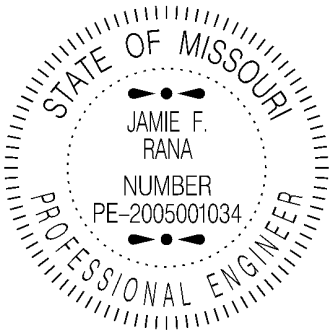
Job No.: JSL0096E
Route: Various
County: Various

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Job No.: JSL0096E
Route: Various
County: Various

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<td>

Jamie F. Rana
11/13/2026 8:29:13 AM
JAMIE F. RANA - CIVIL
MO-PE-2005001034</td>
<td>MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION
105 W. CAPITOL AVE.
JEFFERSON CITY, MO 65102
Phone 1-888-275-6636</td>
</tr>
<tr>
<td></td>
<td>If a seal is present on this sheet, JSP's have been electronically sealed and dated.</td>
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<tr>
<td></td>
<td>JOB NUMBER: SL0096E
VARIOUS COUNTIES, MO
DATE PREPARED: 8/25/26</td>
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<td>ADDENDUM DATE:
R001: November 12, 2026</td>
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Job No.: JSL0096E
Route: Various
County: Various

JOB
SPECIAL PROVISION

1
ADD

A. General - State JSP-09-03M

1.0 Description. The Federal Government is not participating in the cost of construction of this project.

1.1 This contract requires payment of the prevailing hourly rate of wages for each craft or type of worker required to execute the contract as determined by the Missouri Department of Labor and Industrial Relations. The current State Wage Rates can be found on the Missouri Department of Transportation web page at www.modot.org under "Doing Business with MoDOT", "Contractor Resources" for the applicable bid opening. This supplemental bidding document has 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.

State Wage Rates

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 2026 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.

1
REMOVE

~~A. General - Federal JSP-09-02H~~

~~**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 2022 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- 13-01E

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.

1.1 Subproject Identification. Portions of the Contract are hereby identified as subprojects with the following assignment of Bridge Number, Route, or other location of work. This identification is done for the purpose of setting time limits for completion of each subproject and to allow partial acceptance of the work for maintenance as subprojects are completed.

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

Notice to Proceed: January 4th, 2027
Contract Completion Date: December 31st, 2027

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

Project	Calendar Days	Daily Road User Cost
JSL0096E	N/A	$1,800.00

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 specified contract completion date or calendar days.

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

C. Early Notice To Proceed

1.0 Description. The contractor will be given a Notice to Proceed Date for this project, as stipulated in JSP B - Contract Liquidated Damages. All contracts shall be executed and returned to the Commission by or before the end of the day on the business day prior, in order to commence work on the Notice to Proceed date.

2.0 The contract will be distributed electronically by the Commission for execution through DocuSign® upon award.

3.0 As part of the contract execution process, the contractor shall complete and deliver the original documents/forms listed below, immediately following award of the contract.

Contract Bond Form (with associated Power of Attorney Form)
Contractor Acknowledgement Form
Workers Eligibility Verification Affidavit

3.1 These documents will be provided to the contractor through Bid Express®/BidX® correspondence immediately following Commission award. A checklist with instructions on how to complete these documents will be provided with said award correspondence. In order to expedite contract execution, contractors are encouraged to follow the instructions on the checklist. Inquiries related to completing the listed documents may be directed to the following:

Rodney Braman
Phone: (573) 751-9253
Email: Rodney.Braman@modot.mo.gov

4.0 The contractor shall deliver the original documents to the address listed below and notify Rodney Braman at the time the documents are delivered.

5.0 Potential Bidders without a current MoDOT issued DocuSign® access code shall notify Ryan Martin prior to the bid to determine the necessary steps to establish a Contractor specific access code. If another MoDOT District Office location other than the one listed below is more convenient, please contact Ryan Martin.

CENTRAL OFFICE
Ryan Martin
Bidding and Contract Services Engineer
105 West Capitol
Jefferson City, MO 65102-0270
Phone: (573) 526-2923
Email: Ryan.Martin@modot.mo.gov

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

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

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

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

2.0 Traffic Management Schedule.

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

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

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

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

2.5 Traffic Congestion. The contractor shall, upon approval of the engineer, take proactive measures to reduce traffic congestion in the work zone. The contractor shall immediately implement appropriate mitigation strategies whenever traffic congestion reaches an excess of **10 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 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 10 minutes to prevent congestion from escalating to 15 minute or above threshold. If disruption of the traffic flow occurs and traffic is backed up in queues of 15 minute delays or longer, 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.

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 Transportation Management Plan. The contractor Work Zone Specialist (WZS) shall review the Transportation Management Plan (TMP), found as an electronic deliverable on MoDOT's Online Plans Room and discuss the TMP with the engineer during the preconstruction conference. Throughout the construction project, the WZS is responsible for updating any changes or modifications to the TMP and getting those changes approved by the engineer a

minimum of two weeks in advance of implementation. The WZS shall participate in the post construction conference and provide recommendations on how future TMPs can be improved.

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

3.0 Work Hour Restrictions.

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

Memorial Day
Labor Day
Thanksgiving
Christmas
New Year's Day

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

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

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

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:

- New Years Day: January 1st, 2027
- Martin Luther King Jr. Day: January 18th, 2027
- Lincoln's Birthday: February 12th, 2027
- Washington's Birthday: February 15th, 2027
- Truman's Birthday: May 7th, 2027
- Memorial Day: May 31st, 2027
- Juneteenth: June 18th, 2027
- Independence Day: July 5th, 2027
- Labor Day: September 6th, 2027
- Columbus Day: October 11th, 2027
- Veteran's Day: November 11th, 2027
- Thanksgiving Day: November 25th, 2027
- Christmas Day: December 25th, 2027

3.4 Ramp Closures. The contractor shall close ramps specified in the JSP – Wrong Way Alert Systems Preventative Maintenance, Software and Recertification for the following hours as needed to complete that work:

10:00 PM to 5:00 AM, Monday through Sunday

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 **$250.00 per 15 minute increment** for each 15 minutes that the temporary lane closures are in place and not open to traffic in excess of the limitation as specified elsewhere in this special provision. It shall be the responsibility of the engineer to determine the quantity of unapproved closure time.

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

4.0 Detours and Lane Closures.

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

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

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

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

1.0 The contractor shall have communication equipment on the construction site or immediate access to other communication systems to request assistance from law enforcement or other emergency agencies for incident management. In case of traffic accidents or the need for law enforcement to direct or restore traffic flow through the job site, the contractor shall notify law enforcement 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 law enforcement services, the following agencies may also be notified for accident or emergency situation within the project limits.

Missouri Highway Patrol (636) 300-2800
MoDOT TMC Operating Hours 24/7/365 Dispatch (314) 275-1500

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

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

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

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

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

Jamie Rana, PE, PTOE, Project Contact
St. Louis District
1590 Woodlake Drive
Chesterfield, MO 63017

Telephone Number: (314) 624-5035
Email: Jamie.Rana@modot.mo.gov

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

Telephone Number: (573) 751-2876
Email: BCS@modot.mo.gov

2.0 Upon award and execution of the contract, the successful bidder/contractor shall forward all questions and coordinate the work with the engineer listed below:

Tim Hellebusch, PE, Resident Engineer
St. Louis District
1590 Woodlake Drive
Chesterfield, MO 63017

Telephone Number: (314) 239-5975
Email: tim.hellebusch@modot.mo.gov

G. Contractor Quality Control NJSP-15-42

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

2.0 Quality Control Plan.

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

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

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

3.1.1 Test results shall be reported on electronic forms provided by MoDOT. Forms and Contractor Reporting Excel2Oracle Reports (CRE2O) can be found on the MoDOT website. All

required forms, reports and material certifications shall be uploaded to a Microsoft SharePoint® site provided by MoDOT, and organized in the file structure established by MoDOT.

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

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

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

4.0 Work Planning and Scheduling.

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

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

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

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

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

4.4.2 Prior to all Hold Point inspections, the contractor shall verify the work has been completed in accordance with the contract and specifications. If the engineer identifies any corrective actions needed during a Hold Point inspection, the corrections shall be completed prior to continuing work. The engineer may require a new Hold Point to be scheduled if the corrections require a

follow-up inspection. Re-scheduling of Hold Points require a minimum 24-hour advance notification from the contractor unless otherwise allowed by the engineer.

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

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

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

H. Utilities

1.0 The Contractor shall be aware here are numerous utilities present along the routes in this contract. It is the inherent risk of the work under this contract that the contractor may encounter these utilities above and/or below the ground or in the vicinity of any given job order which may interfere with their operations. The contractor expressly acknowledges and assumes this risk even though the nature and extent are unknown to both the contractor and the Commission at the time of bidding and award of the contract. The effect in cost or time of the presence of utilities above, below, or in the vicinity of the contractor's work under this contract shall not be compensable. If a utility is determined to be in conflict with the proposed work the contractor shall contact the engineer to determine a course of action.

1.1 Missouri Standard Specification Book for Highway Construction, Section 105 Control of Work, 105.7 Cooperation with Utilities: Contractor shall adhere to all specifications.

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

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 (5) percent of the original contract amount is earned. The payment will be 50 percent of the price for LSTTC, or five (5) 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 (2) 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	Lump Sum Temporary Traffic Control

J. Contractor Requirements

1.0 Description. The contractor shall have a qualified and competent staff to coordinate, communicate, and perform this specialized work. The contractor shall furnish all equipment necessary to perform the work described in this contract, except where noted.

2.0 Staffing Requirements. The contractor will submit a written list of key staff members to the engineer two (2) weeks prior to the preconstruction meeting for review. When approved, the contractor will be required to use staff as submitted. Key staff may only be substituted through a written request by the contractor and written approval by the engineer. In the event of staff turnover of key staff members, the contractor shall replace the respective staff with an individual with substantially equivalent experience and meeting the respective qualifications described below. The engineer will have final approval on the acceptability of all staff working on the project.

2.1 The contractor's staffing submittal shall include resumes of key staff that clearly provide supporting documentation in meeting the requirements described below and describe maintenance experience on specific projects. At a minimum, the resumes shall include:

- Educational background, including any degrees and/or certifications, and the institution and year for which they were received.

- A brief description of similar projects that the individual was involved with. The description should include: project name, agency, agency contact, contract cost, date(s) of services, and a short narrative of services provided.

- Availability of staff described as a percentage of working hours in a typical work week.

2.2 Key Staff submittal shall, as a minimum, list a project manager, lead field communication technician, lead electrician, and lead field hardware technician.

2.3 Minimum Requirements of Project Manager. As required to maintain the system properly, the contractor shall provide an on-site professional project manager for administration of the maintenance and remedial maintenance or repair services of the ITS hardware. The project manager shall provide technical expertise, direction, and strategies regarding all aspects of ITS hardware maintenance, operation, and/or improvements.

The project manager shall:

- Have a minimum of five (5) years of experience managing similar work.

- Be available (in person and via phone/email) to the engineer twenty-four (24) hours a day, seven (7) days a week

- Participate in bi-weekly coordination meetings with the Commission, and other contract personnel

2.4 Minimum Requirements of Lead Field Communications Technician. The individual, or individuals, assigned to this role will provide the Commission with technical communication repair services.

The lead field communications technician shall:

- Have experience in DWDM networks

- Have experience in wireless radio communication network maintenance

- Either show successful completion of one (1) three-day course in fiber optic splicing from a major manufacturer of fiber optic cable/equipment (such as Corning, AT&T, Lucent etc.) Or be certified as a fiber optic technician by the Fiber Optic Association, Inc. (Boston, MA)

- Have a minimum of two (2) years of experience in the installation of digital and analog data communication systems, within the last five (5) years.

2.5 Minimum Requirements of Lead Electrician. The individual, or individuals, assigned to this role will provide the Commission with field ITS hardware electrical repair services.

The lead electrician shall:

- Be a licensed electrician in the State of Missouri.

2.6 Minimum Requirements of Lead Field Hardware Technician. The individual, or individuals, assigned to this role will provide the Commission with field ITS hardware technical repair services.

The lead field hardware technician shall:

- Have experience in the installation and maintenance of Closed Circuit Television (CCTV)camera assemblies and video switches, including:

    - Controller cabinets

    - Camera housings, and

    - Camera pressurization systems

- Have experience in Dynamic Message Sign (DMS) installation and maintenance

- Have a minimum of two (2) years of experience in the installation, integration, maintenance, and operations of ITS equipment, within the last five (5) years.

- Have experience with the various vehicle detection systems (including microwave, radar, non-intrusive, and Bluetooth technologies)

- Have been certified by MoDOT's ITS device manufacturers.

3.0 Required Equipment. The contractor shall furnish all equipment and tools necessary to complete the work required in this contract, including equipment for field maintenance work and communications for the project. This equipment will remain the property of the contractor throughout the project and after its conclusion. The contractor will also be responsible for all maintenance, repairs, and calibration (including firmware updates) needed to keep the equipment in proper working condition.

3.1 Communication and Coordination Equipment. At least one member of the contractor work crew shall be available by telephone at all times while working on the project. The phone numbers shall be furnished to the engineer for use in the project communications

3.2 Maintenance Equipment. The contractor shall be required to possess, buy upon award, lease or rent any equipment or tools necessary for this project. While it is the contractor's responsibility to determine what equipment is necessary, a partial list of anticipated equipment includes:

- Fiber optic cable fusion splicers
- Fiber optic Optical Time Domain Reflectometer
- Fiber optic cable power meter
- Radar speed gun (or other speed measuring device)
- Bucket truck
- Backhoe
- Cable pulling tension meter
- Cable pulling pulleys
- Pole erection crane or truck

3.3 The contractor shall submit an equipment list to the engineer two (2) weeks prior to preconstruction meeting.

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

K. Coordination with Other Projects

1.0 Description. Other contracts (that increase or decrease field equipment quantities, expand the communication network, and/or develop/integrate software device drivers to control additional equipment) may be awarded, ongoing, and/or completed during the life of this maintenance contract. The contractor shall be responsible for coordinating with the engineer and other project representatives, efforts related to these other contracts to ensure that access to field devices is not the cause of construction delays or claims. The coordination required under this section will consist primarily of ensuring that communications systems are adjusted to account for planned disruptions or existing communications infrastructure.

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

1 REV

L. Scope of Work

1.0 Description. Job JSL0096E is an ITS maintenance project where the contractor will perform the required maintenance work listed in Section 0004. When the contractor is doing the required maintenance work, it is expected the contractor will find additional repairs needed on the ITS system. The contractor shall inform the SL District ITS Group of the repair work needed and, if the SL District ITS Group agrees, a work order will be issued authorizing the contractor to do the repair work. The contractor may also be asked to preform additional ITS repairs as requested by the SL District ITS Group. Section 0004 of the bid items contains the required ITS work of this project while Section 0003 contains bid items that are expected to be needed for the additional ITS repair work. The contractor shall bid the items in Section 0003 with the knowledge that each item may or may not be needed on this project and the quantity of the item may be many times larger than listed in the bid item list.

1.1 Job JSL0096E will also have a few required and preventative maintenance work items related to roadway and signals. Section 0001 and Section 0002 will contain both types of items – required and preventative maintenance. When the contractor is doing the required maintenance work, it is expected the contractor will find additional repairs needed on the roadway or to the signals. The contractor shall inform the SL District ITS Group of the repair work needed and, if the SL District ITS Group agrees, a work order will be issued authorizing the contractor to do the repair work. The contractor may also be asked to perform additional repairs as requested by the SL District ITS Group. Sections 0001 and 0002 of the bid items contain both the required work and the preventative maintenance work related to the roadway and signals. The contractor shall bid the items in these sections with the knowledge that each item may or may not be needed on this project and the quantity of the item may be many times larger than listed in the bid item list.

1.2 The following is a list of job special provisions, which detail the requirements that apply to the two types of work for this project:

Roadway & Signal Required & Preventative Maintenance Work – Sections 0001 and 0002

- JSP CC Remove and Install Intersection Video Detection Cameras
- JSP DD Remove and Install Accessible Pedestrian Signal Pushbutton
- JSP II Mowing and Tree Clearing near ITS Devices
- JSP GG Remove and Install Intersection Radar Detection Sensor

Repair/Replacement Work - If Necessary – Section 0003

- JSP O Conduit Connections to Cabinets
- JSP R Remedial Maintenance
- JSP S ITS Pull Box Lid Replacement
- JSP T Pad Mounted Power Supply
- JSP U Split Duct Conduit Repair
- JSP W Out of Scope Work and Repairs

Required Maintenance Work – Section 0004

- JSP N Remove and Replace Node Cabinet Air Conditioner System
- JSP P Preventative Maintenance
- JSP Q Preventative Maintenance with Repairs

JSP BB Wrong Way Alert Systems Software, Recertification and Preventative Maintenance
JSP FF Remove and Replace Commission-Furnished Uninterruptable Power Supply (UPS) Batteries

The contractor shall coordinate all ITS Preventative Maintenance and Work Order repair work with SLITS Group via an email to SLITS@modot.mo.gov at least one business day prior to any work.

2.0 Basis of Payment. No direct payment shall be made in compliance with this provision.

M. Online Maintenance System

1.0 Description. MoDOT St. Louis District uses an online maintenance system tool to monitor routine operation of all Intelligent Transportation System (ITS) devices in the District. It provides the ability to issue and track MoDOT work orders, plan preventive- and corrective- maintenance, and manage device inventories.

Use of the online maintenance system will be required by the Contractor to manage MoDOT work orders issued by local district staff for both emergency and standard maintenance. Access to the system by the Contractor will be via office computers and portable computer devices capable of accessing the system from most every location in the plans. The Contractor will also use the online maintenance system to record the preventative maintenance checklist.

The Contractor will be required to attend all available necessary trainings provided by MoDOT and use this tool during the entire contract period. The contractor shall use the online maintenance system tool to report time and date of arrival, and resolution details. MoDOT work order will be closed by MoDOT staff after verification of completed work.

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

N. Remove and Replace Node Cabinet Air Conditioner System

Description. The contractor shall remove the existing Node Cabinet Air Conditioner System, dispose of it properly and install a new Air Conditioner System at locations approved by the SLITS group. The contractor shall submit to the SLITS group any location where the air condition system needs to be replaced so that the SLITS group can verify before approving the change.

1.2 Qualified Personnel. This work shall be performed by licensed HVAC (Heating, Ventilation and Air Conditioning) staff. The contractor shall submit their HVAC contractor contact information and a copy of their license to the MoDOT Engineer for review and approval prior to any work.

2.0 Materials.

2.1 The contractor shall submit the new air conditioner specifications, operation and maintenance manuals to the MoDOT Engineer and SLITS Group via an email to SLITS@modot.mo.gov for review and approval.

3.1 Construction Requirements.

3.2 The contractor shall remove all existing Node Cabinet Air Conditioner parts and dispose of them properly.

3.3 There shall be no sun shield on the side on which the air conditioner is mounted.

3.4 The contractor shall mount an air conditioner on the cabinet's sidewall next to the door hinges. It shall use a closed loop cooling system that does not exchange air with the outside. It shall have the following features:

3.4.1 Maximum dimensions: The unit shall not exceed the dimensions of the sidewall. The unit shall not add more than 12 inches to the cabinet width.

3.4.2 Cooling capacity: 6,000 BTU/hour.

3.4.3 Hot gas bypass valve: To regulate cooling and prevent evaporator coil freezing during periods of low heat load and low ambient air temperature.

3.4.4 Intake location: Top.

3.4.5 Solid-state electronic noise suppressor: To minimize EMI/RFI interference.

3.4.6 Thermostat: Adjustable in the range of 70 degrees F (20 degrees C) to 140 degrees F (60 degrees C) to activate cooling. Unit turn-off shall be 7 degrees F (4 degrees C) below the turn-on temperature. Mounting of the unit shall be such that setting changes can be made from one of the door openings.

3.5 Provide a separate circuit and breaker for the air conditioner, and provide a delay-on relay or other protection to ensure that, if a short power outage occurs while the unit is running, the breaker is not tripped when the power is restores and the unit tries to restart while pressurized.

3.6 Provide two contact closure temperature alarms. The high temperature sensor shall be adjustable in the rage of 20 degrees C to 60 degrees C. The low temperature sensor shall be adjustable in the range of 5 degrees F (-15 degrees C) to 40 degrees F (5 degrees C).

4.0 Acceptance Testing. The new Air Conditioner Unit shall run for 15 calendar days prior to acceptance. If for any reason any of the new A/C Unit fails or stops working, it shall be the contractor's responsibility to make necessary repairs or replace the entire A/C Unit and allow it to run another 15 days prior to final acceptance.

5.0 Basis of Payment. Measurement and payment for Remove and Replace Node Cabinet Air Conditioner System includes all labor, equipment and materials necessary to comply with the requirements of this provision. Payment will be made as follows:

Item No.	Type	Description
910-99.02	Each	Remove and Replace Node Cabinet Air Conditioner System

O. Conduit Connections to Cabinet

1.0 Description. The contractor shall provide and install a putty or caulk material as approved by the Engineer which seals any conduit connection entering a signal or ITS cabinet at those locations where the existing sealing material is missing or has been damaged.

2.0 Basis of Payment. No direct payment shall be made to provide and install the putty or caulk material used to seal conduit connections to existing cabinets.

P. Preventative Maintenance

1.0 Description. The contractor shall perform Preventative Maintenance (PM) on ITS devices, cabinets, communication equipment, and any additional ITS hardware identified within this section (including cleaning).

1.1 Schedule. The contractor shall develop a schedule detailing the dates for which each device will have its preventative maintenance performed. The engineer will provide the contractor with the previous year's preventative maintenance schedule four (4) weeks prior to preconstruction meeting. The contractor shall develop a schedule that ensures the minimum frequency of preventative maintenance per device is maintained. The contractor shall submit the schedule to the engineer by the preconstruction meeting. Deviation from the proposed schedule of more than one (1) week may be allowed with prior approval from the engineer. The engineer reserves the right to alter the proposed schedule. The engineer also reserves the right to order additional maintenance visits of problematic ITS devices as needed by increasing the quantity paid for at the contract unit price.

1.2 The contractor shall provide all equipment and materials necessary to comply with the requirements of this provision.

1.3 Detailed preventative maintenance procedures, including checklist of tasks to be performed, per ITS device and cabinet shall be developed by the contractor. The contractor shall be responsible for performing all procedures in accordance with the manufacturer's recommendations. The contractor shall submit checklists per each device to the engineer by the preconstruction meeting for review and approval.

2.0 Items

2.1 CCTV Cameras. All preventative maintenance shall be done in accordance with the manufacturer's recommended procedures. The contractor will need to provide a bucket truck in order to access the cameras. This item shall also include PM of its associated field cabinet, in accordance with Section 2.2 of this provision. For each camera assembly, the following items of work shall be performed:

2.1.1 General Cleaning. The contractor shall thoroughly clean the outside of each camera dome assembly. The contractor shall apply a rain repellent coating to the outside of the lower dome, per the coating manufacturer's instructions. The coating must be recommended by its manufacturer for clear acrylic. Upon completion, the camera assembly shall be neat and clean in appearance.

2.1.2 General Inspection. The contractor shall inspect each camera assembly for general condition, including cables and wires, connectors, cameras, pan-tilt units, power supplies, surge protectors, CCTV pole access panels and any other equipment contained within each

enclosure. All bolts and screws in the cameras and controller will be checked and tightened. Any access panel screws that are broken/stripped/missing shall be replaced or repaired by the contractor.

2.1.3 Operational Integrity Checks. The contractor shall, at a minimum, check the following functions during each preventative maintenance inspection:

- Check all local functions, such as pan, tilt, zoom, focus
- Check operation of auto-iris and adjust as necessary
- Check camera dome pressure and compare to manufacturer's specifications
- Recharge camera dome per manufacturer's recommendations
- Once the cameras are re-installed and prior to leaving the CCTV site, the contractor shall contact SL ITS or TMC Staff in order to verify proper operation (including pan/tilt/zoom, preset functions, and CCTV description).
- Verify each has the latest firmware. If outdated, then update firmware to the latest firmware recommended by the manufacturer.

2.1.4 Frequency. The contractor shall perform preventative maintenance on each CCTV camera once every calendar year.

2.2 Field Cabinets. All preventative maintenance shall be done in accordance with the manufacturer's recommended procedures. Care shall be taken to prevent damaging components or cabling within or near the cabinet. The contractor shall trim grass and brush back for a five (5) foot radius around each cabinet and remove and debris from around and on top of the cabinet base. The contractor shall, upon inspection of the field cabinet, lubricate the locking mechanism, hinges, and door locking arm mechanism in accordance with manufacturer specifications. If any lock covers are missing, the Contractor shall place tape over the keyhole.

2.2.1 General Cleaning. The contractor shall thoroughly clean each cabinet, including vacuuming loose dirt and debris. All enclosures will be cleared of any dirt or debris, and conduits shall be plugged with duct seal to prevent rodents and such from entering. The contractor shall wipe down all accessible equipment areas, racks, and shelves contained within the cabinet. Upon completion, the cabinet shall be free of all debris, rodents, pests, and animal waste, and shall be neat and clean in appearance.

2.2.2 Cabinet Filter Replacement. The contractor shall replace cabinet filters and vacuum out dust particles from the screens and filter holders. This includes cleaning of louvers and screens covering filter holder.

2.2.3 Pest Control and Damage Repair. The contractor shall remove any old ant bait containers and install a new bait container in each field cabinet after the General Inspection and cleaning.

2.2.4 General Inspection. The contractor shall inspect each cabinet for general condition, including condition of cables and wires, conduit duct seal integrity, heaters processors, power supplies, cabinet lights, fans, doors, locks, shelves, din rails, and communications panels or equipment contained within each cabinet. The contractor shall also inspect the integrity of the cabinet identification plaque. Any broken or damaged field cabinet components shall be

documented in the Preventative Maintenance Report and repaired. If the repairs are deemed significant by the engineer, the repairs shall be dealt with as described for **out of scope work.** Preventative maintenance shall include the replacement of any burned-out or broken light bulbs found.

2.2.5 Operational Integrity Checks. The contractor shall check and record incoming power supply voltages, and verify landings of twisted-pair communication cable (where applicable).Any detectors not functioning shall be reported to the engineer.

2.2.6 Frequency. The contractor shall perform preventative maintenance on each field cabinet at the same time as it's associated ITS device.

2.3 Communication Node Field Cabinets. All preventative maintenance shall be done in accordance with the manufacturer's recommended procedures. Care shall be taken to prevent damaging components or cabling within or near the cabinet. The contractor shall trim grass and brush back for a five (5) foot radius around each cabinet and remove any debris from around and on top of the cabinet base. The contractor shall, upon inspection of the field cabinet, lubricate the locking mechanism, hinges, and door locking arm mechanism in accordance with manufacturer specifications. If any lock covers are missing, the Contractor shall place tape over the keyhole. Preventative Maintenance of Communication Node Field Cabinets shall be performed once between March 1st and May 15th, and again from July 1st to September 15th, unless otherwise directed by the engineer.

2.3.1 General Cleaning. The contractor shall thoroughly clean each cabinet, including vacuuming loose dirt and debris. All enclosures will be cleared of any dirt or debris, and conduits shall be plugged with duct seal to prevent rodents and such from entering. The contractor shall wipe down all accessible equipment areas, racks, and shelves contained within the cabinet. Upon completion, the cabinet shall be free of all debris, rodents, pests, and animal waste, and shall be neat and clean in appearance.

2.3.2 Cabinet Filter Replacement. The contractor shall replace cabinet filters and vacuum out dust particles from the screens and filter holders. This includes cleaning of louvers and screens covering filter holder.

2.3.3 Pest Control and Damage Repair. The contractor shall remove any old ant bait containers and install a new bait container in each field cabinet after performing general cleaning.

2.3.4 General Inspection. The contractor shall inspect each cabinet for general condition, including condition of cables and wires, conduit duct seal integrity, heaters processors, power supplies, cabinet lights, fans, doors, locks, shelves, din rails, and communications panels or equipment contained within each cabinet. The contractor shall also inspect the integrity of the cabinet identification plaque. Any broken or damaged field cabinet components shall be documented in the Preventative Maintenance Report and repaired. If the repairs are deemed significant by the engineer, the repairs shall be dealt with as described for **out-of-scope work.** Preventative maintenance shall include the replacement of any burned-out or broken light bulbs found.

2.3.5 Operational Integrity Checks. The contractor shall check and record incoming power supply voltages, and verify landings of twisted-pair communication cable (where applicable).Any detectors not functioning shall be reported to the engineer.

2.3.6 Frequency. The contractor shall perform preventative maintenance on each

Communication Node Cabinet once every calendar year.

2.4 Air Conditioning Units. Currently A/C units are only installed at Communication Node Field Cabinets. All preventative maintenance shall be done in accordance with the manufacturer's recommended procedures. Work under this item shall include removing the A/C unit's panel to provide access to the interior. Preventative Maintenance of HVAC shall be performed once between March 1st and May 15th, and again from July 1st to September 15th, unless otherwise directed by the engineer.

2.4.1 General Cleaning. The contractor shall thoroughly clean the internal components and external surface of each A/C unit, and all enclosures will be cleared of any dirt or debris. Any paint or graffiti markings on the exterior shall be cleaned off and/or remove. Upon completion, the a/c unit shall be free of all debris, rodents, pests, and animal waste, and shall be neat and clean in appearance.

2.4.2 Air Conditioning Filter Replacement. The contractor shall replace the A/C filter during each preventative maintenance visit.

2.4.3 General Inspection. The contractor shall inspect each A/C unit for general condition, including condition of the cables and wires, panels, or components contained within each cabinet.

2.4.4 Operational Integrity Checks. The contractor shall check and ensure operation of the A/C unit including a diagnostics check of the entire A/C unit. This shall include the checking for proper refrigerant levels and filling, if necessary.

2.4.5 Frequency. The contractor shall perform preventative maintenance on each Air Conditioning Unit twice, within the time period stated above.

2.5 Dynamic Message Signs (DMS). All preventative maintenance shall be done in accordance with the manufacturer's recommended procedures. Care shall be taken to prevent damaging components or cabling within the enclosure. The contractor will need to provide a bucket truck to access the signs. This item shall also include PM of its associated field cabinet, in accordance with Section 2.2 of this provision. For each DMS, the following items of work shall be performed:

2.5.1 General Cleaning. The contractor shall thoroughly clean the DMS. The enclosures shall be cleared of any dirt and debris, any paint or graffiti markings on the exterior shall be cleaned off and or removed, and all accessible interior equipment areas, racks and shelves shall be wiped down. Upon completion, the enclosure shall be free of all debris, rodents, pets and animal waste, and shall be neat and clean in appearance. The plexi-glass display cover shall be cleaned, inside and outside, and a water repellant solution shall be applied in accordance with its manufacturer's specifications.

2.5.2 Filter Maintenance. If the DMS' manufacturer recommends replacing the filters, the contractor shall replace its filter. If the DMS' manufacturer recommends cleaning and re- using the filters, the contractor shall clean and reinstall the filters. The contractor shall also vacuum out dust and particles from louvers and screens covering filter holders and before reinstalling cleaned filters or installing new filters.

2.5.3 General Inspection. The contractor shall inspect each location for general condition, including condition of cables and wires, power supplies, connectors, and communication panels or equipment contained within each DMS enclosure. The contractor shall also inspect operation of doors and lights.

2.5.4 Structural Inspection. The contractor shall visually inspect the structure for apparent cracks or defects, including the DMS mounting hardware. Wherever readily accessible, the contractor shall check that nuts and bolts are not loose. Repair or replace damaged grout or rodent mesh at base of sign.

2.5.5 Operational Integrity Checks. The contractor shall check and record voltages on all power supplies, and verify that all equipment appears to be operating properly. Contractor shall also perform a diagnostic on sign display per manufacturer's specifications. Any equipment not functioning properly shall be reported to the engineer. All enclosures shall be checked at this time and air handling devices shall be tested.

2.5.6 Enclosure Sealing and Water Intrusion Prevention. The contractor shall inspect all DMS enclosures to ensure that the sign housing is properly sealed and protected against water intrusion. All door gaskets, weather stripping, and manufacturer-provided sealing surfaces shall be examined for signs of wear, cracking, gaps, or compression loss. Any damaged or deteriorated sealing components shall be replaced in accordance with the manufacturer's recommendations. Door latches shall be checked to ensure they close securely and apply proper pressure to maintain an effective seal. All cable entry points, conduit fittings, and penetrations shall be inspected to verify that factory-approved grommets, glands, or sealants are intact and functioning as intended. The contractor shall report any evidence of water intrusion, moisture accumulation, corrosion, or damage to internal components to the engineer.

2.5.7 Frequency. The contractor shall perform preventative maintenance on each DMS once per calendar year.

2.6 Wireless Radio Communication Links. This work shall include the testing, adjusting/calibrating, and preventative maintenance of wireless radio communication links, both licensed and unlicensed. All preventative maintenance shall be done in accordance with the manufacturer's recommended procedures. Care shall be taken to prevent damaging components or cabling. The existing wireless radio links are in the 900MHz range, the 4.9 GHZ range and the 5 GHz range.

2.6.1 General Cleaning. The contractor shall inspect the general condition of the wireless radio equipment, including antenna and other external mounted equipment, paying particular attention to wiring harnesses and connectors.

2.6.2 Signal Testing. The contractor shall conduct path alignment tests and check antenna alignment from ends, measure antenna gain, measure link throughput, document background signals on similar frequencies, and measure the Voltage Standing Wave Radio. For all 4.9 gig links, the contractor shall report to engineer any links that do NOT provide 22 MB per second. The contractor shall perform site survey to determine if any foliage from trees or structure installations has encroached on the clear line of sight between radio links. If encroachment has occurred, the contractor shall document encroachment and either perform tree trimming remediation efforts or report to the engineer any structure installations.

2.6.3 Equipment Adjustments. The contractor shall perform the necessary adjustments, including adjustments to the antenna alignment to maximize available throughput and maintain the strongest possible signal.

2.6.4 Frequency. The contractor shall meet the requirements of Section 2.6 for all complete wireless radio communications links, including equipment at both ends of the link, a minimum of once calendar year.

2.7 Non-Intrusive Vehicle Detector Stations. This work shall include the inspection, preventative maintenance and minor remediation of each detector and assembly. All preventative maintenance shall be done in accordance with the manufacturer's recommended procedures. This item shall also include PM of its associated field cabinet, in accordance with Section 2.2 of this provision.

The contractor shall perform the following items of work for each detector and assembly:

- Check integrity of cables and connectors
- Check, test and calibrate the vehicle detectors using the testing method submitted to and approved by the engineer.
- Re-aim the detectors as needed
- Visually inspect electrical path to ground
- The documentation prepared and filed for this work shall also include a tabular summary comparing observed speeds and volumes with detected speeds and volumes.

2.7.1 Testing Procedure - Microwave Sensors. A detailed procedure and documentation template shall be prepared and submitted to the engineer for approval. At a minimum, the vehicle detector testing shall be conducted with a radar speed gun and a laptop computer connected to the remote traffic sensor unit. A five (5) minute sample of manually counted traffic volumes shall be taken for each lane and compared to the recorded volume detected by the unit. A variance exceeding five percent (5%) shall be considered a failure and require re-aiming and/or calibrating the detector and re-testing. Additionally, spot speeds shall be recorded from radar gun observations and compared to the observed speed detected by the detector and observed on the laptop. A variance exceeding ten percent (10%) shall be considered a failure and require re-aiming and/or calibrating the unit and retesting.

2.7.2 Testing Procedure - Bluetooth Sensors. A detailed procedure and documentation template shall be prepared and submitted to the engineer for approval.

2.7.3 Frequency. The contractor shall meet the requirements of Section 2.7 for all Non- intrusive Vehicle Detectors and their assemblies a minimum of once per 1-year period.

2.8 Uninterruptible Power Supplies (UPS). This work shall consist of the inspection and preventative maintenance for each UPS assembly located at Node Cabinets. All preventative maintenance shall be done in accordance with the manufacturer's recommended procedures. Preventative Maintenance of Communication Node Field Cabinets UPS shall be performed once between March 1st and May 15th, and again from July 1st to September 15th, unless otherwise directed by the engineer.

2.9 For each UPS assembly, the following items of work shall be performed:

2.9.1 General Cleaning. The contractor shall thoroughly vacuum any dust and debris from the UPS cabinet. Upon completion, the UPS cabinet shall be neat and clean in appearance.

2.9.2 General Inspection. The contractor shall visually inspect all components for damage, defects, corrosion or signs of abnormal wear.

2.9.3 Operational Integrity Checks. The contractor shall, at a minimum, check the following functions during each preventative maintenance inspection:

- Inverter is properly programmed and functioning correctly,
- Battery condition is operating properly and within manufacturer's specifications,
- All line and load terminals are snug on switch panel,
- All applicable control wiring connectors are properly terminated in UPS cabinet,
- Battery harness connections are properly connected,
- Components are properly grounded and connections are snug,
- Batteries are properly labeled in numerical order,
- Software version is current,
- UPS cycles properly on power loss and power return field test,
- Fan is operational and vented louvers are clear of dust and debris,
- Tamper evident lock is installed on rear access door,
- Batteries checked for proper voltage according to the manufacturer,
- Address all active fault warnings,
- Conduit openings are properly sealed, and
- Warning label is affixed on the power supply.

2.9.4 Frequency. The contractor shall meet the requirements of Section 2.9 for all UPS assemblies a minimum of once per calendar year.

2.10 Solar Power System This work shall consist of inspecting and performing preventative maintenance of the solar power systems used to power some ITS devices.

2.10.1 Construction Methods. All preventative maintenance shall be done in accordance with the manufacturer's recommended procedures. For each Solar Power System assembly in the contract, the following items of work shall be performed:

2.10.2 General Cleaning. The Contractor shall thoroughly vacuum any dust and debris from the Solar Power System cabinet. Upon completion, the Solar Power System cabinet shall be neat and clean in appearance.

2.10.3 General Inspection. The Contractor shall visually inspect all components for damage, defects, corrosion, or signs of abnormal wear.

2.10.4 Operational Integrity Checks. The Contractor shall, at a minimum, check the following functions during each preventative maintenance inspection:

- Inverter is properly programmed and functioning correctly,
- Battery conditioner is operating properly,
- All line and Load terminals are snug on switch panel,
- All applicable control wiring connectors are properly terminated in Solar Power System cabinet,
- Battery harness connections are properly connected,
- Components are properly grounded and connections are snug,
- Batteries are properly labeled,
- Ensure there is plenty of ventilation in the battery enclosure,
- Each battery cells should be clean before removing any filter caps for maintenance. To clean the cells, use either a brush to remove dry materials and/or a rag dipped in a solution of baking soda and water and thoroughly squeezed out,
- Solar Power System cycles properly on power loss and power return field test,
- Fan is operational and vented louvers are clear of dust and debris,
- Tamper evident lock is installed on rear access door,
- Batteries checked for proper voltage according to the manufacturer,
- Address all active fault warnings,
- Conduit openings are properly sealed,
- Warning label is affixed on the power supply.

2.10.5 Frequency. The contractor shall meet the requirements of Section 2.10 for all Solar Power Systems a minimum of once per calendar year.

3.0 Structural Defects. The contractor shall visually inspect the ITS device's pole, concrete base, and mounting hardware for signs of abnormal wear, such as cracks, significant rust, missing or broken anchor bolts, or other signs of weakness. If a structural defect or abnormal wear is noticed through this work, the contractor shall submit documentation directly to the engineer to highlight the structural issues noted within 24 hours of the inspection.

4.0 Verification and Modification of Communication Drawings. The engineer will provide the contractor with access to the as-built communication drawings for each device to be maintained on this contract. For each device the contractor performs preventative maintenance on, the contractor shall verify the accuracy of the current communication diagram. If a discrepancy is discovered, the contractor shall notify the SLITS Group with the as-is device names and fiber tube and strands colors in their daily reports and shall modify the electronic copy of the diagram for that device location and submit the revised electronic file to the engineer. This does not include

the Node or the signal cabinets when the contractor does not perform a Preventative Maintenance check. Updated drawings shall be submitted electronically, in color, for both Visio and PDF formats, within fourteen(14) days of the inspection.

5.0 Documentation. The contractor shall use the location documentation, including inventory and wiring diagrams to verify that all equipment is documented and the correct models and serial numbers are recorded. All information gathered under this item shall be submitted to the engineer as outlined in JSP S – Documentation and Reporting. This report shall document all items checked, verified and if repairs were made, including filters replaced. The make, model and serial number of the ITS devices, communication equipment, and other included hardware shall be noted.

5.0.1 Organization of Records. Reports for devices and cabinets inspected under this item shall be organized in an electronic format, sorted by location ID in ascending order, and delivered to the engineer as outlined in JSP – Documentation and Reporting.

6.0 Materials. The contractor shall procure and maintain an inventory of contractor furnished ITS spare parts necessary to complete the requirements of this job special provision. The contractor shall also maintain an inventory of Commission-furnished equipment necessary to complete the requirements of this job special provision. See JSP – Out of Scope Work and Repairs for more details.

7.0 Method of Measurement. Measurement for preventative maintenance of the devices listed above shall be per each.

8.0 Basis of Payment. Payment for furnishing the labor, materials, and equipment necessary to inspect, test, clean, perform minor repairs (calibrations, re-aim, etc.), and perform any other preventative maintenance to the devices/systems listed above, as recommended by the manufacturer, shall be paid for by the contract unit price for:

Item Number	Item Description	Unit
910-99.02	PM CCTV Camera, Assembly, Pole, & Field Cabinet	EA
910-99.02	PM Communication Node Field Cabinet	EA
910-99.02	PM Air Conditioning Units for Node Cabinets	EA
910-99.02	PM DMS, Assembly, Pole, Foundation & Field Cabinet	EA
910-99.02	PM Solar Power System	EA
910-99.02	PM Communication Link and Assembly	EA
910-99.02	PM Uninterruptible Power Supply (UPS) and Assembly	EA
910-99.02	PM Non-Intrusive Vehicle Detector System	EA

Q. Preventative Maintenance with Repairs

1.0 Description. The contractor shall perform preventative maintenance as outlined in the **JSP Preventative Maintenance** for any needed repairs on ITS devices, cabinets, communication equipment, and any additional ITS hardware listed below:

- CCTV Camera, Assembly, Pole, and Field Cabinet
- DMS, Assembly, Pole, Foundation, and Field Cabinet
- DTB, Assembly, Pole, Foundation, and Field Cabinet
- UPS for Node Cabinets
- Solar Power Systems
- Video Detection Camera System

2.0 Materials. The contractor shall procure and maintain an inventory of contractor furnished ITS spare parts necessary to complete the requirements of this job special provision. The contractor shall also maintain an inventory of Commission-furnished equipment necessary to complete the requirements of this job special provision. See **JSP - Out of Scope Work & Repairs** for more details.

3.0 Method of Measurement. Measurement for preventative maintenance and repairs of the devices listed above shall be per each.

4.0 Basis of Payment. Payment for furnishing the labor, materials, and equipment necessary to inspect, test, clean, perform minor repairs (calibrations, re-aim, etc.), and perform any other preventative maintenance and repairs to the devices/systems listed above, as recommended by the manufacturer, shall be paid for by the contract unit price for:

Item Number	Item Description	Unit
910-99-02	PM with Repairs – DMS Pixel Board	EA
910-99-02	PM with Repairs – DMS Driver Board	EA
910-99-02	PM with Repairs – DMS power supply	EA
910-99-02	PM with Repairs – DMS fan	EA
910-99-02	PM with Repairs – DMS Controller	EA
910-99-02	PM with Repairs – DMS LCA	EA
910-99-02	PM with Repairs – Solar Power System	EA
910-99-02	PM with Repairs – UPS device & components	EA
910-99-02	PM with Repairs – CCTV Camera Assembly	EA
910-99-01	PM with Repairs – Video Detection Camera System	EA

R. Remedial Maintenance

1.0 Description. This work should include the repair of field components that have been damaged by storms, vehicle collisions, construction activities, or other unanticipated events. Major relocations or system upgrades shall not be considered part of this work. All work under this provision shall be done in accordance with the current Missouri Standard Specifications for Highway Construction.

1.1 The process for repairs shall be initiated when the engineer or the engineer's representative, issues the contractor a MoDOT Online Maintenance System work order. The contractor shall conduct an initial diagnosis, report to the engineer the diagnosis and recommend a solution with associated costs. With the engineer's approval, the contractor shall implement an appropriate repair. The contractor shall check for new MoDOT Online Maintenance System work orders on a daily basis.

1.1.1 The contractor shall inform the engineer when the work has been completed for each MoDOT Online Maintenance System work order. However, the MoDOT Online Maintenance System work order shall not be closed or considered complete, until the engineer or engineer's representative has verified that the malfunction has been corrected. If the engineer does not concur that the problem has been resolved, the MoDOT Online Maintenance System work order shall be so noted and returned to the contractor.

1.1.2 MoDOT Online Maintenance System work orders, location histories, and inventory information shall be maintained in electronic format by the contractor. These records and logs shall be provided to the engineer as requested.

1.2 The contractor shall furnish all equipment and materials necessary to comply with the requirements of this provision unless stated otherwise.

2.0 Response Time. The engineer, or the engineer's representative, shall determine whether or not a malfunction is critical to the operation of the St. Louis District's ITS system.

2.1 Critical System Repairs. The contractor shall be available to respond, diagnose, and repair critical system failures/malfunctions on a twenty-four (24) hours per day, seven (7) days per week, three hundred sixty-five (365) days per year schedule. The engineer may notify the contractor of critical system failures/malfunctions during and outside normal business hours and on holidays. The contractor shall provide a 24/7 central telephone number to be used by the engineer to notify and report critical system failures/malfunctions. The contractor shall be required to respond onsite with the appropriate crew, equipment and material; make the site safe; and perform an initial diagnosis within 4 hours of notification. The contractor shall recommend an appropriate repair to the engineer. If approved by the engineer, the contractor shall make the necessary repair to the system within the timeframe as described in the provision below as maximum allowable time for completion or as approved by the engineer.

2.1.1 Types of system malfunctions that would be considered critical may include, but shall not be limited to:

- Loss of communication with a node cabinet

- Fiber Optic Cable break in MoDOT's network backbone

- Device malfunctions during critical operations.

2.2 Non-Critical System Repairs. The engineer shall notify the contractor of non-critical system failures/malfunctions during normal business hours. The contractor shall be required to respond onsite with the appropriate crew, equipment and material; make the site safe; and perform an initial diagnosis within 24 hours of notification. The contractor shall recommend an appropriate repair to the engineer. If approved by the engineer, the contractor shall make the necessary repair to the system within the timeframe as described in the provision below as maximum allowable time for completion or as approved by the engineer.

2.3 Notification shall be defined as when the contractor receives a call or email with MoDOT Online Maintenance System work order from the engineer, or the engineer's representative. The contractor is required to immediately reply to the engineer's phone calls or emails to verify receipt of notification.

3.0 Standard Repair Items.

3.1 Remove CCTV Camera & Assembly. The contractor shall remove the existing camera, camera dome, pan/tilt unit, device server, and all cables and connectors from the pole. 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. All items, removed by the contractor, shall remain the property of the Commission and shall be put into storage by the contractor for use as maintenance spare parts, reinstalled or disposed of as directed by the engineer.

3.1.1 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 of field meeting with the engineer, or the engineer's representative, at the site to inspect the equipment prior to removal.

3.1.2 The contractor shall have a maximum of four (4) hours to complete the requirements of this provision.

3.2 Install CCTV Camera & Assembly. This work shall consist of installing a Commission-furnished closed circuit television (CCTV) camera and assembly, or salvaged camera and assembly, on a metal pole and install a Commission-furnished power supply and surge protection in a nearby cabinet. The pole and cabinet will be existing or shall be paid for separately. This work also requires the contractor to provide cables connecting the camera to the equipment in the cabinet and to ground, provide an air terminal, set up the camera assembly and test for proper operation.

3.2.1 Qualified Personnel. The Commission's agreement with the camera assembly manufacturer obligates the manufacturer to train the Commission's installation contractors in the unpacking, assembling, mounting, positioning, connecting to the communication network, set up and testing of the camera and assembly. The training is free to the contractor and is conducted at the jobsite. The contractor shall not perform any work until the manufacturer has certified the contractor as qualified. Only personnel who have been trained by the manufacturer shall participate in the camera and assembly installation, setup and testing. The engineer or the engineer's representative shall be present to observe the training.

Contractors certified under a previous Commission contract shall not need to be trained a second time, but only personnel who received the training shall participate in the camera assembly installation and testing.

3.2.2 Support During Installation. The Commission's agreement with the camera assembly manufacturer obligates the manufacturer to provide both on-site and remote factory support.

3.2.3 Materials. Camera assembly, mounting bracket, power supply and surge suppressors will be provided by the Commission or salvaged and refurbished from a previous installation.

The contractor shall acquire cables for power, video, and camera control from the camera's manufacturer or shall use salvaged and refurbished cables from a previous installation.

The contractor shall provide stainless steel bands to affix the mounting bracket to the new or existing pole. The banding shall be 1-inch wide and 0.044-inch thick stainless steel.

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

3.2.4 Construction Requirements. The dome shall be installed so that the pole does not block the camera's view of traffic.

The air terminal shall be installed on the opposite side of the pole from the dome. The contractor shall position the rod to project a minimum of five feet above the highest point of the pole, and attach it to the pole with bolts passing through the wall of the pole and bond the air terminal to the top of the pole. The contractor shall apply a copper-based conductive sealant between the rod and the pole before tightening the bolts. The pole itself shall be the ground conductor.

The bottom of the pole shall be connected to one or more ground rods using a bare, solid AWG # 6 copper wire. The contractor shall use exothermic welding for all ground wire connections, except the connection to the pole, which shall use the pole's grounding lug. The contractor shall use a device that measures resistance to ground using the three-point fall-of-potential method and shall test the resistance from the air terminal to ground. If the resistance between the air terminal and ground exceeds 8 ohms, the contractor shall add more ground rods to achieve this requirement. The contractor shall perform all work related to the installation of the air terminal in accordance with NFPA 780.

The contractor shall terminate all the cables on surge protectors, install the Commission-furnished power supply in the cabinet, and connect the camera power circuit to the power supply.

The contractor shall be responsible for restricting the camera's field of view, if necessary, so that a user cannot use the cameras to look in the windows of dwellings or view residential property, as long as the restriction does not interfere with the use of the camera for traffic management purposes. Prior to creating these restrictions, the contractor shall submit to the engineer a written description of the proposed restrictions to be installed at each camera, and the proposed method of achieving them. The restrictions shall be constructed such that it shall not be possible for an operator to override them 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. If there are situations in which there is a conflict between the need to protect privacy and the need to

manage traffic, the contractor shall advise the engineer. The contractor shall revise the field of view restrictions as directed by the engineer.

The contractor shall apply a rain repellent coating to the outside of the lower dome, following the coating manufacturer's instructions. The coating must be recommended by its manufacturer for clear acrylic.

The contractor shall configure the CCTV camera and CODEC, including appropriate IP addresses, as directed by the engineer to function properly within the existing communications scheme.

3.2.5 Acceptance Testing. Upon delivery of a shipment of new or refurbished camera assemblies, the manufacturer's representative 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 they choose. The manufacturer shall be responsible for replacing all defective units uncovered by this testing.

After installing the camera assembly, the contractor shall test it using the same procedures as the manufacturer's representative used when the camera assemblies were delivered. In addition, demonstrate that the agreed upon viewing restrictions have been implemented. Also, use a device that measures resistance to ground using the three-point fall-of-potential method to demonstrate that the resistance from the air terminal to ground does not exceed 8 ohms. 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. Except for costs borne by the manufacturer under his warranty agreement, the cost of replacement shall be borne entirely by the contractor.

3.2.6 The contractor shall have a maximum of four (4) hours to complete the requirements of this provision.

3.3 Remove Camera Pole. The work shall consist of removing an existing camera pole, after the existing camera and assembly, including cabinet, is removed from pole. The poles may be mounted and bolted to a concrete foundation or previously damaged to an extent that it has been knocked over and is laying adjacent to the foundation. Each pole, removed by the contractor, shall remain the property of the Commission and shall be put into storage by the contractor for use as maintenance spare parts, reinstalled or disposed of as directed by the engineer.

3.3.1 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. In lieu of a field meeting to determine the condition of the pole prior to its removal, the contractor may photograph the pole to document pre-existing damage prior to beginning work. Any damage, without sufficient documentation, shall be assumed to be caused by the contractor and the contractor will be responsible for the damages.

3.3.2 The contractor shall have a maximum of four (4) hours to complete the requirements of this provision.

3.4 Install Salvaged Camera Pole. The work shall consist of installing a salvaged camera pole on an existing or a new concrete foundation.

The contractor shall perform the following:

- Install the camera pole on a new or existing foundation as directed by the engineer.
- Check the plumb of the pole and adjust as necessary.
- Tighten the anchor bolts to the torque specified by the manufacturer of the pole.

3.4.1 Installation or repair of a concrete foundation shall be considered out of scope work and shall be compensated for through methods described in other articles of this contract.

3.4.2 The contractor shall have a maximum of four (4) hours to complete the requirements of this provision.

3.5 Install New CCTV Pole (60 feet) and Lowering System.

Description. The camera lowering system shall be designed to support and lower a standard closed circuit television camera, lens, housing, PTZ mechanism, cabling, connectors and other supporting field components without damage or causing degradation of camera operations. The camera lowering system device and the pole are interdependent; and thus, must be considered a single unit or system. The lowering system shall consist of a pole, suspension contact unit, divided support arm, and a pole adapter for attachment to a pole top tenon, pole top junction box, conduit mount adapter and camera connection box. The divided support arm and receiver brackets shall be designed to self-align the contact unit with the pole center line during installation and ensure the contact unit cannot twist under high wind conditions. Round support arms are not acceptable. The camera-lowering device shall withstand wind forces of 100 mph with a 30 percent gust factor using a 1.65 safety factor. The lowering device manufacturer, upon request, shall furnish independent laboratory testing documents certifying adherence to the stated wind force criteria utilizing, as a minimum effective projected area, the actual EPA or an EPA greater than that of the camera system to be attached. The camera-lowering device to be furnished shall be the product of manufacturers with a minimum of 3 years of experience in the successful manufacturing of camera lowering systems. The lowering device provider shall be able to identify a minimum of 3 previous projects where the purposed system has been installed successfully for over a one-year period of time each.

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

3.5.1 lbs. with a 4 to 1 safety factor. There shall be a locking mechanism between the fixed and moveable components of the lowering device. The movable assembly shall have a minimum of 2 latches. This latching mechanism shall securely hold the device and its mounted equipment. The latching mechanism shall operate by alternately raising and lowering the assembly using the winch and lowering cable. When latched, all weight shall be removed from the lowering cable. The fixed unit shall have a heavy duty cast tracking guide and means to allow latching in the same position each time. The contact unit housing shall be weatherproof with a gasket provided to seal the interior from dust and moisture.

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

The female and male socket contact halves of the connector block shall be made of thermosetting synthetic rubber known as Hypalon. The female brass socket contacts and the male high conductivity brass pin contacts shall be permanently molded into the Hypalon body.

The current carrying male contacts shall be 1/8 inches in diameter. There shall be two male contacts that are longer than the rest which will make first and break last providing optimum grounding performance. The number of contacts shall be 14 and the camera mounted thereto, shall be capable of performing all of its necessary functions on 14 contacts or less.

The current carrying female contacts shall be 1/8 inches I.D. All of the contacts shall be recessed 0.125” from the face of the connector. Cored holes in the rubber measuring 0.25” in diameter and 0.125” deep molded into the connector body are centered on each contact on the face of the connector to create rain-tight seals when mated with the male connector.

The wire leads from both the male and female contacts shall be permanently and integrally molded in the Hypalon body. The current carrying and signal wires molded to the connector body shall be constructed of #18/1 AWG Hypalon jacketed wire.

The contacts shall be self-wiping with a shoulder at the base of each male contact so that it will recess into the female block, thereby giving a rain-tight seal when mated. The electrical contact connector must meet Mil Spec Q-9858 and Mil Spec I-45208.

3.5.2 Lowering Tool. The camera-lowering device shall be operated by use of a portable lowering tool. The tool shall consist of a lightweight metal frame and winch assembly with cable as described herein, a quick release cable connector, an adjustable safety clutch and a variable speed industrial duty electric drill motor. This tool shall be compatible with accessing the support cable through the hand hole of the pole. The lowering tool shall attach to the pole with one single bolt. The tool will support itself and the load assuring lowering operations and provide a means to prevent freewheeling when loaded. The lowering tool shall be delivered to the applicable DOT engineer upon project completion. The lowering tool shall have a reduction gear to reduce the manual effort required to operate the lifting handle to raise and lower a capacity load. The lowering tool shall be provided with an adapter for operating the lowering device by a portable drill using a clutch mechanism. The lowering tool shall be equipped with a positive breaking mechanism to secure the cable reel during raising and lowering operations and prevent freewheeling. The manufacturer shall provide a variable speed, heavy-duty reversible drill motor and a minimum of one lowering tool plus any additional tools required by plan notes. The lowering tool shall be made of durable and corrosion resistant materials, powder coated, galvanized, or otherwise protected from the environment by industry-accepted coatings to withstand exposure to a corrosive environment.

3.5.3 Materials. All pulleys for the camera lowering device and portable lowering tool shall have sealed, self-lubricated bearings, oil tight bronze bearings, or sintered- oil impregnated, bronze bushings. The lowering cable shall be a minimum 1/8-inch diameter stainless steel aircraft

cable with a minimum breaking strength of 1740 pounds with (7) strands of 19 wire each.

All electrical and video coaxial connections between the fixed and lowerable portion of the contact block shall be protected from exposure to the weather by a waterproof seal to prevent degradation of the electrical contacts. The electrical connections between the fixed and movable lowering device components shall be designed to conduct high frequency data bits and one (1) volt peak-to-peak video signals as well as the power requirements for operation of dome environmental controls.

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

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

The Camera Manufacturer shall provide weights and /or counterweights as necessary to assure that the alignment of pins and connectors are proper for the camera support to be raised into position without binding. The lowering unit will have sufficient weight to disengage the camera and its control components in order that it can be lowered properly.

The Camera Manufacturer shall provide the power and signal connectors for attachment to the bare leads in the pole top and/or camera junction boxes.

Either the Camera Manufacturer or the Lowering Device Provider shall provide a mounting flange sufficient for mounting the respective camera assembly to the bottom of the Camera connection box.

3.5.4 Camera Lowering System Steel Pole

Design. Design shall be in accordance with the 2001 AASHTO "Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals." Minimum Loading requirements shall be based on an isotach wind velocity for the area of installation according to 2001 AASHTO isotach wind chart with a 1.3 gust factor.

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

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

Welding. All welding shall be in accordance with Sections 1 through 8 of the American Welding Society (AWS) D1.1 Structural Welding Code. Tackers and welders shall be qualified in

accordance with the code. Tube longitudinal seam welds shall be free of cracks and excessive undercut, performed with automatic processes, and be visually inspected. Longitudinal welds suspected to contain defects shall be magnetic particle inspected.

All circumferential butt- welded pole and arm splices shall be ultrasonically or radiographically inspected.

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

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

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

Pole Shaft. The pole shaft shall conform to ASTM A595 Grade A with a minimum yield strength of 55 ksi or ASTM A572 with a minimum yield strength of 65 ksi. The shaft shall be round, 12-sided or 16 sided with a four inch corner radius, have a constant linear taper of

0.14 in/ft, and contain only one longitudinal seam weld. Circumferential welded tube butt splices and laminated tubes are not permitted. Longitudinal seam welds within 6 inches of complete penetration pole to base plate welds shall be complete penetration welds. The shaft shall be hotdip galvanized per the requirements of the contract documents.

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

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

The tenon shall be of dimensions necessary to facilitate camera lowering device component installation. For details, see applicable drawings.

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

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

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

3.5.5 The contractor shall have a maximum of four (4) hours to complete the requirements of this provision.

3.6 Dynamic Message Sign (DMS)

3.6.1 Qualified Personnel. The Commission's agreement with the DMS manufacturers obligates the manufacturers to train the Commission's installation contractors in the unpacking, assembling, mounting, positioning, connecting to the communication network, set up and testing

of the DMS. The training is free to the contractor and is conducted at the jobsite. The contractor shall not perform any work until the manufacturer has certified the contractor as qualified. Only personnel who have been trained by the manufacturer shall participate in the DMS assembly repair and testing. The engineer or the engineer's representative shall be present to observe the training.

Contractors certified under a previous Commission contract shall not need to be trained a second time, but only personnel who received the training shall participate in the DMS assembly repair and testing.

3.6.2 Support During Installation. The Commission's agreement with the DMS manufacturers obligates the manufacturer to provide both on-site and remote factory support.

3.6.3 Materials. DMS parts, including but not limited to fans, logic control assemblies, LED matrix modules, temperature sensor assembly, power supply assembly, photo sensor assembly, power surge protectors, and driver boards will be provided by the Commission or salvaged and refurbished from a previous installation.

The contractor shall acquire cables for power from the DMS's manufacturer or shall use salvaged and refurbished cables from a previous installation.

3.6.4 Construction Requirements. Once repairs are completed, the contractor shall inspect each location for general condition, including condition of cables and wires, power supplies, connectors, and communication panels or equipment contained within each DMS enclosure,

check and record voltages on all power supplies, and verify that all equipment appears to be operating properly. Contractor shall also perform a diagnostic on sign display

per manufacturer's specifications. Any equipment not functioning properly shall be immediately repaired and reported to the engineer.

3.6.5 Acceptance Testing. Upon completion, contractor shall contact the TMC staff to post test-messages onto the DMS. Contractor shall verify readability of the messages and report the findings to the engineer.

3.6.6 The contractor shall have a maximum of four (4) hours to complete the requirements of this provision.

3.7 Remove Field Cabinet (Single or Dual). This work shall consist of removing a controller cabinet, and internal component assembles. The cabinet may be single or dual size cabinets used for various ITS devices, including detector stations, DMS, CCTV control and communications, and communication nodes.

The contractor shall remove existing equipment and evaluate components to determine what may be salvaged for immediate reuse or placement into the spare parts inventory. This evaluation may include functional testing of the equipment. Whenever possible, the original cabinet and communications equipment shall be salvaged for reuse at the location or for placement into the spare parts inventory.

3.7.1 The removal of the concrete base foundation, if necessary, shall be considered out of scope work and shall be compensated for through methods described in another provision of this contract.

3.7.2 The contractor shall have a maximum of forty-eight (48) hours to complete the requirements of this provision.

3.8 Install Salvaged Field Cabinet (Single or Dual). This work shall consist of installing a salvaged controller cabinet on a new or existing concrete foundation (or a new or existing pole). This item shall be paid for two separate pay items: 1) Single cabinets used for detector stations, DMS, and CCTVs; and 2) Double cabinets used for communications nodes.

The contractor shall be responsible for all connectors and terminators, communication/power cables, cable management, equipment necessary to move the populated field cabinet, bolts and washers. All connectors, wire, terminators, bolts, and washers shall be new. Installation shall include connecting internal component assemblies and power connections and integrating the assemblies into the existing communications system.

3.8.1 Installation or repair of a concrete foundation shall be considered out of scope work and shall be compensated for through methods described in another provision of this contract.

Furnishing and installing cable outside of the cabinet shall NOT be considered part of this work. It may be paid for under another pay item or it may be considered out of scope work. Again, out of scope work shall be compensated for through methods described in another provision of this contract.

3.8.2 Construction Methods. The contractor shall install a salvaged cabinet on a new, existing, or modified concrete foundation (or a new or existing pole). Installation shall include making all

power connections between the cabinet and local utility connections; and furnishing, installing and connecting all cables between devices within the cabinet.

The contractor shall make all power connections to the cabinet in accordance with requirements of the local power utility and any applicable state codes.

The contractor shall make all detector cable and communications cable connections in the cabinet to provide the required operation. The engineer shall provide the existing wiring diagrams to the contractor. The contractor shall make all traffic signal cable connections and electrical wire connections to the processor assembly cabinet.

All signal current carrying neutral conductors shall terminate on a neutral strip mounted in the cabinet. The neutral bus shall be isolated from the cabinet and equipment ground. It shall terminate at the neutral lug ultimately attached in the meter pedestal.

The equipment grounding strip shall be isolated from the cabinet and current carrying neutral. The cabinet current carrying neutral shall terminate at the current carrying neutral ground lug in the meter pedestal or breaker pedestal.

Existing wiring to the existing, modified, or new concrete control cabinet base shall be reused, if possible, unless directed otherwise by the engineer. Wiring includes bonding wires, conductors, and detector lead-in cable.

The contractor shall make all connections between the field cabinet, the devices within, and among the devices.

The contractor shall demonstrate the functionality and accuracy of the vehicle detector, CCTV, DMS, and/or wireless communication equipment connected to the salvaged field cabinet. For CCTVs and DMS's, the contractor shall coordinate with the ITS operators to test the CCTV's pan-tilt, iris, and video functionality and the DMS' display functionality capabilities through the Advanced Transportation Management System (ATMS) software.

3.8.3 The contractor shall have a maximum of forty-eight (48) hours to complete the requirements of this provision.

3.9 Install new ITS Cabinets (Type 1, 2, 5 or 7). This work shall consist of furnishing and installing new cabinets and base adapters.

3.9.1 Materials.

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

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

3.9.1.3 Provide an additional surge protector just for the circuits powering the communication and traffic management equipment (excluding the dynamic message sign, which has its own surge protectors). This shall be a filtering, two-stage surge protector. Install it on the load side of the

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

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

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

3.9.1.6 All seams shall be continuously welded and ground smooth.

3.9.1.7 All fasteners must be stainless steel.

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

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

3.9.1.10 All cabinet doors shall have locks keyed to match MoDOT's other ITS cabinets.

3.9.2 Type 7 Cabinet

3.9.2.1 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.

3.9.2.2 The cabinet shall be equipped with the following:

- **Rack:** For mounting 19-inch equipment. The mounting rails must have holes of the EIA standard size and spacing for the entire height of the cabinet.

- **Mounting panels:** For terminal blocks, breakers, surge protectors, and other small items on the back and side walls.

- **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. Each terminal shall be clearly and permanently labeled on a contiguous surface using silk screening or other approved method. Terminal blocks for conductors carrying more than 60 volts must be covered by a clear acrylic shield.

- **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, 240/120 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.

3.9.3 Type 2 Cabinet.

3.9.3.1 Provide a cabinet meeting the requirements for a Model 334 cabinet in the latest edition of Transportation Electrical Equipment Specifications published by Caltrans, except as specified in these special provisions. The manufacturer must be on the Missouri Department of Transportation’s Traffic Operations Approved Products List for Type 170 controller cabinets and racks.

3.9.3.2 Components described in Chapter 6 Section 4 of Transportation Electrical Equipment Specifications are not required, nor are police panels. The following components are required:

• **Sunshields:** On all four sides and the top.

• Housing 1a or 1b, Mounting Cage 1, and Service Panel #1.

• **Rack-mounted, slide out shelf with storage tray:** Mounted immediately above the fiber optic patch panel enclosure.

- **Mounting panel:** For terminal blocks, surge protectors, and other small items on a sidewall.

- **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. Each terminal shall be clearly and permanently labeled on a contiguous surface using silk screening or other approved method. Terminal blocks for conductors carrying more than 60 volts must be covered by a clear acrylic shield.

- **Two interior fluorescent lights:** One above each door switch. Each door shall have a door switch. When either door is opened, both lights shall light.

- **Door switch:** On each door, permitting the door status to be monitored remotely. If this is the same switch used to control the lights, then there must be separate, electrically isolated contacts for detecting an open door.

- **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 400 watts.

- **Base adapter:** The base adapter has three functions. It raises the cabinet a foot above the foundation, making it easier for a technician to work in the lower part of the cabinet. Also, it provides a place where a little slack cable can be stored, so that slack is not taking up space in the equipment rack. Most of the slack at a cabinet should be stored in the adjacent pull boxes. In addition, it provides a raceway between adjacent cabinets on the same foundation.

The base adapter shall be a hollow aluminum box one foot high, 30 inches wide, and 30.25 inches deep (the same depth as the cabinet). It shall have a cutout opening centered in the top 15 inches wide and 21 inches deep, matching the opening in the bottom of the cabinet. It shall have a similar cutout on the bottom, directly below the top cutout.

Around the top cutout shall be four punched holes that match the anchor bolt holes in the cabinet. Provide bolts, nuts, washers, and lock washers to bolt the cabinet to the base adapter through these holes. Around the bottom cut out shall be four punched holes that also match the anchor bolt holes in the cabinet.

Construct the adapter so that it does not sag under the weight of the fully loaded cabinet. Any internal members must not obstruct cables going from the cabinet to adjacent cabinets, nor to the conduits below. Construct the adapter of the same material used for the cabinet and give it a matching finish. All seams shall be continuously welded and ground smooth.

When multiple cabinets are installed on the same foundation, provide two close nipple four-inch galvanized rigid metallic conduit fittings and four sealing lock washers for the fittings.

- **Anchor bolts, nuts, and washers:** For installation in a concrete foundation.

- **Electrical distribution system:** Type 1 and Type 2 cabinets may be installed singularly, or in groups of two on a common foundation, or adjacent to an existing cabinet. Provide breaker panels for all single Type 1 or Type 2 cabinets and for one cabinet of a group of new cabinets that share a common foundation. The circuit breaker panel shall be 120/240 volt, split phase, equipped with a solid neutral. The panel shall be UL listed.

Equip the panel with 50 amp main breakers and branch circuit breakers. Branch circuits shall have 15 amp breakers unless the load requires a larger breaker. One or more branch circuits shall serve the communication and traffic management equipment in the cabinet. Connect that circuit to the second stage of the surge suppressor and to at least eight outlets for the equipment. A second branch circuit shall power auxiliary devices in the cabinet, such as the fan, heater, light, and GFI outlet. If the cabinet feeds power to other cabinets not on the same foundation, the contractor shall provide two 15 amp branch circuits for each of the other cabinets.

Type 1 and Type 2 cabinets without breaker panels shall be powered from the breaker panel in another cabinet on the same foundation. The power wiring shall pass from one cabinet to the other through the base adapters.

3.9.3.3 Insulate the cabinet on all four sides, top and doors with a double layer of polyethylene air-bubble sheet, laminated on both sides with aluminum foil. Use aluminum tape on all edges of the insulation for protection from damage and to improve adhesion to the surface. The insulation shall have a thermal resistance of greater than R-7, a vapor resistance permeability of 0.006 or better, and a NFPA Class A, UBC Class 1 fire resistance or better.

3.9.3.4 The contractor shall mount an air conditioner on the cabinet's sidewall next to the door hinges. It shall use a closed loop cooling system that does not exchange air with the outside. It shall have the following features:

- Maximum dimensions: The unit shall not exceed the dimensions of the sidewall. The unit shall not add more than 12 inches to the cabinet width.

- Minimum cool capacity: 6000 BTU/hour.

- Hot gas bypass valve: To regulate cooling and prevent evaporator coil freezing during periods of low head load and low ambient air temperature.

- Intake location: Top

- Solid-state electronic noise suppressor: To minimize EMI/RFI interference.

- Thermostat: Adjustable in the range of 70 degrees F (20 degrees C) to 140 degrees F (60 degrees C) to activate cooling. Unit turn-off shall be 7 degrees F (4 degrees C) below the turn-on temperature. Mounting of the unit shall be such that setting changes can be made from one of the door openings.

There shall be no sun shield on the side on which the air conditioner is mounted.

3.9.3.5 Provide a separate circuit and breaker for the air conditioner and provide a delay- on relay or other protection to ensure that if a short power outage occurs while the unit is running, the breaker is not tripped when the power is restored and the unit tries to restart while pressurized.

3.9.3.6 Provide two contact closure temperature alarms. The high temperature sensor shall be adjustable in the range of 20 degrees C to 60 degrees C. The low temperature shall be adjustable in the range of 5 degrees F (-15 degrees C) to 40 degrees F (5 degrees C.)

3.9.4 Type 1 Cabinet.

3.9.4.1 A Type 1 cabinet shall be the same as a Type 2 cabinet, except that the Type 1 Cabinet

will not be ventilated, insulated, or air-conditioned.

3.9.5 Type 5 Cabinet.

3.9.5.1 The contractor shall provide a single door, NEMA 4 X aluminum cabinet, complete with mounting panel, patch panel, terminal block and hardware for pole mounting. The walls, sides, top and bottom shall be at least 0.08 inch thick. The door shall be at least 0.1 inch thick. The cabinet shall be approximately 24 inches high, 20 inches wide and 8 inches deep.

3.9.5.2 The patch panel shall have one position for every out of pavement vehicle detector assembly connected to the cabinet. The panel shall permit connecting a notebook computer to the detector for setup and troubleshooting. The panel shall be designed for shielded Category 5E cables, and shall include provision for grounding the shields of the connected cables.

3.9.5.3 The terminal block shall connect the power cable coming from the underground to the power cable coming from the detector. It shall be a barrier block with a nickel-plated brass screw terminal and a solid back.

3.9.6 Construction Requirements

3.9.6.1 Raceway between Cabinets. Where multiple Type 1, Type 2, and existing cabinets share a foundation, install the base adapters snugly against one another and flush. Between each pair of adjacent base adapters (including base adapters on existing cabinets), punch two holes in the base adapter walls, each just big enough for a four-inch close nipple. Install close nipples in the holes and secure them with a sealing lock washer one each side. These two nipples shall be used to run power and communication cables from one base adapter to the next. After all the cables have been installed, stuff fiberglass insulation material into the nipples that connect to the air conditioned cabinets, so as to minimize the leakage of chilled air.

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

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

3.9.6.4 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.

3.9.6.5 Wire Management. Use spiral wrap to guide and protect bundles of wires and cables. Affix the spiral wrap to the wall of the cabinet or vertical member of the rack, and keep power and signal cables separated.

3.9.7 Acceptance Testing

Develop a proposed test procedure for the cabinets and submit it to the engineer for approval. It shall include visual inspection, testing of lights, fan, heater, power outlets and alarm sensors. It

shall also include a test in which each branch circuit is shorted to the cabinet wall to confirm that the breaker trips. Revise the proposed test procedure until it is acceptable to the engineer.

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.

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

3.9.8 Documentation. Prior to purchasing the cabinets, provide five sets of complete shop drawings, layout drawings, catalog cuts, and schematics. For the air conditioner, provide an operations/maintenance/ manual that includes a complete parts listing. 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.

After installation, provide one reproducible 22 inch X 34 inch and two prints of the cabinet wiring diagram for each cabinet. The diagrams shall be nonproprietary. They shall reflect as-built conditions and shall identify all circuits in such a manner as to be readily interpreted. The diagrams shall be placed in a heavy duty, clear plastic pouch and attached to the inside of the front cabinet door. The pouch shall be of such design and material that it provides adequate storage and access to the wiring diagram.

3.9.9 Guarantee. All items covered by this specification shall carry a two-year manufacturer's warranty from the date of acceptance against any imperfections in workmanship or materials.

3.9.10 The contractor shall have a maximum of forty-eight (48) hours to complete the requirements of this provision related to installation of cabinets and acceptance testing.

3.10 Remove Wireless Radio Communication Equipment. This work shall consist of removing wireless radio communication equipment, including radio, antenna cable, antenna, and any mounting hardware dedicated to the wireless communication system. The wireless radio communication equipment may consist of 900 MHz unlicensed spread spectrum radios or 4.9 GHz licensed Ethernet bridges.

This item shall be paid per each (radio, antenna and cable) removed. Removal of both half ends of a wireless communication link shall considered 2 units of "Remove Wireless Radio Communication Equipment."

3.10.1 The contractor shall carefully remove and salvage the transmitter/receiver from the controller cabinet for re-use/reinstallation, remove the antenna cable and antennae, and deliver to the Traffic Management Center (TMC). The contractor shall give the ITS staff twenty-four (24) hours notification prior to the delivery. Prior to removing each assembly, the contractor may request, in writing to the engineer, that the equipment be tested for functionality and inspected to determine condition. Once removal has started, the contractor shall be responsible for any damage to the equipment including in this provision or adjacent equipment that is damaged during

the removal process.

3.10.2 The contractor shall have a maximum of forty-eight (48) hours to complete the requirements of this provision related to the removal of wireless radio communication equipment noted within this section.

3.10.3 The contractor shall have a maximum of twenty-four (24) hours to complete the requirements of this provision.

3.11 Install Wireless Radio Ethernet Bridge Communication Equipment. This work shall consist of installing new Commission Furnished or salvaged wireless radio Ethernet bridge communication equipment in new or existing ITS cabinets, including existing traffic signal cabinets.

The Commission shall furnish the wireless radio Ethernet bridges and power injectors, including power cables.

The contractor shall install Commission furnished wireless radio Ethernet bridges on structures as directed by the engineer and connect the devices to power communications and ground. The installations shall be considered complete after the contactor has successful tested the system and notifies the engineer. The contractor shall furnish and install the following, as required:

- Communication cables (Category 5E patch cords, coax patch cords, and short serial cables). Provide outdoor cabling to the pole or structure-mounted radios.

- Coaxial antenna cable up to one hundred (100) feet in length.

- Stainless steel bands to affix the radio mounting bracket to the pole. The banding shall be 1-inch wide and 0.044-inch thick stainless steel.

- Surge protection for all copper communication cables entering from other cabinets (excluding cabinets on the same foundation as the one in which the surge protector would be installed). The protector shall be UL certified as Category 5 and UL497B listed.

- Proper ground for the shields of the cables coming from other cabinets.

3.11.1 Any work to acquire or modify a license for operation of the wireless radio Ethernet bridge shall be considered out of scope work and shall be done by others or by the contractor. If done by the contractor, this out of scope work shall be compensated for through methods described in another provision of this contract.

3.11.2 The contractor shall have a maximum of twenty-four (24) hours to complete the requirements of this provision.

3.12 Remove and Install Cable in Conduit. This work shall consist of removing old cables, installing new cables in an existing conduit network, and terminating the cable at the device. The contractor shall replace the existing cables with similar cables, or otherwise specified by the engineer.

3.12.1 Materials. All necessary cable shall be furnished and installed by the contractor. The contractor shall be responsible for providing all equipment and tools necessary to complete

this item of work. The installation of a new pull rope for the purport of installing new cables in existing conduit shall be considered incidental to the work.

3.12.2 Construction Methods. All cables shall be installed per current MoDOT standards and specifications. All conductors shall be terminated or capped. Old cables and material shall be removed and disposed of by the contractor.

Splicing shall only be permitted underground only in pull boxes and only in proper and approved enclosures at locations approved by the engineer. The wire or cable ends shall not be left uncovered or submerged in water. Any such condition observed shall constitute grounds for rejection of an entire length of cable and/or wire. All electrical connections and splices shall be made with approved pressure or compression type fittings.

Tape shall be covered with a liberal coating of an electrical varnish or sealant providing flexible protection from oil, moisture, and corrosion. This electrical coating shall be approved by the engineer.

The contractor shall verify the number of conductors and the gauge of wire required in the cable runs and shall submit the cable arrangements to the engineer for approval. Conductor totals shall be verified by the engineer.

An extra six (6) ft of cable length shall be provided by the contractor for all cables entering each pull box. This loop of cable shall be in addition to the amount needed to reach from the entrance conduit raceway end to the opening in the existing conduit raceway.

3.12.3 Personnel. All electrical work shall be performed by a licensed electrician or under the onsite supervision of a licensed electrician. The contractor shall provide the engineer with documentation of the status as licensed electricians prior to the start of work.

3.12.4 Duration. The contractor shall have a maximum of twenty-four (24) hours to complete the requirements of this provision.

To complete the requirements of this provision, the contractor shall have a maximum of twenty-four (24) hours per MoDOT Online Maintenance System work order created, if the work doesn't exceed the following:

- 1000 LF of Cable, 8 awg
- 500 LF of Cable, 6 awg
- 100 LF of Cable, 4 awg
- 100 LF of Cable, 2 awg
- 500 LF of Cable, 1/0 awg
- 100 LF of Cable, 2/0 awg
- 250 LF of Cable, 14 awg
- 250 LF of Video Coaxial Cable

- 200 LF of CAT5E Outdoor Rated Cable

3.13 Install Fiber Optic Cable, Fusion Splices, Splice Enclosures, Terminations, Rack Mounted Interconnect Center, Wall Mounted Interconnect Center. This work shall consist of installing, splicing and terminating fiber optic cables.

3.13.1 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.

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

3.14.2.1 Cable. Fiber optic cables 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.

3.14.2.2 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 have both perforations for cable ties and crimpable metal tabs for buffer tube strain relief.

3.14.2.3 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.

3.14.2.4 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.

3.14.2.5 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.

3.14.2.6 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.

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

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

3.14.2.7 Rank-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.

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

3.14.2.7.2 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.

3.14.2.8 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.

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

3.14.2.9.1 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.

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

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

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

3.14.2.9.5 The closure shall accommodate 144 single mode fiber splices.

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

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

3.14.2.9.8 Designed for butt splicing.

3.14.2.9.9 No encapsulated materials shall be allowed.

3.14.2.10 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.

3.14.3 Construction Requirements.

3.14.3.1 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.

3.14.3.2 Cable Installation

3.14.3.2.1 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.

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

3.14.3.2.3 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.

3.14.3.2.4 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.

3.14.3.2.5 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.

3.14.3.2.6 When installing new fiber optic cable store at least 20 feet of slack cable in every Class 2 pull box and 60 feet of slack cable in every Class 5 pull box, unless otherwise noted on plans. When a fiber optic cable runs into a cabinet and then backout, consider the fiber optic cables entering and exiting as separate cables requiring slack for each cable passing through the nearest pull box. If the pull box nearest a cabinet is a Class 2 pull box, 60 feet of slack cable is required for each cable. Store slack in other adjacent pull boxes if needed. 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.

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

3.14.3.3 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.

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

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

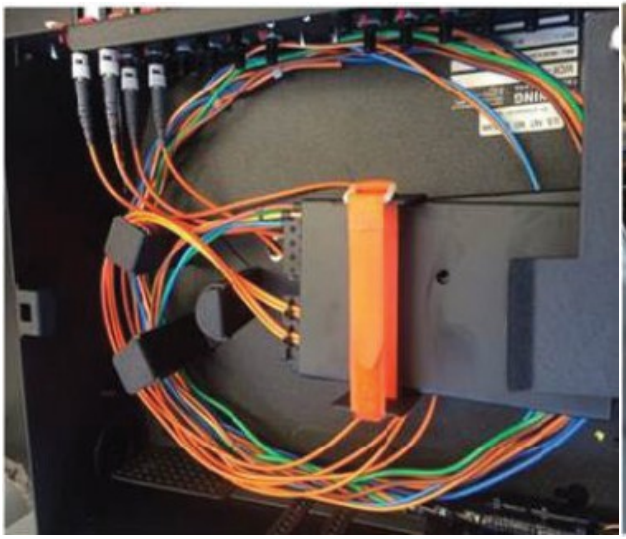
3.14.3.3.3 Prior to splicing to a fiber installed by others, measure and record the optical loss over that fiber. See section 4.0 of this provision.

3.14.3.3.4 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.

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

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

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



Acceptable



Unacceptable

3.14.3.7 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.

3.14.3.8 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.

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

3.14.4.0 Acceptance Testing.

3.14.4.1 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 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.

3.14.4.2 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:

Maximum link loss = Measured loss over portion installed by others

+ (Fiber length in km) x (0.35 for 1310 nm and 0.25 for 1550 nm)

+ (Number of fusion splices) x (0.05)

+ (Number of mechanical splices [for temp. connection]) x (0.3)

+ (Number of connections) x (0.5)

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.

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

3.14.5 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.

3.14.6 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.

3.14.6 Guarantee. All items covered by this specification shall carry a two-year manufacturer's warranty from the date of acceptance against any defects in workmanship or materials.

3.14.7 Work Orders To meet the requirements of this provision, the contractor shall have no more than twenty-four (24) hours from the creation of each MoDOT Online Maintenance System work order to develop a plan of action, provided the work does not exceed the following:

- 1000 LF of 24-Strand Single Mode Fiber Optic Cable
- 1000 LF of 72-Strand Single Mode Fiber Optic Cable
- 250 LF of 6-Strand Multi Mode Fiber Optic Cable
- 500 LF of 18 SM / 6 MM Fiber Optic Cable
- 96 EA of Fiber Optic Fusion Splice, Single Mode
- 18 EA of Fiber Optic Fusion Splice, Multi-Mode
- EA of Fiber Optic Splice Enclosure
- 96 EA of Fiber Optic Termination
- 1 EA of Rack Mounted Interconnect Center
- 1 EA of Wall Mounted Interconnect Center

3.14 Conduit. This work shall consist of furnishing and installing conduit either as a replacement for a damaged section of conduit, as a new installation, or for re-routing the conduit run. The same size and type of conduit shall be replaced or repaired, unless otherwise directed by the engineer.

3.15

3.15.1 Materials. All materials shall be furnished by the contractor for this time. All electrical conduits shall have a U.L. label on each length being delivered and/or used at the project construction site.

Nonmetallic conduit and fittings shall be HDPE SDRII electrical conduit conforming to the requirements of the Underwriters' Laboratories Standard for Rigid Nonmetallic Conduit, UL 651,for Schedule 40 heavy wall type or Schedule 80 extra-heavy wall type.

All nonmetallic conduits, which will be installed in an exposed location when in place and completed, shall be Schedule 80 conduit.

3.16 Construction Methods. The conduit shall match the size and type of conduit being repaired or replaced, unless otherwise directed by the engineer. Conduit repairs or replacements shall be performed in such a way as to avoid interruption to the operation of the ITS system. This may mean rerouting data or video temporarily or repairing conduit with a "split duct" to avoid the need to remove an existing live cable. Each run of conduit shall be of one size for its entire length from access point to access point. Access points shall be considered a pull box, junction box, and/or base of cabinet.

The contractor may elect to substitute a larger diameter conduit than the existing conduit run, if approved by the engineer. However, any additional cost shall be at the contractor's expense and no adjustment compensation shall be allowed.

Standard electrical conduit fittings shall be used. All nonmetallic conduit shall be capped or plugged immediately after installation and shall remain capped or plugged until installation of wire or cable.

End bells shall be installed on all nonmetallic raceway points before installation of wire and/or cable. Nonmetallic conduits shall be reamed to eliminate internal sharp edges before installation of end bells.

3.16.1 The contractor shall have a maximum of seventy-two (72) hours to complete the requirements of this provision for *trenched* conduit, if the MoDOT Online Maintenance System work order does not exceed the following:

3.16.1.1 50 LF of 1-in Conduit, Trenched

3.16.1.2 500 LF of 2-in Conduit, Trenched

3.16.1.3 100 LF of 3-in Conduit, Trenched

3.16.1.4 100 LF of 4-in Conduit, Trenched

The contractor shall have a maximum of fourteen (14) days to complete the requirements of this provision for *pushed* conduit, if the MoDOT Online Maintenance System work order does not exceed the following:

3.16.1.5 50 LF of 1-in Conduit, Pushed

3.16.1.6 1000 LF of 2-in Conduit, Pushed

3.16.1.7 50 LF of 3-in Conduit, Pushed

3.16.1.8 50 LF of 4-in Conduit, Pushed

Maximum time to complete the work described in Section 3.14 shall include the time necessary to locate utilities (**maximum 48 hours**). In the event a utility is in conflict with the proposed work, the engineer shall extend the maximum time for completion for the contractor for the amount of time necessary for the utility conflict to be resolved.

3.17 Twisted Pair Splice. The contractor shall perform mechanical splices as directed by the engineer. This work shall consist of splicing together 25-pair cable, 12-pair cable, 6-pair cable, 3-pair cable, or 2-pair data communication cable end-to-end.

3.17.1 Materials. The contractor shall provide all equipment and materials necessary to perform data communication cable splices. The type of twisted-pair splice enclosures used by the contractor shall be approved by the Engineer.

3.17.2 Construction Methods. Splices shall only be made at approved locations, such as new or existing underground pull boxes, as directed by the engineer.

Prior to performing the twisted-pair splices, the contractor shall test the twisted-pair cable from break point to the nearest cabinets upstream and downstream from the break point.

This test shall be conducted to ensure that no damage to the cable exists as a result of the break. If test indicates the cable is damaged beyond the break point, the contractor shall notify the engineer prior to performing the splice.

The contractor shall obtain adequate cable necessary to perform the splice from nearby pull boxes. Upon completion of the splice, the cable slack required to perform the splice shall be pulled back to the nearby pull boxes.

End-to-end splicing shall be performed as per manufacturer instructions for the supplied twisted-pair splice enclosure units. The contractor shall splice together the applicable size twisted-pair cables pair-for-pair between the two cables. The connection shall be soldered. Solder shall be electrical multi-flux core. The solder connections shall be half loop taped with an approved rubber high voltage tape. Each connection shall than be half loop taped with an approved vinyl electrical tape and insulated from each other before placement in the splice kit. Each connection shall then be coated with an approved electrical varnish approved by the engineer and allowed to dry. After drying, the splice kit shall be installed in accordance with the manufacturer's instructions.

The contractor shall conduct tests on the spliced cables. The test results shall be documented and provided to the engineer for approval. The contractor shall furnish all equipment, appliances, and labor necessary to test the spliced communications cable between the processor assembly cabinets. The following tests shall be successfully performed following terminations:

3.17.2.1 The continuity of each pair shall be measured. Each pair shall show a resistance of not more than 8 ohms per 1,000 feet of conductor. The resistance shall be measured with a meter having a minimum input resistance of 20,000 ohms per volt.

3.17.2.2 The insulation resistance between conductors, and between each conductor; ground and shielding shall be measured using a megger. The resistance shall be infinity.

Should any cable fail to meet the test parameters, or should any testing reveal defects in the splice, the cable shall be re-spliced at the contractor's expense. The new cable shall then be re-tested as specified above.

The contractor shall also submit documentation to the engineer indicating location of splice, type of repair performed, and footages to determine field location to the nearest pull box / communications vault or other landmark as approved by the engineer.

3.17.3 The contractor shall have a maximum of twenty-four (24) hours to complete the requirements of this provision.

3.18 Furnish and Install Pull Boxes. This work shall consist of the contractor furnishing and installing preformed pull boxes (Class 1-5) and preformed ITS pull box (Type 1, 2 or 5) with concrete aprons as shown in plans at locations as directed by the engineer.

3.18.1 The contractor shall have a maximum of seventy-two (72) hours to complete the requirements of this provision per MoDOT Online Maintenance System work order.

Maximum time to complete the work described in Section 3.16 shall include the time necessary to locate utilities (**maximum 48 hours**). In the event a utility is in conflict with the proposed work, the engineer shall extend the maximum time for completion for the contractor for the amount of time necessary for the utility conflict to be resolved.

3.19 Remove Non-Intrusive Vehicle Detector Pole. This work shall consist of removing an existing non-intrusive traffic detector pole from an existing foundation. The existing poles may have also fallen off their foundations or have been knocked over. The contractor shall salvage and store the existing pole, unless otherwise directed by the engineer. If the detector pole is not to be replaced, the contractor shall also be required to remove the foundation to below ground level.

The existing remote traffic detector, mounting bracket, field cabinet, and all cables and connectors shall be removed from the pole and compensated for under a separate pay item. The pole shall be unbolted from the foundation and lowered, if necessary. The existing remote traffic detector power and communication cables shall be disconnected and removed. All items, removed by the contractor, shall remain the property of the Commission and shall be put into storage by the contractor for use as maintenance spare parts, reinstalled or disposed of as directed by the engineer.

3.19.1 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 of field meeting with the engineer, or the engineer's representative, at the site to inspect the equipment prior to removal.

3.19.2 The contractor shall have a maximum of four (4) hours to complete the requirements of this provision.

3.20 Install Salvaged Non-Intrusive Vehicle Detector Pole. The work shall consist of installing a salvaged non-intrusive detector pole on an existing of new concrete foundation. The contractor shall be responsible for anchor bolts, nuts and washers.

The contractor shall perform the following:

- Install the camera pole on a new or existing foundation as directed by the engineer.

- Check the plumb of the pole and adjust as necessary.

- Tighten the anchor bolds to the toque specified by the manufacturer of the pole.

3.20.1 Installation or repair of a concrete foundation shall be considered out of scope work and shall be compensated for through methods described in other articles of this contract.

3.20.2 The contractor shall have a maximum of four (4) hours to complete the requirements of this provision.

3.21 Furnish & Install Non-Intrusive Vehicle Detector Pole. The work shall consist of installing a new non-intrusive detector pole on an existing or new concrete foundation. The contractor shall be responsible for anchor bolts, nuts and washers.

The contractor shall perform the following:

- Install the camera pole on a new or existing foundation as directed by the engineer.

- Check the plumb of the pole and adjust as necessary.

- Tighten the anchor bolds to the toque specified by the manufacturer of the pole.

3.21.1 Installation or repair of a concrete foundation shall be considered out of scope work and shall be compensated for through methods described in other articles of this contract.

3.21.2 The contractor shall have a maximum of four (4) hours to complete the requirements of this provision.

3.22 Remove Non-Intrusive Vehicle Detector Assembly. The work shall consist of removing a non-intrusive vehicle detector and assembly from an existing pole. Non-intrusive vehicle detector assemblies shall be existing on existing poles. The existing pole may be erect and in use, fallen, or knocked over. The existing detector controller assembly in the cabinet shall be disconnected from the detector communication/power cables and the cables shall be removed from the cabinet. All items, removed by the contractor, shall remain the property of the Commission and shall be put into storage by the contractor for use as maintenance spare parts, reinstalled or disposed of as directed by the engineer.

3.22.1 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 of field meeting with the engineer, or the engineer's representative, at the site to inspect the equipment prior to removal.

3.22.2 The contractor shall have a maximum of four (4) hours to complete the requirements of this provision.

3.23 Install New or Salvaged Non-Intrusive Vehicle Detector Assembly. This work shall consist of installing a Commission-furnished non-intrusive vehicle detector and assembly, or salvaged non-intrusive vehicle detector and assembly, on a metal pole and install a Commission-furnished power supply and surge protection in a nearby cabinet. The pole and cabinet will be existing or shall be paid for separately. This work also requires the contractor to provide cables connecting the detector to the equipment in the cabinet and to ground, provide an air terminal, set up the detector assembly and test for proper operation.

3.23.1 Qualified Personnel. The Commission's agreement with the detector manufacturer obligates the manufacturer to train the Commission's installation contractors in the unpacking, assembling, mounting, positioning, connecting to the communication network, set up, and testing of the detectors. The training is free to the contractor, and is conducted at the jobsite. The contractor shall not perform any work until the manufacturer has certified the contractor as qualified. Only personnel who have been trained by the manufacturer shall participate in the detector installation, setup, and testing. A Commission representative will be present to observe the training.

Contractors certified under a previous Commission contract need not be trained a second time, but only personnel who received the training shall participate in the detector installation and testing.

3.23.2 Support During Installation. The Commission's agreement with the detector manufacturer obligates the manufacturer to provide both on-site and remote factory support.

3.23.3 Materials. Detector, mounting bracket, cable connector (detector end), power supply, and communication interface panel will be provided by the Commission.

The contractor shall provide outdoor cabling in accordance with the detector manufacturer's recommendations. Communication cabling shall be shielded. Cables connecting to the detector

shall be stranded and shall be of a gauge compatible with the Commission- furnished connector. Communication cable connecting a Type 5 cabinet to a Type 7 cabinet shall be shielded Category 5 cable. Power cable connecting a Type 5 cabinet to a Type 7 cabinet shall be two-conductor, 14 AWG.

The contractor shall provide stainless steel bands to affix the mounting bracket to the pole. The banding shall be 1-inch wide, 0.044-inch thick, stainless steel.

3.23.4 Construction Requirements. The contractor shall install the detector in accordance with the manufacturer's recommended procedure for side-fired installation. The contractor shall take care to install it at the recommended height, and note that the recommended mounting height is relative to the road surface, not the base of the pole. The contractor shall strap the detector's mounting bracket to the pole with metal bands so that it faces the detection zones shown on the plans.

The contractor shall install the power and communication cables between the cabinet and detector. If the detector and cabinet are mounted on the same pole, the pole shall constitute the raceway, except where the cables leave the pole to make connections. The contractor shall use the Commission-furnished connector to connect the cables to the detector. If two separate cables are used for power and communication, the contractor shall use silicone sealant at the point where the two cables enter the connector to prevent the entry moisture and bugs.

The contractor shall aim and lock the detector to provide the coverage area required for one detection zone per lane.

Using the set-up software from the detector manufacturer, the contractor shall set up the detection zones and operating parameters. The set up shall include speed calibration using measured reference speeds. The contractor shall provide all equipment needed for the setup work, such as a radar gun, software, computer, tools, and cables. When the detector

is operating properly and has passed its acceptance test, the contractor shall deliver the values of all the detector's operating parameters to the engineer in printed or computer- readable form.

3.23.5 Acceptance Testing. Upon delivery of a shipment of detectors, the manufacturer's representative and the engineer will conduct a visual inspection and test of the detectors to check for manufacturing defects and shipping damage. The detector shall be powered during this testing, and tests shall follow procedures developed by the manufacturer and approved by the engineer. The installation contractor may witness this testing if they choose. The manufacturer shall be responsible for replacing all defective units uncovered by this testing.

After installing the detector, the contractor shall test it using procedures developed by the contractor and approved by the engineer. These tests shall include confirmation of the accuracy of counts and average speed in each lane. Both results shall be within ten percent of independently measured values during a 15-minute period. The test will be witnessed by the engineer. If the installed detector fails to operate properly and the problem cannot be fixed by changing the setup parameters, the detector shall be deemed defective and the contractor shall return it to the manufacturer for replacement. Except for costs borne by the manufacturer under his warranty agreement, the cost of replacement shall be borne entirely by the contractor.

3.23.6 The contractor shall have a maximum of four (4) hours to complete the requirements of this provision.

3.24 Remove In-Pavement Wireless Sensors. This work shall consist of removing an in-pavement sensor from the pavement. The sensor shall be reinstalled, relocated, salvaged or disposed as directed by the engineer. This work shall also include repairing the pavement surface.

The contractor shall remove each in-pavement wireless sensor in accordance with the manufacturer's specifications. The contractor shall exercise reasonable care in the handling of the equipment during removal. Should any of the equipment be damaged by the contractor's negligence, it shall be replaced at the contractor's expense.

3.24.1 Repair of Pavement Surface. For concrete surfaces, the hole shall be completely filled with an approved rapid set concrete patching material. The rapid set concrete patching material shall be from the qualified listing of approval products list available from the engineer or as approved by the engineer. For asphaltic surfaces, the hole shall be patched with an approved commercial mix in accordance with the current Missouri Standard Specifications for Highway Construction or as approved by the engineer.

3.24.2 The contractor shall have a maximum of four (4) hours to remove a maximum of five (5) sensors and complete the requirements of this provision.

3.25 Remove Access Point or Wireless Repeater. This work shall consist of removing an access point or wireless repeater and mounting hardware. For access point removals only, this work may also require removing the communication cable and sealing any cable access holes as directed by the engineer.

The contractor shall remove each access point or wireless repeater according to the manufacturer's specifications. The contractor shall exercise reasonable care in the handling of the equipment during removal. Should any of the equipment be damaged by the contractor's negligence, it shall be replaced at the contractor's expense.

3.25.1 The contractor shall have a maximum of four (4) hours to remove each access point or wireless repeater and complete the requirements of this provision.

3.26 Install Access Point or Wireless Repeater. This work shall consist of installing a Commission-furnished or salvaged access point or a wireless repeater, including mounting hardware. For access point installations only, this work shall also include the installation of communication cable from access point to field cabinet (Ethernet switch) which may include drilling cable access holes as directed by the engineer.

The contractor shall install each access point or wireless repeater in accordance with the manufacturer's specifications. A factory certified representative from the manufacturer shall be available for on-site assistance during installation

3.26.1 The contractor shall have a maximum of four (4) hours to install each access point or repeater and complete the requirements of this provision.

3.27 Install Trace Wire. This work shall consist of installing trace wire inside existing conduits that may either be empty spares or include other cables. The trace wire allows for an alternate method of locating facilities where magnetic locate tape has been damaged or destroyed.

3.27.1 Materials. The contractor shall provide a No. 12 AWG, XLP insulated stranded copper, 600 VAC, blue tracer wire. Installation of new pull rope for the purpose of installing the new cables

in existing conduit shall be considered incidental to construction.

3.28.2 Construction Methods. The contractor shall install the trace wire in conduits as directed by the engineer. Separate runs of tracer wire shall be connected at each pull box, as approved by the engineer, so that the locator is able to energize the wire at one pull box and locate all conduits in that location.

3.28.3 The contractor shall have a maximum of five (5) days to install each sensor and complete the requirements of this provision.

3.28 Removal of Solar Power System. This work shall consist of removal of Solar Power System components. The Contractor shall tag each part with the location and date of removal and test the removed components for any salvageable parts, which all parts shall remain the property of the Commission and delivered and put into storage by the Contractor, or used as maintenance spare parts, reinstalled, or disposed of as directed by the engineer.

3.28.1 Once removal has begun, the Contractor shall be responsible for the condition of all equipment. Compensation for damaged equipment 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.

3.29 Install of Solar Power System. This work shall consist of installing a Contractor- furnished Solar Power System and all of its components on an existing metal pole and/or nearby ITS device cabinet. The pole and cabinet will be existing structures or shall be paid for separately.

3.29.1 The installed Solar Power System and all of its components shall be tested for proper functionality. After a successful test of newly installed Solar Power System, the Contractor shall check for and confirm proper operation and network connectivity of the ITS device using the installed power system.

3.29.2 The Contractor shall have a maximum of forty eight (48) hours to complete the work described in this provision.

3.30 Remove Uninterruptible Power Supply (UPS) System. This work shall consist of the removal of the Node UPS systems and all of their components. The Contractor shall tag each part with the location and date of removal and test the removed components for any salvageable parts, which all parts shall remain the property of the Commission and delivered and put into storage by the Contractor, or used as maintenance spare parts, reinstalled, or disposed of as directed by the engineer.

3.30.1 Once removal has begun, the Contractor shall be responsible for the condition of all equipment. Compensation for damaged equipment 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.

3.30.2 Install Uninterruptible Power Supply (UPS) System. This work shall consist of installing Commission furnished components that are part of the existing Node UPS systems. These components may include but are not limited to 120 V Inverter with Ethernet port, Universal Automatic Transfer Switch with Bypass, Universal Automatic Generator Switch, 48V Battery charge management system, gel cell batteries, and any other additional hardware necessary to bring the UPS unit to its intended operation

3.30.3 The contractor shall have a maximum of twenty four (24) hours to complete the work described in this provision once the equipment is made available

3.31 Commission Furnished IP-Addressable Power Strip

3.31.1 Description. The contractor shall install the Commission furnished and programmed IP-Addressable Power Strip(s) in the ITS and/or Signal Cabinets

3.31.2 Installation Requirements. The contractor shall mount the power strip on the back side of the ITS Type 7 ITS cabinet and on the left side panel of the signal cabinet above the detector panel attached to 2 DIN rails, with the power cable facing away from the door. The hardwire interconnect panel, if present, should be removed to make room. A plastic wire tie shall secure any transformer packs plugged into this unit. The power source shall be hardwired to cabinet auxiliary breaker with no plug in to any cabinet outlet allowed.

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

4.0 Modification of Network/Communication Drawings. The engineer will provide the contractor with access to the as-built communication drawings for each device to be maintained on this contract. For each device the contractor repairs or modifies, the contractor shall verify the accuracy of the current communication diagram. If there is a discrepancy, the contractor shall modify the electronic copy of the diagram for that device location and submit the revised electronic file to the engineer. Updated drawings, in color, for both Visio and PDF formats, shall be submitted electronically within fourteen (14) days of the repair.

5.0 Basis of Payment. Payment for furnishing the labor, materials, and equipment necessary to install (including any testing necessary to ensure functionality and accuracy) or to remove (including the costs necessary to salvage, store and refurbish or dispose of as directed by the engineer) the devices/systems listed above, including modification to communication drawings, shall be paid for by the contract unit price for:

Item Number	Item Description	Unit
910-99.02	Install Solar Power System	EA
910-99.02	TB1-17 Aluminum Base for RTMS Pole	EA
910-99.02	TB3-17 Aluminum Base for RTMS Pole	EA
910-99.02	Remove Solar Power System	EA
910-99.03	Conduit, High-Density Polyethylene, 2 in., Pushed	LF
910-99.03	Conduit, High-Density Polyethylene, 2 in., In Trench	LF
910-37.00	Installed CCTV Camera Assembly	EA
910-52.00	Conduit, 2-in, Rigid, In Trench	LF

910-52.01	Conduit, 3-in, Rigid, In Trench	LF
910-52.02	Conduit, 4-in, Rigid, In Trench	LF
910-72.01	Conduit, 3-in, Rigid, Pushed	LF
910-72.02	Conduit, 4-in, Rigid, Pushed	LF
910-83.52	Fiber Optic Cable, 24-Strand, 18 SM, 6 MM	LF
910-99.02	MoDOT Buried Cable Drivable Delineator Post	EA
910-99.02	F&I Camera Pole (60ft) and Lowering System	EA
910-99.02	F&I Fiber Optic Fusion Splice, SM	EA
910-99.02	F&I Fiber Optic Fusion Splice, MM	EA
910-99.02	F&I ITS Pull Box, Class 1	EA
910-99.02	F&I ITS Pull Box, Class 2	EA
910-99.02	F&I ITS Pull Box, Class 5	EA
910-99.02	F&I Non-Intrusive Vehicle Detector Pole	EA
910-99.02	F&I Type 1 ITS Cabinet	EA
910-99.02	F&I Type 2 ITS Cabinet	EA
910-99.02	F&I Type 5 ITS Cabinet	EA
910-99.02	F&I Type 7 ITS Cabinet	EA
910-99.02	Fiber Optic Splice Enclosure	EA
910-99.02	Fiber Optic Termination	EA
910-99.02	Install Non-Intrusive Vehicle Detector Assembly	EA
910-99.02	Install Salvaged Field Cabinet (Single)	EA
910-99.02	Install Salvaged Field Cabinet (Dual)	EA
910-99.02	Install Salvaged Camera Pole	EA
910-99.02	Install Salvaged Non-Intrusive Vehicle Detector Pole	EA
910-99.02	Install Spread Spectrum Wireless Communication Equipment	EA

910-99.02	Install Wireless Ethernet Bridge Communication Equipment	EA
910-99.02	Rack Mounted Interconnect Center	EA
910-99.02	Wall Mounted Interconnect Center	EA
910-99.02	Remove Camera Pole	EA
910-99.02	Remove CCTV Camera & Assembly	EA
910-99.02	Remove Communication Node Field Cabinet (Single Cabinet)	EA
910-99.02	Remove Communication Node Field Cabinet (Double Cabinet)	EA
910-99.02	Remove Non-Intrusive Vehicle Detector Assembly	EA
910-99.02	Remove Non-Intrusive Vehicle Detector Pole	EA
910-99.02	Remove Wireless Communication Equipment	EA
910-99.03	Conduit, 2 in., Rigid, Pushed	LF
910-99.03	F&I Cable in Conduit, #14 wire, variable conductors	LF
910-99.03	F&I Cable in Conduit, #8 wire, variable conductors	LF
910-99.03	F&I Cable in Conduit, #6 wire, variable conductors	LF
910-99.03	F&I Cable in Conduit, #4 wire, variable conductors	LF
910-99.03	F&I Cable in Conduit, #2 wire, variable conductors	LF
910-99.03	F&I Cable in Conduit, #1/0 wire, variable conductors	LF
910-99.03	F&I Cable in Conduit, #2/0 wire, variable conductors	LF
910-99.03	F&I Cable in Conduit, CAT5e Outdoor Rated Cable	LF
910-99.03	F&I Cable in Conduit, Video Coaxial Cable	LF
910-99.03	F&I Fiber Optic Cable, 24-Strand SM	LF
910-99.03	F&I Fiber Optic Cable, 72-Strand SM	LF

910-99.03	F&I Trace Wire	LF
910-99.02	Remove UPS system assembly	EA
910-99.02	Install UPS system assembly	EA
910-99.02	Remove UPS power inverter	EA
910-99.02	Install UPS power inverter	EA
910-99.02	Remove UPS battery monitor	EA
910-99.02	Install UPS battery monitor	EA
910-99.02	Remove UPS battery	EA
910-99.02	Install UPS battery	EA
910-99.02	Remove UPS Automatic Transfer Switch	EA
910-99.02	Install UPS Automatic Transfer Switch	EA
910-99.02	Remove UPS Automatic Generator Switch	EA
910-99.02	Install UPS Automatic Generator Switch	EA
910-99.02	Remove IP Addressable Power Strip	EA
910-99.02	Install IP Addressable Power Strip	EA

5.1 When a call-out or MoDOT Online Maintenance System work order requires specific detailed analytical or investigative measures in the field, or necessitates advanced diagnostics in excess of those typically needed for an ITS repair and in excess of those described in section 5.2, specialized equipment or evaluations may be needed at the location prior to completing the repair or installation. Payment for Advanced Diagnostics will be made under:

Item Number	Item Description	Unit
910-99.02	Advanced Diagnostics	EA

This shall be considered full payment for furnishing the labor, materials, and equipment necessary to install and/or perform the work necessary to complete the above mentioned work. If payment is made for Advanced Diagnostics, no payment will be made for Troubleshooting as it pertains to the call-out or MoDOT Online Maintenance System work order that was issued.

5.2 In the event that the malfunction is repairable by a simple resolution, such as re-setting or re-

booting a device, or re-setting a tripped electrical breaker, the repair work shall be considered complete. Payment for furnishing the labor necessary to inspect and diagnosis the malfunction shall be paid for the **fixed unit price** for:

Item Number	Item Description	Unit	Unit Price
910-99.02	Troubleshooting	EA	$200.00

S. ITS Pull Box Lid Replacement

1.0 Description. The contractor shall furnish and replace the damaged round ITS pull box lids as noted on this contract.

2.0 Materials

2.1 ITS Pull Box Lid. The contractor shall field measure the lid diameter and confirm the pull box manufacturer. Based on the field review, the contractor shall submit their proposed round pull box lid cutsheets per MoDOT Specifications to the SLITS group via an email to SLITS@modot.mo.gov for review and approval.

3.0 Construction Requirements.

3.1 The pull box lid shall meet all applicable requirements in Section 1062 (Pull and Junction Boxes) of the Missouri Standard Specifications for Highway Construction.The contractor shall replace the damaged round ITS pull box lids per SLITS group Online Maintenance System ticket request. The lid bolts shall not be installed. They shall be left in the pull box.

3.2 The pull box lid shall meet all applicable requirements in Section 1062 (Pull and Junction Boxes) of the Missouri Standard Specifications for Highway Construction.

4.0 Basis of Payment. Measurement and payment for this pay item includes, field verification the lid size, furnishing and installing the round ITS pull box lids, in addition to all necessary materials and equipment to complete this task. Payment will be made as follows:

Item No.	Type	Description
910-99.02	Each	ITS Pull Box Lid Replacement (32 Inch Diameter)
910-99.02	Each	ITS Pull Box Lid Replacement (40.5 Inch Diameter)

T. Pad Mounted Power Supply

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

1.1 In locations as required on the plans, Contractor shall use USE-2 cable between the power source to power supply and from power supply to device cabinet/lighting controller. XHHW-2 to be used everywhere else.

2.0

3.0 Basis of Payment. Payment for furnishing and installing pad mounted power supplies shall include all excavation, materials, equipment, tools, labor, and work incidental thereto. Payment will be made as follows:

Item No.	Type	Description
910-99.02	Each	Pad Mounted Power Supply, 120V ITS

U. Split Duct Conduit Repair

1.0 Description. At locations noted on MoDOT Online Maintenance System Work order, the contractor shall repair a damaged conduit using "Split Duct Conduit" method per conduit manufacturer and MoDOT specifications.

2.0 Requirements. The contractor shall use MoDOT approved conduit materials to repair the damaged conduit. Using the conduit manufacturer requirements, when snapping the two piece conduits together, the interlocking design of Split Duct Conduit shall provide watertight connection and smooth tight seal protecting the cable or fiber optics from weathering. No tape, plastic, or any strap materials shall be used to seal or provide extra strength to the Split Duct Conduit repair.

The Split Duct Conduit Repair method and materials shall be inspected and approved by the engineer prior to filling the area.

3.0 Construction Requirements. Construction requirements shall conform to Sec 902.16.

4.0 Basis of Payment. No direct payment will be made to provide conformance to this section. Payment is to be included as part of Conduit, 2", 3", or 4" (depending on the repaired conduit size), in trench, for any conduit repair task.

V. 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.

W. Out of Scope and Works Repairs

1.0 Description. The contractor shall be aware that there may be additional work or repairs required outside of the scope of routine maintenance or common repairs as identified within the

job special provisions above (Preventative Maintenance & Remedial Maintenance). This work may include emergency relocations of ITS devices or fiber to avoid construction conflicts, catastrophic damage to major devices such as Dynamic Message Signs, or essential upgrades to ITS and/or network devices.

2.0 Basis of Payment. When such work is necessary, the engineer shall notify and request a bid for the additional work from the contractor. If appropriate, the contractor and engineer shall meet in the field to discuss and clarify the scope of work. The contractor shall submit a bid price(s) for the work item(s) to the engineer for approval. If a mutually agreed upon bid price cannot be determined, the work item(s) shall be compensated as outlined in Missouri Standard Specifications for Highway Construction under Sec 109.

X. Spare Parts (Contractor-Furnished, Contractor-Salvaged, or Commission-Furnished)

1.0 Description. The contractor shall maintain and store an inventory of spare parts in order to fulfill the requirements of this contract. The spare parts may be Commission- furnished, Contractor-furnished, or Contractor-salvage. The contractor shall also manage and verify repair work on existing ITS devices and equipment removed from the field.

2.0 Storage Facility. The spare parts storage area for this contract must be in a secure location and either be in a building dedicated to the spare parts of this contractor, or be physically separated and secured from areas of the building used for other purposes. Equipment larger than 20-feet long and weatherproof may be stored in a secure location adjacent to the building used to store the smaller equipment. The physical warehouse space must be sized adequately to store all parts and equipment necessary to complete the requirements of this contract.

3.0 Size of Inventory.

3.1 Commission-furnished Equipment. The engineer will provide a sufficient inventory of Commission-furnished spare parts to the contractor in order to prevent delays to the preventative or remedial repairs. The contractor shall advise the engineer if spare parts are getting low or provide recommendations on size of Commission-furnished inventory. The equipment furnished by the Commission shall remain Commission-owned and shall only be used to complete the requirements of this contract. These parts shall be neatly stored, separate from the other parts, and clearly labeled as owned by the Commission. The cost of any of these parts missing or otherwise unaccounted for shall be reimbursed to the Commission at the end of this contract.

3.1.1 The Commission will procure the following equipment for use with this project:

3.1.1.1 CCTV cameras and assemblies

3.1.1.2 Non-intrusive vehicle detectors and assemblies (RTMS Side Radar Detection)

3.1.1.3 Intrusive vehicle detectors and assemblies (In-pavement vehicle sensors, wireless repeaters and access points)

3.1.1.4 Ethernet switches

3.1.1.5 Video Encoders/Decoders

3.1.1.6 Fiber Optic Data Modems

3.1.1.7 Device Servers

3.1.1.8 DMS pixel board, driver board, power supply, fan, controller, and LCA

3.1.1.9 IP-addressable Power Strip

3.1.1.10 Audible Pedestrian System

3.1.1.11 Video Detection Cameras

3.2 Contractor-furnished Equipment. The contractor shall provide and maintain a sufficient inventory of spare parts and equipment in order to complete the requirements of this contract. No extension in maximum time of completion per MoDOT Online Maintenance System work order shall be given for insufficient inventory, unless approved by the engineer. It shall be the sole responsibility of the contractor to determine the size of the inventory of Contractor-furnished equipment.

3.2.1 Contractor furnished equipment shall include, but not be limited to the following:

3.2.1.1 DMS enclosure filters

3.2.1.2 Jumper wires and connectors

3.2.1.3 Field cabinet air filters

3.2.1.4 Any and all wiring within a single field cabinet or between two cabinets on the same base/pole.

3.2.1.5 Cleaning solutions and chemicals

3.2.1.6 Lubricating solutions, lubricants, oils or greases

3.2.1.7 Light bulbs (incandescent, fluorescent, and LED)

3.2.1.8 CCTV camera cable

3.2.1.9 CCTV Camera Poles

3.2.1.10 Vehicle Detector Poles

3.2.1.11 Pull boxes

3.2.1.12 All necessary mounting hardware

3.2.1.13 Solar Panel Battery replacements

4.0 Record of Inventory. In addition to storing the spare and salvaged parts, the contractor shall

be responsible for tracking and reporting on this inventory, including quantities, model numbers and serial numbers of all equipment. The contractor shall also be required to track warrantee information for all equipment within the inventory.

The contractor shall provide the engineer a *monthly report* of all the equipment by storage location. The report shall summarize, at a minimum, the quantity of units ready for deployment, units under repair, units failed and waiting for parts, units failed with no action yet taken, and dates of unit status changes.

4.1 Salvaged Equipment. The equipment removed from the field by the contractor shall remain Commission owned equipment and shall be stored, repaired or disposed of as directed by the engineer. The cost of any of these parts missing or otherwise unaccounted for shall be reimbursed to the Commission at the end of this contract.

4.2 Audits. The contractor shall provide the engineer, or engineer's representative access tothe spare part storage facility within twenty four (24) hours of being notified.

5.0 Repairing Salvaged Equipment. The contractor shall be responsibility for facilitating and verifying repairs made to existing equipment. This work shall include, but limited to:

- Package defective or damaged component(s) for shipping to the manufacturer for repair
- Ship packaged component(s) to approved repair facility for repair or replacement
- Track and report on parts in their repair cycle
- Receive repaired or replacement parts and add to inventory
- Test repaired parts to verify acceptable completion of repairs
- Negotiate repair rates or maintenance agreements with vendors or other qualified companies
- Meet with engineer, or engineer's representative, in order to determine policies on the diagnosis repair, or disposal of damaged equipment.

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

Y. Documentation and Reporting

1.0 Description. The contractor shall prepare a series of documents and reports for the engineer throughout the project. These reports shall, in general, track the frequency and type of work performed and the costs necessary for maintaining the ITS system. All reports shall be provided to the engineer in electronic format (MS Word or as approved by the engineer) through email.

2.0 Annual, Monthly, and Daily Progress Reports.

2.1 Annual Maintenance Report. The contractor shall provide a report at the end of the year (or end of this contract), which includes a simple summary of all maintenance activities for every field element, including the communication system, in the contract. This report may be in table format and shall include, at a minimum, the following information:

- Number of preventative maintenance visits to each site
- Scheduled date and actual date of preventative maintenance visits to each site
- Number of problem call visits to each site
- Average duration of each problem call visit for each site (actual time on site)
- Average time to resolve problems for each site (time from notification to resolution)
- Cost of spare parts used at each site (contractor & commission furnished)
- Total spare parts cost for the system for the year (contractor & commission furnished)
- Total compensation from the Commission to the contractor for this contract with **out-of-scope** work and component repairs broken out separately.

2.2 Progress Reports. The contractor shall provide the engineer with a progress report, via email, every two weeks. This report shall be clear and concise with only relevant information. This report shall include, at a minimum:

- Completed items for payment (separate standard pay items from out-of-scope work)
- Project work status
- Total cost per date
- Estimated cost for completion.

The report should also include any outstanding action and/or risk items, updated schedule, and a recovery plan if necessary.

2.3 Daily Work Report. Each staff member of the contractor, assigned to the project, shall maintain a bound daily log with name clearly indicated. The daily logs of all staff working on the project shall be delivered to the engineer by 10:00 a.m. the following work day. At a minimum, the information in the daily log reports, shall include:

- Date
- Weather and Road Conditions
- Problem(s) reported
- Cause of problem(s) discovered
- Work performed using traffic control and description of traffic control
- Motorized equipment utilized and duration
- Any traffic crashes within or adjacent to work zone or work area

- Any work-related accidents or injuries.

2.4 Preventative Maintenance Checklist/Inventory. The contractor shall submit to the engineer all preventative maintenance checklists, inspection sheets, and testing results per device within 48 hours of performing the work.

4.0 Schedule. The contractor shall develop and maintain a schedule for all maintenance activities. The engineer shall provide the contractor with the previous year's preventative maintenance visit/dates per site a minimum of four (4) weeks prior to preconstruction meeting. The contractor shall incorporate this information into the schedule to ensure that each ITS device is maintained at the frequency required in this provision and per manufacturer's guidelines. The first schedule shall be submitted by the pre-construction meeting.

The schedule shall include preventative maintenance and on-going repairs. The contractor shall update the schedule daily. After the initial schedule submittal and engineer's approval, an updated schedule shall be submitted to the engineer every two weeks or upon request by the engineer.

5.0 Maintenance Plan. The contractor shall create a document to describe in detail how all requirements in this project will be achieved and how repairs will be handled from notification to resolution.

It shall contain a process for efficiently expediting maintenance activities described within this proposal. The maintenance plan shall include, as a minimum:

- Date

- Preventative maintenance schedule for all field elements in the contract

- Description of the process that will be put into place to incorporate and expedite the resolution of unplanned field element service outages while maintaining the prescribed preventative maintenance schedule

- Process for ensuring consistent compliance with the required response times described in this contract.

An initial Maintenance Plan shall be submitted to the engineer prior to the preconstruction meeting. A revised Maintenance Plan based on comments from the engineer shall be submitted prior to the start of work.

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

Z. MoDOT Buried Cable Drivable Delineator Post

1.0 Description. The contractor shall install a MoDOT 'Buried Cable' delineator post next to existing fiber optic cables and fiber optic pull boxes as instructed. The post shall withstand multiple directional impacts and providing a long lasting and extremely durable product requiring little field maintenance. The contractor shall not be required to install posts at pull boxes near existing field cabinets. The posts shall be placed at a minimum spacing of 250 feet or as directed by the engineer. If line of sight to the adjacent post would be obstructed at the minimum spacing, the engineer may direct the contractor to install posts at points to allow for ground-level line of

sight from adjacent posts or field cabinets.

2.0 Construction Requirements. Construction requirements shall conform to the delineator post manufacture recommendations and engineer's approval. The contractor shall be responsible for all utility locates prior to installation.

3.0 Materials. The contractor shall provide all equipment and materials necessary to furnish and install delineator posts. The post shall be supplied in orange color and incorporate a premium UV inhibitor package to resist harmful effects to the sun. The post shall have a minimum 0.20" wall thickness and shall stand up straight in all weather conditions and self-right to straight upon impact. Top of post shall be permanently sealed and partially flattened and transition to round to afford 360 degree visibility. The post materials shall include an anchor, a non-mechanical flexible joint, and a round delineator post. The post assembly should allow for easy change-out of any one part if necessary.

4.0 Method of Measurement. Measurement of the drivable delineator posts shall be made per each.

5.0 Basis of Payment. Payment for furnishing the labor, materials, and equipment necessary to install Drivable Delineator Posts shall be paid for by the contract unit price for:

Item Number	Item Description	Unit
910-99.02	MoDOT Buried Cable Drivable Delineator Post	EA

AA. Coordination with MoDOT Signal Shop for Cabinet Entry

1.0 Description. Commission-furnished color-coded pad locks have been placed on all of MoDOT's signal cabinets in addition to the key used to unlock the door handle. To gain access to the appropriate cabinets during the project all contractors shall coordinate with MoDOT's signal shop to obtain the proper keys and locks.

1.1 Keys & Locks. Red locks and keys are provided when a contractor has modified the signal cabinet and MoDOT staff shall not have access to the cabinet until it is accepted for maintenance. The blue keys are provided for entry into the cabinet where MoDOT's Signal Shop group deems the access to be minor in nature (entry to the cabinet to make a simple network switch connection, for example).

1.2 Completion of Project. At the completion of the project all keys and pad locks distributed to contractor during the project shall be returned to the Signal Shop supervisor or their representative and keys shall not be reproduced.

2.0 Contact. Initial contact must be made at least seven calendar days before work begins, preferably when the project has the notice to proceed or during the pre-construction meeting, if applicable. MoDOT's Signal Shop supervisors shall be notified prior to work beginning. Contact the signal shop via email at **SLTRS@modot.mo.gov** to coordinate which padlocks are to be used.

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

BB. Wrong Way Alert System Software, Recertification and Preventative Maintenance

1.0 Description. This work includes preventative maintenance and reinstallation or replacement of field components that have been damaged by storms, vehicle collisions, construction activities, or other unanticipated events. Major relocations or system upgrades shall not be considered part of this work. All work under this provision shall be done in accordance with the current Missouri Standard Specifications for Highway Construction.

Annual preventative maintenance, software and recertification of the existing Wrong Way Alert Systems at the below noted locations shall be completed by the manufacturer as a subcontractor to the prime contractor on this project.

Wrong Way Alert System Locations:	**Manufacturer:**
EB 44 Off-Ramp to Hampton Ave, Exit 286	Traffic & Parking Control Co, Inc. (TAPCO)
EB 44 Off-Ramp to Lafayette Ave, Exit 290B	Traffic & Parking Control Co, Inc. (TAPCO)
EB 44 Off-Ramp to S Jefferson Ave., Exit 289	Traffic & Parking Control Co, Inc. (TAPCO)
I-70 EB at N. Florissant	Traffic & Parking Control Co, Inc. (TAPCO)
WB 44 Off-Ramp to MO 100 Gray Summit	Traffic & Parking Control Co, Inc. (TAPCO)
St. Clair Rest Area – EB 44 Ramp	Traffic & Parking Control Co, Inc. (TAPCO)
St. Clair Rest Area – WB 44 Ramp	Traffic & Parking Control Co, Inc. (TAPCO)
WB 370 to Off-Ramp to Earth City Expy, Exit 9	Traffic & Parking Control Co, Inc. (TAPCO)
WB 44 Off-Ramp to Arsenal St., Exist 284B	Traffic & Parking Control Co, Inc. (TAPCO)
WB 44 Off-Ramp to Grand/Louisiana, Exit 288	Traffic & Parking Control Co, Inc. (TAPCO)
WB 44 Off-Ramp to Hampton Ave, Exit 286	Traffic & Parking Control Co, Inc. (TAPCO)
WB 44 Off-Ramp to S. Jefferson Ave., Exit 289	Traffic & Parking Control Co, Inc. (TAPCO)

2.0 Material. If the devices are salvageable and in working order, the contractor may reinstall them at the location. Otherwise, the contractor shall purchase the Commission's current Wrong Way Alert Manufacturer all new devices needed to replace the damaged or inoperable devices at the location.

5.0 Scope of Work. This section includes scope of work requirements for Wrong Way Alert Systems preventative maintenance, software configuration, and recertification.

Power Source Testing (Solar Package or AC Source and DC Power Supplies)

-Perform tests on the power source to verify the equipment and power source are operating within an acceptable range

Calibration of Existing Detection Equipment

-Verify each detection sensor for the system is calibrated properly

-Clean each detection sensor assembly

-Verify detection by temporarily changing the detection direction to detect right-way traffic

-Verify each sensor's output triggers as the detection of right-way traffic occurs

-Perform general housekeeping to include cabinet vacuuming

-Perform cable management

Calibration of Existing Video Equipment

-Align each camera to optimal video capture position

-Verify each camera is receiving transmitted trigger from logic controller or individual sensor

-Verify each camera is capturing snapshots upon receipt of trigger

-Verify each camera is sending a daily image

-Verify each camera is sending status updates

-Verify each camera has the correct date and time

-Perform general housekeeping to include wiping the camera lens

-Perform cable management

Alignment and Testing of Warning Equipment

-Verify all static signs are properly orientated

-Verify the LED-enhanced signs or beacons are properly orientated

-Verify warning equipment operates for determined time interval

-Verify all lights are operational

-Perform general housekeeping to include wiping the face of the equipment

-Perform cable management

Verification of Activation and System Updates

-Verify all warning equipment activates upon initial detection

-Verify wrong way alert activation upon wrong way verification

-Perform Firmware and other system updates as they become available

Certification of Complete System by Drive Testing

-Drive a small vehicle twice in each lane to confirm low speed detection of system

-Drive a small vehicle twice in each lane to confirm high speed detection of system

-Drive a large vehicle twice in each lane to confirm low speed detection of system

-Drive a large vehicle twice in each lane to confirm high speed detection of system

Documentation To Be Provided

-Preventative maintenance documentation will be provided.

-System testing documentation will be provided.

Software To Be Provided

The below-described Blinklink® 2.18.0 features and functionality shall be included for the term of this contract and provided by manufacturer, Traffic & Parking Control Co, Inc. (TAPCO). TAPCO will verify system performance in concert with BlinkLink software by testing and verifying the speed of alert delivery and transmission confirmation on a biannual basis. Updates, meaning any updates, bug fixes, patches, or other error corrections to the BlinkLink software that TAPCO generally makes available free of charge to all licensees of BlinkLink is included with this agreement. BlinkLink new

versions or new features, meaning any new feature or version of BlinkLink that TAPCO may from time to time introduce and market generally as a distinct licensed feature or product (as may be indicated by Licensor's designation of a new version number or feature name), and which TAPCO may make available to you at an additional cost under a separate written agreement, shall not be included in the contract price but can be quoted separately as needed.

Quickly Monitor Wrong Way Alert and Other Intelligent Warning Systems

Blinklink® powered by TAPCO will monitor the status of every TAPCO Intelligent Warning System from its interactive map view, gather historical device data and quickly access individual systems through the search and filter function.

- Controller Based Mapping

View every device on an interactive map.

- Historical Data

View system status and activation history.

Remotely Manage Intelligent Warning Systems

Eliminate time-consuming site visits with BlinkLink® powered by TAPCO.

- Remote On Demand Manual Flash Activation

Override any set schedule to immediately turn on any device.

- Configurable Flash Duration

Extend or reduce flash times when needed User-selected event resolutions

○ **Select appropriate event resolutions in conjunction with the details provided in the alert package**

○ **Camera and thermal sensor streaming**

○ **“Offline” stream from any BlinkLink connected camera or thermal sensor**

○ Health and diagnostics

○ Remotely monitor vital system elements to ensure system uptime and proactively identify issues

Receive Email and SMS Alerts

Receive immediate Email/SMS alert notifications when a system activation occurs or system maintenance is identified. Determine what traffic events and pre-set systems thresholds transmit an email or SMS alert. Keep predetermined recipients informed by programming alerts according to their access or responsibilities across city, county and state agencies.

- Configure Email Alerts

Receive email alerts straight to your inbox.

- Configure SMS Alerts

Receive text message alerts on your phone or mobile device.

- Image Alerts

Alerts include up to 15 high resolution color images that include the directional overlay

- Streaming Alerts

Alerts include up to 15 high resolution color images that include the directional overlay

- Video Alerts

Alerts include downloadable high-resolution color video

Custom Reporting
Generate custom reporting for each device's historical data. Analyze traffic trends through system activations and event details to better manage current and future system deployments.

- **System Activation Reporting**
  Better understand event occurrences and document system effectiveness
- **Export Data Logs**
  View and download alert, activation and system status history.

4.0 Traffic Control. The prime contractor shall completely close each ramp listed above in Section 1.0 in order to allow for the Wrong Way Alert System manufacturer subcontractor to perform the configuration of newly installed and annual recertification for preventative maintenance of the Wrong Way Alert System. Traffic control items are included within the Plans and shall be paid as specified in the JSP – Temporary Traffic Control.

5.0 Basis of Payment. Measurement and payment for installation, preventative maintenance, software, and recertification of Wrong Way Alert Systems shall be paid for at the contract unit price for all labor and items included within the scope of work above as follows:

Item No.	Type	Description
910-99.02	Each	Wrong Way Alert Systems Equipment Purchase
910-99.02	Each	Wrong Way Alert Systems Installation
910-99.02	Each	Wrong Way Alert Systems Software and Certification by TAPCO of new installation
910-99.02	Each	Wrong Way Alert Systems Preventative Maintenance, Software and Recertification of existing system

CC. Remove and Install Intersection Video Detection System

1.0 Description. Remove existing video detection system in part or entirely and reinstall Commission-furnished video detection system in part or entirely at the locations and within scope of work as directed by the engineer.

1.1 The Contractor shall remove the existing video detection camera(s) at specified approaches at the signalized intersection and all components including, but not limited to: cameras on poles/mast arms, all cabling and connectors in conduit and/or within the signal cabinet and detection processor and all other equipment that are no longer needed due to the removal of the specified camera(s). All items, removed by the Contractor, shall remain the property of the Commission and shall be returned to Barrett Station signal shop to use as spare parts or disposed of as directed by the engineer.

1.2 Removal of a video detection system is defined as one camera per approach per intersection.

1.3 Installation of a video detection system is defined as either one camera per approach per

intersection or one camera that has the ability to cover detection for the entire intersection.

2.0 Material

2.1 Video Detection System. The replacement video detection system and/or cameras shall be Commission furnished. The Commission may elect to replace with an equivalent video detection system with the same number of cameras per intersection as was removed or elect to replace with an upgraded detection system with one camera that has the ability to cover the entire intersection. This work shall require the Contractor to provide and install all the cables connecting the camera to the equipment in the cabinet.

2.2 Coordination. The Contractor shall notify MoDOT at a minimum 48 hours in advance during normal business hours prior to pick-up of any Commission furnished equipment. Pick-up location is at MoDOT's Barrett Station complex Building A located at 23029 Barrett Station Rd, Ballwin, MO 63021.

3.0 Construction Requirements and Acceptance Testing

3.1 The Contractor shall be responsible for removal and installation of the video equipment per the specified work order and reconfiguring all detection zones for the intersection to ensure all zones are detecting properly as programmed in the signal controller. This must include visual verification of each vehicle detection zone is being received at the signal cabinet.

3.2 The Contractor shall confirm to the satisfaction of the Engineer that each detector's live status is viewable through the Commission's communication network before acceptance.

3.3 There shall be a 15 day test period after installation/setup of the video detection system. During this testing period, the Contractor shall be responsible to respond and resolve accordingly all detection faults reported within 24 hours. Any detection faults received will restart the testing period.

4.0 Method of Measurement. Measurement for removal and install of video detection system shall as defined in section 1.2 and 1.3.

5.0 Basis of Payment. Payment for furnishing the labor, materials and equipment necessary to remove, install, draw detection zones, test and perform any other items necessary for a fully functional video detection system shall be paid for at the contract unit price for within the scope of work above as follows:

Item No.	Type	Description
902.99-02	Each	Removal of Video Detection Camera
902.99-02	Each	Install and Configure Video Detection Camera

DD. Remove and Install Audible Pedestrian System

Job No.: JSL0096E
Route: Various
County: Various

1.0 Description. Remove existing audible pedestrian system (APS) in its entirety and reinstall Commission-furnished APS in its entirety at the locations and within scope of work as directed by the Engineer.

1.1 The Contractor shall remove the existing APS at specified signalized intersections and all components including, but not limited to: housing, pushbuttons, damaged cabling and connectors in conduit and/or within the signal cabinet and processor and all other equipment that are no longer needed due to the removal of the specified APS. All items, removed by the Contractor, shall remain the property of the Commission and shall be returned to the Commission's signal shop to use as spare parts or disposed of as directed by the Engineer.

1.2 Removal of an APS is defined as one system per intersection.

1.3 Installation of an APS is defined as one entire APS system for the entire intersection.

1.4 Contractor shall replace any damaged or non-operative 5-conductor and/or 2- conductor wire per the Commission's Standard Plans and Specifications as needed to make the APS operative as directed by the Engineer.

2.0 Material.

2.1 Audible Pedestrian System. The replacement APS system shall be Commission- furnished. If available, the Commission will furnish an USB data card with audible message files. If not available from the Commission, the Contractor shall request messaging from the manufacturer. The Contractor shall then furnish an USB data card with the new audible message files to the Engineer.

2.2 Coordination. The Contractor shall notify the Commission's Traffic Supervisor at a minimum 48 hours in advance during normal business hours prior to pick-up of any Commission furnished equipment. Pick-up location is at the Commission's Signal Maintenance Facility at 23029 Barrett Station Rd., Building A, Ballwin, MO 63021.

2.3 Cabling. Any cabling needed to make the new APS system operative shall conform with the Commission's Standard Plans and Specifications.

3.0 Construction Requirements and Acceptance Testing

3.1 The Contractor shall be responsible for removal and installation of the APS per the specified work order and manufacturer's specifications. This shall also include post- installation on-site testing and documentation of pushbutton operation and correct audible messaging for all crossings. The Contractor shall provide this documentation to the Engineer for review before acceptance. There shall be a 15-day test period after installation/setup of the APS system. During this testing period, the Contractor shall be responsible to respond and resolve accordingly all malfunctions reported within 24 hours. Any malfunctions received will restart the testing period.

4.0 Method of Measurement. Measurement for removal and install of APS systems shall be as defined in section 1.2 and 1.3. #16 gauge 2-conductor and #16 gauge 5-conducor wiring shall be paid per linear foot.

5.0 Basis of Payment. Payment for furnishing the labor, materials, and equipment necessary to remove, install, test, and perform any other items necessary for a fully functional APS system shall be paid for at the contract unit price for within the scope of work above as follows:

Item No.	Type	Description
902.99-02	Each	Removal of Audible Pedestrian System
902.99-02	Each	Install and Configure Audible Pedestrian System
902.83-10	LF	Cable, 16 AWG 5 Conductor
902.83.08	LF	Cable, 16 AWG 2 Conductor
902.83.09	LF	Cable, 16 AWG 3 Conductor
902.99-03	LF	Cable, 18 AWG 4 Conductor

EE. Order of Work – Various Route Devices

1.0 Description. The Commission is currently constructing roadway improvements, including Intelligent Transportation Systems (ITS) improvements on various routes in the St. Louis District. The Contractor will not perform nor be compensated for any maintenance work on any device within the various project limits unless agreed upon by the Commission representative before the work is completed. Including, but not limited to the projects listed below:

- J6I3020D
- J6I3502
- J6I3574
- JSL0087
- JST0020
- J6I3033
- JSL0297

2.0 Execution of Work.

2.1 The contractor shall perform all work as directed by the MoDOT representative, regardless of any other contractor performing work within the same project area. When work activities overlap with other construction or ITS projects, the MoDOT representative will provide direction on required tasks and will facilitate coordination with the contractor(s) currently operating in that area. The contractor shall cooperate fully with these coordination efforts and shall adjust work activities as necessary to ensure uninterrupted access to field devices and to avoid construction delays or claims.

2.2 The Contractor shall establish their schedule such that the maintenance tasks on these

devices occur after notification of acceptance of maintenance by the Commission.

3.0 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.

FF. Remove and Replace Commission-Furnished Uninterruptable Power Supply (UPS) Batteries

1.0 Description. Work under this item shall consist of removal of Uninterruptable Power Supply (UPS) batteries and install new Uninterruptable Power Supply batteries. Acceptance shall also include testing the system for proper operation as required by the manufacturer's specifications.

2.0 Construction Requirements.

2.1 The contractor shall present to the Engineer prior to the pre-construction conference written documentation of the order of work related. Consideration will be made to minimize the anticipated down time of the existing devices. A member of the SLITS group (must be contact via an email at SLITS@modot.mo.gov) will review and approve the schedule.

2.2 The contractor will be responsible for the proper testing of charge level of all removed batteries before disposal. Batteries with a level of charge above the minimum established by the manufacturer's specifications shall be returned to the Commission. The Contractor shall coordinate the delivery of all batteries with an acceptable charge with at least 48 hours advance notice to the Commission's Signal Shop Supervisors via an email at SLTRS@modot.mo.gov. Contractor will be responsible for disposal of all depleted batteries.

5.0 Measurement and Payment.

5.1 Measurement and payment for items covered by this specification include the documentation and acceptance of testing, in addition to all materials and equipment necessary to restore the system to be fully operational.

Item Number	Type	Description
910-99.02	Each	Remove and Replace Uninterruptable Power Supply (UPS) Battery

GG. Remove and Install Intersection Radar Detection System

1.0 Description. Remove existing radar detection system in part or entirely and reinstall Commission-furnished radar detection system in part or entirely at the locations and within the scope of work as directed by the Engineer.

1.1 The Contractor shall remove the existing radar detectors at specified approaches at the signalized intersection and all components including, but not limited to detectors on poles/mast arms, all cabling, and connectors in conduit and/or within the signal cabinet and detection processor and all other equipment that are no longer needed due to the removal of the specified

detectors. The Contractor shall contact the Commission's Signal Shop at Barrett Station for disposition of all items removed by the Contractor.

1.2 Removal of a radar detection system is defined as one radar sensor per approach per intersection.

1.3 Installation of a radar detection system is defined as one radar sensor per approach per intersection.

2.0 Material.

2.1 Radar Detection System. The replacement radar detection system shall be Commission furnished. This work shall require the Contractor to provide and install all the cables connecting the radar sensor to the equipment in the cabinet.

2.2 SDLC Patch Panel. If an SDLC patch panel is needed for the interface in the cabinet, the SDLC patch panel shall be Commission furnished and installed by the Contractor.

2.3 Coordination. The Contractor shall notify MoDOT at a minimum 48 hours in advance during normal business hours prior to pick-up of any Commission furnished equipment. Pick-up location is at MoDOT's Barrett Station complex Building A located at 2309 Barrett Station Rd, Ballwin, MO 63021

3.0 Construction Requirements and Acceptance Testing

3.1 The Contractor shall be responsible for removal and installation of the radar detection equipment per the specified work order and reconfiguring all detection zones for the intersection to ensure all zones are detecting properly as programmed in the signal controller.

3.2 The Contractor shall perform the installation in accordance with the most current version of the vendor's installation manual.

3.3 The Contractor shall confirm to the satisfaction of the Engineer that each detector's live status is viewable through the Commission's communication network before acceptance.

3.4 The Contractor shall notify the Engineer and the Commission's Signal Maintenance Supervisors (via e-mail to SLTRS@modot.mo.gov) once the installation is completed to schedule a punchlist inspection. There shall be a 15-day test period after installation/setup of the radar detection system, during which, the Contractor shall be responsible to respond and resolve accordingly all detection faults reported within 24 hours. Any detection faults received will restart the testing period.

4.0 Method of Measurement. Measurement for removal and install of the radar detection system shall is defined in section 1.2 and 1.3.

5.0 Basis of Payment. Payment for furnishing the labor, materials, and equipment necessary to remove, install, calibrate detection zones, test, and perform any other items necessary for a fully functional radar detection system shall be paid for at the contract unit price for within the scope of work above as follows:

Item No.	Type	Description
902-99.02	Each	Removal of Radar Detection Sensor

902-99.02 Each Install and Configure Radar Detector Sensor

HH. Commission 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 and/or Signal Cabinets as shown on the plans.

2.0 Installation Requirements. The contractor shall mount the power strip on the back side of the ITS Type 7 ITS Cabinet and on the left side panel of the signal cabinet above the detector panel attached to 2 DIN rails, with the power cable facing away from the door. The hardwire interconnect panel, if present, should be removed to make room. A plastic wire tie shall secure any transformer packs plugged into this unit. The power source shall be hardwired to the cabinet auxiliary breaker with no plug in to any cabinet outlet allowed.

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

4.0 Basis of Payment. Measurement and payment for Power Strip Installation includes installation, testing, grounding, and all miscellaneous hardware required for a safe, fully operational Power Strip. Payment will be made as follows:

Line Item No.	Description	Unit
910-99.02	PM with Repairs – IP Addressable Power Strip	Each

II. Mowing and Tree Clearing near ITS Devices

1.0 Description. This work shall consist of clearing areas listed in the roadway plans near ITS equipment so the contractor and MoDOT can access these ITS devices to make repairs. This work shall be in accordance with Sec 201 and may require the contractor to mow, cut tree branches or completely remove trees near these devices.

2.0 Construction Requirements. The contractor shall mow and remove all brush within a 25' radius around the specified ITS device listed within the plans. Trees that need to be removed near the ITS device shall have a **diameter no greater than 2 inches**. Trees that are larger with a diameter greater than 2 inches will be left in place. No information is being provided to the contractor regarding the trunk diameters that the contractor may encounter at each location. The contractor is encouraged to visit each site prior to bidding on this contract. Any tree that is to be removed shall be cleared to the existing ground elevation. The contractor shall dispose of the cut trees off existing right of way at an appropriate disposal site or the contractor may instead chip the trees and dispose of them on existing MoDOT right of way. Lastly, the contractor shall spray the existing right of way to prevent future growth as specified within Section 201 of the Standard Specifications and per requirements in the EPG (Engineering Policy Guide) 821.17.

3.0 Method of Measurement. Final measurement of areas requiring clearing and grubbing shall not be made by the Engineer. The Engineer shall visually inspect the area after the contractor has completed the clearing and grubbing and acceptance will be based upon this visual inspection

in order to ensure access to the ITS equipment is possible. The contractor is expected to perform this clearing and grubbing **one time for each area** listed in the plans.

4.0 Basis of Payment. Payment for this work, including all materials, equipment, labor and work shall be completely covered by the contract unit price paid under:

Line Item No.	Description	Unit
201-99.02	Clearing, Grubbing, Mowing, and Tree Clearing	Each

JJ. Video Detection Preventative Maintenance

1.0 Description. The Contractor shall perform preventative maintenance work (PMs) to the video detection cameras listed in Video Detection PM Schedule in the contract plans in accordance with the following provisions.

2.0 Schedule. The Contractor shall develop a schedule detailing the dates for which each device will have its preventative maintenance performed. The contract plans have included a schedule of intersections having video detection that are recommended for preventative maintenance in calendar year 2025. The Contractor shall develop a schedule that ensures that every location has a preventative maintenance service performed during the 2025 calendar year. The Contractor shall submit the schedule to the Engineer by the preconstruction meeting. Deviation from the proposed schedule of more than one (1) week may be allowed with prior approval from the Engineer. The Engineer reserves the right to alter the proposed schedule.

2.1 The Contractor shall provide all labor, equipment, and materials necessary to comply with the requirements of this provision. The Contractor is hereby advised that a bucket truck will be necessary to access these detection cameras.

3.0 Construction Requirements.

3.1 Preventative Maintenance Requirements. Detailed preventative maintenance procedures shall be developed by the Contractor. The Commission utilizes a video detection PM checklist that the Contractor shall review and ensure, that at a minimum, those activities are covered. The required checks are identified in the following subsections. In addition, the Contractor shall be responsible for performing all procedures in accordance with the manufacturer's recommendations. The Contractor shall submit their final PM procedure and checklist to the Engineer prior to the preconstruction meeting for review and approval.

3.1.1 Documentation. The Contractor shall document the following at each PM location. Detailed documentation is critical to assist Commission personnel with inventory as equipment may vary greatly within the intersection and from intersection to intersection. If a component's make or model is unknown upon inspection, the Contractor shall document the Serial Number and provide said Serial Number to the Engineer and the Commission's Signal Maintenance Supervisor so that the Serial Number can be verified against the Commission's inventory.

- PM Date
- PM Technician(s)
- Route
- Cross Street
- Camera Make
- Camera Model

- Monitor Make
- Monitor Model
- Processor Make/Model
- Serial Number
- Software Version

3.1.2 Cabinet Video Maintenance Checks. The contractor shall, at a minimum, perform the following checks within the traffic signal cabinet.

- Verify that the video image quality is good.
- Verify that the proper LED lights are illuminated on the video interface modules.
- Verify that the power supply is functioning properly.
- Verify that all applicable connectors are properly terminated in the signal cabinet (including, but not limited to power, RJ45, Deutsch, Coax, SDLC).
- Verify that their field of view is correct in all directions, following four lane minimum rule and rule of thumb.
- Verify that the mouse is in good working condition.
- Verify that all detection zones are properly configured and assigned.
- Verify that all detection zones are placing the proper calls into the signal controller.
- Verify that the software version is the most current for the particular processor being used. The contractor shall update the software version as required. The contractor shall also document the version being used.
- Verify that all components are properly grounded.
- Verify that the camera view switches functionality properly.
- Document any adjustments, repairs, or programming changes performed on the PM checklist.

3.1.3 Field Video Maintenance Checks. The Contractor shall, at a minimum, perform the following checks for each detection camera.

- Inspect all video cameras for visible damage (scratched lenses, etc.)
- Clean all video camera lenses.
- Verify that all applicable connectors are properly terminated on the camera (including, but not limited to power RJ45, Deutsch, Coax).
- Verify that the mounting bracket assembly, banding, and hardware are properly aligned, attached, and in acceptable condition.
- Verify that the mast arm cable entries are weather tight with the proper drip loop.
- Document any adjustments, repairs, or programming changes performed on the PM Checklist.

3.2 Procedure for Non-Operational Cameras. Should the Contractor, in the course of his duties performing the procedures outlined in 3.1, discover that a video detection camera or system is deemed to be non-operational; the Contractor shall stop that particular PM activity and notify the Engineer, the Commission's Signal Maintenance Supervisor, and the Commission's Traffic Operations Engineer of the non-operational camera. The Commission's representatives will determine whether to have the camera/system removed/replaced via work order in accordance the "Remove and Install Intersection Video Detection System" job special provision or via Commission forces. The Contractor shall not perform removal/replacement work nor be compensated for such work until a work order is issued from the Engineer.

4.0 Basis of Payment. Payment for furnishing the labor, materials, and equipment necessary to perform preventative maintenance on video detection cameras shall be paid for at the contract unit price for within the scope of work above as follows:

Line Item No.	Description	Unit
910-99.02	PM Video Detection Cameras	Each (Per Camera)

KK. Replace Ethernet Switch

1.0 Description. Replace existing Ethernet switch with new Commission-furnished and programmed Ethernet switch in existing roadside cabinets. The switch replacement will also include replacement of the switch power supply, an expansion module and small form-factor pluggables (SFP). The replacement switch will be programmed before it is provided to the contractor. 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.

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 W.

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 replacement will begin, at least 30 days before commencing this type of work. Additionally, provide the engineer a list of the switches to be replaced 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 Gateway Guide Transportation Management Center located at 14301 South Outer Forty, Town and Country, MO 63017. All the switches shall be picked up the same day. Email SLITS@modot.mo.gov. at least two days in advance to schedule the pickup day and time.

3.3 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.

3.6 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 preforming as expected. Contact information will be provided at the pre-construction meeting.

3.7 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.

3.8 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. 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:

Line Item No.	Description	Unit
910-99.02	Install Commission-Furnished Ethernet Switch Assembly	Each

LL. Supplemental Revisions JSP-18-01MM

- Compliance with 2 CFR 200.216 – Prohibition on Certain Telecommunications and Video Surveillance Services or Equipment.

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

- Stormwater Compliance Requirements

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

1.1 Definitions. The project site is defined as all areas designated on the plans, including temporary and permanent easements. The project site is equivalent to the “permitted site”, as defined in MoDOT’s State Operating Permit. An Off-site area is defined as any location off the project site the contractor utilizes for a dedicated project support function, such as, but not limited to, staging area, plant site, borrow area, or waste area.

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

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

2.1 Duties of the WPCM:

(a) Be familiar with the stormwater requirements including the current MoDOT State Operating Permit for construction stormwater discharges/land disturbance activities; MoDOT’s statewide Stormwater Pollution Prevention Plan (SWPPP); the Corps of Engineers Section 404 Permit, when applicable; the project specific SWPPP, the Project’s

Erosion & Sediment Control Plan; all applicable special provisions, specifications, and standard drawings; and this provision;

(b) Successfully complete the MoDOT Stormwater Training Course within the last 4 years. The MoDOT Stormwater Training is a free online course available at MoDOT.org;

(c) Attend the Pre-Activity Meeting for Grading and Land Disturbance and all subsequent Weekly Meetings in which grading activities are discussed;

(d) Oversee and ensure all work is performed in accordance with the Project-specific SWPPP and all updates thereto, or as designated by the engineer;

(e) Review the project site for compliance with the Project SWPPP, as needed, from the start of any grading operations until final stabilization is achieved, and take necessary actions to correct any known deficiencies to prevent pollution of the waters of the state or adjacent property owners prior to the engineer's weekly inspections;

(f) Review and acknowledge receipt of each MoDOT Inspection Report (Land Disturbance Inspection Record) for the Project within forty-eight (48) hours of receiving the report and ensure that all Stormwater Deficiencies noted on the report are corrected as soon as possible, but no later than stated in Section 5.0.

3.0 Pre-Activity Meeting for Grading/Land Disturbance and Required Hold Point. A Pre-Activity meeting for grading/land disturbance shall be held prior to the start of any land disturbance operations. No land disturbance operations shall commence prior to the Pre-Activity meeting except work necessary to install perimeter controls and entrances. Discussion items at the pre-activity meeting shall include a review of the Project SWPPP, the planned order of grading operations, proposed areas of initial disturbance, identification of all necessary BMPs that shall be installed prior to commencement of grading operations, and any issues relating to compliance with the Stormwater requirements that could arise in the course of construction activity at the project.

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

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

5.0 Stormwater Deficiency Corrections. All stormwater deficiencies identified in the Inspection Report shall be corrected by the contractor within 7 days of the inspection date or any extended period granted by the engineer when weather or field conditions prohibit the corrective work. If the contractor does not initiate corrective measures within 5 calendar days of the inspection date or any extended period granted by the engineer, all work shall cease on the project except for work to correct these deficiencies, unless otherwise allowed by the engineer. All impact costs

related to this halting of work, including, but not limited to stand-by time for equipment, shall be borne by the contractor. Work shall not resume until the engineer approves the corrective work.

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

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

- ***Delete Sec 106.9, including all subsections and substitute the following:***

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

106.9.1 Buy America Requirements for Iron or Steel Products.
The contractor's attention is directed to Title 23 CFR 635.410 *Buy America Requirements*. Where articles, materials or supplies that consist wholly or predominantly of iron or steel or a combination of both are to be permanently incorporated into the contract work, steel and iron material shall be manufactured, from the initial melting stage through the application of coatings, in the USA except for "minimal use" as described herein. Predominantly of iron or steel or a combination of both means that the cost of the iron and steel content exceeds 50 percent of the total cost of all its components. Under a general waiver from FHWA the use of pig iron and processed, pelletized, and reduced iron ore manufactured outside of the USA will be permitted in the domestic manufacturing process for steel or iron material.

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

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

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

maintain the step certification documentation on file and shall provide this documentation to the engineer upon request.

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

106.9.1.3.2 Items designated as Category 2 will include all other steel or iron products not in Category 1 and permanently incorporated in the project. Category 2 items shall consist of, but not be limited to items such as fencing, guardrail, signing, lighting and signal supports. The prime contractor is required to submit a material of origin form certification prior to incorporation into the project from the fabricator for each item that the product is domestic. The Certificate of Materials Origin form (link to certificate form) from the fabricator must show all steps of manufacturing, including coating, as being completed in the United States and in accordance with CFR Title 23 Section 635.410 Buy America Requirements and be signed by a fabricator representative. The engineer reserves the right to request additional information and documentation to verify that all Buy America requirements have been satisfied. These documents shall be submitted upon request by the engineer and retained for a period of 3 years after the last reimbursement of the material.

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

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

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

Construction materials mean articles, materials, or supplies that consist of only one of the items listed. Minor additions of articles, materials, supplies, or binding agents to a construction material do not change the categorization of the construction material. Upon request by the engineer, the contractor shall submit a domestic certification for all construction materials listed that are incorporated into the project.

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

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

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

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

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

- Third-Party Test Waiver for Concrete Aggregate

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

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

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

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

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

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

3.1 The testing facility shall be AASHTO accredited.

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

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

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

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

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

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

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

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

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

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

- *Add Sec 102.7.9 to include the following:*

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

- Revisions to General Conditions of the Contract for Missouri Standard Specifications for Highway Construction

Insert the following definitions into Sec 101.2:

Agent of Contractor. Subcontractors, its employees, assigns, and agents.

Agent of MoDOT. Any private contractors, subcontractors, engineers, or the employees thereof performing work in accordance with the plans and specifications approved by MoDOT.

Commencement of Work. Also defined as the start of construction operations/activities, this is the date the contractor, its employees, agents, and/or assigns first begins performing work pursuant to the terms of the contract, including the furnishing of labor, material, equipment, and other incidentals necessary or convenient to the successful completion of the project and the carrying out of duties and obligations imposed by the contract. For purposes of clarity, this date shall be deemed to occur on the date certified payroll activities on the project commence.

Exceptions. Work items identified by the engineer, as documented on the semi-final inspection, that are allowed to be completed after the contract completion date but prior to the item-specific completion date established by the engineer. Failure to complete any excepted work item by the item-specific completion date will result in assessment of contract liquidated damages. Designation of exceptions not mandated by the contract is at the sole discretion of the engineer.

Typical exceptions include:

(a) Seasonal items (e.g., sodding, overseeding, establishment of grass for soil stabilization, or tree/shrub plantings)
(b) Tasks that have contractually required or allowed delays (e.g., removal of sediment control devices, waiting periods for signal/lighting systems, pause for retroreflectivity evaluation of pavement markings)
(c) Other tasks in which the engineer determines it is in the best interest of the Commission to allow completion of such task to extend beyond the contract completion date, but within a designated period of time.

Delete Sec 105.10.7, including all subsections and substitute the following:

105.10.7 Final Inspection. Upon apparent completion of the entire project, the engineer will make a Final Inspection of the work to determine acceptance for maintenance in accordance with Sec 105.15.

Delete Sec 105.15, including all subsections and substitute the following:

105.15 Acceptance.

105.15.1 Partial Acceptance. At the discretion of the engineer, portions of the work within a project may be accepted for maintenance prior to the Final Inspection of all work for that project. When a portion of the work or a specific item is partially accepted, the contractor is relieved from maintenance on the identified portion of the work, but this is not the Final Inspection, as defined in Sec 105.15.2, and will not excuse the contractor from liability or responsibility to the Commission for work performed.

105.15.1.1 Acceptance of a Specific Item or Section of Work. Upon completion of any of the items or sections of work listed herein, the contractor may request the engineer's inspection of the work and partial acceptance. If the engineer finds the work to be complete and acceptable, including submittal by the contractor of all required documentation, partial

acceptance will be made for that item or section. The following items, complete in place, as determined by the engineer, are eligible for consideration of partial acceptance:

(a) Any section 0.5 mile or more in length.
(b) Any section 0.5 mile or more in length in one direction of a divided highway.
(c) A complete bridge.
(d) An intersection traffic signal system. Partial acceptance may be made for signal equipment prior to the 30-day testing period though any required performance tests and/or guarantees shall remain applicable.
(e) Devices intended to be used for traffic safety and control. Acceptance of traffic safety devices is limited to guardrail, impact attenuation barriers, traffic signal items, signs, delineators, lighting, concrete barrier walls, concrete bridge parapet, bridge railing, guard cable, crash cushions and fence, which are permanently installed in their final position in accordance with the contract documents.

105.15.1.2 Semi-Final Inspection, Corrections and Exceptions. The contractor shall submit a written request for a semi-final inspection at least seven days prior to the anticipated completion of work, excluding exceptions. If the engineer postpones the inspection beyond the date the contractor completes all work, the period of postponement will be considered an excusable but non-compensable delay.

105.15.1.2.1 Immediately following the semi-final inspection, the engineer will provide the contractor with a list of any remaining items of work, corrections, and exceptions. The count of contract time will continue until all work and corrections are complete. If the engineer determines all work is complete, with no exceptions, the semi-final inspection will be considered the Final Inspection in accordance with Sec 105.15.2.

105.15.1.2.2 Work Complete Date. Upon verification by the engineer that all work, exclusive of exceptions, is complete, the engineer will declare partial acceptance and cease the count of contract time. The count of contract time will resume should the contractor fail to complete one or more exceptions by the required date.

105.15.2 Final Inspection and Acceptance for Maintenance. The contractor shall promptly notify the engineer when all work on a project, including exceptions, is complete. Upon Final Inspection by the engineer and verification that all work on a project is complete, a notice of acceptance for maintenance will be submitted to the contractor. Acceptance for maintenance excludes any items covered by item-specific performance bonds. Final Inspection shall occur not later than ten (10) business days after contractor's notification to the engineer that all corrections and exceptions have been completed. If the Final Inspection has not occurred within the ten (10) business-day time frame, all corrections and exceptions shall be deemed completed and MoDOT will be deemed to have accepted maintenance. If written acceptance for maintenance is not received within twenty (20) business days after the date of the Final Inspection, nor any objections sent to the Agent of MoDOT during this twenty (20) business-day period, the project and the work shall automatically be deemed accepted for maintenance.

105.15.2.1 Following the Final Inspection, the Agent of MoDOT will be relieved of any new or additional liability to third parties for personal injury, death or property damages which may be alleged to result from the design or construction of the work, unless additional work is performed by the Agent of MoDOT on the right of way after Final Inspection.

105.15.2.2 Nothing in these specifications shall be deemed to excuse the contractor of liability or responsibility for any personal injury, death or property damages which may have occurred during the time period from the Commencement of Work through the Final Inspection.

105.15.2.3 Acceptance of a project shall not be construed to relieve the contractor of full responsibility for making good any non-latent defect in work or material found on any section of work prior to final acceptance of the entire project, to alter in any manner the method of payment prescribed in the contract or to constitute a waiver of any claim the Commission might have against the contractor on the entire project.

105.15.2.4 Contracts with Multiple Projects. For contracts that include two or more projects, the contractor may request a separate final inspection and acceptance for maintenance as the work is completed on each project.

105.15.3 Final Acceptance and Payment. Following Final Inspection and acceptance for maintenance, the engineer will prepare the final tabulation of quantities in accordance with Sec 109.8. A final change order, if necessary, and the final tabulation of quantities will be submitted to the contractor for review. Upon receipt of the final tabulation of quantities, the contractor shall promptly submit to the engineer any remaining project documentation including, but not limited to, those listed in Sec 105.15.3.2.

105.15.3.1 A Final Acceptance report will be submitted to the contractor, and final payment will be made, no later than thirty days following concurrence on tabulation of quantities, receipt by the engineer of all project documentation, and verification by the engineer that all material incorporated into the work has been properly inspected. If the final tabulation of quantities determines the contractor was overpaid, the contractor, or in case of default, the surety, shall return the amount of overpayment to the Commission within thirty days of receiving notice of the overpayment from the engineer.

105.15.3.2 When required by the contract, project documentation shall consist of the following:

(a) Contractor's Affidavit Regarding Settlement of Claims (Form C-242)
(b) Final Change Order
(c) DBE Participation List and Final Verification
(d) Affidavit – Compliance with the Prevailing Wage Law

105.15.3.3 Final acceptance will not excuse the contractor's liability or responsibility to the Commission for any latent defects in the work or material incorporated into the work, or for claims relating to any work or material incorporated into the work, except as barred by Sections 537.600 and 537.610, RSMo.

Delete Sec 107.11, including all subsections, and substitute the following:

107.11 Responsibility for Claims for Damage or Injury. The contractor shall be responsible, to the extent imposed by applicable law, for injury, property damage, damage to the Work, or other loss caused by the negligent, wrongful, intentional, reckless, or contractually noncompliant acts or omissions of the contractor or an Agent of Contractor from Commencement of construction activities through Final Inspection and acceptance for maintenance.

107.11.1 The contractor shall not be responsible for damage relating to personal injury or death, arising from the design, condition, or maintenance of the project area prior to commencement of work and after Final Inspection and acceptance of the work, in accordance with Sec 101.2 and 105.15.2, unless any of the following conditions exist:

(a) The work is so defective that it creates an imminent danger to third parties;
(b) A defect in the work was concealed and not discoverable by a reasonable inspection by the Commission;
(c) The agent of MoDOT knew of the dangerous condition and did not disclose it to the Commission; or
(d) The plans or specifications followed were so imperfect or improper that the agent of MoDOT should have known the work to be done thereunder would result in an unsafe condition.

107.11.2 Neither the Commission nor the contractor, by execution of a contract, shall intend to or create a new or enlarge an existing cause of action in any third party. This provision shall not be interpreted to create any new liability that does not exist under the law, or to waive or extinguish any defense that either party to this contract or their respective agents and employees may have to an action or suit by a third party.

Delete Sec 107.12, including all subsections, and substitute the following:

107.12 Contractor's Responsibility for Work Damages to any portion of the work occurring after the date of Commencement of Work and before the work is deemed approved and accepted, caused by the action of the elements or from any other reason, shall be repaired or replaced at the contractor's expense. The contractor, at the contractor's option, may insure against any such damages. The Commission may, in its discretion, make such a payment, determined in accordance with Sec 109.4, for damage to the work due to unforeseeable causes beyond the control of, and without fault or negligence on the part of the contractor, unless the contractor has been reimbursed for such damages by the contractor's insurer. Prior to reimbursement, the contractor shall furnish documentary evidence of all efforts to recover such repair costs.

107.12.1 The contractor shall immediately give written notice to the engineer of any pedestrian, worker and/or vehicular accident that occurs in or near the work zone. The contractor may be directed by the engineer to repair permanent Commission facilities that have been damaged by events that are beyond the control of the contractor. Reimbursement will be provided by the Commission, determined in accordance with Sec 109.4, for the actual direct cost of labor, equipment and material, exclusive of overhead, indirect or consequential costs of profit. The Commission may elect to make such repairs in lieu of the contractor.

Delete Sections 107.13, 107.13.1, 107.13.2, 107.13.3, 107.13.3.4, 107.13.5, 107.13.6, 107.13.9, 107.13.10.4, 107.13.10.8, and substitute the following:

107.13 General Insurance Requirements. From the commencement of construction activities through the Final Inspection and acceptance for maintenance of the project by the engineer, the contractor shall procure and maintain at the contractor's expense, insurance for all damages and losses imposed by law and assumed under the contract, of the kinds and in the amounts specified in Secs 107.13.1 through 107.13.8.

107.13.1 Sovereign Immunity Limits for Missouri Public Entities. The contractor shall procure and maintain at least minimum insurance coverages to meet the sovereign immunity limits for Missouri public entities as calculated by the Missouri Department of Insurance and published annually in the Missouri Register pursuant to Section 537.610, RSMo for Sec 107.13.2 through 107.13.5, unless specified otherwise for each type of insurance coverage. Each policy shall provide additional insured status for the Missouri Highways and Transportation Commission, its members, the Missouri Department of Transportation, and its employees up to Missouri's sovereign immunity limits. Provided, however, additional insured coverage applies only to liability caused in whole or in part by the acts or omissions of the named insured or those acting on its behalf and does not provide defense or indemnity for liability that Section 537.600, RSMo. places solely on MoDOT or another public entity. Each policy shall be endorsed to not waive sovereign immunity limits. The naming of the Commission, its members, MoDOT, and its employees as additional insureds under any insurance policy shall not be construed as a waiver of any sovereign, official, or other governmental immunity. The Commission, its members, MoDOT, and its employees reserve the right to assert any sovereign, official, or any other governmental immunities. Nothing in the Section shall be construed to enlarge the liability of the contractor beyond that imposed by applicable law, create a contractual duty to defend or indemnify prohibited by Section 537.600, RSMo, or require insurance coverage for liability that Section 537.600, RSMo places solely upon MoDOT. Insurance coverage and priority shall otherwise be determined in accordance with the applicable policies and endorsements.

107.13.2 Commercial General Liability Insurance. The contractor shall procure, and maintain during the term of the project, commercial general liability insurance with coverage at least as broad as Insurance Services Office (ISO) policy form CG 00 01. The general aggregate limit shall, by endorsement or otherwise, provide a designated aggregate limit solely for this project using ISO form CG 25 03 05 09 or an equivalent form. General liability policies shall be endorsed to add the Commission, its members, MoDOT, its employees, agents, and assigns as additional insureds (the "Additional Insureds") using Insurance Services Office forms CG 20 10 or the equivalent under such policy. For construction contracts, an endorsement providing completed operations coverage to the Additional Insureds, ISO form CG 20 37 or the equivalent, is also required. This form, CG 20 37, shall be endorsed on each subsequent commercial general liability policy issued to the contractor for three (3) years after final acceptance of the project. Should work on the project be discontinued, the commercial general liability insurance coverage shall remain in effect for three (3) years after the date of discontinuation, when applicable. Coverage shall not be reduced by insured versus insured exclusions or by explosion, collapse and underground (XCU) exclusions.

107.13.3 Commercial Automobile Liability Insurance. The contractor shall procure and maintain automobile liability coverage at least as broad as ISO policy form CA 00 01 covering owned, hired, and non-owned autos. The policy shall be endorsed to Commission, its members, MoDOT, and its employees, agents, and assigns as additional insureds (the "Additional Insureds").

107.13.4 Contractor's Pollution Liability (CPL) Insurance. The contractor shall procure and maintain contractor's pollution liability insurance for liability arising out of sudden, accidental, and gradual pollution and remediation. The policy shall have minimum limits of $1,000,000. The Commission, its members, MoDOT, and its employees, agents, and assigns shall be endorsed as additional insureds under such policy. The policy shall provide coverage for hauling of waste from the project site to the final disposal location including non-

owned disposal sites. Completed operations coverage for pollution liability shall extend a minimum of three (3) years after final acceptance of the project. Contractor shall require any subcontractor that performs environmental remediation, hazardous material removal or related work including the transportation, disposal, or environmental engineering work, to provide contractor's pollution liability insurance with limits and scope of coverage appropriate to the exposure. The Commission, its members, MoDOT, and its employees, agents, and assigns shall be endorsed as additional insured under such policy. The policy shall not contain a cross suits exclusion or other provisions that would eliminate additional insured claims against the contractor or subcontractor.

107.13.5 Aircraft Liability Insurance. If aircraft, including unmanned aircraft, will be used on the project, contractor shall provide, or cause to be provided, aircraft liability insurance protecting against claims for damages resulting from such use in all cases where any aircraft that is owned, leased or chartered by any Contractor-Related Entity used on the Project. The policy shall have minimum limits of $1,000,000 and the Commission, its members, MoDOT, and its employees, agents, and assigns shall be additional insureds on the policy by endorsement or policy provision. The use of any aircraft in performance of the Work, the aircraft crew, flight path and altitude, including landing of any aircraft on the Site or on any property owned by the Commission, MoDOT or other parties at interest, shall be subject to review and written acceptance by the Commission prior to any such usage. If any aircraft are leased or chartered with crew and/or pilot, evidence of non-owned aircraft liability insurance will be acceptable to meet these requirements but must be provided prior to use of the aircraft. For use of unmanned aircraft vehicles, the contractor may provide insurance either through an aircraft liability insurance policy, or by endorsement to the contractor's commercial general liability insurance policy and excess liability policies. Use of unmanned aircraft must comply with all state and federal rules and regulations, including FAA requirements.

107.13.6 Excess or Umbrella Liability Insurance. The contractor may satisfy the required limits for Secs 107.13.2 through 107.13.5 by use of excess or umbrella liability insurance policies in any combination that meets the contract limits requirements. Such policies shall include as additional insureds, the Commission, its members, MoDOT, and its employees, agents, and assigns.

107.13.9 Evidence of Insurance. Required evidence of insurance providing confirmation of compliance with these requirements shall consist of a certificate of insurance and any endorsements adding the Commission, MoDOT and its employees as additional insureds where specified. "Blanket" or "automatic" additional insured endorsements providing additional insured coverage "where required by contract," may be used, provided that such forms provide coverage at least as broad as provided by the specified endorsement forms required. The contractor and any subcontract work shall not commence under the contract until the contractor obtains the applicable insurance coverage required and receives approval for such insurance from the engineer. No later than five (5) business days prior to the Commencement of Work, all evidence of insurance for the prime contractor, including certificates of insurance and required endorsements, and notices shall be submitted electronically by the insurance agent to ContractorSupport@MoDOT.mo.gov. The aforementioned evidence of insurance shall also be submitted in the same manner no fewer than five (5) business days prior to the effective date of any change or renewal of insurance during the term of the project. All evidence of insurance for the prime contractor, including certificates of insurance and required endorsements, and notices shall be submitted electronically by the insurance agent to ContractorSupport@MoDOT.mo.gov. The

contractor shall promptly furnish the engineer with a complete copy of its policy upon request. Failure to furnish evidence of proper insurance, or complete insurance policies when requested, may result in the suspension of work as provided in Sec 108, and may result in other claims or actions for breach of contract or otherwise, as may be recognized at law or in equity.

107.13.10.4 Primary and Non-contributory. For any claims related to this contract or insurance requirements herein identified, the contractor's insurance coverage shall be primary insurance with respect to the Commission, its members, MoDOT, and its employees, as the additional insureds. Any other insurance or self-insurance maintained by any of these parties shall be excess of the contractor's insurance and shall not contribute with the contractor's insurance, unless liability caused in whole or in part by the acts or omissions of the named insured or those acting on its behalf and does not provide defense or indemnity for liability that Section 537.600, RSMo places solely upon MoDOT or another public entity. Priority and allocation shall be governed by the applicable policies and endorsements. MoDOT may not unilaterally alter priority among the contractor's, any subcontractor's, or any additional insured's policies.

107.13.10.8 Timely Notice of Claims. Contractor shall give the engineer prompt and timely notice of claims made or suits instituted that arise out of or result from contractor's or agent of contractor's performance under this Agreement, and that involve or may involve coverage under any of the required liability policies. The Commission and MoDOT will provide timely notice to the contractor of any claims or lawsuits that it receives.

Delete Sec 107.14 and substitute the following:

107.14 Cooperation in Defense. The Agent of MoDOT and MoDOT shall reasonably cooperate in the defense of the other against potential third party claims. This cooperation includes providing reasonable access to relevant records, documents, and personnel. Nothing in this section creates a contractual duty to defend prohibited by RSMo 537.600(5).

Delete Sec 107.18 and substitute the following:

107.18 Basis of Payment. No direct payment will be made for compliance with Sec 107.

- Payment for Excess Piling

Delete Sec 702.6.3 and insert the following:

702.6.3 Pile Cut-Offs. No direct payment will be made for routine pile cut-offs, except as otherwise provided herein.

702.6.3.1 Excess Piling. If the total measured length of installed piling on a given structure, per item, is 85 percent or less of the plan quantity, the difference between plan quantity and installed quantity shall be deemed as excess piling. Reimbursement will be made for excess piling, as determined by the engineer. No reimbursement will be made for piling purchased in excess of plan quantity. The contractor shall provide the engineer with all paid invoices, which may be used to determine an equitable reimbursement. Shipping costs on the invoice will be included in the reimbursement payment, but no handling, overhead or profit will be included. All excess piling shall be removed from the project and retained by the contractor.

- *Delete Sec 102.18.1 and renumber existing Sec 102.18.2 through 102.18.5.4 including all subsections:*

102.18.1 Certification Regarding Disbarment, Eligibility, Indictments, Convictions or Civil Judgments. The president or authorized official of the bidder, under penalty of perjury under the laws of the USA, shall certify that, except as noted in the exceptions, the company or any person associated therewith in the capacity of owner, partner, director, officer, principal investor, project director, manager, auditor or any position involving the administration of federal funds:

(a) Is not currently under suspension, debarment, voluntary exclusion or determination of ineligibility by any federal agency.

(b) Has not been suspended, debarred, voluntarily excluded or determined ineligible by any federal agency within the past three years.

(c) Does not have a proposed debarment or suspension pending.

(d) Has not been indicted, convicted or had a civil judgment rendered against any of the listed parties by a court of competent jurisdiction in any matter involving fraud or official misconduct within the past three years.

102.18.1.1 If there are any exceptions, the bidder shall submit the exceptions on company letterhead, signed by the bidder and inserted inside the bid submitted.

102.18.1.2 Exceptions will not necessarily result in denial of award but will be considered in determining bidder responsibility.

102.18.1.3 For any exception noted, the bidder shall indicate to whom it applies, the initiating agency, and dates of action.

102.18.1.4 Providing false information may result in criminal prosecution or administrative sanctions.

102.18.2 Certification Regarding Anti-Collusion. In accordance with 23 USC 112, the bidder shall certify, under penalty of perjury, that the bidder has not, either directly or indirectly, entered into any agreement, participated in any collusion or otherwise taken any action in restraint of free competitive bidding in connection with this contract.

102.18.3 Certification Regarding Lobbying Activities. In accordance with 31 USC 1352, the bidder shall certify that:

(a) No federal appropriated funds have been paid or will be paid, by or on behalf of the undersigned, to any person for influencing or attempting to influence an officer or employee of any federal agency, a member of Congress, an officer or employee of Congress or an employee of a member of Congress in connection with the awarding of any federal contract, the making of any federal grant, the making of any federal loan, the entering into of any cooperative agreement and the extension, continuation, renewal, amendment or modification of any federal contract, grant, loan or cooperative agreement.

(b) If any funds other than federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any federal agency, a member of Congress, an officer or employee of Congress or an employee of a member of Congress in connection with this federal contract, grant, loan or cooperative agreement, the bidder shall complete and submit Standard Form-LLL, "Disclosure Form to Report Lobbying," in accordance with the instructions.

102.18.3.1 This certification shall be a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification shall be a prerequisite for making or entering into this transaction imposed by 31 USC 1352. Any person who fails to file the required certification will be subject to a civil penalty of no less than $10,000 and no more than $100,000 for each such failure.

102.18.3.2 The bidder also agrees by submitting a bid that the bidder shall require that the language of this certification be included in all subcontracts that exceed $100,000, and that all such subrecipients shall certify and disclose any lobbying activities accordingly.

102.18.4 Certification Regarding Missouri Domestic Products Procurement Act. This certification will only apply to state-funded projects as noted on the cover of the Request for Bid. The bidder's attention is directed to Sections 34.350 through 34.359 RSMo 2000, which requires all manufactured goods or commodities used or supplied in the performance of the contract or any subcontract to be manufactured, assembled or produced in the USA. Sections 34.350 through 34.359 RSMo will not apply if the total bid is less than $1,000.00.

102.18.4.1 Section 34.355 RSMo requires the vendor or bidder to certify compliance with Section 34.353 RSMo and, if applicable, Section 34.359 RSMo at the time of bidding and prior to payment. Failure to comply with Section 34.353 RSMo during performance of the contract and to provide certification of compliance prior to payment will result in nonpayment for those goods or commodities.

102.18.4.2 The bidder shall certify that all the specified goods or products for which this bid was solicited are manufactured, assembled or produced in the USA. If there are any exceptions, the bidder shall submit a list of the exceptions on company letterhead, signed by the bidder and attached to the inside of the bid submitted. The list shall include the pay item number and the location where the item is manufactured. The bidder shall identify any of the exceptions in the list that are specified goods or products that are treated as manufactured, assembled or produced in the USA under an existing treaty, law, agreement or regulation of the USA regarding export/import restrictions and international trade.

102.18.4.3 The bidder shall notify the contact listed in the Request for Bid of any specified goods or products that cannot be manufactured, assembled or produced in the USA in sufficient quantities or in time to meet the contract specifications.

102.18.4.4 The bidder shall certify that the bid complies with all provisions of Section 34.350 *et seq* RSMo.

Delete Sec 106.10 and substitute the following:

106.10 Missouri Domestic Products Requirement. For state funded projects, as noted on the cover of the contract, material shall be in accordance with Sec 102.18.4.