12.2.2.1 IP CAMERAS-LOWERING DEVICE
Provide a camera lowering system for IP cameras that is equipped with a contact block specifically designed for use with IP cameras in an outdoor environment and includes an outdoor rated Cat 5e cable for the operations of video, power, data, and control molded directly to the contact block.

Ensure that the current carrying male contacts are gold plated, beryllium, and 0.09 inch in diameter at the contact area. Ensure that all current carrying female barrel contacts are also gold-plated, beryllium copper, and at least 0.09 inches I.D. at the contact area. Ensure that each individual female barrel contact has a stainless steel sleeve which prevents foreign matter from entering the contact area as well as preclude the possibility of the leaves of the female contact from opening beyond allowable limits and ensure a snug fit around the respective male pins. Ensure that there is at least one female contact that is positioned closer to the face of the female connector body than all the others, which will allow it to make first contact and break last contact to provide optimum grounding performance.

Ensure that each IP male/female connector includes (8) contacts mechanically crimped to Cat 5e wire and (5) contacts mechanically crimped to #18/1 UL lead wire, which may be used for additional camera requirements including, but not limited to: power, alarms, or grounds. Connect these wire ends to the contractor-provided power/signal cable in the pole and CCTV accordingly in a manner acceptable to Engineer. Ensure that each male pin is self wiping. During production, the contacts must be successfully tested and verified for Ethernet data speeds up to a minimum of 1000 Base T requirements.

Ensure that each male contact and female barrel contact is individually encased in their respective male and female molded rubber blocks to provide protection from moisture.

Ensure that the contacts are self-wiping with a shoulder at the base of each male contact so that it will recess into the female block, thereby giving a rain-tight seal when mated. Ensure that the facility manufacturing the electrical contact connector complies with Mil Spec Q-9858 and Mil Spec I-45208.

12.2.2.2 ANALOG CAMERAS-LOWERING DEVICE
Provide a camera lowering system that includes a factory installed 13-conductor plus coax composite cable for the operations of video, power, data, and control. Provide a composite cable that is compatible with the manufacturer of the camera as well as the lowering system and includes a factory pre-wired circular AMP connector and TNC for quick connections to the lowering device leads in the pole top. Provide this composite cable to include: One 75 ohm co-axial cable (RG59/U) with copper center and braid shield conductors, and polyethylene dielectric material; Two #22 AWG shielded twisted pair cable, orange-yellow and red-brown color codes; One #16 AWG twisted pair cable, black-white color code; One #14 AWG twisted pair, brown-red color code; Two #22 AWG twisted pair, violet-gray and blue-green color codes. Ensure that all cables are cabled together and the cable bundle is wrapped with an overall clear polyester tape, and PVC jacket of nominal 0.035” thickness, fillers may be used. Ensure that the overall outside diameter of cable is approximately 0.60”.

Ensure that the current carrying male contacts are 1/8 inch in diameter. Ensure that two male contacts are longer than the rest which will make first contact and break last contact to provide optimum grounding performance. Ensure that the number of contacts is a minimum of 14, and the camera mounted thereto, is capable of performing all of its necessary functions on 14 contacts or less.

Ensure that the current carrying female contacts are 1/8 inch I.D. Ensure that all of the contacts are recessed 1/8 inch from the face of the connector. Cored holes in the rubber measuring 1/4 inch diameter and 1/8 inch deep molded into the connector body are centered on each contact on the face of the connector to create rain-tight seals when mated with the male connector.

Ensure that the wire leads from both the male and female contacts are permanently and integrally molded in a UL94, V0 rated thermosetting synthetic rubber. Ensure that the current carrying and signal wires are constructed of #18/1 AWG synthetic rubber jacketed wire.

Ensure that the contacts are self-wiping with a shoulder at the base of each male contact so that it will recess into the female block, thereby giving a rain-tight seal when mated. The electrical contact connector must meet Mil spec Q-9858 and Mil spec I-45208.

12.2.3 CAMERA POLE
Provide poles in accordance with the latest edition of AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaries, and Traffic Signals including all interims. Furnish and install camera poles as shown on the Plans and details. Submit shop drawings of the poles to the Engineer and receive approval in writing prior to fabrication as described elsewhere in these Specifications. It is at the Contractor’s discretion to use steel or concrete camera poles with written approval by the Engineer.

12.2.3.1 CONCRETE POLE
Design poles considering application of wind load and dead load. The moment at any point along the length of the pole is the sum of the moments resulting from dead load and forces from wind loads. The wind force is equal to the wind pressure multiplied by the effective projected area of the objects involved. Design poles to have a minimum pole top deflection not greater than 1 inch in a 30 mph non-gust wind based upon the mounting of a single lowering device and camera.

Ensure that the pole achieves a minimum 28-day compressive strength of 8,000 psi. Use cement that conforms to the latest requirements of Type I Portland Cement in accordance with ASTM-C150. Maximum size aggregate may be ¾ inch (19mm) or ¾ of the clear spacing between reinforcing steel and surface of pole. Ensure that any water reducers, retarders, or accelerating admixtures conform to ASTM-C494. Use water that is free from foreign materials in amounts harmful to concrete and embedded steel.

Use deformed steel reinforcement that conforms to requirements of ASTM-A615 for Grade 60 Rebar. Use prestressing steel reinforcement that conforms to uncoated 7-wire, stress relieved strand; ASTM-A416. Use steel spiral reinforcement that conforms to the requirements of ASTM-A82 and is not less than .148-inch diameter. Ensure that all structural steel conforms to ASTM-A36 and zinc alloy AC41A conforms to ASTM-B240. Provide a finish that is hot dipped galvanized in accordance with ASTM-A153. Provide all poles with a #2 stranded copper ground wire cast into the wall of the pole at the handhole box location.

If colored or tinted concrete poles are required per the Plans, follow the procedures in this paragraph. Ensure that the pole is etched and finished with two coats of high performance urethane enamel. It is stated on the project drawings if a color other than gray is required, all pigments used shall be non-fade iron or chromium oxides. Color to be approved by the Engineer. Any deviation from the aggregate finish, color, and composition requires approval from Engineer.

Follow all manufacturing tolerance, details of reinforcement, and finishes in accordance with the Guide Specification for Prestressed Concrete Poles as published in the May-June, 1982, issue of the Journal of the Prestressed Concrete Institute.

Perform a concrete cylinder test for each 100 cubic yards of concrete poured. Perform a final quality control check on each pole after manufacturing is complete. Ensure that all quality control procedures are mandated in a written manual and are available for inspection.

Provide poles that are prestressed and the concrete placed by the centrifugal spinning process. The centrifugal spinning is to insure both a minimum 28-day compressive strength of 8,000 psi and a minimum of ¾ inch cover over the prestressing strand.

Provide poles that have a smooth natural form finish, soft gray in color unless an alternate color and finish is specified. Provide poles that are designed and constructed so that all wiring and grounding facilities are concealed within the pole. Cast all handholes, couplings, thru-bolt holes and ground wire into the pole during the manufacturing process.

Provide poles that are round in cross section and provide a continuous taper of 0.18 inch per foot of length and provide a minimum ¾ inch of concrete coverage over the prestressing strands. Provide all cable entry holes in accordance with the location shown on the standard detail drawings, and sizes as required, and are free from sharp edges for passages of electrical wiring.
1.Two 4” x 12” conduit entrance openings centered 24 inch below grade.
2.Handhole and pole top tenon as shown on the plans & per lowering device provider.

Mount camera lowering device to a special designed tenon bolted to the top of pole. Provide poles with a fish wire to facilitate cable installation. Provide poles with a minimum inside raceway dimension of 5 inches at tip of pole.

Ensure that prestressed concrete poles are lifted and supported during manufacturing, stockpiling, transporting, and erection operations only at the points shown on the shop drawings. Ensure that transportation, site handling, and erection are performed with acceptable equipment and methods, and by qualified personnel.

12.2.3.2 STEEL POLE
Steel poles that meet the requirements shown on the Plans shall be designed and used. Pole dimensions not shown on the Plans shall be determined by the manufacturer's design. Only round or hex decagonal (16 sided) shapes will be allowed. Submit shop drawings and detailed calculations signed and sealed by a Professional Engineer registered in the State of Kansas. Demonstrate compliance with the requirements shown on the Plans and herein. Submit calculations for poles that include analysis of the pole, base plate, and anchor rods. The design shall meet AASHTO Standard Specifications for Structural Support for Highway Signs, Luminaries, and Traffic Signals; current edition. Submit pole calculations that are analyzed at six inch (6") intervals from the base plate to the pole top. At each of these locations, give the following information:

1. The pole diameter, thickness, section modulus, moment of inertia, and cross sectional area.
2. The centroid, weight, projected area, drag coefficient, velocity pressure, and wind force of each trapezoidal pole segment.
3. The axial force, shear force, primary moment, total moment, axial stress, bending stress, allowable axial stress, allowable bending stress, and combined stress ratio (CSR) at each elevation.
4. The pole angular and linear deflection at each elevation.

Ensure that the pole is designed such that the deflection does not exceed one inch (1") at the top of the pole in a sustained 30 mile per hour wind condition. Provide a pole shaft that is one piece construction up to 50 feet in length, and conforms to ASTM A595 Grade A with minimum yield strength of 55 ksi or ASTM A572 with minimum yield strength of 55 ksi. Provide a pole with a constant linear taper of greater than or equal to 0.14 in/ft, and contain only one longitudinal seam weld. Ensure that hexadecagonal poles have a 4 in. corner radius. Circumferential welded tube butt splices and laminated tubes are not permitted.

Ensure that longitudinal seam welds within 6 in. of complete penetration pole to base plate welds are complete penetration welds. Ensure that tube longitudinal seam welds are free of cracks and excessive undercut, performed with automatic processes, and be visually inspected. Ensure that longitudinal welds suspected to contain defects are magnetic particle inspected. Ensure that all circumferential butt-welded pole and arm splices are ultrasonically or radiographically inspected.

Provide a single, large, bottom handhole opening that is reinforced with a minimum 2 inch wide hot rolled steel rim. Ensure that the nominal outside dimension is approximately 6 inches x 27 inches. Ensure that the handhole has a tapped hole for mounting the portable winch thereto. Ensure that a tenon is welded or bolted to the pole top with mounting holes and slot as required for the mounting of the camera-lowering system. Ensure that the tenon is of dimensions necessary to facilitate camera lowering device component installation. Ensure that each slot is parallel to the pole centerline for mounting the lowering device.

Provide a pole with a custom plate-mounted tenon that allows the field modification of the arm/camera orientation up to 360 degrees. Ensure that the tenon has mounting holes and slot as required for the mounting of the camera-lowering system. Ensure that the tenon is of dimensions necessary to facilitate camera lowering device component installation. Ensure that each slot shall be parallel to the pole centerline for mounting the lowering device.

Ensure that top and bottom electrical cable guides are located within the pole aligned with each other. Position one cable guide 2 inches below the handhole and position the other 1 inch directly below the top of tenon. Position a parking stand 1.5 inches below the top of the handhole on the inner portion of the handhole frame and located at 90, 180, and 270 degrees.

Construct CCTV pole foundations as indicated on the Plans.

Direct Tension Indicators:
DTIs are to comply with the requirements of the latest edition of ASTM F959 for the ASTM A325 bolts. The DTIs on the anchor rods are to comply with the requirements of the latest edition of ASTM F2437. Installation will adhere to the Plans and the KDOT Standard Specifications.

12.2.4 CABLES AND CONNECTORS
Furnish and install camera control cables. Furnish and install all necessary connectors to make the CCTV system operational. Determine the proper cable lengths. Splices in the control cables are not allowed.

12.2.5 ASSOCIATED CONTROL EQUIPMENT
Furnish and install equipment in the cabinet as specified in the construction Plans including associated patch cables and incidental items.

NO.	DATE	REVISIONS	BY	APP'D

KANSAS DEPARTMENT OF TRANSPORTATION

ITS EQUIPMENT SPECIFICATIONS

ITS-S07 VERSION DATE: 05-29-17

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

Plotted : 14-NOV-2017 10:56
Drawn By : examples
File : ITS-S07.dgn