

JOB SPECIAL PROVISIONS TABLE OF CONTENTS (ROADWAY)

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

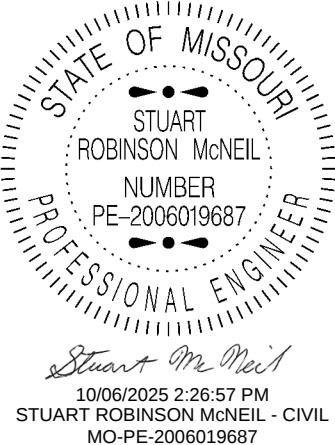
|     |                                                                                                                                             |    |
|-----|---------------------------------------------------------------------------------------------------------------------------------------------|----|
| A.  | General - Federal JSP-09-02L                                                                                                                | 1  |
| B.  | Contract Liquidated Damages JSP- 13-01D                                                                                                     | 1  |
| C.  | Work Zone Traffic Management JSP-02-06N                                                                                                     | 2  |
| D.  | Emergency Provisions and Incident Management JSP-90-11A                                                                                     | 6  |
| E.  | Project Contact for Contractor/Bidder Questions JSP-96-05A                                                                                  | 7  |
| F.  | Utilities                                                                                                                                   | 7  |
| G.  | Contractor Quality Control NJSP-15-42                                                                                                       | 9  |
| H.  | DBE Prompt Payment Reporting JSP-24-05B                                                                                                     | 10 |
| I.  | Optional Temporary Pavement Marking Paint NJSP-18-07G                                                                                       | 12 |
| J.  | Pavement Marking Removal within Concrete Surfaces                                                                                           | 13 |
| K.  | Optional Pavements                                                                                                                          | 14 |
| L.  | Sensitive Streams or Waterbodies Near Project Area                                                                                          | 15 |
| M.  | ADA Compliance and Final Acceptance of Constructed Facilities JSP-10-01C                                                                    | 15 |
| N.  | Median Island Cut-Throughs – St. Louis District Version 10-18-23                                                                            | 17 |
| O.  | ADA Material Testing Frequency Modifications JSP-23-01A                                                                                     | 18 |
| P.  | ADA Compliant Movable Barricade                                                                                                             | 18 |
| Q.  | Shaping Slopes Class III (Modified Material Requirements) NJSP-20-03B                                                                       | 19 |
| R.  | Linear Grading Class 2 – Modified                                                                                                           | 19 |
| S.  | Construction Requirements                                                                                                                   | 20 |
| T.  | Site Restoration                                                                                                                            | 21 |
| U.  | Construction Impacts to Privately Owned Sprinkler Systems                                                                                   | 22 |
| V.  | Coordination with Bi-State                                                                                                                  | 22 |
| W.  | Access to Commercial and Private Entrances                                                                                                  | 23 |
| X.  | Property Owner Notification                                                                                                                 | 24 |
| Y.  | Concrete Manhole Collar                                                                                                                     | 24 |
| Z.  | Island Tubular Marker                                                                                                                       | 25 |
| AA. | Curb Reflectors                                                                                                                             | 26 |
| BB. | Removal and Delivery of Existing Signs JSP-12-01C                                                                                           | 26 |
| CC. | Overhead Sign Mounting Vertical Location and Support Trim                                                                                   | 27 |
| DD. | Grated Inlet Repair/Replacement                                                                                                             | 28 |
| EE. | Curb Inlet Top Repair/Replacement                                                                                                           | 28 |
| FF. | Adjust to Grade Items                                                                                                                       | 30 |
| GG. | Additional Coldmilling at Curb Opening Inlets                                                                                               | 30 |
| HH. | Non-Tracking Tack JSP-24-02A                                                                                                                | 31 |
| II. | Coordination with Affton Athletic Association                                                                                               | 32 |
| JJ. | Coordination with City of Sunset Hills                                                                                                      | 32 |
| KK. | Network Connected Signal Monitor                                                                                                            | 33 |
| LL. | Top Mount Lighting Pole                                                                                                                     | 33 |
| MM. | Top Mount Luminaire                                                                                                                         | 34 |
| NN. | Traffic Signal Maintenance and Programming                                                                                                  | 35 |
| OO. | SL District Traffic Signal Detection System                                                                                                 | 40 |
| PP. | MoDOT TS2 Type 1 Cabinet Assembly Job Special Provision                                                                                     | 56 |
| QQ. | Combination Pad Mounted 120V/240V Power Supply and Lighting Controller with Uninterruptible Power Supply (UPS) – TS2 Traffic Signal Cabinet | 60 |
| RR. | Accessible Pedestrian Pushbutton and Signing                                                                                                | 67 |
| SS. | ATC Traffic Signal Controller                                                                                                               | 69 |
| TT. | Coordination With MoDOT Signal Shop for Cabinet Entry                                                                                       | 70 |
| UU. | Countdown Pedestrian Signal Heads                                                                                                           | 70 |
| VV. | Disposition of Existing Signal/Lighting and Network Equipment                                                                               | 72 |

Job No.: JSL0081

Route: 30

County: St. Louis

|      |                                                                            |     |
|------|----------------------------------------------------------------------------|-----|
| WW.  | LED Blank-out Sign                                                         | 72  |
| XX.  | Retroreflective Backplates                                                 | 74  |
| YY.  | Remove In-Pavement Wireless Detection System                               | 75  |
| ZZ.  | Pot Holing Utility Facilities                                              | 76  |
| AAA. | Backfilling of Utility Locates                                             | 77  |
| BBB. | Removal and Delivery of Adopt-A Highway Signs                              | 77  |
| CCC. | Contractor-Furnished and Install Closed Circuit Television (CCTV) Assembly | 77  |
| DDD. | CCTV Extension Pole Installation                                           | 80  |
| EEE. | Contractor Furnished and Installed IP-Addressable Power Strip              | 80  |
| FFF. | Coordination With ITS Staff and Utility Locates                            | 81  |
| GGG. | Fiber Optic Cable                                                          | 81  |
| HHH. | MoDOT ITS Assets Relocation                                                | 88  |
| III. | Dynamic Message Sign Replacement                                           | 90  |
| JJJ. | Protection of BNSF Railway Company Interests                               | 97  |
| KKK. | Supplemental Revisions JSP-18-01JJ                                         | 110 |

|                                                                                     |                                                                                                                                       |
|-------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------|
|  | <b>MISSOURI HIGHWAYS AND<br/>TRANSPORTATION COMMISSION</b><br>105 W. CAPITOL AVE.<br>JEFFERSON CITY, MO 65102<br>Phone 1-888-275-6636 |
|                                                                                     | If a seal is present on this sheet, JSP's<br>have been electronically sealed and<br>dated.                                            |
|                                                                                     | JOB NUMBER: JSL0081<br>ST. LOUIS COUNTY, MO<br>DATE PREPARED: August 20, 2025                                                         |
|                                                                                     | ADDENDUM DATE:                                                                                                                        |

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

JOB  
SPECIAL PROVISION

A. General - Federal JSP-09-02L

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

**1.1** This contract requires payment of the prevailing hourly rate of wages for each craft or type of work required to execute the contract as determined by the Missouri Department of Labor and Industrial Relations and requires adherence to a schedule of minimum wages as determined by the United States Department of Labor. For work performed anywhere on this project, the contractor and the contractor's subcontractors shall pay the higher of these two applicable wage rates. State Wage Rates, Information on the Required Federal Aid Provisions, and the current Federal Wage Rates are available on the Missouri Department of Transportation web page at [www.modot.org](http://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](http://www.modot.org) under "Doing Business with MoDOT"; "Standards and Specifications". The effective version shall be determined by the letting date of the project.

General Provisions & Supplemental Specifications

Supplemental Plans to July 2025 Missouri Standard Plans  
For Highway Construction

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

B. Contract Liquidated Damages JSP- 13-01D

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

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

Notice to Proceed: **January 5, 2026**  
Contract Completion Date: **November 1, 2026**

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

|                |               |                      |
|----------------|---------------|----------------------|
| Project        | Calendar Days | Daily Road User Cost |
| <b>JSL0081</b> | <b>N/A</b>    | <b>\$5,400.00</b>    |

**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 **\$2,000.00** 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. 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 whether 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 adjust the operations to prevent the queues from reoccurring. Traffic delays may be monitored by physical presence on site or by utilizing real-time travel data through the work zone that generate text and/or email notifications where available. The engineer monitoring the work zone may also notify the contractor of delays that require prompt mitigation. The contractor may work with the engineer to determine what other alternative solutions or time periods would be acceptable. When a Work Zone Analysis Spreadsheet is provided, the contractor will find it in the electronic deliverables on MoDOT's Online Plans Room. The contractor may refer to the Work Zone Analysis Spreadsheet for detailed information on traffic delays.

#### **2.5.1 Traffic Safety.**

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

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

**2.6 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 (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:

| <b>2026<br/>Independence<br/>Day falls on:</b> | <b>The Holiday<br/>is Observed<br/>on:</b> | <b>Halt Lane Closures<br/>beginning at:</b> | <b>Allow Lane Closures to<br/>resume at:</b> |
|------------------------------------------------|--------------------------------------------|---------------------------------------------|----------------------------------------------|
| <b>Saturday</b>                                | <b>Friday</b>                              | <b>Noon on Thursday</b>                     | <b>6:00 a.m. on Monday</b>                   |

**3.1.2** The contractor's working hours will be further restricted at locations where park or public land access may be blocked by either mobile or stationary operations as shown below. Pedestrian, bicycle and vehicular traffic shall not be blocked from public lands access while operating and open. The specific public land locations are listed below.

- a) Grant's Trail and McNary Drive at Grant Road: Grants Trail is open to walkers and bikers from ½ hour before sunrise to ½ hour after sunset. This correlates to about 6:00 am to 8:00 pm during late August. The trail shall not be blocked to the public during open trail hours. The Affton Athletic Field Office and Ice Rink have access from MO 30 only. The Ice rink is open with reservations through and beyond midnight during the summer. McNary Drive shall not be blocked to the public during open hours.
- b) Sunset Hills Athletic fields at West Watson Road shall remain accessible to traffic during open park hours which extend beyond sunset. See the special provision titled Coordination with the City of Sunset Hills for known active hours for the athletic complex.

**3.2** The contractor shall not perform any construction operation on the roadway, 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 outside of 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 below work hours may be modified. Working hours for evenings, weekends and holidays will be determined by the engineer. The contractor may work, with allowed lane closures during the following listed hours:

**Route 30 Eastbound and Westbound Allowed Lane Closures:**

- **Single lane closure on MO 30 (weekday)**
  - East of Weber Hill Rd: 9AM-3PM, 7PM-6AM
  - West of Weber Hill Rd: 7PM-6AM (nighttime)
- **Single lane closure on MO 30 (weekend)**
  - East of Weber Hill Rd: No restriction
  - West of Weber Hill Rd: 6PM-2PM

**3.4** Any Paving operations shall be completed during nighttime hours. Nighttime hours shall be 7:00 p.m. to 5:00 a.m. for this project.

**3.5** The contractor shall not alter the start time, ending time, or a reduction in the number of through lanes of traffic or ramp closures without advance notification and approval by the engineer. The only work zone operation approved to begin 30 minutes prior to a reduction in through traffic lanes or ramp closures is the installation of traffic control signs. Should lane closures be placed or remain in place, prior to the approved starting time or after the approved ending time, the Commission, the traveling public, and state and local police and governmental authorities will be damaged in various ways, including but not limited to, increased construction administration cost, potential liability, traffic and traffic flow regulation cost, traffic congestion and motorist delays, with a resulting cost to the traveling public. These damages are not easily computed or quantified. Therefore, the contractor will be charged with liquidated damages specified in the amount of **\$200.00 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.

| Item Number | Description                         | Unit |
|-------------|-------------------------------------|------|
| 616-10.98A  | CMS Without Communication Interface | EA   |

**D. 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.

|                                                                                                                                                                                                                                                                                       |                         |                               |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|-------------------------------|
| <b>Missouri Highway Patrol</b><br>1-800-525-5555 Cellular: *55                                                                                                                                                                                                                        |                         |                               |
| <b>St. Louis County Police</b><br>314-615-0111                                                                                                                                                                                                                                        |                         |                               |
| <b>MoDOT Traffic Management Center (TMC)</b><br><b>Gateway Guide:</b> 314-275-1513; Jim Connell 314-565-6717<br><b>Risk Management:</b> Daytime (314) 453-1721; After Hours 314-594-SAFE (7233)<br><b>Equipment Damage:</b> Rico Fennewold Day 314-624-2921; After hours 314-205-7391 |                         |                               |
| St. Louis County Police:<br>Fenton/Afton Police Precinct                                                                                                                                                                                                                              | 11500 Gravois Rd. 63126 | Non-Emergency<br>636-529-8210 |
| Fenton Police (in City Hall)                                                                                                                                                                                                                                                          | 625 New Smizer Mill Rd  | 636-349-8120                  |
| Sunset Hills Police:                                                                                                                                                                                                                                                                  | 3905 S Lindbergh 63127  | 314-849-4400                  |
| Fire: Mehlville Station #3:                                                                                                                                                                                                                                                           | 12500 Rott Road 63127   | 314-894-0420                  |
| Fire & Ambulance<br>Afton Station #1:                                                                                                                                                                                                                                                 | 9282 Gravois Road 63123 | 314-631-1803                  |

|                                        |                         |              |
|----------------------------------------|-------------------------|--------------|
| Fire & Ambulance<br>Affton Station #2: | 8110 Valcour Ave. 63123 | 314-353-7677 |
| Mercy South Hospital<br>and Ambulance: | 10010 Kennerly Rd 63128 | 314-525-1000 |

**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.

E. 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.

Stuart McNeil, PE - Project Contact  
St. Louis District  
1590 Woodlake Drive  
Chesterfield, MO 63017

Telephone Number: (314) 453-5402  
Email: [Stuart.McNeil@modot.mo.gov](mailto:Stuart.McNeil@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](mailto: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:

Chris Morgan, Resident Engineer  
St. Louis District – Southwest Area  
Chesterfield Project Office  
601 Salt Mill Road  
Chesterfield, MO 63017

Telephone Number: (314) 453-1753  
Email: [Christopher.Morgan@modot.mo.gov](mailto:Christopher.Morgan@modot.mo.gov)

F. Utilities

**1.1 The Contractor shall be aware there are numerous utilities present along the routes in this contract.** Utility locates were not performed during the design phase of the project. Therefore, the extent of conflicts with utilities are unknown. 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 work item 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 awarding the contract. It is the responsibility of the contractor to comply with Missouri CSR 319 to get utilities marked and verify the existence, location, and status of any marked utility prior to any excavations. Such verification may require direct contact with the listed utilities.

**1.2 Potholing at signal bases.** The contractor shall pothole at proposed signal base locations to verify that buried facilities are not in conflict with the proposed roadway improvements and not damage the utility facility. Any utilities determined to be in conflict or that appear to conflict with construction shall be brought to the attention of the Engineer immediately. See JSP: **Pot Holing Utility Facilities** for additional information.

**2.0 Overhead Power lines:** The proposed scope of work for this project will require working in the vicinity Ameren Missouri's overhead power lines, which run the length of the project. Contractors and their employees working in the vicinity of Ameren's power lines will adhere to the Missouri Overhead Power Line Act as set forth in Missouri Revised Statutes section 319, particularly the safety requirements in sections 319.075 through 319.090.

**2.1** The contractor shall discuss the planned work as it relates to any energized power lines with Ameren and coordinate with Ameren for the installation of any insulation covers over the lines and/or any other designated requirements. The contractor is advised to contact Ameren regarding the current policy and so the anticipated cost to the contractor can be estimated and when payment is required. The Contractor shall contact Ameren at least two weeks in advance of when construction work is scheduled to begin to request covers to be placed at a given location. The contractor will need to contact Ameren at [constructionhotline@ameren.com](mailto:constructionhotline@ameren.com) or (314) 992 - 6619 to coordinate this work with their schedule. **The contractor is responsible for any charges from Ameren Missouri for this provision and payment will be directly to Ameren Missouri.**

**3.0 Adjusting to grade by others.** The proposed roadwork will necessitate adjusting utility facilities within the limits of the project. The Contractor will hold a pre-activity meeting inviting all utility owners, the Engineer, and MoDOT's District Utility Coordinator to discuss adjusting utility facilities within the limits of the project.

**4.0 Utility conflicts not noted.** If utility facilities are found to conflict with the contract work and aren't noted on the plans or in the Job Special Provisions, the Contractor shall contact the MoDOT District Utility Coordinator, **Steve Belcher at (314) 624-7382**. District Utility Staff will determine whether adjustment of the utility is necessary, if alternate construction methods will be required, or if the work can be installed in accordance with Missouri Standard Plans for Highway Construction for the specified item of work.

**5.0 Basis of Payment.** No direct payment shall be made for compliance with this provision unless specified elsewhere in the contract document.

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](http://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. DBE Prompt Payment Reporting JSP-24-05B

##### **1.0 Description.**

**1.1** This provision will only apply to contracts that have a Disadvantaged Business Enterprise (DBE) goal greater than 0% and have at least one DBE subcontractor.

**1.2** MoDOT monitors the payments made by prime contractors and subcontractors to DBEs for compliance with DBE payment monitoring rules as outlined in 49 CFR 26.37. To facilitate this monitoring, MoDOT requires prime contractors to report their remitted payments to DBEs and subcontractors to report their remitted payments to lower-tier DBEs.

**1.3** Tracking of DBE payments are made through the Signet™ application (Signet). Signet is a third-party service, supported by the vendor, for usage by the prime contractor and all subcontractors. Signet is only a reporting tool; it does not process financial transactions. MoDOT does not provide direct technical support for Signet. Information about Signet may be found at <https://signet-help.zendesk.com/hc/en-us>.

**1.4** Upon completion of the first pay estimate on the contract, Signet will automatically send an email to the prime contractor prompting registration. The prime will be required to pay a one-time, fixed fee of \$1,000 for this contract directly to the Signet vendor. Use of Signet to track DBE payments will be available for the life of the contract, regardless of the contract value, contract duration, number of subcontractors, or payments reported. No additional fee will be charged to subcontractors that are required to report payments or DBEs that are required to verify payments through Signet. The contractor may also, at no additional cost, report payments through Signet to subcontractors that are not DBEs.

**1.5** After each estimate, when contractor reporting of payments is complete, the subcontractor will receive an email notifying them of the payment and requesting verification of the reported payment. A subcontractor that has not completed registration with Signet will be prompted to do so at this time.

**1.6** Users will be set up automatically based on information in MoDOT's vendor list. Additional users under each contractor may be added once registration has been completed within Signet. The current vendor list can be found at <https://www.modot.org/bid-opening-info>.

**1.7** For purposes of this requirement, payer is defined as the prime contractor or subcontractor that reports a payment in Signet to a vendor that is either a subcontractor, trucker, manufacturer, regular dealer, or broker. Payee is defined as the vendor that receives notification of payment through Signet from the prime contractor or a higher-tier subcontractor. Payment is defined as issuing an Electronic Funds Transfer (EFT) or mailing a check to a payee.

**2.0 Requirements.** Payers must report remitted payment to DBEs within Signet, for work performed by the DBE subcontractor, DBE trucking, materials supplied from a DBE manufacturer, dealer, or broker, as well as a return of retainage (and/or other amounts withheld), within 15 calendar days.

**2.1** Prime contractors must report remitted payments to DBEs within 15 calendar days of each payment it receives from MoDOT. Prime contractors must also report payments to non-DBE subcontractors if that subcontractor is making payment to a lower tier DBE subcontractor, trucker, manufacturer, regular dealer, or broker.

**2.2** The payer must report the following information within Signet:

- a) The name of the payee.
- b) The dollar amount of the payment to the payee.
- c) The date the payment was made.

- d) Any retainage or other amount withheld (if any) and the reason for the withholding (if other than retainage).
- e) The DBE function performed for this payment (e.g., contracting, trucking, or supplying as a manufacturer, dealer, or broker).
- f) Other information required by Signet.

The payer must report its return of retainage (and/or other amounts withheld) in separate, standalone payment entries (i.e., without being comingled with a payment for work performed or materials supplied).

**2.3** In the event that no work has been completed by a DBE during the estimate period, such that no payment is due to a DBE subcontractor, trucker, manufacturer, regular dealer, or broker, then the prime contractor will mark payment complete within Signet, and no other payments are required to be reported.

**2.4** Each subcontractor making a payment to a lower-tier DBE must report remitted payments within Signet, as detailed in Section 2.2, within 15 days of receipt of each payment from the prime contractor.

**2.5** DBE payees must verify in Signet each payment reported by a payer within 15 calendar days of the payment being reported by the payer. This verification includes whether the payment was received, and if so, whether it was as expected.

**3.0 Basis of Payment.** A fixed cost of \$1,000 will be paid on this contract for the required software to report payments to DBEs through Signet. Regardless of the number of projects in a contract, a single payment will be made under item 108-10.00, SIGNET DBE REPORTING, per lump sum. The engineer reserves the right to underrun this item for any reason. Any additional costs for registration, software, usage, time, labor, or other costs will be considered incidental and no direct payment will be made.

I. Optional Temporary Pavement Marking Paint NJSP-18-07G

**1.0 Description.** This provision provides the contractor with the option to either complete all Permanent Pavement Marking Paint (PPMP) prior to the time limits specified herein or to apply Temporary Pavement Marking Paint (TPMP) in accordance with Sec 620.10.2 (4 in. width) in all locations shown on the plans as PPMP and delay application of the PPMP until the spring of 2027, as allowed herein. PPMP is defined as Class 1 Pavement Marking Paint and Class 2 Pavement Marking Paint and does not include Sec 620.20.3 Durable Pavement Markings.

**1.1** No application of PPMP shall occur between October 1, 2026 and March 1, 2027, both dates inclusive, except as stated herein. When the contractor has begun application of PPMP prior to October 1, 2026, and weather limitations stated in Sec 620.20.2.4 can be met, the contractor may complete the PPMP within the first seven (7) calendar days of October. If all (100%) of the PPMP is not completed on or before October 7, 2026, all previously applied PPMP, including any painted markings applied prior to October 1, shall be considered TPMP, and the contractor shall complete the remaining marking with TPMP, and then re-apply PPMP in all planned locations after March 1, 2027. All PPMP shall be completed prior to June 1, 2027. No additional payment will be made for PPMP that is later determined to be TPMP due to the contractor's failure to complete the PPMP within the time specified.

**1.2 Use of TPMP Prior to October 1.** The contractor has the option to apply TPMP in lieu of PPMP prior to October 1, 2026, even when there is sufficient time to complete the PPMP prior to October 1, 2026. For example, the contractor may choose to use TPMP as a base coat for the PPMP on open-graded surfaces in order to achieve higher retroreflectivity readings on the surface coat as compared to a single application.

**1.2.1** The contractor has the option of using TPMP in lieu of Temporary Raised Pavement Markers if applied each day that existing markings are obliterated.

**2.0 Construction Requirements.** TPMP shall be accurately placed in the final planned location and shall be completely covered by the final application of PPMP. Any failure to comply with this requirement shall be corrected by removal of the misplaced pavement markings at the contractor's expense and without marring of the pavement surface.

**2.1** Prior to application of the PPMP on TPMP, TPMP shall be fully cured in accordance with the manufacturer's recommendation, or for a period of 12 hours, whichever is greater.

**3.0 Weather Limitations.** All weather limitations specified in Sec 620 for PPMP and TPMP shall apply. Cold Weather Pavement Marking Paint, in accordance with Sec 620.10.6, shall be used for TPMP when specified weather limitations do not allow the use of waterborne paint. No additional payment will be made for the use of Cold Weather Pavement Marking Paint as TPMP. Cold Weather Pavement Marking Paint is not an allowable substitute for PPMP and shall subsequently be covered with PPMP.

**4.0 Time Exception.** If application of PPMP is to be delayed to the spring of 2027, the contractor shall submit a request to the engineer for a time exception and shall provide a revised work schedule that shows the planned completion of the PPMP.

**4.1** Upon receipt of the time exception request in Section 4.0, the engineer will list "Application of Permanent Pavement Marking Paint" as an exception on the Semi-Final Inspection form, thus granting an exception to the count of contract time thru June 1, 2027, solely for the purpose of delaying application of PPMP. This time exception shall not apply to any time needed to complete any other work items. Liquidated Damages, as specified elsewhere in this contract, shall remain in effect for all other work items not completed by the contract time limits, as specified elsewhere in this contract, and for PPMP not completed by June 1, 2027.

**5.0 Method of Measurement.** No final measurement will be made for TPMP.

**6.0 Basis of Payment.** Full payment for TPMP will be made at the contract lump sum price even when PPMP is completed prior to the time limitation and TPMP is not used or only partially used.

**6.2** If a \$0 bid is entered for TPMP, no payment will be made should TPMP become necessary.

| Item Number | Description                      | Unit |
|-------------|----------------------------------|------|
| 6209901     | TEMPORARY PAVEMENT MARKING PAINT | LS   |

J. Pavement Marking Removal within Concrete Surfaces

**1.0 Description.** The first sentence of Sec 620.50.3.2 shall be removed and replaced with the following:

*Where required, measurement for the removal of pavement markings will be made to the nearest linear foot per 4-inches of width. No additional pay factor, based upon 4-inches of width, shall be included for removals unless the striping width is greater than 6-inches. Final measurement will not be made except for authorized changes during construction or where appreciable errors are found in the contract quantity. The revision or correction will be computed and added to or deducted from the contract quantity.*

**2.0** Pavement Marking Removal shall be in accordance with Section 620.50 and specifically as follows with the exception in Section 1.0 above.

**3.0 Construction Requirements.** Removal of all pavement markings within the project limits shall be as shown on the plans or as approved by the engineer. Pavement marking shall be completely removed to the satisfaction of the engineer with minimal damage to the pavement. The contractor shall use an approved water blasting method to remove the pavement marking on concrete surfaces. No more than five percent of the existing marking shall remain. The pavement surface shall not be left scarred with an image that might mislead traffic. Any excess damage or scarring of the pavement shall be repaired at the contractor's expense. It shall be the contractor's responsibility to determine what type of material needs to be removed.

**4.0 Method of Measurement.** Final measurement will not be made except for authorized changes during construction or where appreciable errors are found in the contract quantity. The revision or correction will be computed and added to or deducted from the contract quantity.

**5.0 Basis of Payment.** The accepted quantity of pavement marking removal including all labor, equipment, and material necessary to remove the existing marking will be paid for at the contract unit price for the following pay item:

| Item Number | Unit     | Description                                       |
|-------------|----------|---------------------------------------------------|
| 620-99.01   | Lump Sum | Pavement Marking Removal within Concrete Surfaces |

K. Optional Pavements

**1.0 Description.** This work shall consist of a pavement composed of either Portland cement concrete or asphaltic concrete constructed on a prepared subgrade. This work shall be performed in accordance with the standard specifications and as shown on the plans or established by the engineer.

**2.0** The quantities shown reflect the total square yards of pavement surface designated for each pavement type as computed and shown on the plans.

**2.1** No additional payment will be made for asphaltic concrete mix quantities to construct the required 1:1 slope along the edge of the pavement, or for tack applied between lifts of asphalt.

**2.2** No additional payment will be made for aggregate base quantities outside the limits of the final surface area as computed and shown on the plans. When A2 shoulders are specified, payment for the aggregate base will be as shown on the plans.

**2.3** The contractor shall comply with Sections 401 through 403 for the asphalt option and Sections 501 and 502 for the concrete option.

**2.4** Pavement options composed of Portland cement concrete shall have contrast pavement marking for intermittent markings (skips), dotted lines, and solid intersection lane lines. The pavement markings shall be in accordance with Section 620. No additional payment will be made for the contrast pavement markings.

**3.0 Method of Measurement.** The quantities of concrete pavement will be measured in accordance with Section 502.14. The quantities of asphaltic concrete pavement will be measured in accordance with Section 403.22.

**4.0 Basis of Payment.** The accepted quantity of the chosen option will be paid for at the contract unit bid price for Item 401-99.05, Optional Pavement, per square yard.

**4.1** Any additional quantities required to bring the previously graded roadway subgrade to the proper elevation will be considered completely covered by the pay item for Subgrading and Shouldering, Class 1.

**4.2 Price Adjustment for Fuel.** If the contractor accepts the option for fuel adjustment in the bid proposal, a fuel adjustment will be applied in accordance with Sec 109.14 for the type of pavement constructed.

L. Sensitive Streams or Waterbodies Near Project Area

**1.0 Description.** The project crosses, or is in the vicinity of, a sensitive stream or watershed. Waterbodies within and near the project area may serve as habitat for federal and state listed sensitive species. To avoid any negative impacts to these species and their habitats, water quality shall be protected from construction impacts.

**1.1** The contractor shall prevent any debris and materials from construction activities from entering streams and other waterbodies. If debris or materials do enter waterbodies, and if deemed necessary by the engineer or MoDOT's environmental personnel, it shall be removed as directed by the engineer at the contractor's expense.

**2.0 Basis of Payment.** No direct payment will be made for any expense incurred by the contractor by reason of compliance with the specific requirements of the provision, including any delay, inconvenience, or extra work except for those items for which payment is included in the contract.

M. ADA Compliance and Final Acceptance of Constructed Facilities JSP-10-01C

**1.0 Description.** The contractor shall comply with all laws pertaining to the Americans with Disabilities Act (ADA) during construction of pedestrian facilities on public rights of way for this project. An ADA Checklist is provided herein to be utilized by the contractor for verifying compliance with the ADA law. The contractor is expected to familiarize himself with the plans involving pedestrian facilities and the ADA Post Construction Checklist prior to performing the work.

**2.0 ADA Checklist.** The contractor can locate the ADA Checklist form on the Missouri Department of Transportation website:

[www.modot.org/business/contractor\\_resources/forms.htm](http://www.modot.org/business/contractor_resources/forms.htm)

**2.1** The ADA Checklist is not to be considered all-inclusive, nor does it supersede any other contract requirements. The ADA checklist is a required guide for the contractor to use during the construction of the pedestrian facilities and a basis for the commission's acceptance of work. Prior to work being performed, the contractor shall bring to the engineer's attention any planned work that is in conflict with the design or with the requirement shown in the checklist. This notification shall be made in writing. Situations may arise where the checklist may not fully address all requirements needed to construct a facility to the full requirements of current ADA law. In those situations, the contractor shall propose a solution to the engineer that is compliant with current ADA law using the following hierarchy of resources: 2010 ADA Standards for Accessible Design, Draft Public Rights of Way Accessibility Guidelines (PROWAG) dated November 23, 2005, MoDOT's Engineering Policy Guidelines (EPG), or a solution approved by the U.S. Access Board.

**2.2** It is encouraged that the contractor monitor the completed sections of the newly constructed pedestrian facilities in attempts to minimize negative impacts that his equipment, subcontractors or general public may have on the work. Completed facilities must comply with the requirements of ADA and the ADA Checklist or have documented reasons for the non-compliant items to remain.

### **3.0 Coordination of Construction.**

**3.1** Prior to construction and/or closure on an existing pedestrian path of travel, the contractor shall submit a schedule of work to be constructed, which includes location of work performed, the duration of time the contractor expects to impact the facility and an accessible signed pedestrian detour compliant with MUTCD Section 6D that will be used during each stage of construction. This plan shall be submitted to the engineer for review and approval at or prior to the pre-construction conference. Accessible signed detours shall be in place prior to any work being performed that has the effect of closing an existing pedestrian travel way.

**3.2** When consultant survey is included in the contract, the contractor shall use their survey crews to verify that the intended design can be constructed to the full requirements as established in the 2010 ADA Standards. When 2010 ADA Standards do not give sufficient information to construct the contract work, the contractor shall refer to the PROWAG.

**3.3** When consultant survey is not included in the contract, the contractor shall coordinate with the engineer, prior to construction, to determine if additional survey will be required to confirm the designs constructability.

**4.0 Final Acceptance of Work.** The contractor shall provide the completed ADA Checklist to the engineer at the semi-final inspection. ADA improvements require final inspection and compliance with the ADA requirements and the ADA Checklist. Each item listed in the checklist must receive either a "YES" or an "N/A" score. Any item receiving a "NO" will be deemed non-compliant and shall be corrected at the contractor's expense unless deemed otherwise by the engineer. Documentation must be provided about the location of any non-compliant items that are allowed to remain at the end of the construction project. Specific details of the non-compliant items, the ADA requirement that the work was not able to comply with, and the specific reasons

that justify the exception are to be included with the completed ADA Checklist provided to the engineer.

**4.1** Slope and grade measurements shall be made using a properly calibrated, 2 foot long, electronic digital level approved by the engineer.

**5.0 Basis of Payment.** The contractor will receive full pay of the contract unit cost for all sidewalk, ramp, curb ramp, median, island, approach work, cross walk striping, APS buttons, pedestrian heads, detectible warning systems and temporary traffic control measures that are completed during the current estimate period as approved by the engineer. Based upon completion of the ADA Checklist, the contractor shall complete any necessary adjustments to items deemed non-compliant as directed by the engineer.

**5.1** 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 documents.

**N. Median Island Cut-Throughs – St. Louis District Version 10-18-23**

**1.0 Description.** This work shall consist of providing a median or median island cut-through that is compliant with current Americans with Disabilities Act (ADA) and MoDOT guidelines at locations shown on the plans and as directed by the Engineer.

**2.0 Construction Requirements.** The contractor shall be responsible for removing the existing median and if necessary, the existing pavement and base prior to installing the new cut-through as shown in the plans and as per Section 608 in both the Standard Plans and Standard Specifications. If new pavement/sidewalk is to be installed, it shall be minimum 7" Concrete Sidewalk on a 4" Type 5 Aggregate Base with new median island doveled into this new sidewalk. Truncated domes installed within the island or median cut-throughs shall be placed flush with the face of the curb/island.

**2.1 ADA Ramps.** If there is an actual ramp that provides access to the raised portion of the island or median instead of cutting through a portion of the island or median, then that area of concrete will be paid for separately as an ADA Curb Ramp, per each, and not per quantities noted below.

**2.2 Cross Slope through Cut-Throughs.** The contractor shall meet ADA requirements regarding cross slope through the cut-through.

**3.0 Method of Measurement.** Final measurement will not be made except for authorized changes during construction or where appreciable errors are found in the contract quantity. The revision or correction will be computed and added to or deducted from the contract quantity for each item listed in the Basis of Payment.

**4.0 Basis of Payment.** Payment for furnishing and installing a new median or median island cut-through shall include all excavation, base compaction, saw cuts, removal of existing pavement and median island, new sidewalk and base, new median island, new truncated domes, and all materials, equipment, tools, labor, and work incidental thereto, and shall be considered to be completely covered by the contract unit price for items listed below as indicated in the plans.

| Pay Item Number | Description | Unit |
|-----------------|-------------|------|
|-----------------|-------------|------|

|           |                                         |          |
|-----------|-----------------------------------------|----------|
| 202-20.10 | Removal of Improvements                 | Lump Sum |
| 304-05.04 | Type 5 Aggregate for Base (4 In. Thick) | S.Y.     |
| 608-30.06 | 6" Concrete Median Strip                | S.Y.     |
| 608-10.12 | Truncated Domes                         | S.F.     |

O. ADA Material Testing Frequency Modifications JSP-23-01A

**1.0 Description.** This provision revises the Inspection and Testing Plan (ITP) for the construction of ADA compliant features to better match the nature of the work. The minimum Quality Control (QC) testing frequencies shall be as stated in these provisions.

**2.0 Compaction Test on Base Rock Under Sidewalk, Curb Ramps and Paved Approaches.** (Revises ITP Sec 304.3.4) The required test frequency shall be one per 600 tons.

**3.0 Gradation Test on Base Rock Under Sidewalk, Curb Ramps and Paved Approaches.** (Revises ITP Sec 304.4.1) The required frequency shall be one per 500 tons.

**4.0 Concrete Plant Checklists.** (Revises ITP Sec 501) Submittal of the 501 Concrete Plant Checklist shall be once per week when the contractor is only pouring curb, sidewalk, paved approaches, and curb ramps.

**5.0 Concrete Median, Median Strip, Sidewalk, Curb Ramps, Steps and Paved Approaches.** The required frequency shall remain as stated in ITP Sec 608 and further detailed in Sec 608.3.7.

**6.0 Concrete Curb.** (Revises ITP Sec 609 only for Concrete Curb) For concrete curb, the required frequency shall be equivalent to ITP Sec 608 (concrete median, median strip, sidewalk, curb ramps, steps, and paved approaches), and Sec 608.3.7.

P. ADA Compliant Movable Barricade

**1.0 Description.** This work shall consist of providing movable barricades to satisfy the requirements of the pedestrian traffic control plans as shown in the bidding documents. The contractor will be responsible for providing adequate quantity of pedestrian barricades, or moving them to coincide with their planned order of work.

**2.0 Construction Requirements.** The contractor shall use a movable barricade that meets the requirements as established by the ADA. The pedestrian barricades shall be of self-supporting type having a minimum length of 6 feet per unit. The face of the barricade shall not extend into adjacent sidewalk considered open for pedestrian use. The contractor will be responsible for setting and maintaining the pedestrian barricades until all proposed improvements have been constructed.

**3.0 Method of Measurement.** No measurement for ADA Compliant Movable Barricade will be made. The contractor shall determine the quantity needed based on their progression of work.

**4.0 Basis of Payment.** Payment for all work necessary to fulfill the requirements noted above shall be considered completely covered in the contract unit price for the following. No direct payment will be made for any necessary relocation of ADA Compliant Barricades.

| Item Number | Unit     | Description                              |
|-------------|----------|------------------------------------------|
| 616-99.01   | Lump Sum | Misc. Lump Sum Temporary Traffic Control |

Q. Shaping Slopes Class III (Modified Material Requirements) NJSP-20-03B

**Delete Sec 215.1.3 and 215.1.3.1 and substitute the following:**

**215.1.3** Shaping Slopes, Class III, shall consist of providing rock fill material and shaping slopes to construct additional shoulder width for the installation of guardrail and Type A crashworthy end terminals in accordance with Missouri Standard Plans for Highway Construction. The rock fill material used shall meet the requirements specified in Sec 215.1.3.1. The shoulder surface shall be finished smooth such that it is traversable and without significant voids or depressions.

**215.1.3.1 Material Requirements.** Rock fill material used for Shaping Slopes, Class III, shall consist of a durable crushed stone, shot rock or broken concrete, with a predominant size of 3 inches and a maximum size of 6 inches. Acceptance by the engineer will be made by visual inspection.

**215.4 Basis of Payment.** The accepted quantity will be paid at the contract unit bid price for 215-99.10 Misc. Shaping Slopes Class III – Modified Material Requirement, per 100F.

R. Linear Grading Class 2 – Modified

**1.0 Description.** Modified Linear Grading, Class 2 shall consist of any necessary clearing and grubbing in accordance with Sec 201, preparing the subgrade for shoulder, pavement widening, sidewalk, curb and gutter, paved approaches, roadside retaining wall, or other roadside appurtenance by excavating, compacting, fine-grading, and shaping existing shoulder and ditch fore-slope, conforming to the typical section shown on the plans. It may be necessary to haul material.

**2.0 Construction Requirements.** The shoulder, pavement widening, sidewalk, curb and gutter, roadside retaining wall, or other roadside appurtenance shall be excavated and graded as shown on the typical section with minimal disturbance of the existing sub-grade and fore slope. Density shall be obtained from reasonable compactive efforts consisting of no less than three passes with a roller until no further visible compaction can be achieved, or by other methods approved by the Engineer. Subgrade preparation and compaction shall also be in accordance with Sections 203, 209 and 210.

**2.1** All ditches shall be graded to drain and maintain existing flow capacity, unless approved by the engineer. If fill material for the shoulder widening work impacts the ditch capacity, the contractor shall re-grade the backslope to maintain the flow capacity of the ditch. Fore slopes and back slopes shall be constructed at a 3:1, except as noted on the plans or approved otherwise by the engineer.

**2.2** It may be necessary to go outside the limits of the right of way to obtain additional material or to dispose of excess material. All costs for providing additional material or disposing of excess material shall be included at the contract unit price for pay item 207-99.09, Modified Linear

Grading, Class 2. All contractor furnished material shall be approved by the Engineer prior to being incorporated into the project. Quarry screenings will not be considered an approved contractor furnished material.

**2.3 Included in this work is any pavement edge treatment that might be necessary to stay in compliance with the Standard Plans.** The need for edge treatment is determined by the contractor's method of operations.

**3.0 Method of Measurement.** Measurement will be made to the nearest 1/10 station separately for the length of pavement edge along each side of the roadway, measured along centerline of the traveled way and totaled to the nearest Station for the sum of all segments in accordance with Section 207.

**4.0 Basis of Payment.** Payment for Modified Linear Grading, Class 2 as described in this provision will be made at the contract unit price for:

| Item Number | Unit    | Description                      |
|-------------|---------|----------------------------------|
| 207-99.09   | Station | Linear Grading Class 2, Modified |

#### S. Construction Requirements

**1.0 Construction Staging.** The contractor shall be aware that reconstruction of the right turn island at Landmark Avenue will require coordination with the I-270 bridge crack sealing work. The contractor shall submit a plan of intent to the engineer two weeks in advance of staging work in this area. The contractor shall follow requirements per the engineer for advance traveler notification. Separate payment will not be made for this requirement.

**2.0 ADA Accessible Pavement Markings.** Pavement marking paint for the ADA spaces at the eastern park and ride lot at Weber Hill Road shall include the blue background with white border as shown in Figure 3B-19 of the MUTCD Manual. The western lot will not be improved as the property is currently anticipated to be relinquished.

**2.1 Measurement and Payment.** Measurement will be made per Section 620, and payment will be fully covered by the pay items in the plan. No additional compensation will be made for installing ADA pavement markings and symbols including but not limited to materials, labor, time.

**3.0 Type D Crashworthy End Terminals** shall be placed at the BNSF Railroad bridge for the EB Route 30 exit ramp and the WB Route 30 exit ramp.

**3.1** There are several approved CET options available to the contractor. The selected system must fit the space available for length and width. Additional manufacturer requirements may be required based on the specific CET chosen.

**4.0 Curb Replacement.** There are various types of curbs being installed on this project. These curbs are intended to match the existing adjacent curbs and shall be in accordance with Section 609. Locations will be as directed by the Engineer. The pay items are shown below.

**5.0 Paving adjustments** may be necessary on stop and yield controlled side streets and entrances to meet ADA compliance requirements. Payment for this requirement is included in the removal of improvements and no additional payment will be made.

**6.0 Basis of Payment.** The accepted quantities will be paid at the contract unit bid price for items:

| Item No.  | Unit | Description                                                      |
|-----------|------|------------------------------------------------------------------|
| 620-99.02 | EA   | Preformed Thermoplastic Pavement Markings, ADA Accessible Symbol |
| 620-99.03 | LF   | 4 IN. Solid Blue Pavement Marking Paint with Type P Beads        |
| 606-30.21 | EA   | Type D Crashworthy End Terminal (MASH)                           |
| 609-99.03 | LF   | 6-Inch Asphalt Curb                                              |
| 609-99.03 | LF   | Concrete U-Gutter (3 to 4 Feet Wide)                             |
| 609-99.03 | LF   | Various Type Curb (6-Inch Height and Under)                      |

T. Site Restoration

**1.0 Description.** Restore to its original condition any disturbed area at sites including, but not limited to items such as, pavement markings, guardrail, sidewalk, ramp, bus stop pad, sprinklers, 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 Materials.** Any areas of concrete paved ditch, pavement, and shoulders as well as any similar improvements shall be replaced with improvements of similar composition and thickness. Removals shall be achieved by means of full depth saw cut, the resulting subgrade compacted to minimum density requirements and topped with 4 inches of compacted aggregate base course prior to replacement of surface materials. Concrete materials used in replacement shall be approved by the engineer. A commercial asphalt mix may be used for replacement of asphaltic surfacing upon approval of the engineer.

**2.1** Unless quantities and pay items for removal and subsequent replacement of improvements are contained in the plans for a specific location of removal work, no direct payment will be made for full depth saw cutting and the removal and subsequent replacement of asphalt, pavement, shoulders etc. This work will be considered as included in the various unit bid prices established in the contract, and no additional payment will be made.

**2.2** If the contractor elects and receives approval from the engineer for alternate trench and/or pull box locations, any areas of concrete slope protection, sidewalk, pavement, shoulders, islands and medians – as well as any similar improvements consisting of asphaltic concrete materials – removed in conjunction with their construction shall be replaced with improvements of similar composition and thickness. Removals shall be achieved by means of full depth saw cuts, the resulting subgrade compacted to minimum density requirements and topped with 4 inches of compacted aggregate base course prior to replacement of surface materials. Concrete materials used in replacement, shall be approved by the engineer. A commercial asphalt mix may be used for replacement of asphaltic surfacing upon approval of the engineer.

**2.3** Any sidewalks and curb ramps that are disturbed as described in this provision shall be replaced to meet current ADA standards.

**2.4** All guardrail post holes remaining from the removal of existing guardrail posts in existing concrete or asphalt pavement, or ditch shall be backfilled with a granular material and sealed with

a ½ inch hot-poured elastic type material in accordance with Section 1057 or as approved by the Engineer. Any concrete or asphalt pavement or ditch damaged in the process of fulfilling this provision shall be replaced in kind and considered incidental to the installation of the new guardrail at the disturbed location

**2.5** Areas that are used by the contractor for jobsite trailers, equipment, and materials storage, or used for project staging areas that are disturbed shall be cleaned up and restored to a condition that is both acceptable to the engineer and, at a minimum, equivalent to the existing site condition.

**3.0 Basis of Payment.** The cost of restoration of disturbed areas will be incidental to the unit price of the items associated with the disturbance. No direct payment will be made for any materials, equipment, time, or labor, which is performed under this provision.

U. Construction Impacts to Privately Owned Sprinkler Systems

**1.0** This work includes relocation or replacement of all sprinkler heads and sprinkler system pipes that are impacted by construction activities and installation of improvements.

**2.0** The contractor is advised that various properties along the project length have irrigation systems whose sprinkler heads and associated pipe systems are located within or in close proximity to the proposed sidewalk. The contractor shall relocate undamaged sprinkler heads or replace damaged sprinkler heads as directed by the engineer.

**2.1** The contractor shall check with individual property owners to shut off watering as necessary and be aware of the location of said systems. Any damage to the watering system, sprinkler heads, etc. will be repaired or replaced at the contractor's expense and at no direct cost to MoDOT.

**2.2** The contractor is strongly advised to field check the project to determine the extent of impact to the existing sprinkler systems located along the route and adjust the bid accordingly.

**3.0 Method of Measurement:** No measurement shall be made.

**4.0 Basis of Payment:** No direct payment will be made for the relocation or replacement of sprinkler systems located along the project limits. All costs associated with this work shall be considered incidental to other pay items provided in the contract.

V. Coordination with Bi-State

**1.0 Description.** The contractor shall be required to coordinate with Bi-State where construction operations will involve work on or around existing Metro Bus Stops.

**2.0 Construction Requirements.**

**2.1** The contractor shall submit their tentative construction schedule to Bi-State prior to the Preconstruction conference to begin coordination efforts.

**2.2** All Metro Bus stops within the project limits shall remain open and operation throughout the duration of the project. In locations where the contractor's operations will involve work at or near

a bus stop location, the contractor shall notify Bi-State through the contacts listed below, not later than 72 hours prior to beginning work at that location. The contractor shall also take care to minimize exposure of Metro users to construction hazards near all bus stops that are in service during and outside of work operations.

**2.3 Project Contacts.** The contractor shall notify the following contacts at Bi-State and coordinate with them through the duration of the project or their designated representative(s).

Ms. Natalie Siebert, Senior Planner Transit Operations

Office: (314) 982-1400 x1816

Cell: (314) 497-4916

Email: [nsiebert@metrostlouis.org](mailto:nsiebert@metrostlouis.org)

Mr. Lance Peterson, Director of Service Planning

Office: (314) 982-1520

Cell: (314) 220-6756

Email: [llpeterson@metrostlouis.org](mailto:llpeterson@metrostlouis.org)

**3.0 Temporary Facilities.** In locations where the contractor's operations may affect a bus stop location, a temporary stop may be required. Signage of the temporary stop shall be in accordance with Specification Section 104.10.2, and placement of the temporary stop shall be coordinated with Bi-State. All temporary bus stops shall be located near the existing stop it is representing, accessible, clear, and conspicuous to both the bus rider and operator, and be located where it is safe from hazards.

#### **4.0 Permanent Facilities**

**4.1 Bus Stop Landing Pad.** Locations for proposed bus stops are identified on the contract plans. The contractor shall construct the new landing pads as shown on the plans with 8-in concrete sidewalk. Bi-State or Bi-State's contractor shall furnish and install the new bus stop sign and post.

**5.0 Basis of Payment.** No direct payment shall be made to the contractor for the labor, equipment, material, or time required to comply with this provision unless otherwise provide in the plan.

#### **W. Access to Commercial and Private Entrances**

**1.0 Description.** While work on entrances or adjacent properties, the contractor shall make every reasonable effort to minimize any interference to the properties and to complete the work diligently. Under no circumstances shall the contractor block ingress/egress to and from businesses during the normal business hours of each business unless as approved by the property owner and engineer.

#### **2.0 Construction Requirements.**

**2.1 Commercial Entrances.** On all commercial entrances, the contractor shall keep one-half of the entrance open at all times. On commercial entrances less than 20' wide, it may be necessary for the contractor to provide temporary aggregate to provide access to the property. The contractor shall remove and dispose of the temporary aggregate following the completion of the

entrance. For properties with more than one entrance, the contractor may construct one entire entrance at a time with the approval of the property owner and the engineer. Some businesses have already agreed to allowed full driveway closures, see **Right of Way Requirements provisions** for those locations.

**2.1.1** The contractor shall complete the entrances as quickly as possible and shall take **no longer than 4 Weeks** to complete any one entrance.

**2.2 Private Entrances.** The contractor shall complete the entrances as quickly as possible and shall **take no longer than seventy-two (72) hours** to complete any one entrance, unless otherwise approved by the engineer and the property owner. This may require the use of concrete strength accelerators.

**2.2.1** Entrances 20 feet or wider may be constructed half at a time. One half of the entrance shall be open at all times and the contractor shall take **no longer than 10 days** to complete the entrance.

**3.0 Basis of Payment.** No direct payment shall be made to the contractor for the labor, equipment, material, or time required to comply with this provision.

X. Property Owner Notification

**1.0 Description.** It shall be the contractor's responsibility to inform and notify the adjacent property owner 48 hours prior to starting any construction activities that may impact driveway access or occur along the frontage of the property owner's parcel. Notification shall be in written form and include the contractor's contact information, the engineer's contact information, and an estimated schedule of work and the associated impacts.

**2.0 Basis of Payment.** No direct payment will be made to the contractor for the labor, equipment, material, or time required to comply with this provision.

Y. Concrete Manhole Collar

**1.0 Description.** The Contractor shall install a reinforced concrete collar around a manhole frame and cover or utility valve as indicated in the plans and as approved by the Engineer.

**2.0 Material.** All material shall be in accordance with Division 1000, Material Details, and specifically as follows:

| Item                           | Section |
|--------------------------------|---------|
| Reinforcing Steel for Concrete | 1036    |

**2.1** Concrete used for manhole collars shall be the same used for full depth pavement repairs as specified in Section 613.10 of the Standard Specifications.

**3.0 Construction Requirements.** Manhole collars shall be provided in locations within the plans or as directed by the Engineer but generally shall be located where a manhole is adjusted to grade due to the cold-milling and overlaying of an existing roadway. The use of a collar can also be considered for new installations within new full depth asphalt pavement.

**3.1 Steel Plate.** If approved by the Engineer, a steel plate may be installed over the void created by the removal of pavement next to a manhole or utility valve prior to the installation of the manhole collar concrete. Asphalt wedging surrounding the steel plate shall be included when using a steel plate. No direct payment shall be made to provide this steel plate and asphalt wedging.

**3.2 Joint Sealing.** Per Sec 613.3.3 , the contractor shall seal the joint between the asphalt surface and the new concrete collar along with seal any overcut created from the sawcutting operation when removing the portion of pavement to be replaced with manhole collar concrete. This joint shall be filled with either an expansive mortar, epoxy, polyester, or joint material as approved by the Engineer. In addition, the contractor shall install tar paper between the new concrete and the existing manhole frame and cover as directed by the Engineer.

**4.0 Method of Measurement.** Measurement for installation of a reinforced concrete manhole collar will be made per each.

**5.0 Basis of Payment.** Payment for the installation of a reinforced concrete manhole collar, including all materials, equipment, labor, saw cuts before and/or after installation and all necessary work shall be completely covered by the contract unit price paid for the item listed below. Adjusting to grade the actual frame and cover shall be paid for separately. Please see JSP – “Adjust to Grade Items” for additional details regarding the adjustment to grade for those items.

| Item No.  | Type | Description             |
|-----------|------|-------------------------|
| 604-99.02 | Each | Concrete Manhole Collar |

Z. Island Tubular Marker

**1.0 Description.** Tubular markers shall be mounted on raised islands at the locations indicated in the plans.

**2.0 Requirements.** Shall have a height of 18 inches, 2 reflective bands with super high intensity prismatic sheeting in accordance with Sec 1042, and be constructed from thermoplastic polyurethane. Color of the island tubular marker and reflective bands shall match the pavement marking in which it is placed. Post shall be in the shape of a “T” with a width of 3 inches and depth of 2 inches. Post shall be capable of recovering from repeated vehicle impacts. Post shall insert and be secured into the plastic base with horizontal locking pins. When the post is no longer serviceable, it shall be able to be removed and a new post can be manually inserted and locked into the existing base.

**3.0 Construction Requirements.** Shall be surface mounted on the radius points of the island noses. The roadway shall be cleaned of dirt and gravel before installation. Island tubular marker shall be mounted using proper sized anchor bolts according to manufacturer’s instructions.

**4.0 Method of Measurement.** Measurement for installation of tubular marker with base will be made per each.

**5.0 Basis of Payment.** Payment for all labor, equipment, and materials necessary to install these markers shall be made and considered completely covered by the contract unit price bid for:

| Item No.  | Type | Description           |
|-----------|------|-----------------------|
| 620-99.02 | Each | Island Tubular Marker |

AA. Curb Reflectors

**1.0 Description.** This work consists of furnishing, transporting, and installing curb reflectors of the type and spacing specified in the roadway plans. All work shall comply with Sec 620 and include cost of equipment, labor, materials, and time required to complete said work.

**1.1 General.** The surface of the curb to which the reflector shall be applied shall be free of dirt, curing compound, moisture, paint, or any other material which would adversely affect the bond of the adhesive. Cleaning of the surface shall be to the satisfaction of the Engineer. An adhesive meeting the reflector manufacturer's specifications shall be placed either on the surface or the bottom of the reflector in sufficient quantity to ensure complete coverage of the contact area with no voids present and with a slight excess after the reflector is pressed firmly in place. The installed height of the prismatic curb reflectors shall be a maximum of 3/4 in. above the mounting surface. The unit shall have one reflective surface that is placed approximately perpendicular to the mounting surface.

**2.0 Basis of Payment.** This work shall be paid for at the contract unit price for Item Number 620-99.02, "Curb Reflectors", per each.

BB. Removal and Delivery of Existing Signs JSP-12-01C

**1.0 Description.** All Commission-owned signs removed from the project shall be disassembled, stored, transported, and disposed of as specified herein. Sign supports, structures and hardware removed from the project shall become the property of the contractor.

**2.0 Disassembly and Delivery.**

**2.1** All Commission-owned signs, (excluding abandoned billboard signs), designated for removal in the plans, or any other signs designated by the Engineer, shall be removed from the sign supports and structures, disassembled, stored, transported, and delivered by the contractor to the recycling center for destruction.

**2.2** The contractor shall coordinate and make arrangements with the recycling center for delivery of the signs. Sign panels shall be disassembled and/or cut into sizes as required by the recycling center.

**2.3** The contractor shall provide the Engineer with a "Sign Delivery Certification" attesting to completion of delivery of all existing sign material from the project to the recycler. In addition, the contractor shall provide to the Engineer a final "Sign Certification of Destruction" from the recycler that documents the total pounds of scrap sign material received from the project and attests that all such material will not be re-purposed and will be destroyed in a recycling process. The contractor can locate the required certification statements from the Missouri Department of Transportation website:

<https://www.modot.org/forms-contractor-use>

**2.4** Funds received from the disposal of the signs from the recycling center shall be retained by the Contractor.

**3.0 Basis of Payment.** All costs associated with removing, disassembling and/or cutting, storing, transporting, and disposing of signs shall be considered as completely covered by the contract unit price for Item No. 202-20.10, "Removal of Improvements", per lump sum.

CC. Overhead Sign Mounting Vertical Location and Support Trim

**1.0 Overhead Sign Mounting.** The contractor shall verify locations of existing sign hardware to be replaced so that signs are fastened to truss in accordance with the Standard Plans.

**1.1** Overhead signs shall be mounted in accordance with Standard Plans 903.05 through 903.60.

**1.2** All signs shall be centered vertically about the horizontal centerline of the truss, unless the minimum vertical distance to the pavement cannot be met.

**1.3** When a horizontal mounting distance is not provided, the new sign shall be mounted as close to the old sign's position as practical centered over the lane, over the lane of travel that the sign is intended to direct, or as directed by the engineer.

**1.4** Existing overhead vertical sign supports that are reused and that exceed the vertical dimensions of the new sign and extend beyond the structure's upper and lower chords shall be trimmed so as not to exceed the vertical dimensions of the new sign.

**1.5** All existing structural hardware and connections on the overhead structural members, connections, posts, and foundations to be used in place shall be verified for conformance with the Standard Plans. Missing nuts, bolts, and clips will be replaced. Loose nuts, bolts, and clips will be tightened. Any damage incurred to the existing sign structures during sign removal and replacement activities will be repaired at the contractor's expense.

**1.7** All existing vertical uprights that will no longer be used to support new or existing signs shall be removed.

**2.0 Vertical Upright Supports.**

**2.1** Additional 3" aluminum I-beam upright supports shall be provided and placed for installation of signs up to 3' greater in height than the existing signs on ground mounted signs.

**2.2** The contractor shall provide and place any additional vertical upright supports required to mount new signs. Existing 3" and 6" upright supports may be reused and reinstalled.

**3.0 Basis of Measurement.** All costs associated with this work and compliance with this provision are considered incidental to other overhead signing costs.

**4.0 Basis of Payment.** No direct payment shall be made for any labor or materials needed to comply with this provision

**DD. Grated Inlet Repair/Replacement**

**1.0 Description.** This work shall consist of removing the deteriorated or otherwise unacceptable top of an existing drop inlet as directed by the engineer and rebuilding as per the plans. The work shall include replacement of the frame and grate and any surrounding concrete and rebar in the gutter section.

**2.0 Construction Requirements.** The contractor shall be responsible for removing the existing grate and bearing plate, and a minimum of 6 inches from the top of the existing inlet, or down to sound material as per the Engineer. The contractor shall then rebuild the inlet top as per the plans to the existing elevation and as per Section 604. The contractor shall field verify the size of the inlet and required grate opening prior to ordering the corresponding curved vane grate, drop inlet top, grates and bearing plates. The contractor shall saw cut the existing pavement or shoulder around the inlet to provide a concrete pad and shall adjust to grade.

**2.1 Measurement** and payment for grated inlet repair/replacement includes the frame and grate and all concrete work including removal, forming, and reinforcing necessary to replace the inlet top. No direct payment will be made for epoxy coated reinforcing steel, dowel bars, tie bars, or manhole frame and covers and shall be included in the measurement and payment of Grated Inlet Repair/Replacement.

**3.0 Basis of Payment.** Payment for replacing the top of the inlet shall include all excavation, materials, equipment, tools, labor, and work incidental thereto, and shall be considered completely covered by the contract unit price as indicated in the plans for:

| Item Number | Unit | Description                           |
|-------------|------|---------------------------------------|
| 604-99.03   | LF   | Misc. Grated Inlet Repair/Replacement |

**EE. Curb Inlet Top Repair/Replacement**

**1.0 Description.** This work shall consist of removing the deteriorated or otherwise unacceptable top of an existing curb inlet as directed by the engineer and rebuilding as per the plans.

**2.0 Construction Requirements.** The contractor shall be responsible for removing and replacing the existing inlet top, saw cutting and repairing the existing inlet wall so that it may be adjusted to plan elevation and as per Sec 604. A minimum of 6 inches from the top of the existing inlet structure, or down to sound material as per the Engineer. Items may include repairing part of the structure that will require additional structural steel and dowels to tie the existing structure together.

**2.1** A steel angle plate shall be incorporated into the design to strengthen the face of the inlet and help prevent breakage.

**2.2 Measurement** and payment for curb inlet top repair/replacement includes all concrete work including removal, forming, and reinforcing necessary to replace or repair the curb inlet top. Grates and bearing plates in the gutter section shall be included in the measurement and payment of Curb Inlet Top Repair/Replacement.

### 3.0 Example of Existing Cast-In-Place Inlets



**EB MO 30 Left Turn Lane to NB I-270 Ramp**

### 4.0 Examples of Required Inlet Protection with the Inlet Top Replacement



**Proposed at EB MO 30 Left Turn Lane to NB I-270 Ramp**

**5.0 Basis of Payment.** Payment for repairing the inlet shall include all saw cuts, excavation, materials, equipment, tools, labor, and work incidental thereto, and shall be completely covered by the contract unit price for:

| Item Number | Unit | Description                             |
|-------------|------|-----------------------------------------|
| 604-99.02   | EACH | Misc. Curb Inlet Top Repair/Replacement |

FF. Adjust to Grade Items

**1.0 Description.** This work shall consist of adjusting basins/inlets, manholes, valves, and pull boxes as well as relocating pull boxes that are within areas where either new sidewalks, curb ramps, approaches or pavements are to be constructed as shown on the plans. The contractor shall verify the type of frame and cover in the field before performing the work. The adjustment shall be made to match the final proposed grade.

**2.0 Construction Requirements.** Adjusting manholes and adjusting basins or inlets shall be done in accordance with Sec 604 except as modified herein.

**2.1** Adjustments, extensions, and/or lowering of utility and any related excavation and backfill shall be constructed as approved by the Engineer. For MoDOT owned facilities, adjustments shall conform to current Missouri Standard Specifications for Highway Construction. For MSD owned facilities, adjustments shall conform to the 2018 MSD Construction Specifications for Sewer and Drainage Facilities and the 2009 MSD Standard Detail Sheets. Adjustments for inlets require the top lid slopes to be adjusted to less than 2% slope in all directions and some of these inlets need to be raised to the final sidewalk grade. These locations are to be determined in the field by the Engineer. Adjustments shall be completed so that the finished sidewalk, ramp, approach, or pavement meets current ADA standards.

**3.0 Basis of Payment.** All costs for materials, equipment, labor, and installation shall be included in the cost for adjusting basins/inlets, manholes, valves, and pull boxes as well as relocating pull boxes.

| Item No.  | Description       | Unit |
|-----------|-------------------|------|
| 604-20.10 | Adjusting Manhole | Each |
| 604-99.02 | Adjusting Valves  | Each |

GG. Additional Coldmilling at Curb Opening Inlets

**1.0 Description.** This work shall consist of milling the existing pavement to an additional depth in the vicinity adjacent to curb opening inlets prior to placing new pavement. The clear opening at the curb line shall provide a minimum of 6 inches depth to allow proper stormwater flow into the inlets.

**2.0 Construction Requirements.** The contractor shall be responsible for removing an additional depth of pavement to provide the required six-inch minimum clear opening at all inlets within the project limits. The milling shall include a depression leading to and through the curb opening as directed by the Engineer. The milling shall take place prior to the placement of any new asphalt material for paving operations.

**2.1 Examples** of inlets that do not currently provide an acceptable clear opening are shown below.



**3.0 Basis of Payment.** The cost of restoring clear opening depth at curb opening inlets will be incidental to the unit price of the items associated with the disturbance. No direct payment will be made for materials, equipment, time, or labor, which is performed under this provision.

HH. Non-Tracking Tack JSP-24-02A

**1.0 Description.** This work requires application of tack in accordance with Sec 407 and prevention of tack loss from the surface as specified herein. Tack loss prevention shall be accomplished with successful usage of a MoDOT-approved non-tracking tack, or other acceptable non-tracking means, as approved by the engineer.

**2.0 MoDOT-Approved Non-Tracking Tack.** A list of MoDOT-approved non-tracking tack products is available at MoDOT.org under the Materials Qualified List. Upon request from the contractor, the MoDOT Division of Construction & Materials will consider allowance of other non-tracking products. To be approved, the contractor must successfully demonstrate that the proposed product meets the non-tracking requirements specified in section 3.0. The location of a contractor demonstration will only be allowed in areas approved by the engineer. The engineer will make final determination of product acceptance based on observation of the results of the contractor's demonstration.

**2.1** Products on the Qualified List have demonstrated successful non-tracking performance on previous projects; however, the Commission does not endorse nor guarantee success of any of the listed products. Success is dependent on the contractor choosing a product that can achieve the desired results while also taking into consideration all factors, including, but not limited to, cure time, weather conditions, surface prep, surface type, material properties, and adherence to manufacturer's instructions. The contractor is responsible for monitoring adherence of the tack to the pavement surface and shall cease operations when tack first begins to show signs of not meeting the requirements of Section 3.0. Corrective action shall be made prior to resuming tacking operations.

**3.0 Non-Tracking Requirements.** Non-tracking tack shall remain adhered to the pavement surface when exposed to any wheeled or tracked vehicles. The tack shall not track off the surface within 30 minutes of being applied, and shall not stick to the tires, tracks or other parts of paving equipment or vehicles such that the underlying surface becomes visible or void of tack prior to the placement of the hot mix asphalt. The tack shall not track onto any adjacent lanes, pavement markings, driveways, sideroads, etc.

**3.1** The contractor shall be responsible for cleaning all tracked tack from adjacent lanes, driveways, sideroads, etc., and shall replace all pavement markings that become coated with tracked tack. This cleaning and replacement requirement applies to both approved and proposed non-tracking products.

**4.0 Basis of Payment.** Measurement and payment shall be in accordance with Sec 407. The accepted quantity of non-tracking tack coat will be paid for per gallon at the contract unit price for 407-10.07 Tack Coat – Non-Tracking, per gallon. No additional payment will be made for the cost to demonstrate proposed products, for cleaning surfaces due to tracking of tack, or for replacement of pavement marking damaged by tracked tack.

II. Coordination with Affton Athletic Association

**1.0 Description.** The contractor shall contact the Affton Athletic Association three weeks prior to lane closures that will impact the access to McNary Drive so that they have time to notify users of the facility.

**2.0 Contact information** is (314) 843-4207 or email [aafieldoffice@afftonaa.com](mailto:aafieldoffice@afftonaa.com).

**3.0 Mailing Address:**       **Affton Athletic Assosiation**  
PO Box 4360  
St. Louis, MO 63123

**Front Entrance**  
(McNary Drive)  
10300 Gravois Road  
St. Louis, MO 63123

**Back Entrance**  
(Tesshire Road)  
10501 Tesshire Road  
St. Louis, MO 63123

JJ. Coordination with City of Sunset Hills

**1.0 Description.** The contractor shall contact Brittany Gillet, the City Administrator with the City of Sunset Hills three weeks prior to lane closures that will impact the access to the Sunset Hills Athletic Complex so that they can notify users of the facility that work will begin near the entrance. Egress to the athletic fields shall not be obstructed during active field. Contact info is (314) 272-2462 or email [bgillett@sunset-hills.com](mailto:bgillett@sunset-hills.com).

**2.0** The following athletic complex usage hours were provided by the City of Sunset Hills. These hours are provided for information and shall be considered when planning work times in the vicinity of the athletic complex entrance.

- (a) Sundays 2:30-9:00pm through Nov 1 (mostly games for adult league)
- (b) Mondays 5:30-10:30pm through Nov 1 (mostly games for adult league)
- (c) Tuesdays 5:00-10:30pm through Nov 1 (mostly games for adult league)
- (d) Wednesdays 5:30-10:30pm through Nov 1 (mostly games for adult league)
- (e) Thursdays 6:00-8:00pm through September 25 (all rentals)
- (f) Fridays 5-6pm through July 11 (rentals)
- (g) Saturdays nothing consistent, random reservations through September

KK. Network Connected Signal Monitor

**1.0 Description.** The Commission's signal cabinet shall have a flashing yellow arrow compatible monitor installed with an internal RJ-45 plug for 10/100 Ethernet communication that is connected to the Commission's computer network through Commission furnished Ethernet switch and allow a remote user running the monitor's software to interface with any specific monitor.

**2.0 Performance.**

**2.1 Inputs.** If video detection is used, inputs into controller shall be via SDLC port. Signal cabinet to be TS2 Type 2 setup with 3 ea. SDLC connectors and the monitor to be a Malfunction Management Unit (MMU).

**2.2 Status and Event Logging.** Monitor shall be able to remotely communicate, at a minimum, active status, current faults, and event logs for at least the previous 7 days.

**2.3 Flashing Yellow Arrow.** Monitor shall be capable of operating a flashing yellow arrow for left turns by utilizing unused yellow channels on the pedestrian load switches.

**2.4 Software and Configuration.** Software needed to communicate to any network-enabled monitor shall be provided to the Commission for an unlimited number of users.

**3.0 Construction Requirements.**

**3.1 Requirements.** Construction requirements shall conform to Sections 902 and 1092.

**3.2 Setup and Training.** A minimum of one day of training shall be provided in the operation, setup communication and maintenance of the monitors.

**3.3 Acceptance Testing.** Contractor shall demonstrate that all network-connected monitors are remotely communicating and individually addressable via supplied software and Commission furnished devices from the Commission's St. Louis Traffic Management Center in order to satisfy the requirements of this provision. No direct payment will be made for this testing.

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

**5.0 Basis of Payment.** No direct payment will be made for the software. Payment will be considered full compensation for all labor, equipment, and material to complete the described work other than Commission furnished devices needed to complete the network connections. Payment will be made as follows:

| Item No.  | Type | Description                      |
|-----------|------|----------------------------------|
| 902-99.02 | Each | Network Connected Signal Monitor |

LL. Top Mount Lighting Pole

**1.0 Description.** This work shall consist of furnishing and installing top mount poles as indicated in the plans.

**2.0 Construction Requirements.** Top mount poles shall conform to the Type AT lighting poles and shall be fabricated with a circumferentially welded top mount and top plate to accept top mounted luminaires. The top mount shall extend 4" above the top of the pole and meet AASHTO loading requirements for the luminaires provided. The top mount shall be made of the same material as the pole shaft, be constructed as a one-piece pole and top mount unit by the manufacturer and have an outside diameter that accepts the appropriate luminaire slip-fitter. Pole and top mount shall conform to all MoDOT specifications and material requirements. Bridge mounted poles shall be constructed to match the existing bolt pattern.

**3.0 Basis of Payment.** Payment for furnishing and installing top mount poles shall include all excavation, materials, equipment, tools, labor, and work incidental thereto, and shall be considered completely covered by the contract unit price for:

| Item Number | Item Name                      | Units |
|-------------|--------------------------------|-------|
| 901-99.02   | 45 Ft. Top Mount Lighting Pole | Each  |

MM. Top Mount Luminaire

**1.0 Description.** This work shall consist of furnishing and installing LED Top Mounted Luminaires as indicated in the plans.

**2.0 Construction Requirements.** Luminaires shall be vertical top mount type (pole top mount) with a slip-fitter that accommodates a standard 2" top mount. Available types are listed on the MoDOT approved products list and must meet all MoDOT Specifications along with additional requirements noted in the additional sections below. The contractor shall coordinate the pole top mount size with the luminaire mount to ensure compatibility. All luminaires for this project shall allow for a tilt angle to be adjusted in the field dependent upon the placement of the pole. All necessary mounting brackets and hardware shall be included in the payment for the luminaire.

**2.1** LED luminaires shall not be equipped with a Photo Control Receptacle.

**2.2** LED Luminaires shall have a terminal block for easy installation of a two wire Line/neutral circuit (no wire nuts for termination of field/luminaire circuit).

**2.3** LED luminaires shall have an easy access point for future repairs to the driver.

**2.4** LED luminaires shall have pole adaptors which are capable of feeding wires through without disassembling the knuckle.

**3.0 Basis of Payment.** Payment for furnishing and installing top mounted luminaires shall include all materials, equipment, tools, labor, and work incidental thereto, and shall be considered completely covered by the contract unit price for:

| Item Number | Item Name                   | Units |
|-------------|-----------------------------|-------|
| 901-99.02   | Top Mounted LED-B Luminaire | Each  |
| 901-99.02   | Top Mounted LED-C Luminaire | Each  |

NN. Traffic Signal Maintenance and Programming

**1.0 Description.** Traffic signal maintenance and programming for this project shall be in accordance with Section 902 of the Standard Specifications, and specifically as follows.

**2.0 Contractor Maintenance Responsibilities.**

**2.1 Traffic Signal Maintenance.** Once any part of an existing traffic signal within the limits of this project has otherwise been modified and/or adjusted by the contractor or the contractor begins work at an intersection with traffic signals already in operation, then the contractor shall be solely responsible for that traffic signal's maintenance. All traffic signal maintenance shall be the responsibility of the contractor as specified in 902.2 and 902.3, until the Commission accepts the traffic signal for maintenance or as directed by the Engineer. Traffic signals to be accepted for maintenance by the contractor are listed in the below schedule:

Commission Traffic Signals to be Maintained by the Contractor:

- a) Siebert Avenue
- b) Heege Road
- c) Weber Road/Elgin Avenue
- d) Mackenzie Road
- e) Route 21 (Rock Hill Rd/Tesson Ferry Rd)
- f) Valcour Avenue
- g) Laclede Station Road
- h) Grant Road/McNary Drive
- i) Musick Avenue
- j) Baptist Church Road
- k) Eddie and Park Road
- l) Sappington Road
- m) US61/67 (Lindbergh Boulevard)
- n) Geyer Road
- o) I-270 NB
- p) I-270 SB
- q) Weber Hill Road
- r) Rahning Road
- s) Gravois Bluffs Boulevard/Summit Road

**2.2 Traffic Signal Controller Programming.** If the contractor modifies and/or adjusts an existing traffic signal controller's programming or makes any roadway changes to reduce the traffic capacity through a signalized intersection within the limits of a project or utilizes a project defined detour that utilizes the traffic signals within the below schedule, the contractor shall be solely responsible for those traffic signal controller programs. All controller programming shall be the responsibility of the contractor as specified in 902.2 or until final acceptance of the project or until released from the responsibility by the Engineer. Traffic signal controller programs to be administered by the contractor are listed in the below schedule:

Traffic Signal Controller Programs to be Administered by the Contractor:

- a) Siebert Avenue
- b) Heege Road

- c) **Weber Road/Elgin Avenue**
- d) **Mackenzie Road**
- e) **Route 21 (Rock Hill Rd/Tesson Ferry Rd)**
- f) **Valcour Avenue**
- g) **Laclede Station Road**
- h) **Grant Road/McNary Drive**
- i) **Musick Avenue**
- j) **Baptist Church Road**
- k) **Eddie and Park Road**
- l) **Sappington Road**
- m) **US61/67 (Lindbergh Boulevard)**
- n) **Geyer Road**
- o) **I-270 NB**
- p) **I-270 SB**
- q) **Weber Hill Road**
- r) **Rahning Road**
- s) **Gravois Bluffs Boulevard/Summit Road**

**2.3 Contractor's Traffic Engineer.** If traffic signals are listed in the schedule outlined in section 2.2, the contractor shall have an experienced traffic Engineer with a Professional Engineer's (PE) license in Missouri as well as a Professional Traffic Operations Engineer (PTOE) certification (hereafter referred to as "contractor's traffic Engineer") with the noted experience outlined to section 3.0. MoDOT shall approve the traffic Engineer prior to them being hired.

**2.4 Traffic Signal Complaints** The contractor shall respond to malfunction complaints or traffic signal timing complaints for those locations detailed in section 2.1 and/or section 2.2 of this provision and as specified in Section 902.21.1. Response time shall be 1 hour for complaints received by the contractor between 6 AM and 6 PM on non-holiday weekdays, and 2 hours for all other times. For cases due to travel times or other extenuating circumstances additional time may be acceptable within reason but must be approved by a Commission Traffic Operations Engineers. These timeframes will replace the '24 hour' response time in Section 105.14 for any traffic signal-related incidents, where the entire cost of the work, if performed by MoDOT personnel or a third party, will be computed as described in Section 108.9 and deducted from the payments due the contractor.

**2.5 Traffic Signal Contacts.** The contractor must supply to the Engineer and to the Commission's Transportation Management Center (TMC) a contact name and phone number who will be responsible for receiving traffic signal timing complaints for the Engineer. These complaints may be forwarded directly to the contractor by someone other than the Engineer's representative and will not relieve the contractor from properly responding based on the response times of this provision. The contractor shall respond to the Engineer and its representative within 12 hours of the complaint and its remedy. The contractor shall submit to the Engineer's representative a weekly report of complaints received and remedies performed throughout the duration of the project.

**2.6 Existing Traffic Signal Controller Programming.** The contractor shall request an electronic report from the Engineer on the existing phasing and timing of each traffic signal, which may be the contractor's responsibility to program. The contractor shall give the Engineer 2 weeks' notice

to supply the electronic report. The Engineer's representative shall be available to the contractor before any changes are made to a traffic signal or controller to answer any questions about the report. In lieu of the report, the contractor's traffic Engineer may obtain this information from the appropriate agency's central traffic signal control system.

**2.7 Traffic Mitigation Plan.** The contractor shall notify the Engineer 2 weeks prior to the date of any work impacting the Commission's traffic signals as described in Section 2.1 and/or 2.2. The contractor shall meet with the Engineer's representatives to discuss their traffic mitigation plan at least 1 week before the date of the first impacts and as needed between construction stages. The traffic mitigation plan should at a minimum include:

- a) Proposed Timing Plan changes and any models
- b) Anticipated locations of concern
- c) A map in electronic format displaying the locations and names of the traffic signals and owning agency as detailed in sections 2.1 and/or section 2.2.
- d) Other traffic mitigation efforts

**2.8 Notification of Changes to Traffic Signal System.** The contractor shall notify the Engineer or representative of the changes no later than 1 working day after changes are programmed if unable to provide advance notice as specified in 902.2.

### **3.0 Contractor's Traffic Engineer Qualifications.**

**3.1 Credentials.** The contractor shall have an experienced traffic Engineer with a Professional Engineer's (PE) license in Missouri as well as a Professional Traffic Operations Engineer (PTOE) certification.

**3.2 Experience.** Any proposed contractor traffic Engineer shall be able to demonstrate personal successful previous experience in the following tasks:

**3.2.1 Response.** The contractor's traffic Engineer shall have the ability to be on site within 1 hour of being requested.

**3.2.2 Corridor Management.** Time/space diagram manipulation to successfully adjust offsets and splits for rapidly changing traffic demands.

**3.2.3 Controller Programming.** Ability to program by hand and by software NTCIP-compatible controllers.

**3.2.4 Intersection Programming.** Implementation of adjusted and/or new timing plans because of changing traffic demand.

**3.2.5 Traffic Signal Software.** Use and understanding of all traffic signal controllers and central traffic signal control systems utilized by the Commission.

**3.3 Proposed Traffic Engineers.** The contractor shall submit the names(s) of proposed traffic engineer(s) and the name(s) of all other personnel on their proposed staff along with detailed experience in all tasks outlined in Paragraph 3.2 above. The Engineer reserves the right to reject

any contractor traffic engineer, before the start of work, who does not have sufficient experience or, at any point during the project, which does not satisfy the requirements set forth within this Job Special Provision. A list of potential traffic engineers shall be submitted for review to the Project Manager and the Commission's Traffic Engineers prior to bid.

#### **4.0 Contractor's Traffic Engineer Responsibilities.**

**4.1 VPN Access.** The approved contractor's traffic Engineer and any staff assigned to manage the traffic signals during the project are encouraged to apply for VPN (Virtual Private Network) access with the Engineer once the project is awarded. If approved, the Engineer will assign a unique IP address to the contractor's traffic Engineer, which will allow for remote access to the Commission's central traffic signal control systems as appropriate and the ability to interface with the noted traffic signals on this project.

**4.2 Traffic Signal Timing Complaints.** The contractor's traffic Engineer shall respond to any traffic signal timing complaints regarding signals outlined in section 2.2 of this provision.

**4.3 Traffic Signal Coordination.** The contractor's traffic Engineer shall be solely responsible for maintaining the coordination at any affected traffic signal to the satisfaction of the Commission's Traffic Operations Engineers or representative until completion of work as set forth in section 2.2 of this provision. Maintenance of coordination may include the synchronization of the affected controller's internal time clocks to the second using an atomic clock, or other means approved by the Commission's Traffic Operations Engineers. If time clock synchronization is used, the contractor shall verify all affected controllers are synchronized at least 1 time per week with a report to the Engineer or representative. This report will be in the form of a documentation record as spelled out in the Work Zone Traffic Management Plan.

**4.4 Traffic Signal Controller Programming.** The contractor's traffic Engineer shall be responsible for implementing traffic signal controller programming at each intersection listed in section 2.2 for any of the following scenarios:

- a) Intersection Impact
- b) Construction Stage Traffic Switch
- c) Response to Customer Concern
- d) New Intersection Turn-On (along with any subsequent revisions)
- e) Final completion of improvements
- f) As otherwise directed by the Engineer or the Commission's Traffic Operations Engineers

Proposed timing plans should be submitted to the Commission's Traffic Operations Engineers for review prior to field implementation.

**4.5 Central Traffic Signal Control System Setup.** If a traffic signal cabinet is reconfigured, the contractor's traffic Engineer shall archive the existing controller programming in the Commission's central traffic signal control system. If the signal controller type is changed, the contractor's traffic Engineer shall archive the existing controller programming and convert any new controllers to the proper controller interface type in the Commission's central traffic signal control system. If only signal timing adjustments are made, all database versions shall be clearly labeled and saved separately from the default version, and the final timing program shall be uploaded into the

Commission's central traffic signal control system and set as the default database. In addition, the contractor's traffic Engineer shall update any intersection diagrams (i.e., XPL) whose intersection controls were modified during construction.

**4.6 Controller Program Test Period.** The intersection program shall operate properly with no faults or malfunctions for a period of 15 consecutive days as a condition of being accepted for maintenance by the Commission. Any programming faults shall be corrected by the contractor's traffic Engineer per the response protocols of this provision and the 15 days will start over.

**4.7 Cabinet Photos.** The contractor's traffic Engineer shall obtain cabinet photos of any new or modified traffic signal cabinet affected by the project. The photos shall be captured of the following perspectives and delivered in the .jpg format electronically and via thumb drive to the Commission's Traffic Operations Engineers.

- a) Power Meter 1 – Away from power meter with meter centered
- b) Power Meter 2 – Close up with power meter number
- c) Cabinet 1 – Away with cabinet centered and door closed
- d) Cabinet 2 – Close up of entire cabinet with door opened
- e) Cabinet 3 – Close up of center cabinet interior
- f) Cabinet 4 – Close up of left cabinet interior
- g) Cabinet 5 – Close up of right cabinet interior
- h) Cabinet 6 – Close up of back panel
- i) Cabinet 7 – Close up of switch
- j) Cabinet 8-Close up of wall interconnect center

**4.8 RRFB/PHB Timing.** The contractor's traffic Engineer shall calculate the duration of flash time for any new or modified RRFB's (rectangular rapid flashing beacons) affected by the project. The contractor's traffic engineer shall be responsible for calculating phase intervals and programming traffic signal controllers for new/modified PHB's (pedestrian hybrid beacons) affected by the project.

**4.9 Detection.** The contractor's traffic Engineer shall assist the contractor in setting up detection as per plan and/or SL District Traffic Signal Detection System JSP. The contractor's traffic Engineer shall verify that all detectors work properly and that each detector input into the traffic signal controller is programmed regarding its intended use. The contractor's traffic Engineer is responsible for optimizing the detector operation by utilizing various detector settings in the traffic signal controller.

**4.10 Signal Performance Measures.** The contractor's traffic Engineer shall setup traffic signal controllers on the Commission's advanced traffic signal performance measures module unless directed otherwise by the Commission's Traffic Operations Engineers. This includes any work on the Commission's advanced traffic signal performance measures module, traffic signal

controller(s), and video detection processor(s). The contractor's traffic Engineer shall provide proof of each traffic signal setup in the module to the Commission's Traffic Operations Engineers. The contractor's traffic Engineer shall setup any traffic signal detectors as system detectors in the Commission's central traffic signal control system.

**4.11 Preemption Controller Programming.** If preemption is to be provided at a traffic signal, the contractor's traffic Engineer shall program the preemption settings in the traffic signal controller per MoDOT EPG guidelines and at the direction of the Commission's Traffic Operations Engineers. The contractor's traffic Engineer shall test the preempt settings at the traffic signal cabinet to verify proper operation.

**5.0 Post Project Report.** The contractor shall submit to the Engineer a post project report, four to six weeks after the final traffic signal adjustments have been completed. The report shall include at a minimum an observation report, summary of timing changes and locations, summary of complaints, and any other pertinent information regarding the contractor's efforts for managing these traffic signal corridors in one electronic document.

**6.0 Deliverables.** All deliverables mentioned in this provision shall be submitted to the Engineer in a timely manner to the satisfaction of the Engineer prior to receiving full compensation for this work. All deliverables must be submitted to the Engineer via USB.

- a) Experience submittal
- b) Preliminary Traffic Mitigation Plan
- c) Notification of Detour Implementation
- d) Time Base Reports, As Needed
- e) Complaint Resolutions
- f) Audible pedestrian signal voice message files
- g) Traffic Signal Database versions (in PDF format)
- h) Traffic signal photos
- i) Notification of Restoration to Normal Operations
- j) Post Project Report

**7.0 Construction Requirements.** Construction requirements shall conform to Sections 902, 1061 and 1092.

**8.0 Method of Measurement.** Method of measurement shall conform to Section 902.

**9.0 Basis of Payment.** Payment will be considered full compensation for all contractor services, installation, and labor to complete the described work:

| Item Number | Item Name                                  | Units    |
|-------------|--------------------------------------------|----------|
| 902-99.01   | Traffic Signal Maintenance and Programming | Lump Sum |

OO. SL District Traffic Signal Detection System

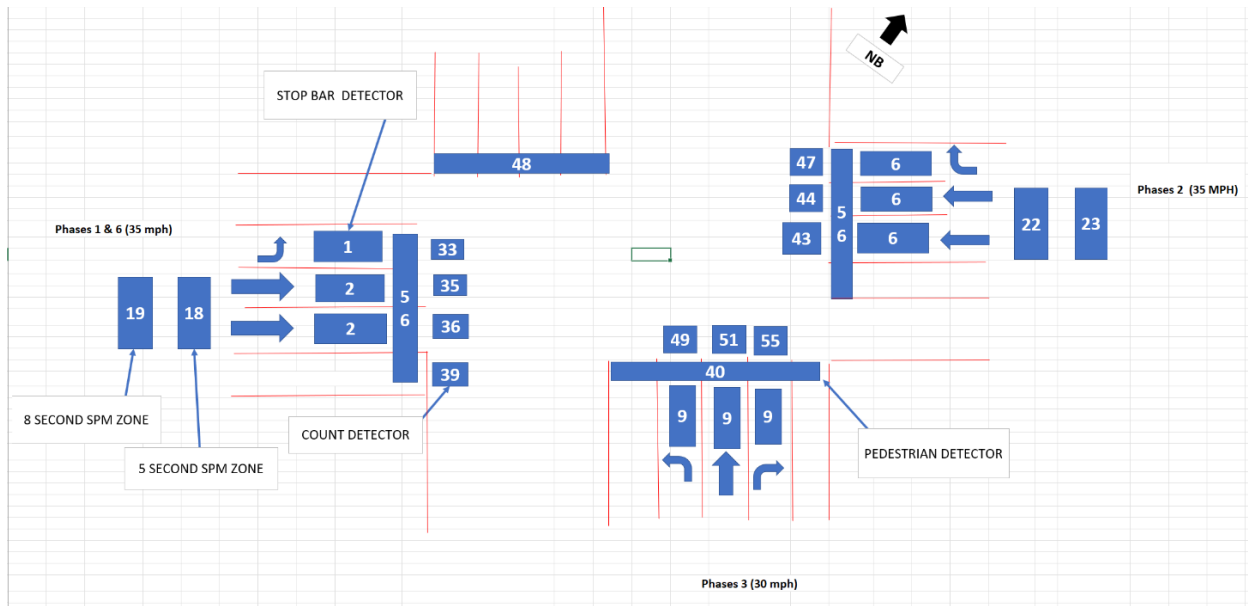
**1.0 Description.** This work shall consist of providing detectors for signalized installations that will support advance traffic signal performance measures (ATSPM) on the Commission's

St. Louis District roadways. Detectors shall be in accordance with the Missouri Standard Specifications for Highway Construction (latest version) and installed to provide detection at locations as shown on the plans or as directed by the Engineer in accordance with Section 902. If any information conflicts between Section 902 and this JSP, the JSP shall supersede.

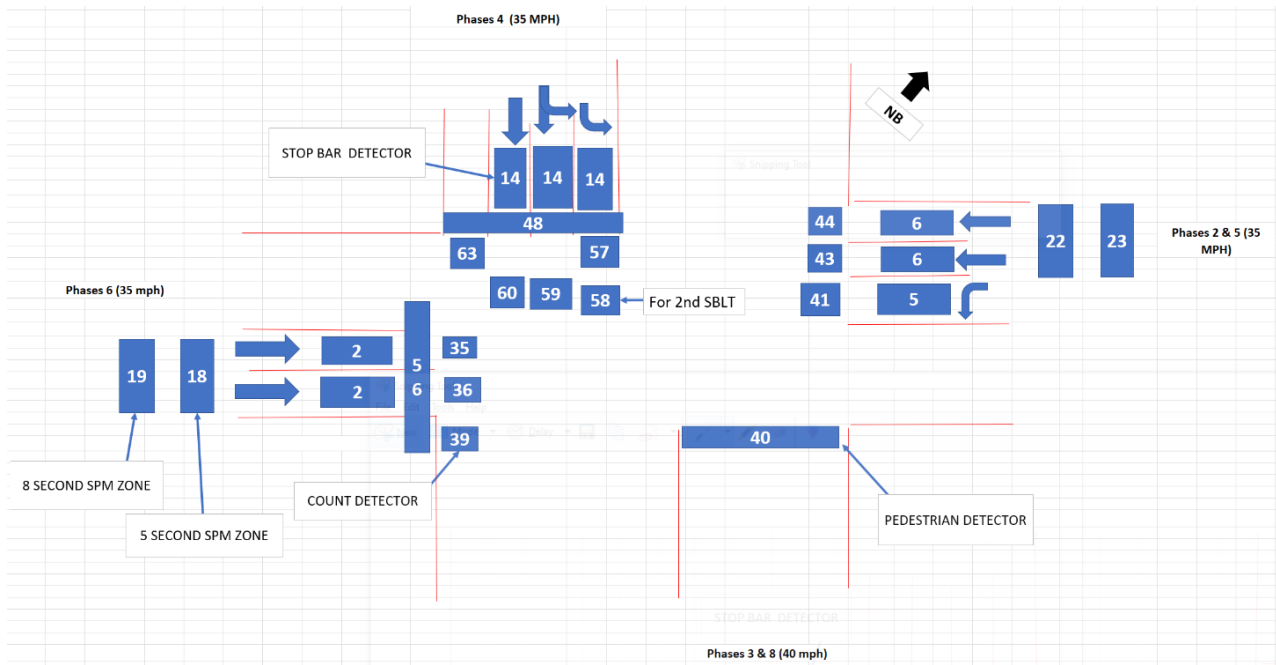
**2.0 Detector Zones.** The following detector zones shall be placed as shown in the plans:

- Stop Bar Detection
- Advance Upstream (Performance Measures)
- Dilemma Zone
- Turn Counts
- Advance Video Zones (if applicable)
- Radar Zones (if applicable)
- Advance Data Collector (if applicable)
- Bicycle/Pedestrian (see Section 2.2)

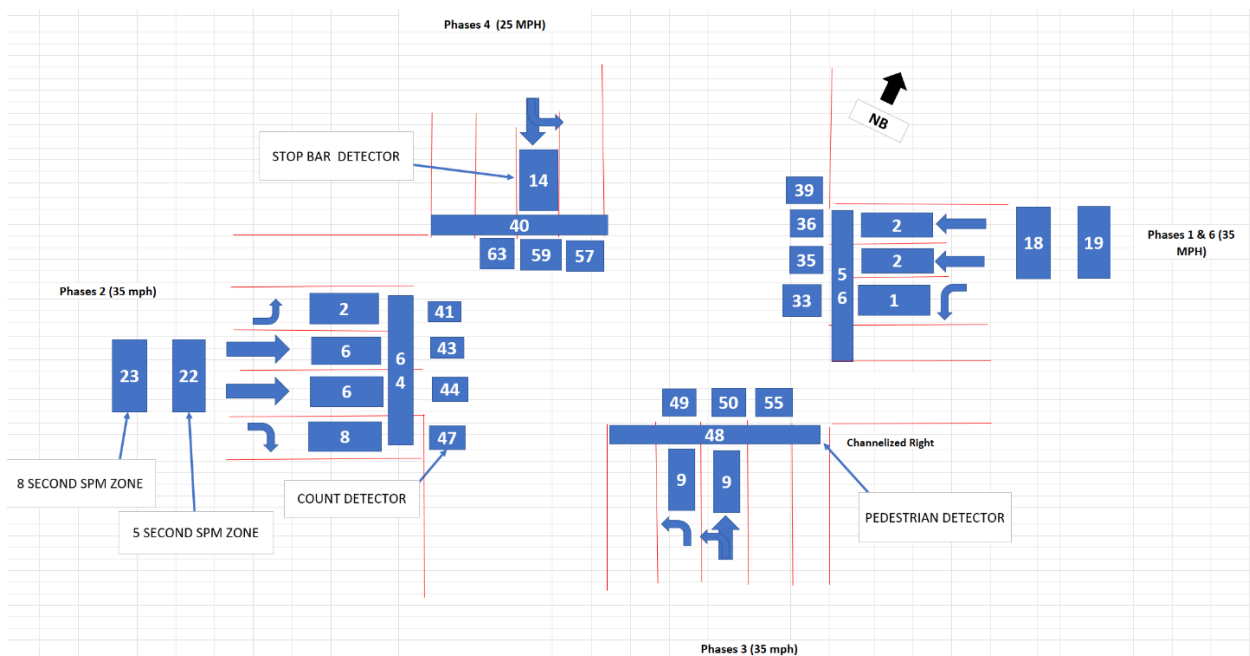
### 2.0.1 MO 30 @ Seibert Ave



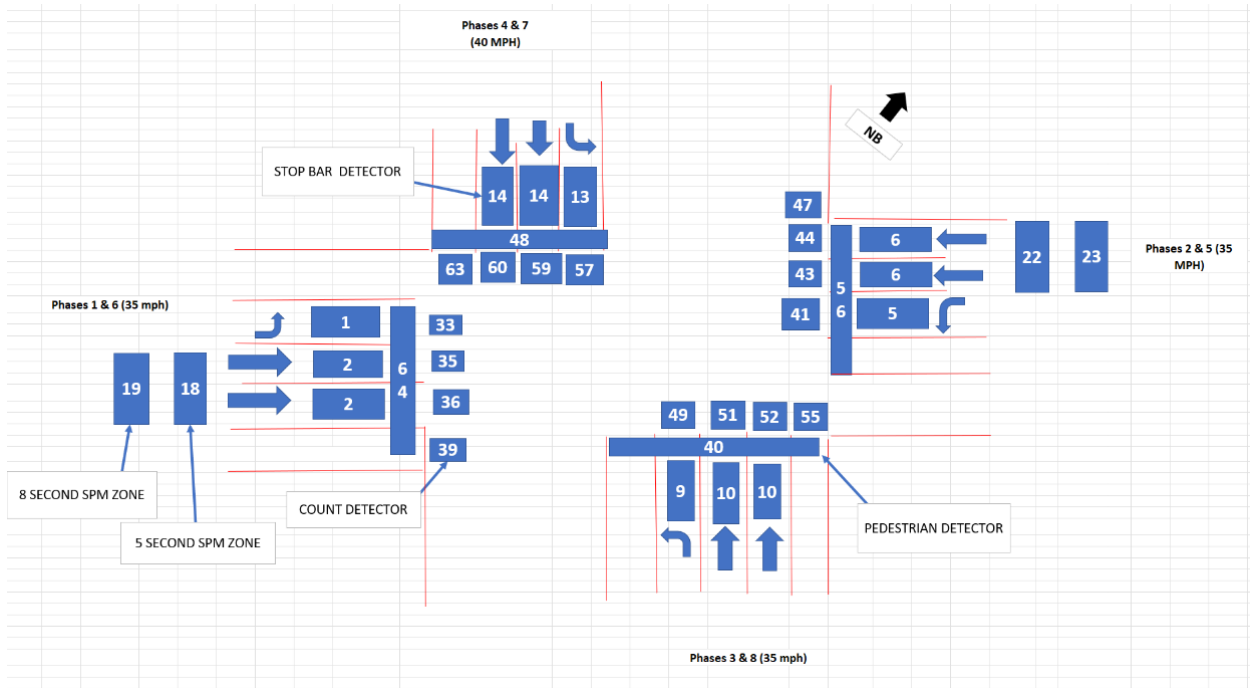
## 2.0.2 MO 30 @ Heege



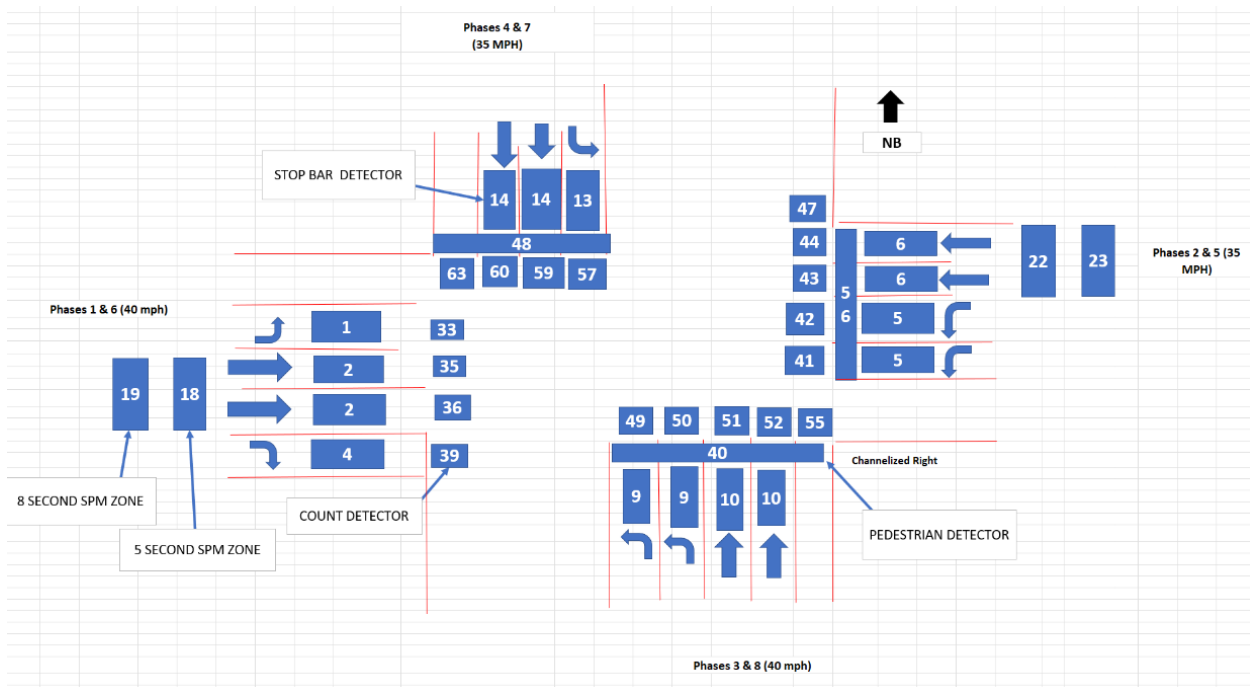
## 2.0.3 MO 30 @ Weber Rd



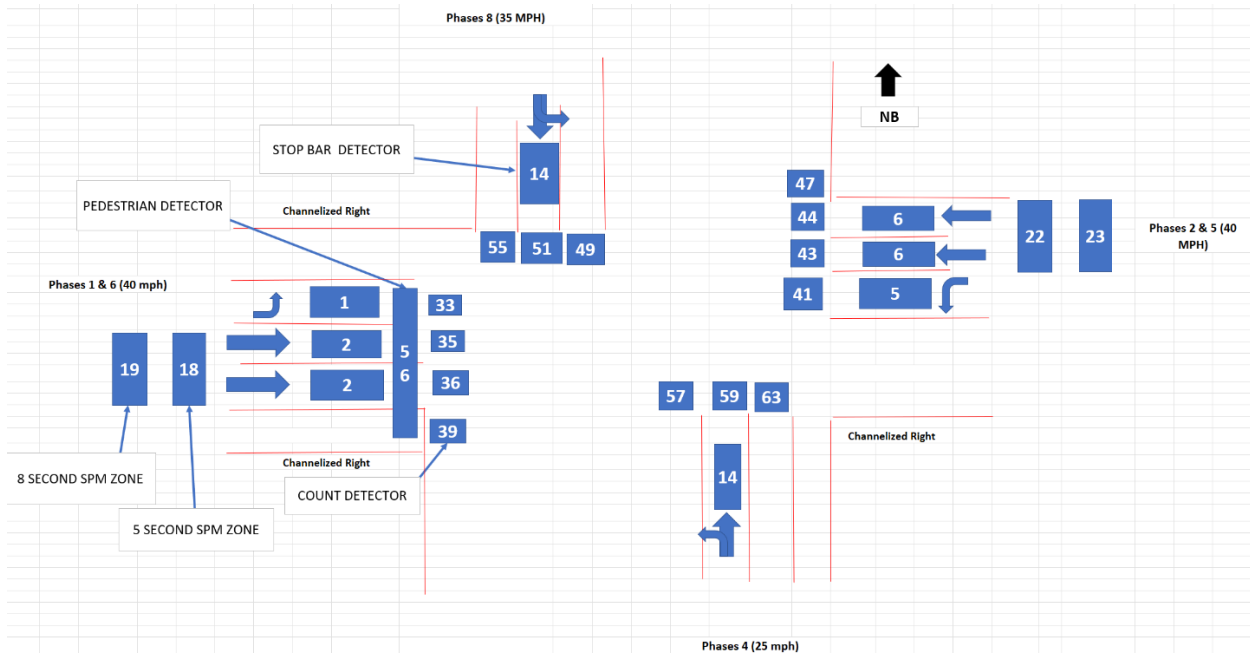
## 2.0.4 MO 30 @ Rt P



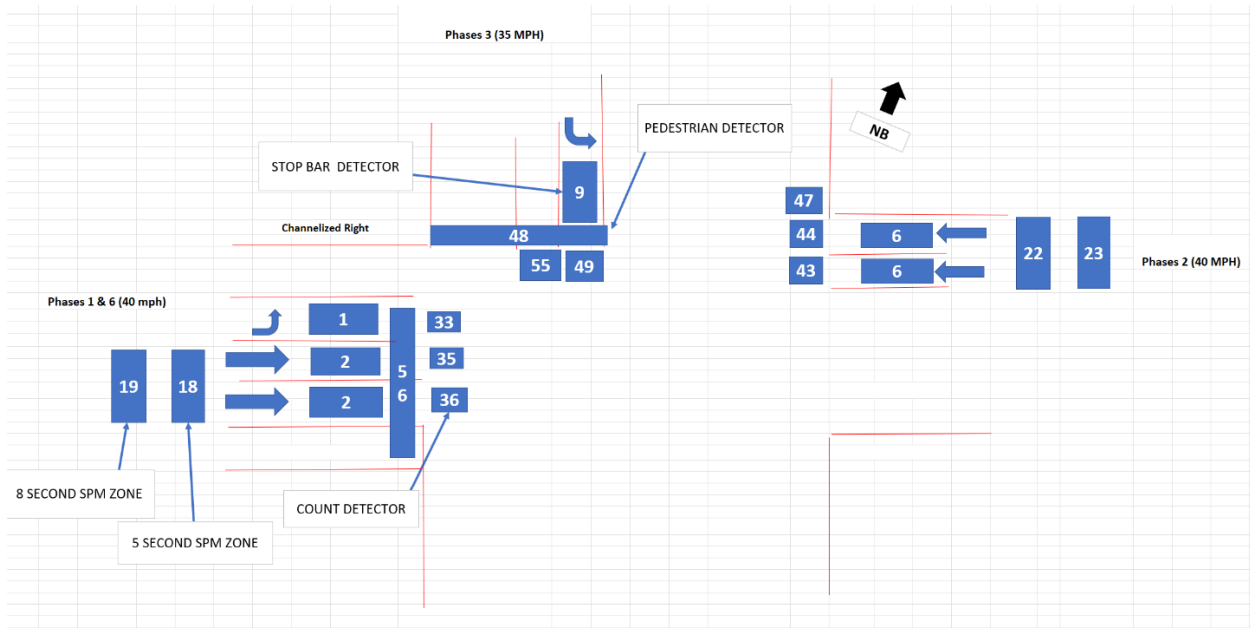
## 2.0.5 MO 30 @ MO 21



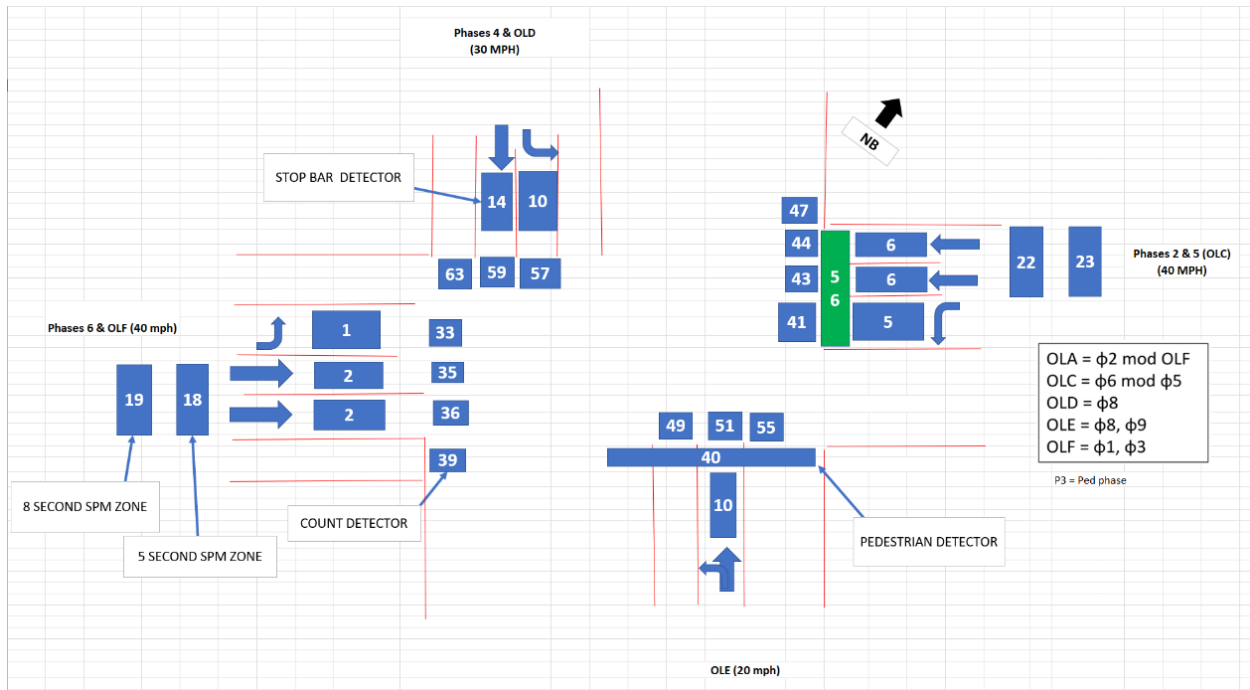
## 2.0.6 MO 31 @ Valcour



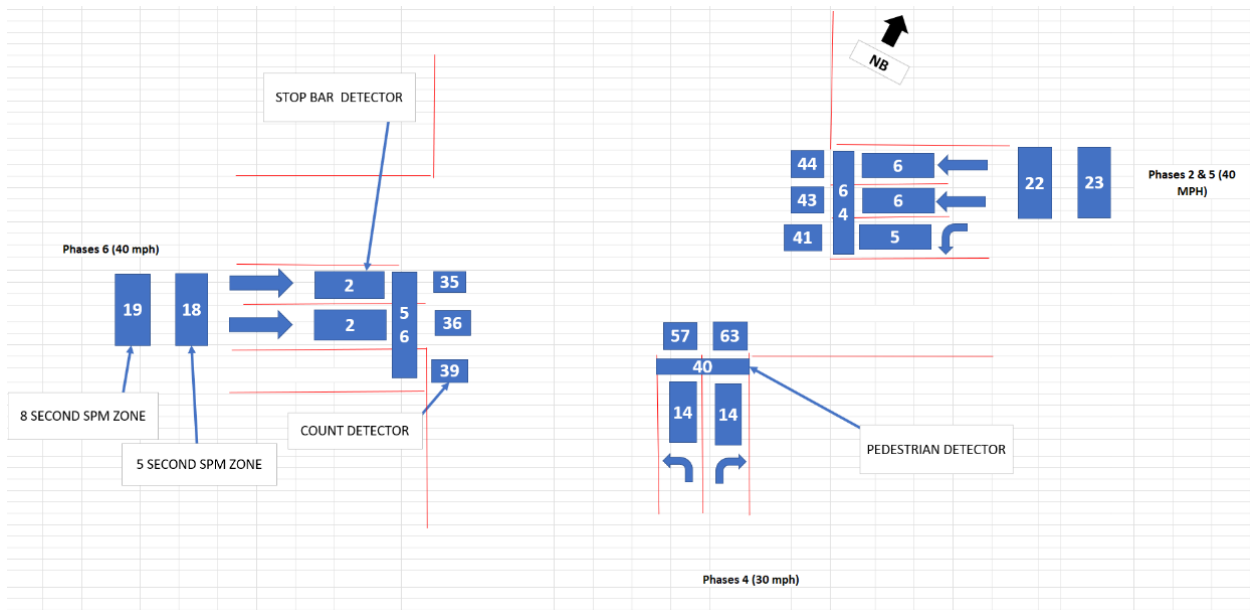
## 2.0.7 MO 30 @ Laclede Station Rd



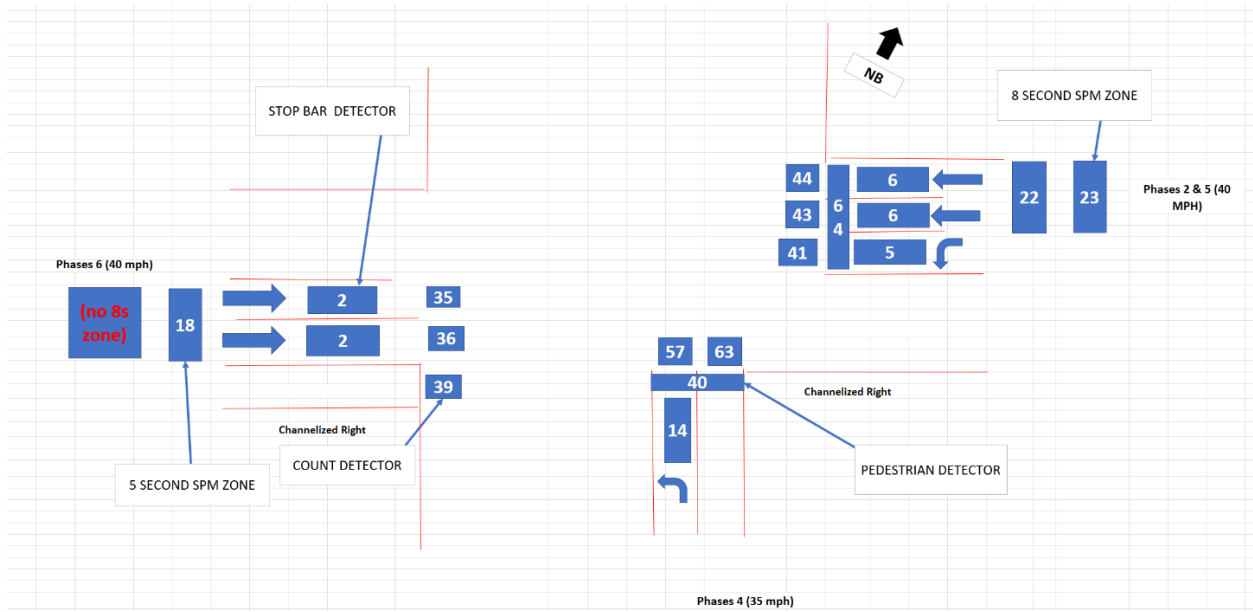
## 2.0.8 MO 30 @ Grant Rd



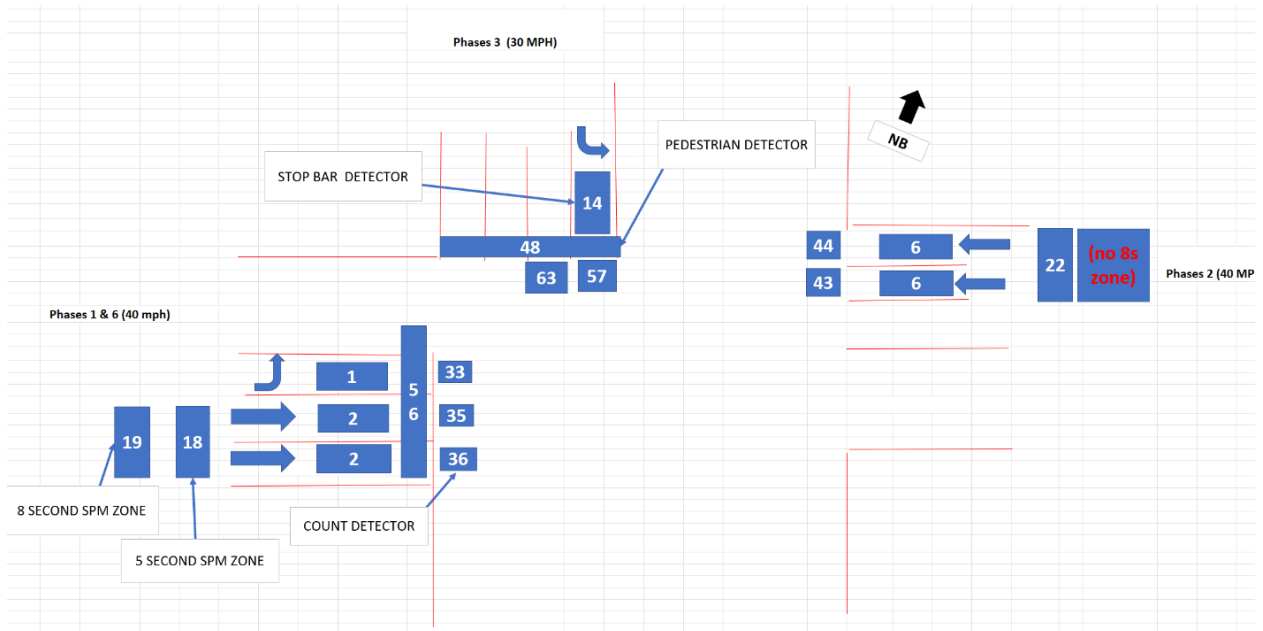
## 2.0.9 MO 30 @ Musick Rd



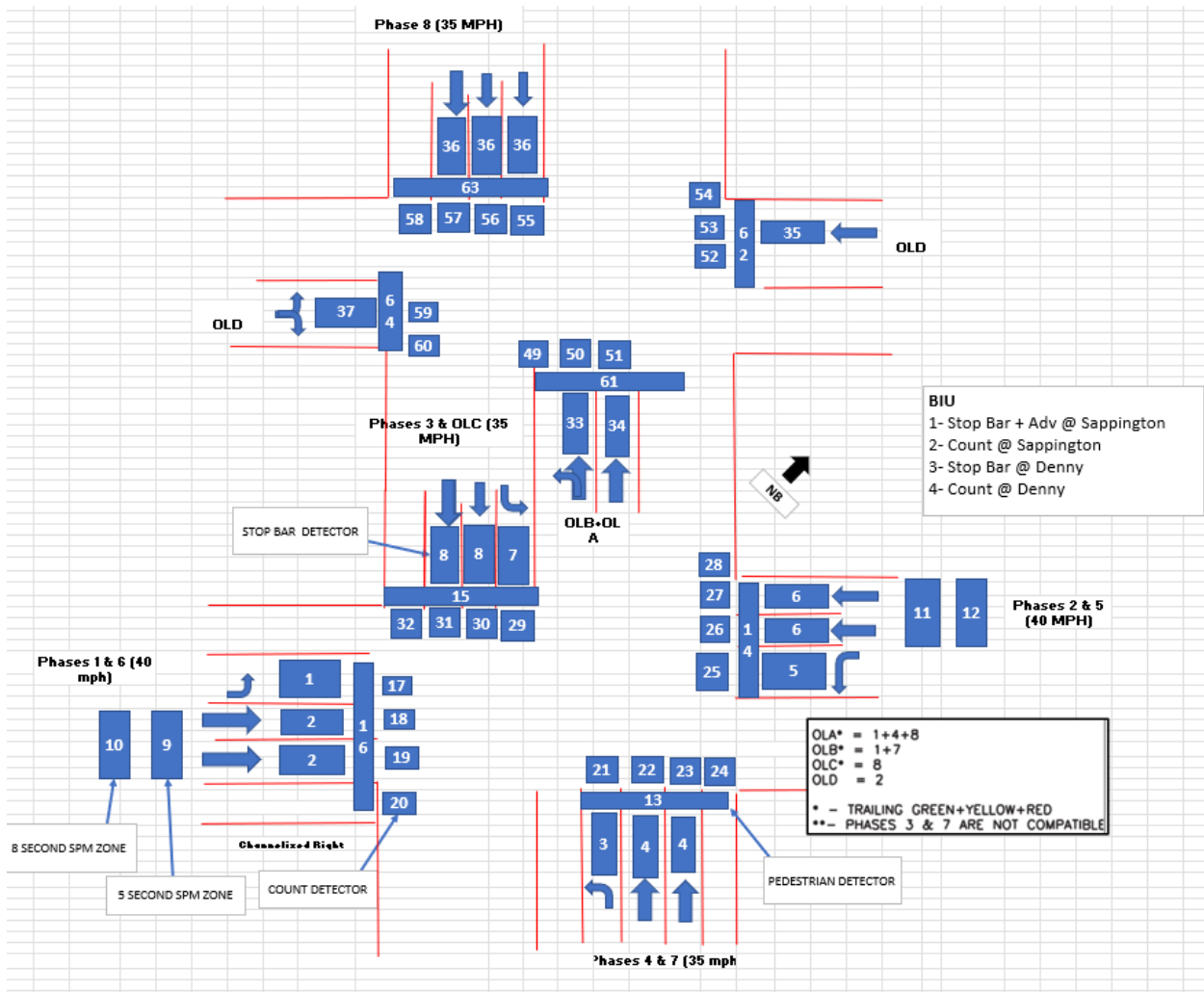
## 2.0.10 MO 30 @ Baptist Church Rd



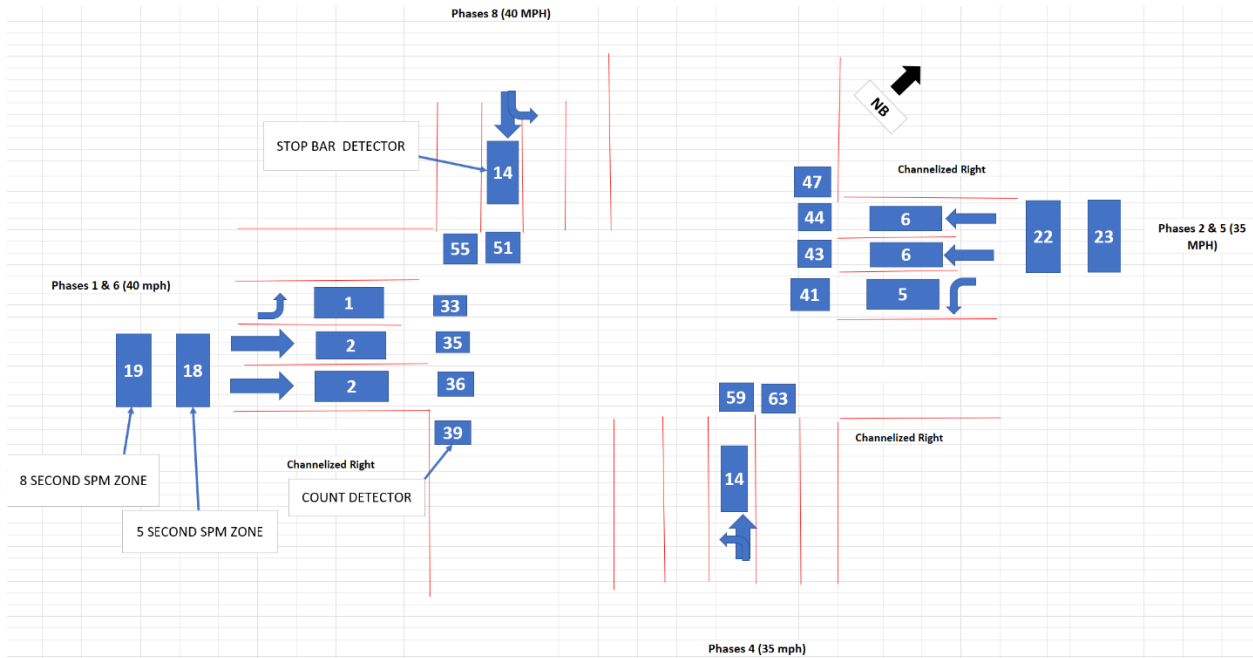
## 2.0.11 MO 30 @ Eddie & Park Rd



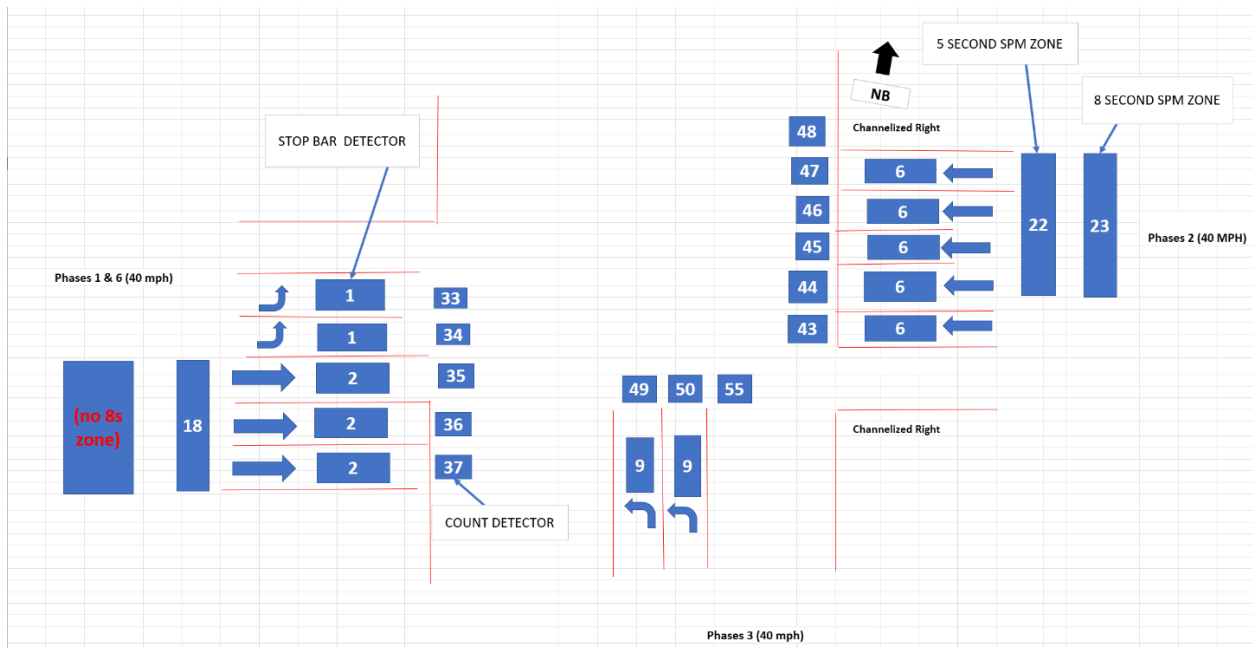
## 2.0.12 MO 30 @ Sappington Rd



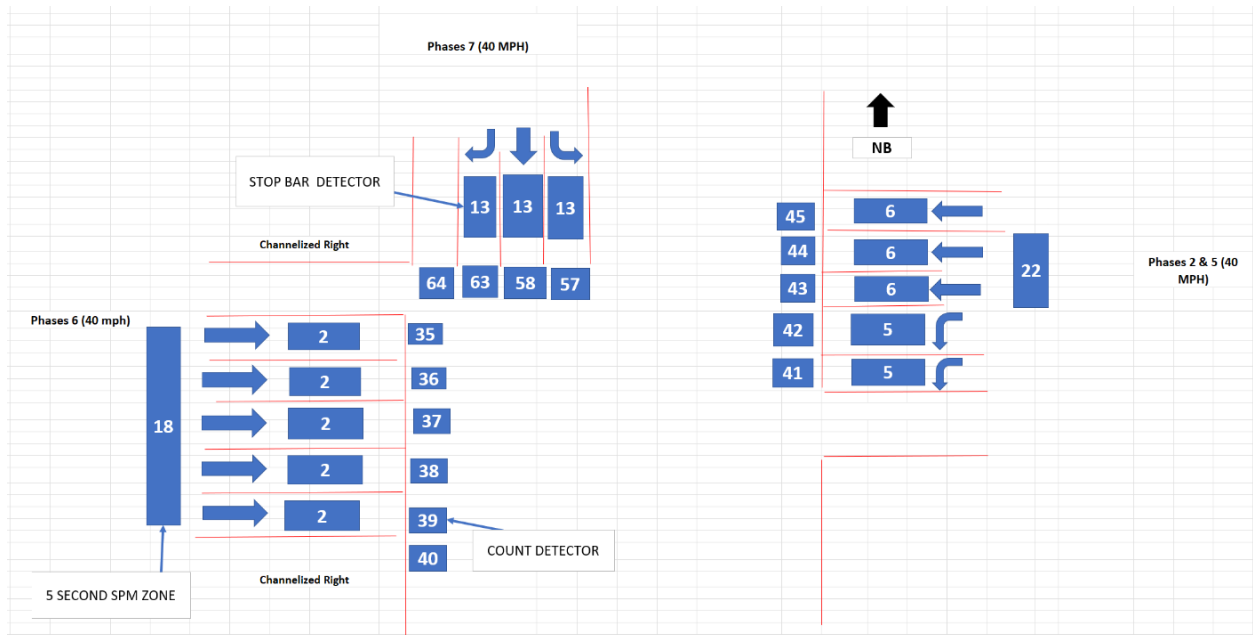
## 2.0.13 MO 30 @ Geyer Rd



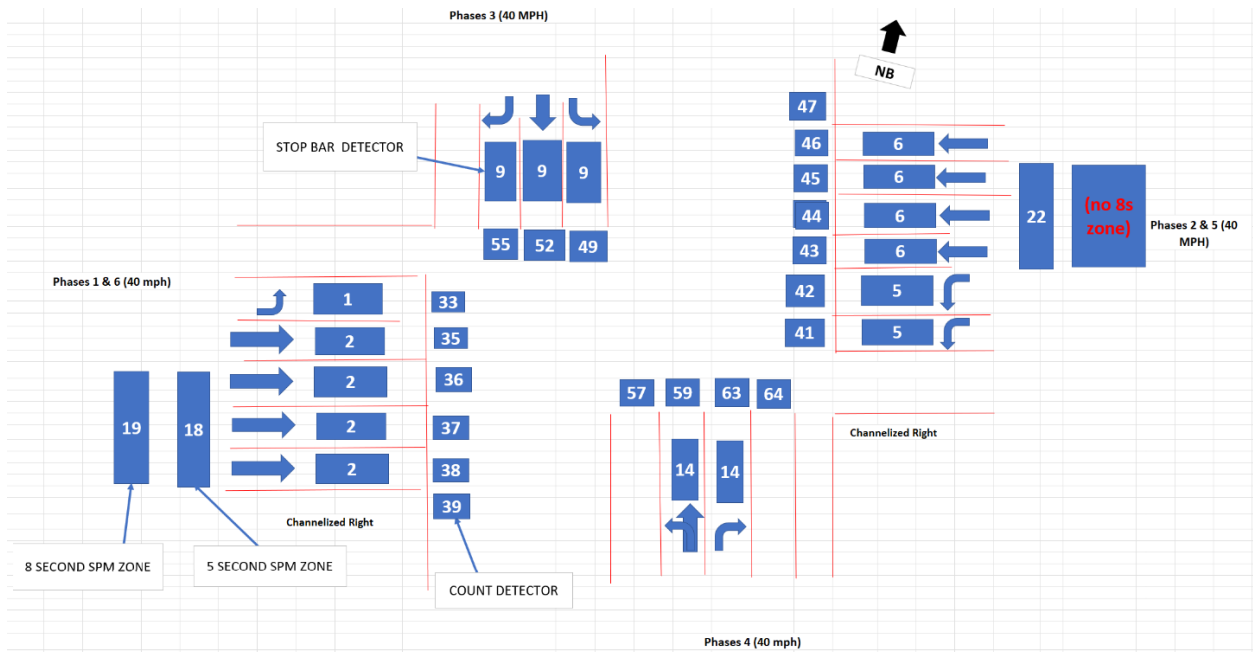
## 2.0.14 MO 30 @ I-270 NB Ramps



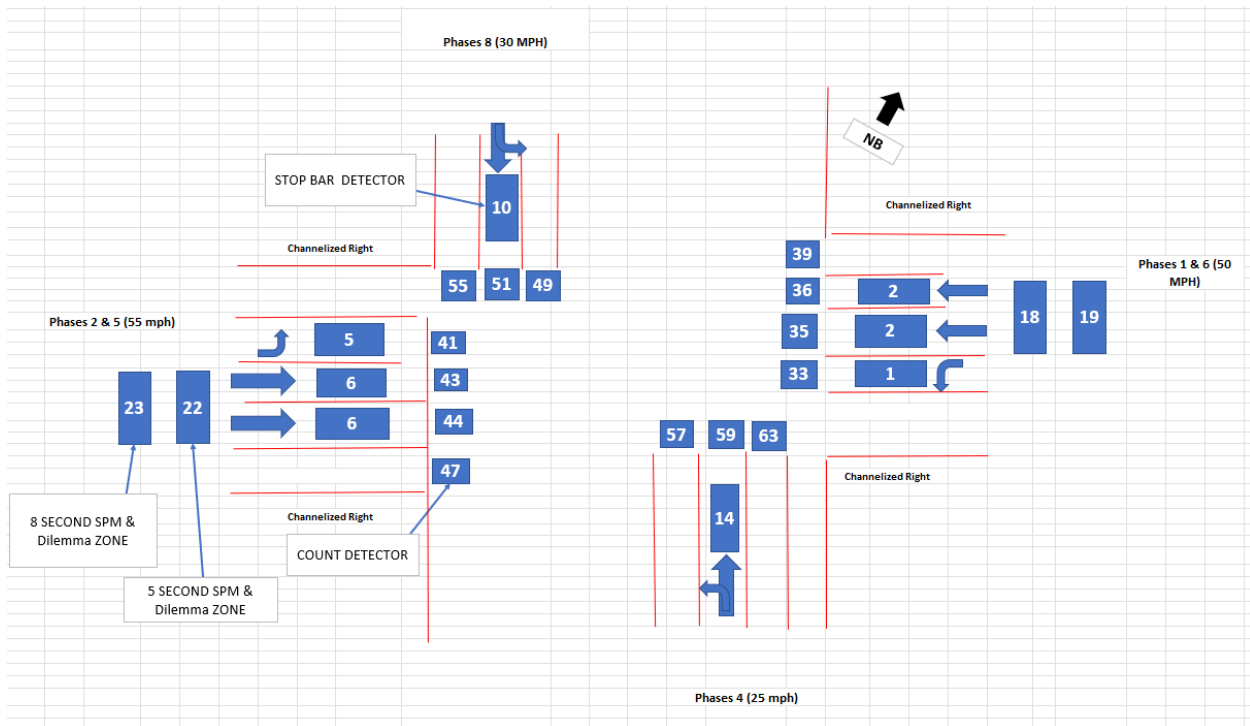
## 2.0.15 MO 30 @ I-270 SB Ramps



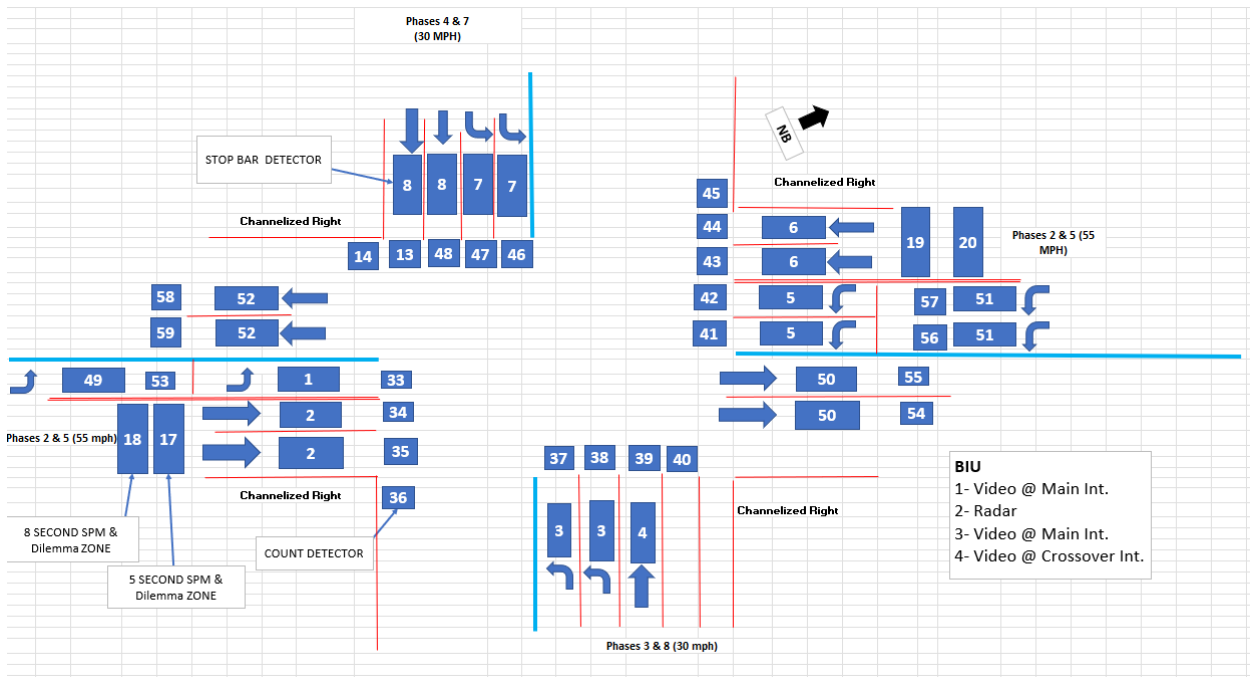
## 2.0.16 MO 30 @ Weber Hill/Kennerly



## 2.0.17 MO 30 @ Rahning Rd



## 2.0.18 MO 30 @ Gravois Bluff



**2.1 Advance Detector Zones.** Advance detector zone detection shall be required for the mainline approaches for all 18 above-mentioned intersections.

Advance zone detectors shall be placed at 5 secs and 8 seconds travel time before stop bar per below Table unless directed otherwise in the plans or by the Engineer.

| Approach Speed (MPH) | Advance Detector Placement<br>secs Travel time 5 | Advance Detector Placement<br>seconds travel time 8 |
|----------------------|--------------------------------------------------|-----------------------------------------------------|
| 30 mph               | 220                                              | 355                                                 |
| <b>35 mph</b>        | <b>260</b>                                       | <b>415</b>                                          |
| <b>40 mph</b>        | <b>295</b>                                       | <b>470</b>                                          |
| 45 mph               | 330                                              | 530                                                 |
| 50 mph               | 370                                              | 590                                                 |
| <b>55 mph</b>        | <b>405</b>                                       | <b>645</b>                                          |
| 60 mph               | 440                                              | 705                                                 |

**2.2 Bicycle/Pedestrian Zones.** Bicycle and/or pedestrian zones (if applicable) shall be provided as directed by the Engineer. Specific zone placement and description as required by vendor shall be reviewed and approved by the Engineer.

**2.3 Dilemma Zones:** Dilemma zone detection shall be required for the following approaches for high speed of 45 mph or above. Dilemma zone detectors shall be placed at 5 secs and 8 seconds travel time before stop bar (same as advance detection) per Table (shown above) unless directed otherwise in the plans or by the Engineer.

- a) MO 30 @ Rahning Rd
- b) MO 30 @ Gravois Bluff

**3.0 Performance Measures.** In addition to presence detection, the detection system shall be capable of providing data to an advanced traffic signal controller that can perform at a minimum the following calculations in real time for each detection zone.

- a) Speed
- b) Volume
- c) Lane Occupancy
- d) Vehicle Classification
- e) Other available performance measures

For speed calculations thru movements are required for all detection installations. Turning movement measurements are required for all detection installations. For volume measurements/calculations both mainline thru and all turning movements are required. All values are to be assigned to detector channels within the controller. Other performance measures must be clearly defined. In all cases all performances measures must be ultimately available in an easily usable, exportable format. Turning movement counts shall be installed per the detector setup diagram(s) above to include all lanes. The Contractor shall provide documentation to the Engineer to confirm the volumes are configured and operational through the detection system. The Contractor shall also provide a final schedule of detector assignments in the .pdf format to the Engineer and the Commission's signal maintenance supervisor. Performance measurement data must be configured and fed into the Commission's ATSPM platform with data storage

confirmed, see Section 5.0. If utilized on the project, the Contractor's Traffic Engineer shall assist in this task.

**4.0 Material.** The Contractor can choose from the following list of detector types according to the exceptions noted below:

- a) Video Image
- b) Radar
- c) Induction Loop

Reference each detection type's subsection for specific allowable models. Unless otherwise specified on the plans, the Contractor may supply more than one type of detector and customize the installation based on field conditions, as approved by the Engineer.

**4.1 Video Detection.** If video detection is selected, the following provisions shall also apply.

**4.1.1 Description.** The Contractor shall furnish and install all equipment, materials, software and other miscellaneous items that are required to provide a fully functional Video Detection System for the control of vehicular and pedestrian traffic signals.

**4.1.2 Material.** The video detection system shall consist of power supply, hard-wired video cameras, all necessary video and power cabling with end connectors, mounting brackets, surge protection as recommended by the manufacturer, video detection processors/extension modules capable of processing the number of camera and phase combination video sources shown on the project plans. The video detection system will be defined as the complete assembly of all required equipment and components for detection of vehicles. Each video detection system shall consist of the video camera(s), lightning arrester for video cabling, processor unit(s), control device (track ball or keypad; no mouse allowed), software and license for system control via a computer (if applicable), communication components, and a color monitor. The video detection system shall have the most current available firmware installed. All camera views shall be obtainable without requiring the disconnection and reconnection of cables within the system. The video detection systems in the list below are the only systems that are tested, fully functional, and approved for use in the St. Louis District.

- a) Autoscope Vision
- b) Iteris Vantage Next
- c) Aldis Gridsmart Smart mount Camera (Performance Module to be included)

**4.1.3 Installation Requirements.** The video detection system shall be installed per the manufacturer's recommendations. The installer shall be certified by the video detection system's manufacturer to install the system. All CAT5 cable runs (if used) shall be continuous without splice from the cabinet to the camera. If requested by the engineer, a factory certified representative from the supplier shall be available for on-site assistance for a minimum of one day during installation. The bottom of the video camera shall be mounted per the manufacturer's recommendations, unless otherwise indicated on the plans or approved by the Engineer. The video detection system shall not be installed on pedestal signal unless otherwise directed by the Engineer. The video detection system shall not be installed on a 15' luminaire arm unless otherwise directed by the Engineer.

A separate grounded 120 VAC service outlet shall be provided in the controller cabinet for supplying power to the parts of the video detection system requiring AC power. Use of the

grounded service outlet located on the cabinet door will not be permitted. The video detection system must integrate/be compatible with an Advanced Transportation Signal Controller (ATC).

**4.1.4 Detection Zones.** The detection zones shall be created by drawing the detection zones on the video image. A graphical user interface shall be built into the video detection system and displayed on a video monitor or computer. It shall be possible to edit previously defined detector configurations to fine-tune detection zone placement. When a vehicle is detected by crossing a detection zone, there shall be a visual change on the video display, such as a flashing symbol or a change in color or intensity to verify proper operation of the video detection system.

**4.1.5 Performance.** Overall performance of the video detection system shall be comparable to inductive loops. Using camera optics and in the absence of occlusion, the video detection system shall be able to detect vehicle presence with 98% accuracy under normal day and night conditions with only slight deterioration in performance under adverse weather conditions, including fog, snow and rain. When visibility exceeds the capabilities of the camera, the video detection system shall default to placing a call on all detectors. Supportive documentation is required to meet this specification and shall be provided to the Engineer before installation.

**4.1.6 Monitor.** The monitor shall be an LCD active matrix with a minimum 7" diagonal screen color monitor, an NTSC-M system and BNC video in-out connections built into the housing. The unit shall be compact and lightweight, securely mounted to the cabinet shelving, have low power consumption, constructed to operate under extreme temperature conditions, and run on AC power. AC adaptor shall be included. The monitor shall be installed to automatically power on when the cabinet door is opened and automatically power off when the cabinet door is closed. A manual on/off switch shall be provided.

**4.1.7 Video Camera and Housing.** The camera shall produce a color video image of vehicles during daylight hours, with an optional production of black and white images during nighttime hours. The video shall produce a clear image for scenes with a luminance from a minimum range of 0.18 to 929 foot-candles (2.0 to 10,000 lux). The camera shall provide a minimum resolution of 430 lines horizontal (TVL) and 350 lines vertical under NTSC operation. The camera shall include an electronic shutter or auto iris control based on average scene luminance and shall be equipped with an auto iris lens. sun shield that prevents sunlight from directly entering the lens. The sun shield shall include a provision for water diversion to prevent water from flowing in the camera field of view and shall be able to slide forward and back.

**4.1.8 Video Detection System Connections.** All bus connections in the video detection system shall be corrosion resistant. Serial communications to a computer shall be through an RS-232/RS-422 serial port through a subminiature "D" connector with a computer running supplied system software. The port shall have the capability to access detection system data as well as the real-time imagery needed to show detector actuations. The processor shall have a RJ-45 plug using Ethernet 10/100 protocols. The equipment shall be provided with either a NEMA TS1 or NEMA TS2 interface as shown on the plans.

For TS2 systems, the video detection system shall be equipped with a TS2 Type 1 detector interface, where detector information is transmitted serially via an RS-485 data path. A 15-pin subminiature "D" connector, meeting the requirements of the TS2 standard, shall be used for the serial detector output. A minimum of 32 detector outputs is required, with the capability of expansion to 64 outputs if required based on the design plans.

The contractor shall be responsible for any changes or additions to either an existing or new cabinet in order to provide a properly functional video detection system and monitor display. This may include, but is not limited to, additional SDLC connectors, an MMU (malfunction management unit), shelf relocation and component reorganization. No direct pay for any changes or additions. All required connections will be considered part of the video detection system installation.

**4.1.9 Documentation.** The contractor shall provide one bound copy and one electronic version (.pdf format) of the user's manual.

**4.2 Radar Detection.** If radar detection is selected, the following provisions shall also apply.

**4.2.1 Description.** Provide, install and test continuous tracking advance detector (CTAD) units and cabinet interface to detect range, speed, and vehicle estimated time of arrival (ETA) to the stop bar for vehicles or clusters of vehicles moving in the user selected direction of travel. The CTAD shall also detect instantaneous roadway efficiency. This specification sets forth the provisions for a radar detection system that detects vehicles, pedestrians, bicycles, and motorcycles on roadways and provides vehicle presence and full-motion tracking.

#### **4.2.2 Material**

**4.2.2.1 Stop Bar Detector.** The radar detection systems in the list below are the only systems approved for use in the St. Louis District. Installation of radar detection systems shall follow both the below specifications and the manufacturer's instructions.

- a) WAVETRONIX SmartSensor
  - 1. Matrix

Provide a radar detection system with the following features.

- b) Shall be able to track/detect a minimum of 64 objects
- c) Shall be able to operate in a temperature range between -30 degrees and 165 degrees F
- d) The detection zones shall be configurable based off several factors' such as classification, ETA, speed, presence, and delay.
- e) The radar sensor shall be forward fire
- f) The sensor shall operate in the 25 GHz band
- g) The sensor shall be housed in a sealed IP-67 enclosure

**4.2.2.2 Advance Detector.** The radar detection systems in the list below are the only systems approved for use in the St. Louis District. Installation of radar detection systems shall follow both the below specifications and the manufacturer's instructions.

- a) WAVETRONIX SmartSensor
  - 1. Advance (approved for approaches **40 mph or lower**)
  - 2. Advance Extended (approved for approaches **45 mph or higher**)
- b) Iteris Vector

1. In addition to the specifications listed in Section 4.2.2.1, the detection range shall also cover the advance detector zone distances prescribed in section 2.1.  
(approved for approaches **40 mph or lower**)

#### **4.2.2.3 Power and Communications.**

- a) Power and communications cabling shall be installed per manufacturer specifications
- b) The radar sensor shall operate at 24 VDC
- c) Power consumption shall be no more than 38 watts
- d) If required, the advance detection System shall include all equipment to communicate wirelessly.

**4.2.2.4 Contact Closure Card.** Any contact closure card shall be compatible with a NEMA detector rack and shall be installed per manufacturer specifications.

**4.2.2.5 Lightning Surge Protection.** The CTAD shall include surge protection hardware installed per manufacturer specifications. The hardware shall be accepted by the engineer before installation in the cabinet.

#### **4.2.3 Construction Requirements.**

**4.2.3.1 Mounting Location.** All mounting hardware shall be installed per manufacturers specifications. The CTAD shall be mounted as follows:

- a) at a height that is within the manufacturer's recommended mounting heights.
- b) The radar shall be positioned so that all detection zones needed for an approach can be captured.
- c) in a forward-fire position, looking towards either approaching or departing traffic.

**4.2.3.3 Support.** A factory-certified representative from the supplier shall be available for on-site assistance for a minimum of one day during installation and shall provide two (2) days of local training after the CTAD has been installed and is operational.

**4.2.3.4 Acceptance Testing.** The contractor shall develop a proposed test procedure for the CTAD and submit it to the Engineer for approval. It must include visual verification of vehicle detections being received. Each detector shall be tested separately. 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. Give the Engineer a report documenting the result of the tests.

#### **4.2.4 Documentation and Software.**

**4.2.4.1** Prior to purchasing the CTAD system, the contractor shall submit five copies of catalog cut sheets and the environmental testing results to the Engineer for approval.

**4.2.4.2** The contractor shall provide five copies of the operation and maintenance manuals for the CTAD system.

**4.2.4.3** Contractor shall provide one copy of the software and any cables needed to interface with the system.

**4.2.4.4** Contractor shall provide the CTAD installation kit, if applicable, to the Commission upon completion and acceptance of the project.

**4.3 Induction Loops.** Induction loops, if selected, shall be in accordance with the Missouri Standard Specifications for Highway Construction (latest version) and shall be installed to provide detection at locations as shown on the plans or as directed by the Engineer in accordance with Section 902. Detector channels shall be assigned as per the layout in this JSP or as directed by the Engineer.

**5.0 Communication with Advanced Transportation Management System (ATMS).** The detection systems and all performance measure data should be fed directly into the Commission's current ATSPM platform (currently through TransSuite). All data must be online and verified by contractor to be fully operational and available for data output reporting via the Commission's ATSPM platform. In addition, the data storage for long-term storage use should be configured properly on the Commission's ATSPM platform. The Contractor shall be responsible for ensuring the firmware of all detection works with the Commission's ATSPM platform. If utilized on the project, the Contractor's Traffic Engineer shall assist in this task.

**6.0 Technical Support for Detection System.** The detection system(s) chosen for installation shall be free of defects in material and workmanship. For five (5) years, technical support from factory certified personnel or factory certified installers shall be available from the supplier. Ongoing software support by the supplier shall include updates for the processor unit and computer software and shall be provided at no cost during this two-year period. The update of the processor unit software to be NTCIP compliant shall be included. Detection system(s) must not be within 5 years of end of support or sale by manufacturer.

**7.0 Construction Requirements.** Construction requirements shall conform to Sec 902.

**8.0 Method of Measurement.** Method of measurement shall conform to Sec 902.

**9.0 Basis of Payment.** Measurement and payment for work covered by this specification shall include all equipment, materials, tools, labor, programming, testing, and documentation necessary to provide a detection system **per intersection** and shall be paid at the contract unit price as follows:

| Item No.  | Type | Description                                                                   |
|-----------|------|-------------------------------------------------------------------------------|
| 902-99.02 | Each | SL District Traffic Signal <b>Video</b> Detection System ( <b>3</b> cameras)  |
| 902-99.02 | Each | SL District Traffic Signal <b>Video</b> Detection System ( <b>4</b> cameras)  |
| 902-99.02 | Each | SL District Traffic Signal <b>Video</b> Detection System ( <b>8</b> cameras)  |
| 902-99.02 | Each | SL District Traffic Signal <b>Video</b> Detection System ( <b>10</b> cameras) |
| 902-99.02 | Each | SL District Traffic Signal <b>Advanced</b> Detection System ( <b>2</b> units) |

PP. MoDOT TS2 Type 1 Cabinet Assembly Job Special Provision

**1.0 Description.** The cabinet assembly shall meet, as a minimum, all applicable sections of the latest revisions as found in the NEMA TS2 Standard Publication and sections 902 and 1092 of the Missouri Standard Specifications for Highway Construction manual. Where differences occur, this specification shall govern.

## **2.0 Materials.**

**2.1 Cabinet.** The cabinet shall be constructed from aluminum with a minimum thickness of 0.125 inches. The cabinet shall be designed and manufactured with materials that will allow rigid mounting, whether intended for pole, base or pedestal mounting. All mounting points where the cabinet is bolted to the foundation shall be reinforced at the factory by welding in an additional layer of material equal to the thickness of the material that the cabinet is constructed from. Triangular gussets are also required when the base plate and cabinet walls are welded together vs. continuous rolled material. A rain channel shall be incorporated into the design of the main door opening to prevent liquids from entering the enclosure. All external hardware shall be stainless steel. Unless otherwise specified, the cabinet exterior shall be supplied with a natural aluminum finish. Sufficient care shall be taken in handling to ensure that scratches are minimized. All surfaces shall be free from weld flash. Welds shall be smooth, neatly formed, free from cracks, blowholes and other irregularities. All sharp edges shall be ground smooth. The cabinet shall be equipped with (2) lifting brackets for installation and removal purposes.

**2.2 Cabinet Doors.** The cabinet shall include front and rear doors of NEMA type 3R construction with rain tight gaskets. A stiffener plate shall be welded across the inside of the main door to prevent flexing. Doors shall include a mechanism capable of holding the door open at approximately 90 and 165 degrees under windy conditions. Manual placement of the mechanism shall not be required by field personnel. Only the main door shall have ventilation louvers. A plaque designation "Traffic Control" shall be affix to each main cabinet door.

**2.3 Door Alarm.** The front and rear doors shall be equipped with switches wired to the traffic signal controller alarm **with** 1 input for logging and reporting of a door open condition. This should indicate a Special Status 1 alarm in the signal controller alarm screen.

**2.4 Shelves.** No less than (2) shelves shall be provided and each shall have the ability to be independently removed, relocated, and adjusted. The front edge of each shelf shall have holes predrilled at a spacing of no greater than 8 inches to accommodate tie-wrapping to secure cables/harnesses.

**2.5 Mounting Rails.** A minimum of one set of vertical "C" channels shall be mounted on each interior wall of the cabinet for the purpose of mounting the cabinet components. The channels shall accommodate spring mounted nuts or studs. All mounting rails shall extend to within 7 inches of the top and bottom of the cabinet.

**2.6 Pull-out Drawer.** The cabinet shall be equipped with a pull-out drawer/shelf assembly. A 1½ inch deep drawer shall be provided in the cabinet, mounted directly beneath the controller support shelf. The drawer shall have a hinged top cover and shall be capable of accommodating one complete set of cabinet prints and manuals. This drawer shall support 50 pounds in weight when fully extended. The drawer shall open and close smoothly. The drawer dimensions shall make maximum use of available depth offered by the controller shelf and be a minimum of 18 inches wide.

**2.7 Police Door.** The police door shall contain only (1) switch used for flash/auto operations. The ability to turn field indications off from the police panel will not be permitted.

**2.8 Lighting.** The cabinet shall include no less than (3) field replaceable LED light assemblies along the top and sides of the cabinet. The LED panels shall be controlled by a manually activated toggle switch on the tech panel.

**2.9 Fans/Ventilation.** The components of the system as well as the CFM requirements shall be in compliance with the MoDOT 902 & 1092 specifications.

**2.10 Heater.** The cabinet shall be supplied with a 200-Watt fan heater with thermostat control that is designed to protect electronics from the effects of low temperatures such as corrosion, freezing or condensation, which can damage critical components within a control enclosure. Housing shall be constructed of aluminum. Overall dimensions including mounting areas shall be approximately: 4inch depth, 4inch width, 5.50inch height.

**2.11 Switch Guards.** All switches shall include switch guards. All switches shall be clearly labeled.

**2.12 Receptacles and power strip(s).** One 8-outlet IP-addressable power strip shall be provided and Commission-furnished. The installation of the power strip shall be included in the cost of the cabinet assembly. The main door tech panel shall contain a 15 amp duplex GFI receptacle. A separate grounded service outlet shall be provided in the controller cabinet for supplying power to the video detection monitor. The monitor shall be installed to automatically power on when the cabinet door is opened and automatically power off when the cabinet door is closed. The use of the grounded service outlet located on the cabinet door will not be permitted for this function. A manual on/off switch shall also be provided and mounted to the main door tech panel.

**2.13 16-Position Back Panel Wiring.** All new signal cabinets shall have a 16-position load switch back panel and conform to the following specifications. Regardless of the number of phases specified on the plans, all load switch positions shall be completely wired for use. The load switch back panel shall be configured for NEMA Configuration "A" or "G" as designated on the signal plans. Vehicle phases, overlaps (including FYA configurations), and pedestrian phases shall be wired such that it must work with a Type 16 MMU. The cabinet shall include both a DT panel and a CTB (SDLC) panel with 6 harnesses.

## **2.14 Detection Configuration.**

**2.14.1 For all Detector Types.** Detection configuration shall be in accordance with the configuration prescribed in the SL District Detection JSP.

**2.14.2 Intersections with Video Detection.** For intersections with video detection, the cabinet shall be wired to automatically power on the video monitor when the cabinet door is open.

**2.15 Load Switch.** The front of the load switch shall be provided with (3) indicators to show the input signal from the controller to the load switch and (3) indicators to show the output to the field devices. The full complement of load switches shall be supplied with each cabinet to allow for maximum phase utilization for which the cabinet is designed.

**2.16 SDLC.** All connection points shall be protected by a BIU 15 pin surge suppressor used for the protection of any devices on Port 1 Synchronous Data Link Control (SDLC). Each cabinet shall be provided with a SDLC hub assembly and (6) SDLC cables unless otherwise noted on the order form. All mechanical connections shall be soldered.

**2.17 Surge Protection.** Surge protection shall be a modular plug in type product as listed in the MoDOT Traffic APL.

**2.18 AC line filter.** The AC line filter shall protect equipment from malfunctions due to conducted interference coming into the equipment from line, especially line to ground (common mode) noise and transients. Overall dimensions including mounting areas shall be approximately: 4.17inch width and 3.53inch height.

**2.19 Signal Buss Relay.** The relay shall be a direct “drop-in” replacement for existing mercury displacement relays. The relay shall be a single pole solid state or hybrid relay. Overall dimensions including mounting areas shall be approximately: 2.5inch depth, 2inch width, 5 inch height.

**2.20 Field Wiring termination.** All field wires shall be attached to the back panel terminal strips via a mechanical copper lug, which can accommodate wire sizes from 14AWG - 6AWG. Lugs shall be provided for all field outputs to maximize the cabinet design.

**2.21 Flash Transfer Relays.** The full complement of relays shall be supplied with each cabinet to allow for maximum phase utilization for which the cabinet is designed.

**2.22 Cabinet Wiring Prints.** Paper cabinet prints as well as electronic media shall be provided with each cabinet. (4) paper copies shall be provided (22” X 34”) and (1) electronic copy in pdf and dgn format. All flash program wiring configurations shall be represented on the cabinet print (Red, Amber, No Flash, FYA, Ped, FYA & Ped).

**2.23 Generator Attachment.** A generator plug shall be installed on each cabinet unless otherwise noted. The access door shall be hinged, lockable and watertight. The plug shall conform to the (NEMA L5-30 configuration). An automatic transfer switch shall be provided which will switch power to/from “line”, “UPS” or “generator” when power from one of the sources has been lost or gained. The unit shall be rated for 30 amps and shall contain either a LCD display or indicator lights that validate the following: Line in, Line out, UPS in, UPS out and “from” generator. The unit shall contain a main breaker (on/off switch), a UPS bypass breaker (switch) and a Generator breaker (switch). To minimize the impact of the presence of the auto transfer switch, the dimensions shall be no greater than 12” wide X 6” deep X 4” high. The unit shall be constructed of either aluminum or stainless steel.

### **3.0 Testing.**

**3.1** Each controller and cabinet assembly shall be tested as a complete entity under signal load in accordance with Missouri Standard Specifications Section 902 for a minimum of 30 days after installation.

**3.2** Each assembly shall be delivered with a signed document detailing the cabinet final tests performed.

The cabinet shall be assembled and tested by the controller manufacturer or authorized local distributor to ensure proper component integration and operation.

### **4.0 Warranty and Training.**

**4.1** If a Controller and/or Malfunction Management Unit are ordered with a cabinet assembly, the Controller and Malfunction Management Unit shall be warranted by the manufacturer against

mechanical and electrical defects for a period of 2 years from date of shipment. The manufacturer's warranty shall be supplied in writing with each cabinet and controller. Second party extended warranties are not acceptable.

**4.2** The cabinet assembly and all other components shall be warranted for a period of one year from date of shipment. Any defects shall be corrected by the manufacturer or supplier at no cost to the owner.

**4.3** MoDOT may require training on the maintenance and operation of NEMA TS2 cabinet assemblies. Maintenance and operation personnel shall be trained on troubleshooting, maintenance and repair of cabinets and all serviceable equipment. Training shall include field level troubleshooting and bench repair. This training shall be for a minimum of sixteen hours over two days. Training shall be conducted at a time and location mutually agreeable by the contractor and the signal shop traffic supervisor or as directed by MoDOT.

**5.0 Method of Measurement.** Method of measurement shall conform to Sections 902 and 1092 of the Standard Specifications.

**6.0 Basis of Payment.** Payment included with cost of pay item 902-42.83 (Controller Assembly Housing, NEMA TS2 Controller) paid per each. Payment will be considered full compensation for all labor, equipment and material to complete the described work as shown on the plans. No additional payment will be made to provide conformance.

QQ. Combination Pad Mounted 120V/240V Power Supply and Lighting Controller with Uninterruptible Power Supply (UPS) – TS2 Traffic Signal Cabinet

**1.0 Description.** This work shall consist of furnishing and installing combination 120/240-volt signal and lighting power supply and uninterruptible power supply (UPS) at signalized intersections utilizing a TS2 traffic signal control cabinet.

**2.0 UPS Requirements.** The traffic signals being constructed on the intersections listed below shall include an "Uninterruptible Power Supply" specifically constructed and NEMA approved for traffic signal operations.

- t) Siebert Avenue
- u) Heege Road
- v) Weber Road/Elgin Avenue
- w) Mackenzie Road
- x) Route 21 (Rock Hill Rd/Tesson Ferry Rd)
- y) Valcour Avenue
- z) Laclede Station Road
- aa) Grant Road/McNary Drive
- bb) Baptist Church Road
- cc) Eddie and Park Road
- dd) Geyer Road
- ee) I-270 NB
- ff) I-270 SB
- gg) Rahning Road

**2.1 UPS Location and Cabling.** The UPS shall be installed separately from the signal cabinet and shall be installed in the same cabinet as the power supply and lighting controller station. In addition to the power cables from the UPS to the signal cabinet, the contractor will route but not connect an outdoor rated CAT-6 cable between the UPS RJ-45 port and the Ethernet switch in the signal cabinet. The contractor shall also install a 7-conductor serial cable and make the appropriate connections from the UPS to the traffic signal cabinet. The **On battery** contact (C-1) on the inverter should be programmed to energize when the UPS provides battery backup. The normally open contact should be wired to provide logic ground to Alarm 2 when the UPS is in battery backup mode. This should indicate a Special Status 2 alarm in the signal controller alarm screen. The **Low Battery** contact (C-2) on the inverter should be programmed to energize when the UPS drops below a preset voltage level, typically set at 40%. The normally open contact should be wired to provide logic ground to Test Point A when the UPS is in Low Battery mode. This should indicate a Special Status 3 alarm in the signal controller alarm screen. The **Arrestor** contact should be wired to provide logic ground to Test Point B and generate a Special Status 4 alarm in the signal controller alarm screen. The **Timer #1** contact (C-4) on the inverter should be programmed to energize after the UPS is in inverter mode for **three (3)** hours. The normally closed contract should be wired in series with the remote flash output to allow for the circuit to open after **three (3)** hours and bring the signal to flash after the side streets service. The remote flash parameters shall be programmed to red/red flash, unless directed otherwise by the Engineer. The CAT-6 cable and serial cable will be run in a separate conduit from the power cables into the cabinet. All conduits will be internal and not visible from the exterior of either the UPS or signal cabinet. The contractor shall verify all control wiring with the manufacture of the traffic signal cabinet assembly for accuracy and compatibility and perform test to ensure proper operation. The contractor shall be responsible for all controller programming to mask the TS2 features to this setup. Upon completion of all controller programming, contractor shall notify contractor's or Commission's traffic engineer (depending on assignment) for uploading into Commission's central signal control system.

**2.2 UPS Input Specifications.** Each UPS system shall have the following input requirements:

- (a) A nominal input voltage of 120 VAC.
- (b) An input voltage range of 85 to 175 VAC.
- (c) Two (2) input voltage boost modes.
- (d) Boost-1 shall increase the input voltage from 94 to 115 VAC.
- (e) Boost-2 shall increase the input voltage from 85 to 101 VAC.
- (f) Two (2) input voltages buck modes.
- (g) Buck-1 shall decrease the input voltage from 154 to 124 VAC.
- (h) Buck-2 shall decrease the input voltage from 175 to 142 VAC.

A user configurable power quality (PQ) option with default values of:

- (a) High line disqualify shall be 130 VAC.
- (b) High line qualify shall be 128 VAC.
- (c) Low line qualify shall be 105 VAC.
- (d) Low line disqualify shall be 100 VAC.
- (e) Input current shall be less than 16A with nominal voltage, full load on the output and charger set at 10A.
- (f) 50/60Hz automatic frequency detection with built-in class A EMI filter and transient suppression.

**2.3 UPS Output Specifications.** Each UPS system shall have the following output requirements:

- (a) The output voltage of the UPS shall be 120 VAC  $\pm 10\%$  in line mode.
- (b) The output voltage of the UPS shall be 120 VAC  $\pm 6\%$  in backup mode.

- (c) The output frequency of the UPS shall be 60Hz  $\pm$ 5% in line mode.
- (d) The output frequency of the UPS shall be 60Hz  $\pm$ 5% in backup mode.
- (e) The output waveform of the UPS shall be sinusoidal.
- (f) The output voltage total harmonic distortion (THD) shall be less than 3% with a resistive load.
- (g) The efficiency of the UPS at nominal line voltage shall be greater than 98%.
- (h) The efficiency of the UPS in backup mode shall be greater than 84%.
- (i) The step-load response of the UPS shall be full recovery in ½-cycle @ 50% change with a resistive load.
- (j) The transfer time of the UPS line to back up and backup to line shall be 5ms typical.
- (k) The line qualification time of the UPS shall be user selectable at 3, 10, 20, 30, 40 and 50 seconds.
- (l) The line qualification time of the UPS default shall be three (3) seconds.

**2.4 UPS Battery and Charger Specifications.** Each UPS system shall have the following specifications for the battery and charger:

- (a) The nominal battery voltage of the UPS shall be 48 VDC.
- (b) The battery charger current of the UPS shall be user programmable for 3, 6, and 10 A.
- (c) The battery charger current default setting for the UPS shall be 6A.
- (d) The battery charger in the UPS shall turn OFF when the battery temperature is 50°C.
- (e) The UPS shall have a user programmable temperature compensated battery charger with setting for -2.5, -4, -5 and -6 mV/°C/Cell.
- (f) The UPS shall have a temperature compensated battery charger with a default setting of -5 mV/°C/Cell.
- (g) The UPS shall have a battery charge with a float voltage of 56VDC maximum.
- (h) The UPS shall have a user configurable low battery warning.
- (i) The UPS shall have a default low battery warning set at 47VDC to indication 40% remaining battery capacity.
- (j) The UPS shall have a low battery shutdown set for 42VDC (10.5VDC per battery).

**2.5 UPS Protection Specifications.** Each UPS system shall have the following specifications for protection:

- (a) The UPS shall have a 250VAC @ 20A input circuit breaker.
- (b) The UPS shall have a 50A battery circuit breaker.
- (c) The UPS shall have electronic short circuit protection when operating in backup mode.
- (d) The UPS shall indicate an overload warning with a flashing alarm LED when the load is between 95% and 105% of the rated output for the UPS.
- (e) The UPS shall shutdown in two (2) minutes when operating in backup mode when the load is between 106% and 115% of the rated output for the UPS, and the fault LED shall turn ON. The fault LED shall clear when the overload is removed and the utility line power returns.
- (f) The UPS shall shutdown in one (1) minute when operating in backup mode when the load is greater than 115% and the fault LED shall turn ON. The fault LED shall clear when the overload is removed and the utility line power returns.
- (g) The UPS shall disable the backup mode function when operating in line mode if the load exceeds 115% of the rated output for the UPS. The alarm shall be reset when the overload condition is removed.
- (h) The UPS shall display an alarm LED if the battery ambient temperature is greater than 75°C and disable the backup mode function. The alarm shall clear when the battery ambient temperature is less than 70°C.

- (i) The UPS shall display a fault LED when operating in backup mode and shutdown the inverter if the internal temperature is greater than 110°C. The fault shall clear when the utility power returns and the internal temperature is less than 90°C.
- (j) The UPS shall have output over-voltage protection to electronically shutdown the UPS if the output voltage exceeds 132VAC.
- (k) The UPS shall disable the battery charger in two (2) seconds and display an alarm LED if the battery voltage exceeds 59VDC. The alarm shall be cleared and charge enabled when the battery voltage drops to less than 57VDC.
- (l) The UPS shall limit the charger voltage to 52VDC in the event the battery probe is not installed.
- (m) The UPS shall have a battery circuit breaker with reverse polarity protection. The battery circuit breaker shall trip in the event the battery polarity is wired incorrectly.
- (n) The UPS shall have protection for electrical backfeed to the utility that meets UL 1778 and CSA C22.2 No. 107.1.3 requirements.
- (o) The UPS shall have user-selectable settings that are password protected.
- (p) The UPS shall be cooled by a variable speed fan that is microprocessor and PWM controlled.
- (q) The fan shall be OFF when the ambient temperature is less than 40°C.
- (r) The UPS shall display an alarm LED to indicate the fan is enabled but not turning.
- (s) The UPS shall have a fan that is field replaceable.

**2.6 UPS Displays, Controls and Diagnostics Specifications.** Each UPS system shall have the following specifications for the noted features:

- (a) The UPS shall have a two (2) line/20-character LCD display and control panel that can be rotated for easy user interface.
- (b) The UPS shall have event and alarm logging with time/date stamping for up to 100 historical events.
- (c) The UPS shall have six (6) independently programmable control relays for control and report functions.
- (d) The UPS shall have two (2) independently programmable timers 0 to 8hr with two (2) time-of-day restrictions on each timer.
- (e) The UPS shall be equipped with a RS-232 port, which can be connected to a laptop.
- (f) The UPS shall be equipped with a SNMP Ethernet card.

**2.7 Programmable Dry Contacts.** Each UPS system shall have the following requirements for the noted features relating to dry contacts:

- (a) The UPS shall have six (6) sets of normally open (NO) and normally closed (NC) single pole double-throw (SPDT) dry contact relays rated for 250VAC @1A.
- (b) The UPS shall have five (5) sets of dry contact relays that are user programmable, C1 through C5, and one relay contact that is factory configured, C6.
- (c) The UPS shall have dry contact relays that are user programmable via either the RS-232 or (optional) Ethernet communication ports to activate under the following conditions:
- (d) ON BATTERY. The relay is energized whenever the UPS switches to battery power.
- (e) LOW BATTERY. The relay is energized when the battery has reached a user defined low battery level of remaining useful capacity. This alarm is latched when a qualified line returns or the inverter shuts down. The default setting is 47VDC (~40%) of remaining useful battery capacity.
- (f) TIMER 1. The relay is energized after being in backup mode for a given amount of time. This timer is adjustable from 0 to 8hr. The default setting is two (2) hours.
- (g) ALARM. The relay is activated after a specific or general alarm is detected. The alarm
- (h) conditions include: line frequency, low output voltage, no temperature probe, overload,

- (i) unconnected batteries, high temperature ( $>55^{\circ}\text{C}$ ) and low temperature ( $<-20^{\circ}\text{C}$ ).
- (j) FAULT. The relay is activated after a specific or general fault is detected. These faults
- (k) include: short circuit, low battery voltage ( $<41\text{VDC}$ ), high battery voltage ( $> 59\text{VDC}$ ), overload and over temperature ( $>75^{\circ}\text{C}$ ).
- (l) OFF. The relay is disabled and will not activate under any condition.
- (m) TIMER 2. Same as TIMER 1.
- (n) TIMER 3. Same as TIMER 1.
- (o) AC/DC FAN CONTROL. The relay is activated when the battery ambient temperature is greater than  $35^{\circ}\text{C}$  or at a user programmable threshold from 25 to  $55^{\circ}\text{C}$  @  $5^{\circ}\text{C}$  increments.
- (p) The UPS shall have a default dry contact relay configuration of:
 

|    |          |
|----|----------|
| C1 | ON BATT  |
| C2 | LOW BATT |
| C3 | LOW BATT |
| C4 | TIMER    |
| C5 | ALARM    |
| C6 | 48VDC    |

**2.8 Mechanical.** Each UPS system shall have the following mechanical requirements:

- (a) The UPS shall have AC input and AC output terminal blocks mounted on the front panel. The terminal blocks shall be a 3 pole, 35 amp, 300 volt Eurostyle socket terminal strip (22-8 AWG).
- (b) The UPS shall have six (6) user programmable dry contact relay terminal blocks on the front panel. The terminal blocks shall be 3 pole, 35 amp, 300 volt PLUGGABLE TERMINAL BLOCK (12-26 AWG)
- (c) The UPS shall have one (1) user input and one (1) Automatic Transfer Switch (ATS) terminal block on the front panel. The terminal blocks shall be 3 pole, 35 amp, 300 volt PLUGGABLE TERMINAL BLOCK (12-26 AWG).
- (d) The UPS shall have a DE-9 RS-232 connector on the front panel.
- (e) The UPS shall have an RJ45 Ethernet connector on the front panel.
- (f) The UPS shall have a battery connector on the front panel. The battery connector shall be a 50 amp SB® series type battery connector (16-6 AWG).
- (g) The UPS shall have a RJ14 battery temperature probe connector on the front panel.

**2.9 Environmental.** Each UPS system shall have the following environmental requirements:

- (a) The operating temperature range of the UPS shall be  $-40^{\circ}$  to  $55^{\circ}\text{C}$  with the capability of operating @ 800W for up to 2hr at  $74^{\circ}\text{C}$  ambient.
- (b) The storage temperature range of the UPS shall be  $-40^{\circ}$  to  $75^{\circ}\text{C}$ .
- (c) The operating and storage humidity (non-condensing) range of the UPS is up to 95% RH.
- (d) The altitude operating range of the UPS is up to 12,000ft with a de-rating of  $2^{\circ}\text{C}$  per 1000ft above 4500ft.
- (e) The UPS shall be shipped in materials designed to meet requirements for ISTA program.
- (f) The UPS shall pass electrical safety standards UL1778, CSA 22.2 No. 107.3, EN50091-1-1-2 and EN60950.
- (g) The UPS shall pass emission standards FCC Subpart J Level A for conducted and radiated EMI CISPR22, EN55022 Level A for conducted and radiated EMI.
- (h) The UPS shall pass Immunity standards:
  - EN61000-4-2: ESD (Electrostatic discharge).
  - EN61000-4-3: Radiated immunity.
  - EN61000-4-4: EFT (Electrical fast transient).
  - EN61000-4-5: Surge.

EN61000-4-6: Conducted (Power and signal lines).

EN61000-4-8: Power frequency magnetic.

EN61000-3-2: Harmonic distortion.

(i) The UPS shall display agency approval mark "cCSAus" on the manufacturer's nameplate label.

**2.10 Manual Bypass Switch.** Each UPS system shall include a manual bypass switch (MPS). UATS assemblies that include items referenced individually need not be duplicated. The MPS shall have the following specifications:

- (a) The MPS shall be a self-contained module separate from the UPS
- (b) The MPS shall be shelf or rack mountable.
- (c) The MPS shall have terminal blocks labeled "AC Input", "AC Output", "To UPS" and "From UPS".
- (d) The MPS shall be a Break-Before-Make rotary switch.
- (e) The MPS shall be rated at 120VAC @ 20A.
- (f) The MPS shall have a 5-15R duplex receptacle connected to utility line.
- (g) The MPS shall have a 5-15R receptacle labeled "Optional LA-P" to facilitate a plug-in surge suppressor.
- (h) The MPS shall have a 5-15R receptacle labeled "Optional Battery Heater Mat" to provide non-standby power to a battery heater mat.
- (i) The MPS shall have two (2) positions: one labeled "UPS" to connect the utility line to the UPS, and one labeled "Bypass" to connect the utility line to the load.
- (j) The MPS shall have a 15A circuit breaker labeled "AC Input".
- (k) The MPS shall have a 15A circuit breaker labeled "AC Output".

**2.11 Automatic Transfer Switch.** Each UPS system shall include an automatic transfer switch (ATS) with the following requirements:

- (a) The ATS shall be rated for 120VAC @ 40A.
- (b) The ATS shall be shelf or rack mountable.
- (c) The ATS shall transfer the load to UPS when the utility line fails or is unqualified.
- (d) The ATS shall transfer the load to utility line when the utility line is available and qualified.
- (e) The ATS shall be activated by a 48VDC input from the UPS.
- (f) The ATS shall have a terminal block labeled "L IN", "NEUT", "GRD" and "L OUT".
- (g) The ATS shall have a six (6) foot line cord labeled "UPS IN".
- (h) The ATS shall have a six (6) foot line cord labeled "UPS OUT".
- (i) The ATS shall have a 5-15R duplex receptacle connected to utility line.
- (j) The ATS shall have a 5-15R receptacle labeled "Optional LA-P" to facilitate a plug-in surge suppressor.
- (k) The ATS shall have a 5-15R receptacle labeled "Optional Battery Heater Mat" to provide non-standby power to a battery heater mat.

**2.12 Automatic Bypass Switch.** Each UPS system shall include an automatic bypass switch (ABS) with the following requirements:

- (a) The ABS shall be rated for 120VAC @ 20 amps.
- (b) The ABS shall be shelf or rack mountable.
- (c) The ABS shall connect the UPS to the load to allow the UPS to continuously power the load.
- (d) The ABS shall transfer the load to utility line when there is no UPS output voltage.
- (e) The ABS shall be activated by the 120VAC from the UPS.
- (f) The ABS shall have a terminal block labeled "L IN", "NEUT", "GRD" and "L OUT".
- (g) The ABS shall have a six (6) foot line cord labeled "UPS IN".

- (h) The ABS shall have a six (6) foot line cord labeled "UPS OUT".
- (i) The ABS shall have a 5-15R duplex receptacle connected to utility line.
- (j) The ABS shall have a 5-15R receptacle labeled "Optional LA-P" to facilitate a plug-in surge suppressor.
- (k) The ABS shall have a 5-15R receptacle labeled "Optional Battery Heater Mat" to provide non-standby power to a battery heater mat.
- (l) The ABS dimensions shall be 4.6"H x 4.75"W x 6.5"D.
- (m) The ABS weight shall be 4lbs.

**2.13 Generator Transfer Switch.** Each UPS system shall include a generator transfer switch (GTS) with the following requirements:

- (a) The GTS shall sense when a portable generator is connected and transfer the load to the generator after a 30s delay.
- (b) The GTS shall be rated for 120VAC @ 20A.
- (c) The GTS shall be shelf or rack mountable.
- (d) The GTS shall have a terminal block labeled "AC INPUT", "AC OUTPUT" and "GENERATOR INPUT".

**2.14 UPS Batteries.** The batteries for the UPS system shall meet the following requirements:

- (a) The batteries shall be Gel Cell Valve Regulated Lead Acid (VRLA) type specifically designed for outdoor use.
- (b) The batteries shall be designed for "Float Service" to provide 100% out-of-box runtime capacity.
- (c) The batteries shall have Silver Alloy positive plates.
- (d) The batteries shall have a five (5) year full replacement, non-prorated warranty.
- (e) The battery capacity rating at 20hr shall be 94Ah.
- (f) The battery shall be 12VDC.
- (g) The number of batteries in the system shall be four (4) or eight (8).
- (h) The batteries shall be connected to provide 48VDC.
- (i) Batteries for each location shall provide full power for all devices shown on the plans that are powered through the signal cabinet for three (3) hours and then send the signal into all red flash and power that state for an additional three (3) hours.

**2.15 Battery Heater Mat.**

- (a) The battery heater mats shall be available in four (4) battery and single (1) battery sizes.
- (b) The single battery heater mat shall allow for a Master-Slave configuration so two (2) or more mats can be ganged together.
- (c) The battery heater mats shall plug into a 120VAC/5-15 receptacle.
- (d) The battery mats shall be thermally controlled, turning ON at 5°C and turning OFF at 15°C.
- (e) The battery mats shall be thermally fused for 82°C to prevent thermal runaway.

**2.16 Battery Charge Management System.** Each UPS system shall have a battery charge management system with the following requirements:

- (a) The battery charge management system shall spread the charge voltage equally across all batteries.
- (b) The battery charge management system shall compensate for batteries with different internal resistances.
- (c) The battery charge management system shall have a quality of final balance of  $\pm 100\text{mV}$  maximum between any two (2) batteries in the string.
- (d) The battery charge management system shall have reversed polarity protection.

(e) The battery charge management system shall be designed to CSA C22.2 No. 107.1 and UL 1778 Standards for safe unattended operation.

**2.17 Surge Suppression.** Each UPS system shall have the following requirements for surge suppression:

- (a) The surge suppression shall provide protection from voltage transients appearing on the utility line.
- (b) The surge suppression shall be a plug-in module that is field replaceable.
- (c) The surge suppression shall have a LED indicator that turns OFF when the module is no longer providing protection.
- (d) The surge suppression shall have a clamping voltage of 150VAC.
- (e) The surge suppression shall have a response time of less than one (1) nanosecond.

**2.18 Construction Requirements.** Construction requirements shall conform to Sec 902. Any exceptions to these requirements will be approved by the engineer before system installation.

**3.0 Method of Measurement.** Method of measurement shall conform to Sec 902.

**4.0 Basis of Payment.** Payment for furnishing and installing pad mounted combination units shall include all excavation, materials, equipment, tools, labor, CAT-5 cable and work incidental thereto, and shall be considered to be completely covered by the contract unit price for:

| Item No.  | Description                                                                     | Type |
|-----------|---------------------------------------------------------------------------------|------|
| 902-99.02 | Combination Pad Mounted 120V/240V Power Supply And Lighting Controller with UPS | Each |

RR. Accessible Pedestrian Pushbutton and Signing

**1.0 Description.** This work shall consist of furnishing, installing and placing into operation an Accessible Pedestrian Signal (APS) that assist the pedestrian who has visual or physical disabilities in activating the pedestrian phase. The APS shall be installed per the manufacturer's recommendations and specifications. Cable runs shall be continuous and unspliced. Audible pedestrian pushbuttons and signing will be required for all pedestrian indications at all intersections.

**2.0 Installation.** The APS shall be installed as part of a pushbutton assembly and shall have both audible and vibrotactile walk indications.

**2.1 Material.** The following systems in the list below are the only systems that are tested, fully functional, and approved for use in the St. Louis District. All necessary equipment for use of the systems below, shall be provided to the Commission for adequate maintenance of the system.

- PedSafety Guardian Mini
- Polara iDS/iNS Accessible Pedestrian Signal (2 wire System)
- Guardian with Bluetooth and Wayfinding Sign

**3.0 Equipment.**

- 3.1 Vibrotactile.** Vibrotactile walk indications shall be provided by a tactile arrow on the pushbutton that vibrates during the walk interval have high visual contrast (light on dark or dark on light), and shall be aligned parallel to the direction of travel on the associated crosswalk.
- 3.2 Audible.** The APS shall have an audible walk indication during the walk interval only. The audible walk indication shall be audible from the beginning of the associated crosswalk.
- 3.3 Pushbutton Signage.** In addition to standard pedestrian sign requirements, all pushbuttons shall have additional signage to indicate crosswalk direction by use of a tactile arrow and the name of the street containing the crosswalk served by the audible pedestrian signal. The sign shall be located immediately above the push button mechanism and parallel to the crosswalk controlled by the button. The street name shall be the name of the street or reasonable abbreviation whose crosswalk is controlled by the push button. Signage shall comply with ADA Accessibility Guidelines (ADAAG) 703.2 specifications for Braille and raised print.

**3.4.1 Arrow.** Signs shall include a tactile arrow aligned parallel to the crosswalk direction. The arrow shall be raised 0.8 mm (.03 inch) minimum and shall be 4 mm (1.5 in) minimum in length. The arrowhead shall be open at 45 degrees to the shaft and shall be 33 percent of the length of the shaft. Stroke width shall be 10 percent minimum and 15 percent maximum of arrow length. The arrow shall contrast with the background.

**3.4.2 Street Name.** The APS shall include street name information aligned parallel to the crosswalk direction and shall comply with Guidelines for Accessible Public Rights-of-Way R308.3.2 or shall provide street name information in audible format.

#### **4.0 Performance.**

**4.1 Audible Locator Tone.** Locator tone tells the pedestrian that the intersection is equipped with APS and where it is. Pushbutton locator tones shall have duration of 0.15 seconds or less, and shall repeat at 1-second intervals. Pushbutton locator tones shall be intensity responsive to ambient sound, and be audible 6 to 12 feet from the pushbutton, or to the building line, whichever is less. The locator tone shall operate during the DON'T WALK and flashing DON'T WALK intervals only and shall be deactivated when the pedestrian signal is not operative.

**4.2 Verbal Wait Message.** If available, the acknowledge tone feature shall not be used. A verbal wait message shall provide a clear message to the pedestrian they have placed a call. The verbal information informational message "Wait to cross" street name at intersecting street name shall be used..

**4.3 Verbal Walk Message.** If available, the audio tone feature shall not be used. The verbal messages shall provide a clear message that the walk interval is in effect, as well as to which crossing it applies. The verbal message shall be provided at regular intervals throughout the timing of the walk interval and shall be the term "walk sign," which will be followed by the name of the street to be crossed.

**4.4 Volume.** Automatic volume adjustment in response to ambient traffic sound level shall be provided up to a maximum volume of 100 dB. The units shall be responsive to ambient noise level

changes up to no more than 5 dB louder than ambient sound. Tone or voice volume measured at 36 inches from the unit shall be 2dB minimum and 5dB maximum above ambient noise level. At installation, signal system is to be adjusted to be audible at no more than 5 to 12 feet from the system.

## **5.0 Documentation and Support.**

**5.1 Operation and Maintenance Manuals.** Two copies of the operation and maintenance manuals for each location shall be provided to the Commission.

**5.2 USB with Audible Messages.** The Contractor shall provide two copies of USB data cards, to the Engineer, that contains files for the manufacturer's audible messages for complete operation of all APS at all locations.

**6.0 Construction Requirements.** Construction requirements shall conform to Sec 902, 1061, and 1092.

**7.0 Method of Measurement.** Method of measurement shall conform to Sec 902.

**8.0 Basis of Payment.** Accepted "Accessible Pedestrian Pushbuttons and Signing" will be paid for at the contract unit price. Payment will be considered full compensation for all labor, equipment and material to complete the described work. Payment for signing will be included in the contract unit price for Accessible Pedestrian Signals.

| Item Number | Type | Description                                  |
|-------------|------|----------------------------------------------|
| 902-99.02   | EA   | Accessible Pedestrian Pushbutton and Signing |

## **SS. ATC Traffic Signal Controller**

**1.0 Description.** The Commission's St. Louis District is utilizing TransCore's TransSuite software as their Advanced Traffic Management System (ATMS), therefore all signal controllers must be able to interface with their TCS program.

**2.0 Material.** All traffic signal controllers purchased and installed on this project shall be selected from the list below and match the cabinet type and connections indicated on the D-37C sheet for each intersection(s). The controllers on the list below are the only controllers that are tested, fully functional, and approved with the version of TransSuite that the St. Louis District is currently operating (TransSuite version 20.4):

| Controller/Firmware Type | Firmware Supported | Cabinet Type (Match in field) |
|--------------------------|--------------------|-------------------------------|
| Econolite Cobalt         | EOS 3.2.24         | NEMA TS2 Type 1 or 2          |
| McCain Omni eX, eX2      | 3.4                | NEMA TS2 Type 1 or 2          |
| Intelligent X3           | MaxTime 2.1.1      | NEMA TS2 Type 1 or 2          |

**3.0 Construction Requirements.** Contractor shall ensure that the signal controller as noted above is programmed to be compatible with the previously mentioned version of TransSuite TCS system.

**4.0 Acceptance Testing.** All controllers shall be tested per the Commission's specifications. Programming and testing should be done prior to any installation and approved by the

Commission's engineer or representative. The contractor shall provide a copy of the signal programming to the engineer via an USB Flash drive.

**5.0 Documentation.** Contractor shall provide the engineer with an electronic copy of the manufacturer's signal controller manual or link to the website where the manual can be downloaded in .pdf format.

**6.0 Basis of Payment.** Measurement and payment for work covered by this specification shall include all equipment, tools and materials necessary and shall be paid at the contract unit price as follows:

| Item No.  | Type | Description                   |
|-----------|------|-------------------------------|
| 902-99.02 | Each | ATC Traffic Signal Controller |

TT. 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.

**1.0.1 Keys & Locks.** Red locks & 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).

**1.0.2 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](mailto:sltrs@modot.mo.gov) to coordinate which padlocks are to be used.

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

UU. Countdown Pedestrian Signal Heads

**1.0 Description.** This work shall consist of furnishing, installing and placing into operation any countdown, pedestrian signal heads.

**2.0 System Requirements.** Delete Sec. 1092.1.9 in its entirety and substitute the following:

**1092.1.9 Pedestrian Signal Heads.** Pedestrian signal heads shall be in accordance with ITE specifications and standards for pedestrian traffic control signal indications and the following:

(a) Pedestrian signal head housings shall be constructed of a one-piece, 0.250-inch (6 mm) thick, polycarbonate material as shown on the plans. The housing shall include an integral mounting bracket designed for side-of-pole mounting on all makes of signal poles with a terminal compartment and minimum 5-position, double-row terminal block.

(b) The door, lens and any openings in the housing shall have gaskets or seals to exclude dust and moisture from the inside of the compartment.

(c) Lenses shall be constructed of polycarbonate material.

(d) Pedestrian signal head units shall be provided with a manufactured preformed rectangular visor or screen-type louver.

(e) All plastic material shall be ultraviolet stabilized.

(f) Indications shall be ITE Class 3 symbol messages. The "Upraised Hand" symbol shall be illuminated with a filled, Portland orange LED module. The "Walking Person" symbol shall be illuminated with a filled, white LED module. The "Countdown" display numbers shall be illuminated with a Portland orange LED module. The LED modules shall be in accordance with applicable portions of Sec 1092.1.

(g) Pedestrian traffic control signal faces shall be constructed such that all messages are displayed from the same message-bearing surface having a black opaque background. The "Countdown" display shall be located to the right of the "Upraised Hand" and "Walking Person" symbols, which will be overlaid.

(h) Pedestrian signal heads require "Countdown" displays and shall have the following features:

(1) Display numbers must be two digits at least 9 inches in height.

(2) Shall only display the "Countdown" time during the pedestrian change interval. Time displayed shall be in seconds, and begin only at the beginning of the pedestrian change interval. The flashing "Upraised Hand" symbol shall be concurrently displayed during the pedestrian change interval. The total time displayed at the start of the pedestrian change interval shall be automatically adjusted by the pedestrian signal head and not require any manual settings or additional wiring to the signal cabinet.

(3) Once the "Countdown" display reaches "0", the "Countdown" display shall blank-out until the next pedestrian change interval begins.

(4) If the pedestrian change interval is interrupted or shortened as part of a transition into a preemption sequence, the "Countdown" display shall go dark immediately upon activation of the preemption transition.

(5) A test switch shall be provided in order to test the "Countdown" display.

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

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

**5.0 Basis of Payment.** Payment for pedestrian signal heads, including all materials, equipment, labor and tools shall be made and considered completely covered by the contract unit price bid for:

| Item Number | Type | Description                               |
|-------------|------|-------------------------------------------|
| 902-99.02   | Each | Countdown Pedestrian Signal Head, Type 1S |

VV. Disposition of Existing Signal/Lighting and Network Equipment

**1.0 Description.** All controllers, cabinets, cabinet equipment, network equipment, DMS equipment, antennas, radios, modems, and other equipment noted in the plans shall be removed by the contractor.

**2.0 Signal Equipment.** All equipment other than network communication devices noted in 3.0 are to be transported to the Commission's maintenance lot located at 2309a Barrett Station Road, Ballwin, Missouri 63021. The contractor shall notify the Commission's representative 24 hours prior to each delivery by calling: 314-275-1524.

- (a) Mr. Dennis Hixson, Traffic Supervisor, Preventive Maintenance/ITS
  - a. Cell: (314) 565-6726
- (b) Mr. Brian Ducote, Traffic Supervisor, Emergency Signal Maintenance
  - a. Cell: (314) 681-8395
- (c) Mr. Todd Burgess, Lighting and Locate Supervisor
  - a. Cell: (314) 348-9470

**3.0 Network Communication Devices.** Devices such as CCTV cameras and domes, video encoders, device servers, Ethernet switches, media converters, and radio assemblies are to be transported to the Commission's TMC in Chesterfield. The contractor shall notify the Commission's representative 24 hours prior to each delivery by calling 314-275-1526 and providing details for the delivery.

**4.0** The contractor shall exercise reasonable care in the handling of the equipment during removal and transportation. Should any of the equipment be damaged by the contractor's negligence, it shall be replaced at the contractor's expense. The contractor shall dispose of any other equipment. Delivery shall be within 2 working days of removal. All items returned shall be tagged with the date removed, project number and location/intersection.

**5.0 Basis of Payment.** Payment for removal, handling and transportation of all equipment specified shall be considered completely covered by the contract unit price for "Removal of Improvements" per lump sum.

WW. LED Blank-out Sign

**1.0 Description.** LED blank out sign shall be used as noted on the plans and conform to the following standards. The signs shall turn on only when the pedestrian phase is actuated by pressing the pedestrian push and remain on until the pedestrian phase ends.

**2.0 Size and Message.**

**2.1 Size.** Sign face shall be 30 inches wide and 30 inches high.

**2.2 Message.** Sign shall duplicate the graphics characteristics of MUTCD sign R3-1, "No Right Turn".

**3.0 Functional Requirements.**

**3.1 Visibility.** The symbol shall be clearly legible, attracting attention under any lighting condition. At full intensity the sign must be completely visible anywhere within an approximate 15-degree cone centered about the optic axis. The LED Blank Out Sign shall be capable of displaying the symbol when energized and be completely blank out when not energized. No phantom words or legend shall be seen under any ambient light conditions.

**3.2 Components.** The sign shall consist of:

- a) Weatherproof housing and door.
- b) LED's.
- c) Transformers.

**3.3 LED's.** All LED's should have an expected lifetime of 100,000 hours and be high in optical power.

**3.4 Transformers.** Transformers shall be used to reduce the incoming 120 volts AC to the design DC voltage. The transformers shall contain Class A insulation and weatherproofing.

**3.5 Operation and Dimming.** The sign shall be capable of continuous operation over a range in temperatures from -35F to +165F (-37C to +75C). 50% Pulse Width Modulation Dimming must be available for improved nighttime visibility.

**4.0 Sign Housing.**

**4.1 Construction.** Housings shall be constructed of extruded aluminum. A flat aluminum panel shall be welded into the housing back. All corners and seams of one or two-way housings are to be heli-arc welded to provide a weatherproof seal around the entire case. Continuous full-length stainless steel hinges shall connect the housing and the extruded aluminum door. Sign shall have #3 stainless steel ¼ turn link-locks per door to tightly secure the door onto a gasket between it and the housing. Link-locks shall provide tool free access to the interior of the sign. Drainage shall be provided by at least four and no more than six drain holes at the corners of the housing.

**4.2 Doors.** Door gaskets should provide a weatherproof seal. The extruded aluminum doors shall have one side removable to gain access to the sign face. Each door shall be fitted with a sun hood. Standard length is 6".

**4.3 Face.** Sign face shall have the entire LED assembly mounted to it. The sign face will be protected by a polycarbonate, matte clear, lexan faceplate.

**4.4 Finish.** Finish on the sign housing shall be in powder coated matte black finish.

**5.0 LED Message Modules.**

**5.1 Components.** The LED message module shall consist of the following components:

- a) A rigid aluminum message plate.
- b) High intensity LED's.
- c) LED drive electronics.

**5.2 Mounting and Color.** The LED's shall be mounted in panel via mounted fixing clips. Each LED shall be individually serviceable with spares included from the same batch to assure color uniformity upon replacement. Arrow shall be white and the circle with a diagonal line across it/slash symbol should be red unless approved by the engineer. Door panels shall be flat black to maximize legibility when activated.

**5.3 Connections and Fasteners.** The signs shall be able to operate using 3c#16 electrical cable and all electrical connections shall be made via barrier-type terminal strip. All fasteners and hardware shall be corrosion resistant stainless steel.

**6.0 Warranty.** Signs shall be warranted to be free of defects due to material and workmanship for a period of at least two (2) years.

**7.0 Construction Requirements.** Construction requirements shall conform to Sec 1092.

**8.0 Method of Measurement.** Method of measurement shall conform to Sec 902.

**9.0 Basis of Payment.** Payment will be for 1 unit per bid item "902-99.02 – LED Blank-Out Sign". Payment will be considered full compensation for all labor, equipment and material to complete the described work. It should be noted that the 3c#16 cable isn't included in this pay item.

**XX. Retroreflective Backplates**

**1.0 Description.** This work shall consist of removing the existing traffic signal backplates and then furnishing and installing new traffic signal retroreflective backplates as noted on the plans and conform to the following standards.

**2.0 System Requirements.** Signal retroreflective backplates shall meet the minimum requirements for traffic signal backplates in Section 1092 of the Standard Specification in addition to the following:

**2.1** A yellow retroreflective strip with a two-inch width shall be placed along the perimeter of the front face of the signal backplate to project towards oncoming traffic a rectangular appearance at night.

**2.2** The retroreflective strip shall conform to Sec 1042.2.7.2 of the Standard Specifications.

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

**4.0 Method of Measurement.** The method of measurement shall conform to Sec 902.

**5.0 Payment.** Accepted traffic signal retroreflective backplates with yellow reflective tape will be paid at the contract unit price per each. Payment will be considered full compensation for all labor, equipment, and material to complete the work described.

| Item No.  | Unit | Description                |
|-----------|------|----------------------------|
| 902-99.02 | Each | Retroreflective Backplates |

YY. Remove In-Pavement Wireless Detection System

**1.0 Description.** The contractor shall remove the existing Sensys Travel Time Access Points (AP), repeaters and related devices inside the signal cabinet(s) at the below noted intersections, tag them properly and deliver those to MoDOT SL District Signal Shop at the Barrett Station Road Complex. All Sensys Travel Time-related cables shall be removed and disposed properly by the contractor. If the existing Sensys In-Pavement Sensors are being impacted by this project's pavement improvements, those pucks must be removed, disposed and the hole shall be filled properly by the contractor. If the pavement improvement is not impacting those In-pavement sensors, they can be left-in-place or covered by the new pavement.

| Intersection    | Direction | Lane | Sensors | AP | Repeater |
|-----------------|-----------|------|---------|----|----------|
| Weber/Elgin     | EB        | 1    | 7       | 1  | 1        |
|                 | EB        | 2    | 2       |    |          |
|                 | WB        | 1    | 7       |    |          |
|                 | WB        | 2    | 2       |    |          |
| Mackenzie       | EB        | 1    | 5       | 1  | 1        |
|                 | WB        | 1    | 5       |    |          |
| Eddie & Park    | EB        | 1    | 7       | 1  | 1        |
|                 | EB        | 2    | 2       |    |          |
|                 | WB        | 1    | 5       |    |          |
|                 | WB        | 1    | 5       |    |          |
| Lindbergh       | EB        | 1    | 5       | 1  | 1        |
|                 | WB        | 1    | 5       |    |          |
| I-270           | EB        | 1    | 5       | 1  | 0        |
|                 | WB        | 1    | 5       |    |          |
| Mauer/Rahning   | EB        | 1    | 7       | 1  | 1        |
|                 | EB        | 2    | 2       |    |          |
|                 | WB        | 1    | 7       |    |          |
|                 | WB        | 2    | 2       |    |          |
| MO 141          | EB        | 1    | 7       | 2  | 2        |
|                 | EB        | 2    | 2       |    |          |
|                 | WB        | 1    | 7       |    |          |
|                 | WB        | 2    | 2       |    |          |
| 7 Intersections | Totals:   |      | 103     | 8  | 7        |

## 2.0 Construction Requirements.

**2.1** The contractor **shall remove the existing** Sensys Travel Time Access Points (AP), repeaters and related devices inside the signal cabinet(s) at the noted intersections, tag them properly and deliver those to MoDOT SL District Signal Shop at the Barrett Station Road Complex. This work shall be coordinated with MoDOT SL District Signal Shop Supervisor.

**2.2** The existing Sensys Intersection Detection or Bluetooth Systems shall NOT be disturbed unless otherwise noted in the plans.

## 3.0 Measurement and Payment.

**3.1** Measurement and payment for items covered by this specification include the training, documentation, and acceptance testing, in addition to all materials and equipment necessary to restore the system to be fully operational. No direct pay for installation of any device or any epoxy required by the manufacturer to construct a fully functional system.

| Item Number | Type | Description                      |
|-------------|------|----------------------------------|
| 202-20.10   | LS   | Lump Sum Removal of Improvements |

## ZZ. Pot Holing Utility Facilities

**1.0 Description: Pot Holing Utility Facilities.** The Contractor shall notify the utility prior to potholing the utilities marked facility. The utility may want to have a representative on site to observe the contractor's pothole work. The Contractor shall be responsible to pothole any existing utility facility under the pavement or outside the pavement, to verify the utilities depth and location for all the Contractor's needs to construct the project. Core drilling pavement prior to pot holing for utilities may be necessary. Any potholed utility facility determined to conflict with construction of the work for the project, shall be brought immediately to the attention of MoDOT's area utility coordinator and the Engineer for the project. The Engineer will determine whether relocation of the utility is necessary to accommodate construction of the project or if the proposed work can be adjusted to avoid any utility relocation. The Contractor is responsible for the costs to repair any utility or MoDOT facility damaged by their work to pothole the utility.

A utility pothole unit shall be defined for this project as a single continuous excavation effort, by the Contractors chosen method, to expose a buried utility at the location marked by the utilities locator and approved by the Engineer. The excavation limits of a single pothole unit shall be any excavation taking place within a 2 feet radius around the center of the locate mark provided by the utilities locator, to a depth where either the utility has been satisfactorily exposed for the Engineer to see or to a depth where the search for the marked utility is terminated by the Engineer and the pothole location abandoned without exposing the utility.

**2.0 Basis of Payment.** All labor, equipment, materials and restoration necessary to pot hole and core drill to verify buried utilities shall be paid for under:

|           | Pay Item Number              | Unit |
|-----------|------------------------------|------|
| 902-99.02 | Potholing Utility Facilities | Each |

AAA. Backfilling of Utility Locates

**1.0 Description.** This work shall consist of backfilling all areas excavated for the purpose of locating underground utilities.

**2.0 Construction Requirements.** The contractor shall be responsible for backfilling all cavities and voids in areas excavated for the purpose of locating underground utilities in paved areas with flowable backfill as per Section 621.

**2.1** If the excavated area is less 2 square foot, any existing asphalt or concrete removed from the existing roadway, islands, shoulders, sidewalks, or medians, including underlying pavement, for the purpose of locating underground utilities shall be completely replaced in like kind by the contractor as directed by the engineer.

**2.2** If the excavated area is larger than 2 square foot, the contractor shall repair it as directed by the engineer.

**3.0 Basis of Payment.** No direct payment will be made to the contractor to recover the cost of equipment, labor, materials, or time required to fulfill the above provisions, unless specified elsewhere in the contract document.

BBB. Removal and Delivery of Adopt-A Highway Signs

**1.0 Description.** All Commission-owned Adopt-A-Highway signs shall be disassembled, stored, transported, and disposed of as specified herein by the **MoDOT maintenance** before sign installation for the **JSL0081** project. Sign supports, structures and hardware would be also removed as a part of that. If the signs/structures are not taken down by the **MoDOT maintenance**, the contractor needs to contact the appropriate Maintenance Building.

Teresa Gentry  
Phone: 314-343-7382

**2.0 Basis of Payment.** No payment would be made for this.

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

**1.0 General.**

**1.1 Description.** The contractor shall remove the existing CCTV Camera Assembly at the noted intersections (if applicable) and install a Contractor furnished IP (Internet Protocol) closed circuit television (CCTV) assembly on a new 4" x 20' extension metal pole (if there is no CL type pole at the noted location; this pole shall be paid separately) which will be mounted to the signal up-right pole (see detail drawing), and install a Contractor furnished power supply and surge protection in the new signal cabinet. Provide cable connecting the camera to the equipment in the cabinet and to ground, set up the camera assembly, and test for proper operation.

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

## **2.0 Materials.**

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

**2.2 CCTV Camera.** All CCTV cameras purchased and installed on this project shall be selected from the list below. These are the only CCTV cameras that are tested and fully functional with the current MoDOT ATMS (Advanced Traffic Management System):

| <b>CCTV Manufacturer</b>          | <b>Model</b>       | <b>Connection Type</b> |
|-----------------------------------|--------------------|------------------------|
| CostarHD (formerly known as Cohu) | 4220HD RISE 3 Dome | Outdoor cat5e          |
| Axis                              | Q6315-LE Dome      | Outdoor cat5e          |
| Bosch                             | Autodome 7000i     | Outdoor cat5e          |

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

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

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

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

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

## **3.0 Construction Requirements.**

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

**3.2** The contractor shall use the latest manufacture camera firmware.

**3.3** Install the dome so that the pole does not block the camera's view of traffic. Unless directed differently by the engineer, install the camera in the same position as the existing camera.

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

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

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

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

#### **4.0 Acceptance Testing.**

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

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

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

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

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

**DDD. CCTV Extension Pole Installation**

**1.0 Description.** Furnish and install a 20' x 4" extension pole to the existing signal upright pole as shown on the plans. CCTV Camera assembly installation is paid separately.

**2.0 Material.** See details in the plans. A metallic finish means a natural aluminum finish. Free from blemishes. The contractor shall demonstrate to the Engineer that the brackets are installed properly and bandings are tight to the signal and extension poles.

**3.0 Basis of Payment.** Measurement and payment for CCTV extension pole includes materials, installation and all miscellaneous hardware required for a fully operational system.

| Item No.  | Type | Description                              |
|-----------|------|------------------------------------------|
| 910-99.02 | Each | CCTV Extension Pole, 20' Metallic Finish |

**EEE. Contractor Furnished and Installed IP-Addressable Power Strip**

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

**2.0 Materials.** The IP-Addressable Power Strip(s) will be provided by the Contractor. All power strips purchased and installed on this project shall be selected from the list below.

| IP-Addressable Power Strip Manufacturer | Model            |
|-----------------------------------------|------------------|
| Digital Loggers, Inc.                   | Web Power Switch |
| APC                                     | AP7900B          |

**3.0 Installation Requirements.** The contractor shall mount the power strip on the back side of the ITS Type 7 ITS cabinet (or any open space of other ITS cabinets away from the door) and on any open space of the signal cabinet with the power cable facing away from the door or other devices. The old power strip as well as any other inactive devices, if present, should be removed to make room. If the contractor has any question regarding the inactive devices, they should contact MoDOT signal shop supervisor. The power source shall be hardwired to cabinet auxiliary breaker with no plug in to any cabinet outlet allowed.

**4.0 Acceptance Testing.** The Contractor shall contact MoDOT St. Louis ITS staff to verify remote communication to the power strip upon installation and while still on-site. They also shall

provide a list of devices and designated port assignments to the ITS group so they can update that port description in the Power Strip software.

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

| Item Number | Unit | Description                                             |
|-------------|------|---------------------------------------------------------|
| 910.99-02   | Each | Contractor Furnished and Installed IP-addressable Power |

#### FFF. Coordination With ITS Staff and Utility Locates

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

**1.1** MoDOT is a member of MO-One-Call System. Prior to any excavation or work within MoDOT Right-Of-way, the contractor must contact MO-One Call at 1-800-DIG-RITE and request for Utility Locates within noted project limits. If the scope of work contains modification, addition and/or expansion of existing underground MoDOT ITS, lighting, or signal facilities, the contractor must notify the MoDOT Utilities Locate staff prior to any work, in order for MoDOT to update MoDOT utility location records with Missouri One Call.

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

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

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

#### GGG. Fiber Optic Cable

**1.0 Description.** This work shall consist of installing, splicing, and terminating fiber optic cables. The fiber optic cable may be new or existing cable relocated as shown on the plans. Fiber optic cable relocation requires existing cable to be removed from an existing conduit system and

installed in a new or existing conduit system per plans. Relocated cable must be carefully removed from the existing conduit system without being damaged. No direct pay shall be paid for relocating the existing fiber optic cable into new ITS or signal cabinet. If the existing fiber cable is removed, that length shall be paid separately per plans.

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

**2.1 Cable.** Fiber optic cable shall be of loose tube construction. Provide certification by an independent testing laboratory that the cable meets all requirements of Rural Utilities Service Bulletin 1753F-601a *Minimum Performance Specification for Fiber Optic Cables* ([https://www.rd.usda.gov/files/UTP\\_Bulletins\\_1753F-601a.pdf](https://www.rd.usda.gov/files/UTP_Bulletins_1753F-601a.pdf)). The cable shall be gel free, all dielectric, and have 12 fibers per tube. The cable sheath shall have length markings in feet, and shall indicate that the unit of measure is feet. The cable shall have single mode fibers whose attenuation does not exceed 0.35 dB/km and 0.25 dB/km for 1310 nm and 1550 nm signals, respectively. The optical fibers used in the cable shall meet or exceed the International Telecommunication Union ITU-T G.652.D requirements.

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

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

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

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

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

**2.6.1** The enclosure shall be made of powder-coated metal. It shall have provisions for cable strain relief and for connector labeling. The enclosure's patch panel shall have at least 24 positions. Provide enough splice trays for all splices made in the interconnect center. Provide patch panel modules that are compatible with the connectors specified in section 2.3 of this provision.

**2.6.2 Wall-Mounted Interconnect Center.** The enclosure shall be designed for wall or panel mounting and occupy no more than 350 square inches of wall space. It shall have a gasketed,

hinged door. It shall hold at least six splice trays. These enclosures are typically used in signal cabinets.

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

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

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

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

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

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

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

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

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

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

**2.9.4** The closure shall accommodate 144 single mode fiber splices.

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

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

**2.9.7** Designed for butt splicing.

**2.9.8** No encapsulated materials shall be allowed.

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

### **3.0 Construction Requirements.**

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

### **3.2 Cable Installation.**

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

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

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

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

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

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

**3.2.7** Use an approved lubricant, in the amount recommended by the cable manufacturer, to facilitate pulling the cable. After the cable has been installed, wipe the exposed cable in a pull

box, junction box, or cabinet clean of cable lubricant with a cloth before leaving the pull box, junction box, or cabinet.

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

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

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

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

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

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

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

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

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

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

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



Acceptable



Unacceptable

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

**3.7.1** In addition, ensure that several of the contractor's team are always on site during the fiber optic cable installation and fiber optic splicing work until successful completion of the work. The contractors team members shall be approved by the engineer and have at least two years of experience in the installation, splicing and testing of the fiber optic cable. Any substitution of this individual shall be approved by the engineer. The engineer may stop the work activity on this project as a result of the absence of these on-site personnel from the project and may continue to charge time to the contractor and will not grant a time extension.

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

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

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

#### **4.0 Acceptance Testing.**

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

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

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

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

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

- c) Calibrate an optical loss test set and provide evidence satisfactory to the engineer that the set produces accurate results at both wavelengths. This can be a demonstration that the set correctly measures the loss of a test fiber whose loss is known.
- d) Use the test set to measure the loss of the link under test. Record the result at both 1310 nm and 1550 nm. Arrange for the engineer or his representative to witness these tests.
- e) If the measured loss exceeds the calculated maximum, use an optical time domain reflectometer and other test equipment to troubleshoot the link. Take whatever

corrective action is required, including cable replacement, to achieve a loss less than the calculated maximum.

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

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

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

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

| Item No.  | Type | Description                      |
|-----------|------|----------------------------------|
| 910-99.02 | Each | Fiber Optic Fusion Splice        |
| 910-99.02 | Each | Fiber Optic Pigtail              |
| 910-99.02 | Each | Fiber Optic Jumper               |
| 910-99.02 | Each | Wall-Mounted Interconnect Center |

#### HHH. MoDOT ITS Assets Relocation

**1.0 Description.** The work consist of relocating existing MoDOT Intelligent Transportation System (ITS) facilities (conduit, cable, and/or pull boxes) that may be in conflict with this project construction sections as noted in the plans or in case of conflict with other MoDOT facilities.

**2.0 Materials.** The materials used for relocating MoDOT ITS facilities shall be per MoDOT Approved Product List (APL) and meet all MoDOT Specifications. If the material is not in the APL, the contractor shall submit material specification documents to the Engineer and the MoDOT ITS group (via an email in advance to [SLITS@modot.mo.gov](mailto:SLITS@modot.mo.gov)) for review and approval.

**3.0 Construction Requirements.** The Contractor shall be aware there are numerous utilities present along the route in this contract. Utility locates were not performed during the design phase of the project; therefore, the extent of conflicts with utilities are unknown.

**3.1** The contractor shall exercise reasonable care relocating MoDOT ITS Assets. Damage to any MoDOT facilities within the area of work caused by the contractor will be deemed by the Engineer as either “non-emergency” or “emergency” upon notification of the damages. Repair to damages will be performed as follows:

- a) Non-Emergency: Contractor will have 4 hours to propose a repair plan to the Engineer for a complete repair within 3 business days.
- b) Emergency: Upon notification of the damage, Contractor must immediately submit a repair plan to the Engineer which will take no more than 4 hours to respond on-site and complete repairs within 48 hours of notification of damage.
- c) In either case, if the proposed plan is unacceptable for any reason to MoDOT, repairs will be made by MoDOT with all costs billed to the Contractor.

**3.2** The ITS In-Ground Facilities located within the project limits are a crucial part of the traffic operation system for this area. It is imperative that the downtime be kept to a minimum when replacing, removing, or modifying any existing ITS In-Ground Facilities.

**3.3** Prior to any in-ground work, the Contractor shall request for utility locates by contacting Missouri One Call (1-800 DIG-RITE or mo1call.com) for any in-ground installation locations as per plans. If there are any conflicts with MoDOT ITS Assets, the Contractor is responsible for relocation to the satisfaction of the Engineer prior to any in-ground work.

**3.4** In the case of a conduit conflict, the Contractor shall trench an area beyond the in-ground work limits, install one or two conduits (must be the same quality as the existing conduit) using Split Duct Method, relocate the existing cables into the new conduit, and seal the conduit joints per manufacturer specifications.

**3.5** The Contractor shall coordinate this work with the MoDOT ITS group and have the Engineer's approval prior to performing this task.

**3.6** The contractor shall perform a fiber testing (see below requirements) before and after relocating MoDOT fiber cables at the nearest Node Cabinet at each site as shown on the plans and submit that report to the SLITS Group for review and approval.

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

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

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

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

- c) Calibrate an optical loss test set and provide evidence satisfactory to the engineer that the set produces accurate results at both wavelengths. This can be a demonstration that the set correctly measures the loss of a test fiber whose loss is known.

- d) Use the test set to measure the loss of the link under test. Record the result at both 1310 nm and 1550 nm. Arrange for the engineer or his representative to witness these tests.
- e) If the measured loss exceeds the calculated maximum, use an optical time domain reflectometer and other test equipment to troubleshoot the link. Take whatever corrective action is required, including cable replacement, to achieve a loss less than the calculated maximum.

**3.6.02 Test Result Documentation.** Prepare a diagram 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 5 copies of this diagram to the engineer, along with the calculations for the maximum allowable loss. Submit the diagrams and calculations in an electronic format acceptable to the engineer.

**3.6.03 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.

**3.6.04 Certifications.** The 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.

**3.7** The Contractor shall trench an area beyond the in-ground work limits, install one or two conduits (must be the same quality as the existing conduit) using Split Duct Method, relocate the existing cables into the new conduit, and seal the conduit joints per manufacturer specifications.

**3.8** Upon completion of this work, the Contractor shall contact the MoDOT ITS group (via email at [slits@modot.mo.gov](mailto:slits@modot.mo.gov)) to verify that all existing MoDOT ITS devices are online and request inspection of this work. Acceptance of this work shall be the sole judgment of the Engineer and the MoDOT ITS group's engineer.

**3.9** The contractor shall restore those areas disturbed by this work or installation according to specifications herein.

**4.0 Basis of Payment.** Payment for "MoDOT ITS Assets Relocation" shall be paid as Linear Feet and shall include the trenching, conduit installation, conduit coupling, pull boxes, sealing materials, cable relocation, needed fiber testing, restoration of all disturbed area, all labor and work incidental thereto, and shall be considered to be completely covered by the contract unit price for the following pay item:

| Item No.  | Unit        | Description                 |
|-----------|-------------|-----------------------------|
| 910-99.03 | Linear Feet | MoDOT ITS Assets Relocation |

### III. Dynamic Message Sign Replacement

**1.0 Description of Work.** Replace existing dynamic message sign (DMS) with a Contractor furnished full color/full matrix display DMS. Install the new DMS on the existing sign structure. The DMS display shall have a pixel pitch of 20 mm. The sign controller shall be installed in an

existing equipment cabinet. Provide a multimode fiber optic communications cable connecting the DMS to the sign controller in the equipment cabinet. Connect the sign and controller to power, communication and ground. The contractor shall install, configure, and test the DMS for proper operation with assistance from the manufacturer's representative.

The existing signs to be replaced are two Ledstar full matrix DMS with amber LEDs. The existing signs have 27 x 110 66 mm pixel displays. The two DMS are mounted back-to-back on one structure.

The contractor shall coordinate this work with MoDOT St. Louis District ITS group by emailing [SLITS@modot.mo.gov](mailto:SLITS@modot.mo.gov) or calling the ITS group at 314-275-1524 to verify DMS can be operated by MoDOT ATMS (Advanced Traffic Management System).

## **2.0 Materials.**

**2.1 General.** All materials furnished, assembled, fabricated, or installed shall be new products and approved by the engineer. All internal and external components shall be manufactured from corrosion resistant material. Dissimilar metals shall be separated by an inert dielectric material. Sign components shall be capable of operating without any decrease in performance over a temperature range of -30°F to 165°F (-34°C to 74°C) with a relative humidity of up to 90 percent non-condensing.

**2.2 Display Size.** The sign display shall provide at a minimum an 80 rows x 288 columns pixel matrix of 20 mm pixels.

**2.3 Housing.** The sign housing shall be front access. The sign housing shall meet the requirements of NEMA TS4 2016, Section 3.2.8.

**2.3.1 Dimensions and Weight.** The maximum exterior dimensions and weight of the DMS shall be as follows:

6'-9" (H) x 19'-11" (W) and 2,000 lbs.

**2.3.2 Enclosure.** The sign housing external skin shall be constructed of aluminum alloy 5052 H32 that is a minimum of 0.125 inch thick. All exterior, excluding the sign face, and all interior housing surfaces shall be natural aluminum mill finish. The interior structure shall be constructed of aluminum. No internal frame connections or external skin attachments shall rely upon adhesive bonding or rivets. The sign enclosure shall meet the requirements of NEMA TS4 2016, Section 3.1.1. All drain holes and other openings in the sign housing shall be screened to prevent the entrance of insects and small animals.

**2.3.3 Design.** The sign housing shall comply with the fatigue resistance requirements of the sixth-edition American Association of State Highway and Transportation Officials (AASHTO) Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals with current addendums. Design and construct the DMS unit for continuous usage of at least 20 years and the sign housing for a 50-year design life.

**2.3.4 Hoist Points.** The top of the housing shall include multiple galvanized or stainless steel lifting eyebolts or equivalent hoisting points. Hoist points shall be positioned such that the sign remains level when lifted. Ensure that the hoist points and sign frame allow the sign to be shipped,

handled and installed without damage. Hoist points shall be attached directly to structural frame members by the sign manufacturer.

**2.3.5 Fabrication.** The sign shall be fabricated, welded and inspected in accordance with the requirements of the current American National Standard Institute/American Welding Society (ANSI/AWS) Structural Welding Code-Aluminum. Exterior seams and joints, except the finish coated face pieces, shall be continuously welded using an inert gas welding method. Limit the number of seams on the top of the housing to a maximum of three. Stitch weld the exterior housing panel material to the internal structural members to form a unitized structure.

**2.3.6 Mounting Assembly.** Exterior mounting assemblies shall be fabricated from aluminum alloy 6061-T6 extrusions a minimum of 0.1875 inch thick. For the DMS, include a minimum of three 6061-T6 structural aluminum Z members on the rear of the sign housing. The number of Z members shall be sufficient for mounting the sign on the two post structure shown in the plans. These structural members shall run parallel to the top and bottom of the sign housing and are each a single piece of material that spans the full length of the sign. These structural members shall be attached to the internal framework of the sign.

**2.3.7 U-Bolts.** Provide galvanized or stainless steel U-bolts of sufficient size to attach the Z member to the DMS structure posts.

**2.4 Housing Face.** The sign face surfaces shall be finished with a matte black coating system that meets or exceeds American Architectural Manufacturers Association (AAMA) Specification No. 2605. Provide certification that the sign face parts are coated with the prescribed thickness. The sign face shall include a contrast border that meets the requirements of NEMA TS 4-2016, Section 3.1.6. No exposed fasteners shall be allowed on the housing face. Display modules shall be easily and rapidly removed from within the sign without disturbing adjacent display modules. If the sign includes external fascia panels, they shall be constructed using aluminum. Finish each fascia panel with a matte black coating system that meets or exceeds AAMA Specification No. 2605. The sign shall be resistant, either by active or passive subsystem, to fog and frost on the front face.

**2.5 Lens Panel Assembly.** If sign includes lens panel assemblies, they shall be modular in design, removable and interchangeable without misalignment of the lens panel and the light-emitting diode (LED) pixels. The lens panel assembly must consist of an environmental shielding layer coating to protect and seal the LEDs and internal electronics. The coating shall be a minimum 90 percent ultraviolet (UV) opaque. Lens panels must have a matte black coating that meets or exceeds AAMA Specification No. 2605. The mask shall be perforated to provide an aperture for each pixel on the display module. The apertures shall not block the LED output at the required viewing angle.

**2.6 Sign Housing Ventilation System.** The ventilation system must meet the requirements of NEMA TS 4-2016, Section 3.1.2. Air drawn into the sign shall be filtered upon entry. The ventilation system shall be testable on command from remote and local control access locations. The sign shall include a sensor or a sensor assembly to monitor airflow volume to predict the need for a filter change. All ventilation system fans shall be new. The ventilation system fans shall have a 60,000-hour, L10-life rating. The sign controller shall continuously measure and monitor the temperature sensors. The sign shall blank when a critical temperature is exceeded and will report this event when polled. All temperature measurements from the sign controller shall be readable remotely. Humidity sensors shall detect from 0 to 100 percent relative humidity in 1 percent or smaller increments. Sensors shall operate and survive in 0 to 100 percent relative

humidity, and have an accuracy that is better than plus or minus 5 percent relative humidity. A humidistat is not acceptable.

**2.7 Photo Sensors.** The sign shall meet the requirements of NEMA TS 4-2016, Section 9.1.3.1. The photo sensors shall provide accurate ambient light condition information to the sign controller for automatic light intensity adjustment. The automatic adjustment of the LED driving waveform duty cycle shall occur in small enough increments that the sign's brightness changes smoothly, with no perceivable brightness change between adjacent levels. Stray headlights shining on the photoelectric sensor at night shall not cause LED brightness changes.

**2.8 Display Modules.** Provide display modules manufactured by one source and fully interchangeable throughout the manufacturer's sign systems. Removal or replacement of a complete display module or LED board can be accomplished without the use of special tools. Removal or failure of any display module shall not affect the operation of any other display module or sign component. Display modules shall contain solid-state electronics needed to control pixel data and read pixel status. The sign shall have a full matrix display area as defined in the glossary of NEMA TS 4-2016. The brightness and color of each pixel shall be uniform over the sign's entire face within a 30-degree viewing angle in all lighting conditions.

**2.9 LED and Pixel.** The LED lamps shall have a minimum viewing angle of 30 degrees. All pixels in all signs in a project shall have equal color and on-axis intensity. The sign display shall meet the luminance requirements of NEMA TS 4-2016, Section 5.4, for light emitting signs connected at full power. Provide LED brightness and color bins that are used in each pixel to the engineer for approval. The LED manufacturer shall demonstrate testing and binning according to the International Commission on Illumination (CIE) 127 (1997) standard. All LEDs shall operate within the LED manufacturer's recommendations for typical forward voltage, peak pulsed forward current and other ratings. Component ratings shall not be exceeded under any operating condition. Provide a pixel test as a form of status feedback to the traffic management center (TMC) from the local sign controller. The operational status of each pixel in the sign can be automatically tested once a day. The pixel status test shall determine the functional status of the pixel as defined by the pixel Failure Status object in National Transportation Communications for ITS Protocol (NTCIP) 1203v0239 and shall not affect the displayed message for more than half a second. The LEDs shall be individually mounted directly on a printed circuit board (PCB).

**2.10 Display Optical, Electrical and Mechanical.** The display modules shall be rectangular and have an identical vertical and horizontal pitch between adjacent pixels. The separation between the last column of one display module and the first column of the next module shall be equal to the horizontal distance between the columns of a single display module. The pitch shall be 20 mm. All components on the LED side of PCBs shall be black. There shall be a minimum of two power supplies that are wired in a parallel configuration for redundancy, so that if one or 25 percent of the supplies in a group, whichever is greater, completely fails, the sign shall still be supplied with enough power to run 40 percent of all pixels at a 100 percent duty cycle with an ambient operating temperature of 165°F. The sign controller shall continuously measure and monitors all LED module power supply voltages and provides the voltage readings to the TMC central ATMS or a laptop computer on command. The LEDs shall be protected from external environmental conditions, including moisture, snow, ice, wind, dust, dirt and UV rays. Do not use epoxy to encapsulate the LEDs. Removal of one or more display modules shall not affect the structural integrity of any part of the sign.

**2.11 Characters, Fonts, and Color.** The display area shall be capable of displaying three lines of 16 characters using an 18-inch font that meets the height-to-width ratio and character spacing

in the Manual on Uniform Traffic Control Devices for Streets and Highways 2009 Edition (MUTCD), Section 2L.04, Paragraphs 05, 06, and 08. The signs shall be capable of displaying American Standard Code for Information Interchange (ASCII) characters 32 through 126, including all uppercase and lowercase letters and digits 0 through 9, at any location in the message line. The sign must be loaded (as a factory default) with a font in accordance with or that resembles the standard font set described in NEMA TS 4-2016, Section 5.6. The sign shall also be loaded (as a factory default) with a font set that resembles the Federal Highway Administration (FHWA) Series E Modified 2000 standard font. Signs shall display the colors prescribed in the MUTCD, Section 1A.12.

**2.12 Power Supply.** The sign shall meet the requirements of NEMA TS 4-2016, Section 10.2 and shall operate from a 120/240 VAC, 60Hz, single-phase power source. Locate all 120 VAC wiring in conduit, pull boxes, raceways or control cabinets as required by the National Electrical Code (NEC). No 120 VAC wiring shall be exposed inside or outside of the sign housing. Do not use the sign housing as a wiring raceway or control cabinet. Provide Type THHN/THWN-2 or XHHW-2 power cables sized as required by the NEC for acceptable voltage drops while supplying alternating current from the existing cabinet to the sign. Provide surge protective devices (SPD) installed or incorporated in the sign system by the manufacturer to guard against lightning, transient voltage surges, and induced current. The SPDs shall protect all electric power and data communication connections.

**2.13 Sign Controller.** The sign controller shall monitor the sign in accordance with NEMA TS 4-2016, Section 9. The sign shall monitor the status of any photocells, LED power supplies, humidity and airflow sensors. The sign controllers shall use fiber optic cables for data connections between the sign housing and ground-level cabinet. The sign controller within ground cabinets shall be rack-mountable, designed for a standard EIA-310 19-inch rack and include a keypad and display.

**2.14 Sign Controller Communications Interface.** The sign controller shall have communication interfaces in accordance with NEMA TS 4-2016, Section 8.3.2. The sign controller shall have a 10/100 Base TX 8P8C port and EIA-232 serial interface. The EIA-232 serial interface shall support the following:

- Data Bits - 7 or 8 bits
- Parity - Even, Odd, or None
- Number Stop Bits - or 2 bit

Switching between Ethernet and serial operation shall not require sign controller software or hardware modifications. The TMC central ATMS or a laptop computer shall be able to remotely reset the sign controller.

**2.15 Message and Status Monitoring.** The DMS shall provide two modes of operation: (1) remote operation, where the TMC central ATMS commands and controls the sign and determines the appropriate message or test pattern; and (2) local operation, where the sign controller or a laptop computer commands and controls the sign and determines the appropriate message or test pattern. The sign shall provide for local or remote sign control to be selected. There shall be a visual indicator on the controller that identifies whether the sign is under local or remote control. The sign controller shall be able to select a blank message or any one of the messages stored in the sign controller's nonvolatile memory when the control mode is set to local. The sign controller shall activate the selected message. The sign shall be programable to display a user-defined message, including a blank page, in the event of power loss. Remotely from the TMC central ATMS or from a local laptop computer message additions, deletions and sign controller changes

can be made. Each font shall be customizable, and modifications to a font may be downloaded to the sign controller from the TMC central ATMS or a local laptop computer at any time without any software or hardware modifications. No perceivable flicker or ghosting of the pixels during sign erasure and writing periods shall be visible.

**2.16 TMC Communications.** The sign controller shall be addressable by the TMC central ATMS through the Ethernet communications network using software that complies with the NTCIP 1101 base standard (formerly the NEMA TS 3.2 -1996 standard), including all amendments as published at the time of contract letting, the NTCIP Simple Transportation Management Framework, and conforms to Compliance Level 1. The sign shall comply with the NTCIP 1102v01.15, 2101 v01.19, 2103v02.07, 2201v01.15, 2202 v01.05 and 2301v02.19 standards. The sign shall also comply with NTCIP 1103v02.17, Section 3. The controller's internal time clock shall be configurable to synchronize to a time server using the network time protocol (NTP). NTP synchronization frequency must be user-configurable and permit polling intervals from once per minute to once per week in one-minute increments. The controller shall allow the user to define the NTP server by internet protocol (IP) address.

**2.17 Central Software Compatibility.** The sign controller shall be compatible with the central ATMS software protocol for sign functionality, which is compliant with NTCIP 1203 version 3.

**2.18 Sign Control Software.** Computer software from the manufacturer shall be provided that allows an operator to program, operate, exercise, diagnose and read current status of all sign features and functions using a laptop computer. The sign control software shall provide a graphical representation that visibly depicts the sign face and the current ON/OFF state of all pixels, as well as allows messages to be created and displayed on the sign. The laptop computer and sign shall be able to communicate when connected directly by an EIA-232 cable and via Ethernet. The software shall allow communication between multiple users and multiple signs across the same communication network.

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

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

### **3.0 Construction Requirements.**

**3.1** Examine DMS carefully to verify that the materials, design, construction, markings, and workmanship comply with all applicable standards, specifications and requirements.

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

**3.3** The contractor shall mount the DMS to the sign structure in accordance with the manufacturer's recommendations. The manufacturer shall have an on-site representative for sign commissioning. Do not provide initial power to the sign without the permission of the manufacturer's representative.

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

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

**3.6** Install the new power conductor and fiber optic communications cables between the new roadside cabinet and the sign housing. Connect the new and existing cabling in the sign.

#### **4.0 Testing.**

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

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

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

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

#### **5.0 Warranty.**

**5.1** Provide a one year manufacture warranty for parts and material that begins when the project is accepted.

#### **6.0 Documentation.**

**6.1 Electronic Equipment.** Provide documentation for electronic equipment. Provide operational manuals, troubleshooting and service manuals, assembly and installation instructions and warranty information. The manufacturer shall grant MoDOT a license that allows for use and internal distribution of any and all sign communications protocols, operating systems, drivers and documentation.

**6.2 As-Built Drawings.** Provide drawings illustrating the equipment locations, conduit routing and display module attachment. A wiring diagram shall also be provided for the new electrical and communications wiring.

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

| Item No.  | Type | Description                               |
|-----------|------|-------------------------------------------|
| 910-99.02 | Each | Arterial Dynamic Message Sign Replacement |
| 910-99.03 | LF   | Multimode Fiber Optic Cable               |

#### JJJ. Protection of BNSF Railway Company Interests

To Report an Emergency on the railroad call: (800) 832-5452  
 St. Louis Co. Rte. 30/Gravois Road, US DOT# 663833E MP 11.1 BNSF  
 River Subdivision in St. Louis, MO. **Current FRA data shows 3  
 daytime trains and 2 nighttime trains and 0 passenger trains.**

#### **1.0 Authority of Railroad Engineer and Commission's Representative.**

**1.1** The authorized representative of BNSF Railway Company, herein called "Railroad Engineer", shall have final authority in all matters affecting the safe maintenance and operation of railroad traffic including the adequacy of the foundations and structures supporting the railroad tracks.

**1.2** The authorized representative of the Missouri Highways and Transportation Commission, herein called "Engineer", shall have authority over all other matters as prescribed herein and in the project specifications.

#### **2.0 Contractor's indemnity Obligations to the Railroad.**

**2.1** The term "contractor" as used in this special provision includes any and all subcontractors. The contractor shall indemnify, defend and hold harmless the Railroad from and against any and all loss, damage, claims, demands, causes of action, costs and expenses of whatsoever nature arising out of injury to or death of persons whomsoever, or out of damage to or destruction of property whatsoever, including, without limitation, damage to fiber optic, communication and other cable lines and systems, where such injury, death, damage or destruction results from any cause arising out of work performed by the contractor pursuant to the agreement between Railroad and the Commission for the project, and shall also release the Railroad from and shall waive any claims for injury or damage to equipment or other property, which may result from the construction, maintenance and operation of railroad tracks, wire lines, fiber optic cable, pipe lines and other facilities on said right of way of the Railroad by the contractor. **THE LIABILITY ASSUMED BY THE CONTRACTOR WILL NOT BE AFFECTED BY THE FACT, IF IT IS A FACT, THAT THE DAMAGE, DESTRUCTION, INJURY, DEATH, CAUSE OF ACTION OR**

**CLAIM WAS OCCASIONED BY OR CONTRIBUTED TO BY THE NEGLIGENCE OF THE RAILROAD, THE RAILROAD'S AGENTS, SERVANTS, EMPLOYEES OR OTHERWISE, EXCEPT TO THE EXTENT THAT SUCH CLAIMS ARE PROVEN BY ANY CLAIMANT TO HAVE BEEN PROXIMATELY CAUSED BY THE INTENTIONAL MISCONDUCT OR SOLE OR GROSS NEGLIGENCE OF THE RAILROAD.** The contractor's indemnity shall include loss of profits or revenue arising from damage or destruction to fiber optic, communication and other cable lines and systems.

**2.2** In addition to the indemnity obligations contained in the preceding paragraph, the contractor shall indemnify, defend and hold harmless the Railroad from any claims, expenses, costs, actions, demands, losses, fines, penalties, and fees, of whatsoever nature arising from, related to or connected, in whole or in part, with the following:

- (a) The removal of the contractor's agents, servants, employees or invitees from the Railroad's property for safety reasons.
- (b) Contractor's compliance or failure to comply with the provision of applicable law in connection with the performance of contractor's work.

### **3.0 Notice of Starting Work.**

**3.1** The contractor shall not commence any work on Railroad's right of way until the contractor has complied with the following conditions:

- (a) The contractor shall be required to apply for, execute and comply with all provisions of a permit obtained by accessing the following link: <http://bnsf.railpermitting.com>

**3.2** The Railroad's written authorization to proceed with the work, with a copy to the Engineer, will include the names, addresses and telephone numbers of the Railroad's representatives who are to be notified as hereinafter required. Where more than one representative is designated, the area of responsibility of each representative shall be specified.

### **4.0 Interference with Railroad Operations.**

**4.1** The contractor shall arrange and conduct all work so that there shall be no interference with the Railroad's operations, including train, signal, telephone and telegraphic services; or damage to the Railroad's property; poles, wires and other facilities of tenants, licensees, easement grantees and invitees on the Railroad's right of way. Whenever work may affect the operations or safety of trains, the method of doing such work shall first be submitted to the Railroad Engineer for approval, but such approval shall not relieve the contractor from liability. Any work to be performed by the contractor that requires flagging service or inspection service shall be deferred by the contractor until the flagging service required by the Railroad is available at the job site.

**4.2** Whenever work within the Railroad's right of way is of such a nature that impediment to the Railroad's operations is unavoidable, such as use of runaround tracks or necessity for reduced speed, the contractor shall schedule and conduct these operations so that such impediment is reduced to the absolute minimum.

**4.3** Should conditions arising from, or in connection with the work require that immediate and unusual provisions be made to protect the Railroad's operations and property, the contractor shall make such provisions. If in the judgment of the Railroad Engineer, or the Engineer if the Railroad

Engineer is absent, such provision is insufficient, the Railroad Engineer or Engineer may require or provide such provisions as deem necessary. In any event, such provisions shall be at the contractor's expense and without cost to the Railroad or the Commission.

**4.4** The contractor shall be responsible for any damage to the Railroad as a result of work on the project, which shall include but not be limited to interference with the normal movement of trains caused exclusively by the work performed by the contractor. The contractor shall be responsible for damages for the Railroad's train delays that are caused exclusively by the contractor. The Railroad agrees not to perform any act to unnecessarily cause any train delay. The damages for train delays per freight hour will be billed at an average rate per hour as determined from the Railroad's records. These records shall be provided by the Railroad, upon request, to the Commission or the Commission's contractor.

## **5.0 Track Clearances.**

**5.1** The minimum track clearances to be maintained by the contractor during construction are shown on the project plans. However, before undertaking any work within Railroad's right of way, or before placing any obstruction over any track, the contractor shall:

- (a) Notify the Railroad Engineer at least 72 hours in advance of the work.
- (b) Receive assurance from the Railroad Engineer that arrangements have been made for flagging service as may be necessary.
- (c) Receive permission from the Railroad Engineer to proceed with the work.
- (d) Ascertain that the Engineer has received copies of notice to the Railroad and of the Railroad's response.

**5.2** The contractor shall fully comply with any horizontal and vertical clearance requirements imposed by Missouri state statutes and regulations and Federal statutes and regulations regarding the placement of structures or equipment near or over railroad tracks.

## **6.0 Construction Procedures.**

**6.1 General.** Construction work on the Railroad's property shall be:

- (a) Subject to the inspection and review of the Railroad.
- (b) In accordance with the Railroad's written outline of specific conditions.
- (c) In accordance with this special provision.
- (d) Care shall be taken to avoid damage to concrete crossing panels. Milling within two (2) feet of concrete crossing planks shall be done manually or using specific machinery for fine mill work such as a milling attachment on a skid-steer or other means and methods approved by the engineer.**

**6.2 Excavation.** The subgrade of an operated track shall be maintained with the berm edge at least 12 feet from centerline of track and not more than 26 inches below top of the rail. The contractor will not be required to make existing section meet this specification if substandard, in

which case the existing section will be maintained. The contractor shall cease all work and notify the Railroad immediately before continuing excavation in the work area if obstructions are encountered which do not appear on the drawings. If the obstruction is a utility and the owner of the utility can be identified, then the contractor shall also notify the owner immediately. If there is any doubt about the location of underground cables or lines of any kind, no work shall be performed until the exact location has been determined. There will be no exceptions to these instructions. Additionally, all excavations shall be conducted in compliance with applicable Occupational Safety and Health Act regulations and, regardless of depth, shall be shored where there is any danger to tracks, structures or personnel. Any excavations, holes or trenches on the Railroad's property shall be covered, guarded and/or protected when not being worked on. When leaving work site areas at night and over weekends, the areas shall be secured and left in a condition that will ensure that Railroad's employees and other personnel who may be working or passing through the area are protected from all hazards. All excavations shall be back filled as soon as possible.

**6.3 Excavation for Structure.** The contractor shall be required to take special precaution and care in connection with excavating, shoring pits and in driving piles for footings adjacent to tracks to provide adequate lateral support for the tracks and the loads which the tracks carry, without disturbance of track alignment and surface, and to avoid obstructing track clearances with working equipment, tools or other material. The procedure for doing such work, including need of and plans for shoring, shall be approved by the Railroad Engineer before work is performed, but such approval shall not relieve the contractor from liability. Before submission of plans to the Railroad Engineer for approval, the Engineer will first review such plans in accordance with the Missouri Standard Specifications for Highway Construction, hereinafter called "Standard Specifications". The responsibility for the design and construction of the sheeting rests solely with the contractor. The temporary shoring along the railroad tracks shall be designed for the Cooper E80 loading. The design shall insure that the shoring is braced or substantially securely to prevent movement. The contractor shall submit plans for the temporary shoring that shall be signed, sealed, and stamped in accordance with the laws relating to Architects and Professional Engineers, Chapter 327, RSMo. and then submitted for review by the Engineer.

**6.4 Demolition of Existing Structures.** The contractor shall be required to take special precaution and care in connection with demolition of existing structures. The procedure for doing such work, including need of and plans for temporary falsework, shall first be approved by Railroad Engineer before work is performed, but such approval shall not relieve the contractor from liability. Before submission of plans to the Railroad Engineer for approval, the Engineer will first review such plans.

**6.5 Falsework.** The contractor shall be required to take special precaution and care to prevent any material from falling on the Railroad's right of way. The procedure for preventing material from falling, including need of and plans for temporary falsework, shall first be approved by the Railroad Engineer, but such approval shall not relieve the contractor from liability. Before submission of plans to the Railroad Engineer for approval, the Engineer will first review such plans.

## **6.6 Blasting.**

**6.6.1** The contractor shall obtain advance approval of the Railroad Engineer and the Engineer for use of explosives on or adjacent to the Railroad's property. If permission for use of explosives is granted, the contractor shall be required to comply with the following:

(a) Blasting shall be done with light charges under the direct supervision of a responsible officer or employee of the contractor.

(b) Electric detonating fuses shall not be used because of the possibility of premature explosions resulting from operation of two-way train radios.

(c) No blasting shall be done without the presence of the Railroad Engineer. At least 72 hours advance notice to the person designated in the Railroad's notice of authorization to proceed as mentioned in Section 2.2 of this job special provision, the contractor shall be required to arrange for the presence of the Railroad Engineer and such flagging as the Railroad may require.

(d) The contractor shall have at the job site adequate equipment, labor and materials and allow sufficient time to clean up debris resulting from the blasting without delay to trains, as well as correcting, at contractor's expense, any track misalignment or other damage to the Railroad's property resulting from the blasting as directed by the Railroad Engineer. If contractor's actions result in delay of trains, the contractor shall bear the entire cost thereof.

**6.6.2 The Railroad Engineer will:**

(a) Determine the approximate location of trains and advise the contractor the approximate amount of time available for the blasting operation and clean-up.

(b) Have the authority to order discontinuance of blasting if blasting is too hazardous or is not in accordance with this special provision.

**6.7 Maintenance of Railroad Facilities.** The contractor shall be required to maintain all ditches and drainage structures free of silt or other obstructions which may result from contractor's operations. The contractor shall promptly repair eroded areas within Railroad's right of way and repair any other damage to the Railroad's property, tenants, licensees, easement grantees and invitees. All such maintenance and repair of damages due to the contractor's operations shall be done at the contractor's expense.

**6.8 Storage of Materials and Equipment.**

**6.8.1** The contractor shall not store or stockpile construction materials or equipment closer than 25 feet to the centerline of the nearest railroad track or on the Railroad's property not covered by construction easement, contractor's permit, lease or agreement. Additionally, the contractor shall not store or leave materials or equipment within 250 feet of the edge of any highway/rail at-grade crossings. Further, both sides of a main track shall remain unobstructed for a distance of 10 feet from the exterior edge of the track at all times to allow for stopped train inspection.

**6.8.2** Machines or vehicles shall not be left unattended with the engine running. Parked machines or equipment shall be in gear with brakes set and with blade, pan or bucket lowered to the ground if so equipped. All grading or construction machinery that is left parked near the track unattended shall be effectively immobilized so that unauthorized persons cannot move such equipment.

**6.9 Cleanup.** Upon completion of the work, the contractor shall remove from within the limits of the Railroad's right of way, all machinery, equipment, surplus materials, falsework, rubbish or

temporary buildings of the contractor, and leave said right of way in a neat condition satisfactory to the Railroad Engineer.

#### **6.10 Buried Cable and Other Buried Facilities.**

**6.10.1** The contractor is placed on notice that fiber optic, communication and other cable lines and systems, collectively the "Lines", owned by various telecommunications companies may be buried on Railroad's property or right of way. The locations of the buried Lines, pipelines or utility facilities have been included on the plans based on information from the telecommunications companies, pipeline operators, or utilities, as the case may be. The contractor shall be responsible for contacting the Railroad Engineer, the Railroad's 24-hour information number (1-800-533-2891), the telecommunications companies, pipeline operators and utilities and notifying them of any work that may damage the buried Lines, pipelines, utility facilities and/or interfere with their service. The contractor shall verify the location of all buried Lines, pipelines and utility facilities shown on the plans or marked in the field in order to establish their exact locations prior to or while doing work on the Railroad's property or right of way. The contractor shall also use all reasonable methods when working on the Railroad's property or right of way to determine if any other buried Lines, pipelines or utility facilities exist on the Railroad's property or right of way.

**6.10.2** Failure to mark or identify the buried Lines, pipelines or utility facilities will be sufficient cause for the Railroad Engineer to stop construction at no cost to the Commission or Railroad until these items are completed. The contractor shall be responsible for the rearrangement of any buried facilities, Lines, pipelines or utility facilities determined to interfere with the construction. The contractor shall cooperate fully with any telecommunications companies, pipeline operators and utility facility owners in performing such rearrangements.

**7.0 Damages.** The Railroad will not assume liability for any damages to the contractor, contractor's work, employees, servants, equipment and materials caused by railroad traffic. Any cost incurred by the Railroad for repairing damages to Railroad's property or to property of the Railroad's tenants, licensees, easement grantees and invitees caused by or resulting from the contractor's operations shall be paid directly to the Railroad by contractor.

#### **8.0 Flagging Services.**

**8.1 When Required.** Under the terms of the agreement between the Commission and the Railroad, the Railroad has sole authority to determine the need for flagging required to protect the Railroad's operations. In general, the requirements of such services will be whenever the contractor's personnel or equipment are, or are likely to be, working on the Railroad's right of way within 25 feet of the centerline of any track, or across, over, adjacent to, or under a track, or when such work has disturbed or is likely to disturb a railroad structure or the railroad roadbed or surface and alignment of any track to such extent that the movement of trains must be controlled by flagging, or reasonable probability of accidental hazard to Railroad's operations or personnel. Normally, the Railroad will require one flagger per project; but in some cases, more than one may be necessary, such as yard limits where 3 flaggers may be required. However, if the contractor works within distances that violate instructions given by the Railroad Engineer or performs work that has not been scheduled with the Railroad Engineer, flaggers may be required full time until the project has been completed.

#### **8.2 Scheduling and Notification.**

**8.2.1** Not later than the time that approval is initially requested to begin work on the Railroad's right of way (30 days), contractor shall furnish to the Railroad and the Commission a schedule for all work required to complete the portion of the project within Railroad's right of way and arrange for a job site meeting between the contractor, the Engineer, and the Railroad Engineer. Flaggers may not be scheduled until the job site meeting has been conducted and the contractor's work scheduled.

**8.2.2** The contractor shall be required to give the Railroad Engineer at least 30 days of advance written notice of intent to begin work within Railroad's right of way in accordance with this special provision. Once begun, if such work is then suspended at any time, or for any reason, the contractor shall be required to give the Railroad Engineer at least 5 working days of advance notice before resuming work on Railroad's right of way. Such notices shall include sufficient details of the proposed work to enable the Railroad Engineer to determine if flagging will be required. If such notice is in writing, the contractor shall furnish the Engineer a copy; if notice is given verbally, the notice shall be confirmed in writing with copy to the Engineer. If flagging is required, no work shall be undertaken until the flagger or flaggers are present at the job site. Obtaining a flagger or flaggers may take up to 30 days to obtain initially from the Railroad or an approved third Party Flagging Company. When flagging begins, the flagger is usually assigned by the Railroad to work at the project site on a continual basis until no longer needed and cannot be called for on a spot basis. If flagging becomes unnecessary and is suspended, obtaining a flagger or flaggers may take up to 30 days to again obtain from the Railroad. Due to Railroad labor agreements, 10 working days notice may be necessary before flagging services may be discontinued and responsibility for payment stopped. Notification for flagging should be addressed to:

Mr. Andru Emmons  
BNSF Railroad  
901-433-7516  
[Andru.emmons@bnsf.com](mailto:Andru.emmons@bnsf.com)

And

[BNSFScheduling@wilsonco.com](mailto:BNSFScheduling@wilsonco.com)

**8.2.3** If, after the flagger is assigned to the project site, emergencies arise which require the flagger's presence elsewhere, then the contractor shall delay work on the Railroad's right of way until such time as the flagger is again available. Any additional costs resulting from such delay shall be borne by the contractor and not the Railroad.

### **8.3 Payment.**

**8.3.1** The Contractor will pay the Railroad or appropriate flagging contractor directly for the cost of flagging services associated with the project and notify the MoDOT Resident Engineer of such payments.

**8.3.2** The Contractor shall be responsible for arranging needed flagging services as required by the Railroad to accomplish the highway improvement.

**8.3.3** The cost of flagging service is estimated at approximately \$1,600 per day based on an 8-hour work day and a 40-hour work week. This cost includes the base pay for the flagger, overhead, and per diem charge for travel expenses, meals and lodging.

If flagging is provided by an approved Third-Party Flagging Company, rates and billing will be governed by the agreement set up between the Contractor and the Third-Party Flagging Company at the time the services are provided. It is the responsibility of the Contractor to ensure that billing complies with applicable provisions of Volume 1, Chapter 4, §3 and Volume 6, Chapter 6 §2, Subsection 1 of the Federal-Aid Highway Program Manual issued by the Federal Highway Administration, including all current amendments.

If flagging is provided by the Railroad, the charge to the contractor by the Railroad will be the actual cost based on the rate of pay for the Railroad's employees who are available for flagging service at the time the service is required. Work by a flagger in excess of 8 hours per day or 40 hours per week but not more than 12 hours a day will result in overtime pay at 1 1/2 times the appropriate rate. Work by a flagger in excess of 12 hours per day will result in overtime pay at 2 times the appropriate rate. If work is performed on a holiday, the flagging rate is 2 1/2 times the normal rate. Railroad expenses incurred preparing and handling invoices will also be charged to the contractor and/or the Commission. Charges to the contractor and/or the Commission by the Railroad shall be in accordance with applicable provisions of Volume 1, Chapter 4, §3 and Volume 6, Chapter 6, §2, Subsection 1 of the Federal-Aid Highway Program Manual issued by the Federal Highway Administration, including all current amendments. Flagging costs are subject to change. The above estimates of flagging cost are provided for information only and are not binding in any way. Each time a flagger is called, the minimum period for billing will be the 8 hour basic day unless the flagger can be assigned to other Railroad work during the work day.

**8.3.4** In addition to the hours of providing flagging at the construction site, the flagger hours will include, but is not limited to, travel time to and from the project, time to complete paperwork for the flagging operations and time for setting warning signs/flags for the train traffic.

#### **8.4 Verification.**

**8.4.1** Any complaints concerning a flagger shall be resolved in a timely manner. If need for a flagger is questioned, please contact the Railroad Engineer and Ms. Kara Brockamp, Manager of Public Projects at (913) 551-4484. All verbal complaints shall be confirmed in writing by the contractor within 5 working days with copy to the Railroad Engineer and Engineer. All written correspondence shall be addressed to the BNSF Manager of Public Projects as shown in Section 2.1 of this job special provision.

**8.4.2** The Railroad flagger assigned to the project will be responsible for notifying the Engineer upon arrival at the job site on the first day, or as soon thereafter as possible, that flagging services begin and on the last day that flagger performs such services for each separate period that services are provided. The Engineer will document such notification in the project records.

#### **9.0 Haul Across Railroads.**

**9.1** Where the plans show or imply that materials of any nature must be hauled across the Railroad's tracks, unless the plans clearly show that the Commission has included arrangements for such haul in the agreement with the Railroad, the contractor shall be required to make all necessary arrangements with the Railroad regarding means of transporting such materials across the Railroad's tracks. The contractor shall be required to bear all costs incidental to such crossings, including flagging, whether services are performed by contractor's own forces or by Railroad's personnel.

**9.2** No crossing may be established for use of the contractor for transporting materials or equipment across the tracks of the Railroad unless specific authority for the installation, maintenance, necessary watching and flagging thereof and removal, all at the expense of the contractor, is first obtained from the Railroad Engineer.

**10.0 Work for the Benefit of the Contractor.** All temporary or permanent changes in wire lines or other facilities which are considered necessary to the project are shown on the plans, and are included in the agreement between the Commission and the Railroad or will be covered by appropriate revisions to same which will be initiated and approved by the Commission and/or the Railroad. Should the contractor desire any changes in addition to the above, then contractor shall make separate arrangements with the Railroad for same to be accomplished at the contractor's expense.

**11.0 Cooperation and Delays.** The contractor shall arrange a schedule with the Railroad for accomplishing staged construction involving work by the Railroad or tenants, licensees, easement grantees and invitees of the Railroad. In arranging a schedule, the contractor shall ascertain, from the Railroad, the lead time required for assembling crews, materials and make due allowance. No charge of claims of the contractor against the Railroad will be allowed for hindrance or delay on account of railway traffic for any work done by the Railroad, other delay incident to or necessary for safe maintenance of railway traffic, or for any delays due to compliance with this special provision.

**12.0 Trainman's Walkways.** Along the outer side of each exterior track of multiple operated track and on each side of single operated track, an unobstructed continuous space suitable for trainman's use in walking along trains shall be maintained extending to a line not less than 12 feet from centerline of track. Any temporary impediments to walkways and track drainage encroachments or obstructions allowed during work hours while Railway's protective service is provided shall be removed before the close of each workday. Any excavation near the walkway, the contractor shall install a handrail with a 12 feet minimum clearance from centerline of track.

**13.0 Insurance.** The amount of work to be performed upon, over or under Railroad's right of way is estimated to be 1 percent of the contractor's total bid for the project.

**13.1** In addition to any other forms of insurance or bonds required under the terms of the contract and specifications, Contractor must, at its sole cost and expense, procure and maintain during the life of this Agreement the following insurance coverage:

(a) Commercial General Liability insurance. This insurance shall contain broad form contractual liability with a combined single limit of a minimum of \$5,000,000 each occurrence and an aggregate limit of at least \$10,000,000 but in no event less than the amount otherwise carried by the contractor. Coverage must be purchased on a post 2004 ISO occurrence form or equivalent and include coverage for, but not limit to the following:

- Bodily Injury and Property Damage
- Personal Injury and Advertising Injury
- Fire legal liability
- Products and completed operations

This policy must also contain the following endorsements, which must be indicated on the certificate of insurance:

- The definition of insured contract must be amended to remove any exclusion or other limitation for any work being done within 50 feet of railroad property.
- Waiver of subrogation in favor of and acceptable to Railway.
- Additional insured endorsement in favor of and acceptable to Railway.
- Separation of insureds.
- The policy shall be primary and non-contributing with respect to any insurance carried by Railway.

It is agreed that the workers' compensation and employers' liability related exclusions in the Commercial General Liability insurance policy(s) required herein are intended to apply to employees of the policy holder and shall not apply to Railway employees.

No other endorsements limiting coverage as respects obligations under this Agreement may be included on the policy with regard to the work being performed under this agreement.

(b) Business Automobile Insurance. This insurance must contain a combined single limit of at least \$1,000,000 per occurrence, and include coverage for, but not limited to the following:

- Bodily injury and property damage
- Any and all vehicles owned, used or hired

The policy shall also contain the following endorsements or language, which shall be indicated on the certificate of insurance:

- Waiver of subrogation in favor of and acceptable to Railway.
- Additional insured endorsement in favor of and acceptable to Railway.
- Separation of insureds.
- The policy shall be primary and non-contributing with respect to any insurance carried by Railway.

(c) Workers Compensation and Employers Liability insurance including coverage for, but not limited to:

- Contractor's statutory liability under the worker's compensation laws of the state(s) in which the work is to be performed. If optional under State law, the insurance must cover all employees anyway.
- Employers' Liability (Part B) with limits of at least \$500,000 each accident, \$500,000 by disease policy limit, \$500,000 by disease each employee.

This policy shall also contain the following endorsements or language, which shall be indicated on the certificate of insurance:

- Waiver of subrogation in favor of and acceptable to Railway.

(d) Railroad Protective Liability insurance naming only the Railway as the Insured with coverage of at least \$5,000,000 per occurrence and \$10,000,000 in the aggregate.

The policy Must be issued on a standard ISO form CG 00 35 10 93 and include the following:

- Endorsed to include the Pollution Exclusion Amendment (ISO form CG 28 31 10 93)
- Endorsed to include the Limited Seepage and Pollution Endorsement.
- Endorsed to remove any exclusion for punitive damages.
- No other endorsements restricting coverage may be added.
- The original policy must be provided to the Railway prior to performing any work or services under this Agreement

In lieu of providing a Railroad Protective Liability Policy, Licensee may participate in Licensor's Blanket Railroad Protective Liability Insurance Policy available to contractor.

### **13.2 Other Requirements:**

**13.2.1** All policies (applying to coverage listed above) must not contain an exclusion for punitive damages and certificates of insurance must reflect that no exclusion exists.

**13.2.2** Contractor agrees to waive its right of recovery against Railway for all claims and suits against Railway. In addition, its insurers, through the terms of the policy or policy endorsement, waive their right of subrogation against Railway for all claims and suits. The certificate of insurance must reflect the waiver of subrogation endorsement. Contractor further waives its right of recovery, and its insurers also waive their right of subrogation against Railway for loss of its owned or leased property or property under contractor's care, custody or control.

**13.2.3** Contractor is not allowed to self-insure without the prior written consent of Railway. If granted by Railway, any deductible, self-insured retention or other financial responsibility for claims must be covered directly by contractor in lieu of insurance. Any and all Railway liabilities that would otherwise, in accordance with the provisions of this Agreement, be covered by contractor's insurance will be covered as if contractor elected not to include a deductible, self-insured retention or other financial responsibility for claims.

**13.2.4** Prior to commencing the Work, contractor must furnish to Railway an acceptable certificate(s) of insurance including an original signature of the authorized representative evidencing the required coverage, endorsements, and amendments and referencing the contract audit/folder number if available. Contractor shall notify Railway in writing at least 30 days prior to any cancellation, non-renewal, substitution or material alteration. Upon request from Railway, a certified duplicate original of any required policy must be furnished. Contractor should send the certificate(s) to the following address:

Railroad:  
BNSF Railway Company  
P.O. Box 140528  
Kansas City, MO 64114  
Toll Free: 877-576-2378  
Fax number: 817-840-7487  
Email:  
www.certfocus.com

Commission:  
Ms. Brandi Baldwin  
State Construction and Materials Engineer  
MoDOT  
P.O. Box 270  
Jefferson City, MO 65102  
BNSF@certfocus.com

**13.2.5** Any insurance policy must be written by a reputable insurance company acceptable to Railway or with a current Best's Guide Rating of A- and Class VII or better, and authorized to do business in the state(s) in which the service is to be provide.

**13.2.6** Contractor represents that this Agreement has been thoroughly reviewed by contractor's insurance agent(s)/broker(s), who have been instructed by contractor to procure the insurance coverage required by this Agreement. Allocated Loss Expense must be in addition to all policy limits for coverages referenced above. Not more frequently than once every five years, Railway may reasonably modify the required insurance coverage to reflect then-current risk management practices in the railroad industry and underwriting practices in the insurance industry.

**13.2.7** If any portion of the operation is to be subcontracted by contractor, contractor must require that the subcontractor provide and maintain the insurance coverages set forth herein, naming Railway as an additional insured, and requiring that the subcontractor release, defend and indemnify Railway to the same extent and under the same terms and conditions as contractor is required to release, defend and indemnify Railway herein.

**13.2.8** Failure to provide evidence as required by this section will entitle, but not require, Railway to terminate this Agreement immediately. Acceptance of a certificate that does not comply with this section will not operate as a waiver of contractor's obligations hereunder.

**13.2.9** The fact that insurance (including, without limitation, self-insurance) is obtained by contractor will not be deemed to release or diminish the liability of contractor including, without limitation, liability under the indemnity provisions of this Agreement. Damages recoverable by Railway will not be limited by the amount of the required insurance coverage.

**13.2.10** For purposes of this section, Railway means "Burlington Northern Santa Fe LLC", "BNSF RAILWAY COMPANY" and the subsidiaries, successors, assigns and affiliates of each.

**13.2.11** Railroad will not accept binders as evidence of insurance, the original policy shall be provided. The named insured, description of the work and designation of the job site to be shown on the Policy are as follows:

(a) Named Insured: BNSF Railway Company

(b) Description and Designation:

Pavement resurfacing (mill/fill) project.

St. Louis County Rte. 30/Gravois Road

Job No. JSL0081

US DOT# 663833E MP 11.1 BNSF River Sub in St. Louis, MO.

**13.2.12** The contractor must notify BNSF Manager of Public Projects at [Kara.brockamp@bnsf.com](mailto:Kara.brockamp@bnsf.com) when applying for railroad insurance coverage.

**13.3** If any part of the work is sublet, similar insurance and evidence thereof in the same amounts as required of the prime contractor, shall be provided by or in behalf of the subcontractor to cover the subcontractor's operations. Endorsements to the prime contractor's policies specifically naming subcontractors and describing their operations will be acceptable for this purpose.

**13.4** All Insurance hereinbefore specified shall be carried until all work required to be performed under the terms of the contract has been satisfactorily completed within the limits of the Railroad's right of way as evidenced by the formal acceptance by the Commission. Insuring Companies

may cancel insurance by permission of the Commission and Railroad or on 30 days written notice to the Railroad and Commission.

**14.0 Hazardous Materials Compliance and Reporting.** Contractor shall be responsible for complying with all applicable federal, state and local governmental laws and regulations, including, but not limited to environmental laws and regulations (including but not limited to the Resource Conservation and Recovery Act, as amended; the Clean Water Act, as amended; the Oil Pollution Act, as amended; the Hazardous Materials Transportation Act, as amended; and the Comprehensive Environmental Response, Compensation and Liability Act, as amended), and health and safety laws and regulations. In addition to the liability provisions contained elsewhere in this job special provision, the contractor hereby indemnifies, defends and holds harmless the Railroad for, from and against all fines or penalties imposed or assessed by federal, state and local governmental agencies against the Railroad which arise out of contractor's work under this special provision. Notwithstanding the preceding sentence, the contractor will not be liable for pre-existing hazardous materials or hazardous substances discovered on Railroad's property or right of way so long as such hazardous materials or hazardous substances were not caused by (in whole or in part) contractor's work, acts or omissions. If contractor discovers any hazardous waste, hazardous substance, petroleum or other deleterious material, including but not limited to any non-containerized commodity or material, on or adjacent to Railroad's property, in or near any surface water, swamp, wetlands or waterways, while performing any work under this special provision, the contractor shall immediately:

- (a) Notify the Railroad's Resource Operations Center at (800) 832-5452, of such discovery.
- (b) Take safeguards necessary to protect employees, subcontractors, agents and/or third parties.
- (c) Exercise due care with respect to the release, including the taking of any appropriate measure to minimize the impact of such release

**15.0 Personal Injury Reporting.** The Railroad is required to report certain injuries as a part of compliance with Federal Railroad Administration ("FRA") reporting requirements. Any personal injury sustained by any employee of the contractor, subcontractor or contractor's invitees while on the Railroad's property shall be reported immediately, by phone or mail if unable to contact in person, to the Railroad's representative in charge of the project. The Non-Employee Personal Injury Data Collection Form is to be completed and sent by Fax to the Railroad at (817) 352-7595 and to the Railroad's Project Representative no later than the close of shift on the date of the injury.

**16.0 Failure to Comply.** In the event the contractor violates or fails to comply with any of the requirements of this special provision, the below orders will be applied. Any such orders shall remain in effect until the contractor has remedied the situation to the satisfaction of the Railroad Engineer and the Engineer.

- (a) The Railroad Engineer may require that the contractor to vacate the Railroad's property.
- (b) The Engineer may withhold all monies due to the contractor until contractor has remedied the situation to the satisfaction of the Railroad Engineer and the Engineer.

**17.0 Payment for Cost of Compliance.** No separate payment will be made for any extra cost incurred on account of compliance with this special provision. All such cost shall be included in

the contract unit price for other items included in the contract. Railroad will not be responsible for paying the contractor for any work performed under this special provision.

KKK. Supplemental Revisions JSP-18-01JJ

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

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

- Stormwater Compliance Requirements

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

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

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

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

## **2.1 Duties of the WPCM:**

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

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

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

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

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

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

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

- **Delete Sec 106.9 in its entirety and substitute the following:**

**106.9 Buy America Requirements.**

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

**106.9.1 Buy America Requirements for Iron and Steel.**

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

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

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

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

**106.9.3** "Minimal use" of foreign steel, iron or coating processes will be permitted, provided the cost of such products does not exceed 1/10 of one percent (0.1 percent) of the total contract cost or \$2,500.00, whichever is greater. If foreign steel, iron, or coating processes are used, invoices

to document the cost of the foreign portion, as delivered to the project, shall be provided and the engineer's written approval obtained prior to placing the material in any work.

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

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

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

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

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

products are awarded in the contract, domestic steel or iron products may be used; however, payment will be at the contract unit price for foreign steel or iron products.

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

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

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

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

**106.9.7 Buy America Requirements for Manufactured Products.**

Manufactured products means:

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

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

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

- 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  $\pm 2.0$  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.