STATE	PROJECT NO.	YEAR	SHEET NO.	TOTAL SHEETS
KANSAS	87 N-0720-01	2023	342	517

8.6 SURGE PROTECTION - DEVICE SIDE
Surge protection for all ITS devices should meet the following minimum specifications:
1. Failure indicator
2. Operating temperature range: -20°F (-28°C) to 165°F (74°C)
3. Operating humidity: 95% RH non-condensing
4. 3 year minimum manufacturer warranty

Terminate all cables on surge protectors. Ensure all surge protection devices are grounded properly with a direct connection to the ground bus.

8.6.1 CAMERA SURGE PROTECTION
Furnish and install a surge protection system that ensures all cables between the cabinet and the camera are protected by the surge protectors in the cabinet. Camera surge protection must meet the additional following minimum requirements:
1. UL listed and labeled to curent editions of UL 497B and UL 497C
2. Wall, DIN rail, or 19" rack mountable
3. Three stage protection
4. The minimum requirements listed on the following table:

Circuit	Maximum Continuous Operating Voltage	Frequency/ Bandwidth/ Data Rate	Surge Capacity	Max. Let-Through Voltage	Pre-Approved Model
12 VDC	15-20V	N/A	5kA per mode (8x20 µs)	< 150 Vpk	Citel DS220S-12DC
24 VAC	30-55V	N/A	5kA per mode (8x20 µs)	<175 Vpk	Citel DS220S-24DC
Ethernet Data	7-12V	Up to 1 Gbps	5kA per mode (8x20 µs)	< 30 Vpk (100kHz 0.5µs; 6kV, 500A)	Citel MJ8-Cat6
Power over Ethernet	60-70V	Up to 1 Gbps	5kA per mode (8x20 µs)	< 30 Vpk (100kHz 0.5µs; 6kV, 500A)	Citel MJ8-PoE

8.6.2 VDS SURGE PROTECTION
Provide a Wavetronix Click 200 surge protector or approved equal that meets the following minimum requirements:
1. Three-stage surge protection over DC, RS-232, and RS-485 lines
2. Meets NEMA TS2-1998 environmental testiing and IEC 61000-4-5 electrical surge test
Use these inside the cabinet to in order to protect both the power and the communications lines.

8.6.3 COAX/ANTENNA SURGE PROTECTION
Provide surge protection (Citel P8AX09 or approved equal) on all coax/antenna cables entering a cabinet or data closet. Provide and install bi-direction replaceable gas tube lightning arrestors that are UL 497E listed devices.

8.6.4 POWER STRIP - SURGE PROTECTION
Refer to 14.2.13 for details.

8.7 CONSTRUCTION REQUIREMENTS

8.7.1 POWER SUPPLY
The power service locations, as indicated on the drawings, are initial service points coordinated between KDOT and the utility company providing power service. Coordinate with the utility to verify the final point of service. Consult the utility company providing power service regarding their service installation requirements and furnish the service equipment in compliance with codes and regulations and their requirements.

Notify the utility company providing power service for the need for service and coordinate the schedule for that service from the utility. Any power supply requiring modifications from what is shown on the Plans will require an additional service request form to be submitted by the Contractor.

Measure the resistance between the ground electrode and earth using the testing procedures as outlined in these Specifications.

Verify the power service voltage at the power service locations prior to installation of circuits at all locations indicated on the drawings. Provide lightning arrestors of the rated voltage as shown on the Plans. Provide each constructed service drop with a phenolic nameplate indicating the following:
Project “KDOT ITS”
Service address: “_____”
Service voltage: “_____”
Coordinate with local City government to determine the appropriate service address for power supply if not otherwise shown on plans.

8.7.2 IN-CABINET GROUNDING REQUIREMENTS AND TESTING
All equipment within the cabinet must be grounded to the master ground bus in the cabinet via a direct-route ground cable as specified. Do not ground equipment to the rack or frame of the cabinet. The ground resistance between each device and the ground bus must not exceed 3 ohms.

8.7.3 GROUNDING SYSTEM CHECKLIST
KDOT will provide a grounding system checklist for each site. Complete the grounding system checklist in the presence of the Engineer or their approved representative for submittal as part of the Technical Reference Manual (TRM). The Contractor shall provide a minimum of 72 hours' notice in request of the grounding system checklist from KDOT and another 72 hours' notice to schedule the grounding system inspection.

9.0 CONCRETE FOUNDATIONS

9.1 DESCRIPTION
Construct and install all foundations for ITS Field Equipment provided for in this contract per Division 400 and 700 of the KDOT Standard Specifications, as modified below, and as detailed in the plans.

9.2 MATERIALS

9.2.1 REINFORCING STEEL
Use reinforcing steel that meets the requirements of the KDOT Standard Specifications. Use reinforcing steel that is free of rust and dirt. Provide reinforcing steel of the size, number, shape and dimensions as shown in the Plans.

9.2.2 ANCHOR RODS
Provide anchor rods of the size, number and materials as shown in the Plans and meet the requirements of Division 1600 of the KDOT Standard Specifications, as described below, and as detailed in the plans.

9.3 CONSTRUCTION REQUIREMENTS

9.3.1 CONCRETE FOUNDATIONS
Before placement of the concrete for the foundation, ensure that the appropriate anchor rods are placed in the proper orientation, in both the horizontal and vertical direction. This will be accomplished by using preformed rod templates as detailed in the plans. Protect all anchor rod threads from concrete fouling when the foundation is poured.

9.3.2 CONDUIT ENTRY
Extend Conduit 5" into base of pole. Cables shall not be exposed between the foundation and the pole.

9.3.3 ANCHOR ROD INSTALLATION
Install anchor rods per the Plans and according to KDOT standard specification 738.3.e.

10.0 ITS FIELD ELEMENTS

10.1 DESCRIPTION
This work consists of furnishing equipment and material for, and installing ITS field elements in conformity with the locations and details shown on the Plans or established by the Engineer. ITS field elements include the controller assemblies, cabinets, communication equipment, closed circuit television (CCTV) systems, vehicle detection systems (VDS), and dynamic message sign (DMS) systems.

10.2 MATERIALS
Furnish all tools, labor, equipment, materials, supplies, and manufactured articles and perform all operations necessary to construct the ITS field element installations as shown on the Plans and as specified herein. The hardware, construction services, and support services specified are intended to describe the minimum configuration that would be acceptable for these installations.

10.2.1 LABELING EQUIPMENT
Apply permanent external labeling on all communication equipment; including any required cross connects to communications equipment, according to these contract documents. Use self-laminating vinyl or polyester labels at least 3/4-inch wide and long enough that the translucent portion of the label completely covers the white area bearing the legend. Use vinyl or polyester with a layer of pressure sensitive acrylic adhesive. Use labels that resist oil, water, and solvents and are self-extinguishing. Use a machine to print the legend in letters at least 1/8 inch high.

10.2.2 INCIDENTALS
Furnish and install all incidental accessories necessary to make the system complete in all respects and ready for operation, even if not particularly specified; furnish, deliver, and install all incidentals without additional expense. Include in the work and in the bid all minor details not usually shown or specified, but necessary for the proper installation and operation.

10.2.3 CABLES AND CONDUCTORS
Incidental items include all cables and conductors including but not limited to, serial cables, alarm ribbon cables, Cisco equipment power cables, DC power cables, AC power cables, power service conductors, fiber optic jumpers, signal cables, interface cables, and other cables and connectors located at the field element sites. All cables and conductors shall be labeled with the standards identified in these specifications. No separate payment shall be made for incidental items.

10.2.4 MEDIA CONVERTER
Furnish and install a GE Security IFS Ethernet Optical Transceiver DE7200 or approved equal if specified in the plans with the following minimum requirements:
1. 10/100 Mbps Ethernet, auto-negotiating, full duplex or half duplex data. IEEE 802.3 compliant.
2. Auto network detection.
3. NTCIP Compatible
4. Optical: 1310/1550 nm, Single-mode fiber optic cabling support. LC optical connectors.
5. Minimum optical range of 10 miles.
6. Data: RJ-45 connector
7. Power: 12VDC @ 200mA
8. Power, Transmit, and Received LED indicators.
9. Physical Properties: 4.0 in x 3.0 in x 1.0 in, 2.0 lbs maximum
10. Operating temperature range from -20ºF (-28ºC) to 165ºF (74ºC)

10.3 CONSTRUCTION REQUIREMENTS

10.3.1 LABELING EQUIPMENT AND CABLES
Label all communication equipment and every cable immediately upon installation. Label all communication equipment and all cables at every point of access, including pull boxes, and termination points. Consult with the Engineer concerning the desired method of identifying each cable.

10.3.1.1 FIBER OPTIC CABLES OUTER JACKETS
1. Label each cable with permanent, weatherproof, and UV-resistant cable tags, with two integrated holes on each end for connecting tag to cable with cable ties. Use self-laminating vinyl or polyester labels at least 3/4-inch wide. Use a machine to print the legend in letters at least 1/8" high.
2. Label each cable where it enters a cabinet, pull box, splice vault, splice closure, and termination points. Tape labels are acceptable at splice closures as approved by the Engineer.
3. All cables shall be labeled within 12 inches of the conduit or other entry point. Label both ends as it comes in and out of a pull box or vault.
4. Label FO trunk cables with the following information:
    a. The number of fiber strands in the cable by mode
    b. Cable type (single mode “SM”, Multi-mode “MM” or hybrid “SM/MM”)
    c. Owner
    d. The item to which the cable travels (e.g. “TO PB 18-2”, “To P.O.P.”, etc.)
    e. Example: “96 SM FIBER KDOT” “TO PB 18-2”
5. Label branch cables with same plus what device it is connecting to. Example: “12 SM FIBER KDOT” “TO CCTV10/DET 12”

10.3.1.2 SPLICE ENCLOSURE
1. Label splice closures indicating what fibers inside are spliced.
2. Label splice trays within closures with cable and fiber strand numbers.
3. Example: “KDOT 96 SMFO FIBERS 23-24 TO KDOT 12 SMFO BRANCH FIBERS 3-4" or "CENTURYLINK/LUMEN-KDOT 12 SMFO FIBERS 11-12 TO KDOT 12 SMFO BRANCH FIBERS 3-4”.

10.3.1.3 POWER CABLES AND LOAD CENTER
1. Label each cable within 12 inches of where it enters a cabinet, pull box, meter pedestal, transformer or other termination point with a round aluminum identification tag with a minimum thickness of 2.5 micrometers attached to the cables with a copper wire.
2. Label it “POWER XXX VOLTS” with a RED label.
3. Label where it is coming from/going to (e.g. “POWER 120 VOLTS” “TO CA CCTV I-135/Central”).
4. Label taps inside meter pedestals or transformers with “ITS POWER” tag.
5. Label each circuit.

NO.	DATE	REVISIONS	BY	APP'D

KANSAS DEPARTMENT OF TRANSPORTATION

ITS EQUIPMENT SPECIFICATIONS

ITS-S05 VERSION DATE: 02-12-21

APP'D			
DESIGNED	DETAILED	QUANTITIES	TRACED
DESIGN CK.	DETAIL CK.	QUAN. CK.	TRACE CK.

KDOT Graphics Certified 04-05-2022

KDOT Graphics Certified

Plotted :25-SEP-2023 18:45
Drawn By : lcvohs
File : ITS-S05.dgn