

Special Specification 6087

Camera Pole Structure with Cabinet



1. DESCRIPTION

Provides for the furnishing, fabricating, and installing of a camera pole structure with cabinets as shown on the plans. The design conforms to the AASHTO "Standard Specifications for Structural Supports for Highway Signs, Luminaries and Traffic Signals, 5th Edition," with Interim Revisions thereto and with additional interpretations as applied by the Department.

2. MATERIALS

2.1 **General.** This Item, instructions on the plans, and the drawings constitute the only acceptable design for the assemblies.

Fabrication and welding will be in accordance with Item 441, "Steel Structures." All welded joints will develop the full required strength of the member.

All materials furnished, assembled, fabricated or installed under this Item will be new, corrosion resistant and in strict accordance with the details shown on the plans and in this Item.

2.2 **Shop Prints.** Seven prints of the shop drawings showing the fabrication and erection details for each support including the closed circuit television (CCTV) cabinet and mounting details will be submitted for review and approval prior to fabrication. The drawings will be prepared on sheets 22 in. x 34 in. in size, with 1-1/2 in. left margin and other margins of 1/2 in.

Each sheet will have a title in the lower right corner which includes the sheet index data shown in the lower right corner of the project plans, names of the fabricator and contractor, and sheet numbering.

Drawings for only one support need be submitted for two or more supports in the submittal which are of identical design and dimensions.

The Contractor will be responsible for the correctness and completeness of the drawings and for shop fit and field connections, even though the drawings have been approved by the Department.

The camera pole will be fabricated to the design wind speed specified on the plans and this wind speed will be identified permanently on the pole base plate and will be visible after erection.

2.3 **Delivery.**

The use of the detailed drawings does not relieve the supplier of the responsibility for providing proper fit of camera pole assembly components.

The supplier will furnish four copies of mill certificates reflecting the physical and chemical properties of the base metal of the pole, base plate, and anchor bolts. Provide four certified copies of the galvanizing test report will be provided.

All items of a shipment will be identified with a weatherproof tag. This tag will minimally identify manufacturer, contract number, and date and destination of shipment.

3. EQUIPMENT

3.1. Anchor bolts.

Anchor bolts will conform to the requirements specified in Items 445, "Galvanizing," 447, "Structural Bolting," and 449, "Anchor Bolts," of the Standard Specifications.

3.2. Poles.

The shaft for the pole may be round or octagonal and will be tapered. Circumferential welds, other than at the ends of the shafts, are not permitted. The exterior of longitudinal seam welds will be ground or otherwise smoothed to the same appearance as other shaft surfaces. Longitudinal seam welds for pole sections will have 60% minimum penetration except longitudinal seam welds will be complete penetration when within 6 in. of circumferential base welds. A maximum of 2 longitudinal seam welds may be made in pole sections. Low hydrogen electrodes, or the equivalent in wire and flux for automatic welding, will be required for all welds. Preheating will be required for welding pole to the base plate, in accordance with ANSI/AWS D1.1 Structural Welding Code.

Material for pole shafts will conform to the requirements in the standard drawings and will comply with the requirements of ASTM A570 Grade 50, or A572 Grade 50, or A670 Grade 50, or A595 Grade A, or if designated A36M50 with the requirements of Item 442, "Metal For Structures." Material supplied under the A570 Grade 50 or A595 Grade A specifications must meet their associated chemical and bend test requirements with the further stipulation that the materials must meet a minimum yield of 50 KSI and a minimum elongation of 18% in 8 in. or 23% in 2 in. prior to brake or tube forming operations. A570 Grade 50 material in thicknesses up to 5/16 in. is also acceptable providing it meets the above stated chemical, bend test, yield, and elongation requirements. A595 Grade A material which can be shown by tests to have a minimum of 50 KSI yield adjacent to base welds after fabrication will also be acceptable.

Mill test reports and laboratory test certifications will be provided to show that the materials conform to these requirements.

A metal cap at the top of all poles will be secured using galvanized or stainless steel set screws.

3.3. Finish.

3.3.1. The camera pole will be galvanized.

3.3.2. All sheared or cut edges and all other exposed edges to be painted or galvanized will be rounded or chamfered to an approximate 1/16 in.

3.3.3. **Hot-Dip Galvanizing.** Camera poles required to be hot-dip galvanized will be so designed as to provide proper filling, venting, and draining during the cleaning and galvanizing operations. All parts, with the exception of the lower portion of the anchor bolts, nut anchorages, and the top and bottom templates, will be hot-dip galvanized after fabrication in accordance with ASTM A123. All screws, nuts, bolts, washers, shims, and the upper portion of the anchor bolts if galvanized will be in conformance with the specifications of ASTM A153, Class C or D, unless otherwise specified on the plans. All nuts will be tapped after galvanizing. Any part of the mast arm assembly, from which the galvanizing has been knocked or chipped to bare metal in fabrication or transit, will be repaired by application of galvanizing-repair compounds in accordance with the manufacturer's recommendations. The galvanizing repair will be applied so as to provide a final assembly which is neat in appearance.

3.4. CCTV Cabinet.

The cabinets will house the CCTV field equipment shown on the plans. The cabinet will be provided with fully wired back panels, with all the necessary terminal boards, wiring, harnesses, connectors, and

attachment hardware for each cabinet location. All terminals and panel facilities will be placed on the lower portion of the cabinet walls below all shelves.

Each cabinet will be provided complete with all internal components, back and side panels, terminal strips, harnesses, and connectors, as well as all mounting hardware necessary to provide for installation of equipment, as described on the plans and specifications.

All cabinets will be identical in size, shape and quality throughout the entire project. In addition, the cabinets will be equipped internally as specified herein.

Details of the cabinet design and equipment layout will be submitted for review and approval prior to fabrication.

Each cabinet, as a minimum, will be supplied with the following:

- adjustable shelves, as required;
- backpanel;
- surge protection;
- terminal strips;
- interconnect harnesses with connectors;
- jack for field telephone;
- "door open" connection to back panel; and
- all necessary installation and mounting hardware.

3.4.1. **Electrical Requirements.**

3.4.1.1. **Backpanel.** This panel will include the following components:

3.4.1.1.1. **Circuit Breakers.** The circuit breakers will be approved and listed by Underwriters Laboratories. The operating mechanism will be enclosed and the switches will be marked to indicate whether it is in the closed or open position. Contacts will be silver alloy enclosed in an arc quenching chamber. Each cabinet will have, as a minimum, a single pole, 20 A circuit breaker. Circuit breakers will be unaffected by ambient temperature range, relative humidity, applied power, shock and vibration range specified in Section 2, "Environmental Requirements," of NEMA TS2-2003. Circuit breakers will have an interrupt capacity of 5,000 A and insulation resistance of 100 mega-ohms at 500 VDC.

3.4.1.1.2. **Power Line Surge Protection.** Power line surge protectors will be provided and installed as described below:

One (1) surge protector will be a 3 electrode gas tube type and will have the following ratings:

- Impulse breakdown: less than 1,000V in less than 0.1 microseconds at 10 kilovolts/microsecond.
- Standby current: less than 1 milliampere.
- Striking voltage: limit any voltage greater than 212 VDC.

Capable of withstanding 15 pulses of peak current, each of which will rise in eight microseconds and fall in 20 microseconds to one half the peak voltage, at 3 min. intervals. Peak current rating will be 20,000 amperes. The surge protector will utilize both metal oxide varistors and silicon avalanche diodes to protect against transient currents having a single surge energy level up to 70 joules, voltage transients up to 6 KV, and current transients up to 6 KA. Protection will be provided for line to neutral, line to ground and neutral to ground terminals.

The protectors will have the following ratings:

- recurrent peak voltage 212V;
- energy rating minimum 120 joules;
- power dissipation - average 0.85 A;

- peak current for pulses for less than 6 microseconds 20,000 A; and
- standby current less than one milliampere.

3.4.1.1.3. **Power Cable Input Junction Terminals.** Power distribution blocks suitable for use as a power feed and junction points for 2 and 3 wire circuits will be provided. The line side of each circuit will be capable of handling 2 size 1/0 AWG conductors.

The AC neutral and equipment ground wiring will be electrically isolated from the line wiring by an insulation resistance of at least 10 megohms when measured at the AC neutral. The AC neutral and equipment grounding wiring will be color coded white and green respectively.

3.4.1.1.4. **Communication Jack.** A RJ 45 jack for camera communication equipment will be provided at a convenient location on the right side panel. The jack will be connected to the communication medium.

The back panel will be utilized to distribute and properly interconnect all cabinet wiring related to the specific complement of equipment called out on the plans. Each item of equipment including any furnished by the Department will have its cable harness properly terminated at terminal boards on the back panel. All functions available at the equipment connector will be carried in the connector cable harness to the terminal blocks from the power distribution panel mounted on the left side panel of the cabinet.

3.4.1.2. **Wiring.** All cabinet wiring will be identified by the use of insulated pre-printed sleeving slipped over the wire before attachment of the lug or making the connection. The wire markers will carry this legend in plain words with sufficient details so that a translating sheet will not be required.

All wires will be cut to the proper length before assembly. No wires will be doubled back to take up slack. Harnesses to connectors will be covered with "Chinese finger" woven braid or braided. Cables will be secured with nylon cable clamps.

Service loops will be provided to facilitate removal and replacement of assemblies, panels and modules.

All wiring containing line voltage AC will be routed and bundled separately and shielded from all low voltage, i.e., control circuits. All conductors and live terminals or parts, which could be hazardous to maintenance personnel, will be covered with suitable insulating material.

All conductors used on the cabinet wiring will be No. 22 AWG or larger with a minimum of 19 strands. Conductors will conform to Mil Specification Mil-W-168780, Type B or D. The insulation will have a minimum thickness of 10 mils. All wiring containing line voltage will be a minimum size of No. 14 AWG.

3.4.1.3. **Terminal strips.** Terminal strips located on the backpanel will be accessible to the extent that it will not be necessary to remove the electronic equipment from the cabinet to make an inspection or connection.

Terminal blocks will be 2 position, multiple pole barrier type. Shorting bars will be provided in each of the positions provided along with an integral marking strip. Terminal blocks will be so arranged that they will not upset the entrance, training and connection of incoming field conductors. All terminals will be suitably identified by legends permanently affixed and attached to the terminal blocks. Not more than three conductors will be brought to any 1 terminal screw. No electrically energized components or connectors will extend beyond the protection afforded by the barriers. All terminal blocks will be located below the shelves. Terminals used for field connections will secure conductors by means of a No. 10-32 nickel or cadmium plated brass binder head screw. Terminals used for interwiring connections, but not for field connections, will secure conductors by means of a No. 5-32 nickel plated brass binder head screw.

As a minimum, all connections to and from the electronic equipment will terminate to an interwiring type block. These blocks will act as intermediate connection points for all electronic equipment input/output.

3.4.1.4. **Cabinet Internal Grounding.** The cabinet internal ground will consist of one or more ground bus-bars permanently affixed to the cabinet and connected to the grounding electrode. Bare stranded No. 6 AWG

copper wire will be used between bus-bars and between the bus-bar and grounding electrode. Each copper ground bus-bar will have a minimum of 20 connector points, each capable of securing at least one number 10 AWG conductor. AC neutral and equipment ground wiring will return to these bus-bars.

3.4.2. **Mechanical Requirements.**

3.4.2.1. **Size and Construction.** The cabinets will be clean-cut in design and appearance and have the following minimum dimensions:

Depth	Width	Height
15"	20"	36"

All cabinets will be constructed of welded sheet aluminum with a minimum thickness of 1/8 in. No wood, wood fiber product, or flammable products will be allowed in the cabinet. The cabinet structure will be effectively sealed to prevent the entry of rain, dust and dirt.

All exterior seams for cabinet and doors will be continuously welded. All edges will be filed to a radius of 0.03125 in. minimum.

Cabinets will conform to the requirements of ASTM designation: B209 for 5052-H32 aluminum sheet.

Welding on aluminum cabinets will be done by the Gas Metal Arc (MIG) or Gas Tungsten Arc (TIG) process using bare aluminum welding electrodes. Electrodes will conform to the requirements of the American Welding Society (AWS) A5.10 for ER5356 aluminum alloy bare welding electrodes.

Procedures, welding machines and welding machine operators for welding on aluminum will be qualified in accordance with the requirements of AWS B3.0, "Welding Procedures and Performance Qualification," and to the practices recommended in AWS C5.6.

3.4.2.2. **Ventilation.** The cabinet will be provided with vent openings to allow convection cooling of electronic components.

The vent opening will be located on the lower portion of the cabinet side and will be covered fully on the inside with a commercially available disposable three layer graded type filter.

There will be no opening on the top portion of the cabinet roof.

3.4.2.3. **Exterior Finish.** The aluminum will be carefully smoothed and the exterior will be left in its unpainted natural color.

3.4.2.4. **Serial Number.** The cabinets will be provided with a 5 digit serial number unique to the manufacturer and this 5 digit serial number will be preceded by an assigned 2 letter manufacturer's code. The entire identification code and number will be either stamped on a metal plate which is riveted to the cabinet, stamped directly on the cabinet, or engraved on a metalized Mylar plate that is epoxied to the cabinet on the upper right hand cabinet side wall.

3.4.2.5. **Shelves.** Adjustable shelves will be provided in each cabinet as required to support the equipment as specified. Shelf adjustment will be at 2 in. intervals in the vertical position.

The shelves will be removable and capable of supporting the electronic equipment. There will be a minimum of 1 in. between the rear and front edge of the shelf and the back inside wall and door of the cabinet respectively to allow room for the equipment cables.

3.4.2.6. **Mounting Hardware.** All cabinets will be furnished with the appropriate mounting plates, anchor bolts, and any other necessary hardware to mount the cabinet on the camera pole structure. Cabinet mounting plates

will be welded to the pole. Banding of cabinet or mounting plates will not be permitted. The cabinet will be designed for pole mounting and will be reinforced at the points of attachment to the pole.

- 3.4.2.7. **Door.** The cabinet door will be sturdy and torsionally rigid. The door will substantially cover the full area of the front of the cabinet and will be attached by a minimum of 2 heavy duty hinges.

The hinges will utilize stainless steel hinge pins. The hinge and door assembly will be of sufficient strength to withstand a 50 lb. per vertical foot of door height load supplied vertically to the outer edge of the door. There will be no deformation or impairment of the door, locking mechanism or door seal when the load is removed.

Each cabinet door will be provided with a No. 2 Corbin lock. Two keys for the tumbler lock will be provided for each cabinet. The cabinet door will be provided with a catch mechanism to hold the door open at two positions, $90^\circ \pm 10^\circ$, and $180^\circ \pm 10^\circ$. Both the door and door stop mechanism will be of sufficient strength to withstand a simulated wind load of 5 lb. psf of door area applied to both inside and outside surfaces without failure, permanent deformation, or compromising of door position. The cabinets will not have auxiliary police doors.

A gasket will be provided to act as a permanent and weather resistant seal at the cabinet door facing. The gasket material will be of a non-absorbent material and will maintain its resiliency after exposure to the outdoor environment. The gasket will have a minimum thickness of 3/8 in. The gasket will be located in a channel provided for this purpose either on the cabinet or on the door. An "L" bracket is acceptable in lieu of this channel if the gasket is fitted snugly against the bracket to insure a uniformly dust and weather resistant seal around the entire door facing.

- 3.4.3. **Surge Protection.** Protector and cabinet configuration. All ungrounded conductor wires entering or leaving the cabinet will be provided with surge protectors. The conductor leads and the surge protector leads will be kept as short as possible with all conductor bends formed to the maximum possible radius. The protector units will be located as near as possible, a minimum of 6 in., to the entry or exit point, and as far as possible from any electrical equipment. The protector ground lead will be connected directly to the ground bus.

The surge protector utilized for AC power will not dissipate any energy and will not provide any series impedance during standby operation. The unit will return to its non-shunting mode after the passage of any surge and will not allow the shunting of AC power.

- 3.4.4. **Environmental Design Requirements.** The camera pole and CCTV cabinet will meet all functional requirements during and after subjection to any combination of the following requirements:

- ambient temperature range of -30°F to 165°F ;
- Temperature shock not to exceed 30°F per hour, during which the relative humidity will not exceed 95%;
- relative humidity range not to exceed 95% over the temperature range of 40°F to 110°F ; and
- moisture condensation on all surfaces caused by temperature changes.

4. CONSTRUCTION

- 4.1. **General.** The equipment, design, and construction will utilize the latest available techniques with a minimum number of different parts, subassemblies, circuits, cards, and modules to maximize standardization and commonality.

The equipment will be designed for ease of maintenance. All component parts will be readily accessible for inspection and maintenance. The only tools and test instruments required for maintenance by maintenance personnel will be simple hand held tools, basic meters and oscilloscopes.

- 4.2. **Electronic Components.** All electronic components will comply with Special Specification, "Electronic Components."
- 4.3. **Mechanical Components.** All external screws, nuts, and locking washers will be stainless steel. No self-tapping screws will be used unless specifically approved.

All parts will be made of corrosion resistant material, such as plastic, stainless steel, aluminum or brass.

All materials used in construction will be resistant to fungus growth and moisture deterioration. Dissimilar metals will be separated by an inert dielectric material.

5. MEASUREMENT

This Item will be measured by each Camera Pole Structure with Cabinet complete in place, excluding foundations.

6. PAYMENT

The work performed and materials furnished in accordance with this Item and measured as provided for under "Measurement" will be paid for at the unit price bid for "Camera Pole Structure with Cabinet," "Camera Pole Structure without Cabinet" or "CCTV Equipment Cabinet." This price will be full compensation for furnishing, fabricating, and erecting the camera pole structure, including CCTV cabinet; for furnishing and placing anchor bolts, nuts and washers; for furnishing and placing electrical conduit in the foundation; and for all other details and incidentals necessary to provide a camera pole structure or CCTV equipment cabinet in accordance with the specifications, plans and approved working drawings, complete in place and ready for the attachment of the camera.

Foundations will be paid for under Item 416, "Drilled Shaft Foundations."