

STATE	PROJECT NO.	YEAR	SHEET NO.	TOTAL SHEETS
KANSAS	87 N-0684-01	2019	91	109

Provide a Wavetronix Click 201 AC/DC power converter or approved equal that meets the following minimum requirements:

1. Provide 24 VDC at currents of 1-Amp
2. Provide a mains buffering greater than 20ms under full load

#### 13.2.7 POLE

For standalone detector locations, conform and construct in accordance with details shown on the Plans. For locations where detectors are mounted to another ITS device pole or structure, mount as shown in the plans. Design the poles for the standalone detectors to comply with the latest edition of the AASHTO publication "Standard Specifications for Structural Supports for Highway Signs, Luminaires, Traffic Signals and Interims". Use fatigue Category II. Also, see the KDOT Standard Specifications.

Provide all hardware (bolts, nuts, and washers, but not including anchor rod assemblies) not otherwise specifically designed in the specifications that is aluminum or stainless steel. Furnish all materials in natural aluminum color. Finish pole shafts with a polished surface.

Conform to the standard KDOT specifications, latest edition, Division 1600 for miscellaneous hardware that requires galvanizing or electroplating.

Use ground wire that is a #6 AWG solid bare copper wire, unless otherwise shown on the Plans. Use ground rods that are solid copper.

Conform to the KDOT Standard Specifications, latest edition, Division 1600 for anchor rods.

Provide break-away cable connectors that provide a fused waterproof wiring connection that when subjected to strain consistent with a knockdown, will separate without damage to the wiring. When separation occurs, ensure the connectors shall have no contacts exposed to present a shock hazard. Meet requirements as listed in the AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals (Latest Edition), Article 12.5.3 (C). Install the connectors as directed by the manufacturer.

If wedge-type stud rod anchors are used, install 3/8 inch by 3 inch wedge-type anchors for conduit clamps. Use wedge-type anchors made from carbon steel meeting AISI 12L14 Steel. Provide a minimum embedded depth of 1-3/4 inches.

If conduit clamps with clamp backs are used, Install 2 inch conduit clamps with a compatible clamp back. Use heavy duty steel clamps to secure the rigid conduit to the structure. Space conduit clamps at 6 foot intervals.

Install one cable support grip in each detector pole. Provide a cable support grip made of high grade, non-magnetic tin coated bronze strand. Provide a cable support grip that is capable of securing two #10 AWG type USE-2 cables in a vertical position holding the weight of the cables and cable connectors off the detector assembly.

#### 13.2.8 STEEL DETECTOR POLE

Comply with the requirements of the ASTM 607 with the exceptions and/or additions as listed in the KDOT standards.

Provide detector poles in one section and conform to the height and diameter on the Plans. Provide a base that is either a one piece steel base complying with the requirements of ASTM A-27, Grade 65-35, a steel forged base complying with the requirements of ASTM A-668, Class C or A, or a plate base complying with the requirements of ASTM A 36-77A. Secure the base to the bottom section by two continuous electric arc welds. Galvanize the base and detectors pole according to ASTM A-123.

#### 13.3 FOUNDATION

Construct as indicated on the Plans and Specifications.

#### 13.4 CONSTRUCTION REQUIREMENTS

##### 13.4.1 RADAR VEHICLE DETECTORS

Install in accordance with the manufacturer's recommended procedure for side-fired installation. Determine proper mounting height of the detector being supplied based on offset, height, and lanes to be detected. Note that the recommended mounting height is relative to the road surface, not the base of the pole. Install mounting hardware to prevent conflict with CCTV camera when lowered. Aim the detector to detect vehicles in the lanes indicated at the particular location.

Specify the length of control cable/harness required to the detector supplier. Include the vehicle detector control cable/harness in the detector ITS unit cost.

Provide a separate entry point for each VDS.

Installation may be done by the Contractor's forces, but each installation must be checked by the manufacturer or manufacturer's representative, and adjusted as recommended by the manufacturer. Installation includes connecting the detector to the device server and power supply in the associated ITS cabinet, as shown on the Plans.

The set up includes speed calibration using measured (not estimated) reference speeds with a LIDAR gun. When the setup is complete and the detector is ready for operation, deliver the values of all parameters that were set during the process to the Engineer in printed or computer-readable form. Provide all equipment, such as a LIDAR gun, software, laptop computer, tools and cables, needed for the set up work.

#### 14.0 ITS CABINET ASSEMBLY

##### 14.1 DESCRIPTION

ITS cabinet assemblies are defined as the complete assembly of all required equipment and components for the control of ITS field elements at each location as detailed in the Plans and the collection and communication to the Traffic Management Center of data gathered from the ITS Field Elements. Install Type 334 and Type 336S in the quantities and numbers at the locations as detailed in the Plans or as directed by the Engineer. Provide all necessary incidental items necessary for a complete fully functioning cabinet installation including DIN rails, wiring, and all equipment mounting hardware.

##### 14.2 MATERIALS

###### 14.2.1 GENERAL

Include necessary back panels, interface for CCTV, VDS, or DMS as shown on the Plans, all required communication equipment, all required wiring, switches and connectors, and all other equipment as required by these specifications and as shown on the Plans, or as directed by the Engineer, to provide a fully functioning and operational ITS system.

###### 14.2.2 ITS CABINETS

Use either model 334 for pad mounted cabinets or 336S for pole mounted cabinets as shown and indicated in the Plans and exhibit a bare aluminum finish. Provide cabinets with two full size doors for front or rear entry. Ensure that all cabinets are designed to NEMA 3R specification. Provide handles for each main door that open outwards. Supply all cabinets with a removable self-standing rack assembly, an AC bus, and a ground bus. Do not provide any power distribution assemblies unless specified.

Provide all KDOT main cabinet doors with a BEST 3L Series Deadbolt Cabinet Lock with construction core that will allow KDOT to install their own lock core. KDOT will replace the construction core with a KDOT keyed core upon cabinet acceptance. Dispose of the construction core after cabinets are accepted. Provide all KDOT main cabinet doors with a raised designation 'KDOT ITS' as indicated in the Plans.

Provide all KC Scout main cabinet doors with a Corbin Number 2 Lock. Provide all KC Scout main cabinet doors with a raised designation 'KC SCOUT ITS' as indicated in the Plans.

###### 14.2.3 CABINET SIZE

Standard 336S cabinet dimensions are approximately 46" x 24" x 22". Standard 334 cabinet dimensions are approximately 66" x 24" x 30". Size each controller cabinet based on the equipment as identified on the Plans and described herein.

###### 14.2.4 LIGHTS

Include 2 fluorescent or LED lighting fixtures mounted inside the front and back portion of the cabinet. Install a door-activated switch to turn on the cabinet lights when the door is open. Install each switch to work each individual light.

###### 14.2.5 ALARM

Install an additional door actuated switch for each main door. Wire this switch such that an alarm can be sent to the TMC when both or either door is opened.

###### 14.2.6 POWER AND LOAD CENTER

The cabinet will be capable of accepting/landing a 120V/240V power circuit. Land all incoming power in a 60 Amp, 120/240 VAC, UL listed Load Center provided with the cabinet, including circuit breakers. Furnish and install a GFCI convenience outlet two position on its own circuit. Provide GFCI outlet that meets the following requirements: 15 Amp - 125 Volt NEMA 5-15R, tamper and weather resistant receptacle, aluminum, steel, or HDPE rectangular box, no cover, mountable to DIN rack adapter for load center. Power will be distributed to the cabinet through the Load Center that will be installed in the cabinet. Ground bars and distribution bars are to be installed adjacent to the Load Center for internal cabinet power distribution. Provide the main power to have its own 2-pole circuit breaker (amperage as defined in the plans) in the load center that will shut off power to the entire cabinet. The load center will be provided with a minimum of three single pole 120V-15A circuit breakers. Distribute cabinet loads across circuits to balance loads. The GFCI outlet and camera should each be on their own individual circuit (three total including one spare). Mount all power terminals and the Load Center a minimum of 12" above the bottom of ground mounted cabinets. If a PDA input file is required for loop detection, one may be installed as approved by the Engineer.

###### 14.2.7 FILTER

Install and house a removable and replaceable furnace type fiberglass filter behind door vents. Ensure the filtration area covers the vent openings. Ensure the filter is held firmly in place with a vented back plate shell that fits over the entire filter providing full support. Ensure the shell is louvered to direct the incoming air downward. Where air-conditioning is required, do not use door vents on the main doors and block the top vents of the cabinet with aluminum panels welded in place.

###### 14.2.8 DIN RACK ADAPTER

Provide each ITS cabinet with a 19 inch recessed DIN rail adapter with DIN rail for placement of Cisco equipment and other equipment. Where necessary for space, provide a second adapter for vehicle detector and/or CCTV equipment. The following minimum requirements apply: rail adapter is a 4U or 5U adapter with a minimum depth of 7.5 inches, 19 inch rack mountable with four mounting holes, aluminum or steel, supports a minimum of 20 lbs of equipment.

Provide each ITS cabinet with an additional 19 inch recessed DIN rail adapter for placement of load center and GFCI outlet. The following minimum requirements apply: adapter is 8U or 9U with a minimum depth of 7.5 inches, 19 inch rack mountable with four mounting holes, aluminum or steel.

###### 14.2.9 FAN

Attach a fan and thermostat assembly to the top of the cabinet.

###### 14.2.10 DRAWER

Supply a pull out drawer for all 334 and 336S type cabinets for placement of laptops or tools.

###### 14.2.11 SHELF

Supply a shelf for all 334 and 336S type cabinets for placement of laptops or tools.

###### 14.2.12 SURGE PROTECTION

Provide each cabinet with devices listed to UL 1449, current edition, to protect the control equipment from power surges and over voltages. This includes incoming power lines, the power supply, and outgoing lines when applicable. Supply all cabinets with 120/240 volt AC heavy-duty parallel surge protector on the AC service input. Provide surge protection for all cabinets except DMS only cabinets that have the following minimum specifications:

1. Voltage Protection Rating (VPR) of 700V, L-N, L-G, N-G
2. Surge current 100 kA per phase
3. Total peak surge current 80 kA (8x20 US)
4. SCCR of 42k AIC or available short circuit current, whichever is greater.
5. Failure indicator
6. Operating temperature range from -40°C to 85°C

If required to supply a DMS only cabinet, the following minimum specifications apply:

1. Voltage Protection Rating (VPR) of 700V, L-N, L-G, N-G
2. Surge current 80,000 amps per phase
3. Total peak surge current 80 kA (8x20 US)
4. SCCR of 200k AIC or available short circuit current, whichever is greater.
5. Failure indicator
6. Operating temperature range from -40°C to 85°C

###### 14.2.13 POWER STRIP

Provide a rack mounted power strip receptacle in cabinets. Include a minimum of 8 receptacles on this unit with a minimum of 2 receptacles on front and 6 receptacles on rear. Use UL 1449 rated for 330V surge suppression. Provide power strip to protect from over voltages up to 40,000 amps per phase.

If required to supply a remote controlled IP addressable power strip, use a rack-mounted power strip Dataprobe iBootBar NEMA model or approved equal and that meets the following minimum requirements:

1. Web controlled 8 outlet power strip
2. Multi-outlet, multi-user remote reboot
3. Outlet grouping for simultaneous switching
4. AutoPing for automatic failure detect and reboot
5. Operating temperature range from -30°C to 70°C

When iBootBar is specified, use iBootBar in lieu of power strip.

Plotted : 23-JUL-2019 11:22

Drawn By : Road  
File : ITS-S09.dgn

KANSAS DEPARTMENT OF TRANSPORTATION			
ITS EQUIPMENT SPECIFICATIONS			
ITS-S09		VERSION DATE: 05-29-17	
APP'D	DESIGNED	QUANTITIES	TRACED
DESIGNED CK.	DETAIL CK.	QUAN. CK.	TRACE CK.