ITEM 690
TRAFFIC SIGNAL HEADS

690.1 Description. This Item shall govern the minimum design and requirements for adjustable face aluminum or polycarbonate functional requirements for traffic control signal heads and signal heads hardware.

690.2 General. The traffic control signal heads shall be in accordance with the Latest Edition of Institute of Transportation Engineers (ITE) Technical Report No. 1, except as noted below. The Contractor shall supply written certification of compliance from the manufacturer.

Each traffic signal face shall consist of a number of signal sections rigidly fastened together in such a manner as to present a continuous pleasing appearance. Assembled signal sections shall not exhibit light leakage.

The traffic signal head shall consist of a system of one or more signal faces installed and illuminated in a definite sequence by a remote timing device, which shall indicate to traffic approaching the signal face the right of way at the intersection or giving warning of existence of a hazardous condition, thus facilitating an orderly movement of traffic through the intersection.

Structural requirements for aluminum and polycarbonate materials are described in Section 690.4.

Unless otherwise specified in the drawings, the material for the mounting attachments shall be cast aluminum alloy.

The signal, including one or more LED modules, shall be sectional in construction, requiring one section for each module.

The design of the signal shall be such, that with the aid of simple tools and addition of standard signal fittings; these signal assemblies with the addition of standard bracket assemblies will assemble into two-way, three-way, four-way and horizontal signal head configurations.

690.3 Standard Signal Face & Heads. Signal face and signal arrangement shall be as shown in the drawings; and conform to the Latest Edition of the "Texas Manual on Uniform Traffic Control Devices for Streets and Highways".

The "Standard Signal Face" shall consist of three or more LED modules, each mounted in an individual housing case.

All housing cases of each of the multiple-way signal heads shall be rigidly attached, at top and bottom, to 1-1/2" (38mm) (inside diameter) tubular supporting arms radiating from hubs at the vertical central axis of the head and rigidly attached thereto in a manner that will assure permanent
alignment of the separate housings. The hub shall be designed to conform to the type of mounting attachment specified in the drawings and provisions shall be made for carrying the leads from each housing enclosed in the supporting arms to a single outlet in the mounting attachment. All units of the assembled head shall be of adequate strength for the purpose intended and shall be constructed of materials not affected by continuous exposure to corrosive atmospheres, particularly salt air.

A metal spacer in place of the bottom pipe bracket will be acceptable for multiple-way span-wire and mast-arm mounted signal heads.

Signal Faces to be installed vertically or horizontally on mast arms shall be mounted by the appropriate and necessary hardware as approved by Harris County. Any signal heads to be installed vertically or horizontally on the signal pole shall likewise be mounted by hardware as approved by Harris County.

Unless otherwise called for in the drawings, all supporting arm assemblies shall have threaded connections, not welded, and shall be assembled with full threaded crosses, not elbows.

690.4 Housings. The Polycarbonate resin material with sides, top, and bottom integrally molded. The housing shall be injection molded from ultraviolet and heat stabilized flame retardant, permanently colored polycarbonate resins. The housing shall at least 0.125 inches (3.18 mm) thick anywhere on the housing and shall be internally ribbed so as to produce the strongest possible assembly consistent with light weight. The terminal block shall either be securely mounted or integrally molded into the housing (see Section 690.4, Paragraph 11).

The silicon aluminum alloy traffic signal housing cases, also designated herein as optical-unit housings, if required in the drawings, shall be die cast of a silicone aluminum alloy by a process imparting a smooth homogeneous finish. Casting shall be accurately formed and free from pouring faults, sponginess, cracks, blowholes, or other defects affecting their strength and appearance.

All visors shall be of a silicon aluminum alloy and may be of cast material or of sheet metal having a minimum thickness of 1/16” (1.6 mm).

The signal housing cases, fittings, and accessories shall be of noncorrosive, rust resistant material capable of withstanding constant exposure to sunlight and corrosive atmospheres, including salt air, and shall provide adequate strength for the purpose of which it is utilized.

Provision shall be made for accommodation of the particular type of mounting specified and attachment of doors, optical units, and other such accessories as may be specified for the particular installation. All traffic signal housing cases, together with doors, lenses, and mounting attachments shall comprise a dust and moistureproof housing for the LED
module, connecting wiring, and terminal block. The housing cases shall be of such construction as to assure permanent alignment of the lens in the traffic signal face. Design of door, housing, and visor shall be such that no light is visible in the profile view of the traffic signal face.

Traffic control signal housing cases shall be of the sectional adjustable expandable type. The assembled housings for each signal face shall consist of three or more individual sections, each designed for housing a single complete LED module. Individual signal sections shall be rigidly attached to form a single "Signal Face" either with at least four machine screws between each section or by the three bolt and two washer method. Complete signal faces shall provide positive locked positioning when used with serrated brackets, mast arm, or span wire fittings.

The top and bottom of each signal section shall be provided with a serrated ring surrounding a two inch diameter hole, such that positive locking of signal faces can be accomplished when mounted with serrated ring.

The serrated ring at the top of each signal shall be raised 0.128 inches above the surrounding body and rib plane to prevent water trapped between signal sections or falling on top of a signal from entering into the housing.

Portions of cases providing for attachment to supporting arms shall be molded with large bosses for the supporting arms. Each housing case shall be so attached to its supporting arm that it will be adjustable by rotation about its vertical axis in such a manner that any pair of adjacent cases may be adjusted individually to give indications in two directions as close as 15 degrees apart and may be rigidly clamped in any position throughout the range of adjustment. Provision shall be made for carrying the traffic signal leads enclosed in the mounting attachment.

Both the top and bottom of each traffic signal housing case shall be provided with an opening of two inches (50 mm) in diameter to accommodate 1-1/2" (38 mm) pipe brackets. A locking ring shall be integrally cast or molded around the bottom opening. Around the top opening shall be either an integrally cast or molded locking ring or a separate splined locking ring designed to fit into notches. The locking rings shall have a minimum of 46 evenly spaced teeth and shall be so designed that the top and bottom rings will mate to provide a perfectly aligned signal head with flush connection between the outer circumference of the sections.

Threaded metal inserts shall be provided in a walled off portion of each signal for terminal block mounting. It shall be possible to place an insulating cover over the terminal block, that will match the wall surrounding the terminal block.

Any open end of an assembled beacon face housing shall be plugged with an ornamental cap and gasket.
690.5 Housing Door. The housing door of each traffic signal housing shall be a one piece polycarbonate resin material or die cast in a silicon aluminum alloy with an approximate 12 inch (300 mm) diameter circular opening for the lens as specified. The door must be of the same material as the housing. The housing door shall be at least 0.125 inches (3.18 mm) thick anywhere on the housing door.

A. Silicon Aluminum Alloy Door. The door shall be provided with hinges and lugs for attachment to the main body casting, so spaced as to hold the door in perfect alignment when closed. The door shall be securely gasketed to the traffic signal housing with a weatherproof gasket.

B. Polycarbonate Resin Door. The door shall be attached to the housing by means of two stainless steel hinge pins.

Two stainless steel wing screws shall be installed on the side of the door to provide for opening and closing the door without the use of tools. Wing screws shall have a flat-bearing surface or stainless steel flat washer to prevent gouging of the housing door by the wing screws. Wing screws shall remain captive in the housing door when the door is open.

690.6 Visors. Each traffic signal housing door shall be equipped with an easily detachable standard tunnel or full circle visor (unless otherwise indicated). The visor shall be a polycarbonate resin or a silicon aluminum alloy to match the housing and door. The visor shall be rigidly attached to the door with stainless steel screw type connections in a manner that will prevent the leakage of light and moisture throughout the periphery of attachment.

Unless otherwise called for in the drawings, the visor on the front of each door shall:

- Be circular in section;
- Have a downward tilt of 2 to 8 degrees;
- Encompass approximately 300 degrees of the lens;
- Extend outward from the face of the lens a minimum of 9-1/2" (240 mm) for 12" (300 mm) diameter lens (measured at its outer visible circumference);
- Be of such design that the encircled portion of the lens will not be visible in the profile view of the traffic signal face; and,
- Be open at the bottom so as to prevent the accumulation of snow and dirt.
Visors shall be easily removed and replaced without damage to visor or signal head.

690.7 Terminal Blocks. Each optical unit shall be wired to a two-post terminal block located in that signal section. The terminal block in the top or red signal section shall have a six-post terminal block. All sections of the signal face assembly shall be wired to the six-post terminal ready for field installation. All terminal blocks shall be securely mounted in an accessible position and shall be of weatherproof molded construction, equipped with identified terminals. Binding screws shall be provided for the field and interior wires.

If specified, and/or shown in the drawings, a Terminal Compartment shall be provided for the side of pole-mounted signal heads in addition to the signal face assembly terminal block specified above. The terminal compartment shall be located as called for in the item description and drawings.

The Terminal Compartment shall be equipped with a readily accessible moistureproof cover and weatherproof molded-construction connector block with identified terminals for signal and field wires. Separate terminals shall be provided for the interior wires and the field wires. In addition to the interior wires required above, the supplier is also required to furnish and install all other leads necessary to connect the terminal block of the multiple section face to the terminal block in the Terminal Compartment. Each lead shall be brought to a separate terminal in the Terminal Compartment except that the commons from one housing can all be brought to the same terminal in the Terminal Compartment. The color coding on leads from the individual optical units shall be maintained from the lamp holder to the individual terminals in the signal head Terminal Compartment except that the commons from each housing shall be grouped and carried to one terminal. The wiring shall be so arranged that any one optical unit can be individually illuminated through connections to terminals in the Terminal Compartment.

The Terminal Block installed in the Terminal Compartment shall be equipped with Pressure-Type Connectors having a minimum capacity of two No. 12 AWG solid-copper conductors per connector and shall be provided with barriers and rated for 25 amperes, 250-volt service. This multiple-connector terminal block is to be equipped with a minimum of twelve sets of connectors, with separate terminals for the interior and the fieldwire connections. Any variations from the above requirements will be covered in the Standard Traffic drawings.

Use of Terminal Compartments containing terminal blocks does not eliminate the requirement for terminal blocks specified above.

690.8 Mounting Attachments. All mounting attachments shall be cast aluminum specified in the drawings.
Provision shall be made for carrying the signal leads enclosed in the mounting attachment. The mounting attachment together with supporting arms and assembled housings, shall comprise a dust-and-moisture-proof enclosure for optical units and lead wiring.

690.9 Traffic Signal Hardware. Horizontal Signal Head Span Wire Hardware Kit. The hardware shall be in accordance with drawing number 1, which is part of this specification. All hardware shall be packaged in the same box.

Horizontal Signal Mid Mast Arm Kit. The hardware shall be in accordance with drawing number 2, which is part of this specification. All hardware shall be packaged in the same box.

Horizontal Signal End Mast Arm Kit. The hardware shall be in accordance with drawing number 3, which is part of this specification. All hardware shall be packaged in the same box.

Vertical Signal Kit. The hardware shall be in accordance with drawing number 4, which is part of this specification. All hardware shall be packaged in the same box.

690.10 Material & Colors (Polycarbonate Signal Faces and/or Signal Heads Only). All material used in construction of major traffic signal components shall be polycarbonate resin. This material shall withstand 70 foot-pounds (95 Joules) of impact without fracture or permanent deformation.

Material for hardware shall be cast aluminum of adequate strength for the intended purpose.

The color of the completed traffic signals shall be Federal Yellow with the exception of the underside of the visors which shall be painted a flat black. The yellow color shall be completely impregnated in the resin material.

690.11 Paint & Painting (Metal Signal Faces and/or Signal Heads). Before shipment, all exposed metal surfaces except for the inside of the visors of the assembled traffic signal head shall be given two coats, separately baked on, of high grade highway yellow enamel. The inside of the visors shall be provided with two coats of high grade dull black finish paint.

Any variation in color of enamel will be covered in the Item Description.

690.12 Guarantee. The signal shall be guaranteed against imperfections in workmanship or material for a period of 2 years from date of completion.

690.18 Measurement and Payment. Traffic Signal Heads shall be paid by each signal head assembly installed, including all required mounting hardware.

There are line code(s), description(s), and unit(s) for this Item.
NOTE: This Item requires drawings that shall be incorporated into the contract documents.

NOTE: This Item requires other Standard Specifications

Item 689 "Twelve Inch LED Traffic Signal Lamp Unit"

END OF ITEM 690