

Job No. JKU0026
Route: 71, I-49, I-435, and 50
County: Jackson

JOB SPECIAL PROVISIONS TABLE OF CONTENTS (ROADWAY)

(Job Special Provisions shall prevail over General Special Provisions whenever in conflict therewith.)

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<div><p>THIS SHEET HAS BEEN SIGNED, SEALED, AND DATED ELECTRONICALLY.</p></div>	MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION 105 W. CAPITOL AVE. JEFFERSON CITY, MO 65102 Phone 1-888-275-6636
	HNTB CORPORATION 715 Kirk Drive Kansas City, MO 64105 Certificate of Authority: 001270 Consultant Phone: 816-472-1201
	If a seal is present on this sheet, JSP's have been electronically sealed and dated.
	JOB NUMBER: JKU0026 JACKSON COUNTY, MO DATE PREPARED: 5/20/2024
	ADDENDUM DATE:

Only the following items of the Job Special Provisions (Roadway) are
authenticated by this seal: All

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**JOB
SPECIAL PROVISION**

A. General - Federal JSP-09-02K

1.0 Description. The Federal Government is participating in the cost of construction of this project. All applicable Federal laws, and the regulations made pursuant to such laws, shall be observed by the contractor, and the work will be subject to the inspection of the appropriate Federal Agency in the same manner as provided in Sec 105.10 of the Missouri Standard Specifications for Highway Construction with all revisions applicable to this bid and contract.

1.1 This contract requires payment of the prevailing hourly rate of wages for each craft or type of work required to execute the contract as determined by the Missouri Department of Labor and Industrial Relations and requires adherence to a schedule of minimum wages as determined by the United States Department of Labor. For work performed anywhere on this project, the contractor and the contractor's subcontractors shall pay the higher of these two applicable wage rates. State Wage Rates, Information on the Required Federal Aid Provisions, and the current Federal Wage Rates are available on the Missouri Department of Transportation web page at www.modot.org under "Doing Business with MoDOT", "Contractor Resources". Effective Wage Rates will be posted 10 days prior to the applicable bid opening. These supplemental bidding documents have important legal consequences. It shall be conclusively presumed that they are in the bidder's possession, and they have been reviewed and used by the bidder in the preparation of any bid submitted on this project.

1.2 The following documents are available on the Missouri Department of Transportation web page at www.modot.org under "Doing Business with MoDOT"; "Standards and Specifications". The effective version shall be determined by the letting date of the project.

General Provisions & Supplemental Specifications

Supplemental Plans to July 2024 Missouri Standard Plans
For Highway Construction

These supplemental bidding documents contain all current revisions to the published versions and have important legal consequences. It shall be conclusively presumed that they are in the bidder's possession, and they have been reviewed and used by the bidder in the preparation of any bid submitted on this project.

B. Contract Liquidated Damages JSP-13-01D

1.0 Description. Liquidated Damages for failure or delay in completing the work on time for this contract shall be in accordance with Sec 108.8. The liquidated damages include separate amounts for road user costs and contract administrative costs incurred by the Commission.

2.0 Period of Performance. Prosecution of work is expected to begin on the date specified below in accordance with Sec 108.2. Regardless of when the work is begun on this contract, all work on all projects shall be completed on or before the date specified below. Completion by this date shall be in accordance with the requirements of Sec 108.7.1.

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Notice to Proceed: October 7, 2024
Completion Date: September 1, 2025

2.1 Calendar Days and Completion Dates. Completion of the project is required as specified herein. The count of calendar days will begin on the date the contractor starts any construction operations on the project.

Job Number	Calendar Days	Daily Road User Cost
JKU0026	N/A	\$1,800

3.0 Liquidated Damages for Contract Administrative Costs. Should the contractor fail to complete the work on or before the contract completion date specified in Section 2.0, or within the number of calendar days specified in Section 2.1, whichever occurs first, the contractor will be charged contract administrative liquidated damages in accordance with Sec 108.8 in the amount of **\$500** per calendar day for each calendar day, or partial day thereof, that the work is not fully completed. For projects in combination, these damages will be charged in full for failure to complete one or more projects within the specified contract completion date or calendar days.

4.0 Liquidated Damages for Road User Costs. Should the contractor fail to complete the work on or before the contract completion date specified in Section 2.0, or within the number of calendar days specified in Section 2.1, whichever occurs first, the contractor will be charged road user costs in accordance with Sec 108.8 in the amount specified in Section 2.1 for each calendar day, or partial day thereof, that the work is not fully completed. These damages are in addition to the contract administrative damages and any other damages as specified elsewhere in this contract.

C. Scope of Work

1.0 Description. This project includes installation of new closed circuit television (CCTV) cameras and fiber backbone extensions in the Kansas City area. Nine new CCTV cameras shall be installed on new camera poles along with camera lowering devices, radar detectors and point-to-point radios at some locations, and pole-mounted cabinets. Along Route 71 the fiber backbone will be extended from the existing camera at 19th Street to Paseo. The remaining cameras being installed along Route 71 will communicate using point-to-point radios.

2.0 Coordination. At the same time that this project is under construction, other related roadway projects will be underway. Any delays experienced by the contractor as a result of the other projects will not be considered as grounds for additional payment.

2.1 Coordination with the Commission. The contractor shall coordinate with the engineer and the other contractors, and endeavor to complete the ITS device installation quickly so as not to delay other contractors. The contractor must coordinate with MoDOT staff to make new and reconnected ITS devices operational.

3.0 Contractor Responsibilities. Contractor shall be responsible for any repair and/or replacement of any damaged contractor-furnished and installed devices (such as cabinets, etc.) as well as existing or MoDOT furnished equipment (after the installation) until the project is accepted.

D. Work Zone Traffic Management

1.0 Description. Work zone traffic management shall be in accordance with applicable portions of Division 100 and Division 600 of the Standard Specifications, and specifically as follows.

1.1 Maintaining Work Zones and Work Zone Reviews. The Work Zone Specialist (WZS) shall maintain work zones in accordance with Sec 616.3.3 and as further stated herein. The WZS shall coordinate and implement any changes approved by the engineer. The WZS shall ensure all traffic control devices are maintained in accordance with Sec 616, the work zone is operated within the hours specified by the engineer, and will not deviate from the specified hours without prior approval of the engineer. The WZS is responsible to manage work zone delay in accordance with these project provisions. When requested by the engineer, the WZS shall submit a weekly report that includes a review of work zone operations for the week. The report shall identify any problems encountered and corrective actions taken. Work zones are subject to unannounced inspections by the engineer and other departmental staff to corroborate the validity of the WZS's review and may require immediate corrective measures and/or additional work zone monitoring.

1.2 Work Zone Deficiencies. Failure to make corrections on time may result in the engineer suspending work. The suspension will be non-excusable and non-compensable regardless if road user costs are being charged for closures.

2.0 Traffic Management Schedule.

2.1 Traffic management schedules shall be submitted to the engineer for review prior to the start of work and prior to any revisions to the traffic management schedule. The traffic management schedule shall include the proposed traffic control measures, hours traffic control will be in place, and work hours.

2.2 The traffic management schedule shall conform to the limitations specified in Sec 616 regarding lane closures, traffic shifts, road closures and other width, height and weight restrictions.

2.3 The engineer shall be notified as soon as practical of any postponement due to weather, material or other circumstances.

2.4 In order to ensure minimal traffic interference, the contractor shall schedule lane closures for the absolute minimum amount of time required to complete the work. Lanes shall not be closed until material is available for continuous construction and the contractor is prepared to diligently pursue the work until the closed lane is opened to traffic.

2.5 Traffic Congestion. The contractor shall, upon approval of the engineer, take proactive measures to reduce traffic congestion in the work zone. The contractor shall immediately implement appropriate mitigation strategies whenever traffic congestion reaches an excess of **15 minutes** to prevent congestion from escalating beyond this delay threshold. If disruption of the traffic flow occurs and traffic is backed up in queues equal to or greater than the delay time threshold listed above then the contractor shall immediately review the construction operations

which contributed directly to disruption of the traffic flow and make adjustments to the operations to prevent the queues from reoccurring. Traffic delays may be monitored by physical presence on site or by utilizing real-time travel data through the work zone that generate text and/or email notifications where available. The engineer monitoring the work zone may also notify the contractor of delays that require prompt mitigation. The contractor may work with the engineer to determine what other alternative solutions or time periods would be acceptable. When a Work Zone Analysis Spreadsheet is provided, the contractor will find it in the electronic deliverables on MoDOT's Online Plans Room. The contractor may refer to the Work Zone Analysis Spreadsheet for detailed information on traffic delays.

2.5.1 Traffic Safety.

2.5.1.1 Recurring Congestion. Where traffic queues routinely extend to within 1000 feet of the ROAD WORK AHEAD, or similar, sign on a divided highway or to within 500 feet of the ROAD WORK AHEAD, or similar, sign on an undivided highway, the contractor shall extend the advance warning area, as approved by the engineer.

2.5.1.2 Non-Recurring Congestion. When traffic queues extend to within 1000 feet of the ROAD WORK AHEAD, or similar, sign on a divided highway or to within 500 feet of the ROAD WORK AHEAD, or similar, sign on an undivided highway infrequently, the contractor shall deploy a means of providing advance warning of the traffic congestion, as approved by the engineer. The warning location shall be no less than 1000 feet and no more than 0.5 mile in advance of the end of the traffic queue on divided highways and no less than 500 feet and no more than 0.5 mile in advance of the end of the traffic queue on undivided highways.

2.6 Traffic Management Center (TMC) Coordination. The Work Zone Specialist (WZS) or their designee shall contact by phone the MoDOT Traffic Management Center (KC Scout TMC at #816-347-2250 or Gateway Guide TMC at #314-275-1513) within five minutes of a lane or ramp closure beginning and within five minutes of a lane or ramp closure being removed. The WZS shall make this phone call 24 hours a day, 365 days of the year since the MoDOT Traffic Management Centers are always staffed.

3.0 Work Hour Restrictions.

3.1 Except for emergency work, as determined by the engineer, and long term lane closures required by project phasing, all lanes shall be scheduled to be open to traffic during the five major holiday periods shown below, from 12:00 noon on the last working day preceding the holiday until 6:00 a.m. on the first working day subsequent to the holiday unless otherwise approved by the engineer.

Memorial Day
Labor Day
Thanksgiving
Christmas
New Year's Day

3.1.1 Independence Day. The lane restrictions specified in Section 3.1 shall also apply to Independence Day, except that the restricted periods shall be as follows:

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When Independence Day falls on:	The Holiday is Observed on:	Halt Lane Closures beginning at:	Allow Lane Closures to resume at:
Sunday	Monday	Noon on Friday	6:00 a.m. on Tuesday
Monday	Monday	Noon on Friday	6:00 a.m. on Tuesday
Tuesday	Tuesday	Noon on Monday	6:00 a.m. on Wednesday
Wednesday	Wednesday	Noon on Tuesday	6:00 a.m. on Thursday
Thursday	Thursday	Noon on Wednesday	6:00 a.m. on Friday
Friday	Friday	Noon on Thursday	6:00 a.m. on Monday
Saturday	Friday	Noon on Thursday	6:00 a.m. on Monday

3.2 The contractor shall not perform any construction operation on the roadway, roadbed or active lanes, including the hauling of material within the project limits, during restricted periods, holiday periods or other special events specified in the contract documents.

4.0 Detours and Lane Closures.

4.1 When a changeable message sign (CMS) is provided, the contractor shall use the CMS to notify motorists of future traffic disruption and possible traffic delays one week before traffic is shifted to a detour or prior to lane closures. The CMS shall be installed at a location as approved or directed by the engineer. If a CMS with Communication Interface is required, then the CMS shall be capable of communication prior to installation on right of way. All messages planned for use in the work zone shall be approved and authorized by the engineer or its designee prior to deployment. When permanent dynamic message signs (DMS) owned and operated by MoDOT are located near the project, they may also be used to provide warning and information for the work zone. Permanent DMS shall be operated by the TMC, and any messages planned for use on DMS shall be approved and authorized by the TMC at least 72 hours in advance of the work.

4.2 At least one lane of traffic in each direction shall be maintained at all times except for brief intervals of time required when the movement of the contractor's equipment will seriously hinder the safe movement of traffic. Periods during which the contractor will be allowed to interrupt traffic will be designated by the engineer.

5.0 Vehicle, Equipment and Material Storage. Except for normal construction activities, the contractor shall not park vehicles or store materials or equipment within 40 feet of the edge of roadway carrying traffic, unless the equipment, vehicles, or materials are located in either a properly protected area approved by the engineer, or an off-site storage area.

6.0 Basis of Payment. No direct payment will be made to the contractor to recover the cost of equipment, labor, materials, or time required to fulfill the above provisions, unless specified elsewhere in the contract document. All authorized changes in the traffic control plan shall be provided for as specified in Sec 616.

E. Emergency Provisions and Incident Management JSP-90-11A

1.0 The contractor shall have communication equipment on the construction site or immediate access to other communication systems to request assistance from the police or other emergency agencies for incident management. In case of traffic accidents or the need for

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police to direct or restore traffic flow through the job site, the contractor shall notify police or other emergency agencies immediately as needed. The area engineer's office shall also be notified when the contractor requests emergency assistance.

2.0 In addition to the 911 emergency telephone number for ambulance, fire or police services, the following agencies may also be notified for accident or emergency situation within the project limits:

Missouri Highway Patrol
816-622-0800

City of Kansas City, Missouri
Fire: 816-513-1700
Police: 816-234-5000

City of Independence, Missouri
Fire: 816-325-7123
Police: 816-325-7300

City of Lee's Summit, Missouri
Fire: 816-969-1300
Police: 816-969-7390

City of Grandview, Missouri
Fire: 816-316-4972
Police: 816-316-4980

2.1 This list is not all inclusive. Notification of the need for wrecker or tow truck services will remain the responsibility of the appropriate law enforcement agency.

2.2 The contractor shall notify law enforcement and emergency agencies before the start of construction to request their cooperation and to provide coordination of services when emergencies arise during the construction at the project site. When the contractor completes this notification with law enforcement and emergency agencies, a report shall be furnished to the engineer on the status of incident management.

3.0 No direct pay will be made to the contractor to recover the cost of the communication equipment, labor, materials, or time required to fulfill the above provisions.

F. Project Contact for Contractor/Bidder Questions JSP-96-05

All questions concerning this project during the bidding process shall be forwarded to the project contact listed below:

K. Mark Sommerhauser, P.E.
Project Manager, KC District
600 NE Colbern Road
Lee's Summit, MO 64086

Telephone No.: (816) 607-2243
Telefax No.: (816) 622-0461
Email: Karsten.Sommerhauser@modot.mo.gov

All questions concerning the bid document preparation can be directed to the Central Office – Design at (573) 751-2876.

G. Utilities

1.0 For informational purposes only, the following is a list of names, addresses, and telephone numbers of the known utility companies in the area of the construction work for this improvement:

<u>Utility Name</u>	<u>Known Required Adjustment</u>
KCP&L Mr. Gary Jones Email: Gary.jones@kcpl.com Phone: (816) 813-1998	None

1.1 The existence and approximate location of utility facilities known to exist, as shown on the plans, are based upon the best information available to the Commission at this time. This information is provided by the Commission "as-is" and the Commission expressly disclaims any representation or warranty as to the completeness, accuracy, or suitability of the information for any use. Reliance upon this information is done at the risk and peril of the user, and the Commission shall not be liable for any damages that may arise from any error in the information. It is, therefore, the responsibility of the contractor to verify the above listing information indicating existence, location and status of any facility. Such verification includes direct contact with the listed utilities.

2.0 It shall be noted to the contractor that MoDOT is a member of Missouri One Call (800 Dig Rite). Some work on this project may be in the vicinity of MoDOT utility facilities, which includes but is not limited to traffic signal cables, highway lighting circuits, ITS cables, cathodic protection cables, etc. Therefore, prior to beginning work, the contractor shall verify that there are no conflicts with MHTC/MoDOT facilities by completing the Notice of Intent to Perform Work form located at the Missouri Department of Transportation website:

www.modot.mo.gov/asp/intentToWork.shtml

The contractor shall submit the form over the web (preferred method) or by fax to the numbers on the printed form. The notice must be submitted a minimum of 2 and a maximum of 10 working days prior to excavation just as Missouri One Call requires. If the contractor wants verification the locate is complete, they may inquire from the associated district office 2 working days after making the request.

H. Scout ITS Conduits

1.0 General. These plans depict conduit routing in schematic form only. The contractor shall determine final routing based on actual field conditions prior to construction at each site, including utility locator service markings, to assure no conflicts with existing utilities, including State owned underground lighting, ITS, traffic signal, or cathodic protection facilities. The

contractor shall field review necessary routing of conduit and location of pull boxes and splice vaults prior to submittal of bid to determine the types and extent of incidental removal, relocation, and replacement items to include in the price of conduit, pull boxes, and splice vaults. Section 902.16 shall apply except as modified herein.

Before preparing a bid, the contractor shall visit the site of the work and make his own determination of the amount of rock, unclassified, or other materials that might be encountered in his trenching or pushing operations. No additional pay will be made for differences in material encountered.

1.1 Material. All material shall conform specifically as follows:

Item	Section
Electrical Conduit	1060
Junction Boxes	1062

All non-metallic conduits shall be color-coded yellow for electrical cables, and powder blue for fiber optic cable. Any conduit on structure shall be galvanized rigid metallic conduit.

All HDPE conduit and materials shall have a minimum SDR of 11 and be compliant with ASTM D3035.

All conduit splices shall be made with conduit couplers in accordance with conduit manufacturer recommendations. Coupler materials to be used for conduit splices shall be submitted to the engineer for review and approval along with the manufacturer's recommendations and installation procedures. All conduit couplers are incidental to the linear feet of conduit being installed.

HDPE SDR11 conduit shall be required for all trenched or bored conduits.

Trenching and Pushing depths and installation shall be constructed with the following minimum covers:

Conduit under Paved areas including Roadway, Shoulders, Paved Medians and Sidewalks:

Pushed Conduit - minimum 42 inches below top of paved areas.

Conduit under Non-Paved Areas:

Conduit in Trench - minimum 30 inches of cover

Conduit shall slope to a pull box at a minimum rate of 0.5 percent, unless otherwise shown on plans. A change in direction of conduit shall be accomplished by bending the conduit uniformly to a radius that will fit the location or by the use of standard bends. The minimum bending radius of all conduits shall be the greater of the following: 20 times the diameter of the fiber optic cable or six times the internal diameter of the conduit.

Open ends of conduit placed for future use shall be capped or plugged with watertight mechanical terminations. Pull ropes shall be placed in all empty conduits. Pull ropes shall be polypropylene with a minimum tensile strength of 1,250 lbs.

All conduit ends shall be deburred before installing any cabling, including fiber optic cable and power cable.

If approved by the engineer, conduit may be installed by trenching, plowing, pushing or directional boring; however, payment will be made by the method specified in the contract for that conduit.

1.2 Conduit in Trench. Trenches shall be excavated to the width and depth necessary for conduit installation. Material which might cause mechanical damage to the conduit shall not be used for backfilling below an elevation 6 inches above the conduit. The bottom of the trench shall be free of such material before the conduit is placed. No conduit shall be placed without approval of the trench by the engineer. All trenches shall be backfilled as soon as practicable after installation of conduit. Backfill material shall be deposited in the trench in layers not exceeding 6 inches deep.

1.2.1 In lieu of trenching, conduits may be installed by plowing. When installation is accomplished by plowing, it shall be done with a vibratory type plow which will place conduits at the minimum depths shown above and recompact the soil over the installation approximately to original in-place density. The contractor shall not plow conduit in areas of rock.

1.2.2 Orange burial tape imprinted with "CAUTION-BURIED FIBER OPTIC CABLE BELOW" shall be installed at approximately 1/3 to 1/2 of the depth of cover over any trenched conduits. The orange burial tape shall be color durable, and chemically resistant. Where excavation is made across parkways or driveways, sod, topsoil and crushed stone or gravel shall be replaced as soon as practicable to its former condition. Concrete or bituminous surfaces and stabilized bases shall be restored to their former condition. The entire area involved shall be left in a neat, presentable condition.

1.3 Pushed Conduit. If pushed conduit is specified or shown on the plans, the conduit shall be installed without disturbing the existing surface. Pushed conduit may be placed by jacking, pushing, boring or other approved means.

1.4 Power Service Conduit. Conduit between the contractor installed power supply pedestal and the utility service point shall meet the requirements of the specific electric utility company. This utility conduit must be installed by the contractor according to the utility company's requirements and the cost of this conduit is incidental to the cost of the Type 2 power supply.

2.0 Method of Measurement. Measurement of conduit in trench and pushed conduit will be made to the nearest linear foot as shown on the plans. Contract quantities will be adjusted using the documented fiber cable sheath readings along all conduit runs. If the contractor decides to bore conduit runs instead of trenching, then those additional boring lengths will only be measured and paid as trenched conduit.

No additional pay will be made for trenching or pushing operations in rock, unclassified, or other materials.

No additional pay will be made for conduit couplers or conduit splicing. Couplers used for conduit splicing are incidental to the linear feet of conduit installed.

Contractor shall not damage paved drainage ditches or unmarked pavement underdrains. Contractor has the option to bore under or trench around concrete drainage ditches or underdrains. No additional pay will be made for routing around paved drainage ditches or underdrains. Any damage to paved drainage ditches or underdrains due to contractor's operations shall be replaced at contractor's expense.

3.0 Basis of Payment. The accepted conduit system will be paid for at the unit price for each of the pay items included in the contract. No direct payment will be made for any incidental items necessary to complete the work unless specifically provided as a pay item in the contract.

4.0 Conduit shall only be paid as Pushed Conduit for only the length that is specified in the plans. Conduit couplers that are utilized to connect pushed conduit to trenched conduit shall be incidental to the linear feet of conduit installed.

<u>Item No.</u>	<u>Type</u>	<u>Item Description</u>
910-52.00	LF	Conduit, 2 in., Rigid, in Trench
910-99.03	LF	Conduit, 2 in., Rigid, Pushed

I. Scout ITS Pull Boxes

1.0 Description. All ITS pull boxes that contain fiber optic cable (splice vaults) in this contract shall be circular and constructed and installed as detailed on the plans or as directed by the engineer. These circular pull boxes shall be constructed of one piece polymer concrete and shall be referred to as splice vaults. The splice vault shall have a minimum depth of 48" and come with a minimum of four stainless steel hooks to be used for hanging the fiber optic cable. The installation of all pull boxes shall conform to the locations, lines, grades, and details shown on the plans. All pull boxes shall be surrounded by a concrete pad and shall withstand a wheel load of 9,000 kg. Each pull box shall be equipped with a bolt down cover of the same material. All fiber and power pull boxes shall include a protective concrete pad around each pull box according to the details provided in the plans. Concrete for the pad shall be Class B, or a commercial mixture meeting the requirements of Sec 501. The concrete pad for the Class 2 Pull Box should extend for 10" around the entire outside of the box perimeter with a 6-inch minimum concrete depth. The top surface edges of all pull boxes and splice vaults shall be flush with surfaced areas and earth or sodded areas. For those locations where only power cable has been installed, the preformed Class 2 Pull Box shall be used.

Covers on pull boxes shown on the plans that contain 480-volt circuits shall be embossed with "CAUTION-HIGH VOLTAGE". Covers on all other pull boxes or splice vaults shall be embossed with "KC SCOUT ITS" unless otherwise directed by the engineer.

1.1 Conduit Openings. Conduit shall enter the splice vault through the side of the box. If it is necessary to increase the excavation depth and extend the pull box or splice vault, no direct payment will be made. The holes shall be round and no more than 1/2 inch larger than the conduit and shall be made as recommended by the manufacturer. All conduit entrances into pull boxes shall be sealed with an expandable foam sealer around the conduits to prevent the entering of foreign material into the pull boxes. Since Class 2 power pull boxes are too shallow for conduit openings, the conduit shall enter the pull box from underneath through the rock drain area. The top of the conduit must be installed a minimum of 6" below the bottom edge of the pull box in order to avoid future crushing of the conduit.

1.2 Excavation and Backfilling. The excavated opening outside pull boxes or splice vaults shall be wide enough to allow compaction of the backfill material. Cinders, broken concrete, broken rock or other hard or undesirable material shall not be used for backfilling. The backfill material shall be placed in layers not to exceed 6 inches deep and each layer shall be thoroughly compacted before the next layer is placed. All disturbed areas shall be seeded and mulched in accordance with Sec 802 and 805. No direct pay will be made for seeding and mulching disturbed areas.

Removed concrete and soil shall become the property of the contractor and shall be disposed of off the right of way. No direct pay will be made for removal of paved surfaces or the disposition of excess material off of the right of way.

1.3 Drains. All ITS pull boxes will be constructed with a stone drain that is 2' deeper than the bottom of the pull box. No direct pay will be made for stone drains.

2.0 Method of Measurement. Measurement all pull boxes shall be made per each structure. All concrete pads, special covers, and grounding requirements for splice locations shall be included in the unit price for Scout Fiber Optic Pull Box or Preformed Class 2 Pull Box.

No additional pay will be made for installation of pull box or splice vault in rock.

3.0 Basis of Payment. The pay items for Pull Boxes and Splice Vaults are:

<u>Item No.</u>	<u>Type</u>	<u>Item Description</u>
910-88.11	EA	Pull Box, Preformed Class 2
910-99.02	EA	Scout Fiber Optic Pull Box

J. ITS Camera Pole, Lowering Device and 336 Pole Mounted Cabinet

1.0 General. At the location specified in the plans, provide a steel camera pole mounted on a concrete foundation along with a camera lowering device and a pole mounted 336 ITS cabinet.

2.0 Materials.

(a) Steel CCTV Pole.

If the contractor's pole manufacturer deviates from the steel camera pole design shown in the plans, then the contractor must submit revised camera pole shop drawings with calculations for review and approval by the engineer before installation.

(b) Camera Lowering Device.

The camera lowering device arm shall be made of steel with a square cross-section. The lowering device shall be constructed with a two piece clamshell junction box with one hinge side and one latch side.

3.0 Construction Requirements.

(a) Pole and Foundation.

The location of closed circuit television cameras as specified on plans is approximate only, based on design location of foundation. CCTV camera locations may need to be field adjusted for final location, upon approval of the engineer. Adjust anchor bolt nuts to plumb the pole under load.

(b) Pole Grounding.

Connect the bottom of the pole to one or more ground rods using a bare, solid AWG #4 copper wire. Use exothermic welding for all ground wire connections, except the connection to the pole, which shall use the pole's grounding lug. Use a device that measures resistance to ground using the three-point fall-of-potential method to ensure that the resistance from the air terminal to ground does not exceed 5 ohms. Add more ground rods if necessary to achieve this requirement. All work related to the installation of the air terminal shall be performed in accordance with NFPA 780.

(c) Anchor Bolt Installation.

Anchor bolts, nuts, and washers shall be shipped pre-assembled and shall be protected from dirt and moisture. Threads must be protected from damage during installation. Anchor bolts shall not be subjected to erection or service loads until the concrete has reached 75 percent of the design strength or as approved by the engineer.

(1) Installation Torque. The torque wrench used for tightening the nuts for final torque verification shall have a torque indicator that is calibrated annually. A certification of such calibration shall be available to the engineer. The verification torque shall be 350 lb-ft for 1.5" diameter Grade 36 anchor bolts.

(2) Anchor Bolt Rotation Capacity Test. Prior to use, an Anchor Bolt Rotation Capacity test shall be run with at least one anchor bolt from each lot. The test consists of two parts:

- (a) Using the base plate or plate of equivalent grade, thickness, and finish; install anchor bolt and nuts as specified below to verify its adequacy to achieve the verification torque. The plate must be restrained to resist the torque during the test. Following completion of tightening, the anchor bolt and nuts shall be removed and inspected for thread damage.
- (b) The anchor bolt is restrained while the nuts are turned onto the bolts at least one bolt diameter past the location of the leveling nut, then backed off by one worker using an ordinary wrench (without a cheater bar). The threads are considered damaged if unusual effort is required to turn the nut.

If the threads are damaged or the verification torque is not attained, the lot of anchor bolts shall be rejected. If there is no damage to the anchor bolt or nuts during this test, they may be used in the joint.

(3) Templates. Two templates plans shall be used to maintain the spacing and alignment of anchor bolts during placing and curing of the concrete. Bottom template shall consist of clean steel and shall be located within the shaft as to ensure the plumbness and rigid orientation of

the bolts during placing and curing of the concrete. Top template shall be located above top of concrete. The template hole pattern shall match the base plate hole pattern. Use of additional templates shall be approved prior to use by the engineer.

(4) Installation. Anchor bolts shall be installed using the following procedure:

- a. Prior to and during concrete placement, anchor bolts shall be adequately secured with templates in place.
- b. After concrete placement, the misalignment from vertical shall not exceed 1:40.
- c. After concrete placement, the exposed part of the anchor bolts shall be cleaned with a wire brush and lubricated.
- d. The nuts shall be turned onto the bolts well past the elevation of the leveling nut and backed off by one worker using an ordinary wrench without a cheater bar. Thread damage requiring unusual effort shall be reported to the engineer.
- e. Lubricate the exposed threads of the anchor bolts immediately prior to placing leveling nuts.
- f. Leveling nuts shall be cleaned and threads and bearing surfaces lubricated. Place on the anchor bolts.
- g. Leveling washers shall be placed on the anchor bolts and brought to their proper elevation.
- h. Place column or pole on foundation.
- i. Top washers shall be placed.
- j. Top nuts shall be cleaned and threads and bearing surfaces lubricated. Place and tighten nuts to between 20 and 30 percent of the verification torque using tightening sequence shown on plans. This is termed snug-tight.
- k. Leveling nuts shall be tightened to between 20 and 30 percent of the verification torque using tightening sequence shown on plans. This is termed snug-tight.
- l. The position of the snug-tight top nuts shall be appropriately marked on the base plate and nut at each bolt. Top nuts shall be turned 1/6 turn for 1.5" diameter Grade 36 anchor bolts beyond snug tight using tightening sequence shown on plans and using at least two full tightening cycles. Verify proper nut rotation. Tolerance is plus 20 degrees.
- m. A torque wrench shall be used to verify that a torque at least equal to the verification torque is required to additionally tighten the leveling nuts and the top nuts. An inability to achieve this torque shall be reported to the engineer.
- n. After at least 48 hours the torque wrench shall again be used to verify that a torque at least equal to 110 percent of the verification torque is required to additionally tighten the leveling nuts and the top nuts. This verification is required at least 48 hours after erection of the remainder of the structure and after any heavy attachments to the structure.
- o. Jam nuts shall be placed and installed to snug tight.
- p. Rodent screens are required around the base of each pole.

(d) Camera Lowering Device.

The bottom of the lowering device junction box shall be pre-tapped with an inch and a half NPT thread that accepts a standard dome CCTV camera housing. The lowering device shall include a mounting point for a static PVC conduit along the inside of the camera pole that separates the moving lowering device cable from any static device cables. The contractor shall provide a work history of, at a minimum, five successful camera lowering device installations from that manufacturer, otherwise the contractor shall have a representative from the lowering device

company onsite to train and supervise the field installation of the first camera pole on the project.

(e) 336 Pole Mounted Cabinet.

This work shall consist of furnishing equipment and material for installing pole mounted 336 ITS cabinets in conformity with the locations and details shown on the plans.

(1) Pole Mounted Cabinet Components. The cabinet shall include a 19 inch rack in order to mount the various equipment. Additional components include the following: power panel and breakers, fan and thermostat, 250 watt cabinet heater with built in thermostat, AC outlet and main power surge protection, rack mounted power strip with built in surge protection, 1U CCH fiber termination panel (unless the cabinet is only connected by a wireless radio), and two recessed DIN rail brackets (one to mount device controllers and device surge protection and the second to mount telecommunication equipment).

(2) 336 Cabinet Mounting Requirements. The contractor shall provide pole mounting brackets and a conduit entry system that allows access to all camera pole handholes while still allowing both cabinet doors to be opened and all sections of the 19 inch rack reachable from the ground level. Each cabinet door shall utilize a MoDOT standard lock as approved by the Engineer.

(f) Painting Requirements.

This work shall consist of furnishing materials and work necessary to apply a dark bronze paint topcoat to all specified camera poles, 336 pole mounted cabinets (including mounting brackets and connecting conduit), and camera lowering devices. The painted equipment is noted in the plans with unique pay items and these devices are located along Bruce R. Watkins Drive (71 Highway) south of Downtown Kansas City. The actual CCTV camera and radar device will not require paint.

(1) Painting Requirements. All new steel shall be galvanized to the standard specifications then shop primed with a compatible primer prior to applying the dark bronze topcoat. All primer shall be two (2) mils minimum thickness unless specified otherwise by the Engineer. Any aluminum parts shall be shop primed with a compatible primer prior to applying the dark bronze topcoat.

(2) Paint Material Requirements. The topcoat paint shall be a two-component acrylic aliphatic, polyurethane paint. The topcoat paint shall be a semi-gloss, low VOC coating with a minimum solids volume of 64 percent and shall be recommended for use on primed aluminum and newly galvanized steel. No lead or chromium material shall be present in the paint. The manufacturer shall furnish a certification certifying each of the material requirements for the prime coat and the topcoat along with the typical test results for the solids content of the paint.

(3) Approved Paint Manufacturers and Colors. The following four manufacturers have an approved dark bronze paint, or the contractor can propose an approved equal:

- Valmont #333\F283B, Dark Bronze by Valmont Industries, Inc.
- Valspar #c:437x505\s:397F251, Dark Bronze by Valspar Corporation
- Tnemec #F073-INO3, Dark Bronze by Tnemec Company, Inc.
- Matthews #LS-43093, Dark Bronze by Matthews Paint Company

(4) Paint Construction. The paint may be field or shop applied. Overspray must be prevented if paint is applied by spraying in the field. Surface preparation and the application of a compatible

primer shall be in accordance with the recommendations and requirements of the coating manufacturer. The manufacturer shall submit recommended procedures for surface preparation, prime coat application, and top coat application work. The contractor shall provide at a minimum, one prime coat and two finish paint top coatings with the approved semi-gloss finish paint. Any chipped or damaged coating areas shall require a paint reapplication to that damaged area.

4.0 Method of Measurement.

4.1 Measurement of CCTV camera poles will be made per each.

4.2 Measurement of CCTV pole foundations, including all specified materials will be made per each.

4.3 Measurement of CCTV camera lowering devices will be made per each.

4.4 Measurement of pole mounted 336 cabinets will be made per each.

5.0 Basis of Payment. Accepted camera poles, pole foundations, cabinets, and lowering devices will be paid for at the unit price for each of the pay items included in the contract. No direct payment will be made for any incidental items necessary to complete the work unless specifically provided as a pay item in the contract.

<u>Item No.</u>	<u>Type</u>	<u>Item Description</u>
910-99.02	EA	Steel Camera Pole, 45 Ft. with Tenon
910-99.02	EA	Painted Steel Camera Pole, 45 Ft. with Tenon
910-37.14	EA	CCTV Pole Foundation, 45 Ft. or 13.7M Mounting Height, Installed
910-99.02	EA	Steel Camera Pole, 70 Ft. with Tenon
910-99.02	EA	Painted Steel Camera Pole, 70 Ft. with Tenon
910-99.02	EA	CCTV Pole Foundation, 70 Ft. Pole
910-99.02	EA	Camera Lowering Device
910-99.02	EA	Camera Lowering Device, Painted
910-99.02	EA	336 Pole Mounted Cabinet
910-99.02	EA	336 Pole Mounted Cabinet, Painted

K. Closed Circuit Television Camera Assembly

1.0 General. At each camera location, provide and install an IP dome camera assembly, as directed on the plans, with cabling, controller, and power over Ethernet surge protection.

2.0 Materials.

(a) CCTV Camera Assembly.

(1) General. The closed circuit television (CCTV) camera assembly shall consist of a high performance digital color CCTV camera, zoom lens, pan, and tilt drive unit, dome assembly, connectors and cabling all assembled together into one operational unit. The CCTV camera assembly shall weigh less than 100 lbs. and have a center of gravity of less than 24" from the

center of the pole. The camera assembly shall utilize a 60 W midspan for the power over Ethernet connection and shall operate between -55° C to 50° C.

The contractor shall provide an HDTV 1080p IP dome PTZ camera that is also capable of providing lower bandwidth video streams as needed.

All CCTV equipment shall meet the following electrical and environmental requirements:

- (1.1) Power: 120VAC @ 60Hz;
- (1.2) Environmental: Operating Temperature: -55° to 50° C; and
- (1.3) Operating Humidity: Up to 100% relative humidity.

(2) Color CCTV Camera. The CCTV camera shall be solid-state having a 1/4-inch color progressive scan with interline transfer CCD image sensor. The camera shall operate with a motorized-iris lens and be designed for day and night functionality. The shutter speeds shall be remotely adjustable from 1/4 to 1/10,000 seconds. The camera shall incorporate Digital Signal Processing (DSP) circuitry to provide advanced features such as automatic electronic shutter control, backlight compensation, digital zoom, and image stabilization. The camera shall support closing of the iris when pointed directly at the sun. The camera shall support on-screen title generation that will allow the user to define the camera with character specific information. The camera shall utilize an instant laser focus in order to maintain color imagery during low light and nighttime conditions.

(3) Zoom Lens. The camera shall be supplied with mechanical and digital zoom capabilities. The mechanical zoom lens shall be remotely controlled through the camera unit and have a magnification factor of at least 30x. The zoom lens shall have an automatic and manual iris and focus controls. In addition, the camera shall have at least a 12x digital zoom capabilities. The lens aperture range shall be F1.4 to F2.8 minimum.

(4) Camera Enclosure. The camera housing shall be a non-pressurized dome enclosure and shall contain the CCTV camera, lens and pan/tilt drive unit. The camera enclosure shall be watertight and constructed so that the enclosed equipment will not be affected by rainfall, blowing dust, salt, fungus, and other debris. The camera casing shall be IP66-rated and NEMA 4X-rated. The unit shall be supplied with a heater to keep the camera within the acceptable operating temperature range.

(5) Pan and Tilt Drive Unit. The pan and tilt drive unit shall allow the remote position of the CCTV camera to view freeway traffic conditions. The units shall be fitted to mount to the CCTV camera and enclosure and be supplied with all of the necessary mounting plates, connectors, brackets and wiring for operation. The unit shall allow 360° of continuous panning which is variable from 0.05 to 450°/second. The unit shall allow a minimum of 64 preset positions accurate to within 0.5°.

(6) Video Encoding. The encoded video shall be H.264 (MPEG-4 Part 10/AVC) compliant using the baseline profile. The video resolution shall be configurable from HDTV 1080p (1920 x 1080) to 320 x 180. The frame rate shall be adjustable up to 30/25 fps (60/50 Hz).

(7) Communications. A 100Base-TX network interface shall be provided that facilitates the transmission of camera control commands and video over an Ethernet based IP network. The network connector at the camera shall be IP66 rated.

3.0 Method of Measurement. Measurement of CCTV camera assemblies, including all specified cameras, cables, and other equipment, will be made per each.

4.0 Basis of Payment. Accepted CCTV Camera System Elements will be paid for at the unit price for each of the pay items included in the contract. No direct payment will be made for any incidental items necessary to complete the work unless specifically provided as a pay item in the contract.

<u>Item No.</u>	<u>Type</u>	<u>Item Description</u>
910-37.00	EA	CCTV Camera Assembly, Installed

L. Vehicle Detection System

1.0 Description. A Vehicle Detection System (VDS) shall be a dual beam radar unit assembly installed for the purposes of detecting vehicular speed, volume counts, and lane occupancies. The VDS shall be of the type shown on the drawings and specified herein and shall be installed in the locations shown on the plans.

2.0 Radar Vehicle Detectors. The radar vehicle detector shall include all the cables, connectors, surge protection and mounting hardware recommended by the manufacturer for proper operation of the system.

2.1 Performance. The radar vehicle detector shall meet or exceed the following requirements:

- Able to measure volume, occupancy (including slow moving or stationary vehicles), and speed, when in a side-fire configuration and mounted as shown on the plans.
- Suitable for polled operation using multipoint RS-232 communication at 9600 bits per second.
- Detection range: 6 to 250 feet with up to 22 lanes detected.
- Frequency Band: 24.0–24.25 GHz (K-band)
- Instantaneous bandwidth: 45 MHz.
- Maximum transmitter power: 10 mW.
- Operating temperature range: -40°C to +75°C.
- Operating humidity range from 5 to 95% RH.
- Meets FCC rules Part 15 for interference.
- Occupies no more than 0.3 cubic feet
- Weighs no more than 5 pounds.
- Housing sealed to withstand rain (or snow) up to a rate of 4 inch per hour or wind loads up to 90 mph.
- Includes a mounting assembly for each microwave detector. The assembly shall be stainless steel or all aluminum construction, shall be capable of supporting a load of 20 lbs, and shall be approved by the manufacturer of the microwave detector.
- Includes a twisted-pair cable between the cabinet and each microwave detector. The cable provides both power and communication. It shall be UV-resistant and rated for 300 volts. This cable shall terminate on a single MS connector.

2.2 Laptop Software. The contractor shall provide software that enables a technician to test all features and functions of the detector, and to perform all set-up procedures. This software shall be delivered on a CD so that it can be installed on other computers. The Commission shall have the right to make and use an unlimited number of copies of this software.

2.3 Communication Protocol. The radar vehicle detector shall have been demonstrated to communicate with the KC Scout ATMS software or be compliant with the National Transportation Communications for ITS Protocol (NTCIP).

To be NTCIP compliant the detector shall adhere to the version of the following standards that is current at the time of bidding:

- Information level: NTCIP Standard 1209, including implementation of the TSS Data Collection conformance group
- Application level: NTCIP Standard 1101, Compliance Level 2
- Transport level: Null protocol
- Subnetwork level: NTCIP Standard 2101

Supply full documentation of all manufacturer-specific objects supported by the detector. This shall be in the form of a CD containing ASCII versions of a MIB in ASN.1 format. The MIB shall contain accurate and meaningful description fields and supported ranges indicated in the syntax field of the object-type macros. The manufacturer shall allow the use of any and all of the documentation described above by the Commission for system integration purposes at any time, regardless of what parties are involved in the system integration effort.

2.4 Pole. The radar detectors shall be installed on a new camera pole mounting, as shown on the plans. The contractor shall provide a new mounting bracket from the radar vendor for each location.

2.5 Device Server. Contractor shall provide a device server recommended by the radar vehicle detector manufacturer that will allow the detector to communicate over the Ethernet IP network when the detector is connected to an Ethernet network device.

2.6 Surge Protection. Surge protection shall be used inside the cabinet in order to protect both the power and the communication lines. If the radar unit is installed on a separate pole that is more than 20' away horizontally from the cabinet, then the contractor shall provide surge protection at the bottom of the radar pole. The surge protection shall be protected in a watertight enclosure that fits within the base of the pole.

3.0 Construction Requirements. Radar vehicle detectors shall be installed in accordance with the manufacturer's recommended procedure for side-fired installation. Note that the recommended mounting height is relative to the road surface, not the base of the pole. The detector shall be aimed to detect vehicles in the lanes indicated at the particular location. Installation may be done by the contractor's forces, but must be checked by the manufacturer's representative, and adjusted as recommended by the manufacturer's representative. Installation includes connecting the detector to the device server and power supply in the associate cabinet assembly, as shown on the plans. Isolation is provided for the power and serial communication wires between the radar unit and the device server.

The set up shall include speed calibration using measured (not estimated) reference speeds. When the setup is complete and the detector is ready for operation, the values of all parameters that were set during the process shall be delivered to the engineer in printed or computer-readable form. All equipment, such as a radar gun, software, laptop computer, tools, and cables, needed for the set up work shall be provided.

4.0 Method of Measurement. Measurement of Radar Vehicle Detector, including all mounting brackets, cables, power supply and device server, will be made per each.

5.0 Basis of Payment. Accepted Radar Vehicle Detector will be paid for at the unit price for each of the pay items included in the contract. For these items, it will include all documentation and acceptance testing. No direct payment will be made for any incidental items necessary to complete the work unless specifically provided as a pay item in the contract.

<u>Item No.</u>	<u>Type</u>	<u>Item Description</u>
910-99.02	EA	Radar Vehicle Detector, Installed

M. Fiber Optic Cable, Installation and Hardware

1.0 General. All fiber optic (F/O) cable required for this project shall be all dielectric, gel filled, duct type, with loose buffer tubes and shall conform to these special provisions. The fiber optic cables shall connect the ITS field equipment such as Closed Circuit Television (CCTV) Cameras and Dynamic Message Signs (DMS) to the aggregators and bandwidth managers via the communications backbone cable. The Single Mode Fiber Optic (SMFO) fibers shall contain single mode (SM) dual-window (1310 nm and 1550 nm) fibers.

The optical fibers shall be contained within loose buffer tubes. The loose buffer tubes shall be stranded around an all dielectric central member. Aramid yarn and/or fiberglass shall be used as a primary strength member, and a polyethylene outside jacket shall provide for overall protection.

Fiber optic cables shall be provided and installed as shown in the plans and specifications. The fiber optic cable shall be installed with a minimum number of splices. No additional splice vault locations will be permitted. The contractor shall utilize the maximum cable lengths possible, and avoid additional splices in the backbone 24 count cable.

All fiber optic cable on this project shall be from the same manufacturer, who is regularly engaged in the production of this material. If availability and delivery schedule does not allow fiber optic cable to be from the same manufacturer, multiple manufacturers may be used if approved by the engineer.

The fiber optic cable shall be qualified as compliant with Chapter XVII, Title 7, Part 1755.900 of the Code of Federal Regulations, "REA specification for filled fiber optic cables".

Each buffer tube shall be terminated in its own splice tray and each tray shall contain a maximum of 12 splices. Pictures must be taken of each fiber splice enclosure when all work has been completed and that documentation must be submitted to the engineer along with OTDR traces. The first splice location must be inspected and approved by the engineer and Scout technical staff before the contractor continues with fiber optic cable splicing.

1.1 Material. Each optical fiber shall be made of glass that is manufactured by Corning or licensed by Corning and consist of a doped silica core surrounded by concentric silica cladding. All fibers in the buffer tube shall be usable fibers, and shall be sufficiently free of surface imperfections and inclusions to meet the optical, mechanical, and environmental requirements of these specifications.

The individual fiber coating shall be a dual layered, UV cured acrylate. The coating shall be mechanically or chemically strippable without damaging the fiber.

The cable shall comply with the optical and mechanical requirements over an operating temperature range of -40° F. to +158° F. The cable shall be tested in accordance with EIA-455-3A (FOTP-3), "Procedure to Measure Temperature Cycling Effects on Optical Fiber, Optical Cable, and Other Passive Fiber Optic Components." The attenuation shall be measured at 1310 nm and 1550 nm.

Fibers within the finished cable shall meet the requirements in the following table:

Fiber Characteristics Table

Parameters	Value
Mode	Single
Type	Step Index
Core diameter	8.3 μm (nominal)
Cladding diameter	125 $\mu\text{m} \pm 1.0 \mu\text{m}$
Core to Cladding Offset	$\leq 0.6 \mu\text{m}$
Coating Diameter	245 $\mu\text{m} \pm 10 \mu\text{m}$
Cladding Non-circularity defined as: [1-(min. cladding dia \div max. cladding dia.)]x100	$\leq 1.0\%$
Proof/Tensile Test	100 kpsi, min.
Attenuation @ 1,310 nm	$\leq 0.40 \text{ dB/km}$
Attenuation @ 1,550 nm	$\leq 0.35 \text{ dB/km}$
Attenuation at the Water Peak	$\leq 2.1 \text{ dB/km @ } 1383 \pm 3 \text{ nm}$
Chromatic Dispersion:	
Zero Dispersion Wavelength	1301.5 to 1321.5 nm
Zero Dispersion Slope at zero dispersion wavelength	$\leq 0.092 \text{ ps}/(\text{nm}^2 \cdot \text{km})$
Maximum Dispersion:	3.3 $\text{ps}/(\text{nm} \cdot \text{km})$ for 1285 - 1330 nm <18 $\text{ps}/(\text{nm} \cdot \text{km})$ for 1550 nm
Cut-Off Wavelength	<1260 nm
Mode Field Diameter (Petermann II)	9.3 $\pm 0.5 \mu\text{m}$ at 1310 nm 10.5 $\pm 1.0 \mu\text{m}$ at 1550 nm

1.2 Color Coding. Optical fibers shall be distinguishable from others in the same buffer tube by means of color coding according to the following:

1. Blue (BL)	5. Slate (SL)	9. Yellow (YL)
2. Orange (OR)	6. White (WT)	10. Violet (VL)
3. Green (GR)	7. Red (RD)	11. Rose (RS)
4. Brown (BR)	8. Black (BK)	12. Aqua (AQ)

The colors shall be targeted in accordance with the Munsell color shades and shall meet EIA/TIA-598A "Color Coding of Fiber Optic Cables." The color formulation shall be compatible with the fiber coating and the buffer tube filling compound, and be heat stable. It shall not fade or smear or be susceptible to migration and it shall not affect the transmission characteristics of the optical fibers and shall not cause fibers to stick together.

1.3 Cable Construction. The fiber optic cable shall consist of, but not be limited to, the following components:

- A. Buffer tubes
- B. Central member
- C. Filler rods if needed
- D. Stranding
- E. Core and cable flooding
- F. Tensile strength member
- G. Ripcord
- H. Outer jacket
- I. Glass fibers as described above

1.3.1 Buffer Tubes. Loose buffer tubes shall provide clearance between the fibers and the inside of the tube to allow for expansion without constraining the fiber. The fibers shall be loose or suspended within the tubes and shall not adhere to the inside of the tube.

The loose buffer tubes shall be extruded from a material having a coefficient of friction sufficiently low to allow free movement of the fibers. The material shall be tough and abrasion resistant to provide mechanical and environmental protection of the fibers, yet designed to permit safe intentional "scoring" and breakout, without damaging or degrading the internal fibers.

Buffer tube filling compound shall be a homogenous hydrocarbon-based gel with anti-oxidant additives. It shall prevent water intrusion and migration. The filling compound shall be non-toxic and dermatologically safe to exposed skin. It shall be chemically and mechanically compatible with all cable components, non-nutritive to fungus, non-hydroscopic and electrically non-conductive. The filling compound shall be free from dirt and foreign matter and shall be readily removable with conventional nontoxic solvents.

Buffer tubes shall be stranded around a central member by a method, such as the reverse oscillation stranding process that will prevent stress on the fibers when the cable jacket is placed under strain.

Each buffer tube shall be distinguishable from other buffer tubes in the cable by using the same color coding as specified above for fibers.

1.3.2 Central Member. The central member, which functions as an anti-buckling element, shall be a glass reinforced plastic rod with similar expansion and contraction characteristics as the optical fibers and buffer tubes. To provide the proper spacing between buffer tubes during stranding, a symmetrical linear overcoat of polyethylene may be applied to the central member to achieve the optimum diameter.

1.3.3 Filler rods. Fillers may be included in the cable cross-section. Filler rods shall be solid

medium or high-density polyethylene. The diameter of filler rods shall be the same as the outer diameter of the buffer tubes.

1.3.4 Stranding. Completed buffer tubes shall be stranded around the overcoated central member using stranding methods, lay lengths and positioning such that the cable shall meet mechanical, environmental and performance specifications. A polyester binding shall be applied over the stranded buffer tubes to hold them in place. Binders shall be applied with sufficient tension to secure the buffer tubes to the central member without crushing the buffer tubes. The binders shall be non-hydroscopic, non-wicking (or rendered so by the flooding compound), and dielectric with low shrinkage.

1.3.5 Core and Cable Flooding. The cable core interstices shall be filled with a polyolefin based compound to prevent water ingress and migration. The flooding compound shall be homogeneous, non-hydroscopic, electrically non-conductive, and non-nutritive to fungus. The compound shall also be nontoxic, dermatologically safe, and compatible with all other cable components.

1.3.6 Tensile Strength Member. Tensile strength shall be provided by high tensile strength aramid yarns and/or fiberglass which shall be helically stranded evenly around the cable core and shall not adhere to other cable components.

1.3.7 Ripcord. The cable shall contain at least one ripcord under the jacket for easy sheath removal.

1.3.8 Outer jacket. The jacket shall be free of holes, splits, and blisters and shall be medium or high density polyethylene (PE), or medium density cross-linked polyethylene with minimum nominal jacket thickness of 37 mils. Jacketing material shall be applied directly over the tensile strength members and flooding compound and shall not adhere to the aramid yarn strength material. The polyethylene shall contain carbon black to provide ultraviolet light protection and shall not promote the growth of fungus. The jacket or sheath shall be marked with the manufacturer's name, the words "Optical Cable" or "Fiber Optic Cable", the number of fibers, "SM" or "Single Mode", year of manufacture, and sequential measurement markings every 3 feet. The actual length of the cable shall be within 1 percent of the length marking. The marking shall be in a contrasting color to the cable jacket (Yellow or White are preferred). The height of the marking shall be approximately 2.5 mm (.098 inch).

1.4 General Cable Performance Specifications. The fiber optic cable shall withstand water penetration when tested with a one-meter static head or equivalent continuous pressure applied at one end of a one-meter length of filled cable for one hour. No water shall leak through the open cable end. Testing shall be done in accordance with EIA-455-82A (FOTP-82), "Fluid Penetration Test for Fluid-Blocked Fiber Optic Cable."

A representative sample of cable shall be tested in accordance with EIA-455-81B (FOTP-81), "Compound Flow (Drip) Test for Filled Fiber Optic Cable". No preconditioning period shall be conducted. The cable shall exhibit no flow (drip or leak) at 176° F as defined in the test method.

Crush resistance of the finished fiber optic cables shall be 220 N/cm applied uniformly over the length of the cable without showing evidence of cracking or splitting when tested in accordance with EIA-455-41A (FOTP-41), "Compressive Loading Resistance of Fiber Optic Cables". The average increase in attenuation for the fibers shall be ≤ 0.10 dB/km at 1550 nm for a cable

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subjected to this load. The cable shall not exhibit any measurable increase in attenuation after removal of load. Testing shall be in accordance with EIA-455-41A (FOTP-41), except that the load shall be applied at the rate of 3 mm to 20 mm per minute and maintained for 10 minutes.

The cable shall withstand 25 cycles of mechanical flexing at a rate of 30 ± 1 cycles/minute. The average increase in attenuation for the fibers shall be ≤ 0.20 dB/km at 1550 nm at the completion of the test. Outer cable jacket cracking or splitting observed under 10x magnification shall constitute failure. The test shall be conducted in accordance with EIA-455-104A (FOTP-104), "Fiber Optic Cable Cyclic Flexing Test," with the sheave diameter a maximum of 20 times the outside diameter of the cable. The cable shall be tested in accordance with Test Conditions I and II of (FOTP-104). Impact testing shall be conducted in accordance with EIA-455-25B (FOTP-25) "Impact Testing of Fiber Optic Cables and Cable Assemblies." The cable shall withstand 20 impact cycles. The average increase in attenuation for the fibers shall be ≤ 0.20 dB/km at 1550 nm. The cable jacket shall not exhibit evidence of cracking or splitting.

The finished cable shall withstand a tensile load of 2669 N (600 lbs.) without exhibiting an average increase in attenuation of greater than 0.20 dB. The test shall be conducted in accordance with EIA-455-33A (FOTP-33), "Fiber Optic Cable Tensile Loading and Bending Test." The load shall be applied for one-half hour in Test Condition II of the EIA-455-33A (FOTP-33) procedure.

1.5 Packaging and Shipping Requirements. Documentation of compliance to the required specifications shall be provided to the engineer prior to ordering the material.

Attention is directed to "Fiber Optic Testing," in Section 3.5 of these special provisions.

The completed cable shall be packaged for shipment on reels. The cable shall be wrapped in weather and temperature resistant covering. Both ends of the cable shall be sealed to prevent the ingress of moisture.

Each end of the cable shall be securely fastened to the reel to prevent the cable from coming loose during transit. Six feet of cable length on each end of the cable shall be accessible for testing. The complete outer jacket marking shall be visible on this six feet of cable length.

Each cable reel shall have a durable weatherproof label or tag showing the manufacturer's name, the cable type, the actual length of cable on the reel, the contractor's name, the contract number, and the reel number. A shipping record shall also be included in a weatherproof envelope showing the above information and also include the date of manufacture, cable characteristics (size, attenuation, bandwidth, etc.), factory test results, cable identification number and any other pertinent information.

The minimum hub diameter of the reel shall be at least thirty times the diameter of the cable. The F/O cable shall be in one continuous length per reel with no factory splices in the fiber. Each reel shall be marked to indicate the direction the reel should be rolled to prevent loosening of the cable.

Installation procedures and technical support information shall be furnished at the time of delivery.

2.0 Cable Installation. The contractor shall submit for review the planned procedures for pulling and or blowing the fiber optic cable to the engineer for review and approval at least 20 working days prior to installing cables. Mechanical aids may be used to assist cable installation.

If cable is pulled a tension measuring device or break away swivel shall be incorporated into the pulling line and attached to the cable, to ensure that the tension does not exceed 2669N (600lb). The cable grips for installing fiber optic cable shall have a ball bearing swivel attached to prevent the cable from twisting during installation. Pulling of fiber optic cable shall be with even tension. F/O cable ends shall be properly sealed during installation.

The breakaway tension limiting device shall be set to release at or below the manufacturer's maximum recommended pulling tension. One break away tension limiting device is required for each cable being pulled.

During cable installation, the bend radius shall be maintained at a minimum of twenty times the outside diameter of the cable. The cable shall not be stressed beyond the minimum bend radius at any time during installation and handling.

Fiber optic cable shall be installed using a cable pulling lubricant recommended by the fiber optic cable manufacturer and/or the inner duct or conduit manufacturer and a non-abrasive pull tape conforming to the provisions described under "Conduit" elsewhere in these special provisions. When lubricant is used, lubricant shall cover the fiber optic cable for entire pull.

Fiber optic cable shall be installed without splices except where specifically allowed on the plans or described in these special provisions. The fiber optic cables shall be spliced only at splice vault/handholes associated with bandwidth managers, aggregators, CCTV camera sites, DMS sites, radar detector sites or other VDS sites, unless shown otherwise in the plans. The engineer may allow additional splices between these specified locations. The slack shall be divided equally on each side of the splice enclosure.

Six feet of slack fiber optic cable shall be provided in all splice vaults/handholes that do not contain splices unless noted otherwise on the plans. At splice vaults/handholes that contain splices 50 feet of slack fiber shall be provided on each side of the splice enclosure. At cabinet assemblies, 50 feet of slack fiber shall be stored in the adjacent splice vaults/handholes and 15 feet stored within the cabinet and fiber distribution unit.

The contractor shall record sequential markings at all splice vault/handholes. The contractor shall after pulling, cut off and discard the first 10 feet of the fiber optic cable. This 10 feet has not been included in the conduit and cable routing tables on the plan sheets and shall be considered incidental to other items of work. The contractor shall account for this length. The remaining cable length in the splice vault/handhole must meet the slack cable length requirements.

Following installation of the cable in conduit, all conduit entrances in cabinet assemblies, pull boxes and splice vault/handholes shall be sealed with duct plugs and sealing compound to prevent the ingress of moisture, foreign materials, and rodents. No residual tension should remain on the cable after installation, except the weight of the cable.

2.1 Splicing. The contractor shall submit a splicing plan for the engineer's review and approval. Approval of the splicing plan shall occur prior to any installation of fiber optic cable.

The contractor's splicing plan shall include all information shown in the splicing diagrams, included in the plans, and be in a similar format.

The contractor shall cut only the fibers to be terminated/spliced at a location according to the design plans. Unused fibers or fibers that are continuous through a splice location are to be coiled, labeled, and left loose in the tray.

Optical fibers shall be spliced using the fusion type method. Alignment shall be via fiber cores and not via fiber diameters. Mechanical splices shall not be permitted.

Splice losses shall average less than or equal to 0.05 dB/splice between any two optical ports and shall not exceed 0.10 dB for any splice.

The completed splices shall be placed in a splice tray. The splice tray shall then be placed in the splice enclosure.

Termination splices shall join the fibers in the fiber optic cable span to the fibers in pigtails. The termination splices shall be placed in a splice tray and the splice tray(s) shall then be placed in the fiber distribution unit (FDU). The individual fibers shall be looped a minimum of one full turn within the splice tray to avoid micro bending. A 51 mm (2 inches) minimum bend radius shall be maintained during installation and after placing in the optical fiber splice tray. Each fiber shall be individually restrained in a splice tray. The optical fibers in buffer tubes and the placement of the optical fibers in the splice tray shall be such that there is no discernable tensile force on the optical fiber.

All splices shall be protected with a thermal shrink sleeve.

All fiber cables shall be labeled in the cabinet assemblies and splice vault/handholes with permanent vinyl markers. Labels shall identify the destination cabinet assembly number or splice vault/handhole number of the fiber. Pigtail ends shall also be labeled to identify the destination cabinet assembly number or splice vault/handhole number of the fiber.

3.0 Passive Cable Assemblies and Components. The fiber optic cable assemblies and components shall be compatible components, designed for the purpose intended, and manufactured by a company regularly engaged in the production of material for the fiber optic industry. All components or assemblies shall be best quality, non-corroding, with a design life of at least 20 years. All components or assemblies of the same type shall be from the same manufacturer.

3.1 General. Fiber optic cable terminations shall include pigtails and jumpers. Breakout cables shall comply with the specifications for pigtails.

All components shall be the size and type required for the specified fiber.

All fiber optic cable on this project shall be from the same manufacturer, who is regularly engaged in the production of this material.

3.2 Fiber Optic Splice Enclosures. The fiber optic splice enclosure (also referred to as simply "closures") shall consist of an outer enclosure, an inner enclosure and splice trays, and shall conform to the following special provisions.

The fiber optic splice enclosure shall be designed for a temperature range of -40° F. to +158° F. The fiber optic splice enclosure shall be designed for splice vault/handhole applications. The splice enclosure shall have enough room for up to 144 splices and shall have a minimum length of 28 inches and a minimum diameter of 6.6 inches. The enclosures shall be designed for cable entrance into the end of the enclosure.

All materials in the enclosures shall be non-reactive and shall not support galvanic cell action. The outer enclosure shall be compatible with the other enclosure components, the inner enclosure, splice trays, and cables.

The outer enclosure shall protect the splices from mechanical damage, shall provide strain relief for the cable, and shall be resistant to salt corrosion. The outer enclosure shall be waterproof, and re-enterable, corrosion resistant, rodent proof, and air tight. The outer enclosure shall be flash-tested at 103 kPa. (15 psi.). The inner enclosure shall be of metallic construction.

The inner enclosure shall be compatible with the outer enclosure and the splice trays and shall allow access to and removal of individual splice trays.

The splice trays shall be constructed of rigid plastic or metal.

Adequate splice trays shall be provided to splice all fibers entering the enclosure, plus 12 additional fibers.

The contractor shall install the fiber optic splice enclosure in the splice vault/handholes where splicing is required. The fiber optic splice enclosures shall be securely fastened to the splice vault/handhole using standard hardware. The contractor shall provide all mounting hardware required to securely mount the enclosures to the splice vault/handhole.

The fiber optic splice enclosure shall be mounted in a manner that allows the cables to enter at the end of the enclosure without exceeding the minimum bending radius specification for any of the cables contained within the splice vault/handhole. A vertical mounting bracket made for the splice enclosure shall be installed and the splice enclosure shall be securely strapped to that mounting bracket.

Upon completion of the splices, the splice trays shall be secured to the inner enclosure. The enclosure shall be sealed using a procedure recommended by the manufacturer that will provide a waterproof environment for the splices.

Care shall be taken at the cable entry points to ensure a tight waterproof seal is made which will not leak upon aging. It is acceptable to have multiple pigtail-fibers enter the fiber optic splice enclosure through one hole as long as all spaces between the cables are adequately sealed.

3.3 Fiber Optic Cable Assemblies. Cable assemblies (jumpers and pigtails) shall be products of the same manufacturer. The cable used for cable assemblies shall be made of fiber meeting the performance requirements of these special provisions for the fiber optic cable being connected, except that the operating temperature shall be modified to -4° F. to +158° F. Manufacturer's attenuation test results shall be provided for all cable assemblies.

3.3.1 Pigtails. Pigtails shall be of simplex (one fiber) construction, in 900 micrometer tight buffer form, surrounded by aramid yarn for strength, with a connector on one end. The outer jacket shall be yellow PVC with a nominal diameter of 3 mm (.118 inch), marked with the manufacturer's identification information. All pigtails shall be at least one meter in length. Pigtails installed in conduit shall follow the installation procedures outlined for fiber optic cables, except that the pulling tension shall not exceed 890 N (200 lb.). Pigtail connectors shall be factory terminated. Field terminations shall not be permitted.

3.3.2 Jumpers. Jumpers may be of simplex or duplex design. Duplex jumpers shall be of duplex round cable construction and shall not have zip cord (Siamese) construction. All jumpers shall be at least 2 meters (6.5 feet) in length, sufficient to avoid stress and allow orderly routing. Jumpers shall have connectors on both ends.

The outer jacket of duplex jumpers shall be yellow. The two inner simplex jackets shall be contrasting colors to provide easy visual identification for polarity. Jumper connectors shall be factory terminated. Field terminations shall not be permitted.

3.3.3 Connectors. Connectors shall be of the type shown on the plans. No index-matching fluids, gels or anti-reflection coating shall be applied to the end of the fiber. The connector operating temperature range shall be -4°F to +158°F. Insertion loss shall not exceed 0.4 dB and the return reflection loss shall be at least 35 dB. Connection durability shall be less than a 0.2 dB change per 500 mating cycles per EIA-455-21A (FOTP-21). All terminations shall provide a minimum 222 N (50 lb.) pull out strength. The installed connector loss shall be less than 0.9 dB. Connectors shall have a yellow color body or boot.

All connectors installed on pigtails and jumpers shall be factory-installed and tested. Factory test results shall be documented and submitted to the engineer prior to installing any connectors. There shall be no installation of connectors in the field. All unmated connectors shall have protective caps installed.

3.4 Fiber Distribution Unit (FDU). The fiber distribution unit (FDU), also referred to as patch panels, shall be used to terminate fibers in the field termination cabinet assemblies including the CCTV camera and DMS cabinets. The terminations shall be SC-bulkhead connectors which match the fiber optic jumper cables used for connection to the optical termination equipment in the cabinet assembly. The units shall be rack mountable in an EIA 19-inch (482.6mm) rack and utilize 3U of rack space. The 3U fiber distribution units shall consist of a closet connector housing (CCH) and shall include two CCH panels at each FDU location. The FDU shall meet the requirements of ANSI/TIA/EIA-568-B and ANSI/TIA/EIA-606-A. The contractor shall leave enough fiber slack so the FDU can be removed and placed on a worktable if needed. At all FDU locations, the contractor shall terminate all 12 fibers inside the fiber distribution unit located inside each ITS cabinet.

3.5 Fiber Optic Testing. The contractor shall test and document any fibers that are spliced and terminated at both ends. The contractor shall complete power meter and OTDR traces in both directions and document that those results meet the loss requirements listed above. The contractor shall complete a summary worksheet for each test and also provide the actual fiber trace for each test. The fiber trace shall be formatted and scaled so losses can be recognized when visually reviewing the fiber trace report. The contractor shall submit a proposed testing summary worksheet to the Engineer for review before any fiber splicing work begins on the project.

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4.0 Method of Measurement. Measurement of fiber optic cable will be made to the nearest linear foot as shown on the plans. Contract quantities will be verified using the documented fiber sheath readings in and out of every fiber pull box and splice enclosure. Fiber optic splicing, testing and documentation will be measured as a lump sum pay item.

5.0 Basis of Payment. Accepted fiber optic cable will be paid for at the unit price for each of the pay items included in the contract. No direct payment will be made for pigtails, jumpers, or connectors, fiber optic splice closure, fiber optic distribution units, fiber distribution frames or any other incidental items necessary to complete the fiber splicing work unless specifically provided as a pay item in the contract. The contractor shall include all incidental items, fiber enclosures, mounting brackets, fiber installation, fiber splicing, fiber testing and documentation in the lump sum price for fiber splicing, testing, and documentation.

<u>Item No.</u>	<u>Type</u>	<u>Item Description</u>
910-83.53	LF	Fiber Optic Cable, 12-Strand, Single Mode
910-83.54	LF	Fiber Optic Cable, 48-Strand, Single Mode
910-99.01	LS	Fiber Optic Splicing, Testing and Documentation

N. Tracer Wire

1.0 Description. All new or relocated cables, including fiber optic cable, communication cable, and power wire, shall be installed with a tracer wire in the conduit. Install a blue jacketed No. 14 AWG (2.5 mm²) stranded copper wire for locating purposes in the conduit. The tracer wire shall be pulled into all cabinets and device bases. Inside cabinets, the tracer shall be coiled up and labeled with the destination point of that specific tracer wire. For instance, a tracer wire running from the cabinet to a CCTV camera pole would be labeled "TRACER - CCTV" while a tracer wire running to the power supply would be labeled "TRACER - POWER". At the device end such as at the camera pole or the power supply, the tracer wire shall be attached to the ground lug. Branch fiber optic cables that run from the backbone splice vault to the cabinet shall be coiled up in the splice vault and labeled "TRACER – BRANCH FIBER" and at the cabinet end this tracer wire shall be terminated into the cabinet ground bar. Along the backbone fiber optic cable route, the tracer wire shall be continuously connected and labeled at each box as "TRACER – BACKBONE FIBER". In all locations, the tracer wire shall have a 20' loop of slack added and that tracer wire shall be free and accessible and not tied to any other cables inside the pull box or splice vault. Tracer wire shall be installed at the longest distance possible, but if splices are required, then the Contractor must use self-stripping, moisture resistant, electrical pigtail connectors in order to complete a waterproof splice of the tracer wire.

2.0 Basis of Payment. The pay item for tracer wire is:

<u>Item No.</u>	<u>Type</u>	<u>Item Description</u>
910-99.03	LF	Tracer Wire

O. Power Supply Assembly

1.0 Description. All electrical power supply and service equipment and work shall comply with the requirements of Section 901.8 except as modified herein. The contractor shall consult the

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local electric utilities regarding their service installation requirements and shall furnish the service equipment in compliance with codes and regulations, and their requirements.

All electrical equipment shall be sized assuming the available fault current from the electric utility is less than 10,000 Amps. The contractor shall coordinate equipment fault current ratings for the electrical equipment used with the available fault current as provided by the electric utility. Available fault current will vary with each installation. Inquiry for a particular location should be directed to the Evergy Business Center: Phone 816-221-2323.

The power service locations as indicated on the drawings are initial service points coordinated with the electric utilities. The contractor is responsible for all coordination of final point of service. Any relocation, adjustment, and/or modification of the service locations shall be a part of this contract at no additional costs. Increases and/or decreases of cable, pull boxes, or conduit quantities based on length as a result of these changes, will be made at the unit price bid for these items.

Power service equipment shall include meter boards, meter socket, meter test cabinets, disconnect means, grounding materials, and service fittings required by the utility. Contractor shall provide lightning arresters at each service drop and shall coordinate installation of the arrester with the utility.

The contractor shall be responsible for notifying the utilities for the need for service and shall coordinate the schedule for that service from the utility. Each constructed service drop shall be provided with a phenolic nameplate indicating the following:

- Project "KC Scout"
- Service address "_____"
- Service Voltage "_____"

2.0 Materials. Materials shall comply with the detail shown in the plans and with the National Electrical Code. Consult the appropriate utility company regarding its requirements and provide equipment complying with the utility company's requirements.

2.1 Service Pole. Where overhead power service points are shown on the plans, the contractor shall provide a new service pole unless an existing pole was left in place from a previous project. The service pole shall be 30 ft. minimum height made of class 4 or 5 wood. Conduit attached to the pole shall be rigid galvanized steel and include a service entrance cap on the top of the conduit run. This cap shall be designed to prevent ingress of water into conduit. Poles shall include guy wires where requested by power service provider. Power supply assemblies shall be supplied and installed in accordance with the details shown on the plans. The service shall include meter socket and disconnect on an overhead service pole. Conductor and disconnect size shall be as indicated on the plans. All grounding shall be in accordance with the NEC.

2.2 Power Service Pedestal. Furnish and install a power supply pedestal for 120/240-volt service as shown in the special sheets. Available units are listed in the MoDOT approved products list. This product shall be installed in accordance with the plans and the manufacture specifications.

2.3 Fittings and Adapters. Where large conductor sizes are shown on the plans, the contractor shall provide shop drawings that show the type of fitting/adaptor being proposed and the locations in which these fittings/adapters are being proposed to accommodate proper termination (lugs/splices) within panels, pull boxes, and cabinets for a complete system assembly that can be installed in a tidy, professional manner.

2.4 Conductors. Power conductors shall be continuous and not spliced in pull boxes or junction boxes. Power conductors shall be in accordance with the requirements of Section 1061.

2.4.1 Labeling for circuits as defined in Section 901.14 shall be used for all handholes, pull boxes and junction boxes.

2.4.2 Labeling for circuits as defined in Section 902.11.1 shall be used for all cabinet assemblies.

2.4.3 The contractor shall install two conductors and a ground for each circuit with the exception of DMS circuits. The two conductors shall include a white neutral and one positive. DMS board locations require three conductors and a ground and the three conductors shall include a white neutral and two positives. The ground shall be the size listed in the plans.

3.0 Construction Requirements. The power service locations, as indicated on the drawings, are initial service points coordinated with the power service provider. The contractor shall coordinate with the local power service provider to verify the final point of service.

The contractor shall be responsible for paying all power consumption costs during periods of construction and testing until the entire intelligent transportation system has been finally accepted by MoDOT.

The power service voltage shall be verified at the power service locations prior to installation of circuits at all locations indicated on the drawings.

Lightning arrestors shall be of the rated voltage as shown on the plans. Guy wires shall be installed per the utility company's requirements.

Notify the local power service provider of the need for service and coordinate the schedule for that service from the utility. A copy of the service request shall be submitted to the engineer for his records.

All 480 Volt Type 1 power supplies shall be installed with a non-fused disconnect according to the requirements of the utility company.

4.0 Measurement and Payment. Measurement for all power supplies shall be made per each power supply location. All power supply locations will be paid under the pay item for Type 1 Pole Mounted Power Supply Assembly or Type 2 Service Pedestal Power Supply Assembly:

<u>Item No.</u>	<u>Type</u>	<u>Item Description</u>
910-86.10	EA	Power Supply Assembly, Type 1, 240/120 Volt Service, ITS
910-86.21	EA	Power Supply Assembly, Type 2, 240/120 Volt

Service, ITS

P. Communication Equipment

1.0 Wireless Radios. The contractor shall provide wireless radios at the locations shown in the plans. The wireless radios shall consist of a 5.8 GHz wireless radio that meets the following requirements:

- Up to 54 Mbps data throughput.
- Configurable as point to point radios with one unit configured as an access and unit and a second unit configured as a subscriber unit.
- Range up to 50 miles.
- Encrypted data transmission.
- WDS connectivity.
- Web browser set up.
- Power over Ethernet cabling.
- Wireless radio enclosure with a built-in integrated antenna
- Mounting bracket that clamps solidly into position, but allows for radio adjustments

The contractor shall provide surge suppression for the power over Ethernet cable inside the 336 ITS cabinet. The contractor shall provide an adjustable mounting bracket for the wireless radio in case radio tuning is required.

2.0 Fiber to Ethernet Media Converters. The contractor shall furnish fiber to Ethernet media converters at the locations shown in the plans. The media converters shall be for single mode fiber and shall communicate over fiber for distances up to 15 kilometers. The media converter shall provide 10/100Base-TX Ethernet communications and utilize SC fiber jumper connections. Any fiber jumpers needed to connect the media converters to the fiber bulkhead shall be considered incidental to the media converter. The media converter shall be a compact size approximately 1 inch by 3 inches by 4 inches and shall utilize a 48V DC power supply.

3.0 Construction.

- a. The contractor is responsible for all radio channel planning, communication path work, power level settings, antenna positioning (X, Y and Z axis including tilt), Radio Frequency Interference (RFI) and Electro Magnetic Interference (EMI) resolution so that a fully functional, operational, and secure communication links is provided. A design plan has been provided in the plan set but it is understood that it may need to change based on field conditions. The contractor needs to take into consideration existing unlicensed radio networks operated by others. The radios shall be installed and oriented to maximize the Signal-to-Noise Ratio (SNR) levels. The contractor shall reference and follow the installation guidelines by the manufacturer. All cabling, lightning protection, configuration, testing, and other subsidiary items shall be included in the individual bid item.
- b. Contractor shall furnish all tools equipment, materials, supplies and manufactured articles and all operations necessary to install wireless equipment and construct the wireless communications facilities as shown on the plans and as specified herein. All hardware and fasteners shall be stainless steel.
- c. Surge protection shall be provided on all cables entering a cabinet.
- d. The Ethernet radio shall be installed at the location shown on the plans.

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- e. The radio shall be mounted as high on the supporting structure as practical. Mounting of the radio shall not interfere with the camera lowering device or the lightning air terminal.
- f. The network interface, power supply, surge suppression, and grounding block shall be mounted in the cabinet at the site.
- g. The contractor is responsible for contacting KC Scout staff to obtain network configuration information including; IP addresses, VLAN tags and security key info for equipment installed.
- h. The wireless radio shall be connected to the Ethernet switch or other Ethernet enable device at the site.
- i. Permanent external labeling shall be applied by the contractor on radio equipment in the cabinet according to information to be provided by the engineer.

4.0 Testing / Submittals.

- a. The contractor shall develop a test plan showing that each radio is providing a wireless link capable of a continuous data rate of 27 Mbps. The wireless radio shall complete a minimum of 15-day test period before final acceptance.
- b. This plan shall be submitted to the engineer for approval.
- c. Changes requested by the engineer will be incorporated into the test plan and each link shall be tested.
- d. The contractor shall document all test results and submit these to the engineer for approval.
- e. An Excel spreadsheet shall be provided (electronically) by the contractor that details all equipment received and installed as well as all configuration settings, including VLAN's.

5.0 Basis of Payment. The wireless radios and fiber to Ethernet media converters will be paid for each of the devices installed on the project. No direct payment will be made for any incidental items necessary to complete the work unless specifically provided as a pay item in the contract. Wireless access units are paid the same as wireless subscriber units and all incidental components, including mounting brackets, antennas, surge suppression and cabling is included in the price for each wireless radio. Each media converter includes the power supply and the SC to SC jumper needed in order to complete each installation that is detailed in the plans.

<u>Item No.</u>	<u>Type</u>	<u>Item Description</u>
910-99.02	EA	Wireless Radio Assembly
910-99.02	EA	Fiber to Ethernet Media Converter

Q. Install Commission Furnished Telecom Equipment

1.0 Description. Install Commission furnished telecom equipment in new and existing roadside cabinets. Connect equipment to power, communication, and ground. Test the completed installation and report any problems to the engineer. Troubleshoot to the point of identifying the device that is causing the communication problem.

2.0 Materials.

2.1 Cisco Ethernet switches and Small Form-factor Pluggable (SFP) interface converter will be provided by the Commission.

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2.2 The contractor shall provide any other cables such as Category 5E patch cords, power conductors, and short serial cables, etc. as required.

3.0 Construction Requirements.

3.1 Provide to the engineer a detailed schedule of installation of Commission furnished telecom equipment, at least 30 days before commencing this type of work. Additionally, coordinate such work with the engineer.

3.2 The Commission furnished telecom equipment shall be picked up at the KC Scout offices located at the MoDOT Kansas City District office (600 NE Colbern Road, Lee's Summit, MO 64086).

3.3 The contractor shall NOT move any cables from port to port on the network switches without prior MoDOT approval. For equipment installed in cabinets, mount the equipment in the rack as shown in the approved cabinet layout diagram or, for existing cabinets, as directed by the engineer and connect the power cables and ground wires. If there are insufficient outlets in existing cabinets, provide power strips as required. Connect the communication cables. The equipment will be configured by the Commission, and therefore do not change any configuration settings.

3.4 Assist Commission staff in making the installed equipment operational. This may entail having a person with a cellular telephone at the cabinet reporting on results and making changes as directed by Commission staff. It may also entail installing replacement equipment when a unit cannot be made to work properly.

3.5 Cisco IE3400 Ethernet Switch. The switch and power supply shall be mounted on a DIN rail bracket. DIN rail depth shall allow the cabinet door to be closed without touching any of the cabling. The Cisco switch shall be powered from the 120V IP Power Strip "Unswitched Outlets".

4.0 Basis of Payment. Measurement and payment for install Commission furnished telecom equipment will be paid at the contract lump sum price. The price shall include patch cords, cabling, assistance to Commission staff in getting the equipment operational and all miscellaneous hardware required for a safe, fully operational system. Payment will be made as follows:

<u>Item No.</u>	<u>Type</u>	<u>Item Description</u>
910-99.01	LS	Install Commission Furnished Telecom Equipment

R. Contractor Quality Control NJSP-15-42

1.0 The contractor shall perform Quality Control (QC) testing in accordance with the specifications and as specified herein. The contractor shall submit a Quality Control Plan (QC Plan) to the engineer for approval that includes all items listed in Section 2.0, prior to beginning work.

2.0 Quality Control Plan.

- (a) The name and contact information of the person in responsible charge of the QC testing.
- (b) A list of the QC technicians who will perform testing on the project, including the fields in which they are certified to perform testing.
- (c) A proposed independent third party testing firm for dispute resolution, including all contact information.
- (d) A list of Hold Points, when specified by the engineer.
- (e) The MoDOT Standard Inspection and Testing Plan (ITP). This shall be the version that is posted at the time of bid on the MoDOT website (www.modot.org/quality).

3.0 Quality Control Testing and Reporting. Testing shall be performed per the test method and frequency specified in the ITP. All personnel who perform sampling or testing shall be certified in the MoDOT Technician Certification Program for each test that they perform.

3.1 Reporting of Test Results. All QC test reports shall be submitted as soon as practical, but no later than the day following the test. Test data shall be immediately provided to the engineer upon request at any time, including prior to the submission of the test report. No payment will be made for the work performed until acceptable QC test results have been received by the engineer and confirmed by QA test results.

3.1.1 Test results shall be reported on electronic forms provided by MoDOT. Forms and Contractor Reporting Excel2Oracle Reports (CRE2O) can be found on the MoDOT website. All required forms, reports and material certifications shall be uploaded to a Microsoft SharePoint® site provided by MoDOT, and organized in the file structure established by MoDOT.

3.2 Non-Conformance Reporting. A Non-Conformance Report (NCR) shall be submitted by the contractor when the contractor proposes to incorporate material into the work that does not meet the testing requirements or for any work that does not comply with the contract terms or specifications.

3.2.1 Non-Conformance Reporting shall be submitted electronically on the Non-Conformance Report form provided on the MoDOT Website. The NCR shall be uploaded to the MoDOT SharePoint® site and an email notification sent to the engineer.

3.2.2 The contractor shall propose a resolution to the non-conforming material or work. Acceptance of a resolution by the engineer is required before closure of the non-conformance report.

4.0 Work Planning and Scheduling.

4.1 Two-week Schedule. Each week, the contractor shall submit to the engineer a schedule that outlines the planned project activities for the following two-week period. The two-week schedule shall detail all work and traffic control events planned for that period and any Hold Points specified by the engineer.

4.2 Weekly Meeting. When work is active, the contractor shall hold a weekly project meeting with the engineer to review the planned activities for the following week and to resolve any outstanding issues. Attendees shall include the engineer, the contractor superintendent or project manager and any foreman leading major activities. This meeting may be waived when, in the opinion of the engineer, a meeting is not necessary. Attendees may join the meeting in person, by phone or video conference.

4.3 Pre-Activity Meeting. A pre-activity meeting is required in advance of the start of each new activity, except when waived by the engineer. The purpose of this meeting is to review construction details of the new activity. At a minimum, the discussion topics shall include: safety precautions, QC testing, traffic impacts, and any required Hold Points. Attendees shall include the engineer, the contractor superintendent and the foreman who will be leading the new activity. Pre-activity meetings may be held in conjunction with the weekly project meeting.

4.4 Hold Points. Hold Points are events that require approval by the engineer prior to continuation of work. Hold Points occur at definable stages of work when, in the opinion of the engineer, a review of the preceding work is necessary before continuation to the next stage.

4.4.1 A list of typical Hold Point events is available on the MoDOT website. Use of the Hold Point process will only be required for the project-specific list of Hold Points, if any, that the engineer submits to the contractor in advance of the work. The engineer may make changes to the Hold Point list at any time.

4.4.2 Prior to all Hold Point inspections, the contractor shall verify the work has been completed in accordance with the contract and specifications. If the engineer identifies any corrective actions needed during a Hold Point inspection, the corrections shall be completed prior to continuing work. The engineer may require a new Hold Point to be scheduled if the corrections require a follow-up inspection. Re-scheduling of Hold Points require a minimum 24-hour advance notification from the contractor unless otherwise allowed by the engineer.

5.0 Quality Assurance Testing and Inspection. MoDOT will perform quality assurance testing and inspection of the work, except as specified herein. The contractor shall utilize the inspection checklists provided in the ITP as a guide to minimize findings by MoDOT inspection staff. Submittal of completed checklists is not required, except as specified in 5.1.

5.1 Inspection and testing required in the production of concrete for the project shall be the responsibility of the contractor. Submittal of the 501 Concrete Plant Checklist is required.

6.0 Basis of Payment. No direct payment will be made for compliance with this provision.

S. Lump Sum Temporary Traffic Control JSP-22-01A

1.0 Delete Sec 616.11 and insert the following:

616.11 Method of Measurement. Measurement for relocation of post-mounted signs will be made to the nearest square foot of sign area only for the signs designated for payment on the plans. All other sign relocations shall be incidental. Measurement for construction signs will be made to the nearest square foot of sign area. Measurement will be made per each for each of the temporary traffic control items provided in the contract.

616.11.1 Lump Sum Temporary Traffic Control. No measurement will be made for temporary traffic control items grouped and designated to be paid per lump sum. The list of lump sum items provided in the plans or contract is considered an approximation and may be subject to change based on field conditions. This is not a complete list and may exclude quantities for duplicate work zone packages used in simultaneous operations. The contractor shall provide all

traffic control devices required to execute the provided traffic control plans for each applicable operation, stage, or phase. No measurement will be made for any additional signs or devices needed except for changes in the traffic control plan directed by the engineer.

2.0 Delete Sec 616.12 and insert the following:

616.12 Basis of Payment. All temporary traffic control devices authorized for installation by the engineer will be paid for at the contract unit price for each of the pay items included in the contract. Whether the devices are paid individually, or per lump sum, no direct payment will be made for the following:

- (a) Incidental items necessary to complete the work, unless specifically provided as a pay item in the contract.
- (b) Installing, operating, maintaining, cleaning, repairing, removing, or replacing traffic control devices.
- (c) Covering and uncovering existing signs and other traffic control devices.
- (d) Relocating temporary traffic control devices, including permanent traffic control devices temporarily relocated, unless specifically included as a pay item in the contract.
- (e) Worker apparel.
- (f) Flaggers, AFADs, PFDs, pilot vehicles, and appurtenances at flagging stations.
- (g) Furnishing, installing, operating, maintaining, and removing construction-related vehicle and equipment lighting.
- (h) Construction and removal of temporary equipment crossovers, including restoring pre-existing crossovers.
- (i) Provide and maintaining work zone lighting and work area lighting.

616.12.1 Lump Sum Temporary Traffic Control. Traffic control items grouped together in the contract or plans for lump sum payment shall be paid incrementally per Sec 616.12.1.1. Alternately, upon request from the contractor, the engineer will consider a modified payment schedule that more accurately reflects completion of traffic control work. No payment will be made for any additional signs or devices needed except for changes in the traffic control plan directed by the engineer. Additional items directed by the engineer will be paid for in accordance with Sec 109.4. No adjustment to the price will be made for overruns or underruns of other work or for added work that is completed within existing work zones.

616.12.1.1 Partial payments. For purposes of determining partial payments, the original contract amount will be the total dollar value of all original contract line items less the price for Lump Sum Temporary Traffic Control (LSTTC). If the contract includes multiple projects, this determination will be made for each project. Partial payments will be made as follows:

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Route: 71, I-49, I-435, & 50
County: Jackson

- (a) The first payment will be made when five percent of the original contract amount is earned. The payment will be 50 percent of the price for LSTTC, or five percent of the original contract amount, whichever is less.
- (b) The second payment will be made when 50 percent of the original contract amount is earned. The payment will be 25 percent of the price for LSTTC, or 2.5 percent of the original contract amount, whichever is less.
- (c) The third payment will be made when 75 percent of the original contract amount is earned. The payment will be 20 percent of the price for LSTTC, or two percent of the original contract amount, whichever is less.
- (d) Payment for the remaining balance due for LSTTC will be made when the contract has been accepted for maintenance or earlier as approved by the engineer.

616.12.1.2 Temporary traffic control will be paid for at the contract lump sum price for Item:

<u>Item No.</u>	<u>Type</u>	<u>Item Description</u>
616-99.01	LS	Misc. Lump Sum Temporary Traffic Control

T. Supplemental Revisions JSP-18-01BB

Compliance with [2 CFR 200.216 – Prohibition on Certain Telecommunications and Video Surveillance Services or Equipment](#).

The Missouri Highways and Transportation Commission shall not enter into a contract (or extend or renew a contract) using federal funds to procure or obtain equipment, services, or systems that uses covered telecommunications equipment or services as substantial or as critical technology as part of any system where the video surveillance and telecommunications equipment was produced by Huawei Technologies Company, ZTE Corporation, Hytera Communications Corporation, Hangzhou Hikvision Digital Technology Company, or Dahua Technology Company (or any subsidiary or affiliate of such entities).

Stormwater Compliance Requirements

1.0 Description. This provision requires the contractor to provide a Water Pollution Control Manager (WPCM) for any project that includes land disturbance on the project site and the total area of land disturbance, both on the project site, and all Off-site support areas, is one (1) acre or more. Regardless of the area of Off-site disturbance, if no land disturbance occurs on the project site, these provisions do not apply. When a WPCM is required, all sections within this provision shall be applicable, including assessment of specified Liquidated Damages for failure to correct Stormwater Deficiencies, as specified herein. This provision is in addition to any other stormwater, environmental, and land disturbance requirements specified elsewhere in the contract.

1.1 Definitions. The project site is defined as all areas designated on the plans, including temporary and permanent easements. The project site is equivalent to the “permitted site”, as defined in MoDOT’s State Operating Permit. An Off-site area is defined as any location off the

project site the contractor utilizes for a dedicated project support function, such as, but not limited to, staging area, plant site, borrow area, or waste area.

1.2 Reporting of Off-Site Land Disturbance. If the project includes any planned land disturbance on the project site, prior to the start of work, the contractor shall submit a written report to the engineer that discloses all Off-site support areas where land disturbance is planned, the total acreage of anticipated land disturbance on those sites, and the land disturbance permit number(s). Upon request by the engineer, the contractor shall submit a copy of its land disturbance permit(s) for Off-site locations. Based on the total acreage of land disturbance, both on and Off-site, the engineer shall determine if these Stormwater Compliance Requirements shall apply. The Contractor shall immediately report any changes to the planned area of Off-site land disturbance. The Contractor is responsible for obtaining its own separate land disturbance permit for Off-site areas.

2.0 Water Pollution Control Manager (WPCM). The Contractor shall designate a competent person to serve as the Water Pollution Control Manager (WPCM) for projects meeting the description in Section 1.0. The Contractor shall ensure the WPCM completes all duties listed in Section 2.1.

2.1 Duties of the WPCM:

- (a) Be familiar with the stormwater requirements including the current MoDOT State Operating Permit for construction stormwater discharges/land disturbance activities; MoDOT's statewide Stormwater Pollution Prevention Plan (SWPPP); the Corps of Engineers Section 404 Permit, when applicable; the project specific SWPPP, the Project's Erosion & Sediment Control Plan; all applicable special provisions, specifications, and standard drawings; and this provision;
- (b) Successfully complete the MoDOT Stormwater Training Course within the last 4 years. The MoDOT Stormwater Training is a free online course available at MoDOT.org;
- (c) Attend the Pre-Activity Meeting for Grading and Land Disturbance and all subsequent Weekly Meetings in which grading activities are discussed;
- (d) Oversee and ensure all work is performed in accordance with the Project-specific SWPPP and all updates thereto, or as designated by the engineer;
- (e) Review the project site for compliance with the Project SWPPP, as needed, from the start of any grading operations until final stabilization is achieved, and take necessary actions to correct any known deficiencies to prevent pollution of the waters of the state or adjacent property owners prior to the engineer's weekly inspections;
- (f) Review and acknowledge receipt of each MoDOT Inspection Report (Land Disturbance Inspection Record) for the Project within forty eight (48) hours of receiving the report and ensure that all Stormwater Deficiencies noted on the report are corrected as soon as possible, but no later than stated in Section 5.0.

3.0 Pre-Activity Meeting for Grading/Land Disturbance and Required Hold Point. A Pre-Activity meeting for grading/land disturbance shall be held prior to the start of any land disturbance operations. No land disturbance operations shall commence prior to the Pre-

Activity meeting except work necessary to install perimeter controls and entrances. Discussion items at the pre-activity meeting shall include a review of the Project SWPPP, the planned order of grading operations, proposed areas of initial disturbance, identification of all necessary BMPs that shall be installed prior to commencement of grading operations, and any issues relating to compliance with the Stormwater requirements that could arise in the course of construction activity at the project.

3.1 Hold Point. Following the pre-activity meeting for grading/land disturbance and subsequent installation of the initial BMPs identified at the pre-activity meeting, a Hold Point shall occur prior to the start of any land disturbance operations to allow the engineer and WPCM the time needed to perform an on-site review of the installation of the BMPs to ensure compliance with the SWPPP is met. Land disturbance operations shall not begin until authorization is given by the engineer.

4.0 Inspection Reports. Weekly and post run-off inspections will be performed by the engineer and each Inspection Report (Land Disturbance Inspection Record) will be entered into a web-based Stormwater Compliance database. The WPCM will be granted access to this database and shall promptly review all reports, including any noted deficiencies, and shall acknowledge receipt of the report as required in Section 2.1 (f.).

5.0 Stormwater Deficiency Corrections. All stormwater deficiencies identified in the Inspection Report shall be corrected by the contractor within 7 days of the inspection date or any extended period granted by the engineer when weather or field conditions prohibit the corrective work. If the contractor does not initiate corrective measures within 5 calendar days of the inspection date or any extended period granted by the engineer, all work shall cease on the project except for work to correct these deficiencies, unless otherwise allowed by the engineer. All impact costs related to this halting of work, including, but not limited to stand-by time for equipment, shall be borne by the Contractor. Work shall not resume until the engineer approves the corrective work.

5.1 Liquidated Damages. If the Contractor fails to complete the correction of all Stormwater Deficiencies listed on the MoDOT Inspection Report within the specified time limit, the Commission will be damaged in various ways, including but not limited to, potential liability, required mitigation, environmental clean-up, fines, and penalties. These damages are not reasonably capable of being computed or quantified. Therefore, the contractor will be charged with liquidated damages specified in the amount of \$2,000 per day for failure to correct one or more of the Stormwater Deficiencies listed on the Inspection Report within the specified time limit. In addition to the stipulated damages, the stoppage of work shall remain in effect until all corrections are complete.

6.0 Basis of Payment. No direct payment will be made for compliance with this provision.

Delete Sec 106.9 in its entirety and substitute the following:

106.9 Buy America Requirements.

Buy America Requirements are waived if the total amount of Federal financial assistance applied to the project, through awards or subawards, is below \$500,000.

106.9.1 Buy America Requirements for Iron and Steel.

On all federal-aid projects, the contractor's attention is directed to Title 23 CFR 635.410 *Buy America Requirements*. Where steel or iron products are to be permanently incorporated into the contract work, steel and iron material shall be manufactured, from the initial melting stage through the application of coatings, in the USA except for "minimal use" as described herein. Furthermore, any coating process of the steel or iron shall be performed in the USA. Under a general waiver from FHWA the use of pig iron and processed, pelletized, and reduced iron ore manufactured outside of the USA will be permitted in the domestic manufacturing process for steel or iron material.

106.9.1.1 Buy America Requirements for Iron and Steel for Manufactured items.

A manufactured item will be considered iron and steel if it is "predominantly" iron or steel. Predominantly iron or steel means that the cost of iron or steel content of a product is more than 50 percent of the total cost of all its components.

106.9.2 Any sources other than the USA as defined will be considered foreign. The required domestic manufacturing process shall include formation of ingots and any subsequent process. Coatings shall include any surface finish that protects or adds value to the product.

106.9.3 "Minimal use" of foreign steel, iron or coating processes will be permitted, provided the cost of such products does not exceed 1/10 of one percent (0.1 percent) of the total contract cost or \$2,500.00, whichever is greater. If foreign steel, iron, or coating processes are used, invoices to document the cost of the foreign portion, as delivered to the project, shall be provided and the engineer's written approval obtained prior to placing the material in any work.

106.9.4 Buy America requirements include a step certification for all fabrication processes of all steel or iron materials that are accepted per Sec 1000. The AASHTO Product Evaluation and Audit Solutions compliance program verifies that all steel and iron products fabrication processes conform to 23 CFR 635.410 Buy America Requirements and is an acceptable standard per 23 CFR 635.410(d). AASHTO Product Evaluation and Audit Solutions compliant suppliers will not be required to submit step certification documentation with the shipment for some selected steel and iron materials. The AASHTO Product Evaluation and Audit Solutions compliant supplier shall maintain the step certification documentation on file and shall provide this documentation to the engineer upon request.

106.9.4.1 Items designated as Category 1 will consist of steel girders, piling, and reinforcing steel installed on site. Category 1 items require supporting documentation prior to incorporation into the project showing all steps of manufacturing, including coating, as being completed in the United States and in accordance with CFR Title 23 Section 635.410 Buy America Requirements. This includes the Mill Test Report from the original producing steel mill and certifications documenting the manufacturing process for all subsequent fabrication, including coatings. The certification shall include language that certifies the following. That all steel and iron materials permanently incorporated in this project was procured and processed domestically and all manufacturing processes, including coating, as being completed in the United States and in accordance with CFR Title 23 Section 635.410.

106.9.4.2 Items designated as Category 2 will include all other steel or iron products not in Category 1 and permanently incorporated in the project. Category 2 items shall consist of, but not be limited to items such as fencing, guardrail, signing, lighting and signal supports. The prime contractor is required to submit a material of origin form certification prior to incorporation into the project from the fabricator for each item that the product is domestic. The Certificate of

Materials Origin form ([link to certificate form](#)) from the fabricator must show all steps of manufacturing, including coating, as being completed in the United States and in accordance with CFR Title 23 Section 635.410 Buy America Requirements and be signed by a fabricator representative. The engineer reserves the right to request additional information and documentation to verify that all Buy America requirements have been satisfied. These documents shall be submitted upon request by the engineer and retained for a period of 3 years after the last reimbursement of the material.

106.9.4.3 Any minor miscellaneous steel or iron items that are not included in the materials specifications shall be certified by the prime contractor as being procured domestically. Examples of these items would be bolts for sign posts, anchorage inserts, etc. The certification shall read “I certify that all steel and iron materials permanently incorporated in this project during all manufacturing processes, including coating, as being completed in the United States and in accordance with CFR Title 23 Section 635.410 Buy America Requirements procured and processed domestically in accordance with CFR Title 23 Section 635.410 Buy America Requirements. Any foreign steel used was submitted and accepted under minor usage”. The certification shall be signed by an authorized representative of the prime contractor.

106.9.5 When permitted in the contract, alternate bids may be submitted for foreign steel and iron products. The award of the contract when alternate bids are permitted will be based on the lowest total bid of the contract based on furnishing domestic steel or iron products or 125 percent of the lowest total bid based on furnishing foreign steel or iron products. If foreign steel or iron products are awarded in the contract, domestic steel or iron products may be used; however, payment will be at the contract unit price for foreign steel or iron products.

106.9.6 Buy America Requirements for Construction Materials other than iron and steel materials. Construction materials means articles, materials, or supplies that consist of only one of the items listed. Minor additions of articles, materials, supplies, or binding agents to a construction material do not change the categorization of the construction material. Upon request by the engineer, the contractor shall submit a domestic certification for all construction materials listed that are incorporated into the project.

- (a) Non-ferrous metals
- (b) Plastic and Polymer-based products (including polyvinylchloride, composite building materials, and polymers used in fiber optic cables)
- (c) Glass (including optic glass)
- (d) Fiber optic cable (including drop cable)
- (e) Optical fiber
- (f) Lumber
- (g) Engineered wood
- (h) Drywall

106.9.6.1 Minimal Use allowance for Construction Materials other than iron or steel.

“The total value of the non-compliant products is no more than the lesser of \$1,000,000 or 5% of total applicable costs for the project.” The contractor shall submit to the engineer any non-domestic materials and their total material cost to the engineer. The contractor and the engineer will both track these totals to assure that the minimal usage allowance is not exceeded.

106.9.7 Buy America Requirements for Manufactured Products.

Manufactured products means:

- (a) Articles, materials, or supplies that have been:
 - (i) Processed into a specific form and shape; or
 - (ii) Combined with other articles, materials, or supplies to create a product with different properties than the individual articles, materials, or supplies.
- (b) If an item is classified as an iron or steel product, a construction material, or a section 70917(c) material under § 184.4(e) and the definitions set forth in this section, then it is not a manufactured product. However, an article, material, or supply classified as a manufactured product under § 184.4(e) and paragraph (1) of this definition may include components that are construction materials, iron or steel products, or section 70917(c) materials.

106.9.7.1 Manufactured products are exempt from Buy America requirements. To qualify as a manufactured product, items that consist of two or more of the listed construction materials that have been combined together through a manufacturing process, and items that include at least one of the listed materials combined with a material that is not listed through a manufacturing process, should be treated as manufactured products, rather than as construction materials.

106.9.7.2 Manufactured items are covered under a general waiver to exclude them from Buy America Requirements. To qualify for the exemption the components must comprise of 55% of the value of materials in the item. The final assembly must also be performed domestically.