

Job No.: JSL0184
Route: Various
County: Various

JOB SPECIAL PROVISIONS TABLE OF CONTENTS (ROADWAY)

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

A.	General - Federal JSP-09-02L	1
B.	Contract Liquidated Damages JSP-13-01D	1
C.	Scope of Work JSL0184	2
D.	Work Zone Traffic Management JSP-02-06N	3
E.	Emergency Provisions and Incident Management JSP-90-11A	7
F.	Project Contact for Contractor/Bidder Questions JSP-96-05A	7
G.	Traffic Management Coordination	8
H.	Contractor-Furnished and Install Closed Circuit Television (CCTV) Assembly	8
I.	Install CCTV Camera On High Mast Lighting Tower	11
J.	Drilled Shaft for CCTV Pole	13
K.	CCTV Pole	14
L.	CCTV Extension Pole	18
M.	General Electrical Requirements	18
N.	Site Restoration	19
O.	Erosion Control	19
P.	Conduit	20
Q.	ITS Pull Box	23
R.	MoDOT Buried Fiber Cable Driveable Delineator Post	24
S.	Remove and Reinstall Cable	24
T.	Fiber Optic Cable	25
U.	ITS Cabinets	31
V.	120 Volt Power Strip	35
W.	Install a Commission Furnished and Programmed IP Addressable Power Strip	35
X.	Add Circuit Breaker	36
Y.	Install New or Relocate Existing Communication Equipment	36
Z.	Cabinet Base	38
AA.	ITS Asset Management Tool	38
BB.	Power Supply Assembly, Pad-Mounted, 240/120 V, ITS	39
CC.	Coordination with ITS Staff and Utility Locates	39
DD.	Utilities	40
EE.	Contractor Quality Control NJSP-15-42	41
FF.	MoDOT ITS Equipment within Project Limits	43
GG.	Lump Sum Temporary Traffic Control JSP-22-01B	44
HH.	Truck Mounted Attenuator (TMA) for Stationary Activities	45
II.	Supplemental Revisions JSP-18-01KK	46

Job No.: JSL0184
Route: Various
County: Various

	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: JSL0184 VARIOUS COUNTIES, MO DATE PREPARED: 1/21/2026
	ADDENDUM DATE:

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

JOB
SPECIAL PROVISION

A. General - Federal JSP-09-02L

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 2025 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.

Job No.: JSL0184
Route: Various
County: Various

Notice to Proceed: May 18, 2026
Contract Completion Date: June 28, 2027

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
JSL0184	N/A	\$11,400

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 **\$1500** 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.

5.0 Winter Period Exemption Eliminated. The elimination of charges for liquidated damages from December 15 through March 15 in Sec. 108.8.1.3 (a) is deleted.

C. Scope of Work JSL0184

1.0 Description. Install 28 new cameras along freeways and 101 cameras along arterial roadways in St. Louis County, St. Charles County, Jefferson County, Franklin County and St. Louis City. Sixteen of the new freeway cameras will be installed on new poles with pole-mounted cabinets. Eight new freeway cameras will be mounted on existing dynamic message sign structures. Three of the new freeway cameras will be installed on high mast light towers with new modified Type 7 cabinets on pedestal foundations. The final new freeway camera will be installed on an existing signal pole at a weigh station. The 101 arterial cameras will be mounted on existing signal poles. As shown in the plans, some will be mounted on the existing signal pole lighting extension and other will be mounted on new extension poles attached to the existing signal pole.

2.0 Coordination. At the same time that this project is under construction, other related roadway and ITS 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.

Include coordination with the following STIP projects:

- Route 21 – J6S3283 (Pavement, signals and ADA)
- Route 30 – JSL0081 (Resurfacing)
- Route 231 – J6S3632 (Pavement, signals and ADA)
- Route 100 – J6P3274 (Pavement, signals and ADA)
- Route 109 – JSL0295 (Pavement, signals and ADA)

- I-64 – J6SL0168 (Outer Roads Pavement and Signs)
- I-64/I-170 – J6I3650 (Overhead Lighting)
- I-170 – J6I3572 (Rehab/Redeck Woodson Rd Bridge, Culvert, RR Bridge and Page Bridges)

2.1 Coordination with the Commission and the SL District ITS (Intelligent Transportation System) group known as the SLITS. The contractor shall coordinate with the engineer and the other contractors, and endeavor to complete the fiber optic cable and ITS device installation quickly so as not to delay other contractors. The contractor must coordinate with SLITS 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.

4.0 Restrictions on Work. The work entails connecting some existing traffic management equipment to the communication system extensions being built in conjunction with this project. It also entails working in some existing communication cabinets. These work activities may require shutting off power or disconnecting equipment from its communication links. Unless the engineer grants special approval, no existing traffic management device may be out of service for more than 48 hours in any 7-day period. Time out of service includes time that the device cannot communicate with its central computer.

D. Work Zone Traffic Management JSP-02-06N

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, the 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 (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:

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

3.1.2 Except for emergency work, as determined by the engineer, and long term lane closures required by project phasing, the contractor's working hours will be restricted for the Special Events as shown below. All lanes shall be scheduled to be open to traffic during these Special Events. There may be other events of regional significance, such as specific sporting events (i.e., St. Louis Cardinals and St. Louis Blues home games), events at Forest Park, Soulard, or parades, marathons, concerts, and other major St. Louis events. The engineer will advise the contractor of any such events and how they are to be handled. Restricted periods for special events shall be determined by the engineer.

3.1.3 Cardinals and Blues Home Games. Work requiring lane closures during any of the St. Louis Cardinals and Blues home games shall be stopped in accordance with the following schedule:

I-170 in St. Louis County:

Work shall stop two hours before the game begins. Work may resume one hour after the official end of the game.

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

3.3 The contractor shall be aware that traffic volume data indicates construction operations on the roadbed between the following hours will likely result in traffic queues greater than 15 minutes. Based on this, the contractor's operations will be restricted accordingly unless it can be successfully demonstrated the operations can be performed without a 15 minute queue in traffic. It shall be the responsibility of the engineer to determine if the above work hours may be modified. Working hours for evenings, weekends and holidays will be determined by the engineer. The contractor may not work during the following listed hours:

All Routes:

6:00 a.m. – 9:00 a.m. Monday-Sunday
3:00 p.m. – 6:00 p.m. Monday-Sunday

3.4 Any work requiring closure of two through lanes shall be completed during nighttime hours. Nighttime hours shall be considered to be 10:00 p.m. to 5:00 a.m. for this project.

3.5 The contractor shall not alter the start time, ending time, or a reduction in the number of through lanes of traffic or ramp closures without advance notification and approval by the engineer. The only work zone operation approved to begin 30 minutes prior to a reduction in through traffic lanes or ramp closures is the installation of traffic control signs. Should lane closures be placed or remain in place, prior to the approved starting time or after the approved ending time, the Commission, the traveling public, and state and local police and governmental authorities will be damaged in various ways, including but not limited to, increased construction administration cost, potential liability, traffic and traffic flow regulation cost, traffic congestion and motorist delays, with a resulting cost to the traveling public. These damages are not easily computed or quantified. Therefore, the contractor will be charged with liquidated damages specified in the amount of **\$1,000 per 15-minute increment** for each 15 minutes that the temporary lane closures are in place and not open to traffic in excess of the limitation as specified elsewhere in this special provision. It shall be the responsibility of the engineer to determine the quantity of unapproved closure time.

3.5.1 The said liquidated damages specified will be assessed regardless if it would otherwise be charged as liquidated damages under the Missouri Standard Specification for Highway Construction, as amended elsewhere in this contract.

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 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 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 636-300-2800
City of St. Louis Police Department 314-231-1212
St. Louis County Police Department 314-615-5000

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-96-05A

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

Job No.: JSL0184
Route: Various
County: Various

Jamie Rana, P.E., Project Contact
Project Manager
Missouri Department of Transportation - St. Louis District
1590 Woodlake Drive
Chesterfield, MO 63017

Telephone No.: 314-624-5035
Email: jamie.rana@modot.mo.gov

All questions concerning the bid document preparation can be directed to the Central Office – Design as listed below.

Telephone No.: (573) 751-2876
Email: BCS@modot.mo.gov

G. Traffic Management Coordination

1.0 Description. The contractor shall coordinate traffic management between this project and any other projects on I-44 and Route 364, and projects which affect Route I-44 and Route 364, including all future projects.

1.1 The contractor shall be aware that there may be other projects including, but not limited to, utility, St. Louis City, private, MoDOT maintenance, permit, or other projects that may impact project construction or traffic control in the vicinity of this project. It shall be the responsibility of the contractor to determine what, if any, projects other than the ones listed above may impact this project and work to coordinate construction and traffic management efforts between this project and any other project involved.

1.2 Each Contractor shall conduct their work so as not to interfere with or hinder the progress or completion of the work being performed by other Contractors. In case of dispute, the Engineer shall be the referee and the Engineer's decision shall be final and binding on all.

2.0 Site Construction. The Contractor shall arrange the work and shall place and dispose of the materials being used so as not to interfere with the operations of the other contractors.

3.0 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.

H. Contractor-Furnished and Install Closed Circuit Television (CCTV) Assembly

1.0 General.

1.1 Description. Install Contractor furnished IP (Internet Protocol) closed circuit television (CCTV) camera assemblies on new and existing metal poles, and install a contractor furnished power supply and surge protection in the new or existing cabinets. Provide cable connecting the camera to the equipment in the cabinet and to ground, set up the camera assembly, and test for proper operation.

1.2 Compatibility. The St. Louis District is utilizing TransSuite as their Advanced Traffic Management System (ATMS) and all CCTV cameras must be able to integrate with the software and its related interfaces.

2.0 Materials.

2.1 Camera assembly, mounting bracket, power supply and surge suppressors will be provided by the contractor. The cable connecting the camera to the cabinet will also be provided by the contractor.

2.2 CCTV Camera. The dome style CCTV cameras purchased and installed on this project shall be selected from the list below. These are the only CCTV cameras that are tested and fully functional with the version of iNET that the St. Louis District is currently operating:

CCTV Manufacturer	Model	Connection Type
CostarHD (formerly known as Cohu)	4220HD RISE Dome	Outdoor cat5e
Axis	AXIS Q6355-LE PTZ	Outdoor cat5e
Bosch	Autodome inteox 7000i	Outdoor cat5e

2.3 POE Injector. The Power Over Ethernet (POE) injector shall be of a make and model produced by the manufacturer of the camera. The POE injector shall operate on standard 120 VAC at 60 Hz electrical service and shall not be affected by transient voltages, surges, and sags normally experienced on commercial power lines. The POE injector shall have an operating temperature range of -40 degrees F (-40 degrees C) to 158 degrees F (70 degrees C).

2.4 Surge Protection. The cable between the POE injector and the camera assembly shall be protected by a surge protection device in the cabinet that meets the following requirements:

- a) UL listed and labeled to current editions of UL 497B and UL 497C
- b) Operating Temperature: -20 degrees F (- 28 degrees C) to 122 degrees F (50 degrees C)
- c) Operating Humidity: 95% RH non-condensing
- d) Wall, DIN rail or 19" rack mountable
- e) Three stage protection
- f) Maximum Continuous Operating Voltage: 44-52 V
- g) Data Rate: >100 Mbps
- h) Frequency: 125 MHz
- i) Surge Capacity: 10kA per mode (8x20 μs)
- j) Maximum Let-Through Voltage <90Vpk

2.5 Cables. Provide CAT 5e outdoor rated cable to carry power, video and camera control between the camera and POE injector. Between the POE injector and the Ethernet switch a new outdoor rated CAT 5e patch cable with factory terminated connectors shall be used. These cables shall meet requirements of applicable manufacturers listed in Section 2.2 above.

2.6 Banding. Provide stainless steel bands to affix the mounting bracket to poles. The banding shall be 1-inch wide, 0.044-inch thick, stainless steel.

3.0 Construction Requirements.

3.1 The contractor shall coordinate this work as well as any ITS (Intelligent Transportation System) network changes with MoDOT St Louis District ITS Group in advance via an email to SLITS@modot.mo.gov.

3.2 Install the dome so that the pole does not block the camera's view of traffic.

3.3 The contractor shall use the latest manufacture camera firmware.

3.4 To confirm the existing camera pole is sufficiently grounded, use a device that measures resistance to ground using the three-point fall-of-potential method to ensure that the resistance from the pole to ground does not exceed 8 ohms. If resistance exceeds the 8 ohms threshold, report to the engineer.

3.5 Terminate all the cables on surge protectors, install the contractor furnished power supply in the cabinet and connect the camera power circuit to the power supply. Connect POE injector port to the existing Ethernet switch or media converter in the cabinet.

3.6 Restrict the camera's field of view, if necessary, so that a user cannot use the cameras to look in the windows of dwellings. To the extent that it does not interfere with the use of the camera for traffic management purposes, ensure that a camera cannot be used to view residential property. Prior to creating these restrictions, submit to the engineer a written description of the proposed restrictions to be installed at each camera, and the proposed method of achieving them. It shall not be possible for an operator to override these restrictions without intervention by his or her supervisor. Affixing a mask to the inside of the clear dome shall be an acceptable method to achieve this. Highlight situations in which there is a conflict between the need to protect privacy and the need to know about traffic situations. Revise the field of view restrictions as directed by the engineer.

3.7 Apply a rain repellent coating to the outside of the lower dome, following the coating manufacturer's instructions. The coating must be recommended by the CCTV manufacturer for use on their equipment.

4.0 Acceptance Testing.

4.1 Upon delivery of a shipment of camera assemblies, the contractor shall conduct a visual inspection and test of the camera assemblies to check for manufacturing defects and shipping damage. The camera assembly shall be powered during this testing, and tests shall follow procedures developed by the manufacturer and approved by the engineer. The engineer will witness this testing and the contractor may witness this testing if he or she chooses. The contractor shall be responsible for replacing all defective units uncovered by this testing.

4.2 After installing the camera assembly, test it using the same procedures used when the camera assemblies were delivered. In addition, demonstrate that the agreed upon viewing restrictions have been implemented. If the installed camera assembly fails to operate properly, and the problem cannot be fixed by changing the wiring or setup parameters, the camera assembly will be deemed defective and the contractor shall return it to the manufacturer for replacement at contractor's expense. Except for costs borne by the manufacturer under their warranty agreement, the cost of replacement shall be borne entirely by the contractor.

4.3 Acceptance Testing. Conduct a 60-day acceptance test after the successful completion of the system test. During the 60-day test period, limit downtime due to mechanical, electrical, or other malfunctions to a maximum total of five calendar days. If the equipment fails to operate for a total of five or more calendar days, testing will be restarted. The engineer may select to pause and extend the 60-day test period by the number of days lost by failure and repair time in lieu of restarting the full 60-day test. The engineer will furnish the contractor with a letter of approval and completion stating the first and last day of the 60 day test period.

4.4 SLITS Group shall inspect this CCTV assembly installation as well as the related network devices for proper operations prior to acceptance.

5.0 Basis of Payment. Measurement and payment for furnishing and installing the camera assembly installation includes testing, grounding testing, and all miscellaneous hardware required for a safe, fully operational camera assembly. Payment will be made as follows:

Item No.	Type	Description
910-99.02	Each	Furnish & Install Dome CCTV Camera and Assembly
910-99.03	LF	CCTV Camera Cable

I. Install CCTV Camera On High Mast Lighting Tower

1.0 Description. Furnish and install a CCTV camera on a high mast light tower. Modify the existing high mast lighting system as necessary to allow for the addition of the CCTV camera to the existing high mast tower assembly.

2.0 Materials.

2.1 CCTV Camera. The dome style CCTV cameras purchased and installed shall be selected from the list below. These are the only CCTV cameras that are tested and fully functional with the version of TransSuite that the St. Louis District is currently operating:

CCTV Manufacturer	Model	Connection Type
CostarHD (formerly known as Cohu)	4220HD RISE Dome	Outdoor cat5e
Axis	AXIS Q6355-LE PTZ	Outdoor cat5e
Bosch	Autodome inteox 7000i	Outdoor cat5e

2.2 POE Injector. The Power Over Ethernet (POE) injector shall be of a make and model produced by the manufacturer of the camera. The POE injector shall operate on standard 120 VAC at 60 Hz electrical service and shall not be affected by transient voltages, surges, and sags normally experienced on commercial power lines. The POE injector shall have an operating temperature range of -40 degrees F (-40 degrees C) to 158 degrees F (70 degrees C). The Commission will provide a IP CCTV camera that uses 120 VAC power.

2.3 Mounting Hardware. The Contractor shall provide the mounting hardware to allow for the CCTV camera to be mounted to the existing lighting ring. The camera mounting hardware shall be modified such that the camera dome is at an elevation below the existing lighting luminaires.

2.4 Cable. The composite cable shall be compatible with the existing pulley system in the pole. The cable shall incorporate a shielded Category 5E or better Ethernet cable and conductors for 120 VAC lighting power. The length of the cable shall correspond to the distance between the junction box on the lighting ring and the handhole at the bottom of the pole. At the top end, the cable shall have any connectors that may be required for connection to the proposed surge protectors in the existing junction box on the lighting ring. At the bottom, the cable shall terminate a typical lighting connector and watertight connector designed for shielded Ethernet.

2.5 Wiring between the camera and the junction box on the lighting ring shall consist of a Category 5E or better Ethernet jumper. The Ethernet jumper shall have such connectors as may be required to mate with the surge protector in the junction box and the camera. The Ethernet jumper shall be outdoor rated or protected by a flexible conduit. Connect the camera ground to the ground bus in the junction box.

2.6 Wiring between the pole's handhole and the equipment cabinet shall consist of a shielded Category 5E or better Ethernet cable. On the pole end, the cable shall have a connector matching the one on the cable coming from the camera. On the other end, it shall be terminated to match the surge protectors in the cabinet. Wiring between the pole and cabinet shall also include an insulated # 6 stranded bond wire connecting the pole to the ground bar in the cabinet.

2.7 Ethernet surge protectors shall be:

- UL 497B listed
- Designed for shielded cable
- Suitable for power over Ethernet
- Able to withstand and dissipate surges of 10,000 amps
- Able to operate between -40 degrees and 74 degrees C
- Compatible with 100 Mbps operation.

3.0 Construction Requirements.

3.1 All mounting hardware shall be installed to limit vibration of the camera dome and to withstand wind and fatigue loads associated with high mast lighting towers.

3.2 Modification of the high mast lighting system shall not degrade the existing functionality of maintenance of the lighting ring and luminaires.

3.3 The contractor shall provide a proposed plan of work to the Engineer 14 days prior to commencing operations, and shall not perform any work concerning the modification of the high mast lighting system until this plan has been approved. The Contractor shall provide all wiring diagrams and shop drawings necessary to detail the installation.

3.4 The high mast lighting shall be fully functional from dusk until dawn throughout this project. The Contractor is responsible for ensuring that all work to modify the high mast lighting site can be completed in such time that the luminaires will be functional during the dusk to dawn hours.

3.5 Ground the shield for the shielded Ethernet cable at the equipment cabinet only, not in the junction box at the top of the pole.

3.6 Bond the pole to its ground rods, to the ground bar in the equipment cabinet, and to the ground bar in the lighting control center. If the equipment grounding conductor between the pole

and the control center is missing, provide one meeting the requirements of the *National Electrical Code*.

3.7 Test the pole’s grounding system using the three-point fall of potential method as described in IEEE Standard 81. During this test, disconnect the bond wires from the lighting control center and ITS equipment cabinet. If the resistance between the pole and the earth is greater than eight Ohms, add additional ground rods until the resistance is eight Ohms or less. Connect the ground rods to each other or the pole using # 6 bare copper wire. Use exothermic welds for all underground connections. Reconnect the bond wires from the lighting control center and equipment cabinet when this work is complete.

3.8 At the top of the pole, connect the equipment grounding conductor coming from the camera and the ground terminals of each surge protector to the lighting system ground bus in the junction box and ensure that the lighting system ground is connected to the ground lug at the base of the pole.

3.9 In the handhole at the bottom of the pole, secure the cable that comes from the equipment cabinet so that it does not fall down inside the pole when it is disconnected from the cable that goes up the pole.

3.10 Perform testing of the functionality of the lighting system, as well as the IP CCTV camera.

4.0 Basis of Payment. Measurement and payment for tower modifications includes all splicing, wiring, surge protectors, ground rods, mounting hardware, connections, and testing, required for fully operational camera and lighting. Payment will be made as follows:

Item No.	Type	Description
910-99.02	Each	Furnish & Install Dome CCTV Camera on High Mast Light Tower

J. Drilled Shaft for CCTV Pole

1.0 Drilled Shafts for CCTV Structures.

1.1 Description. Follow the requirements of Sec 701 of the Standard Specifications except for the following:

Delete Secs 701.4.10.3 through 701.4.11.2

Delete Secs 701.6.4 and 701.6.5

Replace Secs 701.7.1 and 701.7.2 with sections 1.2.1 and 1.2.2 respectively, below.

Delete Secs 701.7.5 thru 701.7.9

1.2 Basis of Payment. Follow the requirements of Sec 701.7 of the Standard Specifications, except for the following:

1.2.1 Drilled Shaft. Replaces Sec 701.7.1 of the Standard Specifications. Payment will be considered full compensation for all reinforcing steel, anchor bolts and templates, washers, nuts, disposal of excavated soil, restoration of site around the drilled shaft, costs of drilling (including temporary casing), excavation, slurry, cleaning, an acceptable method of inspection as required,

furnishing and placing concrete, grouting and incidental work and material required by the contract documents. Payment for any drilled shaft installed and accepted will be at the contract unit price per linear foot for the diameter of the drilled shafts specified, irrespective of the character of the material actually encountered during excavation. No additional compensation will be made for concrete required to fill an oversized casing or for oversized excavation. If the method of construction requires that drilled shaft casing be seated into the sound rock such that the bottom of the casing is below the determined top of sound rock elevation, payment for excavation below the top of the sound rock layer (top of the rock socket) will be included in the payment for the rock socket. If sound rock is encountered within the excavation at which point a rock auger, core barrel, or other rock-removing specialty tool must be used by the contractor before the top of the sound rock elevation to be used as "top of the rock socket" is confirmed by the engineer, that work will be paid for as rock socket excavation. Payment will be made as follows:

Item No.	Type	Description
910-99.03	Linear Foot	Drilled Shaft (2 Ft. 6 In. Dia.)
910-99.03	Linear Foot	Drilled Shaft (3 Ft. 0 In. Dia.)
910-99.03	Linear Foot	Drilled Shaft (3 Ft. 6 In. Dia.)

K. CCTV Pole

1.0 Description. Provide a camera pole as shown on the plans. If the pole is 60 feet or taller, equip it with a camera lowering device.

2.0 Materials.

2.1 Lowering Device. The camera lowering system shall be designed to support and lower a standard closed circuit television camera, lens, housing, PTZ mechanism, cabling, connectors and other supporting field components without damage or causing degradation of camera operations. The lowering device shall include a suspension contact unit, divided support arm, a pole adapter for attachment to a pole top tenon, and camera connection box.

The camera-lowering device shall withstand wind forces of 100 mph with a 30 percent gust factor using a 1.65 safety factor. The lowering device manufacturer, upon request, shall furnish independent laboratory testing documents certifying adherence to the stated wind force criteria utilizing, as a minimum effective projected area, the actual EPA or an EPA greater than that of the camera system to be attached.

All pulleys for the camera lowering device and portable lowering tool shall have sealed, permanently lubricated bearings, oil tight bronze bearings, or sintered- oil impregnated, bronze bushings.

The camera-lowering device manufacturer shall have three years of experience in the successful manufacturing of camera lowering systems. The lowering device provider shall be able to identify three projects where the purposed system has been installed successfully.

2.1.1 Suspension Contact Unit. The suspension contact unit shall have a load capacity 200 lbs. with a 4 to 1 safety factor. There shall be a locking mechanism between the fixed and moveable components of the lowering device. The movable assembly shall have a minimum of two latches. This latching mechanism shall securely hold the device and its mounted equipment. The latching mechanism shall operate by alternately raising and lowering the assembly using the

winch and lowering cable. When latched, all weight shall be removed from the lowering cable. The fixed unit shall have a heavy duty cast tracking guide and means to allow latching in the same position each time. The contact unit housing shall be weatherproof with a gasket provided to seal the interior from dust and moisture.

The interface and locking components shall be made of stainless steel and or aluminum. All external components of the lowering device shall be made of corrosion resistant materials, powder coated, galvanized, or otherwise protected from the environment by industry-accepted coatings to withstand exposure to a corrosive environment.

The female and male socket contact halves of the connector block shall be made of chlorosulfonated polyethylene (CSPE). The female socket contacts and the male pin contacts shall be permanently molded into the CSPE body.

The connector block shall incorporate contacts designed for 100Base-T Ethernet communication and power over Ethernet (POE) power for the camera and its heaters. The contacts shall be self-wiping with a shoulder at the base of each male contact so that it will recess into the female block, thereby giving a rain-tight seal when mated. The electrical contact connector must meet Mil Spec Q-9858 and Mil Spec I-45208.

2.1.2 Support Arm. The divided support arm and receiver brackets shall be designed to self-align the contact unit with the pole center line during installation and insure the contact unit cannot twist under high wind conditions. Round support arms are not acceptable.

2.1.3 Pole Adapter. The prefabricated components of the lift unit support system shall be designed to preclude the lifting cable from contacting the power or communication cabling. The lowering device manufacturer shall provide a conduit mount adapter for housing the lowering cable. This adapter shall have an interface to allow the connection of a contractor-provided conduit and be located just below the cable stop block at the back of the lowering device. The contractor shall supply internal conduit in the pole as required by the engineer. The only cable permitted to move within the pole or lowering device during lowering or raising shall be the stainless steel lowering cable. All other cables must remain stable and secure during lowering and raising operations.

2.1.4 Lowering Cable. The lowering cable shall be a minimum 1/8-inch diameter stainless steel aircraft cable with a minimum breaking strength of 1740 pounds with (7) strands of 19 wire each.

2.1.5 Pole Top Tenon. The pole shall have a custom plate mounted tenon that allows the field modification of the arm/camera orientation up to 360 degrees. With this design the DOT engineer can make slight orientation modifications to the camera mount to allow optimum viewing in case of future road development, change in terrain or a change in the viewing needs priority. The tenon shall have mounting holes and slot as required for the mounting of the camera-lowering system. The tenon shall be of dimensions necessary to facilitate camera lowering device component installation.

2.1.6 Camera Junction Box. The camera junction box shall be cast ZA-12 (12% aluminum and 88% zinc) and weigh a minimum of 50 LBS to insure stability of camera during the raising and lowering operation. The camera junction box shall have 2 fully gasketed doors to prevent water intrusion. The bottom of the camera junction box shall be equipped with a condensation/moisture exit system.

2.1.7 Lowering Tool. The camera-lowering device shall be operated by use of a portable lowering tool. The lowering tool shall be made of durable and corrosion resistant materials, powder coated, galvanized, or otherwise protected from the environment by industry-accepted coatings to withstand exposure to a corrosive environment. The tool shall consist of a lightweight metal frame and winch assembly with cable as described herein, a quick release cable connector, an adjustable safety clutch and a variable speed industrial duty electric drill motor. This tool shall be compatible with accessing the support cable through the hand hole of the pole. The lowering tool shall attach to the pole with one single bolt. The lowering tool shall be equipped with a positive braking mechanism to secure the cable reel during raising and lowering operations and prevent freewheeling. One lowering tool shall be delivered to the engineer upon project completion.

2.2 Steel Pole

2.2.1 Design. Design shall be in accordance with the latest AASHTO "Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals." Minimum Loading requirements shall be based on an isotach wind velocity for the area of installation according to AASHTO isotach wind chart with a 1.3 gust factor.

2.2.2 Shop Drawings. Shop Drawings are required and shall include details of the hand holes, cable inlets, and pole cap, as well as fasteners and hardware required for the lowering device. Calculations showing that the pole meets the requirements of the AASHTO specifications shall be submitted with the shop drawings, and calculations shall be signed and sealed by a Professional Engineer registered in the State of Missouri.

2.2.3 Fabricator. The Fabricator shall be certified under Category I, "Conventional Steel Structures" as set forth by the American Institute of Steel Construction Quality Certification Program. Proof of this certification will be required to ensure that the fabricator has the personnel, organization, experience, procedures, knowledge, equipment, capability and commitment to fabricate quality pole structures.

2.2.4 Welding. All welding shall be in accordance with Sections 1 through 8 of the American Welding Society (AWS) D1.1 Structural Welding Code. Tackers and welders shall be qualified in accordance with the code. Tube longitudinal seam welds shall be free of cracks and excessive undercut, performed with automatic processes, and be visually inspected. Longitudinal welds suspected to contain defects shall be magnetic particle inspected.

2.2.5 Material Certifications. The pole shall be manufactured in the United States of America, and comply with ASTM or AASHTO specifications. Mill certifications shall be supplied as proof of compliance with the specifications.

2.2.6 Performance Calculations. The pole shall be designed to support the specified camera and accessories. Close consideration must be given to the effective projected area of the complete lowering system and camera equipment to be mounted on the pole along with the weight when designing the pole to meet the specified deflection performance criteria. The pole top deflection shall not exceed one inch in a 30-mph (non-gust) wind. The calculations shall include a pole, base plate, and anchor bolt analysis. The pole calculations shall be analyzed at the pole base, at 5-ft. pole intervals/segments and at any other critical pole section. At each of these locations, the following information shall be given:

- The pole's diameter, thickness, section modulus, moment of inertia, and cross sectional area.

- The centroid, weight, projected area, drag coefficient, velocity pressure, and wind force of each pole segment.
- The axial force, shear force, primary moment, total moment, axial stress, bending stress, allowable axial stress, allowable bending stress, and combined stress ratio (CSR).
- The pole's angular and linear deflection.

2.2.7 Pole Shaft. The pole shaft shall conform to ASTM A595 Grade A with a minimum yield strength of 55 ksi or ASTM A572 with a minimum yield strength of 65 ksi. The shaft shall be round, 12-sided or 16 sided with a four inch corner radius, have a constant linear taper of 0.14 in/ft, and contain only one longitudinal seam weld. Circumferential welded tube butt splices and laminated tubes are not permitted. Pole to base plate welds shall be complete penetration welds. The shaft shall be hot dip galvanized.

2.2.8 Winch Hand Hole. The hand hole opening shall be reinforced with a minimum 2-inch wide hot rolled steel rim. The minimum outside dimension shall be 6 inches x 27 inches. The handhole shall have a tapped hole for mounting the portable winch thereto. Unless otherwise required, the bottom lip of this handhole shall be a minimum of 30 inches from the pole base.

2.2.9 Cable Supports / Electrical Cable Guides and Parking Stand (Eyebolts). Top and bottom electrical cable guides shall be located within the pole aligned with each other. One cable guide shall be positioned 2 inches below the handhole and the other shall be positioned 1 inch directly below the top of tenon. Two parking stands shall be positioned a maximum of 2.75 inches below the top of the handhole and located at 90 and 270 degrees from the handhole.

2.2.10 Base Plate. Base plates shall conform to ASTM A36 or A572 Grade 42. Plates shall be integrally welded to the tubes with a telescopic welded joint or a full penetration butt weld with backup bar. Plates shall be hot dip galvanized.

2.2.11 Anchor Bolts. Anchor bolts shall conform to the requirements of ASTM F1554 Grade 55. The upper 12 inches of the bolts shall be hot dip galvanized per ASTM A153. Each anchor bolt shall be supplied with two hex nuts and two flat washers. The strength of the nuts shall equal or exceed the proof load of the bolts.

2.2.12 Air Terminal. The air terminal shall be solid copper at least 5/8 inch in diameter. The top of the rod shall be tapered to a point. The bottom of the rod shall be flattened and bolted to the pole using at least three stainless steel bolts.

3.0 Construction Requirements.

3.1 The lowering device manufacturer shall furnish a factory representative to assist the electrical contractor with the assembly and testing of the first lowering system. The manufacturer shall furnish the engineer documentation certifying that the electrical contractor has been instructed on the installation, operation and safety features of the lowering device. The contractor shall be responsible for providing applicable maintenance personnel "on site" operational instructions.

3.2 Connect the bottom of the pole to one or more ground rods using a bare, solid AWG # 6 copper wire. Use exothermic welding for all ground wire connections, except the connection to the pole, which shall use the pole's grounding lug. Provide a grounding system for the pole such that the resistance between the pole and earth, as measured using the 3-point fall of potential method (IEEE 81), is less than 8 Ohms. Add more ground rods if necessary to achieve this

requirement. Measure the resistance when the pole is not connected to the ground of the electrical service.

3.3 Install the air terminal on the opposite side of the pole from the dome. Position the rod to project a minimum of five feet above the highest point of the pole and attach it to the pole with bolts passing through the wall of the pole and bond the air terminal to the top of the pole. Apply a copper-based conductive sealant between the rod and the pole before tightening the bolts. The pole itself shall be the ground conductor. Perform all work related to the installation of the air terminal in accordance with NFPA 780.

4.0 Basis of Payment. Measurement and payment for the CCTV pole includes the furnishing and the installing both the pole and lowering device, and all miscellaneous hardware required for a fully operational system as shown on the plans.

Item No.	Type	Description
910-99.02	Each	CCTV Camera Pole 50 FT.
910-99.02	Each	CCTV Camera Pole 60 FT., With Lowering Device
910-99.02	Each	CCTV Camera Pole 70 FT., With Lowering Device

L. CCTV Extension Pole

1.0 Description. Furnish and install a 20' pole for mounting a camera above a signal pole or DMS as shown on the plans.

2.0 Materials. See the details in the plans. A metallic finish means a natural aluminum finish, free from blemishes.

3.0 Basis of Payment. Measurement and payment for CCTV Extension Pole and Vertical Mounting Arm includes materials, installation, and all miscellaneous hardware required for a fully operational system.

Item No.	Type	Description
910-99.02	Each	CCTV Extension Pole, 20' Metallic Finish
910-99.02	Each	Vertical Mounting Arm On Existing DMS

M. General Electrical Requirements

1.0 Dissimilar Metals. To prevent galvanic corrosion, avoid connections between dissimilar metals. Where this is not practical, connections between dissimilar metals shall incorporate a means of keeping moisture out of the connection. Where the connection need not conduct electricity, interpose a non-absorbing, inert material or washer between the dissimilar metals. Use nonconductive liners and washers to insulate fasteners from dissimilar metals. Where the connection must conduct electricity, use a conductive sealant between the dissimilar metals. Alternatively, use an insulating gasket and a bond wire connecting the two metal parts.

2.0 Wiring. Every conductor, except a conductor contained entirely within a single piece of equipment, must terminate either in a connector or on a terminal block. Provide and install the connectors and terminal blocks where needed, without separate payment. Approved splice kits shall be used instead of connectors and terminal blocks for underground power cable splices.

2.1 All connectors must be permanently labeled and keyed to preclude improper connection. The labeling method(s) shall be approved by the engineer prior to use.

2.2 Terminal blocks shall be affixed to panels that permanently identify the block and which wire connects to each terminal. This may be accomplished by silk screening or by installing a laminated printed card under the terminal block, with the labels on portions of the card that extend beyond the block. Installation of terminal blocks by drilling holes in the exterior wall of the cabinet is not acceptable.

2.3 Do not install conductors carrying AC power in the same wiring harness as conductors carrying control or communication signals.

2.4 Arrange wiring, including jumpers, so that any removable assembly can be removed without disturbing wiring that is not associated with the assembly being removed.

2.5 Use wire saddles to guide and protect bundles of wires, jumpers, and cables. Affix the wire saddles to the wall of the cabinet or vertical member of the rack and keep power and signal cables separated.

3.0 Labeling Cables. Label every cable immediately upon installation. Label the cables at every point of access, including pull boxes, and termination points. Use self-laminating vinyl labels at least 1.5" wide and long enough that the translucent portion of the label completely covers the white area bearing the legend. The vinyl shall have a layer of pressure sensitive acrylic adhesive. The labels shall resist oil, water and solvents and shall be self-extinguishing. The legend shall be machine printed in letters at least 3/32" high. Consult with the engineer concerning the desired method of identifying each cable. Labeling cables is incidental to the installation of cable and will not be paid separately.

4.0 Basis of Payment. No direct payment will be made for any materials, equipment or labor which is performed under this provision. All costs of compliance with this provision shall be considered included in the bid unit prices of the pay items included in the contract.

N. Site Restoration

1.0 Description. Restore to its original condition any disturbed areas at sites including, but not limited to, pull box, conduit, and pole base installations. Restoration shall be accomplished by placing material equivalent to that of the adjacent undisturbed area. Disturbed unpaved areas shall be fertilized and either seeded and mulched or sodded as directed by the engineer. The engineer will have the final authority in determining the acceptability of the restoration work.

2.0 Basis of Payment. The cost of restoration of disturbed areas will be incidental to the unit price of pole base, conduit and/or pull box. No direct payment will be made for any materials or labor, which is performed under this provision.

O. Erosion Control

1.0 Description. Follow the requirements set forth in MoDOT's Stormwater Pollution Prevention Plan (SWPPP). All areas disturbed by the contractor's operations shall be subject to erosion

control measures. Erosion control measures shall follow the standard specifications and applications as set forth in the standard plans. The engineer will direct the contractor where erosion control measures will apply.

2.0 Basis of Payment. No direct payment will be made for erosion control measures.

P. Conduit

1.0 Description.

1.1 Furnish and install conduits as shown on the plans and as described within this section. The plans depict conduit routing in schematic form only. Determine final routing based on actual field conditions at each site, including utility locator service markings, to assure no conflicts with existing utilities.

2.0 Materials.

2.1 Use PVC conduit meeting the requirements of Sec 1060.

2.2 Use HDPE conduit meeting the requirements of Sec 1060. Use orange conduit for communication cable and black for power cable.

2.3 Pull ropes or tapes shall be polypropylene with a minimum tensile strength of 600 pounds.

3.0 Construction Requirements.

3.1 General. The contractor shall comply with Sec 902.16, except as noted in this special provision.

3.1.2 Pull ropes shall be furnished and installed in all empty conduit cells.

3.1.3 HDPE duct shall not be spliced. All runs shall be continuous.

3.1.4 Use an impact mole to install conduit under existing sidewalk unless otherwise indicated or unless the crossing is part of a longer bore or unless otherwise indicated in the plans. The portion installed using a mole will be paid for at the same price per foot as trenched conduit.

3.1.5 Trenching and pushing conduit installation shall be with the following minimum depth:

- Conduit under paved areas including roadway, shoulders, paved medians and sidewalks for pushed method shall be 42 inches below top of the paved areas.
- Conduit under non-paved areas for trench method shall be 30 inches of cover.

3.2 Directional Drilling.

3.2.1 Preliminary Site Work. Determine all utility locations near the path of the proposed bore, including depth. Use this information to avoid damage to utilities and/or facilities within the work area. Provide this information, including the sources, to the engineer a minimum of five working

days prior to boring. Do not bore until the engineer approves that submittal. Prior to boring, expose all utilities for which it is customary and safe to do so.

3.2.2 Boring. The diameter of the drilled hole shall conform to the outside diameter of the conduit as closely as practical. Pressure grout as directed by the engineer, to fill any voids, which develop during the installation operation. Remove and replace any conduit damaged in directional drilling operations at no expense to the project.

3.2.3 Drilling Fluid (“Slurry”). The use of water and other fluids in connection with the drilling operation will be permitted only to the extent necessary to lubricate cuttings. Jetting will not be permitted, and the use of water alone as a drilling fluid will not be permitted. Use a drilling fluid consisting of at least 10% high grade, processed Bentonite to consolidate excavated material, seal the walls of the hole, and furnish lubrication for subsequent removal of material and immediate installation of the pipe.

Provide a means of collecting and containing drilling fluid that returns to the surface, such as slurry pit, or a method approved by the engineer. Provide measures to prevent drilling fluids from entering storm sewer systems. Prevent drilling fluid from accumulating on or flowing onto sidewalks, other pedestrian walkways, driveways, or streets. Immediately remove any slurry that is inadvertently deposited on pedestrian walkways. Transport waste drilling slurry from the site and dispose of it. Do not allow slurry to enter wetlands. Protect wetlands using appropriate soil erosion control measures approved by the engineer. This requirement also applies to slurry resulting from vacuum excavation to locate underground utilities.

3.2.4 Drilling Control. Use a digital walkover locating system to track the drill head during the bore. At minimum, the locating system shall be capable of determining the pitch, roll, heading, depth, and horizontal position of the drill head at any point along the bore. During each drilling operation, locate the drill head every 10 feet along the bore and prior to crossing any underground utility or structure. Upon completion of the drilling operation and conduit installation, furnish the engineer with an as-built profile drawing and plan drawing for the drilled conduit showing the horizontal and vertical locations of the installed conduit.

3.3 Intercept Existing Conduit with Proposed Pull Box.

3.3.1 Determine whether the conduit is occupied. If so, disconnect the cables at one end of the cables and pull them back so that they are not damaged when the conduit is cut. Alternatively, they can be removed entirely and replaced with new, identical cables. Notify the engineer if any of the cables appear to be in poor condition.

3.3.2 Excavate a pit big enough for the pull box and drain material, with at least an additional foot on each side with conduit.

3.3.3 Install the drain material. From the top of the drain material, measure the vertical distance to the bottom the conduit at the points corresponding to the walls of the box.

3.3.4 If the conduit is PVC or metal, cut it in two places such that the distance between the cuts is longer than the box. Be sure the ends are cut squarely. If the conduit is HDPE, cut it in the center of the pit. Ensure that the pit is long enough that the conduit can be bent out of the way when the box is installed, and can be bent enough to insert the conduit through the wall of the box.

3.3.5 Make a hole in the wall of the box at each point that the conduit will enter. Use the distances measured earlier to determine how far from the box's bottom to make the holes.

3.3.6 Set the pull box in the pit with the holes aligned with the conduits.

3.3.7 Pass the conduits through the wall of the box so that they end about one inch inside the wall. For PVC conduit, extend the existing conduit using a short length of new PVC conduit that includes a socket end. For metal conduit, thread the existing conduit, apply a threaded coupling, and add a short length of new conduit. For HDPE, bend the existing conduit to pass through the box wall, then cut it to length inside the box.

3.3.8 Use non-shrink grout to completely fill the space between the conduit and box wall.

3.3.9 Backfill the pit and restore the area as with any pull box installation.

3.3.10 Reinstall, reconnect, and test the cables that were pulled back at the beginning of the procedure. Alternatively, replace them in kind and test them.

3.4 Install Conduit into Existing Pull Box.

3.4.1 Carefully expose the outside of the existing pull box without disturbing any existing conduits or cabling.

3.4.2 Make the appropriately sized hole for the entering conduit at a location within the pull box that will not disturb the existing cabling and that will not hinder the installation of new cabling within the installed conduit.

3.4.3 Install the conduit.

3.4.4 Fill any void area between the drilled hole and the conduit with an engineer-approved filling material to protect against conduit movement and the entry of fill material.

3.4.5 Backfill shall be carefully tamped in place. All disturbed areas shall be restored.

4.0 Basis of Payment.

4.1 All surface-mounted junction boxes, fittings, liquid-tight flexible conduits, hangers, supports, resin anchor systems, and all hardware are incidental to the cost of conduit.

4.2 Conduit may be installed by directional boring at locations shown as trenched on the plans. Such conduit will be paid for as if it had been installed by trenching.

4.3 Payment for Intercept Conduit with Pull Box includes only that work that would not be incurred in a normal pull box installation. The cost of the box and its installation will be paid for separately.

4.4 Measurement and payment for work covered by this specification includes equipment, tools, materials, necessary to install conduit. It includes excavation and site restoration. Payment will be made as follows:

Item No.	Type	Description
910-99.03	Linear Foot	Conduit, 2 in., PVC, In Trench
910-99.03	Linear Foot	Conduit, 2 in., HDPE, In Trench
910-99.03	Linear Foot	Conduit, 2 in., HDPE, Bored
910-99.03	Linear Foot	Conduit, 3 in., PVC, In Trench
910-99.02	Each	Intercept Conduit with Pull Box
910-99.02	Each	Install Conduit Into Existing Box

Q. ITS Pull Box

1.0 Description. Furnish and install ITS Pull Boxes with concrete pads as shown on the plans.

2.0 Materials.

2.1 Pull Box. ITS pull boxes shall meet the requirements in Section 1062 of the Missouri Standard Specifications for Highway Construction.

2.2 Ground Rod. Ground rods shall be listed according to UL requirements as detailed in the standard UL 467, Grounding and Bonding Equipment, and meet the requirements of NEC 250. Use electrodes that are solid copper or copper-bonded steel.

2.3 Concrete Pad. The contractor shall install a non-reinforced concrete pad around the ITS pull box as shown in the plans. The concrete used shall be a Class 'B' concrete as described within Sec 501 of the Standard Specifications.

3.0 Construction. Install ITS pull boxes as shown in the plans. Provide a concrete pad around the pull boxes as shown in the plans. Install a ground rod in the Class 5 pull boxes nearest ITS or signal cabinets.

3.1 If grading will result in an existing fiber pull box not being flush with the final grading, the pull box elevation should be adjusted to match the final ground surface. If the existing pull box is in a condition that can be adjusted without damage, it can be reused. If a pull box is raised, a split duck system shall be used to protect the cable into the adjusted pull box and the void below the box shall be backfilled and the stone drain installed. If the pull box is lowered, the stone drain shall be provided as shown on the pull box detail. Installing a new pull box or concrete sonotube over the existing ITS pull box is NOT allowed. A concrete pad shall also be installed around the adjusted box. If site conditions do not allow these construction requirements to be met, the contractor shall suspend such a work and notify MoDOT ITS group via an email to SLITS@modot.mo.gov and carbon copy MoDOT construction inspector immediately for approval of any alternative fiber adjustment option.

4.0 Basis of Payment. Measurement and payment for ITS Pull Boxes with a concrete pad includes excavation, materials, construction, backfill and all miscellaneous hardware required for a fully operational system. Payment will be made as follows:

Item No.	Type	Description
910-99.02	Each	ITS Pull Box with Concrete Pad, Preformed Class 2
910-99.02	Each	ITS Pull Box with Concrete Pad, Preformed Class 5

R. MoDOT Buried Fiber Cable Driveable Delineator Post

1.0 Description. The contractor shall install a MoDOT ‘Buried Cable’ delineator post next to each ITS pull box and additional locations approved by the Engineer (typically within grass areas using 500’ spacing on interstates/freeways and 200’ spacing on arterials) within the project limits as indicated on the plans.

2.0 Materials. See detail in the plans. The post shall be supplied in orange color and incorporate a premium UV inhibitor package to resist harmful effects to the sun. The post shall withstand multiple directional impacts and provide a long lasting and extremely durable product requiring little field maintenance. The post shall have a minimum 0.20” wall thickness and shall stand up straight in all weather conditions and self-right to straight upon impact. Top of post shall be permanently sealed and partially flattened and transition to round to afford 360 degree visibility. The post materials shall include an anchor, a non-mechanical flexible joint, and a round delineator post.

The post assembly should allow for easy change-out of any one part if necessary.

3.0 Construction Requirements. Construction requirements shall conform to the delineator post manufacturer’s recommendations and engineer’s approval. If the plans show the post near a pull box, put it next to the box as an aid to finding the box. Do not drive it through the conduit.

4.0 Basis for Payment. Payment for the ‘Buried Fiber Driveable Delineator Post’ shall be considered full compensation for all contractor-provided equipment items, labor, and material to complete the described work. Payment will be made as follows:

Item No.	Type	Description
910-99.02	Each	Buried Fiber Driveable Delineator Post

S. Remove and Reinstall Cable

1.0 Description. Pull fiber optic (FO) or power cables out of the sign structure, cabinet, and conduits without damaging the cables. Reinstall the cables as shown on the plans.

2.0 Construction Requirements. Remove the cable carefully. Replace any cables damaged by the removal operation. Notify the engineer if any of the removed cables appear to be damaged by other causes. Meet typical slack requirements when reinstalling cables. Dispose of any length of cable made unnecessary by this project. Protect all cables until they are reinstalled.

3.0 Method of Measurement. Remove and Reinstall FO Cable and Remove and Reinstall Power Cable will be measured in units of linear feet of fiber optic or power cable pulled back.

4.0 Basis of Payment. The payment covers all labor, equipment, and material to complete the work. It covers removing the cables, protecting the cables, and reinstalling the cables.

Item No.	Type	Description
910-99.03	Linear Foot	Remove and Reinstall FO Cable

T. Fiber Optic Cable

1.0 Description. This work shall consist of installing, splicing, and terminating fiber optic cables. The fiber optic cable may be new or existing cable relocated as shown on the plans. Fiber optic cable relocation requires existing cable to be removed from an existing conduit system and installed in a new or existing conduit system per plans. Relocated cable must be carefully removed from the existing conduit system without being damaged. No direct pay shall be paid for relocating the existing fiber optic cable into new ITS or signal cabinet. If the existing fiber cable is removed, that length shall be paid separately per plans.

2.0 Materials. Some of the below noted materials may not be applicable on this project. See the plans and below quantities for applicable materials.

2.1 Cable. Fiber optic cable shall be of loose tube construction. Provide certification by an independent testing laboratory that the cable meets all requirements of Rural Utilities Service Bulletin 1753F-601a *Minimum Performance Specification for Fiber Optic Cables* (https://www.rd.usda.gov/files/UTP_Bulletins_1753F-601a.pdf). The cable shall be gel free, all dielectric, and have 12 fibers per tube. The cable sheath shall have length markings in feet and shall indicate that the unit of measure is feet. The cable shall have single mode fibers whose attenuation does not exceed 0.35 dB/km and 0.25 dB/km for 1310 nm and 1550 nm signals, respectively. The optical fibers used in the cable shall meet or exceed the International Telecommunication Union ITU-T G.652.D requirements.

2.2 Splice Tray. Splice trays shall be 11.7" long, 3.9" wide, and 0.2" tall. They shall be aluminum with clear plastic covers, designed for outdoor use. Each shall accommodate 24 fusion splices. The trays shall have a black powder coat finish. The trays shall have both perforations for cable ties and crimpable metal tabs for buffer tube strain relief.

2.3 Connector. LC connectors shall be used for all cabinet terminations and patch panel connections unless the plans indicate otherwise. Connectors shall have ceramic ferrules and be suitable for ITS field cabinets. If any equipment requires a different connector type, a hybrid jumper may be used (LC-to-ST or LC-to-SC) to match that device.

2.4 Pigtail. Pigtails shall be factory-made, buffered, and strengthened with aramid yarn to reduce the possibility that accidental mishandling will damage the fiber or connection. Pigtails shall be yellow. Each must contain one fiber. Length shall suffice to provide two feet of slack after installation.

2.5 Jumper. Jumpers shall meet the requirements for pigtails but shall have a connector on each end. Length shall suffice to provide approximately five feet of slack after installation.

2.6 Interconnect Center. An interconnect center is a splice enclosure that has a patch panel built into one of its walls. Within the interconnect center, fibers in cables are spliced to pigtails and the pigtails are plugged into the patch panel from the inside. This allows jumper cables (not part of the interconnect center) to plug into the patch panel from the outside, connecting the fibers to equipment in the cabinet or to other fibers on the patch panel. Within an interconnect center, some fibers may be spliced to the corresponding fiber in a mating cable, rather than to a pigtail. Still other fibers may be coiled, un-terminated.

The enclosure shall be made of powder-coated metal. It shall have provisions for cable strain relief and for connector labeling. The enclosure's patch panel shall have at least 24 positions.

Provide enough splice trays for all splices made in the interconnect center. Provide patch panel modules that are compatible with the connectors specified in section 2.3 of this provision.

2.6.1 Wall-Mounted Interconnect Center. The enclosure shall be designed for wall or panel mounting and occupy no more than 350 square inches of wall space. It shall have a gasketed, hinged door. It shall hold at least six splice trays. These enclosures are typically used in signal cabinets.

2.6.2 Rack-Mounted Interconnect Center. The enclosure shall have brackets and all other hardware required for rack mounting in an EIA standard 19-in. equipment rack. It shall take up no more than three rack units (1¾ inch each) in the cabinet. It shall have front and rear doors. It shall hold at least four splice trays. These enclosures are typically used in ITS device cabinets.

2.7 Rack-Mounted Splice Enclosure. The enclosure shall have brackets and all other hardware required for rack mounting in an EIA standard 19-in. equipment rack. However, alternate forms of mounting will be permitted if more practical at a particular location. The enclosure shall take up no more than five rack units (1¾ inch each) in the cabinet. It shall be made of powder-coated aluminum. These enclosures are typically used in network node cabinets.

2.7.1 The enclosure shall have provisions for cable strain-relief. It shall have hinged front and rear doors.

2.7.2 The enclosure shall include splice trays as specified in section 2.2 of this provision. The contractor shall provide enough splice trays for all the splices made in the enclosure. The enclosure shall include a splice tray holder with capacity for 22 trays. It shall be mounted on a sliding shelf inside the enclosure so that individual trays can be removed from the enclosure without disturbing the other trays or removing the enclosure itself from the cabinet.

2.8 Rack-Mounted Patch Panel Enclosure. The enclosure shall have brackets and all other hardware required for rack mounting in an EIA standard 19-in. equipment rack. However, alternate forms of mounting will be permitted if more practical at a particular location. The enclosure shall take up no more than five rack units (1¾ inch each) in the cabinet. It shall be made of powder-coated aluminum. Provide patch panel modules that are compatible with the connectors specified in section 2.3 of this provision, as needed. These enclosures are typically used in network node cabinets.

2.9 Underground Splice Closure. Closures for underground fiber splices include all materials necessary to make, organize, and protect the splices.

2.9.1 The closure shall supply environmental protection of cable and splices from water and dirt. It shall be designed for splicing fiber-optic cables underground in pull boxes and to be submersed in water.

2.9.2 Provide certification by an independent testing laboratory that the closure meets all requirements of Telcordia GR-771 for environmentally sealed closures for buried installation.

2.9.2 The closure shall be re-enterable without any special tools.

2.9.3 The closure shall be able to accommodate at least four fiber optic cables.

2.9.4 The closure shall accommodate 144 single mode fiber splices.

2.9.5 It shall be possible to remove any splice tray without disturbing the others.

2.9.6 Splice trays in the closure need not be of the type specified in 2.2, above.

2.9.7 Designed for butt splicing.

2.9.8 No encapsulated materials shall be allowed.

2.10 Tracer Wire. A jacketed #14 AWG XHHW-2 standard blue tracer wire (also known as the locator wire) shall be provided in the conduit within the project limits unless it exists.

3.0 Construction Requirements.

3.1 Pre-Installation Cable Inspection and Testing. Prior to installation, confirm that the cable is in good condition and complies with the specifications. The contractor shall perform fiber testing (see below requirements) of new fiber on the reel and existing fiber before it is removed. Notify the SLITS Group about any fiber anomalies and submit fiber testing reports to the SLITS Group for review and approval. Any defects found after installation will be deemed the fault of the contractor.

3.2 Cable Installation.

3.2.1 The ITS and network devices located within the project limits are a crucial part of the traffic operation system for this area. It is imperative that the network downtime be kept to a minimum when adding, removing, or modifying any existing ITS and network devices. This may require the contractor to perform work that will affect existing network devices during nighttime and/or weekend hours, at the discretion of the Engineer. Allowable timeframes for this work will be subject to the need for ITS devices in the area to be used to manage other traffic impacting work zones.

3.2.2 In case of fiber optic cable replacement, all new fiber cable must be installed, spliced, terminated and go online before removing the old cable.

3.2.3 Remove existing cable to be relocated and install cable such that the optical and mechanical characteristics of the fiber are not degraded. Do not violate the minimum bend radius or the maximum tension, both during and after installation.

3.2.4 Before any cable installation is performed, provide the engineer with four copies or an electronic copy, as required by the engineer, of the cable manufacturer's recommended maximum pulling tensions for each cable size. These pulling tensions shall be specified for pulling from the cable's outer jacket. Also, provide a list of the minimum allowable cable bending radius and the cable manufacturer's approved pulling lubricants. Only those lubricants approved by the cable manufacturer will be permitted.

3.2.5 If the cable is pulled by mechanical means, use a clutch device to ensure the allowable pulling tension is not exceeded. Also, attach a strain gauge to the pulling line at the cable exit location, and at a sufficient distance from the take-up device, such that the strain gauge can be read throughout the entire cable pulling operation.

3.2.6 Do not leave the let-off reel unattended during a pull, in order to minimize the chance of applying excess force, center pull, or back feeding.

3.2.7 Use an approved lubricant, in the amount recommended by the cable manufacturer, to facilitate pulling the cable. After the cable has been installed, wipe the exposed cable in a pull box, junction box, or cabinet clean of cable lubricant with a cloth before leaving the pull box, junction box, or cabinet.

3.2.8 When installing new fiber optic cable store 30 feet of slack fiber in every intermediate pull box, unless otherwise noted on plans. Additional slack storage, as indicated on the plans, is required in designated pull boxes. At cabinet locations, where cable runs from the pull box directly to an equipment cabinet, store 60 feet of slack fiber optic cable in the pull box, unless otherwise noted on plans. Additionally, treat the cable returning from the cabinet to the pull box as a separate cable, and store 60 feet of slack for these links, unless otherwise noted on plans. Store slack cable neatly on the walls of the pull box using racking hardware acceptable to the engineer. If the length of fiber optic cable being relocated does not allow for fully meeting these slack requirements, maximize fiber slack at cabinets before providing slack in pull boxes.

3.2.9 While pulling and until splicing seal the fiber optic cable ends to prevent the escape of filling compound and the entry of water.

3.3 Splicing. Splice all optical fibers, including spares, to provide continuous runs. Splices shall be allowed only in equipment cabinets except where shown on the plans.

3.3.1 Make all splices using a fusion splicer that automatically positions the fibers using the Light Injection and Detection (LID) system or the High-resolution Direct Core Mounting (HDCM) system. Provide all equipment and consumable supplies.

3.3.2 Secure each spliced fiber in a protective groove. Completely re-coat bare fibers with a protective room temperature vulcanizing (RTV) coating, gel, or similar substance, prior to insertion in the groove, so as to protect the fiber from scoring, dirt, or microbending.

3.3.3 Prior to splicing to a fiber installed by others, measure and record the optical loss over that fiber. See section 4.0 of this provision.

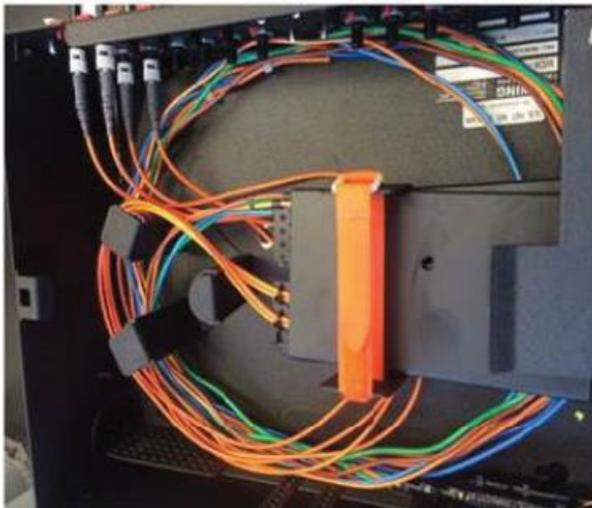
3.3.4 Use a different splice tray for each buffer tube color. If an enclosure contains multiple buffer tubes of the same color, but none of the fibers in one of the tubes are spliced to fibers in other tubes of the same color, use a separate splice tray for that tube.

3.4 Termination. Terminate fibers by splicing them to factory-made pigtails. Cap all connectors that are not connected to a mating connector.

3.5 Tracer Wire. The contractor shall install a jacketed #14 AWG XHHW-2 standard blue tracer wire (also known as the locator wire) in conduit with new or replaced fiber optic cable(s). In the pull box nearest to the ITS or signal cabinet connect the tracer wire to a ground rod with a ground rod clamp and provide five feet of slack, as shown on the ITS pull box detail. In other fiber pull boxes provide five feet of slack, but a ground rod shall not be installed. Secure the tracer wire slack in individual coils to the inside wall of each pull box. If the tracer wire already exists, the contractor shall ensure it is connected to the ground rod properly in the pull box nearest to the ITS or signal cabinet and demonstrate a locate signal will transmit along the tracer wire. When fiber optic cable is relocated, existing tracer wire may be reused.

Prior to final acceptance and transition of ownership, the contractor shall meet with the Engineer to demonstrate the tracer-wire and locate system is working properly throughout the entire fiber, tracer wire and locate system.

3.6 Fiber Management. Fiber in splice trays along with pigtails and buffer tubes in the interconnect center or splice closures shall be neatly looped and restrained following telecom industry standard fiber and cable management practice and enclosure manufacturer's recommendations. Shown below are examples of acceptable and unacceptable fiber and cable management. Work will not be accepted unless good fiber management practices are followed.



Acceptable



Unacceptable

3.7 Required Fiber Splicing, Installation and Testing Experience. Submit resumes, certificates and references detailing fiber installation, splicing and testing for on-site personnel to the engineer for approval. Subcontractors used on the project are considered part of the contractor's team and are also required to submit resumes, certificates and references. Submit to the engineer references including client project manager, phone number and project experience. Demonstrate successful completion of fiber optic cable installation and splice training courses by providing certificates of completion. Failure to comply may result in a declaration of noncompliance.

In addition, ensure a number of the contractor's team approved by the engineer that has at least two years of experience in the installation, splicing and testing of the fiber optic cable is on site at all times during the fiber optic cable installation and fiber optic splicing work until successful completion of the work. Receive approval from the engineer for any substitution of this individual. The engineer may stop the work activity on this project as a result of the absence of these on-site personnel from the project and may continue to charge time to the contractor and will not grant a time extension.

3.8 Existing Fiber Replacement. When plans show new fiber being installed to replace existing fiber, the existing fiber should remain in service until the new fiber is installed and is ready for splicing to minimize network downtime.

3.9 Fiber Relocation. The fiber optic cable is a crucial part of the traffic operation system. It is imperative that the downtime be kept to a minimum when relocating fiber optic cable. When existing fiber is disconnected for relocation, the relocation and fiber splicing of the relocated fiber shall progress continuously to minimized downtime.

3.10 If grading will result in an existing fiber pull box not being flush with the final grading, the pull box elevation should be adjusted to match the final ground surface. If the existing pull box is in a condition that can be adjusted without damage, it can be reused. If a pull box is raised, a split duct system shall be used to protect the cable into the adjusted pull box and the void below the box shall be backfilled and the stone drain installed. If the pull box is lowered, the stone drain shall be provided as shown on the pull box detail. Installing a new pull box or concrete sonotube over the existing ITS pull box is NOT allowed. A concrete pad shall also be installed around the adjusted box. If site conditions do not allow these construction requirements to be met, the contractor shall suspend such a work and notify MoDOT ITS group via an email to SLITS@modot.mo.gov and carbon copy MoDOT construction inspector immediately for approval of any alternative fiber adjustment option.

4.0 Acceptance Testing.

4.1 General. Test the fiber after installation, including all splicing and termination, is complete. Note, however, that this test procedure involves measuring the loss of fiber installed by others before splicing to it. For each fiber optic link, including spare fibers, determine whether the optical loss is within the limits permitted by these specifications. A link is a continuous segment of fiber between one connector (or unterminated end) and another connector (or unterminated end). When testing links that do not have connectors on both ends, use a mechanical splice to attach a pigtail to the unterminated fiber for the duration of the test.

4.2 Test Procedure. For each fiber link, follow this procedure:

- (a) If the link includes fiber installed by others, use an optical loss test set to measure and record the optical loss over that portion of the link before it is spliced to new fiber.
- (b) Calculate the maximum allowable loss for the completed link, both at 1310 nm and at 1550 nm. Use the following formula:

$$\begin{aligned} \text{Maximum link loss} = & \text{Measured loss over portion installed by others} \\ & + (\text{Fiber length in km}) \times (0.35 \text{ for } 1310 \text{ nm and } 0.25 \text{ for } 1550 \text{ nm}) \\ & + (\text{Number of fusion splices}) \times (0.05) \\ & + (\text{Number of mechanical splices [for temp. connection]}) \times (0.3) \\ & + (\text{Number of connections}) \times (0.5) \end{aligned}$$

Provide this calculation to the engineer along with the test results.

- (c) Calibrate an optical loss test set and provide evidence satisfactory to the engineer that the set produces accurate results at both wavelengths. This can be a demonstration that the set correctly measures the loss of a test fiber whose loss is known.
- (d) Use the test set to measure the loss of the link under test. Record the result at both 1310 nm and 1550 nm. Arrange for the engineer or his representative to witness these tests.

- (e) If the measured loss exceeds the calculated maximum, use an optical time domain reflectometer and other test equipment to troubleshoot the link. Take whatever corrective action is required, including cable replacement, to achieve a loss less than the calculated maximum.

4.3 Test Result Documentation. Prepare a report showing all of the links tested in this project. For the portions installed in this project, show the equipment cabinets, splices, and pigtails. On each line representing a link, show the maximum allowable loss and the actual loss. The actual loss shall be the one measured after all corrective actions have been taken. Submit an electronic copy of the report to the engineer, along with the calculations for the maximum allowable loss. Submit the report including calculations in an electronic format acceptable to the engineer.

5.0 Documentation. Provide the engineer mark-ups of the plans, neat and legible, illustrating as-built versions of the splice and connection diagrams that are contained in the plans.

6.0 Certifications. New fiber optic cable shall be factory certified to meet the requirements in this specification. In addition, the manufacturer shall certify that the fiber optic cable has a life expectancy of 20 years.

7.0 Basis of Payment. Measurement and payment for items covered by this specification include all items listed below, acceptance testing and tracer wire within new, existing or relocated conduit used for the fiber optic cable in addition to all materials, labor and equipment necessary for a fully operational system. Payment will be made as follows:

Item No.	Type	Description
910-99.02	Each	Fiber Optic Fusion Splice
910-99.02	Each	Fiber Optic Pigtail
910-99.02	Each	Fiber Optic Jumper
910-99.02	Each	Rack-Mounted Interconnect Center
910-99.02	Each	Underground Splice Closure
910-99.03	Linear Feet	Fiber Optic Cable, 24-Strand, Single Mode

U. ITS Cabinets

1.0 Description. This work shall consist of furnishing and installing new cabinets and base adapters.

2.0 Materials.

2.0.1 All cabinets shall include a grounding system. Connection to ground must be bare, solid AWG # 6 copper wire or equivalent bonding strap.

2.0.2 All powered cabinets shall be wired for three-wire 240/120 volt AC service. Provide a lightning arrestor designed to protect 120/240 VAC split phase breaker panels. The protector shall use metal oxide varistors as the protective elements. The response time shall be under five nanoseconds and the maximum surge current shall be at least 40,000 amps. The clamping voltage shall not exceed 400 volts. The device shall protect line-to-line and line-to-neutral.

2.0.3 Provide an additional surge protector just for the circuits powering the communication and traffic management equipment (excluding the dynamic message sign, which has its own surge

protectors). This shall be a filtering, two-stage surge protector. Install it on the load side of the appropriate breaker. The protector shall provide radio frequency noise filtering and be capable of protecting equipment drawing a total of at least 10 amps. If the maximum load on the circuit exceeds 10 amps, the contractor shall split the load among multiple circuits, each with a surge protector. The protector shall clamp both the main line and the main neutral at 250 volts, both relative to each other and relative to the cabinet ground. The response time shall be such that the voltage never exceeds 250 volts. The surge protector shall suppress surges of up to 20,000 amps.

2.0.4 All circuit breakers shall be molded case units with quick-make, quick-break, trip-free mechanism, and with a minimum interrupting capacity of 10,000A (RMS Symmetrical). The circuit breakers shall be of fixed trip type and UL listed. Circuit breakers shall be listed on the latest Qualified Products List QPL-W-C-375 maintained by the Defense Supply Center.

2.0.5 All doors shall have cabinet identification labels displaying the cabinet identifier. The engineer will provide a list of the identifiers for each location, as well as the format for the labels.

2.0.6 All seams shall be continuously welded and ground smooth.

2.0.7 All fasteners must be stainless steel.

2.0.8 All cabinets shall have a natural aluminum finish, free from blemishes.

2.0.9 Provide terminal blocks for all conductors entering the cabinet. Except for blocks used for coaxial cable, the blocks shall be the barrier type with nickel-plated brass screw terminals and solid backs. Terminal blocks for conductors carrying more than 60 volts must be covered by a clear acrylic shield.

2.0.10 All cabinet doors shall have locks keyed to match MoDOT's other Gateway Guide cabinets.

2.1 Type 7 Cabinet.

2.1.1 Provide a single door, NEMA 3R, aluminum cabinet. The aluminum shall be at least 0.188 inches thick, except that the door and top need be only 0.125 inches thick. The cabinet shall be approximately 36 inches high, 20 inches wide, and 17 inches deep. The cabinets shall be designed for pole mounting (with the back against the pole). The cabinet shall have a three-point door latch. It shall also have provision for padlocking. The door hinge shall be continuous and shall be affixed by nuts and bolts that are concealed when the door is closed

2.1.2 The cabinet shall be equipped with the following:

- **Rack:** For mounting 19-inch equipment. The mounting rails must have holes of the EIA standard size and spacing for the entire height of the cabinet.
- **Mounting panels:** For terminal blocks, breakers, surge protectors, and other small items on the back and side walls.
- **Fluorescent light:** Controlled by a door switch.
- **Duplex ground fault interrupt outlet:** For use by technicians.
- **Thermostatically controlled fan and heater:** The fan shall move 100 CFM through vents at the top of the cabinet. The air intake shall be through louvers in the door, and the

air shall pass through a replaceable filter as it enters the cabinet. The heater shall use at least 250 watts and shall be designed to prevent accidental contact with dangerous heat or voltage.

- **Electrical distribution system:** Consisting of two 15 amp main circuit breakers, one for each side of the split phase service. One of the main breakers shall serve the communication and traffic management equipment in the cabinet. Provide at least four outlets on this circuit. The second main breaker shall power auxiliary devices in the cabinet, such as the fan, heater, light, and GFI outlet.

If the cabinet feeds power to other cabinets, the contractor shall provide two separate branch circuits for each of the other cabinets (one circuit for communication and traffic management equipment and the other circuit for the remaining devices). The contractor shall equip those branch circuits with 15 amp breakers.

- **Sunshield:** On the top.
- **Mounting brackets:** Stainless steel U-bolts and any other mounting hardware needed.

2.2 Modified Type 7 Cabinet.

2.2.1 Provide a two door, NEMA 3R, aluminum cabinet. The aluminum shall be at least 0.188 inches thick, except that the doors and top need be only 0.125 inches thick. The cabinet shall be approximately 36 inches high, 20 inches wide, and 22 inches deep. The cabinets shall be designed for mounting on a concrete base. The cabinet shall have both front and back doors with three-point door latches. It shall also have provisions for padlocking the doors. The door hinges shall be continuous and shall be affixed by nuts and bolts that are concealed when the door is closed.

2.2.2 The cabinet shall be equipped with the following:

- **Rack:** For mounting 19-inch equipment. The mounting rails must have holes of the EIA standard size and spacing for the entire height of the cabinet.
- **Mounting panels:** For terminal blocks, breakers, surge protectors, and other small items on the rack and side walls.
- **Fluorescent light:** Controlled by a door switch.
- **Duplex ground fault interrupt outlet:** For use by technicians.
- **Thermostatically controlled fan and heater:** The fan shall move 100 CFM through vents at the top of the cabinet. The air intake shall be through louvers in the door, and the air shall pass through a replaceable filter as it enters the cabinet. The heater shall use at least 250 watts and shall be designed to prevent accidental contact with dangerous heat or voltage.
- **Electrical distribution system:** Consisting of two 15-amp main circuit breakers, one for each side of the split phase service. One of the main breakers shall serve the communication and traffic management equipment in the cabinet. Provide at least four outlets on this circuit. The second main breaker shall power auxiliary devices in the cabinet, such as the fan, heater, light, and GFI outlet.

If the cabinet feeds power to other cabinets, the contractor shall provide two separate branch circuits for each of the other cabinets (one circuit for communication and traffic management equipment and the other circuit for the remaining devices). The contractor shall equip those branch circuits with 15-amp breakers.

- **Sunshield:** On the top.
- **Mounting:** Designed to be mounted on a concrete foundation.

3.0 Construction Requirements.

3.1 Base Adapter and Cabinet Installation. Prior to bolting the base adapter to the foundation, apply silicone sealant to the mating surface of the adapter to prevent water from seeping between the adapter and foundation. Likewise, prior to bolting the cabinet to the base adapter, apply silicone sealant to the mating surface of the cabinet to prevent water entry. Ensure that the cabinet is plumb, using shims if necessary, and ensure that it is properly aligned with the front edge of the base adapter.

3.2 Pole Mounted Cabinets. Securely fasten pole-mounted cabinets to their poles using mounting brackets as indicated in the plans.

3.3 Bonding and Grounding. Bond pole-mounted cabinets to the pole and ensure that the pole is connected to a ground rod. Connect base-mounted cabinets directly to a ground rod.

4.0 Acceptance Testing.

4.1 Develop a proposed test procedure for the cabinets and submit it to the engineer for approval. It shall include visual inspection, testing of lights, fan, heater, power outlets and alarm sensors. It shall also include a test in which each branch circuit is shorted to the cabinet wall to confirm that the breaker trips. Revise the proposed test procedure until it is acceptable to the engineer.

4.2 Provide all equipment and personnel needed to safely conduct the tests, arrange for the engineer's representative to witness the tests, and give the engineer a report documenting the result of every visual inspection and test. Include a summary indicating whether the cabinet passed every test. The cabinet must pass every test to be accepted.

4.3 If the cabinet fails, correct the problems and arrange for a new test. If the test of the breakers reveals breakers that do not trip, the resistance to ground is too high; lower the resistance by adding more ground rods and improving the connections in the ground system.

5.0 Documentation.

5.1 Prior to purchasing the cabinets, provide five sets of complete shop drawings, layout drawings, catalog cuts, and schematics. The layout drawings shall be dimensioned drawings showing the proposed location of all equipment for each cabinet. The drawings shall demonstrate that all the equipment will fit, and that all controls, connections, and other service points are readily accessible. It should also demonstrate that incoming conductors reach surge suppressors as soon as they enter the cabinet. Lay out all cabinets that have the same equipment in the same way and submit a single drawing for all like cabinets. Revise the layout as instructed by the engineer and resubmit the drawings until they are accepted.

5.2 After installation, provide one reproducible 24 inch X 36 inch and two prints of the cabinet wiring diagram for each cabinet. The diagrams shall be nonproprietary. They shall reflect as-built conditions and shall identify all circuits in such a manner as to be readily interpreted. The diagrams shall be placed in a heavy duty, clear plastic pouch and attached to the front cabinet door. The pouch shall be of such design and material that it provides adequate storage and access to the wiring diagram.

6.0 Guarantee. All items covered by this specification shall carry a two-year guarantee from the date of acceptance against any imperfections in workmanship or materials.

7.0 Basis of Payment. Measurement and payment for items covered by this specification include the documentation and acceptance testing, in addition to all materials, including base adapters and equipment. Payment will be made as follows:

Item No.	Type	Description
910-99.02	Each	Type 7 Cabinet
910-99.02	Each	Modified Type 7 Cabinet

V. 120 Volt Power Strip

1.0 Description. All new cabinets require the addition of one 120V power strip that is hardwired inside the cabinet.

2.0 Requirements. Shall have a circuit breaker rated at least 15 amps, on/off switch and six grounded outlets for AC plugs. Mounting shall be on the left side panel of the cabinet above the detector panel attached to two rails, with the power cable facing away from the door. Hardwire interconnect panel, if present in existing cabinet, should be removed to make room. A plastic wire tie shall secure any transformer packs plugged into this unit. Power source shall be hardwired to cabinet auxiliary breaker.

3.0 Construction Requirements. Construction requirements shall conform to Sec 902.

4.0 Method of Measurement. Method of measurement shall conform to Sec 902.

5.0 Basis of Payment. No direct payment. Payment to be included as part of Type 7 and Modified Type 7 cabinet installation.

W. Install a Commission Furnished and Programmed IP Addressable Power Strip

1.0 Description. The contractor shall install a Commission Furnished and Programmed IP-Addressable Power Strip(s) in the ITS and/or Signal Cabinets as shown on the plans. The IP-Addressable Power Strip(s) shall be approved by the ITS group prior to installation.

2.0 Installation Requirements. The contractor:

- Shall email the SL ITS Group at SLITS @modot.mo.gov two business days in advance of installation and include MoDOT Job # and the location of the ITS or Signal Cabinets.
- Shall mount the power strip on the back side of the ITS Type 7 ITS cabinet (or any open space of other ITS cabinets away from the door) and on any open space of the signal cabinet with the power cable facing away from the door or other devices.

- Should remove and dispose the old power strip as well as any other inactive devices, if present, to make room.
- Should contact MoDOT Signal Shop Supervisor and/or SL ITS group if they have questions regarding the inactive devices.
- Should hard-wired the power source to the cabinet auxiliary breaker. No plug in to any cabinet outlet allowed to the Power Strip.

4.0 Acceptance Testing. The Contractor shall contact MoDOT St. Louis ITS staff to verify remote communication to the power strip upon installation and while still on-site. They also shall provide a list of devices and designated port assignments to the ITS group so they can update that port description in the Power Strip software.

5.0 Basis of Payment. Measurement and payment for Power Strip Installation includes the removal of the old and inactive power strip or other devices to make space for new power strip, installation of new power strip, grounding, testing and all miscellaneous hardware required for a safe, fully operational Power Strip. Payment will be made as follows:

Item No.	Type	Description
910-99.02	Each	Install a Commission Furnished and Programmed IP Addressable Power Strip

X. Add Circuit Breaker

1.0 Description. Modify an existing breaker panel to handle an additional branch circuit. Provide a circuit breaker of appropriate capacity and any necessary mounting, cable management, or grounding hardware. Update the breaker schedule in the enclosure or label the breaker, as applicable.

2.0 Basis of Payment. Payment for adding the circuit breaker shall include all materials, equipment, tools, labor, and work incidental thereto. Payment will be made as follows:

Item No.	Type	Description
910-99.02	Each	Add Circuit Breaker

Y. Install New or Relocate Existing Communication Equipment

1.0 Description. The contractor shall install MoDOT furnished ethernet network switch or relocate all existing network equipment from existing ITS or signal cabinet into new cabinet, make necessary connections and test for proper network connection. This work shall be coordinated with MoDOT SLITS Group via an email to SLITS@modot.mo.gov.

2.0 Materials.

2.1 The Contractor shall install MoDOT furnished Ethernet network switch(es) or relocate the existing Ethernet network switch(es), video encoders, cellular modem and other existing or new network devices inside the new ITS or signal cabinet as shown on the detail communication plans. These will include power cables and network device surge arresters. Relocating the existing CCTV camera(s) and network radios(s) shall be paid under separate pay items.

Job No.: JSL0184
Route: Various
County: Various

2.2 The Contractor shall furnish and install any other cables such as Category 5E patch cords, coax patch cords, and short serial cables, etc. as required for the new location connections.

3.0 Construction Requirements.

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

3.2 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 Commission approved power strips as required. Connect the communication cables as shown on the connection diagrams in the plans. The equipment will be configured by the Commission, and therefore do not change any configuration settings.

3.3 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.

3.4 Cisco Ethernet Switch. Prior to the beginning of the project, the Contractor shall verify the correct switch type and model including any additional necessary Cisco supported equipment with MoDOT St. Louis ITS department. Additional equipment may include but is not limited to the power supply, DIN rails, and any applicable Cisco supported SFPs (Small Form-factor Pluggable transceivers), or expansion modules. For signal cabinets, the switch shall be mounted on the left side panel above the 120V IP Power Strip. Attach unit to 2 rails of the side panel, with the power cable facing away from the cabinet door. The Cisco switch shall be powered from the 120V IP Power Strip. The Cisco Ethernet Switch including the additional Cisco supported equipment shall be delivered to Commission's ITS Engineer for programming at least 2 weeks prior to the field installation.

3.5 Cellular Modem. If present, the contractor shall provide before and after documents on cellular modem signal strength. The new cellular modem signal strength shall be equivalent or better than existing. Contractor shall be responsible for installation or relocation of cellular antenna to achieve acceptable signal strength.

3.6 Other Agency's Devices on MoDOT Right-Of-Way and Facilities. If other agency's devices such as emergency pre-emption system, CCTV Camera, etc. exist within MoDOT Right-Of-Way and must be relocated onto the new MoDOT facilities, the contractor must notify MoDOT SLITS Group via an email to SLITS@modot.mo.gov and MoDOT area traffic engineer in the early stage of the construction. MoDOT SLITS Group and MoDOT area traffic engineer will coordinate the removal and re-installation of those devices with responsible agency.

4.0 Basis of Payment. Measurement and payment for communication equipment installation will be on a per cabinet basis. The unit 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:

Item No.	Type	Description
910-99.02	Each	Install or Relocate Existing Communication Equipment

Z. Cabinet Base

1.0 Description. Provide a concrete base for a Modified Type 7 cabinet. See the detail in the plans.

2.0 Basis of Payment. Payment for Cabinet Base includes all excavation, foundation construction, ground rod, anchor bolts, materials, equipment, tools, labor, and work incidental thereto. Payment will be made as follows:

Item No.	Type	Description
910-91.00	Cu. Yd.	Base, Concrete

AA. ITS Asset Management Tool

1.0 Description. For all locations where any MoDOT and other agency's ITS (Intelligent Transportation System) components are modified or added, the contractor shall be responsible for populating and updating the Commission's ITS and Signal Network Asset Management Tool (currently NexusWorx) to reflect the final condition of the entire ITS system within the project limits as shown on the plans. Updating shall be performed by the Commission approved staff (currently the Byers Engineering; Doug Stanford at Doug.Stanford@BYERS.COM).

2.0 Construction Requirements.

2.1 The Contractor shall provide the final construction as-built plans and any relevant notes to the Commission approved contractor (currently the Byers Engineering) via an email and carbon copy the SL Construction staff and ITS group at SLITS@modot.mo.gov for input into the ITS Asset Management Tool. The relevant notes for each modified or new location shall aid in the understanding of the device configuration and location details. At a minimum, this will include providing the required latitude and longitude coordinates of each pull box, DMS, CCTV, cabinet, conduit, cable, and fiber, along with any serial numbers and/or identification information for any new, relocated or otherwise changed by this project. The Contractor shall locate the conduit every 100 feet using a GPS locating device that is accurate to the nearest foot. The Contractor shall provide a GIS based map of the conduit route and a complete listing of all of map coordinates in an electronic format. Population of the ITS Asset Management Tool will be required for all new, relocated and modified devices improved under this contract.

2.2 Other agency's ITS assets such as conduit, fiber cable, Cat-E cable, cabinet, pull box, etc. within MoDOT Right-Of-Way shall be highlighted including in a polygon in the ITS Asset Management Tool so it can be clearly identified for future references.

2.3 The contractor shall furnish to Commission approved staff a copy of the final plans relevant to all of the ITS components in Visio and/or Microstation formats, if relevant.

2.4 The contractor shall be provided one licensed read-only access login by Commission before work begins.

2.5 A PDF and Visio format of all relevant fiber splicing drawings shall be provided to the Commission approved contractor for posting into the ITS Asset Management Tool’s perspective ITS and Signal cabinets.

3.0 Acceptance.

3.1 All entries and updates shall be completely entered and available for use within 30 days from substantial completion of construction of the project.

3.2 Commission staff shall verify population of the ITS Asset Management Tool within 10 working days, including accuracy and completeness of details for each component prior to acceptance and payment.

4.0 Measurement and Payment. Measurement and Payment for items covered by this specification include the population and correction of inaccuracies, in addition to all materials and equipment necessary complete the updates to the ITS Asset Management Tool which shall be coordinated and paid to the Commission approved staff (currently the Byers Engineering).

Item No.	Type	Description
910-99.01	Lump Sum	ITS Asset Management Tool

BB. Power Supply Assembly, Pad-Mounted, 240/120 V, ITS

1.0 Description. Provide a 120/240 volt power supply assembly. The power supply shall be multi-circuit and pad mounted. Available power supplies are listed in the lighting section of the MoDOT approved products list under Pad Mounted Lighting Controllers. Control stations shall be installed in accordance with the plans and by direction of the engineer.

2.0 Basis of Payment. Payment for furnishing and installing pad mounted power supplies shall include all excavation, foundation construction, ground rod, rigid metal conduit and conductors as shown on the plans, all coordination with the power company, materials, equipment, tools, labor, and work incidental thereto. Payment will be made as follows:

Item No.	Type	Description
910-86.21	Each	Power Supply Assembly, Pad-Mounted, 240/120 V, ITS

CC. Coordination with ITS Staff and Utility Locates

1.0 Description. Any work that will impact the existing communications network must be coordinated with the Commission’s St. Louis District ITS staff. This includes but not limited to removal and replacement of any existing communications equipment, adding new devices and changes to power sources or disconnects. Minor modifications to the existing communications network can have significant impacts on the system and operation of other ITS and traffic signal systems.

1.1 MoDOT is a member of MO-One-Call System. Prior to any excavation or work within MoDOT Right-Of-way, the contractor must contact MO-One Call at 1-800-DIG-RITE and request for Utility Locates within noted project limits. If the scope of work contains modification, addition and/or expansion of existing underground MoDOT ITS, lighting, or signal facilities, the contractor must

Job No.: JSL0184
 Route: Various
 County: Various

notify the MoDOT Utilities Locate staff prior to any work, in order for MoDOT to update MoDOT utility location records with Missouri One Call.

2.0 Contact. The contractor shall notify the ITS group via an email to SLITS@modot.mo.gov at least 2 days before any work that may impact the existing network communications. The contractor shall include the Job#, location and brief scope of work in the email's subject line. The engineer shall be notified prior to making contact with ITS staff. For MoDOT Utility location updates, the contractor must contact MoDOT TMC at 314-275-1500 and ask for Utility Locate Section at least seven calendar days before performing any work.

3.0 The ITS and network devices located within the project limits are a crucial part of the traffic operation system for this area. It is imperative that the downtime be kept to a minimum when adding, removing, or modifying any existing ITS and network devices. This may require the contractor to perform work that will affect existing network devices during nighttime and/or weekend hours, at the discretion of the Engineer. Allowable timeframes for this work will be subject to the need for ITS devices in the area to be used to manage other traffic impacting work zones.

4.0 Basis of Payment. No direct payment shall be made for compliance with this provision.

DD. Utilities

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

Utility Name	Known Required Adjustment	Type
Ameren Missouri (OH) Bobby Dale Telephone: 314-564-7586 Email:bdale@ameren.com	No	Electric
Ameren Missouri (UG) Brandon Johnson Telephone: 314-599-7773 Email: bjohnson@ameren.com	No	Electric
Lumen Rich Obremski Telephone: 314-378-9931 Email: Richard.obremski@lumen.com	No	Communications
MoDOT Michael Quadrini Telephone: 314-648-4079 Email: Michael.quadrini@modot.mo.gov	See Section 4.0 below	Fiber

2.0 The contractor shall be aware there are numerous utilities present along the route in this contract. Utility locates were not performed during the design phase of the project; therefore, the extent of conflicts with utilities are unknown. The table listed above may not be all inclusive.

2.1 There may be underground utilities that run parallel or cross the route that are in close proximity to the proposed work locations. The contractor shall take necessary precautions and measures to verify locations and depths of utilities by any necessary means to determine exact impacts to their work.

2.2 If utility facilities are found and discovered, the engineer will determine whether relocation of the utility is necessary to accommodate construction or if the work can be installed in accordance with Missouri Standard Plans for Highway Construction for the item of work specified.

3.0 Overhead Power Lines. In the event that any work is required within 25' of an existing Ameren power line, the contractor shall discuss the planned work as it relates to any energized power lines with Ameren Missouri and coordinate with Ameren Missouri for the installation of any insulation covers over the lines and/or any other designated requirements. Please note Ameren Missouri has revised the policy regarding the charges for placement, length of use and relocation of covers. The contractor is advised to contact Ameren Missouri regarding the current policy and so the anticipated cost to the contractor can be estimated and when payment is required. The Contractor shall contact Ameren Missouri at least two weeks in advance of when construction work is scheduled to begin to request covers to be placed at a given location. **The contractor is responsible for any charges from Ameren Missouri for this provision and payment will be directly to Ameren Missouri.**

4.0 Contact. The contractor shall notify the District Utility Coordinator, Michael Quadrini, via phone (314-648-4079) or email (Michael.quadrini@modot.mo.gov) for information and coordination on new power supply construction before performing any work.

5.0 Basis of Payment. There is no direct pay for complying with this provision.

EE. 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.

FF. MoDOT ITS Equipment within Project Limits

1.0 Description. MoDOT owned fiber optic cable and conduit, critical MoDOT power supplies and power cables, and pull boxes for fiber and power cabling, are present within the limits of this project. Damage or interruption of these items can cause extensive outages to the MoDOT network.

2.0 Construction Requirements. The contractor shall exercise reasonable care while completing work near these facilities and shall take steps necessary to protect these facilities from damage for all items that are not specifically identified as being removed and/or relocated in the plans. Should any of the existing wiring or conduit be damaged by the contractor, it shall be replaced at the contractor's expense and the system in full operation within 4 hours of when the damage occurred. If it is mutually agreed upon between the Commission and the Contractor that the repairs will require more than 4 hours to complete, a mutually agreed upon time for repairs to be complete will be determined.

2.1 The contractor shall not modify any existing network or electrical connections within equipment cabinets, unless coordinated with MoDOT ITS staff. Existing connections include, but are not limited to, fiber jumpers, CAT5(e) cables, power supplies and power strips. The connection to specific fiber and copper ports on network equipment shall also not be modified, unless coordinated with MoDOT ITS staff, as the network equipment has been configured specifically for each equipment cabinet. Significant network outages and unnecessary troubleshooting to investigate outages can occur, even with minor changes to existing connections within the cabinet.

3.0 Liquidated Damages. In the event of damage, if the system is not repaired and in full operation within 4 hours of the damage occurring, or within the timeframe agreed upon, the contractor will be charged with a liquidated damage specified in the amount of \$100 per hour for each full hour that the system is not fully operational. This damage will be assessed independently of the liquidated damages specified elsewhere in the contract.

3.1 The MoDOT engineer will also have the option of issuing a work order for MoDOT's on-call ITS maintenance contractor to make repairs, if it is the engineer's opinion that the contractor creating the damage will not be able to make repairs in a timely manner. The ITS maintenance contractor will then bill the contractor causing the damage directly.

4.0 Basis of Payment. No direct payment shall be made for compliance with this provision.

GG. Lump Sum Temporary Traffic Control JSP-22-01B

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.

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:

(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:

Item No.	Unit	Description
616-99.01	Lump Sum	Misc. Lump Sum Temporary Traffic Control

HH. Truck Mounted Attenuator (TMA) for Stationary Activities

1.0 Description. Provide and maintain Truck Mounted Attenuators (TMA) in accordance with Sec 612 and as specified herein.

2.0 Construction Requirements. Truck Mounted Attenuators (TMA) shall be used for the work activities indicated in the plans or specified herein.

2.1 Camera Installation Lane Closure. A TMA or TMAs shall be used for lane closures implemented to allow for the installation of new camera poles and mounting of cameras on dynamic message signs. The number of TMAs required will depend on the number of lanes being closed as shown in the temporary traffic control details.

3.0 Method of Measurement. No measurement will be made for Truck Mounted Attenuators (TMA).

4.0 Basis of Payment. Delete Sec 612.5.1 and substitute with the following:

612.5.1 No payment will be made for truck mounted attenuators (TMAs) used in mobile operations or for any TMAs designated as optional.

612.5.1.1 Payment for TMAs required for stationary work activities will be paid for at the contract unit bid price for Item 612-30.01, Truck Mounted Attenuator (TMA), per lump sum. The lump sum payment includes all work activities that require a TMA, regardless of the number of deployments, relocations, or length of time utilized. No payment will be made for repair or replacement of damaged TMAs.

II. Supplemental Revisions JSP-18-01KK

- 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 or Steel Products.

The contractor's attention is directed to Title 23 CFR 635.410 *Buy America Requirements*. Where articles, materials or supplies that consist wholly or predominantly of iron or steel or a combination of both 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. Predominantly of iron or steel or a combination of both means that the cost of the iron and steel content exceeds 50 percent of the total cost of all its components. 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.

Job No.: JSL0184
Route: Various
County: Various

106.9.1.1 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.

106.9.1.2 “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.

106.9.1.3 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.

106.9.1.3.1 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 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.

106.9.1.3.2 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.

106.9.1.3.3 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.

106.9.1.4 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.

106.9.2 Buy America Requirements for Construction Materials other than iron or steel products.

Construction materials mean 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

106.9.3 Buy America Requirements for Manufactured Products.

Manufactured products mean articles, materials or supplies that have been processed into a specific form and shape, or combined with other articles, materials or supplies to create a product with different properties than the individual articles, materials or supplies. If an item is classified as an iron or steel product, an excluded material, or other product category as specified by law or in 2 CFR part 184, then it is not a manufactured product. However, an article, material or supply classified as a manufactured product may include components that are iron or steel products, excluded materials, or other product categories as specified by law or in 2 CFR part 184. Mixtures of excluded materials delivered to a work site without final form for incorporation into a project are not a manufactured product.

106.9.3.1 Produced in the United States, in the case of manufactured products, means:

- (A) For projects obligated on or after October 1, 2025, the product was manufactured in the United States; and
- (B) For projects obligated on or after October 1, 2026, the product was manufactured in the United States and the cost of the components of the manufactured product that are mined, produced, or manufactured in the United States is greater than 55 percent of the total cost of all components of the manufactured product.

106.9.3.2 (i) With respect to precast concrete products that are classified as manufactured products, components of precast concrete products that consist wholly or predominantly of iron or steel or a combination of both shall meet the requirements of paragraph (b) of this section. The

cost of such components shall be included in the applicable calculation for purposes of determining whether the precast concrete product is produced in the United States.

(ii) With respect to intelligent transportation systems and other electronic hardware systems that are installed in the highway right of way or other real property and classified as manufactured products, the cabinets or other enclosures of such systems that consist wholly or predominantly of iron or steel or a combination of both shall meet the requirements of paragraph (b) of this section. The cost of cabinets or other enclosures shall be included in the applicable calculation for purposes of determining whether systems referred to in the preceding sentence are produced in the United States.

106.9.4 Waiver for De Minimis Costs for Manufactured and Construction Materials other than iron or steel products.

“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.

- Third-Party Test Waiver for Concrete Aggregate

1.0 Description. Third party tests may be allowed for determining the durability factor for concrete pavement and concrete masonry aggregate.

2.0 Material. All aggregate for concrete shall be in accordance with Sec 1005.

2.1 MoDOT personnel shall be present at the time of sampling at the quarry. The aggregate sample shall be placed in an approved tamper-evident container (provided by the quarry) for shipment to the third-party testing facility.

2.2 AASHTO T 161 Method B Resistance of Concrete to Rapid Freezing and Thawing, shall be used to determine the aggregate durability factor. All concrete beams for testing shall be 3-inch wide by 4-inch deep by 16-inch long or 3.5-inch wide by 4.5-inch deep by 16-inch long. All beams for testing shall receive a 35-day wet cure fully immersed in saturated lime water prior to initiating the testing process.

2.3 Concrete test beams shall be made using a MoDOT approved concrete pavement mix design.

3.0 Testing Facility Requirements. All third-party test facilities shall meet the requirements outlined in this provision.

3.1 The testing facility shall be AASHTO accredited.

3.1.1 For tests ran after January 1, 2025, accreditation documentation shall be on file with the Construction and Materials Division prior to any tests being performed.

3.1.2 Construction and Materials Division may consider tests completed prior to January 1, 2025, to be acceptable if all sections of this provision are met, with the exception of 3.1.1. Accreditation documentation shall be provided with the test results for tests completed prior to January 1, 2025. No tests completed prior to September 1, 2024, will be accepted.

3.2 The testing facility shall provide their testing process, list of equipment, equipment calibration documentation, and testing certifications or qualifications of technicians performing the AASHTO T 161 Procedure B tests. The testing facility shall provide details on their freezing and thawing apparatus including the time and temperature profile of their freeze-thaw chamber. The profile shall include the temperature set points throughout the entirety of the freeze-thaw cycle. The profile shall show the cycle time at which the apparatus drains/fills with water and the cycle time at which the apparatus begins cooling the specimens.

3.3 Results, no more than five years old, from the third-party test facility shall compare within ± 2.0 percent of an independent test from another AASHTO accredited test facility or with MoDOT test records, in order to be approved for use (e.g. test facility results in a durability factor of 79, MoDOT's recent durability test factor is 81; this compared within +2 percent). The independent testing facility shall be in accordance with this provision. The comparison test can be from a different sample of the same ledge combination.

3.4 When there is a dispute between the third party durability test results and MoDOT durability test results, the MoDOT durability test result shall govern.

3.5 Test results shall be submitted to MoDOT's Construction and Materials division electronically for final approval. Test results shall include raw data for all measurements of relative dynamic modulus of elasticity and percent length change for each individual concrete specimen. Raw data shall include initial measurements made at zero cycles and every subsequent measurement of concrete specimens. Raw data shall include the cycle count and date each measurement was taken. Test results shall also include properties of the concrete mixture as required by AASHTO T 161. This shall include the gradation of the coarse aggregate sample. If AASHTO T 152 is used to measure fresh air content, then the aggregate correction factor for the mix determined in accordance with AASHTO T 152 shall also be included.

4.0 Method of Measurement. There is no method of measurement for this provision. The testing requirements and number of specimens shall be in accordance with AASHTO T 161 Procedure B.

5.0 Basis of Payment. No direct payment will be made to the contractor or quarry to recover the cost of aggregate samples, sample shipments, testing equipment, labor to prepare samples or test samples, or developing the durability report.

- ***Delete paragraph 15.0 of the General Provision Disadvantaged Business Enterprise (DBE) Program Requirements and substitute the following:***

15.0 Bidder's List Quote Summary. MoDOT is a recipient of federal funds and is required by 49 CFR 26.11 to provide data about its DBE program. All bidders who seek to work on federally assisted contracts must submit data about all DBE and non-DBEs in accordance with Sec 102.7.9. MoDOT will not compare the submitted Bidder's List Quote Summary to any other documents or submittals, pre or post award. All information will be used by MoDOT in accordance with 49 CFR 26.11 for reporting to USDOT and to aid in overall DBE goal setting.

- ***Add Sec 102.7.9 to include the following:***

Job No.: JSL0184
Route: Various
County: Various

102.7.9 Bidder's List Quote Summary. Each bidder shall submit with each bid a summary of all subcontractors, material suppliers, and service providers (e.g. hauling) considered on federally funded projects pursuant to 49 CFR 26.11. The bidder will provide the firm's name, the corresponding North American Industry Classification System (NAICS) code(s) the firm(s) were considered for, and whether or not they were used in the bid. The information submitted should be the most complete information available at the time of bid. The information shall be disclosed on the Bidder's List Quote Summary form provided in the bidding documents and submitted in accordance with Sec 102.10. Failure to disclose this information may result in a bid being declared irregular.