


Job No.: J6I3644 J6I3645
Route: Various Various
County: Various 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-09-02J | 1 |
| B. | Contract Liquidated Damages JSP-13-01C | 1 |
| C. | Scope of Work J6I3644 | 2 |
| D. | Scope of Work J6I3645 | 3 |
| E. | Work Zone Traffic Management JSP-02-06N | 3 |
| F. | Emergency Provisions and Incident Management JSP-90-11A | 7 |
| G. | Project Contact for Contractor/Bidder Questions JSP-96-05 | 8 |
| H. | NTCIP Compliant Changeable Message Sign (Contractor Furnished and Retained) | 8 |
| I. | Traffic Management Coordination | 11 |
| J. | Dynamic Message Sign Replacement | 11 |
| K. | Sign Structure Base Mesh | 13 |
| L. | Salvage Existing Sign Components | 14 |
| M. | DMS Training | 14 |
| N. | DMS Control Cable | 15 |
| O. | Program and Replace Ethernet Switch | 15 |
| P. | General Electrical Requirements | 17 |
| Q. | Site Restoration | 18 |
| R. | Erosion Control | 18 |
| S. | Conduit | 19 |
| T. | ITS Pull Box Cover | 21 |
| U. | Remove and Reinstall Cable | 21 |
| V. | Fiber Optic Cable Installation and Relocation | 21 |
| W. | Equipment Cabinets | 27 |
| X. | 120 Volt Power Strip | 31 |
| Y. | Install MoDOT Furnished IP-Addressable Power Strip | 31 |
| Z. | Install Communication Equipment | 31 |
| AA. | Cabinet Base | 32 |
| BB. | ITS Asset Management Tool | 33 |
| CC. | Contractor-Furnished and Install Closed Circuit Television (CCTV) Assembly | 34 |
| DD. | Removal of CCTV Camera and Assembly | 36 |
| EE. | Coordination with ITS Staff and Utility Locates | 37 |
| FF. | Utilities | 37 |
| GG. | Contractor Quality Control NJSP-15-42 | 38 |
| HH. | MoDOT ITS Equipment within Project Limits | 40 |
| II. | Lump Sum Temporary Traffic Control JSP-22-01A | 41 |
| JJ. | Supplemental Revisions JSP-18-01AA | 43 |

Job No.: J613644 J613645
 Route: Various Various
 County: Various Various

| | |
|--|---|
|  <p>THIS SHEET HAS BEEN SIGNED, SEALED, AND DATED ELECTRONICALLY.</p> | 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: J613644 & J613645 VARIOUS COUNTIES, MO DATE PREPARED: 12/17/2023 |
| | ADDENDUM DATE: |
| Only the following items of the Job Special Provisions (Roadway) are authenticated by this seal: All | |

Job No.: J613644 J613645
Route: Various Various
County: Various Various

JOB
SPECIAL PROVISION

A. General - Federal JSP-09-02J

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 2023 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-13-01C

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 (J613644 and J613645) 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.: J613644 J613645
Route: Various Various
County: Various Various

Notice to Proceed: April 8, 2024
Completion Date: March 12, 2025

2.1 Calendar Days. 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 |
|------------|---------------|----------------------|
| J613644 | N/A | \$9,800 |
| J613645 | N/A | \$9,800 |

3.0 Liquidated Damages for Contract Administrative Costs. Should the contractor fail to complete the work on or before the contract completion date specified in Section 2.0, or within the number of calendar days specified in Section 2.1, whichever occurs first, the contractor will be charged contract administrative liquidated damages in accordance with Sec 108.8 in the amount of **\$750** 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 above 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 J613644

1.0 Description. Replace 12 existing dynamic message signs (DMS) with Commission furnished full color matrix DMSs with a pixel pitch of 20 mm in St. Louis County and St. Charles County. Replace 60 Ethernet switches and power supplies with Commission furnished equipment in existing roadside cabinets in Franklin County, Jefferson County, St. Charles County, St. Louis County and St. Louis City. New DMS controllers shall be installed in new cabinets at three of the DMS locations and in nine existing cabinets being used in place. At the DMS locations having new cabinets installed, provide equipment cabinets, foundations and relocate equipment as noted in the plans. The work also includes modifying existing electrical conductors and fiber optic cabling to service the new equipment cabinets at the roadside locations. DMS control cable shall be a multimode fiber optic cable.

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.

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

Job No.: J613644 J613645
Route: Various Various
County: Various Various

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. Scope of Work J613645

1.0 Description. Replace the existing analog and older IP CCTV cameras with new IP CCTV cameras at 49 locations in Jefferson County, St. Charles County, St. Louis County and St. Louis City and replace 130 Ethernet switches and power supplies with Commission furnished equipment in existing roadside cabinets in Franklin County, Jefferson County, St. Charles County, St. Louis County and St. Louis City. Forty-nine dome style IP CCTV cameras will be installed on existing poles using new mounting brackets provided by the camera manufacturer. New cabling shall also be installed between the new cameras and the existing cabinet, except for cameras mounted on high mast light towers. In the existing cabinets, the new power injector shall be installed and connected to power and the existing Ethernet switch or media converter.

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.

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 camera installation quickly so as not to delay other contractors. The contractor must coordinate with SLITS staff to make newly installed IP cameras 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.

E. 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.

Job No.: J613644 J613645
Route: Various Various
County: Various Various

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 |

Job No.: J613644 J613645
Route: Various Various
County: Various Various

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-44 in St. Louis City and 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.

Job No.: J613644 J613645
Route: Various Various
County: Various Various

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.

F. 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.

Job No.: J613644 J613645
Route: Various Various
County: Various Various

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.

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

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

Jamie Rana, P.E.
Project Manager
Missouri Department of Transportation - St. Louis District
1590 Woodlake Drive
Chesterfield, Missouri 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 at (573) 751-2876.

H. NTCIP Compliant Changeable Message Sign (Contractor Furnished and Retained)

1.0 Description. All solar powered changeable message signs, hereinafter referred to as a CMS, shall be in accordance with these specifications.

2.0 Material. Each CMS shall consist of an all LED (light emitting diode) matrix message board, solar/battery power supply and a user-operated interface, as specified, all mounted on a heavy duty, towable trailer.

2.1 Each CMS shall be either Full Matrix or Character Matrix, and have the following minimum characteristics:

- (a) Full Matrix - Each CMS shall be the Full Matrix type with the capability of providing one, two, and three lines of individual changeable characters with minimum heights of 52 (1300), 28 (700), and 18 (450) inches (mm), respectively. Full Matrix signs shall be capable of both static and dynamic graphics, and full display sized messages.
- (b) Character Matrix (Three Line) – Each CMS shall consist of a minimum of three lines containing eight individual changeable characters per line. Each character shall be a minimum of 12 inches wide and 18 inches (450 mm) high.
- (c) Sign firmware shall comply with the current FHWA and DOT (Department of Transportation) NTCIP standards and support all NTCIP mandatory objects.

Job No.: J613644 J613645
Route: Various Various
County: Various Various

- (d) The sign controller shall be remotely accessible by the MoDOT St Louis District Transportation Management Center (TMC) through the Commission's ATMS (Advanced Traffic Management System) software, currently Intelligent NETWORK (iNET) provided by Parsons. The contractor will be responsible for ensuring the CMS is added to the ATMS software.
- (e) The CMS shall have a cellular data modem compatible with the district's current cellular IP (packet data) service provider and be capable of allowing the MoDOT St Louis District TMC ATMS software to have full control of the NTCIP compliant CMS controller remotely. Modem shall be capable of being programmed with a static IP.
- (f) The sign shall have a GPS unit that can assist in locating the sign's position when polled by the TMC. The GPS unit must be remotely accessible by the TMC and be part of or work with the provided communication modem.
- (g) Physical access to the onboard computer shall be protected by a padlock or other locking handle mechanism. Electronic access to the onboard computer shall be protected by a username and password.

2.2 Full matrix CMS and character matrix CMS shall meet the following:

- (a) The overall sign dimensions shall not be less than 72 inches (1800 mm) high x 126 inches (3150 mm) wide.
- (b) The CMS shall be legible up to a distance of 650 feet (200 m) for both day and night operations and shall be visible for ½-mile (800 m) with 18-inch (450 mm) characters.
- (c) When fully raised in the display position, the bottom of the CMS board shall be at least a height of 7 feet (2100 mm) from the ground and shall be able to rotate a complete 360 degrees atop the lift mechanism. A sight tube, used to aim the CMS board to oncoming traffic, shall be installed on the CMS board or mast. The CMS shall have an electrical-hydraulic lifting mechanism that includes a manual lifting and lowering relief mechanism as a backup. It also must be able to be locked into various viewing angles as determined best for the motorists by the CMS operator.
- (d) All LED displays and control circuitry shall be operational from -20 F (-29 C) to 120 F (50 C). The LEDs shall have a rated life of 100,000 hours. The LEDs shall be ITE amber in color on a flat black background.
- (e) The CMS face shall be constructed that if an individual panel or pixel fails the rest of the face shall continue to display the message.
- (f) All costs and coordination needed for testing to verify modem communication, sign NTCIP compliance, remote GPS status polling, ability to control the sign via the St Louis District's ATMS software provided by Parsons shall be the sole responsibility of the Contractor. Full integration into Parsons' ATMS shall be completed at least 5 business days prior to use of the CMS in the project. Parsons contact information will be provided to the contractor by contacting MoDOT's Gateway Guide staff at 314-275-1526 or via email at SLITS@modot.mo.gov with details of the request. No other support shall be provided by

Job No.: J613644 J613645
 Route: Various Various
 County: Various Various

MoDOT other than Parsons contact information. Information provided shall include, at a minimum, CMS make and model, IP address, and proposed locations and messages.

- (g) The Contractor shall be responsible for all monthly cellular service fees for the duration of the project.
- (h) The unit shall be able to withstand a 65-mph (105-kmph) maximum road wind speed. The trailer shall be able to support the fully extended CMS board in an 80-mph (130-kmph) wind load.
- (i) Solar charging system shall allow for total autonomy of 24/7/365 continuous operation.
- (j) All exterior surfaces except the sign face shall be cleaned, primed, and finished with two coats of Highway Safety Orange and the sign interior itself shall be cleaned and finished with one coat of corrosion inhibiting primer and two coats of flat black. The sign face shall be covered with a rigid translucent material to prevent damage to the sign face caused by the environment.

3.0 Construction Requirements. Prior to placing a CMS on a project, the engineer shall verify proposed CMS location is void of conflict with another DMS or CMS locations presently established. If a conflict is present, the engineer shall contact the Traffic Management Center (TMC) at 314-275-1526 to mitigate. If no conflict is present, engineer shall provide Traffic Management Center (TMC) with the Job Number, Route, County, specific CMS location, and a CMS identification number that is permanently affixed to the CMS. The engineer and contractor shall verify the message displayed on board is compliant with CMS messaging policies. The contractor shall place the CMS 6 feet [2 meters] off of the right edge of shoulder at the location shown on the plans or as directed by the engineer. The CMS shall be placed so that the right side of the unit is advanced approximately 3 degrees ahead with the direction of traffic. CMS shall not be located in medians. CMS shall be delineated with a minimum of five non-metallic channelizing devices. Installation, including location and placement, shall be approved by the engineer. If needed, the contractor shall relocate the CMS as directed by the engineer.

3.1 When not in use, the CMS shall be stored no closer than 30 feet [10 meters] to the edge of pavement carrying traffic, unless it is in a properly protected area or an off-site storage area or as otherwise directed by the engineer.

4.0 Basis of Payment. All expenses incurred by the contractor in integrating, maintaining, relocating, operating, and protecting the changeable message signs as outlined above shall be paid for at the contract unit price for Item 616-99.02 Changeable Message Sign, Contractor Furnished and Retained, per Each.

4.1 Cost for channelizers shall be included in the contract unit price for CMS.

4.2 Cost for cellular phone hookup and monthly usage fee for the duration of the project shall be included in the contract unit price for CMS.

| Item No. | Type | Description |
|-----------|------|---|
| 616-99.02 | Each | NTCIP Changeable Message Sign (Contractor Furnished and Retained) |

Job No.: J613644 J613645
Route: Various Various
County: Various Various

I. Traffic Management Coordination

1.0 Description. The contractor shall coordinate traffic management between this project and any other projects on I-44 and I-270, and projects which affect Route I-44 and I-270, including all future projects. The contractor shall be aware of the following job:

J613020B – I-270 North design-build project from west of U.S. 67 to Bellefontaine Road

1.1 This list of projects is not all inclusive. 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.

J. Dynamic Message Sign Replacement

1.0 Description of Work. Replace existing dynamic message sign (DMS) with a Commission furnished full color/full matrix display DMS. Install the new DMS on the existing sign structure. The sign controller shall be installed in a new or existing equipment cabinet. Provide a new multimode fiber optic communications cable connecting the DMS to the sign controller in the equipment cabinet. Connect the sign and controller to power, communication, and ground. The contractor shall install, configure, and test the DMS for proper operation with assistance from the manufacturer's representative.

The existing signs to be replaced are all 4 line/15 character display with 18-inch characters and walk-in cabinet signs. They are full matrix signs with amber LEDs and 66 mm pixel pitch that allow for four lines of 18-inch text.

The contractor shall coordinate this work with MoDOT St. Louis District ITS group by emailing SLITS@modot.mo.gov and calling Anna Privitt at 314-624-7466 to verify DMS can be operated by MoDOT ATMS (Advanced Traffic Management System). Construction related activities shall be coordinated with Nicholas Gibbons (314-453-1871 office, 314-239-5975 cell, nicholas.gibbons@modot.mo.gov) and Nathan Norton (636-484-6018 cell, nathan.norton@modot.mo.gov).

Job No.: J613644 J613645
Route: Various Various
County: Various Various

2.0 Materials.

2.1 Daktronics Vanguard VF-2020-120x336-20-RGB dynamic message sign along with a controller will be provided by the Commission.

2.2 Dimensions and Weight. The nominal exterior dimensions and weight of the DMS are as follows:

9'-9" (H) x 24'-9" (W) x 4'-0" (D) and 4,200 lbs.

2.3 Use an AWG # 6 wire or equivalent bonding straps to bond the sign to the structure.

2.4 The Contractor shall furnish any other miscellaneous hardware required to complete this task per manufacturer and MoDOT specifications.

3.0 Construction Requirements.

3.1 Pickup. The DMS and associated controller shall be picked up from the MoDOT facility located at 669 Salt Mill Rd. Chesterfield, MO 63017. DMSs and controllers can be picked up on an as needed basis. Call the Gateway Guide TMC emergency response supervisor or Brian Umfleet at 314-275-1513 at least 24 hours in advance of desired pickup time to schedule a pickup. Weekend pickups are not allowed.

3.2 Examine DMS carefully to verify that they have not been damaged in transit and provide the equipment required to load the signs for local transport. Once the DMS is accepted for loading and transport, remediation of any damage to the signs becomes the responsibility of the contractor.

3.3 Remove the existing DMS from the structure and install the new DMS on the same day. The DMS shall not be removed until the contractor has the new DMS delivered and ready for installation. Transport the existing DMS to an off-site indoor facility for the salvaging of components. The contractor is responsible for any damage occurring during existing DMS removal and new DMS installation.

3.4 The contractor shall mount the DMS to the sign structure in accordance with the manufacturer's recommendations. The manufacturer shall have an on-site representative for sign commissioning. Do not provide initial power to the sign without the permission of the manufacturer's representative. The contractor shall have full responsibility of working with the manufacturer's representative to ensure sign commissioning is completed fully and to the approval of engineer.

3.5 Use a device that measures resistance to ground using the three-point fall-of-potential method to ensure that the resistance from the sign's ground bar to ground does not exceed 10 ohms. If resistance exceeds 10 ohms check and repair grounding system to meet the requirement.

3.6 Install new sign controller in existing or new cabinet. Make needed power and network connections within the cabinet.

3.7 Install the new power conductors, ground wire and fiber optic communications cables between the new roadside cabinet and the sign housing.

4.0 Testing.

4.1 Site Testing. Conduct stand-alone equipment installation tests at the field site following an engineer approved test plan. Test all stand-alone (i.e., non-network) functions of the DMS equipment using equipment installed as detailed in the plans and as approved by the engineer. Complete approved testing documentation forms and turn them over to the engineer for review and as a basis for rejection or acceptance. Provide a minimum notice of 15 calendar days prior to all tests to permit the engineer or his representative to observe each test.

4.2 System Testing. Conduct DMS system tests on the field equipment with the master equipment including, at a minimum, all remote-control functions. Testing shall follow an engineer approved test plan. Display the return status codes from the sign controller for a minimum of 72 hours. Demonstrate the sign’s ability to display the proper predefined message or remain blank when power is restored following an AC power interruption. Complete approved testing documentation forms and turn them over to the engineer for review, and as a basis for rejection or acceptance.

4.3 Testing Failure. If any component fails during either site or system testing, the component shall be corrected or another component substituted in its place and the test repeated. If a component has been modified as a result of a failure, a report shall be prepared and delivered to the engineer. The report shall describe the nature of the failure and the corrective action taken. If a failure pattern develops, the engineer may direct that design and construction modifications be made to all signs without additional cost to the Department or an extension of the contract period.

4.4 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.

5.0 Documentation.

5.1 As-Built Drawings. Provide drawings illustrating the equipment locations and conduit routing.

6.0 Basis of Payment. Measurement and payment for replacing existing DMSs with new color DMS includes all miscellaneous hardware required for a safe, fully operational color DMS along with removal, transport, testing and documentation. Payment will be made as follows:

| Item No. | Type | Description |
|-----------|------|---|
| 910-99.02 | Each | Roadside Dynamic Message Sign Replacement |

K. Sign Structure Base Mesh

1.0 Description. Existing grout between the sign structure base plate and the drilled shaft foundation shall be removed and steel mesh shall be installed to prevent access by rodents.

Job No.: J613644 J613645
 Route: Various Various
 County: Various Various

2.0 Materials. Screens shall be press-formed of 3 or 4 mesh, 21 gage or heavier, stainless steel or hot-dipped galvanized wire screen or approved equivalent.

3.0 Construction Requirements. Remove existing grout between concrete base and post base plate. Install galvanized screen between the post base plate and concrete base as shown in the plans. The screen shall provide a friction-tight fit when installed.

4.0 Basis of Payment. All work, materials, and equipment necessary to complete the grout removal and mesh installation shall be paid for at the unit price per each for Sign Structure Base Mesh:

| Item No. | Type | Description |
|-----------|------|--------------------------|
| 910-99.02 | Each | Sign Structure Base Mesh |

L. Salvage Existing Sign Components

1.0 Description. Salvage existing DMS components and deliver the salvaged items to MoDOT.

2.0 DMS Components. Salvage the sign controller from inside the sign, the sign controller located in the cabinet, LED display modules, surge protectors and power supplies.

3.0 Packaging and Delivery. Package all savaged components in boxes that can be hand carried. Label each box with the type and number of components enclosed. Also note the date the components were salvaged on the label. Deliver the salvaged equipment to the Missouri Department of Transportation's maintenance facility located at 2309 Barrett Station Road, Ballwin, Missouri 63021. Notify MoDOT Signal Shop supervisors 24 hours prior to each delivery by emailing SLTRS@modot.mo.gov with SLITS@modot.mo.gov copied and by calling Dennis Hixson at 314-205-7319. All items not specified to be salvage shall be recycled or disposed of by the contractor.

4.0 Basis of Payment. All work, materials, and equipment necessary to complete the salvaging of sign components shall be paid for at the unit price per each for Salvage Existing Sign Components:

| Item No. | Type | Description |
|-----------|------|----------------------------------|
| 910-99.02 | Each | Salvage Existing Sign Components |

M. DMS Training

1.0 Description. Conduct a training course for MoDOT operations and maintenance staff on operating and maintaining the new DMS. Design the training course to ensure that MoDOT staff achieves a full knowledge and appreciation of the design, operation, and maintenance of equipment. Training may consist of field device operations and maintenance training, field communications operations and maintenance training and system operations and maintenance training.

2.0 Materials. Provide all training documentation, and coordination with the sign vendor to provide teaching staff. Provide the training to consist of lectures and demonstrations that shall

provide practical (hands-on) training and experience. Provide five hard copies of the training manual and one electronic copy of the training manual.

Provide a detailed training plan and a syllabus for the course for the approval of the engineer. Include in the information: tentative dates for course, location, and an outline of topics and names of instructors. Provide this information to the engineer at least 30 days in advance of the training course.

3.0 Construction Requirements. Provide up to a two-day training class to train operations and field maintenance personnel. Include in-field demonstrations.

4.0 Basis of Payment. Payment for work covered by this specification includes equipment and materials, necessary to prepare for and conduct the training. Payment will be made as follows:

| Item No. | Type | Description |
|-----------|----------|--------------|
| 910-99.01 | Lump Sum | DMS Training |

N. DMS Control Cable

1.0 Description. Furnish and install DMS control cable that is recommended by DMS vendor.

2.0 Materials. Provide DMS control cable that is recommended by the DMS vendor.

3.0 Construction Requirements. Install and terminate the DMS control cable between the cabinet and the new DMS in a manner recommended the sign vendor.

4.0 Basis of Payment. Measurement and payment for work covered by this specification includes equipment, tools, and materials, necessary to furnish and install DMS Control Cable. Payment will be made as follows:

| Item No. | Type | Description |
|-----------|-------------|-------------------|
| 910-99.03 | Linear Foot | DMS Control Cable |

O. Program and Replace Ethernet Switch

1.0 Description. Program and replace existing Ethernet switch with new Commission-furnished Ethernet switch in existing roadside cabinets. The switch replacement will also include replacement of the switch power supply and installation of an expansion module as shown in the plans. The replacement switches shall also be programmed. Connect replacement switch to power, network, and ground. Test the completed installation and report any problems to the engineer. Troubleshoot to the point of identifying the connection that is causing the communication problem. The old switch, power supply and expansion modules shall be recycled following appropriate e-waste protocols.

2.0 Materials.

2.1 Cisco IE 3300 Ethernet switch, power supply and switch expansion module will be provided by the Commission.

Job No.: J613644 J613645
Route: Various Various
County: Various Various

2.2 Existing small form-factor pluggable (SFP) optical transceivers will be reused in the new switch.

2.3 Contractor shall provide all power cables and wires to connect the switch to power and ground the equipment per manufacturer's requirements.

2.4 Fiber optic jumpers shall be contractor furnished. Jumpers shall meet the requirement provided in Section V.

2.5 The contractor shall provide any other cables such as Category 5E patch cords, as required to replace cables damaged during the switch replacement.

3.0 Construction Requirements.

3.1 Schedule. Provide to the engineer a schedule for when switch programming and replacement of switches will begin, at least 30 days before commencing this type of work. Additionally, provide the engineer a list of the switched to be replace the next day the day before the replacements. The list should be emailed to SLITS@modot.mo.gov.

3.2 Pickup. The switches, power supplies and expansion modules shall be picked up from the MoDOT Barrett Station maintenance facility located at 2309 Barrett Station Rd. Ballwin, MO 63021. All the switches shall be picked up the same day. Call Dennis Hixson at 314-205-7319 at least two days in advance to schedule the pickup day and time.

3.3 Switch Programming. Programming of switches shall occur at the contactor's facility. The Commission will provide a configuration template and the existing switch configuration for the switch to be replaced. The contractor shall engage with a Commission approved vendor to program the replacement switch to replicate the functionality of the existing switch. Before beginning the switch programming, the contactor shall provide a written plan explaining the process to be followed and the equipment to be used to program the switches. For up to ten switches the contractor shall provide a configuration file or script to the engineer for review. The engineer will provide the list of switches for which these files must be provided for review.

3.4 Pre-installation. Before disconnecting and removing the existing switch, take a picture of the cabinet with the door open and a picture of the switch face. Note the active network connections for use in confirming the replacement switch has reestablished all existing connections.

3.4 Installation. The switch and power supply shall be mounted on the existing DIN rail bracket the switch being replaced is mounted to. Confirm that with the switch mounted on the existing DIN rail the cabinet door can be closed without touching any of the cabling. If cables are touched by the closed door, install a deeper DIN rail to eliminate the conflict. Relocate the existing SFPs from the switch being replaced to the new switch. Install new fiber optic jumpers to connect the new switch to the existing patch panel. The new jumpers and existing patch panel ports shall be cleaned prior to installation of the new jumpers. If the connectors or pigtails in the existing patch panel are damaged, the contractor shall make the necessary repairs. Connect all existing copper patch cables. If a patch cable is damaged, the contractor shall replace it.

3.5 Wiring. Connect the switch power supply to the existing 120V IP Power Strip "Unswitched Outlets" (meaning it is always on and cannot be rebooted remotely). Ground the equipment as recommended by the manufacturer.

3.3 Testing and Documentation. Use notes and images taken of the existing switch to confirm all cables are connected and communication links are active that were active prior to the switch replacement. Take a picture of the cabinet with the door open and a picture of the switch face. Contact the STL ITS to confirm the replacement switch is performing as expected. Contact information will be provide at the pre-construction meeting.

3.4 Troubleshooting. If the replacement switch is not performing as expected remain on-site to assist the Commission staff in making the installed switch operational. If a problem occurs with a replacement switch withing 5 business days of replacement, the contractor shall provide on-site troubleshooting assistance. Troubleshooting may entail having a person with a cellular telephone at the cabinet reporting on results and making changes as directed by Commission staff. It may also entail installing replacement equipment when a unit cannot be made to work properly.

3.5 Recycling. The switches, power supplies and expansion module being replaced shall be recycled following state of Missouri e-waste recycling requirements. Recycling of the flash memory cards from each switch must also include a certified data destruction process. Provide the engineer the name of companies to be used for the data destruction and recycling of the electronics for approval. Provide a certificate of data destruction and written documentation that the electronics were recycled by the approved electronic waste recycling company.

4.0 Basis of Payment. Measurement and payment for Ethernet switch and expansion module replacement will be on a per device replaced basis and includes all programming. The unit price shall include patch cords, cabling, power supply installation, relocation of SFPs, assistance to Commission staff in getting the switch 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 | Ethernet Switch Programming & Replacement |
| 910-99.02 | Each | Expansion Module Programming & Replacement |

P. 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.

Job No.: J613644 J613645
Route: Various Various
County: Various Various

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.

Q. 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.

R. 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.

S. Conduit

1.0 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.

3.2 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 percent 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 Install Conduit into Existing Pull Box.

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

3.3.2 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.

3.3.3 Install the conduit.

3.3.4 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.

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

| Item No. | Type | Description |
|-----------|-------------|--|
| 910-52.01 | Linear Foot | Conduit, 3 in., Rigid, In Trench |
| 910-99.02 | Each | Install Conduit into Existing Pull Box |

T. ITS Pull Box Cover

1.0 Description. Provide a replacement cover for a standard Class 5 ITS pull box and replace the existing damaged lid.

2.0 Materials. Provide a Class 5 pull box cover that meets the requirements in Section 1062 of the Missouri Standard Specifications for Highway Construction, as shown on the drawing 902.20G of the Missouri Standard Plans for Highway Construction and as shown in the plans. The cover shall be embossed with “MODOT ITS”. Before procuring the replacement cover, field measure cover size to confirm appropriate size is ordered.

3.0 Construction. Install replacement cover on existing pull box. Dispose of existing cover.

4.0 Basis of Payment. Measurement and payment for ITS Pull Box Cover includes field measurement of existing cover, installation of cover and disposal of the damaged cover to provide a functional pull box. Payment will be made as follows:

| Item No. | Type | Description |
|-----------|------|--------------------|
| 910-99.02 | Each | ITS Pull Box Cover |

U. 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. 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 |
| 910-99.03 | Linear Foot | Remove and Reinstall Power Cable |

V. Fiber Optic Cable Installation and Relocation

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 conduit system. Relocated cable must be carefully removed from the existing conduit system without being damaged.

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. Connectors shall be the LC type with ceramic ferrules unless a different connector is required to mate with the equipment or an existing panel. They shall be suitable for use in traffic cabinets and shall be designed for single mode fibers.

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 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.

2.6.2 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.

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 cable meets all requirements of Telcordia GR-771-CORE for environmentally sealed closures for buried installation.

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

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

2.9.5 The closure shall accommodate 144 single mode fiber splices.

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

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

2.9.8 Designed for butt splicing.

2.9.9 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 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.

3.2.2 Before any cable installation is performed, provide the engineer with four copies 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.

3.2.3 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.

3.2.4 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.

3.2.5 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.

3.2.6 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.

3.2.7 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. 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, to protect the fiber from scoring, dirt, or microbending.

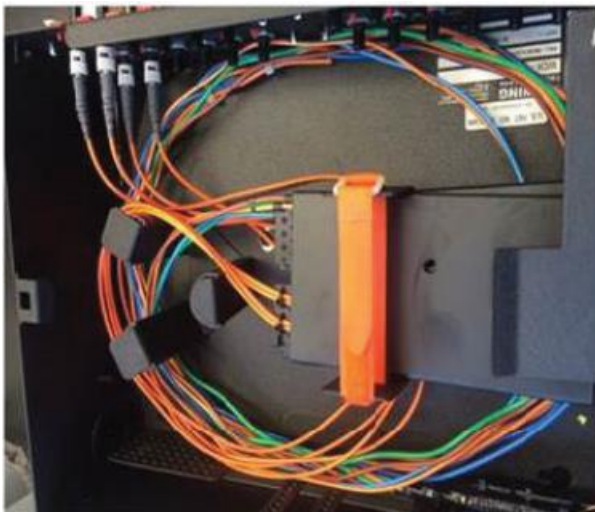
3.3.3 Prior to splicing to a fiber installed by others, measure and record the optical loss over that fiber. See Sec 4.0 of this provision.

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.

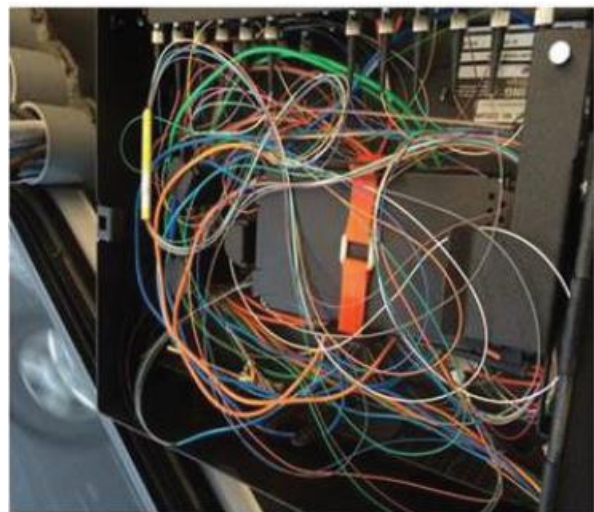
3.4 Termination. Terminate fibers by splicing them to factory-made pigtails. Cap all connectors that are not connected to a mating connector.

3.5 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.

3.6 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.

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 diagram showing all 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 five copies of this diagram to the engineer, along with the calculations for the maximum allowable loss. Submit the diagrams and 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 the acceptance testing and guarantee, in addition to all materials 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, SM |
| 910-99.02 | Each | Fiber Optic Jumper, SM |
| 910-99.02 | Each | Rack-Mounted Interconnect Center |
| 910-99.03 | Linear Foot | Remove and Reinstall FO Cable |

W. Equipment Cabinets

1.0 Description. This work consists of furnishing and installing new cabinets.

2.0 Materials.

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

2.2 All powered cabinets shall be wired for three-wire 240/120 volt AC service. Provide a surge protector designed to protect 120/240 VAC split phase breaker panels. The protector shall be UL 1449 listed and have a nominal discharge current of 20,000 amps. Its operating temperature

Job No.: J613644 J613645
Route: Various Various
County: Various Various

range shall be at least -40 degrees to 60 degrees C. It shall have no audible alarm. The device shall protect line-to-line and line-to-neutral.

2.3 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.

2.4 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.

2.5 All seams shall be continuously welded and ground smooth.

2.6 All fasteners must be stainless steel.

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

2.8 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.

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

3.0 Pole-Mounted Type 7 Cabinet.

3.1 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

3.1.1 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.

If the cabinet feeds power to a DMS, the contractor shall provide a pair of breakers connected in parallel with the 15-amp main breakers. The capacity of the breakers shall be as recommended by the manufacturer of the sign, but no larger. The arrangement shall provide three-wire, 240/120V service to the sign and shall allow a technician to disconnect power to the sign while leaving the cabinet operational, and vice versa. The contractor shall clearly label the cabinet breakers as "CABINET ONLY" and the sign breakers as "SIGN ONLY".

- **Sunshield:** On the top.
- **Mounting brackets:** Stainless steel U-bolts and any other mounting hardware needed.
- **Conduits and fittings:** As required to provide raceways for the power and communication cables shown on the plans.

3.2 Modified Type 7 Cabinet.

3.2.1 Modified Type 7 cabinets shall meet the requirements for a Type 7 cabinet except for the following differences:

- **Mounting:** Designed to be mounted on a concrete foundation.
- **Dimensions:** Depth shall be 22 inches.
- **Doors:** The cabinet shall have both front and back doors.

4.0 Construction Requirements.

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

4.2 **Base-Mounted Cabinets.** Apply silicone sealant to the bottom flanges of the cabinet before lowering it onto the foundation. Shim the cabinet, if necessary, to ensure that it is level and plumb. Use additional sealant, if necessary, to eliminate gaps between the cabinet and foundation.

4.3 **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. In either case, ensure that the cabinet ground is bonded to the ground of the electrical service and to the grounding system of all poles supporting ITS devices that are powered from the cabinet.

5.0 Acceptance Testing.

5.1 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 of the grounding system in which a circuit is shorted to the cabinet ground bar to confirm that the breaker trips. If different circuits in the cabinet have breakers of different amperages, perform this test using one of the circuits with the largest breaker capacity. Revise the proposed test procedure until it is acceptable to the engineer.

5.2 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.

5.3 If the cabinet fails, correct the problems and arrange for a new test. If the test of the grounding reveals that the breaker does 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.

6.0 Documentation.

6.1 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.

6.2 After installation, provide one reproducible 24 inch by 36 inch drawing 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.

7.0 Warranties. All items covered by this specification shall carry a two-year manufacturer’s warranty from the date of acceptance against any imperfections in materials.

8.0 Basis of Payment. Measurement and payment for items covered by this specification include the documentation and acceptance testing, in addition to all materials and equipment. The foundation for the modified Type 7 cabinet will be paid for separately. Payment will be made as follows:

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

X. 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 Modified Type 7 cabinet installation.

Y. Install MoDOT Furnished IP-Addressable Power Strip

1.0 Description. The contractor shall install the Commission furnished and programmed IP-Addressable Power Strip(s) in the ITS cabinets as shown of the plans.

2.0 Installation Requirements. The contractor 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 cabinet with the power cable facing away from the door or other devices. The old power strip as well as any other inactive devices, if present, should be removed to make room. If the contractor has any question regarding the inactive devices, they should contact MoDOT signal shop supervisor. The power source shall be hardwired to cabinet auxiliary breaker with no plug in to any cabinet outlet allowed.

3.0 Acceptance Testing. The contractor shall contact MoDOT St. Louis ITS staff (SLITS@modot.mo.gov) 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.

4.0 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 MoDOT Furnished IP-Addressable Power Strip |

Z. Install Communication Equipment

1.0 Description. Install Commission-furnished or relocated communication equipment in new and existing roadside cabinets. Connect equipment to power, communication, and ground. Test

Job No.: J613644 J613645
 Route: Various Various
 County: Various Various

the completed installation and report any problems to the engineer. Troubleshoot to the point of identifying the device that is causing the communication problem.

2.0 Materials.

2.1 Ethernet switches, video encoders, fiber optic data modems, and device servers will be provided by the Commission.

2.2 Relocate existing Ethernet switches as shown on the plans or as directed by the engineer.

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

3.0 Construction Requirements.

3.1 Provide to the engineer a detailed schedule of installation of Commission-furnished communications equipment, at least 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 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 IE3300 Ethernet Switch. The switch shall be mounted on a DIN rail bracket. DIN rail depth shall allow the cabinet door to be closed without touching any of the cabling. The Cisco switch shall be powered from the 120V IP Power Strip “Unswitched Outlets” (meaning it is always on and cannot be rebooted remotely).

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 Communication Equipment |

AA. Cabinet Base

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

Job No.: J613644 J613645
 Route: Various Various
 County: Various Various

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 |

BB. ITS Asset Management Tool

1.0 Description. For all locations where any ITS (Intelligent Transportation System) components are modified or added, the contractor shall be responsible for populating and updating Commission’s ITS Assets Management Tool. fiber management tool to reflect the final condition of the entire ITS system within the project limits as shown on the plans. Updating shall be performed by Commission approved staff (currently NexusWorx).

2.0 Construction Requirements.

2.1 Contractor shall provide any relevant notes to a specific location that can be entered into the tool to aid in the understanding of the device configuration and location. At a minimum, this will include providing the required latitude and longitude coordinates of each pull box, DMS, CCTV, node cabinet, conduit, cable, and fiber, along with any serial numbers and/or identification information. The Contractor shall locate the conduit every 100 feet using a GIS 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 fiber management tool will be required for all devices that have been installed to date as well as any devices installed 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.

3.0 Acceptance Testing.

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

3.2 Commission staff shall verify population of the fiber management tool, 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 acceptance testing, in addition to all materials and equipment necessary for a fully operational system.

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

CC. 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 existing metal poles, and install a contractor furnished power supply and surge protection in the existing cabinet. 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 iNET 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 unless the camera is mounted on a high mast light tower. If the camera is mounted on a high mast light tower, the existing cable shall be reused.

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 | Q6315-LE Dome | 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 μ s)
- 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. Unless directed differently by the engineer, install the camera in the same position as the existing camera.

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 |

DD. Removal of CCTV Camera and Assembly

1.0 The contractor shall remove the existing camera, camera dome, pan/tilt unit, device server, and all cables and connectors from the pole and dispose of it appropriately. The existing camera controller assembly in the cabinet shall be disconnected from the camera communication/power cables and the cables shall be removed from the cabinet. The contractor shall only remove the camera controller or CODEC from the cabinet if directed by the engineer.

1.1 Once removal has begun, the contractor shall be responsible for the condition of all equipment. Compensation for equipment damaged shall be deducted from the contract. The contractor may request a field meeting with the engineer, or the engineer’s representative, at the site to inspect the equipment prior to removal.

Job No.: J613644 J613645
 Route: Various Various
 County: Various Various

2.0 Basis of Payment. Payment for furnishing the labor, materials, and equipment necessary to remove the CCTV camera assembly (including the costs necessary to dispose of as directed by the engineer) shall be paid for by the contract unit price for:

| Item No. | Type | Description |
|-----------|------|---------------------------------|
| 910-99.02 | Each | Remove CCTV Camera and Assembly |

EE. 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 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. Initial contact must be made at least seven calendar days before work that may impact the existing communications network commences. Contact the ITS staff via an email at SLITS@modot.mo.gov. 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.

FF. Utilities

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

Job No.: J613644 J613645
Route: Various Various
County: Various Various

existence, location, and status of any facility. Such verification includes direct contact with the listed utilities.

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.

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

GG. 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).

Job No.: J613644 J613645
Route: Various Various
County: Various Various

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.

Job No.: J613644 J613645
Route: Various Various
County: Various Various

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.

HH. 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.

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

1.0 Delete Sec 616.11 and insert the following:

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

616.11.1 Lump Sum Temporary Traffic Control. No measurement will be made for temporary traffic control items grouped and designated to be paid per lump sum. The list of lump sum items provided in the plans or contract is considered an approximation and may be subject to change based on field conditions. This is not a complete list and may exclude quantities for duplicate work zone packages used in simultaneous operations. The contractor shall provide all traffic control devices required to execute the provided traffic control plans for each applicable operation, stage, or phase. No measurement will be made for any additional signs or devices needed except for changes in the traffic control plan directed by the engineer.

2.0 Delete Sec 616.12 and insert the following:

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

- (a) Incidental items necessary to complete the work, unless specifically provided as a pay item in the contract.
- (b) Installing, operating, maintaining, cleaning, repairing, removing, or replacing traffic control devices.
- (c) Covering and uncovering existing signs and other traffic control devices.
- (d) Relocating temporary traffic control devices, including permanent traffic control devices temporarily relocated, unless specifically included as a pay item in the contract.

- (e) Worker apparel.
- (f) Flaggers, AFADs, PFDs, pilot vehicles, and appurtenances at flagging stations.
- (g) Furnishing, installing, operating, maintaining, and removing construction-related vehicle and equipment lighting.
- (h) Construction and removal of temporary equipment crossovers, including restoring pre-existing crossovers.
- (i) Provide and maintaining work zone lighting and work area lighting.

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

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

- (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 |

Job No.: J613644 J613645
Route: Various Various
County: Various Various

JJ. Supplemental Revisions JSP-18-01AA

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:

Job No.: J613644 J613645
Route: Various Various
County: Various Various

- (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

Job No.: J613644 J613645
Route: Various Various
County: Various Various

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.

Anti-Discrimination Against Israel Certification

By signing this contract, the Company certifies it is not currently engaged in and shall not, for the duration of the contract, engage in a boycott of goods or services from the State of Israel, companies doing business in or with Israel or authorized by, licensed by, or organized under the laws of the State of Israel, or persons or entities doing business in the State of Israel as defined by Section 34.600 RSMo. This certification shall not apply to contracts with a total potential value of less than One Hundred Thousand Dollars (\$100,000) or to contractors with fewer than ten (10) employees.

Ground Tire Rubber (GTR) Dry Process Modification of Bituminous Pavement Material

1.0 Description. This work shall consist of the dry process of adding ground tire rubber (GTR) to modify bituminous material to be used in highway construction. Existing GTR requirements in Section 1015 pertain to the wet process method of GTR modification that blends GTR with the asphalt binder (terminal blending or blending at HMA plant). The following requirements shall govern for dry process GTR modification. The dry process method adds GTR as a fine aggregate or mineral filler during mix production. All GTR modified asphalt mixtures shall be in accordance with Secs 401, 402, or 403 as specified in the contract; except as revised by this specification.

2.0 Materials. The contractor shall furnish a manufacturer's certification to the engineer for each shipment of GTR furnished stating the name of the manufacturer, the chemical composition, workability additives, and certifying that the GTR supplied is in accordance with this specification.

2.1 Product Approval. The GTR product shall contain a Trans-Polyoctenamer (TOR) added at 4.5 % of the weight of the crumb rubber or an engineered crumb rubber (ECR) workability additive that has proven performance in Missouri. Other GTR additives shall be demonstrated and proven prior to use such as a five-year field performance history in other states or performance on a federal or state-sanctioned accelerated loading facility.

2.2 General. GTR shall be produced from processing automobile or truck tires by ambient or cryogenic grinding methods. Heavy equipment tires, uncured or de-vulcanized rubber will not be permitted. GTR shall also meet the following material requirements:

| Table 1 – GTR Material Properties | | |
|--|--------------------|-----------------|
| Property | Test Method | Criteria |
| Specific Gravity | ASTM D1817 | 1.02 to 1.20 |
| Metal Contaminates | ASTM D5603 | ≤ 0.01% |
| Fiber Content | ASTM D5603 | ≤ 0.5% |
| Moisture Content | ASTM D1509 | ≤ 1.0%* |
| Mineral Filler | AASHTO M17 | ≤ 4.0% |

*Moisture content of the GTR shall not cause foaming when combined with asphalt binder and aggregate during mix production

2.3 Gradation. The GTR material prior to TOR or ECR workability additives shall meet the following gradation and shall be tested in accordance with ASTM D5603 and ASTM D5644.

| Table 2 – GTR Gradation | |
|--------------------------------|----------------------------------|
| Sieve | Percent Passing by Weight |
| No. 20 | 100 |
| No. 30 | 98-100 |
| No. 40 | 50-70 |
| No. 100 | 5-15 |

3.0 Delivery, Storage, and Handling. The GTR shall be supplied in moisture-proof packaging or other appropriate bulk containers. GTR shall be stored in a dry location protected from rain before use. Each bag or container shall be properly labeled with the manufacturer’s designation for the GTR and specific type, mesh size, weight and manufacturer’s batch or Lot designation.

4.0 Feeder System. Dry Process GTR shall be controlled with a feeder system using a proportioning device that is accurate to within ± 3 percent of the amount required. The system shall automatically adjust the feed rate to always maintain the material within this tolerance and shall have a convenient and accurate means of calibration. The system shall provide in-process monitoring, consisting of either a digital display of output or a printout of feed rate, in pounds per minute, to verify feed rate. The supply system shall report the feed in 1-pound increments using load cells that will enable the user to monitor the depletion of the GTR. Monitoring the system volumetrically will not be allowed. The feeder shall interlock with the aggregate weight system and asphalt binder pump to maintain correct mixture proportions at all production rates.

Flow indicators or sensing devices for the system shall be interlocked with the plant controls to interrupt mixture production if GTR introduction rate is not within ± 3 percent. This interlock will immediately notify the operator if GTR introduction rate exceeds introduction tolerances. All plant production will cease if the introduction rate is not brought back within tolerance after 30 seconds. When the interlock system interrupts production and the plant has to be restarted, upon restarting operations; the modifier system shall run until a uniform feed can be observed on the output display. All mix produced prior to obtaining a uniform feed shall be rejected.

4.1 Batch Plants. GTR shall be added to aggregate in the weigh hopper. Mixing times shall be increased per GTR manufacturer recommendations.

4.2 Drum Plants. The feeder system shall add GTR to aggregate and liquid binder during mixing and provide sufficient mixing time to produce a uniform mixture. The feeder system shall ensure GTR does not become entrained in the exhaust system of the drier or plant and is not exposed to the drier flame at any point after introduction.

5.0 Testing During Mixture Production. Testing of asphalt mixes containing GTR shall not begin until at least 30 minutes after production or per additive supplier's recommendation.

6.0 Construction Requirements. Mixes containing GTR shall have a target mixing temperature of 325 F or as directed by the GTR additive supplier. The additive supplier's recommendations shall be followed to allow for GTR binder absorption/reaction. This may include holding mix in the silo to allow time for binder to absorb into the GTR. Rolling operations may need to be modified.

7.0 Mix Design Test Method Modification. A formal mixing procedure from the additive supplier shall be provided to the contractor and engineer that details the proper sample preparation, including blending GTR with the binder or other additives. Samples shall be prepared and fabricated in accordance with this procedure by the engineer and contractor throughout the duration of the project.

8.0 Mix design Volumetrics. Mix design volumetric equations shall be modified as follows:

8.1 Additional virgin binder added to offset GTR absorption of binder shall be counted as part of the mix virgin binder

8.2 GTR shall be included as part of the aggregate when calculating VMA of the mix.

8.2.1 GTR SPG shall be 1.15

8.3 Mix G_{sb} used to determine VMA shall be calculated as follows:

$$G_{sb (JMF)} = \frac{(100 - P_{bmv})}{\left(\frac{P_s}{G_{sb}} + \frac{P_{GTR}}{G_{GTR}}\right)}$$

where:

- $G_{sb (JMF)}$ = bulk specific gravity of the combined aggregate including GTR
- P_{bmv} = percent virgin binder by total mixture weight
- P_s = percent aggregate by total mixture weight (not including GTR)
- P_{GTR} = percent GTR by total mixture weight
- G_{sb} = bulk specific gravity of the combined aggregate (not including GTR)
- G_{GTR} = GTR specific gravity

8.4 G_{se} shall be calculated as follows:

$$G_{se} = \frac{(100 - P_b - P_{GTR})}{\left(\frac{100}{G_{mm}} - \frac{P_b}{G_b} - \frac{P_{GTR}}{G_{GTR}}\right)}$$

8.5 P_{be} shall be calculated as follows:

$$P_{be} = P_b - \frac{P_{ba}}{100} * (P_s + P_{GTR})$$

9.0 Minimum GTR Amount. The minimum dosage rate for GTR shall be 5 % by weight of total binder for an acceptable one bump grade or 10 % by weight of total binder for an acceptable two bump grade as detailed in the following table. Varying percentage blends of GTR and approved additives may be used as approved by the engineer with proven performance and meeting the specified requirements of the contract grade.

| Contract Binder Grade | Percent Effective Virgin Binder Replacement Limits | Required Virgin Binder Grade | Minimum GTR Dosage Rate |
|-----------------------|--|------------------------------|-------------------------|
| PG 76-22 | 0 - 20 | PG 70-22 | 5 % |
| | | PG 64-22 | 10 % |
| PG 70-22 | 0 - 30 | PG 64-22 | 5 % |
| | | PG 58-28 | 10 % |
| PG 64-22 | 0 – 40* | PG 58-28 | 5 % |
| | | PG 52-34 | 10 % |
| PG 58-28 | 0 – 40* | PG 52-34 | 5 % |
| | | PG 46-34 | 10 % |

* Reclaimed Asphalt Shingles (RAS) may be used when the contract grade is PG 64-22 or PG 58-28. RAS replacement shall follow the 2 x RAS criteria when calculating percent effective binder replacement in accordance Sec 401.

Delete Sec 403.19.2 and substitute the following:

403.19.2 Lots. The lot size shall be designated in the contractor’s QC Plan. Each lot shall contain no less than four sublots and the maximum subplot size shall be 1,000 tons. The maximum lot size shall be 4,000 tons for determination of pay factors. Sublots from incomplete lots shall be combined with the previous complete lot for determination of pay factors. When no previous lot exists, the mixture shall be treated in accordance with [Sec 403.23.7.4.1](#). A new lot shall begin when the asphalt content of a mixture is adjusted in accordance with [Sec 403.11](#).

Delete Sec 106.9 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.

Job No.: J613644 J613645
Route: Various Various
County: Various Various

106.9.1 Buy America Requirements for Iron and Steel.

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

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

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

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

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

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

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

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

Job No.: J613644 J613645
Route: Various Various
County: Various Various

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

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

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

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

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

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

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

106.9.7 Buy America Requirements for Manufactured Products.

Manufactured products means:

- (a) Articles, materials, or supplies that have been:

Job No.: J613644 J613645
Route: Various Various
County: Various Various

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

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

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