SPECIAL PROVISIONS & TECHNICAL SPECIFICATIONS

City of Flagstaff

Fourth Street

South of Sparrow Avenue to North of Soliere Avenue

July 2020

Prepared by:
AECOM
7720 North 16th Street, Suite 100
Phoenix, AZ 85020

TECHNICAL SPECIFICATIONS

PART 100 – GENERAL CONDITIONS

SECTION 107 – LEGAL RELATIONS AND RESPONSIBILITY TO THE PUBLIC

Legal Relations and Responsibility to the Public shall conform to Section 107 of the MAG Uniform Standard Specifications for Public Works Construction, 2015 edition including revisions, except as modified herein.

Subsection 107.2 – Permits: is modified to add the following:

The Contractor shall obtain all permits and licenses, including those required by the City of Flagstaff, State of Arizona, Coconino County, U.S. Government, or any other local or federal agency, and shall pay all charges, fees, taxes and provide all notices necessary and incidental to due and lawful prosecution of the work. The cost for the required City of Flagstaff Public Improvement Permit will be paid by the City. Construction activities shall not begin until approvals are received from all applicable permitting agencies.

Refer to Subsection 107.2 for required AZPDES permits. In particular, the Contractor will obtain all necessary AZPDES and SWPPP permits as required and in accordance with Subsection 107.2.1.

Subsection 107.2.1 – AZPDES Permit Requirements: is modified to add the following:

This project is subject to the Arizona Pollutant Discharge Elimination System (AZPDES) stormwater requirements for construction sites under the Arizona Department of Environmental Quality's (ADEQ's) General Permit for Arizona. Under provisions of that permit, the Contractor shall be designated as permittee and shall take all necessary measures to assure compliance with the AZPDES General Permit for Arizona as well as all other applicable Federal, State, and local laws, ordinances, statutes, rules and regulations pertaining to stormwater discharge. As the permittee, the Contractor is responsible for preparing, in a manner acceptable to ADEQ, all documents required by this regulation, including but not necessarily limited to:

Storm Water Pollution Prevention Plan (SWPPP) for the project, including the certification of compliance form. Contractor shall be required to develop, implement, update and revise the SWPPP, as necessary, in order to assure compliance with the ADEQ permit requirements. The SWPPP shall be retained on the project site at all times during construction.

Notice of Intent (NOI) to assure compliance with the AZPDES General Permit for Arizona, including certification of signatures.

Notice of Termination (NOT) of coverage under AZPDES General Permit for Arizona.

The Contractor shall submit the completed and duly signed NOI forms to ADEQ no later than seven (7) business days after the contract award. Proof of the submittal date must be provided to the Owner. If the work is within ¼ mile of an Impaired or Unique Water, the SWPPP needs to be submitted to ADEQ but it still must be available on site.

When the discharge is to an Impaired or Unique Water or is in or near endangered species habitat as identified by ADEQ's smart NOI permitting system, applicants are not authorized under this permit for a minimum of thirty-two (32) business days following the receipt of the NOI and SWPPP. ADEQ may notify operations within this timeframe that there is cause for SWPPP amendment, or denial of coverage as specified in Parts 1.D.5 and 1.D.6 of the general permit. If notification is not received in the thirty-two (32) business-day timeframe, the Contractor may assume coverage under this permit according to ADEQ requirements. Contractor must notify Owner of the status of the NOI prior to commencing work. The applicant shall submit the NOI (application) to:

Arizona Department of Environmental Quality
Water Permits Section/Stormwater NOI (5415B-3)
1110 W. Washington Street
Phoenix, Arizona 85007
or fax to: (602) 771-4674

If the facility has the potential to discharge to a municipal separate storm sewer system (MS4), the applicant must also provide a copy of the completed NOI to the owner/operator of the MS4 system at the time it is submitted to the Department. The completed NOI will be provided to the City of Flagstaff.

Failure by the Contractor (or Subcontractors or any tier) to submit NOIs within the mandated timeframe shall result in delay of the construction start date, and no claim for extension of time will be granted for such delay. A copy of the completed NOI shall be posted at the construction site, and a copy of the general permit and SWPPP should be on-site at all times.

Inspections of all stormwater pollution control devices on the project shall be performed by Contractor every seven (7) days or at least once every fourteen (14) calendar days, and also within twenty-four (24) hours of the end of a storm event of 0.50 inches or greater as required under provisions of the AZPDES General Permit for Arizona. A reduced inspection frequency may be used provided the conditions in Part IV.H.2 of the general permit have been met. Contractor shall prepare reports on such inspections and retain the reports for a period of three (3) years after permit coverage expires or is terminated. Inspection reports shall be submitted monthly to the City of Flagstaff. Additionally, Contractor shall maintain all stormwater pollution control devices on the project in proper working order, which shall include cleaning and/or repair during the duration of the project.

The Contractor warrants that its employees and Subcontractors of any tier and their employees shall at all times comply with all applicable laws, ordinances, statutes, rules and regulations set forth by all federal, state and local governments and the Arizona

Department of Environmental Quality in connection with AZPDES Permitting requirements and laws and regulations pertaining to air, groundwater and surface water quality.

Fines and penalties imposed by the ADEQ against the City of Flagstaff or the Contractor for Contractor's failure to comply with any of the requirements of AZPDES General Permit of Arizona shall be borne by the Contractor.

Upon project completion, acceptance and demobilization, Contractor shall submit its completed, duly executed NOT form to the Arizona Department of Environmental Quality at the address listed in Section (C) above, thereby terminated all AZPDES permit coverage for the project. Contractor shall then surrender to the City of Flagstaff copies of the SWPPP, inspection information and all other documents prepared and maintained by the Contractor in compliance of the AZPDES General Permit. Contractor shall retain the originals of such documents for a period of three (3) years following the completion of the project.

The Lump Sum price for the SWPPP shall include all material, labor and all other costs relating to the preparation, installation and maintenance of the SWPPP during the project construction, including assuring proper operation of the pollution control devices installed, and all maintenance, cleaning and disposal costs associated with clean-up and repair following storm events, runoff or releases on the project. The Lump Sum price for the SWPPP shall be inclusive of all costs, and the Contractor shall make no additional claims under any other specification provision of these documents, including Changed Conditions.

Copies of all required forms and guidance for preparing the SWPPP are available in the "Drainage Design Manual for Maricopa County, Volume III Erosion Control." The manual is available at the Flood Control District, 2801 West Durango Street, Phoenix, Arizona 85009. For appropriate guidance forms as provided by ADEQ, the Contractor should refer to the ADEQ website at:

http://www.adeq.state.az.us/environ/water/permits/stormwater.html#const.

PART 200 – EARTHWORK

SECTION 201 – CLEARING AND GRUBBING

201.3 – Construction Methods: is revised to add:

The Engineer and the contractor will walk the site and agree on the trees to be removed. The contractor shall coordinate with the Engineer to identify and tag the trees to be removed prior to construction. No trees shall be removed until they have been identified and tagged and the removal techniques have been approved by the Engineer. The contractor shall not remove additional trees without the approval of the Engineer.

A tree is defined as a tree that has a single trunk diameter or combined trunk diameter of at least 4 inches measured 4 feet above existing ground. A tree will be considered as one unit that has a distinct and separate root system, as determined by the Engineer.

If the contractor damages existing features, including guardrails and barrier walls, inlets and outlets of drainage facilities, flow paths of the inlets and outlets as well as other drainage facilities, they shall be repaired or replaced as directed by the Engineer and at no cost to the Department.

Removal shall meet the requirements of the Section 201 of the specifications.

The contractor shall properly dispose of all stumps, rootball material and debris generated from removal activities.

The contractor shall avoid damaging vegetation that is to remain in place. If limbs or branches of vegetation that are intended to remain are broken or damaged during removal, the contractor shall first ensure that the plant will survive and then trim the damaged limbs or branches with clean, straight cuts. If a plant not intended for removal has been damaged and not expected to survive, the contractor shall replace the damaged plant as directed by the Engineer and at no cost to the Department.

The contractor shall keep the roadway pavement and shoulders clear at all times. Debris from removal activities shall be removed from the site immediately. If debris cannot be removed immediately, it shall be kept a minimum of 30 feet from the edge of pavement and removed at the end of each workday.

201.6 MEASUREMENT, REMOVAL AND DISPOSAL OF TREES: is revised to read:

Removal of Trees will be measured by the unit for each.

201.7 PAYMENT, REMOVAL AND DISPOSAL OF TREES: is revised to read:

The accepted quantities of this Removal of Trees, measured as provided above, will be paid for at the contract unit price each, which price shall be full compensation for the work, complete in place, including protection of tree stumps, disposal of removed tree debris off site and protecting existing which are not scheduled for removal.

No measurement or direct payment will be made for removal and disposal of trees with a trunk caliper of 4 inches or less, the cost is considered included in the price of contract items.

There will be no separate measurement or payment for backfilling, compacting and returning the disturbed area to grade or as otherwise called for in the plans or directed by the Engineer.

PART 400 – RIGHT OF WAY AND TRAFFIC CONTROL

SECTION 430 – LANDSCAPE AND PLANTING: is revised to add:

SECTION 432 – NATIVE SEEDING

432.1 DESCRIPTION

All areas disturbed by construction shall be hydroseeded in accordance with City of Flagstaff Engineering Standards Division 13-17-002. A revegetation plan will be required for the disturbed areas. This plan will require a minimum of 70% regrowth on the disturbed area.

432.2 MATERIALS

Materials shall be in accordance with City of Flagstaff Engineering Standards Section 13-17-002.

432.3 CONSTRUCTION METHODS

All areas to be seeded that are accessible to machinery shall be tilled to a minimum depth of four (4) inches. Areas inaccessible to machinery shall be hand tilled and prepared to a minimum depth of two (2) inches. Cut slopes of 2:1 or steeper do not require tilling. Cultivation on sloping terrain shall run perpendicular to the direction to the slope. If weeds or herbaceous plant material interferes with proper seedbed preparation, the contractor shall remove them from the seedbed.

Contractor shall remove and dispose of all debris and other objectionable material that may interfere with seeding operations.

The area to be seeded shall be relatively smooth and all surface irregularities (e.g. rills, tire marks) shall be filled and firmed to conform to the desired cross sections. The seedbed shall be rolled both before and after the seeding operation with a minimum of one pass of a cultipacker or drag harrow.

Seed shall be sown when conditions will promote germination and growth. Normal non-irrigated permanent native seed application dates are between April 1 and June 15, between August 15 and September 20 and after the first frost (recurring overnight temperature of 28 degrees F) until snowfall. Seeding work shall be performed only after planting and other work affecting ground surface is complete.

To assist in establishment of the permanent seed mix, a nurse crop shall be used for this work. Preapproved nurse crop seed shall be one of the following, incorporated with the specified permanent seed mix;

Annual ryegrass	*(Lolium multiflorum)*	30 lbs/acre
Oats	(*Avena sativa)*	60 lbs/acre
Regreen©	(*Triticum aestivum x Elytrigia elongata)*	30 lbs/acre

Alternative species may be acceptable but are subject to prior approval from the City Project Manager or duly authorized representative.

When cut or fill slopes are greater than six (6) feet in height and steeper than 3H:1V, the seeded area shall be covered with American Excelsior Company straw/coconut blanket or an approved equal. Installation shall be per the manufacturer's written directions.

Following acceptance of the seeding and mulching, the contractor shall be responsible for maintaining and stabilizing the seeded and mulched areas for a forty-five (45) calendar day period. During the establishment period, the contractor shall repair and restore eroded or damaged areas.

Prior to project closeout, the contractor shall provide documentation that the 70% regrowth to the disturbed areas was achieved.

432.4 MEASUREMENT

Seeding shall be measured by the acre which shall include all ground preparation, soil conditioners, hydroseeding and water.

432.5 PAYMENT

The quantities measure as provided above will be paid for at the contract price per acre, which price shall be full compensation for all soil preparation, seeding and maintenance required to provide a minimum of 70% regrowth in the disturbed areas.

PART 600 – WATER AND SEWER:

SECTION 601 – TRENCH EXCAVATION, BACKFILLING AND COMPACTION

601.4 –Foundation, Bedding, Haunching, Backfilling and Compaction: is revised to add:

Lime treated material used in the pipe embedment zone (bedding, haunching, initial backfill) for waterlines shall be prohibited. Aggregate Base Course (ABC) material used in the pipe embedment zone is required to have a PH between 6.0-9.0. The minimum resistivity is 2,000 ohm-cm. The material shall be tested according to Arizona Test Method 236.

All costs related to meeting this requirement shall be included in the various bid items.

SECTION 610 – WATER LINE CONSTRUCTION:

Water Line Construction shall conform first to the City of Flagstaff Engineering Standard 13-09-006 and then to Section 610 of the MAG Uniform Standard Specifications for Public Works Construction, 2015 edition including revisions, except as modified herein.

610.2 - General: is revised to add:

All work associated with the protection in place of existing water lines, connections of new water lines to the existing water system, system shutdown and re-start, placement of

service taps, tees, thrust blocks and/or restraint joints, shall be considered incidental to the water line installation. Any portion of the water line not affected by construction shall remain and be protected-in-place. The contractor will coordinate with the City of Flagstaff for the shutdown of any water line.

The contractor is responsible for making proper application and paying the prevailing fees to the City prior to construction of all services. Connections to existing mains shall be done by the Contractor after approval by the City. Conflicts with existing utilities discovered during construction shall be called to the attention of the City Representative and resolved prior to proceeding. It shall be the responsibility of the contractor to have the service line visible and accessible when requesting a pre-final inspection. Only City forces are authorized to open and close water valves.

SECTION 618 – STORM DRAIN CONSTRUCTION:

Section 618.1 Description: is revised to add:

Catch basins, Detail DD1, will be construction per ADOT Standard Specifications Section 503.

PART 700 – Materials:

Paving Asphalt shall conform the Geotechnical Report and the MAG Uniform Standard Specifications for Public Works Construction, 2015 edition including revisions, except as modified by the Flagstaff Standard Specifications.

TRAFFIC SIGNAL AND ROADWAY LIGHTING

Traffic signals and roadway lighting shall be constructed according to ADOT Standard Specifications sections 730, 731 and 732 and the City of Flagstaff Standard Specifications. Any item not covered by this technical specification shall be constructed per ADOT standard Specifications.

ITEM NO. 59 REMOVE & SALVAGE TRAFFIC SIGNAL (SOLIERE AVENUE)

DESCRIPTION

The work under this item shall consist of furnishing all labor, equipment and materials necessary to remove and salvage the entire existing traffic signal system including control cabinet with all contents, poles, mast arms, signal heads, pedestrian push buttons, pedestrian signal, load center cabinet, luminaire, and video detection to the City of Flagstaff and removal of existing pull boxes, conductors, and foundations in accordance with Sections 202 and 737 of the ADOT Standard Specifications and as directed by the Engineer.

REQUIREMENTS

Unless otherwise indicated, removal of pole foundations shall be to a depth of at least three (3) feet below finished grade. The contractor shall be responsible for the disposal of the removed items.

The contractor shall salvage control cabinet with all contents, poles, mast arms, signal heads, pedestrian push buttons, pedestrian signal, load center cabinet, luminaire, and video detection to the City of Flagstaff Traffic Operations Yard, 3200 W. Route 66, Flagstaff, AZ 86001. The contractor shall coordinate with Steven Hill, City Inspector at 928-607-2375 for all removal activities. The contractor shall contact Signal Shop at 928-213-2175 to schedule delivery.

Arrangements for disposal of all waste material shall be the responsibility of the contractor.

Removal of existing improvements shall be performed in a safe manner avoiding damage to improvements not designated for removal.

After removal of foundations and pull boxes the location should be finished to match the surrounding area and acceptable to the engineer.

MEASUREMENT

Remove & salvage traffic signal (Soliere Avenue) will be measured as one complete unit of work, which shall include, but not limited to, loading, transporting, unloading, stockpiling of the equipment and materials.

PAYMENT

The accepted quantity of this work, measured as provided above, will be paid for at the contract lump sum price, which price shall be full compensation for the work.

ITEM NO. 60 REMOVE & SALVAGE TRAFFIC SIGNAL (SPARROW AVENUE)

DESCRIPTION

The work under this item shall consist of furnishing all labor, equipment and materials necessary to remove and salvage existing traffic signal poles, mast arms, signal heads, pedestrian push buttons, pedestrian signal, and luminaire as equipped to the City of Flagstaff and removal of existing pull boxes, conductors, and foundations as shown on the plans and in accordance with Sections 202 and 737 of the ADOT Standard Specifications and as directed by the Engineer.

REQUIREMENTS

Unless otherwise indicated, removal of pole foundations shall be to a depth of at least three (3) feet below finished grade. The contractor shall be responsible for the disposal of the removed items.

The contractor shall salvage poles, mast arms, signal heads, pedestrian push buttons, pedestrian signal, and luminaire as equipped to the City of Flagstaff Traffic Operations Yard, 3200 W. Route 66, Flagstaff, Az 86001. The contractor shall Coordinate with Steven Hill, City inspector at 928-

607-2375 for all removal activities. The contractor shall contact Signal Shop at 928-213-2175 to schedule delivery.

Arrangements for disposal of all waste material shall be the responsibility of the contractor.

After removal of push buttons and other equipment from any existing pole to remain, the contractor shall patch the holes and spray paint to match pole color per direction of the Engineer.

Removal of existing improvements shall be performed in a safe manner avoiding damage to improvements not designated for removal.

After removal of foundations and pull boxes the location should be finished to match the surrounding area and acceptable to the Engineer.

MEASUREMENT

Remove & Salvage Traffic Signal (Sparrow Avenue) will be measured as one complete unit of work which shall include, but not limited to, loading, transporting, unloading, stockpiling of the equipment and materials.

PAYMENT

The accepted quantity of this work, measured as provided above, will be paid for at the contract lump sum price, which price shall be full compensation for the work.

ITEM NO. 61 RELOCATE WIRELESS RADIOS
ITEM NO. 62 RELOCATE PTZ CAMERA

DESCRIPTION
The work under these items shall consist of providing all labor, equipment and materials needed for relocation of the existing PTZ camera and wireless radios and putting in place a fully functional CCTV system at the intersection of 4th Street and Soliere Avenue. The work shall include, but not limited to, removal of the existing camera and radios, storage and installation of these equipment, and relocating at the locations shown on the plans and as directed by the Engineer.

MATERIAL

The materials used to mount and wire the PTZ camera and radios shall be per manufacturer recommendation, compatible with the existing system, and shall be approved by the Engineer.

REQUIREMENTS

The contractor shall inventory the existing CCTV camera and wireless radio system before removing these items. If the wire length is not sufficient for the installation at new location, the contractor shall provide new wiring which shall be unspliced runs from the controller cabinet to each equipment. The contractor shall perform line of sight survey to align the radios so as to establish wireless communication similar to the current installed system, as approved by the Engineer.

The contractor shall furnish all equipment and materials necessary to have a fully functional CCTV and wireless communication system at the new location.

MEASUREMENT

Relocate Wireless Radios and Relocate PTZ Camera will be measured as a unit for each radio or camera relocated and made operational and fully functional. No separate measurement will be made for loading, transporting, unloading, and stockpiling of the equipment and materials.

PAYMENT

The accepted quantities of relocated items, measured as provided above will be paid for at the contract unit price, which price shall be full compensation for the work.

ITEM NO. 87 240V LED LUMINAIRE

DESCRIPTION

The work under this item consists of furnishing and installing 240V Light Emitting Diode (LED) luminaires on traffic signal poles, in accordance with the plans. The work shall also include any submittals and meetings necessary for luminaire approval.

MATERIAL

Luminaires shall be Phosphor Converted Amber (PCA), distribution Type III, at 9000 maintained lumens and a Scotopic to Photopic (S/P) ratio of 0.50 or less. Fixtures shall have 7-pin photocell receptacles and multi-voltage tap ballasts. Service voltage will be 240V. All luminaires shall be per section 13-12-003-0002 Streetlights at Intersections of the Flagstaff Engineering Design Standards and Specifications for New Infrastructure (Chapter 13-12: Street Lighting Draft 11/01/2019).

REQUIREMENTS

The contractor shall submit the manufacturer's specification and installation sheets for approval prior to purchase of the luminaires for installation. The contractor shall coordinate with Steven Hill, City inspector at 928-607-2375, for shop drawing submittal and approval. The contractor shall contact Megan McCarthy at APS at 928-864-8351 for any coordination pertaining to power or signal lighting.

MEASUREMENT

240V LED Luminaires will be measured as a unit for each luminaire furnished, installed and made operational.

PAYMENT

The accepted quantities of luminaires as provided above will be paid for at the contract unit price for each luminaire, which shall be full compensation for the work.

ITEM NO. 88 PEDESTRIAN PUSH BUTTON ASSEMBLY

DESCRIPTION

The work under this item shall consist of furnishing and installing pedestrian push button assembly at the locations shown on the project plans, with the requirements of manufacturer, project plans, and these technical specifications.

MATERIALS

The contractor shall furnish and install Polara iNS 2-wire system that includes but not limited to Polara iNS iNavigator ped station (to include APS push buttons with R10-3eAZ push button signs), 2-wire central communication control unit (iCCU-S2), and wireless programming capability; or City approved equal.

The contractor shall furnish any other materials necessary to complete the push button assembly installation which also include any wiring, mounting kits, hardware and labor.

REQUIREMENTS

Pedestrian push button assembly shall be APS and in compliance with ADA and MUTCD. The contractor shall submit the manufacturer's specification and installation sheets for approval prior to purchase of the item. The contractor shall coordinate with Steven Hill, City inspector at 928-607-2375, for shop drawing submittal and approval.

MEASUREMENT

Pedestrian push button assembly will be measured as a lumpsum for the two complete systems installed at the two intersections of Fourth Street with Sparrow Avenue, and Soliere Avenue.

PAYMENT

The accepted quantities of pedestrian push button assembly**,** measured as provided above, will be paid for at the contract price which shall be full compensation for the item approved, installed, complete in place, tested, made operational, and accepted by the Engineer.

ITEM NO. 91 RADAR DETECTION SYSTEMS:

DESCRIPTION

The work under this item shall consist of furnishing all materials, wiring, tools, equipment, mounting equipment, training and labor necessary to provide complete Frequency Modulated Continuous Wave (FMCW) radar vehicle detection system for the intersections and approaches of 4th Street & Sparrow Avenue, and 4th Street & Soliere Avenue, as shown on the Project Plans and in accordance with these technical specifications.

MATERIALS

The contractor shall use existing radar units and cabinet interface device in the intersection of 4th Street and Sparrow Avenue and provide one new radar detector with all accessories including but not limited to additional wiring for existing detectors to make it a complete system.

The contractor shall provide a new complete radar detection system for the intersection of 4th Street and Soliere Avenue.

The contractor shall provide and install the following equipment.

1. Wavetronix – SmartSensor Matrix – Presence Detection Devices
2. Wavetronix – SmartSensor Advanced Extended Range – Advance Detection Devices (When indicated on plans)
3. Wavetronix – Click 650 – Cabinet Interface Device

The contractor shall furnish the following materials to complete the installation:

- Matrix and Advance mount (when indicated on plans) with related mounting assemblies.
- Sufficient lengths of Matrix and Advance connectorized high quality cables for existing and new radar detectors.
- Sufficient length of bulk cables.
- NEMA 3R Splice Boxes.

The contractor shall furnish other materials necessary to complete the radar detection system which also include any additional wiring for the existing radars and cabinet interface device. Any required training shall be provided as a part of this bid item. The training should last no more than one working day and include the users of the system, the City of Flagstaff Traffic Signal Supervisor and the Engineer.

REQUIREMENTS

The contractor shall make necessary arrangements to have a Wavetronix representative review the intersection and signal plans to recommend locations for the SmartSensor Matrix sensors and to configure the system.

The contractor shall be responsible to ensure that all necessary features are included when installing the radar detection system and reconnecting the existing Radar detection system as shown on the Project Plans and in accordance with the requirements of the system manufacturer, the Standard Specifications and these technical specifications.

Unless otherwise noted on the Project Plans, all electrical equipment shall be maintained. Removal and reinstallation of electrical equipment shall be in accordance with Subsection 737-3 of the ADOT Standard Specifications.

The system shall be properly installed, configured with setup software and tested for optimum performance in accordance with the manufacturer requirements and recommendations.

MEASUREMENT

Radar Detection Systems will be measured as a lump sum, including all equipment, mounting kits, hardware, labor, documentation and training.

PAYMENT

The accepted quantities of Radar Detection Systems, measured as provided above, will be paid for at the contract unit price, which price shall be full compensation for the work, complete in place, tested, operational, and accepted by the Engineer.

ITEM NO. 95 STREETLIGHT POLE WITH LUMINAIRE (APS DET. 8040):

DESCRIPTION

The work under this item shall consist of furnishing and installing streetlight poles with luminaire arm and luminaire at the location shown in the project plan, with the requirements of the plan and these specifications.

MATERIALS

Materials shall meet the requirements of APS T&D Construction Standards 8040. Streetlight pole, mast arm, and luminaire assembly shall be in accordance with AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals (2001 Design Criteria), to withstand a wind speed of ninety (90) miles per hour. Streetlight structure color and paint shall be per section 13-12-005-002 of the Flagstaff Engineering Design Standards and Specifications for New Infrastructure (Chapter 13-12: Street Lighting Draft 11/01/2019).

Luminaire shall be Phosphor Converted Amber (PCA), distribution type III, at 9000 maintained Lumens and a Scotopic to Photopic (S/P) ratio of 0.50 or less. Fixtures shall have 7-pin photocell receptacles and multi-voltage tap ballasts. Service voltage will be determined by APS.

The installation of the luminaire shall include wiring from fixture to the pole handhole.

REQUIREMENTS

Construction shall be with the requirements of section 13-12 of the Flagstaff Engineering Design Standards and Specifications for New Infrastructure (Chapter 13-12: Street Lighting Draft 11/01/2019) and APS construction standards.

The contractor shall submit the manufacturer's specification and installation sheets for approval prior to purchase of the streetlight poles and luminaires for installation. The contractor shall coordinate with Steven Hill, City inspector at 928-607-2375, for shop drawing submittal and approval. The contractor shall contact Megan McCarthy at APS at 928-864-8351 for all coordination pertaining to street lighting.

The luminaire shall be installed perpendicular to the 4th Street or as approved by the Engineer.

If borings are required to install the poles, the voids shall be pressure grouted after the pole is in place.

MEASUREMENT

Street Light Pole with Luminaire (APS Det. 8040) will be measured by the unit each for each pole assembly that includes pole, luminaire arm, wiring within the pole, and luminaire installed.

PAYMENT

The accepted quantities of Street Light Pole with Luminaire (APS Det. 8040)**,** measured as provided above, will be paid for at the contract price which shall be full compensation for the work, complete in place, as described and specified herein and as shown on the plans.

ITEM NO. 96 PULL BOX (APS DET. 8655)

DESCRIPTION

The work under this item shall consist of furnishing and installing pull boxes for street lighting system per APS Standard at the locations designated on the project plans.

MATERIALS

Pull boxes shall be per APS Standard Detail 8655, small junction box. The contractor shall contact Bobby Garza at (602)-361-6840 for any APS standard related information.

REQUIREMENTS

Pull boxes shall be installed in accordance with APS Standard Detail 8655.

Pull boxes shall be set and adjusted so that they are flush at curb or sidewalk grade. When no grade is established pull boxes shall be set as requested by the Engineer.

All pull box covers shall be secured with the required bolts and washers before final acceptance of the project.

All pull boxes shall be left in a clean condition, free of dirt and debris upon completion of the work.

MEASUREMENT

Pull Box (APS Det. 8655) will be measured as a unit for each pull box acceptably placed. All additional materials necessary for the installation of the pull box shall be incidental and will not be measured separately.

PAYMENT

The accepted quantities for Pull Box (APS Det. 8655), measured as provided above, will be paid for at the contract unit price, which shall be full compensation for the work complete in place, including any excavating, backfilling and landscaping necessary to complete the work. No additional compensation shall be made for coordination with APS.

ITEM NO. 97 ELECTRICAL CONDUIT (TWO 1")
ITEM NO. 98 ELECTRICAL CONDUIT (ONE 2")
ITEM NO. 99 ELECTRICAL CONDUIT (ONE 2-1/2")
ITEM NO. 100 ELECTRICAL CONDUIT (ONE 3")
ITEM NO. 101 ELECTRICAL CONDUIT (TWO 3")
ITEM NO. 102 ELECTRICAL CONDUIT (ONE 4")
ITEM NO. 103 ELECTRICAL CONDUIT (TWO 4")

DESCRIPTION

The work under these items shall consist of furnishing and installing conduit for traffic signal and ITS elements in accordance with the ADOT Standard Drawing FM-1.01 and furnishing and installing Streetlight conduits per APS standards.

MATERIALS

Polyvinyl Chloride (PVC) conduit shall conform to Subsection 732-2.02 of the ADOT Standard Specifications. Intermediate Metal Conduit (IMC) is not allowed for ITS applications. Conduit runs which enter pole and cabinet foundations shall consist of PVC.

Unless otherwise shown on the plans, conduit bends, fittings, expansion couplings, sweeps, and other accessories shall be of the same material as the conduit.

Conduit elbows for new or future fiber optic cable shall have a minimum radius of 36 inches. Other conduit elbows shall have a minimum radius of 24 inches.

(A) HDPE Conduit:

The contractor may propose substituting HDPE conduit which meets these specifications in place of PVC conduit. The contractor shall obtain written approval from the Engineer prior to procuring and installing substituted HDPE conduit. The cost of providing and installing this substituted material will be paid for at the original bid price of the PVC conduit item.

HDPE conduit and fittings shall comply with ASTM D 2241 and ASTM-F2160-01. HDPE conduit shall have a minimum rating of SDR 11. It shall have a cell classification of PE334470C (for black conduit) and PE334470E (for colored conduit) in accordance with ASTM 3350: Standard Specification for Polyethylene Pipe and Fittings Materials. The polyethylene base resin shall meet the density requirement and melt index properties described herein. The density shall not be less than 0.940 and not more than 0.955 g/CM3 in accordance with ASTM D 1505: Standard Test Method for Density of Plastics by the Density-Gradient Technique. The range for the melt index shall be between 0.05 to 0.5g/10 minutes in accordance with ASTM D 1238: Standard Test Method for Melt Flow Rates of Thermoplastics by Extrusion Plastometer. The HDPE conduit shall have a minimum Flexural Modulus, of 80,000 psi, in accordance with ASTM D 790 and a minimum tensile strength at yield of 3,000 psi, in accordance with ASTM D-638. Additives to the base resin shall be included to provide heat stabilization, oxidation prevention and ultraviolet (UV) protection. It shall utilize carbon black in the range of 2 to 3 percent for long term protection against UV degradation. The minimum protection period shall be one year from date of manufacture in unprotected, outdoor storage in accordance with ASTM D 1603: Standard Test Method for Carbon Black in Olefin Plastics.

The contractor shall provide the Engineer original data sheets and a Certificate of Compliance letter from the HDPE conduit manufacturer to stating that the product meets these requirements.

(B) Innerduct:

When called for in the project plans or technical specifications, innerduct shall be corrugated HDPE. The number of innerducts per conduit and sizes shall be as called for in the project plans. Innerduct color shall be orange from the factory unless otherwise specified. The innerduct shall be furnished in one continuous length with no factory installed splices or couplings, and of lengths sufficient to complete runs between pull boxes without splicing.

(C) Conduit Warning Tape:

Conduit warning tape shall be a minimum four mil composite reinforced thermoplastic, with a minimum width of 3 inches and minimum length of 5 feet. Warning tape shall be highly resistant to alkalis, acids, and other destructive agents found in the soil.

Warning tape shall have a continuous printed message warning of the location of underground conduits. The message shall be in permanent ink specifically formulated for prolonged underground use and shall bear the words, “CAUTION - ELECTRIC LINE BURIED BELOW” or “CAUTION – COMMUNICATION CABLE BURIED BELOW” in black letters on a red background for electric conduits or orange background for communication conduits. Where both electric and communications conduits are in a single trench, both warning tapes, as described above, shall be provided.

(D) Detectable Pull Tape:

Detectable pull tape shall be constructed of fiber and have an embedded No. 22 AWG conductor. The tape shall be low-stretch and moisture-resistant. The tape shall have nominal pull strength of 2,500 pounds. The tape shall include distance markings at intervals not to exceed 2 feet.

MATERIALS

Construction Requirements for traffic signal and ITS conduits shall conform to Section 732 of the ADOT Standard Specifications, unless otherwise specified on the project plans, or the specifications. Conduit for street lighting system shall be per APS standards. The contractor shall coordinate with Megan McCarthy at APS at 928-864-8351 to obtain and conform APS standards for conduit installation.

No conduit trenches shall be left open after the work shift. All conduit trenches shall be compacted and backfilled prior to leaving the construction site.

Exact conduit route to be verified with the Engineer prior to placement to account for field conditions. All conduit, communication and electrical cable shall be installed according to National Electric Code requirements and manufacturer's recommendations. The contractor shall note that existing conduit may be encased in concrete.

Part of the work include horizontal directional drilling, horizontal directional boring, excavating, backfilling, compacting, warning tape, detectable pull tape, connectors and fittings, locating existing conduit when new is to be intercepted with existing, and restoration of the surface to

existing condition, including the replacement of concrete slabs, decomposed granite, irrigation and other landscaping items where appropriate, and/or at the locations designated on the project plans.

(A) Conduit Routing:

Conduit shown on the plans indicates the intended path and conduit shall be placed in accordance with the lines, grades, details and dimensions shown on the project plans and technical specifications, unless otherwise approved by the Engineer. The conduit path shall be staked for review and approval of the Engineer 3 working days prior to excavation and installation. The conduit path shall be modified as necessary, with the approval or at the direction of the Engineer, to avoid obstacles and obstructions, to facilitate future maintenance, or to conform to appropriate codes and specifications. Final conduit locations shall be documented in the record drawings.

The contactor shall restore, repair, or replace, as directed by the Engineer, vegetation, landscaping features, decomposed granite, irrigation facilities, walkways, utilities, and other items damaged or contaminated as a result of construction activities.

Excavations shall not be left open overnight and shall be backfilled with appropriate material unless a plan has been submitted to and approved by the Engineer allowing for open excavation. Safety devices used for the protection of excavations will not be considered as traffic control items. The cost of these safety devices is considered as included in the price of these items.

(B) Conduit Size:

Changes in the size of the conduit shall be submitted to the Engineer for approval prior to construction. Changes in conduit size shall be documented in the record drawings.

(C) Conduit Bend Radius and Deflection:

Except for factory bends, conduit bends shall have a radius of not less than that specified in the NEC. Conduit shall be bent without crimping or flattening, using the longest radius practicable. Communications conduits shall not deflect more than 1 inch per foot (1:12) vertically or horizontally. This is equivalent to a minimum radius of 6 feet. If the 1:12 requirement cannot be achieved, elbow fittings of 11 1/4, 22 1/2, 30 or 45 degrees, with a minimum radius of 24 inches shall be used. If 90-degree cumulative turns are required, they shall be made of individual elbows with a minimum radius of 36 inches for new or future fiber optic cable.

(D) Conduit Fittings:

New runs of HDPE conduit shall be continuous from pull box to pull box. HDPE conduit shall not be joined to PVC conduit in the length of the run.

If joining segments of HDPE conduit is called for on the plans or required by the Engineer, the contractor shall utilize non-corrosive, sit-tight, water-tight couplings. Heat fusion, electrofusion fittings and mechanical connections will be permitted if the HDPE conduit and joining device manufacturer’s recommendations are followed and the internal diameter of the HDPE conduit is not reduced. Extrusion welding and hot gas welding to join HDPE conduits is not permitted. Upon completion of joining HDPE conduit sections and setting the pull boxes, the contractor shall clean the HDPE conduit with compressed air. The contractor shall demonstrate that the conduit was not deformed during installation by pulling a cleaning mandrel or ball mandrel with a diameter of

80 percent of the HDPE inside diameter. If the mandrel passes through the HDPE, the contractor shall install the pull tape in accordance with Section 732 of the ADOT Standard Specifications. If the mandrel encounters a deformity in the HDPE conduit, the contractor shall replace the entire segment of HDPE between pull boxes with new HDPE at no additional cost to the Department.

(E) Conduit Depth:

Conduits shall have a minimum cover depth of 30 inches, or as indicated in the project plans. Depth of Streetlighting conduit shall be per APS standards. Backfill compaction shall be in accordance with ADOT Standard Specifications Subsection 203-5.03 (B) (4) for traffic signal and ITS and per APS standard for street lighting. When conduit cannot be installed at the required minimum depths, it shall be encased in Class B concrete, in accordance with Section 1006 of the ADOT Standard Specifications.

(F) Conduit in Trenches:

Immediately after conduit work including, installation, mandrelling, or cable or pull tape installations, they shall be sealed to prevent the intrusion of water, mud, gravel, vermin, etc. Taping the ends of the conduit is not allowed.

Conduits entering into pull boxes shall be capped or sealed using a method recommended by the conduit manufacturer to prevent intrusion of water, mud, gravel and rodents. Duct tape or similar material shall not be used for sealing conduit ends.

Unoccupied conduits on which work is performed shall be sealed with a water-tight, corrosion-proof, removable, reusable, and vermin resistant conduit plug or cap.

Occupied conduits on which work is performed shall be sealed with a conduit cap, as approved by the Engineer. The conduit cap shall be water-tight, corrosion-proof, removable, and vermin resistant.

Unoccupied innerduct on which work is performed extending beyond the end of the capped conduit shall be sealed with a water-tight, corrosion-proof, removable, reusable, and vermin resistant innerduct plug or cap. Prior to use, the innerduct plug or cap shall be submitted to the Engineer for approval.

Occupied innerduct on which work is performed extending beyond the end of the capped conduit shall be sealed with an innerduct cap, as approved by the Engineer. The innerduct cap shall be water-tight, corrosion-proof, removable, and vermin resistant.

New innerducts and existing empty innerducts to be utilized as part of the project, shall have a plug pulled through to demonstrate that the innerduct integrity and continuity is appropriate for use.

New innerducts and existing empty innerducts to be utilized as part of the project, shall have a means, approved by the Engineer, to secure the ends of the innerduct to prevent the innerduct from retracting into the conduit.

A three inch “Y” shall be cut into the face of the curb directly over conduit located under rolled or vertical curbs.

The contractor shall place detectable warning tape in trenches in which new PVC or trenched HDPE conduit is placed. Warning tape is not required in conduit segments where trenchless methods are used for installation except direct plow method. Warning tape shall be buried at a depth of 6 to 8 inches below the finished grade.

(G) Conduit by Trenchless Methods:

New conduit to be installed under existing pavement, curbs and gutters, sidewalks, established landscaping or decomposed granite not otherwise impacted by construction, and at other locations specifically indicated on the project plans, shall be installed by Horizontal Directional Boring (HDB) or Horizontal Directional Drilling (HDD) methods. Use of either method is allowed, subject to approval of the Engineer.

Conduit installation in areas where trenching would typically be allowed may be completed by trenchless methods, if approved in advance by the Engineer as a means of facilitating installation or mitigating potential damage to existing surface and subsurface elements. If approved by the Engineer, the substitution of trenchless methods for the original method of installation specified shall be paid for at the original bid price of the conduit item.

Prior to beginning trenchless installation methods, the contractor shall complete the necessary potholing, and submit the proposed profile to the Engineer for approval. Installation shall be performed in accordance with industry standards and as directed by the Engineer.

The contractor's installation process shall utilize the "walkover" locating system or other Engineer approved equivalent, for determining the installation profile. The installation equipment shall register the depth, angle, rotation and directional data. At the surface, equipment shall be used to gather the data and relay the information to the equipment operator.

When enlargement of an installation hole is necessary, the hole shall be at least 25 percent larger than the conduit to be installed, unless otherwise specified by the Engineer. Pulling equipment such as grips, pulling eyes, and other attachment hardware external to the conduit will be permitted as long as a wooden dowel is placed inside the conduit to prevent it from collapsing at the point of attachment when pull tension is at its peak. A swivel shall be used with pulling hardware when pulling back the conduit into the installation path. Drilling fluid shall be pumped down the hole to provide lubrication for the conduit as it is pulled in. The pulling tension for installing conduit into the installation path shall not exceed 75 percent of the conduit manufacturer's tensile strength rating in order to prevent the conduit from "necking down" or deforming.

Final installation profiles shall be submitted to the Engineer.

(H) Detectable Pull Tape:

The contractor shall install detectable pull tape in new and existing empty conduits and innerducts. Detectable pull tape in conduits shall terminate at the end of the conduit with a minimum of 2 feet of coiled slack in the pull box. Detectable pull tape traveling through conduit that terminates in a pull box, shall have its wire ends connected together to allow for a continuous locating signal to be used for the entire conduit run.

(I) Conduit Cleaning:

The contractor shall clean existing conduit, no more than one week prior to installation of cables or conductors. For PVC conduit, a metal-disc mandrel with an outer diameter not less than 90 percent of the conduit's inside diameter shall be pulled through the conduit. For HDPE conduit, a ball mandrel with an outer diameter not less than 80 percent of the conduit's inside diameter shall be pulled through the conduit. Prior to pulling the mandrel through the conduit, the conduit shall be brushed or swabbed if required by the Engineer.

(J) Conduit Entering Pull Boxes:

Conduit entering pull boxes shall be installed in accordance with the details shown on the project plans and the ITS Standard Drawings FM-2.03, FM-2.04 and FM-2.06. Conduit ends shall be capped with conduit end cap or plug fittings until wiring or cabling is installed. When end caps or plugs are removed, the contractor shall install bell end fittings or approved bell end shape integral to the conduit. Bell ends shall be installed prior to the installation of the conductors or cables. Approved insulated grounding bushings shall be used on steel conduit ends.

New HDPE conduits terminating in a No. 9 pull box shall run directly into the conduit port hole of the pull box wall and be cut flush with the inside face of the pull box. The void between the outside of the conduit and inside of conduit port hole shall be sealed with an approved sealant.

(K) Innerduct:

Where applicable, innerduct shall be installed in conduit as shown on the plans. Innerduct shall be pulled with a minimum of dragging on the ground or pavement. The contractor shall ensure that the tensile load on the innerduct does not exceed the allowed maximum specified by the manufacturer by using a break-away technique and/or a pulley system with numeric readout which includes a means of alerting the installer when the pulling tension approaches the manufacturer's maximum pulling tension.

The contractor shall ensure that the innerduct is protected from sharp edges and excessive bends. The contractor shall not cause the innerduct to violate the minimum bending radius for which the innerduct was designed. The contractor shall be responsible for damages caused from violations and shall remove and install new innerduct at no cost to the Department.

During pulling, the innerduct shall be continuously lubricated as it enters the conduit. Prelubrication may be necessary, if directed by the Engineer. The lubricant used shall be compatible with the innerduct material. The manufacturer's recommended pulling speed and pulling tension shall not be exceeded.

Innerduct shall be anchored at pull boxes to keep innerduct from retracting into the conduits, beyond the exposed conduit end, in a manner approved by the Engineer.

Newly installed empty innerduct shall contain detectable pull tape from pull box to pull box. Each pull tape shall terminate at the end of the innerduct with a minimum of 2 feet of coiled slack in each pull box.

(L) Cathodic Protection:

Prior to trenching, the contractor shall verify the existence of cathodic protection in existing utilities and take all possible precautions to maintain existing cathodic protection.

(M) Conduit at Removed Pull Boxes:

At pull boxes to be removed, where existing HDPE conduit has a HDPE to PVC coupling, the coupling and PVC components shall be removed and the conduit shall be spliced, resulting in an all-HDPE segment.

MEASUREMENT

Conduit will be measured by the linear foot for each diameter size and configuration from center to center of pull boxes or, from center of pull box to edge of foundation or, from edge to edge of cabinet or node foundation or, from end of conduit to center of pull box or foundation or, from end to end of conduit when no pull boxes are used.

No measurement will be made for vertical distances of below-ground conduit.

No measurement will be made for distances of unsuccessful conduit runs not used.

PAYMENT

The accepted quantities of conduit, measured as provided above, will be paid for at the contract unit price, which price shall be considered as full compensation for the work, complete in place, including, warning tape, excavation, backfill, detectable pull tape, connectors, fittings, removal of spoil, compaction of trenches and directional drilling/boring pits, restoration of the surface to existing condition, including concrete, pavement, decomposed granite and other landscaping items where appropriate, locating of existing conduit when new is to be intercepted with existing, and related items necessary to complete the work.

ITEM NO. 104 PULL BOX (NO. 9) WITH GROUND ROD:

DESCRIPTION

The work under these items shall consist of furnishing and installing No. 9 ITS pull boxes at the locations designated on the project plans.

MATERIALS

Pull boxes shall be per the City of Flagstaff (COF) Standard Detail Drawings 16-03-010 (included with the plan set). The contractor shall refer to ADOT Standard Drawing FM-2.03 thru FM-2.05 for materials not covered under the COF detail. Pull box lids shall have a locking mechanism per ADOT Standard Drawing FM-2.05. Pull box lids shall bear the words “CITY OF FLAGSTAFF”. Markings shall be clearly defined and placed parallel to the long side of the cover. Letter height for No. 9 pull boxes shall be minimum of two (2) inches.

No. 9 pull boxes shall be fabricated of concrete and provide conduit access ports on the four sides per COF Detail 16-03-010.

No. 9 pull box lids shall have a square, hinged lid that opens a full 180 degrees. Lid opening shall be spring assisted from both the open and closed positions using a torsion bar lift system. Lids shall lock down with at least one stainless steel security type penta-head bolt that shall be captive to the lid. Lids shall have padlock cavity with a spring-loaded cover and lock-down bolt that leaves no part of the padlock is exposed.

No. 9 pull boxes shall be furnished with galvanized and slotted C-channel struts embedded in the concrete walls of the pull box, with an 18-hole rack mounted to each slotted C-channel strut, and ½ inch spring nuts and bolts and one cable hook per rack.

REQUIREMENTS

The contractor shall provide a Certificate of Compliance to the City that the pull boxes furnished and installed are in conformance with the specifications.

Prior to installation, pull boxes shall be field-located, and the locations approved by the Engineer, to avoid drainage swales, extreme slopes, maintenance vehicle pathways or repeating wheel loads.

The contractor shall be responsible for restoring the surrounding surface conditions back to their original condition.

When a new pull box occupies the same location as an existing pull box, the existing bricks, stone sump and felt paper shall be replaced with new. In instances where the existing and proposed depth of pull box varies, the contractor shall adjust the existing conduits, as necessary, to allow the conduit to enter the box in conformance with the ADOT Standard Drawings FM-2.03, the project plans and specifications.

Compaction around pull boxes shall not subject the pull box to more than 400 lbs. per square foot of lateral pressure causing the sides to deflect or the box or lid to crack or become dented. The contractor shall replace pull boxes damaged due to its activities and by excessive forces during installation at no additional cost to the Department.

Removable caps shall be placed on unused conduits within pull boxes.

Voids resulting from entrance of conduit into pull box shall be completely filled with hydraulic cement grout or duct sealant.

Maximum lateral slope adjacent to pull box shall be 2:1.

All non-metallic conduit entering pull boxes shall have a bell-end to protect the conductor or fiber optic cable from damage.

The plans depict pull box locations in general form only. The contractor shall determine final locations based on actual field conditions at the time of construction, including Blue Stake marking, to assure no conflicts with existing utilities. The Engineer will approve final placement of this equipment prior to installation. Placement of pull boxes in low lying locations with poor drainage shall be avoided.

When installing a No. 9 pull box, the contractor shall only lift the pull box and covers using the lifting hardware installed for that purpose. The lid shall be oriented such that the lid hinge lies along the side of the pull box farthest from the roadway.

MEASUREMENT

Pull box (No. 9) with ground rod will be measured as a unit for each pull box with ground rod installed. Decomposed granite, landscape restoration and interception of existing conduits are considered as part of the work and will not be measured separately.

PAYMENT

The accepted quantities of pull boxes, measured as provided above, will be paid for at the contract unit price, which price shall be considered as full compensation for the work, complete in place, including ground rods, grounding conductors, grounding lugs, excavating, backfilling, surface restoration, conduit adjustment, and brick and stone sump, and other materials necessary to complete the work.