ITEM 680.80140002 - 16 PHASE NEMA TRAFFIC SIGNAL CONTROLLER AND CABINET

DESCRIPTION
This work shall consist of furnishing and installing 16 PHASE NEMA TRAFFIC SIGNAL CONTROLLER AND CABINET in accordance with the contract documents and as directed by the Engineer.

MATERIALS
1.0 Controller
The Contractor shall supply a PEEK 3000E solid state controller, or APPROVED EQUAL, which is capable of communicating with CLMats.

2.0 Cabinet Details
2.1 General: The purpose of this specification is to describe the minimum acceptable design requirement for the fabrication, wiring, and installation of aluminum weather tight traffic signal controller cabinets. The cabinets shall be pole or ground mounted as shown on the plans and be of sufficient size to house all necessary equipment for the traffic signal operation specified, including detector amplifiers or trans receivers. The cabinets shall be clean cut in design and appearance or approved equal. Grinding, sanding or other appropriate means shall be used to effect a smooth surface. All non-aluminum parts shall be made of stainless steel.

2.2 Cabinet: The main door of all cabinets shall include substantially the full area of the front of the cabinet. All doors shall be reinforced on the inside in such a manner as to prevent warping. Two hinge lugs shall be integrally cast in the right side of the door in such a way that together with the stainless steel hinge pins, they shall provide proper mounting and operation of the door. A gasket bead shall be installed on the inside of the door, which together with the neoprene air-cored cabinet gasket, shall form a weather-tight seal between the housing and the cabinet door. The main door shall be equipped with a 3 cylinder lock, keyed for the maintaining authority’s standard locks and a dust cover. An adjustable stainless steel striker plate shall be attached to the inside of the housing to ensure positive locking. Door shall be designed so that it can be removed and replaced if damaged.

2.3 Police Door: Cabinets shall have a secondary police panel door. A manual control grip switch and cord approximately 6 foot long shall be installed in each police door housing. The cord shall retract itself into a 6 inches length. The secondary door shall also provide access to switch for flashing operation an manual operation.

2.4 Mounting Hardware: Cabinets shall be furnished with mounting plates, condulets, anchor bolts and/or other necessary hardware for installing cabinets to poles or foundations as indicated on the plans.

2.5 Ventilation: Cabinets shall be equipped with a thermostatically controlled ventilation fan. The vent shall be designed to prohibit entry of rain, insects, and foreign objects. The fan shall have a minimum rating of 4.5 cubic yards per minute. The thermostat shall
be adjustable from 68°F to 160°F with a differential of not more than 39°F between automatic turn on and turn off.

2.6 Exterior Finish: Natural aluminum.

2.7 Keys: Two keys shall be provided for each controller cabinet and two keys for each secondary police panel door.

2.8 Interior Equipment: All cabinets shall contain a mounting table, sliding ways or other suitable support for a controller. Each cabinet shall contain no less than the following equipment:

2.8.1 Main switch and circuit breaker.

2.8.2 Solid-state switch packs.

2.8.3 Solid-state conflict monitor.

2.8.4 Automatic flash switch.

2.8.5 Duplex convenience outlet.

2.8.6 Standard NEMA lamp receptacle.

2.8.7 Flash transfer delay.

2.8.8 Radio interference filter and suppressor.

2.8.9 Ground bus.

2.8.10 Power line surge protector.

2.8.11 Terminal blocks (including interconnect, detector and signal lamp).

2.8.12 Programming flasher sequence.

2.8.13 Solid-state flasher, Type 1-20 amp, single circuit.

2.8.14 Flasher operation switch (Police door).

2.8.15 Manual operation switch (Police door).

2.8.16 6 foot manual operation cord (Police cord).

2.8.16.1 The circuit breaker or approved equal line disconnect switch, shall be of adequate amperage and installed for operation in a vertical direction. An enclosure for this switch shall not be required unless otherwise shown on the
ITEM 680.80140002 - 16 PHASE NEMA TRAFFIC SIGNAL CONTROLLER AND CABINET

plans or required by Underwriters’ laboratory or utility company supplying electric power.

2.8.16.2 All cabinets containing a flasher and other kinds of interrupting devices shall be equipped with a suitable radio interference suppressor installed at the circuit breaker. The suppressor shall provide a minimum attenuation of 50 kilocycles to 75 megacycles. The suppressor shall be hermetically sealed in a substantial metal case, filled with a suitable insulation compound. The suppressor terminals shall be nickel plated, 10-24 brass studs of sufficient external length to provide space for connection of two No. 8 AWC conductors, and shall be so mounted that the terminals cannot be turned in the case. The suppressors shall be designed for operation on 30 amperes, 125 volts, 60 Hertz, single phase operation and shall be approved by UL and EIA.

2.8.16.3 The gauge of all insulated wires between various parts and components of the cabinet shall be of adequate size. Where signal lamp currents are carried, the minimum wire size shall be No. 14 AWG. All cabinet wiring where connected to terminal strips, flasher, relays, switches, radio interference, suppressors, etc., shall be identified by the use of either insulated, pre-printed sleeving slipped over the wire before attachment of the lug or making the connection, or by the use of heat stenciled wire designations are used, an appropriate translating sheet shall be supplied with the controller. All wires shall be doubled back to take up slack. Wires shall be neatly laced into cables with nylon lacing. Cables shall be secured with nylon cable clamps. The grounded side of the electric service shall be carried through the cabinet without a break. The electrical connections between the controller unit and the terminal panel shall be made by MS type, female cable socket to enable the rapid exchange of the complete mechanism without disconnecting and reconnecting individual wires. All electrical connections in the cabinet, including relays, flashers, terminal strips, etc., shall have sufficient clearance between each terminal and cabinet to provide an adequate distance to prevent a leakage path or physical contact under stress. Where these distances cannot be maintained, barriers must be provided.

All equipment grounds shall run directly and independently to the ground bus. The lay of the interconnect cable between the components must be such that when the door is closed, it does not press against the cables or force the cables against the various components inside the cabinet.

Terminal strips located within the cabinet shall be accessible to the extent that it shall not be necessary to remove the controller from the cabinet to make an inspection or connection. The right side of the cabinet shall have the detection terminals. The electric service connections shall be on the left side of the cabinet. The signal lamp circuit shall be located at the rear wall, and
interconnection wiring, where required, shall be to the right wall. All terminal strips shall be provided with barriers between each terminal, be brass screw type hot dipped finish and rated for 15 amp 120 volt AC. Signal lamp circuit terminals shall be marked for each controller phase with a subscript denoting the particular phase, in consecutive order as follows:

R1, A1, G1, DW1, W1, R2, A2, G2, etc.

Terminals shall also be provided for all other circuits for the controller specified, including, but not limited to detector circuits, yield circuits, etc. A grounding strip having a minimum of nine connections shall be provided and grounded to the cabinet.

2.8.16.4 The automatic-flash switch shall extinguish all signal indication except the yellow on the major street and the red on the minor street or streets, which shall flash. The power supply to the controller is not to be affected and the controller will continue to function in a normal manner.

2.8.16.5 It shall be possible to disconnect the controller without interfering with the flash operation. One contact on the flash switch shall extinguish the AC plus voltage used to feed power to the pedestrian signals.

3.0 Details for Solid-State Load Switches
Requirements. The solid-state load switches shall be triple-signal load switches as specified in NEMA Publication TS 1-1976, and all subsequent revisions. The solid-state load switches shall be mounted external to the controller unit, and shall be jack mounted in compliance with NEMA Publication TS 1-1976, and all subsequent revisions. Each solid-state load switch shall be furnished with three built-in indicator lights on the output side for phase identification. No mechanical means shall be employed to mount the solid-state load switches, which shall prohibit the interchangeability between the manufactures.

4.0 Details for Signal Conflict Monitor
A NEMA conflict monitor unit shall be supplied for all solid-state load switches. The conflict monitor shall be the latest NEMA PLUS conflict monitor.

5.0 Details for Solid-State Flasher and Flasher Relay
5.1 Requirements.
5.1.1 A solid-state flasher, Type 1-20 ampere-single circuit, as described in NEMA Publication TS 1-1976, all subsequent revisions, shall be furnished and produce between 50 and 60 flashes per minute with an on period of 50 ± 5 percent. The flasher shall mate with a Cinch-Jones socket type S-406-SB or equivalent.

5.1.2 The flashing output shall consist of one output rated at 20 amperes. The combined load connected to circuits 1 and 2 shall not exceed 20 amperes.
ITEM 680.80140002 - 16 PHASE NEMA TRAFFIC SIGNAL CONTROLLER AND CABINET

5.1.3 The flasher relay shall energize the solid-state flasher and transfer the signal light circuits from the controller unit to the flasher. The flasher relay shall have a plug-in mounting.

CONSTRUCTION DETAILS

METHOD OF MEASUREMENT
This work will be measured as the number of 16 PHASE NEMA TRAFFIC SIGNAL CONTROLLERS AND CABINETS satisfactorily furnished and installed.

BASIS OF PAYMENT
The unit price bid shall include the cost of furnishing all labor, materials, and equipment necessary to satisfactorily complete the work. This shall include all labor, materials, and equipment necessary to complete the installation of the controller, controller wiring harnesses, cabinet, all needed conduits, mounting fittings, power supply meter installation (if required), and all auxiliary equipment necessary to meet plans and specifications.

Progress payments will be made in the following manner:

- Sixty-five percent of the bid price of each component will be paid after it is installed and ready for testing.
- Twenty-five percent of the bid price will be paid after satisfactory completion of all tests required by these specifications, including the function test for ten days of continuous satisfactory operation of the traffic signal system at each signalized location.
- The remaining ten percent will be paid when all the traffic signals in the contract are functioning to the satisfaction of the Engineer.