SECTION 650
VEHICULAR SIGNAL ASSEMBLIES

650-1 Description.

Install vehicular traffic signal assemblies. For additional requirements related to the installation of the signals, refer to the appropriate Sections for the installation of related elements of the overall traffic signal system.

650-2 Materials.

Use signal housings, light emitting diode (LED) modules, backplates, and signal auxiliaries currently listed on the Department's Approved Product List (APL). Ensure that all equipment is marked in accordance with Section 603.

650-3 Installation.

650-3.1 Preassembly: Pre-assemble the signal heads when more than one signal section is required prior to installation at the site. Furnish signal heads with LED modules, backplates, and visors. Use tunnel visors unless otherwise specified in the Contract Documents. Install the LED ball module in the door so that the UP arrow or the word UP or TOP is in the up orientation of the signal housing. Install the LED arrow modules in the signal housing door in the direction of the intended use.

650-3.2 Positioning of Signals: Consider the locations of the installed signals as shown in the Plans as sufficiently flexible as to allow for unanticipated field conditions at the site. The Engineer will direct any variations from the locations shown. Position adjacent signal faces no closer than 8 feet apart measured horizontally at 90 degrees to the traffic flow between centers of faces.

Regardless of the results of any scaled dimensions, consider the location shown in the Plans to be approximate. Position a signal face mounted on a span wire or mast arm as near as practical to the line of the driver's normal view.

Ensure that all sections are of the same manufacturer and the section assemblies are uniform in appearance and alignment.

650-3.3 Clearances: Unless directed otherwise by the Engineer for unusual circumstances at the site, provide a vertical clearance of not less than 17 feet-6 inches and not more than 19 feet for traffic signals placed over the roadway. Measure such clearance for each span directly under the most critical signal assembly (in regards to clearance) for that span. Place signal assemblies on each span as near as practical to the same elevation as the critical signal assembly.

Ensure that the lowest point on pedestal-mounted and side-mounted signal heads is 12 feet above finished grade at the point of their installation.

650-3.4 Aiming of Signal Indication: For proper lateral orientation, aim signals after installing and before locking them in position.

650-3.5 Wiring Connections: Do not splice signal cable. Connect the proper signal cable to the terminals in each signal head in order to provide the proper signal indication display when the cables are connected to the controllers. Wire a separate neutral circuit and return it to the controller cabinet from each vehicular movement as shown in the Contract Documents.

650-3.6 Special Installation Requirements for Optically Programmed Signals: Install, direct (aim), and conceal optically programmed signals in strict accordance with the

instructions of the manufacturer, using the materials furnished by the signal manufacturer with the signals, and with the directions of the Engineer.

Position the signals for maximum performance in accordance with the requirements shown in the Plans, and install them with rigidly firm mounts, using elbows and plumbizers of such type as will provide for stability of the position of the signals. Do not use clevises in the supporting attachments.

Seal the cable routing to the signals to provide permanent water tightness.

650-3.7 Vertically Mounted Polycarbonate (Light-Weight) Signal Head Assemblies: The top section of all multi-section (5-section, 3-section), vertically mounted, light-weight signal heads must be constructed of die cast aluminum, unless the entire 3-section polycarbonate signal head assembly is specifically approved and listed on the APL as a 12 inch polycarbonate 3-section vehicle assembly. Ensure that all sections of multi-section assemblies are from the same manufacturer.

Single section signals may be constructed of die cast aluminum or polycarbonate construction.

650-3.8 Backplates: Install louvered backplates on all signal head assemblies. On posted speed limits of 45 mph or greater, provide backplates with a reflectorized border.

650-3.9 Sealing Installed Signal Head Assembly: Ensure that the installed signal head assembly is sealed to exclude dust and moisture. Drill two, 1/4 inch drain holes in the bottom of the installed signal head assembly.

650-3.10 Concealing Signals Not in Use: Where traffic signals are installed and not put into service immediately, conceal the signal head assembly by placing burlap bags or other covering approved by the Engineer over a weather resistant covering of non-transparent material open at the bottom to prevent condensation buildup.

650-3.11 Installation Sequence: Install all traffic signal assemblies at any intersection as a single operation unless a staged operation is approved by the Engineer.

650-4 Method of Measurement.

650-4.1 General: Measurement for payment will be in accordance with the following work tasks.

650-4.2 Furnish and Install: The Contract unit price per assembly for traffic signal, furnished and installed, will consist of the traffic signal assembly, including all attachment hardware necessary to make a complete unit, all mounting brackets, drop-pipe, disconnect hangers, backplates, visors, LED modules, labor, and materials necessary for a complete and accepted installation.

650-4.3 Furnish: The Contract unit price per assembly for traffic signal, furnished, will include the cost of all components of a traffic signal assembly plus all shipping and handling cost involved in delivery as specified in the Contract Documents.

The Contractor shall deliver the assembly in an unassembled state, with the following exception, deliver signal sections assembled in the required number of sections for one direction so that with minimum effort they may be combined into a multiple direction assembly as specified in the Contract Documents. The Contractor shall include all hardware specified in this Section in the components of the assembly which are to be furnished and used in the installation of the assembly. The Contractor shall package and ship component parts of the assembly in accordance with manufacturer’s instructions in order to minimize the potential for damage during shipment.

650-4.4 Install: The Contract unit price per assembly for traffic signal, installed, will consist of all labor necessary to assemble all traffic signal components for a complete and accepted installation.

The Engineer will supply all traffic signal assembly components. The Contractor shall furnish any required minor miscellaneous standard hardware items, such as nuts and bolts, as part of the installation task.

650-4.5 Relocate: The Contract unit price per assembly for traffic signal, relocate, will include the removal of the signal head and installation at the location shown in the Plans. This includes signal cable and all other materials necessary for a complete and accepted relocation.

650-5 Basis of Payment.

Price and payment will be full compensation for all work specified in this Section.

Payment will be made under:

Item No. 650- 5- Traffic Signal - per assembly.