

STATE	PROJECT NO.	YEAR	SHEET NO.	TOTAL SHEETS
KANSAS	87 N-0662-01	2019	134	194



STREET IMPROVEMENTS FOR
17TH ST - BROADWAY TO I-135
FROM BROADWAY TO I-135

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ELECTRICAL SPECIFICATIONS

PROJECT NO.	87 N-0662-01		
DATE	8/30/2019		
SCALE	#"=#"		
DESIGNED	DRAWN	CHECKED	
XXX	XXX	XXX	
NO.	REVISION	DATE	
SHEET NO.			

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 LAMPS AND BALLASTS.

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.

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.

G. 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.

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.

11. 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.

CONTRACTOR SHALL ROUTE A DEDICATED #6 BARE COPPER WIRE FROM THE SERVICE ENTRANCE GROUND BUS TO THE TELEPHONE TERMINAL BOARD (TTB) IF A TTB IS INSTALLED ON THE PROJECT.

12. 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.

13. 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. 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 RELAMPING WITHOUT USE OF TOOLS. ARRANGE DOORS, FRAMES, LENSES, DIFFUSERS AND OTHER PIECES TO PREVENT ACCIDENTAL FALLING DURING RELAMPING AND WHEN SECURED IN OPERATING POSITION. LENSES, DIFFUSERS, COVERS AND GLOBES SHALL BE 100 PERCENT VIRGIN ACRYLIC PLASTIC OR ANNEALED CRYSTAL GLASS, UNLESS OTHERWISE

RMC - SHALL BE USED IN HAZARDOUS LOCATIONS, MECHANICAL AND ELECTRICAL ROOMS WHERE PHYSICAL ABUSE IS PROBABLE, UNDERGROUND CONDUIT ELBOWS AND ELBOWS EXTENDING UP THROUGH THE SLAB. SHALL ALSO BE USED IN OUTDOOR, EXPOSED APPLICATIONS.

PVC - SHALL BE USED IN UNDERGROUND CONDUIT APPLICATIONS.

5. 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.

6. 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.

7. 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.

8. 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.

9. BOXES - ALL BOXES SHALL BE METALLIC TYPE UNLESS OTHERWISE NOTED ON THE DRAWINGS.

INTERIOR BOXES SHALL BE GALVANIZED SHEET STEEL. BOXES FOR SWITCHES AND RECEPTACLES SHALL BE 4" SQUARE, 2-1/8" DEEP. BOXES SHALL BE INSTALLED SUCH THAT DEVICE COVERS ARE TIGHT AND PLUMB WITH FINISHED SURFACE.

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.

PAINT EXTERIOR OF BOXES AS FOLLOWS: EMERGENCY-ORANGE AND FIRE ALARM-RED.

10. VOLTAGE DROP - ALL BRANCH CIRCUITS SUPPLYING

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 JOURNEMEN. 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. 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:

EMT - SHALL BE USED FOR INDOOR, ABOVE GRADE POWER FEEDERS, BRANCH CIRCUITS, AND IN CONCEALED LOCATIONS. SHALL ALSO BE USED FOR FIRE ALARM, TELE/DATA, SECURITY, A/V, NURSE CALL, AND PAGING SYSTEMS. ALL CONDUIT FITTINGS FOR EMT CONDUIT SHALL BE COMPRESSION TYPE FITTINGS. INDENTURE FITTINGS WILL NOT BE ALLOWED.

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