

SECTION 13551

GENERAL ATMS REQUIREMENTS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Furnish and install all ATMS components as defined on the plans, specifications, details, and special provisions.
- B. Provide all documentation required for the installation and testing of ATMS components.

1.2 RELATED SECTIONS

- A. Section 00725: Scope of Work
- B. Section 01554: Traffic Control
- C. Section 01721: Survey
- D. Section 13554: Polymer Concrete Junction Box
- E. Section 13591: Traffic Monitoring Detector Loop
- F. Section 15595: ATMS Integration

1.3 REFERENCES

- A. ASTM: A 153: Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
- B. ASTM: A 307: Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength
- C. ASTM D 3005, Type I or II. UL 510
- D. American Wire Gauge (AWG)
- E. Electronic Industries Association (EIA) and Telecommunications Industry Association (TIA) Specifications

- F. International Municipal Signal Association Regulations
- G. National Electric Code (NEC)
- H. Rural Electrical Association (REA) Bulletins
- I. Underwriters Laboratory (UL)
- J. USDA Rural Utilities Service (RUS) Bulletin

1.4 DEFINITIONS

- A. ATMS - Advanced Traffic Management System
- B. CCTV - Closed Circuit Television
- C. RMS - Ramp Meter System
- D. RWIS - Road Weather Information System
- F. TMS - Traffic Monitoring Station
- G. VMS - Variable Message Sign
- H. WIM - Weigh In Motion

1.5 SUBMITTALS

- A. Provide all required submittals as described in this section, article 2.1, paragraph A.

1.6 WARRANTY

- A. Provide warranties of merchantability and fitness for a particular purpose for all furnished equipment, as a whole, each of its components, and the workmanship for the duration of one year from the date of acceptance of the entire project by the Department.
- B. Warranties are not required for State Furnished equipment.

- C. Take any corrective action necessary during the Warranty Period, within 72 hours after notification by the Engineer to restore any identified deficiency caused by defective workmanship or materials. Repair or replace defective items. Notify the Engineer when corrective action has been completed.

PART 2 PRODUCTS

2.1 DOCUMENTATION

- A. Submittals
 1. Provide two copies of all documentation to the engineer.
 2. Provide one copy of the test reports, configuration data, and as-built drawings in each of the field cabinets.
 3. The general purpose and content of all required submittals is described in the following list. The details of the submittal requirements for each ATMS device type can be found in the appropriate Standard Specification, Supplemental Specification, or Special Provision for the ATMS device.
 - a. Contractor Furnished Material and Equipment Lists: The lists will include the name of the manufacturer, size, and identification number.
 - b. Test Reports: After the completion of a successful test, provide a test report for the Cable and Conductor Test, the Local Field Operations Test, and Acceptance Tests. Refer to the section, Article 3.1 of this Standard Specification or the respective Standard Specification or Special Provision. Obtain UDOT's newest version of the test procedures for the local field operations test from the UDOT Web site. Refer to <http://www.udot.utah.gov/index.php/m=c/tid=719>. Test Reports are required for each appropriate ATMS device installation, including, but not limited to CCTV, VMS, RWIS, WIM, Traffic Monitoring Detector Loops or other specified detection device, and Fiber optic communication systems. Provide Test Reports in a neatly bound (3-hole) and printed format. The Test Reports will include the following items:
 - 1) All test results (including failed tests)
 - 2) Description of any observed discrepancies
 - 3) Description of required corrective action
 - 4) Estimated time to complete corrective action and re-test
 - 5) Results of any corrective action

- c. Completion Notice: Provide a Completion Notice to the Engineer after all devices have successfully passed the Local Field Operations Tests, and all ATMS components are ready to begin Acceptance Tests. The Completion Notice consists of the certification that all ATMS installations are compliant with all project requirements. Use the Local Field Operations Testing Completion Notification Form obtained from the UDOT Web site. Refer to <http://www.udot.utah.gov/index.php/m=c/tid=719>.
- d. Compliance Certificate: Provide an installation compliance certification by the manufacturer on required equipment.
- e. Manufacturer's Equipment Documentation: For all Contractor furnished items, provide all factory issued manuals per this section, article 2.1, paragraph C, software, detailed shop drawings, wiring diagrams, certifications, warranties, instruction sheets, and parts lists to the engineer.
- f. As-Built Drawings: Refer to Section 01721.

B. Documentation Timeline

- 1. The following list describes the conditions under which submittals must be provided:
 - a. Contractor Furnished Material and Equipment Lists: Submit within fifteen business days from the Notice to Proceed. All Contractor furnished equipment must be approved by the Engineer prior to ordering.
 - b. Test Reports: Submit within five business days from the completion of a successful test.
 - c. Compliance Certificate: Submit within five business days of receipt by the Manufacturer for each site.
 - d. Completion Notice: Submit within five business days prior to the beginning of the Acceptance testing.
 - e. Manufacturer's Equipment Documentation and As-Built Drawings: Must be received and accepted prior to Final Acceptance.
- 2. The Engineer accepts or rejects submittals within ten business days. Rectify and resubmit rejected submittals within five business days, or as specified by the Engineer.

C. Factory Issued Manuals

- 1. Acceptable factory manuals must contain technical, diagnostic, and maintenance (preventative and troubleshooting) information. Advertising brochures and catalog cuts not accepted.

2.2 WIRING

- A. Copper, as specified. International Municipal Signal Association (IMSA).

- B. Size as specified. American Wire Gauge (AWG).
- C. Service Cable:
 - 1. Single-conductor, as specified. Type THWN, THW, THHW.
- D. Signal Cable:
 - 1. Multi-colored cables, as specified.
 - 2. IMSA 20-1
- E. Ground Wire:
 - 1. Solid, bare, soft-drawn, copper wire, as specified.
 - 2. NEC 250.1.
- F. Splice Sealing: Rural Electrical Association (REA) Bulletin 345-72.
 - 1. Use approved direct buried, rigid body splice kits with reenterable, gel-filled encapsulant and listed in the USDA Rural Utilities Service (RUS) List of Materials, Informational Bulletin (IP) 344-2, Section 2 - **Housings, Splice Cases, etc.** Properly size for the cable or wire being spliced.
 - 2. ASTM D 3005, Type I or II. UL 510.
- G. Power Conductors:
 - 1. Power conductors, copper, type RHH, USE, RHW.
- H. RS-232/RS-422 Cables:
 - 1. 24 AWG stranded tinned copper drain wire.
 - 2. 4 twisted pairs.
 - 3. Overall aluminum-polyester shielded.
 - 4. PVC jacket.
 - 5. Nominal outside diameter of 0.28 in.
 - 6. Nominal impedance of 100 (ohms).
 - 7. Nominal capacitance of 12.8 pF/ft between conductors.
 - 8. Nominal capacitance of 25 pF/ft between one conductor and the other conductors connected to shield.
- I. Category 5 Cable (CAT-5) as specified in ANSI/TIA/EIA-568-B. Refer to NEC, Article 800.
- J. Detector Cables as specified in Section 13591.

PART 3 EXECUTION

3.1 TESTING AND ACCEPTANCE

- A. The following tests will be required for all appropriate ATMS devices:
 - 1. Cable and Conductor Test
 - 2. Local Field Operations Test
 - 3. Acceptance Tests

- B. Notify the Engineer five working days prior to the proposed date and time of all tests.
 - 1. Obtain UDOT's newest version of the Five-Day ATMs Testing Prenotification Form from the UDOT Web site. Refer to <http://www.udot.utah.gov/index.php/m=c/tid=719>.
 - 2. The Engineer or the Engineer's Agent witnesses the tests.

- C. Before any connections are made, perform the Cable and Conductor Test.
 - 1. Obtain UDOT's newest version of the ATMS Cable and Conductor Test Form from the UDOT Web site. Refer to <http://www.udot.utah.gov/index.php/m=c/tid=719>.
 - 2. Prior to any testing, verify that all cables and conductors are installed as per the manufacturer's plans and recommendations.
 - 3. Perform all resistance testing after final termination and cable installation, but prior to the connection of any electronics or field devices.
 - 4. Replace the cable, then retest new cable as specified above should any cable fail to meet these parameters, or should any testing reveal defects in the cable.
 - 5. Furnish all equipment, appliances, and labor necessary to test the installed cable and conductors.

- D. Refer to the appropriate Standard Specification, Supplemental Specification, or Special Provision for device specific Field Operations Test procedures.

- E. Refer to Section 13595 for Acceptance testing procedures.

3.2 EXISTING FACILITIES

- A. Until Final Acceptance, repair any damage to any traffic signal equipment, lighting equipment, utilities, and other ATMS devices, including but not limited to, conduit, junction boxes, underground traffic signal circuits, power sources, or power conductors, that are caused by the Contractor's activities, or failure to maintain adequate traffic control or protection of the work. (This includes items to be salvaged, such as: cabinets or poles.) Request a meeting with the Department and the party with current maintenance responsibility to verify that all existing equipment is in working order at the work site. Test all loops, cabling, connectors, cabinet operations, etc. Request, coordinate, and conduct the on-site meeting and provide all labor, materials, test equipment, and test documentation. All testing will be non-destructive. If work begins at a location without arranging this testing, it will be assumed that all cabinet components and operations were in proper working order at that time and responsibility assumed for proper operation upon completion of the work. If no pre-testing is completed, any equipment that is not functioning at the time the work is completed, will be assumed to have been working at the project start and must be replaced at the Contractor's expense.
- B. Locate and mark all utilities prior to initiation of construction. Contact Blue Stakes and schedule the location of underground utilities. Contact any utilities and local government agencies not participating in Blue Stakes locate services. Any utilities shown on the plans concerning the type and location of existing underground and overhead utilities is shown in an approximate manner only and have not been independently verified by the Engineer or the Engineer's Agent. Determine the exact location of all existing utilities before commencing work, and be fully responsible for any damage that might result from the Contractor's failure to locate and preserve any underground and overhead utilities.
- C. Following any repairs to underground facilities, contact the Engineer for inspection, prior to restoring cover.
- D. If any conflicts with existing facilities are identified, contact the Engineer to re-locate any project foundations, trenches, or other items, prior to further construction work.
- E. Arrange to have a utility company inspector on site when doing any construction within ten feet of existing facilities.
- F. Place electrical service requests and orders as well as all other necessary utility coordination with all utility companies in an efficient manner as to not delay the project.

- G. Any pre-marking of ATMS equipment locations in the field by the designer has been performed without consideration of existing underground utilities. Determine any conflicts with existing utilities at locations pre-marked in the field by the Designer.
- H. Do not proceed on work occurring outside Department right-of-way until the required permits, environmental clearances, and approvals are obtained from all local entities.
- I. Do not cut any limited access fences.
- J. Perform all digging using hand tools, without power equipment if any construction is to take place within two feet of existing facilities.

3.3 LOCATION OF INSTALLED EQUIPMENT

- A. Proposed equipment locations may be modified to avoid conflict with underground utilities or other obstructions. Consult Engineer for approval.
- B. Install all above ground equipment the maximum practical distance from traffic or behind barrier or other approved protection.
- C. No portion of the equipment can infringe within the following distances unless behind a barrier or other approved protection.
 - 1. 35 ft. from the edge of traveled way for a freeway
 - 2. 35 ft. from the edge of traveled way for an off ramp
 - 3. 50 ft. from the edge of traveled way for an on ramp
- D. Minimum distance behind guardrail for all above ground equipment: 4 ft.
- E. Minimum distance behind concrete barrier for all above ground equipment: 2 ft.

3.4 EXCAVATION

- A. Do not damage streets, sidewalks, landscaping, or other surrounding conditions when excavation is required.
- B. Do not excavate wider than necessary for the proper construction of the foundations and other equipment.
- C. Do not perform excavation until immediately before construction of foundations.

- D. Place the material from the excavation in a position that will minimize obstructions to pedestrian or vehicular traffic and interference with surface drainage.
- E. Remove all surplus excavated material and properly dispose of it within 48 hours as directed by the Engineer.
- F. Notify the Engineer after each excavation is completed that the site is ready for inspection.
- G. Do not cover any underground materials or equipment fill under any circumstances, without the approval of the Engineer.
- H. Barricade and cover all excavations to provide safe passage for pedestrian and vehicular traffic at the end of each working period.
- I. Keep sidewalk and pavement excavations well covered and protected to provide safe passage for pedestrian and vehicular traffic until permanent repairs are made.

3.5 ANCHOR BOLTS

- A. Place and hold anchor bolts in proper alignment, position, and height during the placing and vibrating of concrete.
- B. Assemble bolts, nuts, washers and torque bolts as required by the manufacturer.
- C. Conform to minimum requirements of ASTM A 307 for anchor bolts. Do not weld anchor bolts to reinforcing steel. Galvanize all nuts, washers and anchor bolts in accordance with ASTM A 153.

3.6 TRAFFIC CONTROL

- A. Refer to Section 01554.
- B. Submit all lane closure and traffic control plans to the Department for approval. Refer to Section 01554.
- C. Contact each business manager 48 hours prior to construction affecting any business access. Place BUSINESS ACCESS signs where access to business is not readily apparent. Keep at least one driveway open during periods when business is open for businesses with multiple driveways. Coordinate with the business owner for businesses with only one driveway to minimize the amount of time that the driveway is closed.

3.7 TEMPORARY TRAFFIC SIGNAL TIMING

- A. Design and implement any temporary traffic signal timing or phasing required for traffic management during construction. Submit any proposed timing or phasing changes, including any temporary signal head placement, to the Engineer for review and approval seven days in advance.
- B. Implement the approved temporary changes including for example, programming the controller, relocating traffic signal heads and, recabbling. Contact the Engineer for inspection (giving 24 hours notice) prior to implementing temporary phasing.

3.8 REUSE EXISTING CONDUIT AND JUNCTION BOXES

- A. Reuse existing conduit when no new adjacent conduit is being installed.
- B. Reuse only existing conduit that meets NEC requirements and Department standards for conduit material and depth of cover.
- C. Replace existing plastic lid on all reused junction boxes with polymer concrete lid Refer to Section 013554.

3.9 ABANDON ATMS EQUIPMENT IN PLACE

- A. Do not remove existing pull wire from conduit that is to be abandoned in place.
- B. Obliterate all existing foundations left in place to a depth of at least 6 inches below the existing surface. Properly dispose of removed concrete.
- C. Properly label “abandoned” each piece of abandoned ATMS equipment in each junction box and all cables and conductors that are left in place.

3.10 REMOVE AND SALVAGE ATMS EQUIPMENT

- A. Remove existing equipment as specified.
 - 1. Maintain the integrity of the equipment during removal and transport. Contact the Engineer to arrange for an inspection by the Department to verify Equipment condition prior to removal, otherwise the equipment will be assumed functional and undamaged.
 - 2. Return equipment to the appropriate Department facility, as indicated by the Engineer.
 - 3. Contact Engineer at least 48 hours prior to removal.

- B. All removed poles and cabinets:
 - 1. Contact the Engineer at least 48 hours prior.
 - 2. Return to appropriate Department facility.

- C. Cable:
 - 1. Spool all cable to be salvaged neatly onto appropriately sized spools. Avoid cutting long cables whenever possible. Cut cables only at splice locations or as directed by the Engineer. Cap wires as described in this section, Article 3.12.
 - 2. Do not exceed the minimum bending radius and the maximum pulling tension recommended by the manufacturer's specifications at any time.

3.11 ELECTRICAL

- A. Perform all work in accordance with the National Electric Code (NEC).

3.12 INSTALL WIRING

- A. Conductors:
 - 1. Clean and dry the inside of the conduit before installing conductors.
 - 2. Install grounding conductor in all power circuit conduits (Refer to NEC, Article 250.1).
 - 3. Use powdered soapstone, talc or other approved lubricants when pulling conductors in conduit.
 - 4. Tape the ends of unused conductors and label them as spares.
 - 5. Use conductors that are color coded as specified in IMSA 20-1 and comply with NEC, Article 310.

- B. Ground wire:
 - 1. In all non-metallic conduit, a ground wire must run continuously and be grounded at each junction box, except in those conduits used solely for interconnect and detector circuits.
 - 2. Bond the ground wire to the ground rod in each junction box except in circuits with less than 50 V.

- C. Neatly arrange wiring within cabinets, junction boxes, fixtures, etc.

- D. Wire splicing:
 - 1. Splice wires only in detection circuits where the wire type changes in the junction boxes.
 - 2. Mechanically secure and solder, individually insulate, and water seal all splices. Encapsulate in a rigid body re-enterable gel filled enclosure approved by the department.

- E. Do not exceed the minimum bending radius or the maximum pulling tension recommended by the manufacturer's specifications at any time.
- F. Keep cable ends sealed at all times during installation using an approved cable end cap. Do not use tape to seal the cable end. Keep cable end sealed until connectors are installed.

3.13 MAINTENANCE

- A. Repair, replace, maintain and operate all installed ATMS devices until Final Acceptance. Includes but is not limited to:
 - 1. Replacement of damaged cabling.
 - 2. Repair or replacement of damaged conduit and junction boxes.
 - 3. Repair or replacement of Department and Contractor furnished items.
- B. Repair installation or replace equipment due to any damage as specified in Section 00725.
- C. Emergency Maintenance: Until Final Acceptance of the ATMS device, provide emergency maintenance on a seven-day per week, twenty-four hour basis. Respond to the dispatcher within fifteen minutes when called or paged by the dispatcher. Provide contacts and telephone numbers to the Engineer for the emergency service.
- D. Limit emergency maintenance (one hour response) to problems of a public safety nature, such as exposed wires or knockdowns.
- E. Routine Maintenance: Initiate other routine maintenance, not of a public safety nature, within twenty-four hours of notice.
- F. Failure to provide adequate routine or emergency maintenance will result in the Department performing the necessary maintenance or the selection a separate contractor by the Department to perform the work. The Contractor will be charged accordingly.

3.14 LOCATION OF NEW FACILITIES

- A. Locations staked in the field and dimensioned on the plans and details are approximate. Coordinate with the Engineer to have the Engineer or the Engineer's Agent on-site to field locate all new facilities such as cabinet foundations, camera poles, detector poles, and junction boxes.

END OF SECTION