN FOR POSITIVE, NEGATIVE, AND GROUND, RESPECTIVELY.
F. PV SYSTEM DC CIRCUIT CONDUCTORS SHALL BE IDENTIFIED AT ALL ACCESSIBLE POINTS OF TERMINATION, CONNECTION, AND SPLICES AS REQUIRED PER NEC 690.31(B)(1).
G. ALL AC CONDUCTORS SHALL BE IN CONDUIT.
H. SPLICES IN #10 AWG AND SMALLER SHALL BE MADE UP WITH CRIMPED CONNECTORS WITH INSULATING CAPS (NO TAPE) OR WIRENUTS (MAXIMUM OF 3 CONDUCTORS UNDER ANY CONNECTOR OR WIRENUT). LARGER WIRE SHALL USE SPLIT BOLTS OR BOLTED CLAMPS.
I. ALL WIRING LUGS THROUGHOUT THE PROJECT, INCLUDING, BUT NOT LIMITED TO, BREAKERS, PANELBOARD/SWITCHBOARD LUGS, SAFETY SWITCH LUGS, MOTOR STARTER LUGS, TRANSFORMERS LUGS, WIRING DEVICE TERMINALS, AND ALL EQUIPMENT LUGS/TERMINALS SHALL BE RATED FOR USE WITH 75 DEGREE INSULATED CONDUCTORS AT THEIR 75 DEGREE AMPACITY AND SHALL BE SIZED AND SELECTED TO MATCH THE CONDUCTOR SIZE AND MATERIAL.
J. CIRCUIT SPLICES SHALL NOT BE MADE ON DEVICE TERMINALS.
K. WIRE WITHIN PANELBOARDS SHALL BE NEATLY TRAINED, SQUARED, BUNCHED, AND TAGGED.
L. ALL CONDUCTORS INSTALLED IN VERTICAL RACEWAYS SHALL BE SUPPORTED AT INTERVALS AS REQUIRED PER NEC 300-19.
M. GROUND ALL EQUIPMENT PER NEC ARTICLE 250. BOND WHERE CONDUITS ENTER ENCLOSURE THROUGH CONCENTRIC KNOCKOUTS. ALL FLEX, INCLUDING FIXTURE TAPS, SHALL INCLUDE GREEN GROUNDING CONDUCTOR, #12 AWG MINIMUM. PROVIDE GREEN INSULATED EQUIPMENT GROUNDING CONDUCTOR IN EACH CONDUIT, SIZED PER NEC 250-122.

4.1 INSTALLATION STANDARDS

A. THE INSTALLATION CONTRACTOR SHALL OBTAIN APPROPRIATE CERTIFICATIONS FROM A PROFESSIONAL ENGINEER REGARDING STRUCTURAL, SEISMIC, AND WIND LOADING REQUIREMENTS FOR THE SPECIFIC APPLICATION.
B. THE INSTALLATION SHALL BE COMPLETE WITH THE MINIMUM OF IMPACT ON THE ENVIRONMENT.
C. SYSTEM INSTALLATION SHALL CONFORM TO MANUFACTURER'S INSTALLATION MANUALS AND APPROVED PROJECT DRAWINGS AND SPECIFICATIONS.
D. ARRAY MOUNTING HARDWARE SHALL BE COMPATIBLE WITH THE SITE CONSIDERATIONS AND ENVIRONMENT. SPECIAL ATTENTION SHALL BE PAID TO MINIMIZING THE RISK FROM EXPOSED FASTENERS, SHARP EDGES, AND POTENTIAL DAMAGE TO THE MODULE OR SUPPORT STRUCTURES. CORROSION RESISTANCE AND DURABILITY OF THE MECHANICAL HARDWARE SHALL BE EMPHASIZED. THE USE OF FERROUS METALS, WOODS, OR PLASTIC COMPONENTS IS NOT ACCEPTABLE.

SYMBOL SCHEDULE

- WIRING SYSTEM CONCEALED IN OR UNDER SLAB OR UNDERGROUND.
- CONDUIT TURNED UP TO FLOOR ABOVE.
- CONDUIT TURNED DOWN TO FLOOR BELOW.
- BRANCH CIRCUIT HOMERUN TO PANEL.
- J — JUNCTION BOX WITH CONNECTION TO EQUIPMENT SERVED.
- FUSED HEAVY DUTY DISCONNECT SWITCH. NEMA 3R, 4 OR 4X ENCLOSURE, UNLESS OTHERWISE NOTED.
- PV MODULE
- 3R — NEMA 3R
- EC — EMPTY CONDUIT WITH PULL WIRE.
- WP — WEATHERPROOF

SEAL:

- PRELIMINARY - NOT FOR FINAL CONSTRUCTION

BUNCOMBE COUNTY PUBLIC SECTOR SOLAR INITIATIVE

EAST ASHEVILLE LIBRARY
3 AVON RD.
ASHEVILLE, NC 28805

OWNER: BUNCOMBE COUNTY OFFICE OF SUSTAINABILITY

REV	DATE	DESCRIPTION

DATE:	2021-07-19
PROJECT #:	21-0126
DRAWN BY:	JWK
DESIGNED BY:	JWK
CHECKED BY:	KGP

SHEET TITLE:
SPECIFICATIONS

DWG #:
E-001

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