

10-3. HIGH MAST CAMERA POLE ASSEMBLY

GENERAL

The Contractor shall furnish and install the following equipment for each high mast camera assembly as described herein and as shown on the plans:

1. Camera lowering device
2. One high mast pole
3. One interlock junction box (IJC)
4. Hybrid camera cable (HCC), Connectors and fittings as required
5. High mast hybrid camera cable assembly
6. Pole foundation

The high mast camera pole shall have a minimum design wind velocity rating of 100 mph x 1.3 gust factor. Steel and concrete minimum dimensions shall not be less than shown on the standard plans.

Interlock junction box (IJC), hybrid camera cable (HCC) shall conform to the specifications described elsewhere in these special provisions.

MATERIALS

All structures shall be constructed from galvanized steel.

All materials used for construction of structural supports and foundations shall be new and conform to material requirements in the Standard Specifications and Standard Plans, unless otherwise stated in these special provisions.

Corrosion resistance shall be provided with the following methods:

1. Avoidance of contact between stainless steel and carbon steel, between different types of stainless steel (including welding material), and between aluminum and ferrous materials.
2. Utilizing continuous welding to eliminate crevices that retain moisture.
3. Minimizing welding of stainless steel.
4. Use of adequate sections and suitable materials to limit stress related corrosion.

POLE

The final detailed pole designs shall be required to show full structural integrity and shall be stamped and signed by a registered Professional Engineer in the State of California. The pole design shall be submitted to the Engineer for review and approval prior to fabrication. Metal parts of steel poles and hardware shall conform to the details shown on drawings shown in these special provisions.

The poles and hardware shall be galvanized in conformance with Section 75-1.05, "Galvanizing", of the Standard Specifications. The high mast camera pole shall conform to the requirements in Section 86-2.04, "Standards, Steel Pedestals and Posts," of the Special Specifications, and these special provisions.

The pole shall include the shaft, access hole, access hole cover, support plate, anchor base and camera-lowering device. The shaft shall consist of sections of a round or multisided (16 sides) tapered steel tube with a uniform taper of 0.14-inch per foot. Segment of the multisided poles shall be convex and shall have minimum bend radius of 4 inches. Steel used in fabricating the pole shall be weldable quality steel. No field welding shall be performed in the assembly of

the pole. The pole shall have a reinforced access hole to allow adequate clearance for maintaining and servicing the lowering device. Access hole reinforcement shall provide a bending strength equal to that of a pole without opening. Other hardware inside the pole shall accommodate the lowering device.

The access door shall be hinged to the pole, open horizontally 180 degrees. When the access door is in the open position, it shall not interfere with access to the interior of the pole. Unless otherwise shown on the plans, the pole shall be installed with the access door towards the controller cabinet.

The pole shall be erected plumb. The vertical axis of the erected pole shall be within 3 inches of the theoretical vertical axis when measured without the action of sunlight or wind.

The pole shall conform to the requirements of the latest edition and the interim revisions of the AASHTO "Standard Specifications for the Structural supports for Highway Signs, Luminaries and Traffic Signals." The maximum allowable wind deflection shall not exceed 7.2 inches under full load conditions, with a maximum wind velocity of 30 MPH.

An embossed aluminum plate shall be attached with rivets to the outside of each pole approximately 2 inches above the access door. The nameplate shall indicate the name of the pole manufacturer, the height of the pole and the State's contract number.

Plastic laminated data sheets shall be secured on the inside of the access door, and shall include names, addresses and telephone numbers on the manufacturers of the pole, camera lowering device, and the design parameters, including wind velocity, weight, projected area and coefficient of drag for the camera lowering device with the camera unit (specified elsewhere in these special provisions) installed.

CAMERA LOWERING DEVICE

The camera lowering device shall consist of a head frame, a camera ring, and an internal power drive winch. The maximum projected area of the total assembly at the top of the pole, exclusive of the camera unit, shall not exceed 5 square feet. The maximum weight of the head frame, camera ring and cover shall not exceed 750 lbs.

The head frame shall be hot rolled steel conforming to ASTM Designation: A 36, and attached to the pole by means of slip fitter and secured by a minimum of 4 stainless steel set screws conforming to ASTM Designation: F 880, Type 304. The head frame as a minimum, shall be hot-dip in accordance with the provisions in Section 75-1.05, "Galvanizing," of the Standard Specifications.

The head frame shall be fitted with at least 6 hoisting cable sheaves, of either galvanized or stainless steel, or aluminum, with a minimum of 5-inch pitch diameter. The head frame shall be fitted with hybrid camera cable assembly sheaves or rollers configured to provide a minimum-bending radius as specified by the hybrid camera cable manufacturer.

The hoisting cable sheaves and hybrid camera cable sheaves or rollers shall be fitted with suitable keepers to keep the cables in their tracks during pole erection and operation. The sheaves shall be supported by stainless steel shafts and shall be fitted with oil-impregnated sintered bronze bushings or roller bearings.

At least 3 hoisting cables shall be supplied. The cables shall be 3/16 inch, minimum, in diameter, 7 x 19 strand, stainless steel aircraft cable, manufactured in accordance with Military Specification: MIL-8320B.

The head frame shall be provided with a cover designed for that device and securely attached with stainless steel machine screws meeting ASTM Designation: F 593, Type 304 requirements and self-locking nuts meeting the general chemical requirements of ASTM Designation: F 594, Type 304, or a stainless steel clamp band. The shape of the lowering device and the cover shall be generally symmetrical about a vertical axis.

The camera ring shall be fabricated to 6 inches x 2 inches x #7 gauge spun steel and shall be hot-dipped galvanized after fabrication in accordance with the provisions in Section 75-1.05, "Galvanizing," of the Standard Specifications. The camera ring shall be provided with the appropriate number of 3 inches nominal steel tubes, shall be hot-dipped galvanized after fabrication in accordance with the provisions in Section 75-1.05, "Galvanizing," of the Standard Specifications, to accommodate the integrated camera unit and the counterweights. The mounting arms shall be fastened to the ring with stainless steel that can be readily removed in case of a rearrangement of the integrated camera unit.

Roller-contact, spring loaded, centering arms shall be provided to center the camera ring while ascending and descending the full length of the designed travel on the pole. The arm system shall be capable of keeping the ring concentric with pole in the winds up to 30 MPH. The rollers for the centering arms shall be of a water resistant, non-marking material. All axle shafts for arms and rollers shall be of stainless steel conforming to ASTM Designation: A 276, Type 304. The arms system shall not allow the pole to be inadvertently wedged between the rollers and the camera ring. Ultimate support of the camera ring shall not be lost by an individual or total spring failure.

Provisions shall be made for leveling the camera ring while in lowered position. The Contractor shall level and balance the camera support ring upon installation and again before completion of the contract.

The transition assembly shall be fabricated from A36 steel. The camera ring shall be supported by three stainless steel 7 x 19 strands, 1/4-inch minimum diameter aircraft cable manufactured per MIL-8320B. Each cable shall be fitted with a stainless steel fitting which enables it to develop the full strength of the cable. The fitting shall attach to the transition assembly within the pole shaft without the use of springs. A ball bearing swivel, of sufficient size to sustain the loading on the cable, with a safety factor of four to allow the attitude of the aircraft cable to be relieved as the camera ring is raised and lowered. The lift cable shall pass up through the pole shaft, over the stainless steel head frame sheaves, to the camera ring, where they are led through guides and a compression ring and terminated with a collar-type strand vice device. The compression springs, while supporting the camera ring, are not relied upon for support of the ring in case of spring failure.

The safety mechanism shall be located in the base of the pole and consist of multi-point safety chain and hook assemblies to maintain the tension on the transition assembly, allowing the winch assembly to be disengaged. Chain and hooks shall be hot-dipped galvanized after fabrication in accordance with the provisions in Section 75-1.05, "Galvanizing," of the Standard Specifications. Each chain shall be secured to a plate welded to the inside of the pole shaft. The safety mechanism shall be self-contained within the pole and independent of the anchor bolt and pole foundation. Top latch units shall not be acceptable.

The internal mechanism shall be capable of raising or lowering the camera ring at an approximate speed of 11 feet/min. The winch shall be furnished with 1/4-inch minimum diameter, 7 x 19 strand stainless steel aircraft cable, conforming to Military Specification: MIL-8320B, of sufficient length to maintain at least four wraps around the drum with the camera ring unit fully lowered position. The free end of the winch cable shall be finished with a stainless steel compression sleeve sufficient to develop 95 percent of the rated load capacity of the assembly through a ball bearing swivel of sufficient size to sustain the loading of the cable factor of four. The transition design shall be such to prevent twisting of the support cables to assure smooth winding of the cables on the winch and to prevent binding on the inside of the tower shaft. Winch cable shall wind uniformly.

The internal power drive winch unit shall include:

1. A heavy duty, totally enclosed, fan cooled, reversible universal type motor, rated at 115 V (ac) 746 W, minimum, for continuous duty, and provided with overcurrent protection.
2. An adjustable torque limiter with ball or roller bearings on all rotating shafts.
3. A remote control reversing switch (labeled "UP" and "DOWN") with minimum 20 feet cord.
4. Worm-gear driven winch.
5. Mounting frame.
6. Other equipment as necessary.

All internal power drive winch unit components, including transformer and interlock junction box, shall be removable through the access hole for repair or replacement.

FOUNDATION

The foundation shall conform to the requirements for cast-in-drill-hole concrete piles in Section 86-2.03, "Foundation," of the Standard Specifications.

SUBMITTALS

Submittals for the high mast camera pole assembly shall conform to the requirements in Section 86-1.03, "Equipment List and Drawings," of the Standard Specifications and these special provisions. Submittals shall be delivered to the Engineer prior to the erection of the high mast camera assembly.

The Contractor shall submit descriptive data, design working drawings, erection working drawings, calculations, and a list of materials used for the high mast camera assembly. The material list shall be complete as to the name of manufacturer, catalog number, size, capacity, finish, pertinent ratings, and identification symbols used on the plans or in the special provisions for each unit. Each submittal shall consist of 5 copies. Plans and detailed drawings shall not be larger than 22" x 34". Each separate item submitted shall bear the descriptive title and the State's contract number.

INSPECTION & TESTING

All equipment furnished by the Contractor shall be subject to monitoring and testing to determine conformance with all applicable requirements and to ensure proper operation of the camera lowering device prior to final acceptance of the project. Documentation as required demonstrating performance and operation in conformance to these special provisions shall be furnished by the Contractor as part of this project. All equipment required for conducting tests shall be supplied and retained by the Contractor. No separate payment will be made for the monitoring, testing, test equipment, and documentation of test results, but shall be included in the amount bid for other pay items.

The State reserves the right to examine and test any or all materials furnished by the Contractor (using the test equipment supplied by the Contractor) for this project to determine if they meet these special provisions and the Standard Specifications.

If any material used in the construction of this project is defective or otherwise unsuitable, or the workmanship does not conform to the accepted standards, the Contractor shall replace such defective parts and material at no cost to the State.

The Contractor may offer rejected equipment again for consideration provided all non-compliance has been corrected and pretested by the Contractor.

The camera-lowering device shall be submitted for inspection and testing. Inspection and testing shall be performed at a site in California approved by the Engineer. Notification shall be

given to the Engineer at least 10 days prior to demonstration. The times and dates of the tests shall be approved by the Engineer. The Contractor shall conduct all tests in the presence of the Engineer. Testing shall only take place on weekdays as specified elsewhere in the special provisions. Prior to acceptance of the contract, a trained manufacturer's representative shall perform the operational testing of the high mast camera assembly. The testing shall consist of a minimum of 3 complete cycles of raising and lowering the camera ring (complete with the integrated camera unit connected to hybrid camera cable) the full length of its travel, as designed, within one working day. Notification shall be given to the Engineer at least 10 days prior to testing.

DOCUMENTATION & TRAINING

After the high mast camera assembly is in operation, The Contractor shall provide an instructional digital video in Audio Video Interleave (AVI) format on a minimum 8 GB USB version 2.0 flash drive or a Secure Digital ([SD](#)) card, complete written instructions, and a demonstration to State Maintenance personnel on the maintenance of the high mast camera assembly, including leveling of the camera ring and the procedures for the safe raising and lowering of the camera ring.

Spare parts, parts lists, and the operating, maintenance and service instructions, packaged with or accompanying the equipment installed on the project, shall be delivered to the Engineer prior to acceptance of the project.