

Modifications of "Electrical" Special Provisions per 10-Mar-2009 Meeting w/FHWA

Signal – Traffic

Supply each traffic signal in accordance with the provisions of Subsection 703.10.1, except for the "RED" and "GREEN" signal indications. Supply "RED" and "GREEN" signal indications which utilize light-emitting-diodes (LEDs) in accordance with the latest issue of the I.T.E. Vehicle Traffic Control Signal Heads specification. Supply circular signal indications that have colored polycarbonate lens that match the wavelength of the LEDs. Supply bi-modal "GREEN/YELLOW" arrow indications that utilize LED's.

a) Provide LED indications from a manufacturer that guarantees replacement or repair of LED signal indications that fall below minimum I.T.E. intensity levels during the first 60 months of operation.

b) Affix a permanent label, indicating the date of installation, to the back of each "RED" and "GREEN" and "GREEN/YELLOW" signal indication. The Project Manager must approve the label and method of attachment.

c) Use 7 conductor signal cable from the pole shaft mounted terminal block to the end of mast arm signal indication.

d) ~~Supply LED indications as specified above. Three manufacturers that meet this spec are Dialight Corporation, GELcore, and Leotek.~~

e) Use ½" coarse thread stainless steel bolts to mount traffic signals to the side of signal poles.

Signal – Pedestrian

Supply pedestrian indications that utilize light-emitting diodes (LEDs) for both the UPRaised HAND symbol and the WALKING PERSON symbol in accordance with the latest issue of the I.T.E. Pedestrian Traffic Control Signal Indications specification. Supply pedestrian signal indications that conform to the MUTCD. Supply indications that have the symbols side by side and have filled in symbols to give the appearance of an incandescent indication. Supply indications that are compatible with the pedestrian signal housing.

Supply LED indications that have a guarantee to be replaced or repaired if a signal indication fails to function as intended due to workmanship or material defects within the first 60 months of operation.

Supply LED indications that work with a conflict monitor utilizing NEMA-plus functions, specifically DUAL INDICATION.

Affix a permanent label, indicating the date of installation, to the back of each LED signal indication. The Project Manager must approve the label and method of attachment.

~~Supply LED indications as specified above. Three manufacturers that meet this spec are Dialight Corporation, GELcore, and Leotek.~~

Use ½" coarse thread stainless steel bolts to mount pedestrian signals to the side of signal poles.

Detector Loop

Furnish and install preformed and filled detector loops constructed from conduit.

Completely fill the conduit with hot rubberized asphalt or an approved flexible sealant to prevent incursion of moisture, and to set the turns of wire firmly in place.

Encase lead-in wires in a non-conductive 2250 psi flex hose constructed with a seamless extruded polyester fiber braid reinforcement and a non-conductive, seamless extruded urethane non-perforated jacket. Fill the lead-in hose completely with hot rubberized asphalt or flexible sealant. Twist wires in all lead-ins a minimum of two turns per foot for the entire length of the lead-in. Attach lead-ins to loop heads with a schedule 80 CPVC tee and a CPVC adapter bushing. Supply loops with sufficient lead-in to reach adjacent pull boxes. Use a continuous conductor without splices throughout the entire loop and lead-in hose.

~~Install Never Fail Loop System Model A preformed loops or approved equal.~~

Install loop detectors in accordance with the LOOP DETECTOR INSTALLATION detail included in the plans.

Detector - Video

a) Description. Provide a video detection system to detect vehicles for traffic signal operation.

b) Materials. Provide a complete detection system including a video camera, all necessary mounting hardware, a rack-mount vehicle detection video processor to detect vehicles, and one video monitor per traffic signal cabinet. Provide video detection cable as specified by the manufacturer of the video detection equipment utilizing a minimum Belden 8281 coaxial cable and an AWG16 conductor in a Siamese cable.

Provide a detection system that holds a call for presence while a vehicle remains in the detection zone. Provide a video camera that is shielded against sun and inclement weather and operates in a temperature range of -20°F to +120°F (-29°C to +49°C).

Include lightning protection as recommended by the video manufacture between the video camera and the video processor. Provide any additional coaxial cable, jumpers, connectors, and any miscellaneous equipment required to make this a complete, functional system as part of this item. Include terminal blocks necessary for connection.

Insure that a factory representative of the video detection system manufacturer is present at the traffic signal turn-on to give technical assistance in setting up, checking out, and demonstrating that the system meets functional and operational requirements.

~~Two video detection systems that meet these requirements are Iteris Vantage series, and Traficon VIP series.~~

c) Construction Requirements. Mount the video camera on the signal standard as shown on the plans. Install the video detection cable as one continuous cable from the traffic signal cabinet to each video camera. Splicing the video detection cable is not allowed. Install the lightning protection between the video camera and video processor as directed by the traffic signal engineer from the Traffic & Safety Bureau. Seal any wire entrance holes drilled in the signal standard as approved by the project manager. Deliver the video processor to the construction site at the time of the traffic signal turn on for installation in the cabinet.

d) Basis of Payment. Payment will be for furnishing and installing each camera, all mounting hardware, video detection cable, one video monitor per traffic signal cabinet, rack-mount video processor, and any miscellaneous equipment required to make this a complete and functional system.

Pushbutton - Pedestrian

Furnish and install pedestrian push buttons meeting the requirements of the Standard Specifications and the following specifications.

Supply push buttons that use a piezo switch and are actuated with minimal or no movement of the button. Supply push buttons that have a momentary red LED display and an audible tone to confirm actuation. Supply push buttons that have a stainless steel button. ~~Two manufacturers that meet this spec are Campbell Company and Polara Engineering Inc.~~

Use ¼" coarse (20 threads/inch) stainless steel bolts to mount pedestrian push buttons to the side of signal poles.

Yagi Antenna

a) Description. This item covers the antenna and the design, fabrication, and installation of antenna structures and brackets. This specification, instructions on the plans, and the drawings constitute the only acceptable design for the assemblies.

b) Materials. Provide a yagi antenna for mounting on traffic signal poles as shown in the detail drawings. Provide an antenna with a frequency range of 896 MHz to 960 MHz, a front to back ratio of 20 dB, a nominal gain of 10 dBd, and a bandwidth of 90 MHz. Provide an antenna that will withstand wind speeds of 100 mph, plus a 1.3 gust factor. Provide an antenna constructed of rust resistant, corrosive free materials. Provide associated hardware; plate mounts, washers, nuts, and bolts made of anodized aluminum, galvanized steel, or stainless steel. Round or chamfer all sheared or cut edges to approximately 1.6 mm and paint or galvanize all exposed edges. Provide an antenna that has coaxial cable integrally attached by the manufacturer.

~~One yagi antenna that meets these specifications is the Bluewave BMY890K Antenna.~~

Provide a broadband (125 MHz to 1,000 MHz) flange-mounted lightning arrester utilizing a UL497B listed gas tube. Provide an arrester that is multi-strike capable and has a maximum turn on time of 2.5 ns for a 2 kV/ns surge. Provide an arrester with an operating temperature range of -50 °F to 120 °F. ~~One manufacturer meeting this specification is Polyphaser Corporation part number IS-50NX C2.~~

Provide suitable brackets for installing the antenna on the signal pole. ~~Use Sky Brackets or Astro Brackets~~ as illustrated on the plans ~~or an approved equal~~. All associated hardware, brackets, washers, nuts and bolts are included as part of this item.

The use of the detailed drawings does not relieve the supplier of the responsibility for providing proper fit of the antenna and associated assembly components.

c) Construction Requirements. Install the antenna on the signal pole. Install the lightning arrester in the lower right hand side of the controller cabinet below the incoming power panel or as directed by the Project Manager.

Basis of Payment. Payment will be for each yagi antenna, which includes furnishing and installing the antenna, lightning arrester, and all hardware as described above.

Master Antenna

a) Description This item covers the design, fabrication, and installation of antenna structures and brackets. This specification, instructions on the plans, and the drawings constitute the only acceptable design for the assemblies.

Furnish and install an omnidirectional antenna with the following specifications:

- (1) Frequency range of 890 MHz to 960 MHz.
- (2) Gain of 6 dBd.
- (3) Impedance of 50 ohms.
- (4) Termination with a type "N" connector.
- (5) Wind survival rating of 200 km/h.

~~Two omnidirectional antennas that meet these specifications are the Scala OGB6-900 Omnidirectional Antenna, and the Decibel Products 586-Y Omnidirectional Antenna.~~

All associated hardware, brackets, washers, nuts and bolts are included as part of this item.

Furnish and install a broadband (125 MHz to 1,000 MHz) flange-mounted lightning arrester utilizing a UL497B listed gas tube. Furnish an arrester that is multi-strike capable and has a maximum turn on time of 2.5 ns for a 2 kV/ns surge. Furnish an arrester with an operating temperature range of -45°C to 50°C . ~~One manufacturer meeting this specification is Polyphaser Corporation part number IS-50NX-C2.~~ Install the lightning arrester in the lower right hand side of the controller cabinet below the incoming power panel or as directed by the Project Manager.

Furnish and install suitable brackets for mounting the antenna. ~~Use Sky Brackets or Astro Brackets~~ as illustrated on the plans ~~or an approved equal~~.

The use of the detailed drawings does not relieve the supplier of the responsibility for providing proper fit of the antenna and associated assembly components.

Payment will be for each master antenna, which includes furnishing and installing the antenna, lightning arrester, and all hardware as described above.

Cable – Copper Coaxial 50 Ohm 13 mm

a) Materials. Furnish 13-mm, super flexible, low loss, foam filled, watertight, coaxial cable between the omnidirectional master antenna and the master radio. Furnish coaxial cable with the following characteristics:

- (1) Impedance of 50 ohms, ± 1 ohm.
- (2) Maximum attenuation of 10.5 dB/100 m at 900 MHz.
- (3) Outer conductor of bonded aluminum tape and an overall braid of tinned copper with an inner conductor of copper-clad aluminum.
- (4) Foam polyethylene dielectric.
- (5) UV protected black polyethylene jacket.
- (6) Minimum bending radius of 50 mm.

~~One coaxial cable meeting this specification is Times Microwave Systems LMR-500-DB Flexible Communications Cable.~~

Use standard type "N" connectors with silver plated bodies and pins at both ends of the cable. Use type "N" connectors manufactured by the coaxial cable manufacturer.

Provide a jumper cable to connect the lightning arrester to the master radio that meets all of the same specifications as the coaxial cable and type "N" connectors listed above. Provide a jumper cable that is approximately 1.4 m in length. A pre-manufactured, super flexible, jumper cable may be used in place of coaxial cable.

b) Construction Requirements. Install the coaxial cable. Route the cable from the omnidirectional master antenna through the traffic signal pole as shown in the details. Field drill a hole in the traffic signal pole approximately 19 mm in diameter for cable entrance. Break sharp edges and treat the hole with cold galvanizing compound. Furnish and install a cable-protecting weatherproofing grommet to insure the installation is weather tight. Furnish and install a stainless steel wire mesh grip to provide strain relief for the cable.

Provide approximately 300 mm to 600 mm of extra cable in the vicinity of the lightning arrester prior to making the connection to the lightning arrester.

Install coaxial cable in one continuous run from the master antenna to the lightning arrester. Do not splice the cable. Do not place stress on the cable during installation such that the cable is twisted or stretched.

Cable – Copper Coaxial 50 Ohm 10 mm

a) Materials. Furnish 10-mm, super flexible, low loss, foam filled, watertight, coaxial cable between the yagi antenna mounted on the signal pole and the local radio located inside the traffic signal controller cabinet. Furnish coaxial cable with the following characteristics:

(1) Impedance of 50 ohms, ± 1 ohm.

(2) Maximum attenuation of 13.0 dB/100 m at 900 MHz.

(3) Outer conductor of bonded aluminum tape and an overall braid of tinned copper with an inner conductor of copper-clad aluminum.

(4) Foam polyethylene dielectric.

(5) UV protected black polyethylene jacket.

(6) Minimum bending radius of 50 mm.

~~One coaxial cable meeting this specification is Times Microwave Systems LMR 400 DB Flexible Communications Cable.~~

Use coaxial cable that is integrally attached to the antenna by the manufacturer or that uses a type “N” connector. Use a standard type “N” male connector with silver plated bodies and pins at the end of the cable. Use type “N” connectors manufactured by the coaxial cable manufacturer.

Provide a jumper cable to connect the lightning arrester to the local radio that meets all of the same specifications as the coaxial cable and type “N” connectors listed above. Provide a jumper cable that is approximately 1.4 m in length. A pre-manufactured, super flexible, jumper cable may be used in place of coaxial cable.

b) Construction Requirements. Install the coaxial cable. Route the cable from the yagi antenna through the traffic signal pole as shown in the details. Field drill a hole in the traffic signal pole approximately 19 mm in diameter for cable entrance. Break sharp edges and treat the hole with cold galvanizing compound. Furnish and install a cable-protecting weatherproofing grommet to insure the installation is weather tight. Furnish and install a stainless steel wire mesh grip to provide strain relief for the cable.

Provide approximately 300 mm to 600 mm of extra cable in the lower right side of the controller cabinet prior to making the connection to the lightning arrester.

c) Install coaxial cable in one continuous run from the antenna to the controller cabinet. Do not splice the cable. Do not place stress on the cable during installation such that the cable is twisted or stretched.

Gate – Road Closure

Furnish and install Road Closure Gates as shown on the plans. Include all necessary items and work required to erect the road closure gates as shown in the plans as part of this bid item. The cost of foundations, pull boxes, luminaire assemblies, service assemblies, and conduit & cables/conductors from the service assemblies to the road closure gates are included under separate bid items.

Include the Type 3R cabinet mounted on the road closure gate and internal components thereof as part of this bid item. Furnish a dry type core and coil transformer with 120 volt primary / 12 volt secondary meeting UL standard 506. Size of the transformer is 2.79”(H) x 3.29”(W) x 3.97”(D). ~~One transformer meeting these specifications is the GE Type IP Transformer, catalog number 9T58K1873.~~

Furnish and install gate arm lights that utilize red light-emitting diodes (LEDs) and have an operating range of 8.5 to 12 VAC (input voltage). ~~One product meeting these specifications is the AURORA Gate Arm Lights.~~

Furnish and install flashing beacon circular indications that utilize LEDs in accordance with the latest issue of the ITE Interim Purchase Specification Vehicle Traffic Control Signal Heads, Part 2: Light Emitting Diode (LED) Vehicle Traffic Signal Modules. Supply circular signal indications that have a colored polycarbonate lens that matches the wavelength of the LEDs.

Seal the lens for the LED signals to the housing making the unit watertight. Provide a one-piece neoprene or EPDM (Ethylene, Propylene, Diene Monomers) gasket around the lens and housing.

Supply LED indications that have a guarantee to be replaced or repaired if a signal indication fails to function as intended due to workmanship or material defects within the first 60 months of operation.

Affix a permanent label, indicating the date of installation, to the back of each LED signal indication. The Project manager must approve the label and method of attachment.

~~Supply LED indications as specified above. Three manufacturers that meet this spec are Dialight Corporation, GELcore, and Leotek.~~