SP-150710
(New)

SPECIAL PROVISIONS
FOR
TRAFFIC SIGNALIZATION

Johnson County
IM-380-6(319)2--13-52

Effective Date
December 15, 2020

THE STANDARD SPECIFICATIONS, SERIES 2015, ARE AMENDED BY THE FOLLOWING MODIFICATIONS AND ADDITIONS. THESE ARE SPECIAL PROVISIONS AND THEY SHALL PREVAIL OVER THOSE PUBLISHED IN THE STANDARD SPECIFICATIONS.

Comply with Sections 2525 and 4189 of the Standard Specifications with the following revisions.

4189.02, Detection.

Replace the Article:

~~**A. Inductive Loop Vehicle Detector:** A detector consists of a conductor loop or series of loops installed in the roadway, lead-in (feeder) cable, and a sensor (amplifier) unit with power supply installed in a traffic signal controller cabinet.~~

~~**1. Cables:** All cables must be UL approved.~~
~~**a. Tube Loop Detector Cable:** Comply with IMSA Specifications 51-5.~~
~~**b. Preformed Loop Detector Cable:** As approved by the Engineer.~~
~~**c. Loop Detector Lead-in Cable:** Comply with IMSA Specifications 50-2.~~

~~**2. Detector Loop Sealant:**~~
~~**a.** Use a rapid cure, high viscosity, liquid epoxy sealant formulated for use in sealing inductive wire loops and leads embedded in pavement. Ensure the cured sealer is unaffected by oils, gasoline, grease, acids, and most alkalis.~~
~~**b.** Use a sealant complying with Materials I.M. 491.18.~~

~~**3. Sensor (Amplifier) Unit:**~~
~~**a.** Use a sensor unit that is solid state, digital, providing detection channel(s) with an inductance range of 0 to 2000 micro-henries. Output circuits of the sensor unit will be provided by relays. Vehicle presence will result in a continuous call indication.~~
~~**b.** Provide a sensor unit with the following qualities:~~
~~**1)** Sensitivity adjustment to allow as a minimum the selection of high, medium, or low sensitivity.~~
~~**2)** Be capable of providing reliable detection of all licensed motor vehicles.~~

3) Provide an indicator light for visual indication of each vehicle detection.
4) Will not require external equipment for tuning or adjustment.
5) Provide operation in the pulse mode or presence mode. Ensure mode switch is readily accessible.
6) Provide a self tuning system that is activated automatically with each application of power. Provide automatic and continuous fine tuning to correct for environmental drift of loop impedance.
7) Provide for fail-safe operation (continuous call) in the event of detector loop failure.
8) Ensure each detector channel will respond to a frequency shift in an increasing or decreasing value as occurs with temperature shifts in the pavement without requiring a locked call.
9) Use detector units with delay and extension timing. The delay feature is selected and adjusted externally on the sensor unit housing. Digitally derived timing is selectable in 1 second increments from 0 to 30 seconds. Ensure delay timing inhibits detector output until presence has been maintained for the time selected. Restart delay timer at each new detection.
10) Use a sensor unit capable of normal operation without interference and false calls between sensor units ("crosstalk") when installed in the physical environment of the controller cabinet and the electrical environment of the associated electronic equipment installed therein, including other detectors.

B. Pedestrian Push Button Detectors.

1. Assembly.

a. Ensure the entire assembly is weather tight, secure against electrical shock, withstands continuous hard usage.
b. Provide a removable contact assembly mounted in a die cast aluminum case.
c. Ensure contacts are normally open with no current flowing except at the moment of actuation.
d. Ensure the contacts are entirely insulated from the housing and operating button with terminals for making connections.
e. Provide housing with one outlet for 1/2 inch pipe.

2. Accessible Pedestrian Signals (APS) Push Button Stations.

a. **Housing:** Die cast aluminum, weather tight, secure against electrical shock and withstands continuous hard usage.
b. **Audible and Vibrotactile Features:** Audible walk indication tone, vibrotactile arrow, and locator tone complying with MUTCD.
c. **Voice Messages:** As specified in the contract documents and per MUTCD.
d. **Speaker:** Weatherproof with automatic volume adjustment to 5 dBA over ambient sound. Maximum volume 100 dB at 3 feet.
e. **Push Button:** Nonrusting metal alloy, ADA compliant, 2 inch diameter with tactile arrow and 3 pounds maximum operational force.
f. **Switch:** Solid state rated at 20 million operations minimum.
g. **Program and Audio File Updates:** USB or Ethernet.
h. **Operating Temperature:** -30ºF to 165^{0}F.

3. Solid State Pedestrian Push Buttons (non-APS).

a. **Housing:** Die cast aluminum, weather tight, secure against electrical shock and withstands continuous hard usage.
b. **Push Button:** Nonrusting metal alloy, ADA compliant, 2 inch diameter with 3 pounds maximum operational force.
c. **Switch:** Solid state rated at 20 million operations minimum.
d. **Operating Temperature:** -30ºF to 165^{0}F.

4. **Signs:** Furnish signs complying with MUTCD.

C. **Video Detection Camera System:** Detects vehicles by processing video images and providing detection outputs to the traffic signal controller.

1. **Video Detection System and Processors.**
   a. Processor to be card rack mounted or located within camera. Compatible with NEMA TS-1, TS-2, and Type 170 controllers and cabinets.
   b. Shall be capable of the following:
      1) Shadow rejection without special hardware.
      2) Non impaired operation under light intensity changes.
      3) Maintained operation during various weather conditions (e.g. rain, fog, snow).
      4) Anti-vibration, 5% rejection based on image change.
      5) Ability to select direction of flow parameters.
      6) Ability to properly detect directionally.
      7) Operate in presence mode with less than 4% error.
   c. Provide user-defined detection zone programming via a graphical user interface (GUI) and any necessary equipment for future programming. Store detection zones in non-volatile memory.
   d. Comply with NEMA TS-1 and TS-2 environmental and physical standards with an operating temperature of -29°F to 140°F, and 0% to 95% relative humidity.
   e. Ensure a factory certified representative from the supplier provides on-site VDS programming and testing.

2. **Video Cameras.**
   a. Provide a charge-coupled device (CCD) image sensor with variable focus color or black and white lens providing a minimum of 4 to at least a 40 degree horizontal field of view.
   b. Equipped with internal thermostatically controlled heater and external sunshield.
   c. Meet NEMA-4 or NEMA-6P environmental standards.
   d. Use camera cable(s) meeting the manufacturer's recommendations. Provide a continuous run, without splices, from the camera to the controller cabinet.

D. **Microwave Vehicle Detectors:** Detects all vehicles moving within the field of detection at speeds from 2 to 80 mph.

1. Must be capable of the following:
   a. Minimum detection range from 3 to 200 feet for all vehicles.
   b. Pattern spread of the detection field no more than 16 degrees.
   c. Self-tuning and capable of continuous operation over a temperature range of -35°F to 165°F.
   d. Side-fire mount or overhead mount.
   e. Detecting directional traffic and the direction user selectable.

2. Microprocessor based using Doppler microwave at an operating frequency of 10.525 GHz.

3. FCC certification and tested to the applicable FCC specifications.

4. Enclosure constructed of aluminum or stainless steel and water resistant.

5. All user operated controls and adjustments must be clearly marked and easily accessible.

6. Relay detection output to the controller with a minimum 5 amp rating and designed to place a constant call to the controller in the event of any failure.

~~**7.** Easily accessible indicator showing activation of detection relay.~~

~~**8.** Required wiring as recommended by the manufacturer.~~

~~**9.** Provide mounting hardware for the type of mounting specified in the contract documents and power supply equipment as recommended by the manufacturer.~~

A. Wireless Vehicle Detector.

1. Detector consists of a wireless magnetometer sensor embedded in the roadway, an antenna/access point mounted on a signal pole, and a base station located in the traffic signal controller cabinet.

2. The wireless vehicle detector shall be Cubic / Trafficware POD Detection System.

3. Installation shall include PODs as indicated the plan documents, access points and antennas as needed per manufacture requirements, and a base station in traffic signal controller cabinet installed.

B. Video and Radar-Based Vehicle Detector.

1. Detectors shall be FLIR TrafiRadar Part Number 10-6066U.

2. Additional equipment shall be FLIR TI X-STREAM EDGE (US) Part Number 10-6055.

4189.04, Cabinet and Controller.

Replace the Article:

A. ~~NEMA~~ ATC Controller, Cabinet, and Auxiliary Equipment: Comply with the latest edition of ~~NEMA TS1 or TS2 standards~~ AASHTO/ ITE/ NEMA Advanced Transportation Controller (ATC) Cabinet Standard, ATC 5301 VO2.02.

1. Controller.

~~**a.** Solid state modular design with digital timing and capable of accommodating at least eight phases.~~
~~**b.** Fully prompted, front panel keyboard with menu driven programmability.~~
~~**c.** Local time base scheduler including automatic accommodation for daylight savings time.~~
~~**d.** Local coordination control.~~
~~**e.** Local preemption control with at least four programmable internal preemption sequences.~~
~~**f.** Current software and documentation.~~
~~**g.** Data retained in a memory medium that does not require battery backup.~~
The controller shall be Cubic / Trafficware Commander Rack Mount ATC Controller.

2. Cabinet.

a. Unpainted aluminum cabinet according to NEMA standards and the following.
1) The cabinet shall provide at least 72 input channels and 32 output channels.
2) The cabinet shall provide 48-volt DC output to signal heads.
3) The cabinet footprint shall be 340. Rack width shall be 19 inches.
4 The cabinet shall have front and rear double doors.

b. Aluminum cabinet riser with same dimensions as cabinet and 12 ~~to 18~~ inch height~~, as specified in the contract documents~~.

c. Police door with auto/flash switch and on/off power switch, manual/stop time switch, for signal heads only. Controller to remain in full operation regardless of switch positions.

d. Maintenance panel on inside of the main door containing the following test switches.
  1) Controller power switch.
  2) Detector test switches.
  3) Stop time switch.
  4) Signal flash switch.

e. Heavy-duty clear plastic envelope attached to inside wall of cabinet or cabinet door, for cabinet wiring diagrams, 12 inches by 18 inches minimum.

f. GFI electrical outlet and lamp in accessible location near the front of the cabinet. GFI outlet fused separately from main AC circuit breaker. Fluorescent or LED cabinet lamp connected and fused with GFI outlet.

g. Back panel positions to accommodate phasing and expansibility specified in the contract documents.

h. Power protection devices including AC power circuit breakers, radio interference suppressors, and lightning and surge protectors.
  1) AC field service single pole, nonadjustable, magnetic breaker rated for 117 VAC operation, NEC approved.
  2) Radio interference suppressors (RIS) as required to minimize interference in all broadcast transmission and aircraft frequency bands.
  3) Lightning arrestor/surge protector capable of withstanding repeated (minimum of 25) 30,000 ampere surges.

i. Neatly train wiring throughout the cabinet and riser. Bundle and attach wiring to interior panels using nonconductive clamps or tie-wraps.

3. Auxiliary Equipment: Conflict monitor/malfunction management unit, flasher, load switches, terminals and facilities, and miscellaneous equipment and materials according to NEMA standards.

a. The ATC Cabinet Monitor Unit shall be Eberle Design Inc. Model CMUip-2212-LV 32 Channel capability with ethernet for 48 Vdc cabinets.

b. The high density switch pack / flasher shall be Eberle Design Inc. Model 2202-LV 2 channel load switch (six outputs) / two channel flasher (four outputs), 48 Vdc.

c. The Auxiliary Display Unit shall be Eberle Design Inc. Model ADU-2220 ATC Cabinet, powered by 48 Vdc.

d. The Video and Radar-Based Vehicle Presence sensor shall consist of FLIR TrafiRadar (US) Part Number 10-6066U and FLIR TI X-STREAM EDGE part number 10-6055.

e. The ITS Serial Interface Unit shall be Eberle Design Inc. Model SIU-2218 Standard product with 1.5 inch narrow faceplate

f. The cabinet power supply shall be Eberle Design Inc. Model PS-2216-24-HV 48VDC@1 Amp, 24VDC @5 Amp

f. The Ethernet Swtich shall be EtherWan Model EX75964-0VTU 24-port 10/100/1000BASE-T(X) PoE + 4-port 1G/10G SFP+

B. Uninterruptible Power Supply Battery Backup System: Monitors 120VAC input from the electric utility source and automatically switches to/from a system consisting of batteries and electronics. The uninterruptible power supply shall be SIGNALSense Model SSDC-1500.

~~**1.** Include a maintenance bypass switch to allow operation of the traffic signal system while repairs are made to the battery backup system.~~

~~**2.** Designed to provide a minimum of 4 hours of normal operation.~~

~~**3.** Use cabinet equipment that is plug connected and shelf mounted.~~

~~**4.** Designed to cover a temperature range from -30°F to 165°F and include a surge suppressor.~~

C. Emergency Vehicle Preemption System: As specified in the contract documents.