

SECTION 13556

CLOSED CIRCUIT TELEVISION (CCTV) ASSEMBLY

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Install all State-furnished items including CCTV assembly, pan/tilt unit, camera control receiver, pole cabinet, and freeway pole with anchor bolts.
- B. Furnish and install foundation, wood pole, and any additional equipment required for a complete and operational CCTV assembly.
- C. Test the installed CCTV using Department furnished software. (Furnish remainder of test equipment including laptop).

1.2 RELATED SECTIONS

- A. Section 03211: Reinforcing Steel and Welded Wire
- B. Section 03310: Structural Concrete
- C. Section 13551: General ATMS Requirements
- D. Section 13553: ATMS Conduit
- E. Section 13554: Polymer Concrete Junction Box
- F. Section 13555: ATMS Cabinet

1.3 REFERENCES

- A. AASHTO M31M: Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.
- B. AASHTO M111: Zinc (Hot Dipped Galvanized) Coatings on Iron and Steel Products.

- C. AASHTO M 284M: Epoxy Coated Reinforcing Bars.
- D. AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaries, and Highway Bridges.
- E. AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals.
- F. ASTM A36: Standard Specification for Carbon Structural Steel.
- G. ASTM A123: Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron or Steel Products.
- H. ASTM A 153: Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
- I. ASTM A 307: Carbon Steel Bolts and Studs, 60 000 PSI Tensile Strength
- J. NEC 250.1: National Electric Code.

1.4 SUBMITTALS

- A. Submit two copies of the following to the Engineer within 15 days after receiving the Notice to Proceed. (Submit samples of all materials, when requested).
 - 1. List of equipment and materials (name of manufacturer, size, and identification number).
 - 2. Detailed shop drawings, wiring diagrams, and certifications.
 - 3. Provide copies of all manufacturers' warranties, guarantees, instruction sheets, and parts lists.
 - 4. Camera Cable Test and Local Field Operations Test plan. Engineer will accept or reject these plans within ten days of receipt.
- B. Submit copies of the Camera Cable Test results, including any unsuccessful and subsequently successful tests to the Engineer prior to any Field Operations testing.

- C. Upon successful completion of both the Camera Cable Test and the Local Field Operations Test, demonstrating that the work is in accordance with the specifications, deliver within three days, a written Completion Notice to the Engineer along with a copy of the test results.

1.5 TESTING AND ACCEPTANCE

- A. Complete the following:
 - 1. Camera Cable Test
 - 2. Local Field Operations Test
- B. Notify the Engineer two days prior to CCTV installation so that the Engineer can be present to establish appropriate pan and tilt stops for the Contractor to set.
- C. Notify the Engineer at least two days in advance of the proposed date for the Camera Cable Test and Local Field Operations Test. The Engineer will have the right to witness such tests or to designate an individual or entity to witness such tests on the Departments behalf.
- D. Perform the following Camera Cable Test as indicated following the approved test plan. Furnish all equipment, appliances, and labor necessary to test the installed camera cable between the camera assembly and the camera control receiver. Perform the following tests before any connections are made:
 - 1. Perform continuity test on the camera cable. Camera cable must not exhibit any discontinuities such as opens, shorts, crimps, or defects.
 - 2. Perform continuity tests on the stranded conductors element of the camera cable using a meter having a minimum input resistance of 20,000 ohms per volt. Show that each conductor has a resistance of not more than 16 ohms per 1000 feet of conductor.
 - 3. Measure the insulation resistance between the conductors and between each conductor, ground, and shielding using a meggar meter. The resistance must be infinity. Perform all resistance testing after final termination and cable installation, but prior to connection of any electronics or field devices.
 - 4. Replace any cable that fails to meet these parameters, or if any testing reveals defects in the cable. Retest new cable as specified above.
 - 5. Furnish all test equipment.

- E. Perform the following Local Field Operations Test at the CCTV field site, in accordance with the approved test plans. Demonstrate the following after the camera controller assembly, other camera hardware, power supply, and connecting cabling have been installed:
1. Verify physical construction has been completed in accordance with the plans and specifications.
 2. Inspect quality and tightness of ground and surge protector connections.
 3. Check power supply voltages and output.
 4. Connect devices to power source.
 5. Verify installation of specified cables and connections between camera, pan/tilt unit, camera control receiver.
 6. Set the camera control address.
 7. Verify presence and quality of video image with a vector scope and a portable NTSC monitor.
 8. Test local operation of all CCTV equipment
 - a. Exercise the pan, tilt, zoom, focus, iris opening, and manual iris control selection and operation, low pressure alarm (if present), pre-set positioning, and power on/off function.
 - b. Observe the video picture on a portable video and waveform monitor.
 9. Demonstrate camera sensitivity at low light levels to meet the specified requirements.
 10. Demonstrate pan/tilt speed and extent of movement to meet the specified requirements.
 11. Measure video signal level at the communications interface with a waveform monitor to verify NTSC Standards.
 12. Verify proper voltage of power supply.
- F. Deliver within three days, a written Completion Notice to the Engineer along with a copy of the test results upon successful completion of such test.
1. In the first part of the Completion Notice, document any discrepancies.
 2. Within ten days of receipt of the Completion Notice and test results, the Engineer will either accept or reject the work (specifying, if rejected, the defect of failure in the work) by delivery of written notice to the Contractor.

- G. In the event the Engineer rejects the work, the Contractor will promptly remedy the defect of failure specified in Engineer's notice.
 - 1. Provide the Engineer with a Completion Notice.
 - 2. The Engineer may identify an independent, third party to specify what defects must be addressed in order for the work to meet the specifications.

- H. The Engineer may authorize others to complete the work at the Contractors expense if the Contractor fails to remedy any identified deficiencies in the work within ten days of receipt of the Completion Notice.

PART 2 PRODUCTS

2.1 CCTV POLE OR LUMINAIRE

- A. Wood Pole Mounted CCTV: provide class 5 or 6 Douglas Fir wood pole, treated with Chromated Copper Arsenate CCA Type C, 33 ft nominal length and not less than 5 ½ inches diameter at top.

- B. Steel Pole Mounted CCTV: steel pole with anchor bolts provided by the Department.
 - 1. Anchor bolts: conform to M 270 Grade 36.
 - 2. Nuts, washers, and anchor bolts: galvanized according to ASTM A153.

- C. Luminaire Mast Arm Mounted CCTV: provide luminaire extension per Section 02892 and Std Dwg SL 1.

2.2 CCTV STEEL POLE FOUNDATION

- A. Class AA(AE) concrete. See Section 03055.

- B. Reinforcing Steel
 - 1. Coated.
 - 2. AASHTO M284 or M111
 - 3. AASHTO M 31M Grade 400

- C. Non-Shrink Grout.

2.3 JUNCTION BOX

- A. See section 13554, Polymer Concrete Junction Box.

2.4 CCTV ASSEMBLY

- A. Department furnished:
 - 1. Camera assembly, including camera, pan/tilt unit, control receiver, environmental enclosure, and cabling.
 - 2.. Type G Pole mount cabinet.

2.5 MOUNTING EQUIPMENT

- A. Provide clamp kit, mounting hardware, pipe, shims, grommet, and all additional equipment to attach CCTV assembly to pole or mast arm.
- B. Provide all stainless steel or hot-dipped galvanized fasteners and hardware unless otherwise approved. Provide copper pole grounding lug.

2.6 24VAC TRANSFORMER

- A. Department furnished: 24VAC transformer for powering the CCTV enclosure.

2.7 RS-232/RS-422 CONVERTER

- A. Department furnished: converter for connecting communication equipment to CCTV enclosure.

2.8 DATA SURGE SUPPRESSOR

- A. General characteristics (typical):
 - 1. Typical application: RS-422.
 - 2. Surge: 36 kA.
 - 3. Turn-on at 10 mA: +2.8/-0.6 V dc.
 - 4. Resistance: 1 Ohm.
 - 5. Capacitance: 30 pF.
 - 6. Energy: 310 ft-lbs

7. Let-through: less than +10/-1 Vp (peak open circuit voltage at max current).
8. -3dB (600 Ohms) BW: 95Mhz
 9. Temperature: -40 degrees F to 185 degrees F
Storage/Operating 122 degrees F.

2.9 VIDEO SURGE SUPPRESSOR

A. General characteristics (typical):

1. Typical application: VLF/HF receive only, LAN, closed circuit video.
2. Surge: 18 kA IEC 1000-4-5 8/20 ms waveform 80 ft-lbs.
3. Turn-on Time: 4 ns for 2 kV/ns.
4. VSWR: less than or equal to 1.1 to 1 over frequency range.
5. Insertion Loss: less than or equal to 0.3 dB over frequency range.
6. User Current: 2.0A dc continuous.
7. Vibration: 1G up to 100Hz.
8. Temperature: -50 degrees F to 185 degrees F Storage/Operating 113 degrees F.

2.10 POWER LINE SURGE SUPPRESSOR

A. Conform to the following requirements (typical):

1. Peak surge current occurrences: 20 minimum.
2. Peak 8x20 msec wave shape: 20K amps.
3. Response: 250 maximum.
4. Maximum current at 120-VAC, 60Hz: 10 amps.
5. Series inductance: 200 mH.
6. Temperature: NEMA TS-1.

B. Provide two stage power line surge protector that allows the connection of a radio interference filter (to prevent disruption in the event of a power surge) in the circuit between the stages. Equip each cabinet with one or more radio interference filters in the power line surge protector to provide attenuation of at least 50 dB over a range of 50 KHz to 20 MHz.

2.11 DEPARTMENT FURNISHED MATERIALS PICK UP

- A. Pick up all Department furnished camera assemblies and cabinets at:
Utah Department of Transportation
Traffic Operations Center
2060 South 2760 West
Salt Lake City, UT 84104-4592

Contact the Engineer seven calendar days before pick-up date.

- B. Pick up all Department furnished poles, anchor bolts, and light pole extensions at:

UDOT Complex
4501 South 2700 West
Salt Lake City, Utah 84119

PART 3 EXECUTION

3.1 INSTALLATION

- A. Conform to the requirements of the NEC, current edition.
- B. Load, transport, and install all state-furnished materials per the manufacturer's instructions and as shown in the plans.
- C. Provide foundation, junction boxes, ground rod, grounding lug, conduit, stainless steel mounting bands, wood pole, and all additional equipment required for a complete and operational CCTV system.
- D. Install all wiring, conduit, and junction boxes as shown on site plans and details.
1. Field locate all conduits and junction boxes to avoid drainage areas and steep slopes whenever possible.
 2. Protect existing conductors while installing camera cables and conductors.
- E. Connect the controller and all wires as specified by the manufacturer.

- F. Furnish and install all incidental items, such as wire nuts, grommets, tape connectors, and electrical nuts, necessary to make the CCTV system complete.
- G. After installation, the exterior of all equipment: free of all loose rust and mill scale, dirt, oil, grease and other foreign substances.

3.2 STEEL CCTV POLE FOUNDATION

- A. All material and workmanship conforms to AASHTO's Standard Specifications for Highway Bridges.
- B. Verify that the installation of the CCTV camera, pole, pole mount cabinet, junction boxes, and foundation in the location marked in the field has no conflict with existing utilities, underground and overhead. Comply with all utility and blue stake requirements.
- C. Excavation
 - 1. See Section 13551.
- D. Caissons conform to AASHTO Division II Section 5, Drilled Piles and Shafts. Drill caissons into either native soil or compacted fill.
 - 1. If formwork is required during drilling, the forms may be withdrawn during concrete placement.
 - 2. Cast the top of the caisson against the formwork for appearance.
- E. Place concrete directly into the excavation. Use minimum forming.
- F. Do not weld reinforcing steel, conduit, or anchor bolts; tie reinforcing steel and conduit securely in place.
- G. Coat all reinforcing steel to conform to AASHTO M284 or M111 and AASHTO M31M Grade 420, respectively. Coat the ends of cut reinforcing with approved coating.
- H. All cast-in-place concrete will be class AA(AE) except where specified otherwise. Cap all conduits before placing concrete.

- I. After pole is installed, place non-shrink grout between base plate and foundation surface.
- J. Install weep hole in foundation per Standard drawing SL 4.

3.3 ANCHOR BOLTS

- A. Refer to Section 13551.

3.4 STEEL CCTV POLES

- A. Install the metal camera poles on concrete bases as described herein. Apply rust, corrosion, and anti-seize protection at all threaded assemblies by coating the mating surfaces with an approved compound.
- B. Install pole such that the hand hole is facing away from traffic.
- C. Install ground rod. NEC 250.
- D. All fasteners and attachment hardware for bands and other equipment: stainless steel.
- E. Furnish and install all incidental items, such as wire nuts, grommets, tape connectors, electrical nuts, etc., necessary to make the CCTV system complete.
- F. Adjusting the anchor bolt nuts, plumb all steel poles to the vertical with all camera equipment installed.
- G. Pole Mount Cabinet
 - 1. The Department rejects poles that are damaged by improper drilling of holes.
 - 2. Drill and nipple holes at each site.
 - 3. Touch-up by hot stick method.

3.5 WOOD CCTV POLE

- A. Install wood pole below grade to a minimum depth equal to one sixth the total pole height.

- B. Tamp and compact surrounding grade to match existing soil compaction.

3.6 CCTV ASSEMBLY

- A. Assemble the camera assembly and prepare for installation per the manufacturer's instructions prior to delivery to the job site.
- B. Deliver the assemblies to the job site as complete units, and install as per the plan details.

3.7 CCTV CABLES

- A. Install camera cables in conduit and poles. All cable runs must be continuous and must run without splices between the camera and the cabinet.
- B. Keep cable ends sealed at all times during installation using an approved cable end cap. Keep cable end sealed until connectors are installed.
- C. Do not violate the minimum bending radius and the maximum pulling tension recommended by the manufacturer's specifications at any time.
- D. Provide 6 ft of cable slack in all cabinets.
- E. Make all camera cable connections between the CCTV assembly, RS-422/RS-232 converter, and communications equipment, as required to provide a fully operational CCTV system.

3.8 CONDUCTORS

- A. Domed CCTV: furnish and install 3-#12 stranded IMSA Spec 20-1 power conductor cables between the 24 VAC transformer in the cabinet and the cabinet assembly on the luminaire arm.
- B. Freeway CCTV: furnish and install 3-#6 from camera assembly to cabinet.
- C. Freeway CCTV with Pole Mounted Cabinet: furnish and install 3-#12 from camera assembly to cabinet.
- D. Splices: not allowed between camera and cabinet.

3.9 POLE MOUNTED CABINET

- A. Install cabinet such that cables enter the underside of the cabinet.
- B. Arrange all equipment installed in the cabinet in a neat and orderly fashion on cabinet shelf.
- C. Install pole mounted cabinet such that it faces away from traffic. Use stainless steel bands.

3.10 JUNCTION BOX

- A. Refer to section 13554.

END OF SECTION