

J:\PROJECTS\2023\20230110\0431_COW_WDC_BRIDGE REPLACEMENT AT 15TH STREET\100_230431_CAD\SHR101\BLDG_MEPLIBELELECTRICAL_SPECIFICATIONS.DWG
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ELECTRICAL SPECIFICATIONS

A. GENERAL:

1. **SCOPE OF SERVICES** - WORK SHALL INCLUDE THE FURNISHING AND INSTALLING OF A COMPLETE AND FUNCTIONING ELECTRICAL SYSTEMS FOR COMPONENTS INDICATED ON THE DRAWINGS AND THESE SPECIFICATIONS. THIS SHALL INCLUDE ACCESSORIES NECESSARY, WHETHER SPECIFICALLY STATED OR NOT, TO MAKE THE REQUIRED ELECTRICAL SYSTEMS COMPLETE AND OPERATIONAL. THIS WILL INCLUDE EVERY ARTICLE, DEVICE OR ACCESSORY NECESSARY TO FACILITATE EACH SYSTEM FUNCTIONING AS INDICATED BY THE DESIGN AND THE EQUIPMENT SPECIFIED. THE CONTRACTOR SHALL BECOME FAMILIAR WITH THE SITE AND ALL EXISTING CONDITIONS PRIOR TO BIDDING.
 2. **MATERIAL AND WORKMANSHIP** - ALL EQUIPMENT AND MATERIALS PROVIDED SHALL BE NEW EXCEPT AS OTHERWISE STATED ON THE DRAWINGS. ALL EQUIPMENT PROVIDED SHALL BE UL LISTED WHEN SUCH STANDARDS EXIST FOR THE TYPE OF EQUIPMENT FURNISHED AND ACCEPTABLE FOR INSTALLATION OF THE LOCAL BUILDING AUTHORITY. ALL WORKMANSHIP SHALL BE BY LICENSED AND EXPERIENCED ELECTRICIANS OR JOURNEYMEN. ALL TOOLS, MACHINERY AND EQUIPMENT REQUIRED OF THE PERFORMANCE OF THE ELECTRICAL WORK SHALL BE FURNISHED BY THIS CONTRACTOR.
 3. **COORDINATION** - THE CONTRACTOR SHALL COORDINATE ALL WORK WITH OTHER CONTRACTORS AND SUBCONTRACTORS SO THAT VARIOUS COMPONENTS OF THE ELECTRICAL SYSTEMS WILL BE INSTALLED AT THE PROPER TIME, WILL FIT THE AVAILABLE SPACE, AND WILL ALLOW PROPER SERVICE ACCESS TO ALL EQUIPMENT. THE CONTRACTOR SHALL REFER TO ARCHITECTURAL, STRUCTURAL AND MECHANICAL DRAWINGS AND TO RELEVANT EQUIPMENT DRAWINGS TO DETERMINE THE EXTENT OF CLEAR SPACES.
 4. **ORDINANCES AND CODES** - CONTRACTOR'S PERFORMANCE, WORKMANSHIP AND MATERIALS SHALL COMPLY WITH APPLICABLE NATIONAL FIRE PROTECTION ASSOCIATION CODES, STATE AND LOCAL BUILDING CODES, AND/OR ALL OTHER APPLICABLE CODES AND ORDINANCES. ALL PERMITS, LICENSES AND FEES THAT ARE REQUIRED BY THE GOVERNING AUTHORITIES FOR THE PERFORMANCE OF THE ELECTRICAL WORK SHALL BE OBTAINED AND PAID FOR BY THE CONTRACTOR. FILLING OUT FORMS FOR APPLICATIONS BY THE ENGINEER WILL BE BILLED HOURLY TO THE CONTRACTOR.
- B. COMMON WORK AND BASIC MATERIALS/EQUIPMENT:**
1. **GUARANTEE** - GUARANTEE AGAINST DEFECTIVE WORKMANSHIP AND MATERIAL FOR A PERIOD OF ONE YEAR FROM THE DATE OF FINAL PAYMENT. GUARANTEE SHALL INCLUDE MATERIAL/EQUIPMENT TO BE REPLACED AND ALL LABOR REQUIRED.
 2. **TESTING, CHECK-OUT, AND CLEANING** - REPLACE ALL BURNED-OUT LAMPS. THE CONTRACTOR SHALL CLEAN ALL MATERIAL AND EQUIPMENT INSTALLED UNDER THE ELECTRICAL CONTRACT. DIRT, DUST, PLASTER, STAINS AND FOREIGN MATTER SHALL BE REMOVED FROM ALL SURFACES. ALL EQUIPMENT SHALL HAVE FINISH TOUCHED UP PRIOR TO INSPECTION. DAMAGED ELECTRICAL EQUIPMENT DURING THE CONSTRUCTION PROCESS SHALL BE REPLACED WITH NEW EQUIPMENT. ALL COSTS ASSOCIATED WITH THE DAMAGED EQUIPMENT SHALL BE ASSUMED BY THE INSTALLING CONTRACTOR.
 3. **CUTTING AND PATCHING** - THIS CONTRACTOR SHALL DO ALL CUTTING OF WALLS, FLOORS, CEILINGS, ETC. AS REQUIRED TO INSTALL WORK UNDER THIS SECTION. CONTRACTOR SHALL PATCH WALLS, FLOORS, ETC. TO MATCH THE ORIGINAL MATERIAL AND CONSTRUCTION. CONTRACTOR SHALL REPAIR ALL FIRE/SMOKE RATED PENETRATIONS TO RETAIN RATING.
 4. **UTILITY REQUIREMENTS** - THE SECONDARY SERVICE SHALL EXTEND FROM UTILITY TRANSFORMER TO THE SERVICE DISCONNECT. PRIMARY DUCTBANK SHALL BE PROVIDED BY THE CONTRACTOR IF REQUIRED BY THE LOCAL UTILITY COMPANY. FINAL TERMINATIONS AT THE TRANSFORMER SHALL BE COORDINATED WITH THE UTILITY COMPANY.

THE FOLLOWING ELECTRICAL SERVICE CHARACTERISTICS SHALL BE COORDINATED WITH THE UTILITY COMPANY:
 - a. SERVICE VOLTAGE
 - b. POWER COMPANY CONNECTION CHARGES
 - c. AVAILABLE SHORT CIRCUIT CURRENT
 - d. LOAD ANALYSIS, CONNECTED AND ESTIMATED DEMAND
 - e. POWER COMPANY CHARGES FOR ESTABLISHING SERVICE WHICH ARE TO BE PAID BY THE OWNER.
- CONTRACTOR SHALL PROVIDE PROPER TERMINATION, METERING PROVISIONS, ETC. FOR ELECTRICAL AND TELEPHONE SERVICES FOR CONNECTION BY THE SERVING UTILITY, IN STRICT COMPLIANCE WITH THE REQUIREMENTS OF ALL CODES HAVING JURISDICTION AND OF THE SERVING UTILITY INVOLVED. UTILITY COSTS SHALL BE INCLUDED IN THE BID. COORDINATE ALL INSTALLATION REQUIREMENTS WITH THE LOCAL UTILITY PRIOR TO BIDDING.
5. **CONDUIT INSTALLATION** - ALL WIRING SHALL BE ROUTED IN CONDUIT. CONDUIT SHALL BE INSTALLED CONCEALED WHEREVER POSSIBLE. EXPOSED CONDUIT SHALL BE PAINTED TO MATCH SURROUNDINGS. ALL CONDUIT BOXES SHALL BE ACCESSIBLE TO COMPLY WITH THE NEC. THE MINIMUM CONDUIT SIZE SHALL BE 1/2" UNLESS OTHERWISE NOTED ON THE DRAWINGS. CONDUIT TYPES SHALL BE THE FOLLOWING:

RMC - SHALL ALSO BE USED IN OUTDOOR, EXPOSED APPLICATIONS.

- LFMC - SHALL BE USED IN OUTDOOR APPLICATIONS FOR CONNECTIONS TO EQUIPMENT SUBJECT TO MOVEMENT OR VIBRATION. CONDUIT SHALL BE NO GREATER THAN 36" IN LENGTH. CONDUIT SHALL BE PROVIDED WITH SEPARATE GROUND CONDUCTOR. CONDUIT MAY NOT BE UTILIZED AS GROUND PATH. MKEC WILL NOT ACCEPT LFMC UNLESS PERMITTED BY BOTH THE OWNER AND AHJ. ACCEPTANCE OF THIS INSTALLATION MUST BE SUBMITTED IN WRITING TO THE ENGINEER FROM BOTH THE OWNER AND AHJ VIA THE INSTALLING CONTRACTOR.
- RTRC - SHALL BE USED UNDER BRIDGE, WHERE PHYSICAL ABUSE AND OUTDOOR, EXPOSED CONDITIONS ARE PROBABLE.
- PVC - SHALL BE USED IN FOR UNDERGROUND AND WITHIN CONCRETE APPLICATIONS.
6. **UNDERGROUND CONDUIT** - SCHEDULE 40 PVC WITH RMC FOR ELBOWS AND ABOVE GRADE, WHERE INSTALLED BELOW SLAB, CONDUIT SHALL BE SURROUNDED ON ALL SIDES WITH 2' OF AGGREGATE.
 7. **WIRE** - ALL WIRE SHALL HAVE COPPER CONDUCTORS, WITH U.L. LISTING. SERVICE ENTRANCE CABLE SHALL BE THWN OR XHHW WITH STRANDED CONDUCTORS. ALL FEEDER AND BRANCH CIRCUIT WIRE #8 AWG AND LARGER SHALL BE TYPE THWN OR XHHW, BOTH WITH STRANDED CONDUCTORS. ALL WIRE #10 AND SMALLER AWG SHALL BE TYPE THWN (WET OR DAMP LOCATIONS, OR IN CONDUIT BELOW GRADE OR SLAB) OR THHN (DRY LOCATIONS ONLY AND ABOVE GROUND), BOTH WITH SOLID CONDUCTORS. ALL BRANCH CIRCUIT WIRING SHALL BE NOT SMALLER THAN #12 AWG WIRE.
 8. **WIRING INSTALLATION** - ALL WIRING SHALL BE INSTALLED IN APPROVED RACEWAY AND ENCLOSURES. ALL SPLICES OR TAPS SHALL OCCUR IN APPROVED BOXES AND ENCLOSURES AND SHALL BE MADE UP WITH APPROVED SOLDERLESS CONNECTORS. FOR #10 CONDUCTORS AND SMALLER THE CONDUCTORS SHALL HAVE INSULATION OF THE PROPER COLOR TO MATCH NEC COLOR CODE SYSTEM. FOR CONDUCTORS OF #8 AND LARGER THE CONTRACTOR MAY USE COLORED PRESSURE SENSITIVE PLASTIC TAPE AT EACH END TO PROPERLY IDENTIFY THE CONDUCTOR VOLTAGE PER THE NEC. ALL BRANCH CIRCUITS SHALL HAVE AN EQUIPMENT GROUNDING CONDUCTOR INSTALLED IN THE RACEWAY, SIZED IN ACCORDANCE WITH NEC 250-122. COMPLY WITH VOLTAGE DROP SECTION IN THIS SPECIFICATION.
 9. **HANGERS AND SUPPORTS** - SUPPORTS FOR EMT AND RMC SHALL BE AS REQUIRED BY NFPA 70. THE MINIMUM HANGER ROD SIZE SHALL BE 1/4" DIAMETER. TRAPEZE STYLE SUPPORTS FABRICATED TO SUPPORT MULTIPLE RACEWAYS SHALL BE SIZED SUCH THAT CAPACITY CAN BE INCREASED BY 25% IN FUTURE WITHOUT EXCEEDING LOAD LIMITS. COORDINATE MOUNTING ANCHORAGE TYPES WITH STRUCTURAL SUPPORT SYSTEM PRESENT IN BUILDING. THE FOLLOWING ANCHORAGE TYPES WILL BE ALLOWED BASED ON APPROVAL FROM THE STRUCTURAL ENGINEER:

WOOD: FASTEN WITH LAG SCREWS OR THROUGH BOLTS. LAG SCREWS SHALL BE INSTALLED ONLY IN HORIZONTAL POSITION.

NEW CONCRETE: BOLT TO CONCRETE INSERTS.
EXISTING CONCRETE: EXPANSION ANCHOR FASTENERS.

MASONRY: APPROVED TOGGLE TYPE BOLTS ON HOLLOW MASONRY UNITS AND EXPANSION ANCHOR FASTENERS ON SOLID MASONRY UNITS.

STEEL: WELDED THREADED STUDS WITH LOCK WASHERS AND NUTS OR BEAM CLAMPS.

LIGHT STEEL: SHEET METAL SCREWS.

EXTERIOR STRUT STANDS SHALL BE GALVANIZED STEEL RATED FOR USE IN AN OUTDOOR ENVIRONMENT. ALL STRUT STANDS SHALL BE PAINTED GRAY AFTER FABRICATION TO PROVIDE ADDITIONAL WEATHER RESISTANCE.
 10. **DEVICES** - DEVICES SHALL BE SPECIFICATION GRADE. COMMERCIAL OR RESIDENTIAL GRADE DEVICES ARE NOT ACCEPTABLE. COORDINATE DEVICE AND COVER PLATE COLOR WITH THE ARCHITECT AND ENGINEER PRIOR TO SUBMITTAL OF EQUIPMENT. DEVICE PLATES SHALL BE NYLON. ISOLATED GROUND DEVICES SHALL BE ORANGE AND COVER PLATES SHALL BE ENGRAVED "ISOLATED". EMERGENCY DEVICES AND COVER PLATES SHALL BE RED (NOTE THIS IS NOT GENERATOR POWER, BUT CODE REQUIRED EMERGENCY LOADS). ACCEPTABLE MANUFACTURERS SHALL BE ARROW HART, BRYANT, HUBBELL, LEVITON, AND PASS & SEYMOUR.
 11. **BOXES** - ALL BOXES SHALL BE METALLIC TYPE UNLESS OTHERWISE NOTED ON THE DRAWINGS.

EXTERIOR BOXES SHALL BE CORROSION RESISTANT, CAST-METAL, WEATHERPROOF OUTLET WIRING BOXES. DIVIDERS SHALL BE PROVIDED IN ALL BOXES WITH WIRING OF DIFFERENT VOLTAGE TO SEPARATE VOLTAGES.

JUNCTION BOXES AND PULL BOXES SHALL BE INSTALLED WHERE REQUIRED FOR CONDUCTOR PULLING AND BEND RADIUS REQUIREMENTS PER THE NEC.
 12. **VOLTAGE DROP** - ALL BRANCH CIRCUITS SUPPLYING EQUIPMENT, LIGHTING, OR DEVICES SHALL BE SIZED NOT TO EXCEED 3% VOLTAGE

- DROP, AND NOT EXCEED 5% VOLTAGE DROP FROM SOURCE (E.G. TRANSFORMER, SERVICE, ETC.) TO LOAD. DERATE CONDUCTORS PER NEC WHEN ROUTED IN RACEWAY CONTAINING MORE THAN THREE CURRENT CARRYING CONDUCTORS. PROVIDE BUCK-BOOST TRANSFORMERS MEETING THE REQUIREMENTS OF THE TRANSFORMER SECTION WHEN VOLTAGE DROP EXCEEDS 3% FROM OVERCURRENT DEVICE TO END DEVICE.
13. **EQUIPMENT AND DEVICE GROUNDING** - ALL CONDUCTORS, CONDUITS, MOTOR FRAMES, ETC. WHICH REQUIRE GROUNDING SHALL BE PERMANENTLY AND EFFECTIVELY GROUNDED BY THIS CONTRACTOR IN A THOROUGH AND EFFICIENT MANNER CONFORMING IN ALL PARTICULARS TO THE NATIONAL ELECTRICAL CODE. ALL CIRCUITS MUST BE PROVIDED WITH A SEPARATE GROUND CONDUCTOR. CONTRACTOR SHALL NOT UTILIZE THE RACEWAY AS A GROUND PATH UNDER ANY CIRCUMSTANCE.
 14. **SYSTEM GROUNDING** - GROUND THE ELECTRICAL SERVICE PER THE ADOPTED VERSION OF THE NEC AND DETAILS INDICATED ON THE DRAWINGS. GROUND RODS UTILIZED FOR BUILDING GROUNDING SHALL BE 3/4" DIAMETER AND 10'-0" IN LENGTH. A MINIMUM OF (2) GROUND RODS SHALL BE INSTALLED WITH A COUPLER TO CREATE A 20'-0" LONG GROUND ROD. CONTRACTOR SHALL BOND THE SYSTEM GROUND TO ALL AVAILABLE GROUNDING LOCATIONS PER ARTICLE 250 OF THE NEC.
 15. **EXTRA MATERIALS** - PROVIDE MINIMUM 1 EACH TYPE AND 1 ADDITIONAL FOR EVERY 10 OF THE FOLLOWING: LAMPS, BALLASTS, BATTERIES FOR EMERGENCY LIGHTING, AND GLOBES/DIFFUSERS. PROVIDE IN PROTECTIVE COVERING/PACKAGING WITH LABEL OF CONTENTS.
 16. **EQUIPMENT PADS AND CONCRETE BASES** - EXTERIOR PADS AND BASES - UNLESS SPECIFIED ELSEWHERE IN THE CONTRACT DRAWINGS, PROVIDE MINIMUM 6" THICK CONCRETE PAD 28 DAY 3000 PSI WITH #6 REBAR AT 12" CENTER, EACH WAY FOR REINFORCING. PAD SHALL EXTEND MINIMUM 4" BEYOND EQUIPMENT FOOTPRINT ON ALL SIDES. COORDINATE ADDITIONAL REQUIREMENTS FOR UTILITY TRANSFORMER PAD WITH LOCAL UTILITY COMPANY.
 17. **LABELING** - ALL DEVICES SHALL BE LABELED THAT ARE MODIFIED IN ANY WAY BY THIS PROJECT.
 - a. ALL PANELBOARDS (NEW OR THAT HAVE CIRCUITS MODIFIED) SHALL HAVE INSTALLED A NEW TYPED CIRCUIT DIRECTORY UPDATED WITH ALL AVAILABLE INFORMATION.
 - b. ALL NEW OR AFFECTED DISCONNECTS, STARTERS, TRANSFORMERS, AND PANELS SHALL HAVE A PHENOLIC, WHITE TEXT ON BLACK, MINIMUM 1/2" INCH HIGH TEXT LABELING WITH THE DEVICES NAME, VOLTAGE AND WIRING SYSTEM (EXAMPLE: "PANEL A, 120/208V, 3 PHASE, 4 WIRE") AND OTHER INFORMATION PER THE OWNER.
 - c. ALL NEW, RELOCATED, OR REWIRED RECEPTACLES, SWITCHES AND OTHER DEVICES INCLUDING THOSE ABOVE SHALL BE LABELED WITH THE SOURCE OF POWER. THIS LABEL SHALL BE ON THE DEVICE COVER PLATE AND SHALL HAVE BLACK ON WHITE HELVETICA MEDIUM FONT LETTERING 1/4" INCH HIGH, DESIGNATING PANELBOARD AND CIRCUIT NUMBER SEPARATED BY COLON. THE SAME TYPE LABEL SHALL ALSO BE INSTALLED ON THE DEVICE BEHIND THE COVERPLATE.
 - C. **DISTRIBUTION EQUIPMENT:**
 1. **MANUFACTURERS** - ALL COMPONENTS SHALL BE BY ONE OF THE FOLLOWING UNLESS OTHERWISE NOTED: EATON CUTLER HAMMER, GENERAL ELECTRIC, SIEMENS, OR SQUARE D.
 2. **GROUND BUS** - ALL PANELS, DISTRIBUTION PANELS, AND SWITCHBOARDS SHALL BE PROVIDED WITH A COPPER GROUND BUS.
 3. **SERIES RATING** - SERIES RATING OF CIRCUIT BREAKERS IN NOT ALLOWED UNLESS SPECIFICALLY NOTED ON THE CONTRACT DRAWINGS.
 4. **LOW VOLTAGE TRANSFORMERS (600V AND LESS)** - TRANSFORMERS SHALL BE RATED FOR 150 DEG C INSULATION CLASS. TRANSFORMER SHALL BE ALUMINUM OR COPPER WOUND TYPE. TRANSFORMERS LOCATED INDOORS IN DRY LOCATIONS SHALL BE PROVIDED WITH VENTILATED, NEMA TYPE 2 RATED ENCLOSURES. TRANSFORMERS SHALL BE GROUNDED AS SEPARATELY DERIVED SYSTEMS PER NFPA 70.
 5. **PEDESTALS** - FURNISH AND INSTALL MILBANK OR EQUIVALENT, AS SHOWN ON THE DRAWINGS. PANELBOARD INSIDE PEDESTAL SHALL MEET THE REQUIREMENTS OF THE "PANELBOARD" SECTION OF THE SPECIFICATION.
 6. **SAFETY SWITCHES** - FURNISH AND INSTALL FUSED OR NON-FUSED (AS REQUIRED) HEAVY DUTY SAFETY SWITCHES WHERE NOT FURNISHED WITH THE EQUIPMENT, AND AT ALL OTHER POINTS REQUIRED BY CODE. CONSTRUCTION SHALL BE OF A NEMA DESIGN SUITABLE FOR THE ENVIRONMENT INSTALLED. ALL FUSES SHALL BE BUSSMAN, LITTLEFUSE OR FERRAZ-SHAWMUT, SIZE AND TYPE AS REQUIRED OR INDICATED.
 7. **SURGE PROTECTIVE DEVICES** - PROVIDE SURGE PROTECTIVE DEVICES AS INDICATED ON THE DRAWINGS. SURGE PROTECTIVE DEVICES LOCATED INTEGRAL TO THE PANEL MAY BE SUPPLIED BY THE PANEL MANUFACTURER. SURGE PROTECTIVE DEVICES MOUNTED OUTSIDE OF THE PANEL MAY BE SUPPLIED BY THE PANEL MANUFACTURER, LIEBERT, CURRENT TECHNOLOGY, OR ADVANCED

PROTECTION TECHNOLOGIES.

SURGE PROTECTIVE DEVICES SHALL BE RATED AS FOLLOWS:

- a. SERVICE ENTRANCE LOCATIONS: 250 KA PER PHASE AND 125 KA PER MODE.
 - b. BRANCH PANELS: 120 KA PER PHASE AND 60 KA PER MODE.
- SPD'S MOUNTED EXTERNAL TO PANELS SHALL BE LOCATED SUCH THAT THE CONDUCTOR/CONDUIT RUN BETWEEN THE EQUIPMENT IS AS SHORT AND STRAIGHT AS POSSIBLE. PROVIDE OVERCURRENT PROTECTION OF THE SPD AS REQUIRED BY THE EQUIPMENT MANUFACTURER.
8. **LIGHTING CONTACTORS** - CONTACTOR SHALL BE ELECTRICALLY OPERATED AND MECHANICALLY HELD, COMPLYING WITH NEMA ICS 2 AND UL 508. CURRENT RATING FOR SWITCHING SHALL BE LISTED OR RATED CONSISTENT WITH TYPE OF LOAD SERVED, INCLUDING TUNGSTEN FILAMENT, INDUCTIVE, AND HIGH INRUSH BALLAST (BALLAST WITH 20 PERCENT OR LESS TOTAL HARMONIC DISTORTION OF NORMAL LOAD CURRENT). CONTROL COIL VOLTAGE SHALL MATCH CONTROL POWER SOURCE. PROVIDE ALL CONTACTORS WITH RED PILOT LIGHT.
- D. **LIGHTING:**
1. **GENERAL** - THE LOCATIONS, NUMBERS, SIZES AND TYPES OF LIGHTING FIXTURES SHALL BE AS SHOWN ON THE CONTRACT DOCUMENTS. ALL LIGHTING FIXTURES FURNISHED UNDER THIS CONTRACT TO HAVE UL LABELS ATTACHED TO EACH FIXTURE OR AN INTEGRAL PART OF THE DEVICES FOR 120V AND 277V SOLID-STATE EQUIPMENT. FOR DEVICES WITHOUT INTEGRAL LINE VOLTAGE SURGE PROTECTION, FIELD MOUNTING SURGE PROTECTION SHALL COMPLY WITH IEEE C62.41, WITH UL 1449. METAL PARTS SHALL BE FREE FROM BURRS, SHARP CORNERS AND EDGES. DOORS, FRAMES AND OTHER INTERNAL ACCESSSES SHALL BE SMOOTH OPERATING, FREE FROM LIGHT LEAKAGE UNDER OPERATING CONDITIONS, AND ARRANGED TO PERMIT RE-LAMPING WITHOUT USE OF TOOLS. ARRANGE DOORS, FRAMES, LENSES, DIFFUSERS AND OTHER PIECES TO PREVENT ACCIDENTAL FALLING DURING RE-LAMPING AND WHEN SECURED IN OPERATING POSITION. LENSES, DIFFUSERS, COVERS AND GLOBES SHALL BE 100 PERCENT VIRGIN ACRYLIC PLASTIC OR ANNEALED CRYSTAL GLASS, UNLESS OTHERWISE INDICATED. PLASTIC SHALL BE HIGH RESISTANCE TO YELLOWING AND OTHER CHANGES DUE TO AGING, EXPOSURE TO HEAT AND ULTRAVIOLET RADIATION. CLEAN ALL LIGHT FIXTURES AFTER INSTALLATION AND PRIOR TO OWNER ACCEPTANCE. TEST EACH FIXTURE AND REPLACE ALL MALFUNCTIONING BOARDS AND DRIVERS.
 2. **LED FIXTURES AND DRIVERS** - MANUFACTURERS SHALL BE AS SHOWN ON THE CONTRACT DRAWINGS. LED DRIVER AND HEAT SINK SHALL BE MATCHED TO PROVIDE 50,000 HOURS OF LAMP LIFE. DRIVERS SHALL BE INTEGRAL TO THE LIGHT FIXTURE UNLESS SPECIFICALLY NOTED OTHERWISE. PROVIDE DIMMING DRIVER WHERE SPECIFIED ON THE CONTRACT DOCUMENTS. DRIVERS SHALL BE DESIGNED FOR THE OPERATING VOLTAGE AS SHOWN ON THE CONTRACT DOCUMENTS. DRIVERS SHALL HAVE A POWER FACTOR OF NOT LESS THAN 0.95 AND A TOTAL HARMONIC DISTORTION OF LESS THAN 10%. DRIVERS SHALL BE UL LISTED AS A CLASS 2 POWER SUPPLY. DRIVER SHALL BE SOUND RATED "A". DRIVERS RATED FOR 0 DEG F STARTING TEMPERATURE SHALL BE USED IN EXTERIOR LOCATIONS. DRIVERS SHALL BE DESIGNED TO BE OPERATED IN THE TYPE FIXTURE AS SHOWN ON THE CONTRACT DRAWINGS. BATTERY INVERTER DRIVERS SHALL BE BODINE, POWER SENTRY, OR IOTA. BATTERY BALLASTS SHALL PROVIDE 90 MINUTES OF OUTPUT AS INDICATED ON THE DRAWINGS. WHEN SPECIFICALLY PERMITTED BY THE CONTRACT DOCUMENTS, INSTALL NON-INTEGRAL DRIVERS IN ACCESSIBLE LOCATIONS. PROVIDE COLD WEATHER TYPE BATTERY INVERTER DRIVERS IF EXPOSED TO EXTERIOR TEMPERATURES.
 5. **POLES** - POLES SHALL BE OF THE TYPES AND SIZES AS SHOWN ON THE CONTRACT DRAWINGS. THE POLE SHALL BE STEEL, UNLESS SPECIFICALLY SHOWN AS OTHER MATERIAL ON THE CONTRACT DRAWINGS. WHERE APPLICABLE, THE POLE SHOULD BE PROVIDED WITH A HANDHOLE AND A GROUND LUG, AND LOCAL FUSES. THE POLE SHALL BE INSTALLED AS SHOWN ON THE CONTRACT DRAWINGS. POLE FINISH SHOULD MATCH LIGHT FIXTURE FINISH. PROVIDE CONCRETE POLE BASES AS INDICATED ON THE DRAWINGS.
- E. **CONTROLS:**
1. **PHOTOELECTRIC SWITCHES** - MANUFACTURERS: INTERMATIC, TORK AND WATT STOPPER.

SOLID STATE, WITH SPST DRY CONTACTS RATED FOR 1800VA TO OPERATE CONNECTED LOAD, RELAY OR CONTACTOR COILS; AND COMPLYING WITH UL 773. LIGHT LEVEL MONITORING RANGE TO BE 1.5 TO 10 FC WITH AN ADJUSTMENT FOR TURN ON AND TURN OFF LEVELS WITHIN THAT RANGE. TIME DELAY SHALL BE 15 SECOND MINIMUM TO PREVENT FALSE OPERATION. LIGHTNING ARRESTER SHALL BE AIR GAP TYPE. MOUNTING SHALL BE TWIST LOCK COMPLYING WITH IEEE C136.10 WITH BASE. PROVIDE WITH STEM MOUNTING OR STEM AND SWIVEL MOUNTING ACCESSORIES AS REQUIRED TO DIRECT SENSOR TO THE NORTH SKY EXPOSURE.
- F. **CONSTRUCTION:**
1. **SUBMITTALS** - SUBMIT FOR REVIEW SIX SETS OF MANUFACTURERS CUT SHEETS AND/OR SHOP DRAWINGS OF LIGHT FIXTURES WITH LAMPS AND LIGHT FIXTURE BASE, POWER PEDESTAL, AND ALL ITEMS IN THIS SPECIFICATION OTHER THAN WIRE AND CONDUIT. ALSO

SUBMIT ITEMS REQUIRING COORDINATION BETWEEN CONTRACTORS. BEFORE SENDING SUBMITTALS, THE CONTRACTOR SHALL VERIFY THAT ALL EQUIPMENT SUBMITTED IS MUTUALLY COMPATIBLE AND SUITABLE FOR THE INTENDED USE AND SHALL FIT THE AVAILABLE SPACE AND ALLOW AMPLE ROOM FOR MAINTENANCE. THE ENGINEER'S REVIEW AND COMMENT ON SUCH SUBMITTALS SHALL NOT RELIEVE THE CONTRACTOR FROM RESPONSIBILITY FOR ERRORS IN DIMENSIONS, DETAILS, SIZE OF MEMBERS, OR QUANTITIES; OR OMISSIONS OF COMPONENTS OR FITTINGS; OR FOR COORDINATING ITEMS WITH ACTUAL PROJECT CONDITIONS.

H. SUBSTITUTIONS:

1. MATERIAL ALTERNATES SHALL BE SUBMITTED IN COMPLETE DETAIL TO THE ENGINEER NO LATER THAN 10 CALENDAR DAYS PRIOR TO BID DATE. DECISION ON ACCEPTANCE OF A SUBSTITUTION IS SOLELY UP TO THE ENGINEER.



IMPROVEMENT PLANS FOR
15TH STREET BRIDGE OVER THE WICHITA DRAINAGE CANAL
WICHITA, KS

ELECTRICAL SPECIFICATIONS

PROJECT NO.	472-2023-085864	
SCALE	AS NOTED	
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