

**GENERAL ELECTRICAL SPECIFICATIONS**

**1. GENERAL**

- 1.1. ELECTRICAL CHARACTERISTICS
  - 1.1.1. SERVICE POWER: 208/120V, 3PH 4W
- 1.2. SUBMITTALS – SUBMIT PRODUCT DATA FOR THE FOLLOWING:
  - 1.2.1. SWITCHES
  - 1.2.2. CIRCUIT BREAKERS
  - 1.2.3. LAMPS AND LIGHTING FIXTURES
- 1.3. DEFINITIONS
  - 1.3.1. FURNISH – PURCHASE NEW AND TURN OVER TO OWNER.
  - 1.3.2. INSTALL – CONNECT COMPLETE AND OPERATIONAL.
  - 1.3.3. RELOCATE – REMOVE FROM EXISTING LOCATION AND INSTALL IN A NEW SPECIFIED LOCATION.
  - 1.3.4. PROVIDE – FURNISH AND INSTALL.
- 1.4. PERFORM WORK IN COMPLIANCE WITH ALL APPLICABLE CODES AND STANDARDS INCLUDING, BUT NOT LIMITED TO:
  - 1.4.1. NATIONAL ELECTRICAL CODE 2014
  - 1.4.2. NFPA101 – LIFE SAFETY CODE
  - 1.4.3. NFPA101B – MEANS OF EGRESS
  - 1.4.4. MICHIGAN BUILDING CODE 2015
- 1.5. MANUFACTURER'S NAMEPLATE
  - 1.5.1. EACH ITEM OF EQUIPMENT SHALL HAVE A NAMEPLATE BEARING THE MANUFACTURER'S NAME, ADDRESS, MODEL NUMBER, AND SERIAL NUMBER SECURELY AFFIXED IN A CONSPICUOUS PLACE; THE NAMEPLATE OF THE DISTRIBUTING AGENT WILL NOT BE ACCEPTABLE.
- 1.6. GROUND AND BOND ELECTRICAL SYSTEM PER NEC ARTICLE 250.
- 1.7. COORDINATE SCOPE OF ELECTRICAL DEMOLITION WITH ARCHITECTURAL DRAWINGS AND ACTUAL FIELD CONDITIONS.
- 1.8. DRAWINGS ARE DIAGRAMMATIC. LOCATION OF ELECTRICAL EQUIPMENT AND CONDUIT ROUTES ARE APPROXIMATE. FIELD VERIFY BEST ROUTE AND COORDINATE WITH OTHER TRADES FOR AVOID CONFLICTS.
- 1.9. PROVIDE TEMPORARY ELECTRICAL POWER AND LIGHTING FOR CONSTRUCTION.
  - 1.9.1. COORDINATE WITH THE OWNER TO PROVIDE TEMPORARY POWER.
- 1.10. PROVIDE ELECTRICAL PERMITS.
- 1.11. COORDINATE WITH OTHER TRADES TO AVOID CONFLICTS PRIOR INSTALLATION OF EQUIPMENT, DEVICES, CONDUIT AND WIRE.
- 1.12. DRILL AND PATCH PENETRATIONS THROUGH WALLS, CEILINGS AND FLOORS TO ORIGINAL CONDITION. PROVIDE CONDUIT SLEEVES FOR PENETRATIONS. FILL PENETRATIONS THROUGH FIRE WALLS WITH FIREPROOF COMPOUND PER NEC.
- 1.13. PROVIDE UL LISTED ELECTRICAL PRODUCTS FOR A COMPLETE AND OPERATIONAL SYSTEM.
  - 1.13.1. SUBMIT CUTSHEETS OF ELECTRICAL PRODUCTS FOR ENGINEER/ARCHITECT REVIEW PRIOR TO PURCHASE.
  - 1.13.2. INSTALL PRODUCTS PLUMB AND TRUE, PARALLEL AND PERPENDICULAR TO BUILDING LINES.
  - 1.13.3. PROVIDE BRACKETS FOR MOUNTING ELECTRICAL DEVICES.
- 1.14. TESTING AND INSPECTION
  - 1.14.1. INSPECT INSTALLATION FOR A CLEAN AND CONCEALED FINISH.
  - 1.14.2. VERIFY ALL TERMINATIONS ARE TIGHT.
  - 1.14.3. VERIFY SWITCH AND RECEPTACLE BOXES AND COVER ARE TIGHT AND SECURED IN PLACE AND PARALLEL AND PERPENDICULAR TO BUILDING LINES.
  - 1.14.4. TEST OPERATION OF ELECTRICAL EQUIPMENT AND DEVICES FOR INTENDED USE.
  - 1.14.5. REPAIR OR REPLACE MALFUNCTIONING DEVICES AND RETEST TO DEMONSTRATE COMPLIANCE.
- 1.15. WARRANTY
  - 1.15.1. WARRANTY COMPONENTS AND SYSTEM AGAINST COMPONENT DEFECTS AND WORKMANSHIP FOR ONE YEAR FROM ACCEPTANCE DATE.
  - 1.15.2. PROVIDE LABOR TO REPAIR OR REPLACE DEFECTIVE COMPONENTS, AT NO ADDITIONAL CHARGE, DURING THE WARRANTY PERIOD.
- 1.16. UPON COMPLETION OF THE SPECIFIED WORK, PROVIDE "AS-BUILT" DRAWINGS INDICATING FINAL LOCATIONS AND CIRCUITING OF DEVICES AND EQUIPMENT.

**2. PRODUCTS**

- 2.1. MATERIALS
  - 2.1.1. MATERIALS AND EQUIPMENT TO BE PROVIDED SHALL BE THE STANDARD CATALOGED PRODUCTS OF MANUFACTURERS REGULARLY ENGAGED IN THE MANUFACTURE OF THE PRODUCTS.
  - 2.1.2. RIGID STEEL CONDUIT
    - 2.1.2.1. RIGID STEEL CONDUIT SHALL COMPLY WITH UL 6 AND BE GALVANIZED BY THE HOT-DIP PROCESS. RIGID STEEL CONDUIT SHALL BE POLYVINYLCHLORIDE (PVC) COATED IN ACCORDANCE WITH NEMA RN 1, WHERE UNDERGROUND AND IN CORROSIVE AREAS, OR MUST BE PAINTED WITH BITUMASTIC.
    - 2.1.2.2. FITTINGS FOR RIGID STEEL CONDUIT SHALL BE THREADED.
    - 2.1.2.3. GASKETS SHALL BE SOLID. CONDUIT FITTINGS WITH BLANK COVERS SHALL HAVE GASKETS, EXCEPT IN CLEAN, DRY AREAS OR AT THE LOWEST POINT OF A CONDUIT RUN WHERE DRAINAGE IS REQUIRED.
    - 2.1.2.4. COVERS SHALL HAVE CAPTIVE SCREWS AND BE ACCESSIBLE AFTER THE WORK HAS BEEN COMPLETED.
  - 2.1.3. ELECTRICAL METALLIC TUBING (EMT)
    - 2.1.3.1. EMT SHALL BE IN ACCORDANCE WITH UL 797 AND BE ZINC COATED STEEL. COUPLINGS AND CONNECTORS SHALL BE ZINC-COATED, SETSCREW TYPE FITTINGS.
  - 2.1.4. FLEXIBLE METALLIC CONDUIT
    - 2.1.4.1. FLEXIBLE METALLIC CONDUIT SHALL COMPLY WITH UL 1 AND BE GALVANIZED STEEL.
    - 2.1.4.2. FITTINGS FOR FLEXIBLE METALLIC CONDUIT SHALL BE SPECIFICALLY DESIGNED FOR SUCH CONDUIT.
    - 2.1.4.3. PROVIDE LIQUID TIGHT FLEXIBLE METALLIC CONDUIT WITH A PROTECTIVE JACKET OF PVC EXTRUDED OVER A FLEXIBLE INTERLOCKED GALVANIZED STEEL CORE TO PROTECT WIRING AGAINST MOISTURE, OIL, CHEMICALS, AND CORROSIVE FUMES.
    - 2.1.4.4. SPECIFICALLY DESIGN FITTINGS FOR LIQUID TIGHT FLEXIBLE METALLIC CONDUIT FOR SUCH CONDUIT.
- 2.2. WIRE AND CABLE
  - 2.2.1. CONDUCTORS INSTALLED IN CONDUIT SHALL BE COPPER 600-VOLT TYPE THHN/THWN.
  - 2.2.2. SIZE CONDUCTORS PER NEC REQUIREMENTS FOR AMPACITIES. APPLY DERATING FACTORS AND VOLTAGE DROPS BASED UPON ACTUAL INSTALLATION.
- 2.3. SPLICES AND CONNECTORS
  - 2.3.1. MAKE ALL SPLICES IN AWG NO. 8 AND SMALLER WITH APPROVED INSULATED ELECTRICAL TYPE.
- 2.4. LUMINARIES
  - 2.4.1. REFER TO FIXTURE SCHEDULE ON DRAWINGS FOR SPECIFIC FIXTURE TYPES.
  - 2.4.2. LED LUMINARIES SHALL HAVE NO PERCEIVABLE COLOR TEMPERATURE DIFFERENCE BETWEEN THOSE OF THE SAME TYPE AND NO CHANGE IN COLOR IN ANY SINGLE FIXTURE OVER THE RATED LIFE OF THE FIXTURE (50,000 HOURS MINIMUM).
- 2.5. LIGHTING CONTROLS – PROVIDE AS SHOWN ON THE DRAWINGS.
- 2.6. SWITCHES
  - 2.6.1. TOGGLE SWITCHES
    - 2.6.1.1. TOGGLE SWITCHES SHALL COMPLY WITH EIA 480, CONTROL INCANDESCENT, LED, AND FLUORESCENT LIGHTING FIXTURES AND BE OF THE HEAVY DUTY, GENERAL PURPOSE, NON-INTERCHANGEABLE FLUSH-TYPE.
    - 2.6.1.2. TOGGLE SWITCHES SHALL BE SPECIFICATION GRADE TOGGLE TYPE, RATED 20 AMPERES AT 277 VOLTS, 60 HERTZ ALTERNATING CURRENT (AC) ONLY. COORDINATE COLOR AND STYLE WITH ARCHITECT.
    - 2.6.1.2.1. PROVIDE RED DEVICES FOR THOSE CONNECTED TO POWER THAT IS BACKED UP BY GENERATOR.
  - 2.6.1.3. ALL TOGGLE SWITCHES SHALL BE PRODUCTS OF THE SAME MANUFACTURER.
- 2.7. CIRCUIT BREAKERS
  - 2.7.1. CIRCUIT-BREAKER INTERRUPTING RATING SHALL BE NOT LESS THAN THOSE INDICATED AND IN NO EVENT LESS THAN 10,000 AMPERES ROOT-MEAN-SQUARE (RMS) SYMMETRICAL AT 240 VOLTS, RESPECTIVELY. MULTIPOLE CIRCUIT BREAKERS SHALL BE THE COMMON-TRIP TYPE WITH A SINGLE HANDLE. MOLDED CASE CIRCUIT BREAKERS SHALL BE BOLT-ON TYPE CONFORMING TO UL 489.
  - 2.7.2. MANUFACTURER: SQUARE-D

**3. EXECUTION**

- 3.1. PROVIDE EMPTY FLUSH BOX WITH COVER AND 3/4" CONDUIT WITH PULL STRING STUBBED TO AN ACCESSIBLE LOCATION ABOVE CEILING FOR LOW VOLTAGE COMMUNICATION DEVICES. CONDUIT STUBS ACCESSIBLE FROM CONFINEMENT AREAS IS PROHIBITED.
- 3.2. CONDUITS, RACEWAYS AND FITTINGS
  - 3.2.1. INSTALL CONDUCTORS IN CONDUIT. MINIMUM 3/4".
  - 3.2.2. CONDUIT RUNS BETWEEN OUTLET AND OUTLET, BETWEEN FITTING AND FITTING, OR BETWEEN OUTLET AND FITTING SHALL NOT CONTAIN MORE THAN THE EQUIVALENT OF THREE 90-DEGREE BENDS, INCLUDING THOSE BENDS LOCATED IMMEDIATELY AT THE OUTLET OR FITTING.
  - 3.2.3. DO NOT INSTALL CRUSHED OR DEFORMED CONDUIT. AVOID TRAPPED CONDUIT RUNS WHERE POSSIBLE. TAKE CARE TO PREVENT THE CONTAMINATION OF FOREIGN MATERIAL IN THE CONDUIT, BOXES, FITTINGS, AND EQUIPMENT DURING THE COURSE OF CONSTRUCTION. CLEAR ANY CLOGGED CONDUIT OF OBSTRUCTIONS OR REPLACE.
  - 3.2.4. RIGID STEEL CONDUIT
    - 3.2.4.1. USE: OUTSIDE ABOVE GRADE AND WHERE RACEWAY IS EXPOSED IN CONFINEMENT AREAS.
    - 3.2.4.1. MAKE FIELD-MADE BENDS AND OFFSETS WITH APPROVED CONDUIT BENDING MACHINE. CONDUIT ELBOWS LARGER THAN 2-1/2 INCHES SHALL BE LONG RADIUS.
  - 3.2.5. ELECTRICAL METALLIC TUBING (EMT)
    - 3.2.5.1. USE: ABOVE CEILINGS, INSIDE WALLS OR SURFACE MOUNTED IN NON-CONFINEMENT AREAS.
    - 3.2.5.2. EMT SHALL BE GROUNDED IN ACCORDANCE WITH NFPA 70, USING PRESSURE GROUNDING CONNECTORS ESPECIALLY DESIGNED FOR EMT.
  - 3.2.6. FLEXIBLE METALLIC CONDUIT
    - 3.2.6.1. USE: CONNECT RECESSED FIXTURES FROM OUTLET BOXES IN ABOVE CEILINGS (RUN LENGTHS NOT TO EXCEED 72") AND TO FISH THROUGH EXISTING WALLS.
    - 3.2.6.2. BONDING WIRES SHALL BE USED IN FLEXIBLE CONDUIT AS SPECIFIED IN NFPA 70, FOR ALL CIRCUITS. FLEXIBLE CONDUIT SHALL NOT BE CONSIDERED A GROUND CONDUCTOR.
- 3.3. WIRING
  - 3.3.1. FEEDER AND BRANCH CIRCUIT CONDUCTORS SHALL BE COLOR CODED AS FOLLOWS:
    - 3.3.1.1. 208/120V 3Ø: MATCH EXISTING SCHEME
  - 3.3.2. CONDUCTORS UP TO AND INCLUDING AWG NO. 2 SHALL BE MANUFACTURED WITH COLORED INSULATING MATERIALS. CONDUCTORS LARGER THAN AWG NO. 2 SHALL HAVE ENDS IDENTIFIED WITH COLOR PLASTIC TAPE IN OUTLET, PULL, OR JUNCTION BOXES.
  - 3.3.3. SPLICE IN ACCORDANCE WITH NFPA 70. PROVIDE CONDUCTOR IDENTIFICATION WITHIN EACH ENCLOSURE WHERE A TAP, SPLICE, OR TERMINATION IS MADE AND AT THE EQUIPMENT TERMINAL OF EACH CONDUCTOR. TERMINAL AND CONDUCTOR IDENTIFICATION SHALL MATCH AS INDICATED.
  - 3.3.4. WHERE SEVERAL FEEDERS PASS THROUGH A COMMON PULL BOX, THE FEEDERS SHALL BE TAGGED TO CLEARLY INDICATE THE ELECTRICAL CHARACTERISTICS, CIRCUIT NUMBER, AND PANEL DESIGNATION.
  - 3.3.4. PROVIDE SEPARATE NEUTRAL CONDUCTORS FOR EACH CIRCUIT CONTAINING A NEUTRAL. NO SHARED NEUTRALS.
    - 3.3.4.1. PROVIDE NEUTRAL CONDUCTORS RATED 100% OF THE POWER CONDUCTORS.
- 3.4. WIRING DEVICES
  - 3.4.1. GROUNDING/BONDING CONNECTIONS MUST BE MADE SO THAT THE DISCONNECTION OR REMOVAL OF A DEVICE WILL NOT INTERRUPT THE EFFECTIVE GROUND FAULT PATH.
  - 3.4.2. WALL SWITCHES
    - 3.4.2.1. INSTALL WALL SWITCHES AND RECEPTACLES SO THAT WHEN DEVICE PLATES ARE APPLIED, THE PLATES WILL BE ALIGNED VERTICALLY TO WITHIN 1/16 INCH.
    - 3.4.2.2. GROUND TERMINAL OF EACH FLUSH-MOUNTED RECEPTACLE SHALL BE BONDED TO THE OUTLET BOX WITH AN APPROVED GREEN BONDING JUMPER WHEN USED WITH DRY WALL TYPE CONSTRUCTION.
  - 3.4.3. DEVICE PLATES
    - 3.4.3.1. DEVICE PLATES FOR SWITCHES THAT ARE NOT WITHIN SIGHT OF THE LOADS CONTROLLED SHALL BE SUITABLY ENGRAVED WITH A DESCRIPTION OF THE LOADS.

**3.5. BOXES AND FITTINGS**

- 3.5.1. FURNISH AND INSTALL PULLBOXES WHERE NECESSARY IN THE CONDUIT SYSTEM TO FACILITATE CONDUCTOR INSTALLATION. CONDUIT RUNS LONGER THAN 100 FEET OR WITH MORE THAN THREE RIGHT-ANGLE BENDS SHALL HAVE A PULLBOX INSTALLED AT A CONVENIENT INTERMEDIATE LOCATION.
- 3.5.2. SECURELY MOUNT BOXES AND ENCLOSURES TO THE BUILDING STRUCTURE WITH SUPPORTING FACILITIES INDEPENDENT OF THE CONDUIT ENTERING OR LEAVING THE BOXES.
- 3.6. LAMPS AND LIGHTING FIXTURES
  - 3.6.1. INSTALL NEW LAMPS OF THE PROPER TYPE AND WATTAGE IN EACH FIXTURE. SECURELY FASTEN FIXTURES AND SUPPORTS TO STRUCTURAL MEMBERS AND INSTALL PARALLEL AND PERPENDICULAR TO MAJOR AXES OF STRUCTURES.
- 3.7. IDENTIFICATION PLATES AND WARNINGS
  - 3.7.1. PROVIDE PERMANENT IDENTIFICATION LABELS FOR ELECTRICAL EQUIPMENT.
    - 3.7.1.1. PROVIDE SELF ADHESIVE CLEAR LABELS WITH 1/4" BLACK LETTERS FOR SWITCH COVERS INDICATING PANEL AND CIRCUIT IDENTIFICATION.
- 3.8. FIELD TESTING
  - 3.8.1. FIELD VERIFY THE OPERATION OF THE DEVICES TO MEET THE DESIGN INTENT. REPAIR OR REPLACE DEFECTIVE EQUIPMENT, CONNECTIONS OR DEVICES.

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PROJECT TITLE:  
**CLARE COUNTY JAIL MODIFICATIONS  
KLM BUILDING DESIGNS  
HARRISON, MI**

SHEET TITLE:  
**ELECTRICAL GENERAL NOTES  
AND SPECIFICATIONS**

ISSUED FOR	

10/23/17 CONSTRUCTION

PROJECT NUMBER:  
**17-797-199**

DATE: 10/19/2017

DRAWN BY: CAM

CHKD BY: TEM

SHEET NUMBER:

**E100**

SHT 1 OF 3



