

JOB SPECIAL PROVISIONS TABLE OF CONTENTS (ROADWAY)

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

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Job No.: J6S3283

Route: 21

County: St. Louis


<p>"THIS MEDIA SHOULD NOT BE CONSIDERED A CERTIFIED DOCUMENT."</p>	<p><b>MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION</b></p>
	<p><b><i>THOUVENOT, WADE &amp; MOERCHEN, INC.</i></b> 3701 S. Lindbergh Boulevard, Suite 100</p>
	<p>If a seal is present on this sheet, JSP's have been electronically sealed and dated.</p>
	<p>JOB NUMBER: J6S3283 ST. LOUIS COUNTY, MO DATE PREPARED: 08/08/2024</p>
	<p>ADDENDUM DATE:</p>
<p>Only the following items of the Job Special Provisions (Roadway) are authenticated by this seal: A thru E, G thru UU, XX thru CCC, and JJJJ-LLLL.</p>	

  10/03/2024 2:49:15 PM Jason Lawrence C. Jarquio Civil MO PE-2021011939	<p><b>MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION</b></p>
	<p><b><i>George Butler Associates. Inc.</i></b> 16305 Swingley Ridge Road Chesterfield, MO</p>
	<p>If a seal is present on this sheet, JSP's have been electronically sealed and dated.</p>
	<p>JOB NUMBER: J6S3283 ST. LOUIS COUNTY, MO DATE PREPARED: 08/08/2024</p>
	<p>ADDENDUM DATE:</p>
<p>Only the following items of the Job Special Provisions (Roadway) are authenticated by this seal: DDD thru IIII</p>	

Job No.: J6S3283

Route: 21

County: St. Louis

 <p>THIS SHEET HAS BEEN SIGNED, SEALED AND DATED ELECTRONICALLY.</p>	<b>MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION</b>
	<b><i>CIVIL DESIGN, INC.</i></b> 5220 Oakland Avenue St. Louis, MO 63110 Certificate of Authority:
	If a seal is present on this sheet, JSP's have been electronically sealed and dated.
	JOB NUMBER: J6S3283 ST. LOUIS COUNTY, MO DATE                      PREPARED: 08/08/2024
	ADDENDUM DATE:
Only the following items of the Job Special Provisions (Roadway) are authenticated by this seal: VV thru WW	

	<b>MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION</b>
	<b><i>Kivindyo Engineering Services, LLC</i></b> 1310 Papin Street, Suite 103
	If a seal is present on this sheet, JSP's have been electronically sealed and dated.
	JOB NUMBER: J6S3283 ST. LOUIS COUNTY, MO DATE                      PREPARED: 08/08/2024
	ADDENDUM DATE:
Only the following items of the Job Special Provisions (Roadway) are authenticated by this seal: F	

JOB  
SPECIAL PROVISION

A. General - Federal JSP-09-02K

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

**1.1** This contract requires payment of the prevailing hourly rate of wages for each craft or type of work required to execute the contract as determined by the Missouri Department of Labor and Industrial Relations and requires adherence to a schedule of minimum wages as determined by the United States Department of Labor. For work performed anywhere on this project, the contractor and the contractor's subcontractors shall pay the higher of these two applicable wage rates. State Wage Rates, Information on the Required Federal Aid Provisions, and the current Federal Wage Rates are available on the Missouri Department of Transportation web page at [www.modot.org](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 2024 Missouri Standard Plans  
For Highway Construction

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

B. Contract Liquidated Damages JSP-13-01D

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

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

Notice to Proceed: January 6, 2025  
Contract Completion Date: November 15, 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 J6S3283	Calendar Days N/A	Daily Road User Cost \$7,600
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**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 **\$3,000** 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 Work Zone Specialist (WZS).** The Traffic Management Plan shall name an individual, either employed by the contractor or hired by the contractor, to act as the Work Zone Specialist (WZS) throughout the entirety of the project. The (WZS) will have no job duties other than traffic control. The WZS shall be in direct charge of the temporary traffic control pre-activity meeting and traffic control items such as; setup, communications, reviews, and reporting of all daily work zones on the project. Any change in personnel for the WZS shall be submitted in written form to the engineer. The WZS shall be trained and certified as a Traffic Control Supervisor from an organization such as ATSSA or equivalent and will be directly involved with daily traffic management and traffic management planning. It will be the responsibility of the WZS to coordinate daily traffic management with the contractor's traffic control crews, inspector or engineer and the ST. Louis Traffic Management Center (TMC). The WZS shall be required to be on the project daily and remain on the project until all work zones have been removed for the day. The WZS shall be on site before the first work zone sign is placed for the day and until the last traffic control device is taken down for the day. The WZS shall remain on site the entire time daily/nightly lane drops are in use. The WZS shall maintain daily contact with the engineer or inspector on the project.

**1.2 Work Zone Set Up.** The WZS shall direct the configuration and placement of each work zone daily and ensures work zones are set up and maintained in accordance with the EPG. The WZS

shall conduct a daily meeting with the set up crew to determine which traffic control devices are required, their locations and set up and take down times.

**1.3 Work Zone Communication.** The WZS shall notify the TMC before the first work zone sign is set up and after the last traffic control item is taken down at the end of each work day or night. The WZS shall also to notify the inspector of any work zone cancellation for the day. Notification of cancellations shall be made prior to 3:00 pm for nighttime work zones, as well as for daytime work zones the following day. The WZS shall also notify the inspector or engineer 2 weeks before any new lane closures or detours are put into place.

**1.4 Work Zone Reviews.** Once the traffic control has been placed for the day, the WZS shall review the work zone to ensure all devices are legible and clean, installed in the correct location with the correct spacing and convey the correct message. The WZS shall approve the work zone before any work can begin. The WZS shall also review the job site hourly to determine if any traffic control devices need to be added, reconfigured or cleaned. If the engineer or inspector notifies the WZS of any safety or traffic related concerns in the work zone, the engineer or inspector will communicate the type of deficiency as per Sec 616.4.2.5.2. This communication will be verbal and documented in writing via the DWR for that day. The DWR entry will include the time of verbal communication. The WZS will also document the deficiency in their daily report. For Category 1 deficiencies, the written documentation will include the time of notification and the time of correction. Any liquidated damages assessed shall be placed on the next Engineer's estimate as per 1.7 of this section.

**1.5 Work Zone Reporting.** After the WZS has conducted the daily initial review of the work zone, the WZS shall record the findings. Thereafter, the WZS shall conduct reviews on an hourly bases and subsequently record findings, required corrections and times the corrections were completed. Copies of the WZS review documentation shall be furnished to the Engineer within 24 hours.

**1.6 Maintaining Work Zones and Work Zone Reviews.** The WZS shall maintain work zones on a daily basis to ensure safety to the traveling public and the workers; this includes long term work zones that have devices and/or roadway conditions that need to be maintained. If the engineer or inspector notifies the WZS of any safety or traffic delay concerns in the work zone, the WZS shall promptly inspect and work to provide a solution to correct the situation in accordance with Sec. 616.4.2.5. Missing, damaged or over-turned traffic control devices shall typically be corrected without the need for direction by the engineer. The WZS is responsible to assure all traffic control devices are maintained in accordance with EPG standards. The WZS is responsible to ensure 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 project special provisions. The WZS and engineer shall submit one joint weekly technical review of work zone operations identifying any concerns present and the corrective actions taken. Reviews may be subjected to unannounced inspections by the engineer to corroborate the validity of the ratings. The engineer and WZS will be notified of the results.

**1.6.1** Work zone signs and bases shall be removed from both inside and outside shoulders of the roadway when not in use and the end of each work shift. This includes signs and bases used for daily or nightly lane closures.

**1.7 Work Zone Conflict Resolution.** Any conflict resolution shall be in accordance with Sec 616.4. Failure to make corrections on time may result in the engineer suspending work. The

suspension will be non-excusable and non-compensable regardless of 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 contractor shall request permission at least two working days prior to lane closures or shifting traffic onto detours, and 14 calendar days prior to the imposition of height, width or weight restrictions. This is to ensure closures do not conflict with other work within the zone of influence and the work zone information on the MoDOT's website can remain real-time. In accordance with Management of Traffic (MOT) procedures, the contractor shall submit lane closures for the following week to the engineer by 3:00pm on Monday.

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

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

**2.5 Traffic Congestion.** The contractor shall, upon approval of the engineer, take proactive measures to reduce traffic congestion in the work zone. The contractor shall immediately implement appropriate mitigation strategies whenever traffic congestion reaches an excess of **10 minutes** to prevent congestion from escalating beyond this delay threshold. If disruption of the traffic flow occurs and traffic is backed up in queues equal to or greater than the delay time threshold listed above then the contractor shall immediately review the construction operations which contributed directly to disruption of the traffic flow and make adjustments to the operations to prevent the queues from reoccurring. Traffic delays may be monitored by physical presence on site or by utilizing real-time travel data through the work zone that generate text and/or email notifications where available. The engineer monitoring the work zone may also notify the contractor of delays that require prompt mitigation. The contractor may work with the engineer to determine what other alternative solutions or time periods would be acceptable. The contractor may refer to the Work Zone Analysis Spreadsheet found in the electronic deliverables under the MoDOT Online Plans Room for detailed information on traffic delays.

### **2.5.1 Traffic Safety.**

**2.5.1.1** 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** When a traffic queue extends 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 due to non-recurring congestion, 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.

### 3.0 Work Hour Restrictions.

**3.1** There are six major holiday periods shown below. All lanes shall be scheduled to be open to traffic during these holiday periods, from 12:00 noon on the last working day proceeding the holiday until 9:00 a.m. on the first working day subsequent to the holiday.

Memorial Day  
Labor Day  
Thanksgiving  
Christmas  
New Year's Day

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

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

**3.1.2** The contractor's working hours will be restricted for the Special Events as shown below. All lanes shall be scheduled to be open to traffic during these Special Events.

#### No Special Events are planned

**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. Any work requiring a temporary reduction the number of through lanes of traffic shall be in accordance with the following:

Route	From	To	Direction	Single Lane Drop Restricted Hours	
				Weekday	Weekend
MO 21	MO 30	I-270	Both	3PM-6PM	No restriction
	I-270	Schuessler	Both	6AM-7PM (nighttime work only)	9AM-6PM
	Schuessler	Wells Dr	SB	11AM-7PM	2PM-5PM
			NB	6AM-7PM (nighttime work only)	
	Wells Dr	MO 141	Both	3PM-6PM	No restriction

	MO 141	South of Interchange	SB	No restriction	No restriction
	MO 141	North of Interchange	NB	6AM-8AM	No restriction
			SB	3PM-6PM	
MO 141	East & West of Interchange		BOTH	6AM-9PM (nighttime work only)	No restriction

**3.3** 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 or ramp 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 **\$1000 per 15 minute increment** for each 15 minutes that the temporary lane or ramp 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.

**3.3.1** 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** The contractor shall provide changeable message signs (CMS) notifying 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. The CMS shall be capable of communication with the Transportation Management Center (TMC), if applicable, 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. Permanent dynamic message signs (DMS) owned and operated by MoDOT 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 documents. All authorized changes in the traffic control plan shall be provided for as specified in Sec 616.

**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.

Missouri State Highway Patrol – Troop C Office 891 Technology Drive Weldon Spring, MO 63304 (636) 300-2800	
St. Louis County Police Department Affton Southwest Precinct 11500 Gravois Road St. Louis, MO 63126 (314) 638-5550	
MoDOT Transportation Management Center (TMC) 14301 S. Outer Forty Road Chesterfield, MO 63017 (314) 275-1500	
<b>City of Lakeshire</b>	
<b>Police</b>	<b>Fire / EMS</b>
Lakeshire Police Department 10000 Puttington Drive St. Louis, MO 63123 (314) 631-4670	Affton Fire Protection District 9282 Gravois Road St. Louis, MO 63123 (314) 631-1803
<b>City of Green Park</b>	
<b>Police</b>	<b>Fire / EMS</b>
St. Louis County Police Affton Southwest Precinct 11500 Gravois Road St. Louis, MO 63126 (314) 638-5550	Mehlville Fire Protection District 11020 Mueller Road St. Louis, MO 63123 (314) 894-0420

**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-96-05

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

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

Telephone Number: 314-453-5042

Email: [Stuart.McNeil@modot.mo.gov](mailto:Stuart.McNeil@modot.mo.gov)

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

F. Utilities JSP-93-26F

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

<u>Utility Name</u>	<u>Known Required Adjustment</u>	<u>Type</u>
Rachel Cruse <b>Ameren Electric</b> Telephone: 314.344.9560 Email: <a href="mailto:rcruse2@ameren.com">rcruse2@ameren.com</a>	Yes Section 3.0	Power
Herbert Connors & Jim Lashley <b>AT&amp;T (Distribution)</b> Telephone: 314.40.3316 & 636.402.7027 Email: <a href="mailto:hc1549@att.com">hc1549@att.com</a> & <a href="mailto:jl4728@att.com">jl4728@att.com</a>	Yes Section 3.1	Communication
Kevin Wingard & Lenny Vohs <b>AT&amp;T (Transmission)</b> Telephone: 580.931.7688 & 618.691.8561 Email: <a href="mailto:kwingard@sdt-1.com">kwingard@sdt-1.com</a> & <a href="mailto:lv2121@att.com">lv2121@att.com</a>	No	Communication
Sue Banaszek <b>Charter/Spectrum</b> Telephone: 314.386.1645 Email: <a href="mailto:sue.banaszek@charter.com">sue.banaszek@charter.com</a>	Yes Section 3.3	Communication
Steve Massmann <b>Everstream</b> Telephone: 314.565.9514 Email: <a href="mailto:smassmann@everstream.com">smassmann@everstream.com</a>	No	Communication
Koji Bjerke <b>Extenet</b>	Yes Section 3.5	Communication

Telephone: 808.348.1503 Email: <a href="mailto:bbjerke@extenetsystems.com">bbjerke@extenetsystems.com</a>		
Amity Portell <b>Jefferson County Public Water Sewer District #1</b> Telephone: 636.797.6035 Email: <a href="mailto:aportell@jeffcomo.org">aportell@jeffcomo.org</a>	No	Water/Sewer
Ken Weldele <b>Jefferson County Public Water Sewer District #3</b> Telephone: 314.603.6373 Email: <a href="mailto:kweldele@publicwater3.com">kweldele@publicwater3.com</a>	No	Water/Sewer
Rich Obremski <b>Lumen (CenturyLink/Level 3)</b> Telephone: 636.459.1600 Email: <a href="mailto:Richard.Obremski@lumen.com">Richard.Obremski@lumen.com</a>	No	Communication
Jess Bull & James Rowden <b>Missouri American Water</b> Telephone: 417.680.0315 Email: <a href="mailto:Jess.Bull@amwater.com">Jess.Bull@amwater.com</a> & <a href="mailto:James.Rowden@amwater.com">James.Rowden@amwater.com</a>	Yes Section 3.7	Water
Domenic NiCastro & Andy Gotto <b>MCI/Verizon</b> Telephone: 314.459.1600 & 636.577.7429 Email: <a href="mailto:domenic.nicastro@verizon.com">domenic.nicastro@verizon.com</a> & <a href="mailto:andrew.gotto@verizon.com">andrew.gotto@verizon.com</a>	Yes Section 3.8	Communication
Chuck Drinen <b>Northeast Public Sewer District</b> Telephone: 314.568.8125 Email: <a href="mailto:chuckd@northeastsewer.org">chuckd@northeastsewer.org</a>	No	Sewer
Mike Codd <b>Phillips 66 Pipeline</b> Telephone: 618.857.6052 Email: <a href="mailto:Mike.P.Codd@p66.com">Mike.P.Codd@p66.com</a>	Yes Section 3.9	Petroleum
Jason Seger <b>Rock Creek Sewer District</b> Telephone: <a href="mailto:jasons@rockcreekpsd.com">jasons@rockcreekpsd.com</a> Email: <a href="tel:636.633.0761">636.633.0761</a>	No	Sewer
Nick Eggert <b>Spire Energy</b> Telephone: 816.520.8004 & 314.330.5720 Email: <a href="mailto:nicholas.eggert@spireenergy.com">nicholas.eggert@spireenergy.com</a>	Yes Section 3.10	Gas
Glenn Henninger <b>St. Louis County – Department of Transportation</b> Telephone: 314.615.8506 Email: <a href="mailto:ghenninger@stlouisco.com">ghenninger@stlouisco.com</a>	Yes Section 3.11	Signal Interconnect

1.1 The existence and approximate location of utility facilities known to exist, as shown on the plans, are based upon the best information available to the Commission at this time. This information is provided by the Commission "as-is" and the Commission expressly disclaims any representation or warranty as to the completeness, accuracy, or suitability of the information for any use. Reliance upon this information is done at the risk and peril of the user, and the

Commission shall not be liable for any damages that may arise from any error in the information. It is, therefore, the responsibility of the contractor to verify the above listing information indicating existence, location and status of any facility. Such verification includes direct contact with the listed utilities.

**2.0 Guardrail Locations:** The contractor shall be aware there are numerous utilities present along the route in this contract. The full extent of conflicts with utilities are unknown. There may be underground utilities that run parallel or cross the route that are in close proximity to guardrail work locations. The contractor shall take necessary precautions and measures to verify locations and depths of utilities by any necessary means to determine exact impacts to their work.

**2.1** If utility facilities are discovered the contractor shall contact MoDOT's Utility Coordination Consultant Kivindyo Engineering Services, LLC. Utility Coordination consultant, Kivindyo Engineering Services, LLC, will work with the Engineer and Utility Owner to 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 item of work specified.

Clem Kivindyo – (314)-623-8942

Alexa Masters – (314) 803-2058

Timothy Woolsey – (814) 404-9751

### **3.0 AMEREN – MISSOURI (DISTRIBUTION)**

Ameren Distribution has aerial facilities running south along western right of way limits from Sta. 104+00 to Sta 164+00, from Sta. 175+00 to Sta. 225+00 and from Sta. 388+00 to Sta. 537+95.23. They also have buried facilities running north along eastern right of way limits at Sta. 129+50, from Sta 143+0 to Sta. 145+0 and at Sta. 462+00.

Ameren Distribution has the following existing facilities in conflict within the project limits. MoDOT's Utility Coordination consultant, Kivindyo Engineering Services LLC, will coordinate with Ameren to relocate facilities in coordination with the contractor.

#### **Overhead facilities along the southbound lanes of Rt. 21 throughout the project that require relocation:**

- Pole and guy at Sta. 114+93, 39' Rt Lt falls within 10' of proposed signal structure.
- Overhead facilities at Sta. 130+18, 42' Rt to Sta. 130+31, 185' LT cross proposed signal structure and falls within 10' clearance.

#### **Overhead facilities along the northbound lanes of Rt. 21 throughout the project that require relocation:**

- Pole and guy at Sta. 106+88, 45' Lt falls in proposed sidewalk.
- Overhead facilities at Sta. 194+67, 77' Lt fall within 10' clearance of proposed signal structure.
- Overhead facilities at Sta. 266+25, 40' Lt fall within 10' clearance of proposed signal structure.
- Overhead facilities at Sta. 273+45, 42' Lt to Sta. 274+24, 42' Lt fall within 10' clearance of proposed signal structure.
- Overhead facilities at Sta. 337+09, 127' Rt to Sta 336+51, 131' Lt fall within 10' clearance of proposed signal structure.

- Overhead facilities at Sta. 412+84, 51' Lt to Sta. 414+49, 49' Lt fall within 10' clearance of proposed signal structure.

**Overhead facilities crossing Rt. 21 throughout the project that require relocation:**

- Overhead facilities at Sta. 317+26, 127' Rt to Sta 317+73, 154' Lt cross proposed signal structure and within 10' clearance.

Ameren-Missouri has at-grade access points for its facilities at various locations throughout the project. Some of these access points may need to be adjusted to new grades. The contractor shall coordinate directly with Ameren-Missouri for these adjustments. Ameren-Missouri's representative for this will be as follows:

- Rachel Cruse (ph: 314.344.9560, email: rcruse2@ameren.com )

The contractor shall contact Ameren-Missouri a minimum of 4 weeks ahead of need for at-grade adjustment.

The contractor shall coordinate with Ameren-Missouri, as necessary, and take measures to protect in place their existing facilities during construction.

The contractor shall directly contact Ameren-Missouri to verify the locations of their facilities.

The Commission cannot warrant the information above which was provided by Ameren-Missouri.

The contractor shall coordinate with Ameren-Missouri as necessary and take measures to protect in place their existing facilities during construction.

### **3.1 AT&T (DISTRIBUTION)**

AT&T Distribution has buried existing buried copper and fiber along the entire project limits and aerial facilities on Ameren owned poles.

AT&T Distribution has the following existing facilities in conflict within the project limits. MoDOT's Utility Coordination consultant, Kivindyo Engineering Services LLC, will coordinate with AT&T to relocate facilities in coordination with the contractor.

**Overhead facilities along Rt 21 that require transfer of attached utilities to Ameren Poles:**

- Aerial attachment at Sta. 106+88, 45' Lt on Ameren pole that requires relocation.
- Aerial attachment at Sta. 114+93, 39'Rt on an Ameren pole requiring relocation.
- Aerial attachment at Sta. 130+18, 42' Rt on an Ameren pole requiring relocation.
- Aerial attachment at Sta. 194+67, 77' Lt on an Ameren pole requiring relocation.

**Buried facilities throughout the project that require protection in place:**

- Duct bank at Sta. 266+05, 38'Lt falls within 2' of proposed signal post.

**Buried facilities throughout the project that require an adjustment to grade:**

- Manhole at Sta. 129+45.00, 51' Rt

- Manhole at Sta. 266+52.00, 40' Lt
- Manhole at Sta. 273+80.00, 43' Lt
- Manhole at Sta. 385+26.00, 27' Lt
- Manhole at Sta. 388+92.00, 23' Lt
- Handhole at Sta. 396+45.00, 20' Lt
- Handhole at Sta. 401+58.00, 21' Lt
- Handhole at Sta. 405+82.00, 15' Lt
- Handhole at Sta. 407+55.00, 18' Lt
- Handhole at Sta. 415+53.00, 17' Lt
- Handhole at Sta. 422+58.00, 15' Lt
- Handhole at Sta. 429+85.00, 15' Lt
- Handhole at Sta. 437+11.00, 15' Lt
- Handhole at Sta. 449+18.00, 16' Lt
- Handhole at Sta. 451+63.00, 16' Lt
- Handhole at Sta. 454+64.00, 22' Lt
- Handhole at Sta. 458+92.00, 22' Lt
- Manhole at Sta. 466+03.00, 25' Lt

Handhole at Sta. 388+92.00, 23' Lt ATT-D has at grade access points for its facilities at various locations throughout the project. Some of these access points may need to be adjusted to new grades. The contractor shall coordinate directly with ATT-D for these adjustments. ATT-D's representative for this will be as follows:

- Herbert Connors (ph: 314.40.3316, email: [hc1549@att.com](mailto:hc1549@att.com) )
- Jim Lashley (ph: 636.402.7027, email: [jl4728@att.com](mailto:jl4728@att.com) )

The contractor shall contact ATT-D a minimum of 4 weeks ahead of need for adjustment.

The contractor shall coordinate with ATT-D, as necessary, and take measures to protect in place their existing facilities during construction.

The contractor shall directly contact ATT-D to verify the locations of their facilities.

The Commission cannot warrant the information above which was provided by ATT-D.

### **3.2 AT&T (TRANSMISSION)**

AT&T Transmission has buried facilities running south along western right of way limits on Rt 21 throughout the project limits.

AT&T Transmission has the following existing facilities in conflict within the project limits. MoDOT's Utility Coordination consultant, Kivindyo Engineering Services LLC, will coordinate with AT&T - T to relocate facilities in coordination with the contractor.

#### **Buried facilities throughout the project that require protection in place:**

- Buried facilities at Sta. 414+35, 45'Lt falls within 2' of proposed signal post.



### **3.3 CHARTER**

Charter has aerial facilities running south along western right of way limits on Rt 21 within the project limits. Charter also has buried facilities running north along eastern right of way limits within project limits.

Charter has the following existing facilities in conflict within the project limits. MoDOT's Utility Coordination consultant, Kivindyo Engineering Services LLC, will coordinate with Charter to relocate facilities in coordination with the contractor.

#### **Buried facilities throughout the project that require relocation:**

- Pedestal at Sta 142+89, 36' Rt falls in proposed curb ramp.

#### **Aerial facilities throughout the project that require transfer of attached utilities to Ameren Poles:**

- Aerial attachment at Sta. 106+88, 45' LT on an Ameren pole requiring relocation..
- Aerial attachment at Sta. 114+93, 39'Rt on an Ameren pole requiring relocation.
- Aerial attachment at Sta. 130+18, 42' Rt on an Ameren pole requiring relocation.
- Aerial attachment at Sta. 194+67, 77' Lt on an Ameren pole requiring relocation.
- Aerial attachment at Sta. 273+45, 42' LT on an Ameren pole requiring relocation.
- Aerial attachment at Sta. 317+24, 125' Rt to Sta. 317+73, 154' Lt on an Ameren poles requiring relocation.

### **3.4 EVERSTREAM**

Everstream has buried facilities running north along eastern right of way limits on Rt 21 from Sta. 129+00 to Sta. 143+00. No conflict with these facilities is anticipated.

### **3.5 EXTENET**

Extenet has buried facilities running south along western right of way limits on Rt 21 from Sta. 194+00 to Sta. 222+00.

Extenet has the following existing facilities in conflict within the project limits. MoDOT's Utility Coordination consultant, Kivindyo Engineering Services LLC, will coordinate with Extenet to relocate facilities in coordination with the contractor.

#### **Buried facilities within the project limits that require an adjustment to grade:**

- Handhole at Sta. 203+78, 30' Rt.
- Handhole at Sta. 213+11, 31' Rt.

### **3.6 LUMEN**

Lumen has buried facilities crossing Rt 21 at Sta. 299+00 and crossing at Sta 317+00. They also have buried facilities running south along western right of way limits at Sta. 347+00 to Sta. 377+00. No conflict with these facilities is anticipated.

### **3.7 MISSOURI AMERICAN WATER COMPANY (MAWC)**

MAWC has buried facilities along the southbound lanes and crossing Rt 21 from Sta. 105+00 to Sta 484+00.

MAWC has the following existing facilities in conflict within the project limits. MoDOT's Utility Coordination consultant, Kivindyo Engineering Services LLC, will coordinate with MAWC to relocate facilities in coordination with the contractor.

**Buried facilities in conflict within the project limits that require relocation:**

- 16" Cast iron main at Sta. 115+12, 39' Rt in conflict with proposed signal cabinet base.
- 8" Cast iron main at Sta. 259+19, 93' Rt crosses proposed drainage.

**Existing valves & hydrants which require an adjustment to grade:**

- Valve at Sta. 106+38.00, 52' Lt
- Valve at Sta. 107+05.00, 48' Lt
- Hydrant at Sta. 114+87.00, 40' Rt
- Valve at Sta. 119+02.00, 32' Rt
- Valve at Sta. 119+21.00, 35' Rt
- Valve at Sta. 120+83.00, 33' Lt
- Valve at Sta. 125+58.00, 42' Rt
- Valve at Sta. 129+08.00, 59' Lt
- Valve at Sta. 129+13.00, 39' Rt
- Valve at Sta. 140+65.00, 20' Lt
- Valve at Sta. 143+15.00, 40' Rt
- Valve at Sta. 143+21.00, 25' Rt.
- Valve at Sta. 144+06.00, 30' Rt
- Valve at Sta. 147+82.00, 51' Lt
- Valve at Sta. 151+30.00, 35' Rt
- Valve at Sta. 155+37.00, 16' Rt
- Valve at Sta. 195+68.00, 36' Lt
- Valve at Sta. 197+48.00, 45' Lt
- Valve at Sta. 198+19.00, 32' Rt
- Valve at Sta. 198+52.00, 33' Rt
- Valve at Sta. 198+59.00, 32' Rt
- Valve at Sta. 198+94.00, 33' Rt
- Valve at Sta. 202+87.00, 31' Rt
- Valve at Sta. 210+24.00, 32' Rt
- Valve at Sta. 213+53.00, 29' Rt
- Valve at Sta. 217+37.00, 32' Rt
- Valve at Sta. 217+42.00, 32' Rt
- Valve at Sta. 217+63.00, 32' Rt
- Valve at Sta. 218+50.00, 64' Lt
- Valve at Sta. 221+65.00, 57' Lt
- Valve at Sta. 266+67.00, 39' Lt
- Valve at Sta. 268+52.00, 32' Lt
- Valve at Sta. 273+63.00, 51' Lt
- Valve at Sta. 273+78.00, 54' Rt
- Valve at Sta. 273+79.00, 37' Lt
- Valve at Sta. 274+00.00, 39' Lt
- Valve at Sta. 276+08.00, 38' Lt
- Valve at Sta. 281+94.00, 38' Lt
- Valve at Sta. 370+59.00, 54' Rt

- Valve at Sta. 371+06.00, 55' Rt
- Valve at Sta. 385+82.00, 26' Lt
- Valve at Sta. 399+92.00, 56' Rt
- Valve at Sta. 441+50.00, 47' Rt
- Valve at Sta. 441+81.00, 47' Rt

MAWC has at grade access points for its facilities at various locations throughout the project. Some of these access points may need to be adjusted to new grades. The contractor shall coordinate directly with MAWC for these adjustments. MAWC's representative for this will be as follows:

- Jess Bull (ph: 417.680.0315, email: [Jess.Bull@amwater.com](mailto:Jess.Bull@amwater.com))
- James Rowden ([James.Rowden@amwater.com](mailto:James.Rowden@amwater.com))

The contractor shall contact MAWC a minimum of 4 weeks ahead of need for adjustment.

The contractor shall coordinate with MAWC, as necessary, and take measures to protect in place their existing facilities during construction.

The contractor shall contact MAWC directly to verify the locations of their facilities.

The Commission cannot warrant the information above which was provided by MAWC.

### **3.8 MCI**

MCI has buried facilities running north along eastern right of way limits at Sta. 347+00 to Sta. 441+00.

MCI has the following existing facilities in conflict within the project limits. MoDOT's Utility Coordination consultant, Kivindy Engineering Services LLC, will coordinate with MCI to relocate facilities in coordination with the contractor.

#### **Aerial facilities in conflict within the project limits that require transfer of attached utilities to Ameren Poles:**

- Aerial attachment at Sta. 114+93, 39' Rt on an Ameren pole requiring relocation.
- Aerial attachment at Sta. 130+18, 42' Rt on an Ameren pole requiring relocation.

### **3.9 PHILLIPS 66 PIPELINE**

Phillips 66 has buried facilities crossing Rt 21 at Sta. 352+70. No conflict with these facilities is anticipated.

### **3.10 SPIRE**

Spire has buried facilities throughout Rt 21 in both eastern and western right of way limits and crossing Rt 21.

Spire has the following existing facilities in conflict within the project limits. MoDOT's Utility

Coordination consultant, Kivindyo Engineering Services LLC, will coordinate with Spire to relocate facilities in coordination with the contractor.

**Buried facilities in conflict within the project limits that require relocation:**

- 8" ST IP Main at Sta. 259+23, 98' Rt crosses proposed drainage structures.

**Facilities which require an adjustment to grade:**

- Gas valve at Sta. 107+53.00, 43' Lt
- Gas valve at Sta. 109+08.00, 36' Lt
- Gas valve at Sta. 109+86.00, 40' Rt
- Gas valve at Sta. 114+45.00, 33' Lt
- Gas valve at Sta. 129+62.00, 42' Lt
- Gas valve at Sta. 129+85.00, 68' Lt
- Gas valve at Sta. 130+68.00, 40' Lt
- Gas valve at Sta. 137+33.00, 32' Lt
- Gas valve at Sta. 140+08.00, 36' Rt
- Gas valve at Sta. 156+14.00, 43' Lt
- Gas valve at Sta. 158+33.00, 42' Lt
- Gas valve at Sta. 163+09.00, 54' Lt
- Gas valve at Sta. 195+06.00, 36' Lt
- Gas valve at Sta. 195+71.00, 36' Lt
- Gas valve at Sta. 197+43.00, 47' Lt
- Gas valve at Sta. 210+71.00, 33' Lt
- Gas valve at Sta. 217+30.00, 40' Lt
- Gas valve at Sta. 264+83.00, 29' Rt
- Gas valve at Sta. 266+44.00, 24' Rt
- Gas valve at Sta. 266+92.00, 16' Rt
- Gas valve at Sta. 267+05.00, 34' Rt
- Gas valve at Sta. 273+78.00, 41' Lt
- Gas valve at Sta. 276+47.00, 41' Lt
- Gas valve at Sta. 356+42.00, 122' Rt
- Gas valve at Sta. 418+59.00, 72' Lt
- Gas valve at Sta. 471+08.00, 47' Rt
- Gas valve at Sta. 483+13.00, 73' Rt

Spire has at grade access points for its facilities at various locations throughout the project. Some of these access points may need to be adjusted to new grades. The contractor shall coordinate directly with Spire for these adjustments. Spire's representative for this will be as follows:

- Nick Eggert (ph: 330.5720, email: [nicholas.eggert@spireenergy.com](mailto:nicholas.eggert@spireenergy.com))

The contractor shall contact Spire a minimum of 4 weeks ahead of need for adjustment.

The contractor shall coordinate with Spire, as necessary, and take measures to protect in place their existing facilities during construction.

The contractor shall directly contact Spire to verify the locations of their facilities.

The Commission cannot warrant the information above which was provided by Spire.

### **3.11 ST LOUIS COUNTY DEPARTMENT OF TRANSPORTATION (STLCo DOT)**

STL Co DOT has buried facilities crossing Rt 21 at Sta 105+00 and running south along western right of way limits from Sta. 103+00 to Sta. 129+00 and crossing back over Rt 21 again. They also have facilities at Sta 195+00, at Sta. 260+00 and from Sta 309+00 to Sta. 317+00.

STL Co DOT has the following existing facilities in conflict within the project limits. MoDOT's Utility Coordination consultant, Kivindyo Engineering Services LLC, will coordinate with STL Co DOT to relocate facilities in coordination with the contractor.

#### **Facilities in conflict within the project limits that require an adjustment to grade:**

- Handhole at Sta 126+22, 39' Rt.

### **4.0 Cover for Ameren Overhead Lines Located in Close Proximity to Proposed Work**

The contractor shall discuss the planned work as it relates to any energized power lines with Ameren Missouri and coordinate with Ameren Missouri for the installation of any insulation covers over the lines and/or any other designated requirements. Please note Ameren Missouri has revised the policy regarding the charges for placement, length of use and relocation of covers. The contractor is advised to contact Ameren Missouri regarding the current policy and so the anticipated cost to the contractor can be estimated and when payment is required. The Contractor shall contact Ameren Missouri at least two weeks in advance of when construction work is scheduled to begin to request covers to be placed at a given location. No direct payment will be made for this provision. The contractor is responsible for any charges from Ameren Missouri for this provision and payment will be directly to Ameren Missouri.

### **5.0 Existing Utility Facilities Located in Close Proximity to Proposed Work**

The contractor is advised there are existing utility facilities located in close proximity to proposed work. The contractor may need to use shoring to avoid conflicts with utility facilities. The contractor is advised that the cost for this shoring is incidental. No direct payment will be made to the contractor to recover the cost of equipment, labor, materials or time required to fulfill the above provision.

### **6.0 Contractor Responsibilities Related to Utilities and any Necessary Potholing of Utility Facilities**

Utility Companies with utility adjustments advised they anticipate completing their relocation work during construction in coordination with the contractor. The contractor shall take an active role in verifying that the utility work is complete. The contractor shall directly contact each utility company about the status of their relocation work. The contractor shall submit/coordinate one call tickets early enough at specific locations of planned work to verify everything is marked and

if there are questions about old and relocated facilities, so the issues can be addressed in field by utility locators in a timely manner.

The contractor shall also pothole any necessary buried utility facilities in the project limits to verify the buried facilities are deep enough for the roadway improvements and not damage the utility facility. Any utilities determined to be in conflict or that appear to be in conflict with construction shall be brought to the attention of the Engineer immediately. The Engineer shall determine course of action to remedy the situation. It may be necessary to shallow up rock lining, rock blanket or shift pipe installation to avoid a utility relocation.

No direct payment will be made to the contractor to recover the cost of equipment, labor, materials or time required to fulfill the above provision.

G. Winter Months Requirements JSP-15-07A

**1.0 Description.** This project contains work which spans the winter months.

**2.0 Work to be Completed.** When the contractor ceases operations for the winter months, any paving operation performed by the contractor shall not result in a lane height differential between adjacent lanes.

**3.0 Maintenance of Pavement Marking.** Prior to ceasing operations for winter months, a permanent or temporary stripe shall be provided on any completed length to the point that the original stripe was obliterated or obscured by the contractors' operation. Temporary striped areas shall be re-striped with the remaining route upon performance of the final striping.

**4.0 Winter Related Maintenance Activities.** The contractor shall have the project in a condition as not to interfere with the plowing of snow. The contractor shall also provide a taper at the end of his paving that will not be damaged by the plowing of snow.

**5.0 Basis of Payment.** There will be no direct pay for compliance with this provision

H. Liquidated Damages for Winter Months JSP-04-17A

Delete Sec 108.8.1.3 (a)

Liquidated damages for failure to complete the work on time shall not be waived from December 15 to March 15, both dates inclusive.

I. Liquidated Damages Specified JSP-93-28A

**1.0 Description.** If bridge construction work is not complete and open to traffic on or before 180 days, 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 delay, with its resulting cost to the traveling public. 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 **\$2,000.00** per day for each day, or partial day thereof, that bridge construction work is not complete and 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 excess closure time.

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

J. Liquidated Damages Specified for Entrance Closures

**1.0 Construction and Closure of Entrances.** The contractor shall provide ingress and egress at all times for each property owner along the project either by constructing the new approach half at a time or by providing temporary access as approved by the engineer. Businesses with two or more entrances shall have only one entrance closed at a time, unless otherwise noted in the special provision for “**Right of Way Requirements**”. However, in the case of a property having one approach used exclusively as an entrance and another approach used exclusively as an exit, the approaches shall be built one half at a time to provide for safe traffic movement into and out of the properties. See special provision “**Access to Commercial and Private Properties**” for further details.

**1.1** If each entrance, once construction has started, is not completely constructed to plan design within the fore mentioned times, of beginning construction on the entrance and open to traffic, the City, 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 delay, with its resulting cost to the traveling public. 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 **\$500 per day per entrance for each full day** that the entrance is not fully complete and 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 excess closure time.

**2.0** The said liquidated damages specified will be assessed regardless if whether it would otherwise be charged as liquidated damages under the Missouri Standard Specification for Highway Construction.

K. Liquidated damages for Pedestrian Impacts

**1.0 Description.** Providing work zone protection for pedestrians will be a primary component of this project. This work shall consist of staging/managing construction timelines to minimize the project's impacts to pedestrian traffic where construction activities make walkways impassible. Nothing in this provision shall be construed to limit contractor innovation in mitigating pedestrian traffic impacts.

**2.0 Prosecution of Work.** At locations where construction makes walkways impassible, the contractor shall have all necessary personnel, equipment, and materials at hand for all work at each location before the work begins so that work may proceed without delay. Work requiring

the mitigation of pedestrian traffic impacts includes, but shall not be limited to, removal of sidewalk, curb ramp, or other paved pedestrian pathway.

**3.0 Time of Disruption of Pedestrian Facilities.** Regardless of construction methods chosen, once a section of sidewalk has been closed to pedestrian traffic, the contractor shall prosecute the work as to minimize delays and inconvenience to the traveling public. The contractor, with approval from the engineer, shall specify the length of a given sidewalk section to be reconstructed. Once a corner has been closed to pedestrian traffic, the contractor shall have a maximum of three weeks, regardless of weather or other delays, to reopen that corner/section to pedestrian traffic.

**4.0 Work Area Safety.** The contractor shall maintain a work area that is safe for pedestrians. In order to provide this, the contractor shall work on only one side of Route 67 at a given time to improve the sidewalks along either the north or south sides and to allow a walkable path on the other side during construction. The areas adjacent to the contractor's physical work site shall also be maintained to provide access to adjoining properties, regardless of whether a detour route is in place. All holes shall be covered with secured plywood or steel plates, and the work area walkways shall be free of trip hazards, loose debris, vehicles, materials, and equipment when the contractor is not in the work area. A 3' minimum path shall be maintained on any used-in-place walkway needed for access. The contractor shall not be permitted to park on any walkway.

**5.0 Liquidated Damages.** If work associated with new sidewalk or curb ramps along a given side of Route 67 begins, but is not complete and open to pedestrian traffic within 3 weeks of commencement, 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, and pedestrian delay, with its resulting cost to the traveling public. 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 **\$500.00 per day** of delay that closes a walkway in excess of **3 weeks**. The contractor's superintendent and the engineer shall be on site at the time of any closures and shall both record an agreed time when the walkway was closed. It shall be the responsibility of the engineer to determine the quantity of excess closure time.

**5.1** The said liquidated damages specified will be assessed regardless of whether it would otherwise be charged as liquidated damages under the Missouri Standard Specification for Highway Construction. There shall be no permitted excuse for delay of the work, including weather.

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

#### L. Temporary Construction Easements

**1.0 Description.** MoDOT has obtained temporary construction easements from property owners in order to construct improvements for the project. Commercial businesses and church properties within the project limits will continue utilizing those construction easements to conduct their day-to-day business. Regardless of the type or use of the property, the contractor shall coordinate with all property owners to minimize the amount of time and space needed to construct the improvements located inside each temporary construction easement.



**2.0 Construction Requirements.** The contractor shall not disturb any improvements, besides the entrance or parking lot, located inside each temporary construction easement, unless shown as such on the plans. Improvements include such things as, but not limited to, monument signs and their electrical connections, landscaping, or sprinkler systems. The Contractor will be solely responsible for the cost to repair or replace any improvements disturbed that are not specifically marked on the plans for removal or adjustment.

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

M. Coordination with St. Louis County Department of Transportation

**1.0 Description.** St. Louis County maintains several roadways near MoDOT Job J6S3283, including but not limited to Rock Hill Road, Baptist Church Road, Mattis Road, Sappington Road, and Butler Hill Road.

**2.0 Requirements.** The contractor shall contact the St. Louis County Department of Transportation 7 days in advance of beginning work near any of the roadways mentioned above so that St. Louis County can adjust any maintenance activities or work with the contractor to coordinate St. Louis County work in the same general vicinity as Job J6S3283. The St. Louis County representative is Ray Gawlik, South Area Engineer at 314-615-8592 or [RGawlik@stlouiscountymo.gov](mailto:RGawlik@stlouiscountymo.gov)

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

N. 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.

O. Access to Commercial and Private Properties

**1.0 Description.** This improvement is in a commercial and residential area. While working on entrances or adjacent properties, the contractor shall make every reasonable effort to minimize any interference to the properties and to pursue the work diligently. The contractor shall maintain access to all properties within the project limits that do not have access from another roadway for the duration of the construction. This may be accomplished by constructing entrances half-at-a time if the parcel has only one entrance. If the parcel has multiple entrances, the contractor will be allowed to close one entrance as long as the remaining entrance(s) are open unless otherwise specified in this provision. The contractor may also use temporary surfacing and concrete accelerating admixtures as approved by the engineer to maintain access.

**1.1** 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 the engineer.

## **2.0 Construction Requirements.**

**2.1 Commercial Entrances.** On all commercial entrances greater than 20 feet wide, the contractor shall keep one-half of the entrance open at all times. On commercial entrances less than 20 feet 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 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.

**2.1.1** The contractor shall complete the entrances as quickly as possible and shall **take no longer than four (4) weeks** to complete any one entrance over 20' wide. The contractor shall **take no longer than five (5) days** to complete any one commercial entrance with a width less than 20 feet.

**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 private entrance, unless otherwise approved by the engineer and the property owner.

**2.2.1** Private 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 ten (10) days** to complete the entrance.

**2.3** If shown with the temporary traffic control plans provided within this project, the contractor may shift traffic to allow for 1 lane in each direction on Route 21 enabling the contractor to close lanes directly next to private or commercial properties between two sideroads in order to complete all entrances, sidewalk, ADA ramps, etc. for that given section of roadway. Space shall be provided for people to park their vehicles and access their properties at all times next to the active lanes of traffic. The minimum parking width to be provided shall be 9 feet. Temporary connections either through the entrance or via the sidewalk leading to the private or commercial property shall be provided at all times.

**2.4** The contractor has the option of using high early strength Portland cement concrete pavement (PCCP) for use in paved approaches and other areas of improvements as shown on the plans or as approved by the engineer. All materials, mixture and placement requirements shall be in accordance with all applicable portions of Section 501, 502, and 613, except as specified herein. An accelerator will be allowed as approved by the engineer.

**3.0 Communication.** The contractor shall contact each property owner at least 48 hours prior to any sidewalk or entrance construction within their property limits to advise them of the work that will take place and the timeframe of the work. The contractor will be allowed to vary from Section 1.0 of this provision if other access arrangements are made with the property owner or tenant. These variations must be approved by the engineer prior to beginning work.

**4.0 Liquidated Damages Specified.** See special provision **Liquidated Damages Specified for Entrance Closures** for further details.

**5.0 Right of Way Requirements.** See special provision **Right of Way Requirements** for further details and requirements.

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

P. Property Owner Agreements(10/3/24)

**Parcel 06** - 9515 Tesson Ferry Road: Lutheran High School South has made substantial improvements to its campus approaches along Tesson Ferry Road/Route 21. The Contractor, at its expense, shall correct any damage caused to the Lutheran High School South's campus because of this project. The Contractor will be required to coordinate construction work schedules with Myron Koehn, Facilities Manager for Lutheran High School South, to ensure that campus ingress and egress will be minimally impacted. Mr. Koehn may be reached at (314) 833-1093 or [mkoehn@slancers.org](mailto:mkoehn@slancers.org)

**Parcel 07** - 9625 Tesson Ferry Road: The Contractor will take any necessary precautions to avoid damage to the property, and shall not damage or impact the paving on the parking lot.

If damage does occur during improvements, the Contractor will make satisfactory repairs and bring the parking lot(s) to the current condition. The existing sidewalk will be replaced with soil, tamped down, then sod placed in the areas affected by the removal.

**Parcel 09** - 9655 Tesson Ferry Road: The Contractor will take any necessary precautions to avoid damage to the property, and shall not damage or impact the paving on the parking lot.

If damage does occur during improvements, the Contractor will make satisfactory repairs and bring the parking lot(s) to the current condition. The existing sidewalk will be replaced with soil, tamped down, then sod placed in the areas affected by the removal.

**Parcel 23** - 11120 Tesson Ferry Road: The contractor shall provide ingress and egress at all times by constructing the entrance located at Station 216+15.10 LT one-half at a time. The contractor shall be directed to ensure that this entrance will not be completely blocked at any time during construction, and that the project will not prohibit ingress and egress to the parking lot.

**Parcel 26** - 5655 S. Lindbergh Boulevard: The Contractor shall be directed to ensure that the entrance located Station 239+10.18, LT will not be completely blocked at any time during construction due to car hauler deliveries. The contractor will take the necessary steps to contact Dan Sinclair @ 314-568-7216 in advance to inform Dan when the entrance will be affected by construction and an estimated timeline for completion. This will allow Sinclair Buick-GMC Truck, Inc. to coordinate car deliveries around construction.

**Parcel 50** - 13169 Tesson Ferry Road: The contractor will be required to notify Fellowship of Praise STL at least 14 days prior to construction within the easement on Parcel 50. Lynnette Joyce may be reached at 314-722-3204 or [lynnettejoyce@att.net](mailto:lynnettejoyce@att.net)

The Contractor will not prohibit customer ingress/egress during the construction process.

Q. Right of Way Requirements

**1.0 Description.** The Right of Way has been cleared on this project. However, there are some special requirements and conditions that have been agreed to in the negotiation process that the contractor shall adhere to.

**2.0 Construction Requirements.** All materials and work performed for this item shall be in accordance with applicable Standard Specifications. Please note that the list of special requirements below may not be all inclusive. The contractor shall consult the Right of Way Negotiator's Report for a full detail of any special requirements at each parcel.

**2.1 Business Hours.** A number of parcels within the project require minimal or no disruptions during business hours. If specific business hours are not listed or where multiple tenants share a building, it shall be the responsibility of the contractor to verify the proper business hours with each business/tenant to plan the construction work accordingly. Where listed, business hours included in this JSP are current as of the time of the project's advertisement for bidders. However, business hours are subject to change and actual business hours may vary slightly from those hours listed herein, and may be temporarily adjusted during different times of the year. It shall be the responsibility of the contractor to verify the accuracy of the noted business hours and provide as little disruption as possible during construction operations.

**3.0 Locations.**

**3.1 Parcel XX – NAME**

**3.1.1** Insert special information here.

**4.0 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.

R. Delayed Access to Parcels Pending Acquisition

**1.0 Description.** Acquisition is pending for the parcels listed below on the project. The contractor shall not be permitted to begin work within any designated Temporary Construction Easement or Permanent Easement on any of these parcels until the Right of Way acquisition has been completed. An anticipated date of possession has been provided for each parcel to assist with scheduling purposes.

**2.0 Construction Requirements.** The contractor shall verify with the engineer prior to beginning work on any of the parcels listed in this provision. The contractor will not be permitted access to work on any of these parcels until notification has been given by the engineer that the parcel has been cleared from this list.

**3.0 Parcels.** The following is the list of the parcels where acquisition is pending.

Parcel 2, anticipated possession January 6, 2025

Parcel 3, anticipated possession January 6, 2025

Parcel 5, anticipated possession January 6, 2025

Parcel 6, anticipated possession January 6, 2025

Parcel 10, anticipated possession January 6, 2025

Parcel 15, anticipated possession April 30, 2025

Parcel 16, anticipated possession January 6, 2025

Parcel 29, anticipated possession January 6, 2025

Parcel 30, anticipated possession April 30, 2025

Parcel 31, anticipated possession January 6, 2025

Parcel 34, anticipated possession April 30, 2025

Parcel 35, anticipated possession January 6, 2025

Parcel 39, anticipated possession January 6, 2025

Parcel 42, anticipated possession April 30, 2025

Parcel 43, anticipated possession April 30, 2025

Parcel 46, anticipated possession January 6, 2025

Parcel 47, anticipated possession January 6, 2025

Parcel 48, anticipated possession April 30, 2025

Parcel 49, anticipated possession April 30, 2025

Parcel 52, anticipated possession April 30, 2025

**4.0 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.

S. Site Restoration

**1.0 Description.** Restore to its original condition any disturbed area at sites including, but not limited to, guardrail, entrances, signs, pull box, conduit, pole base installations, paving, curbing, and work to ADA facilities. 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** 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.

**2.1** 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 or concrete slope protection, sidewalk, pavement, shoulders, islands, medians, sod and the required dowel and tie bars removed and replaced by the contractor as a result of his election to vary the location of conduit runs and pull boxes. This work will be considered as included in the various unit bid prices for conduit and pull boxes established in the contract, and no additional payment will be made.

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

**2.2.1** Seed and mulch will not be an acceptable means to reestablish grass in disturbed areas adjacent to ADA facilities constructed with this project. Any grassy areas around these facilities that have been disturbed by the contractor in order to construct ADA compliant facilities shall be replaced with sod in accordance with Sec 808. For locations where an existing ADA facility is removed and replaced on a new, accessible alignment, the old alignment shall have the subgrade appropriately prepared and sod shall be installed at the surface.

**2.3** 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 guardrail, entrances, signs, pole base, conduit, pull box, paving, curbing, and/or ADA facilities. No direct payment will be made for any materials or labor, which is performed under this provision

T. Concrete Washout

**1.0 Description.** Concrete washout BMPs shall be established in designated areas for this project if concrete production or delivery is occurring. Washout BMPs can be non-leaking plastic or clay/bentonite lined pits, a straw bale enclosure lined with plastic, a storage tank or prefabricated BMP or other structure approved by the engineer or inspector. Designated washout areas should be located at least 50 feet away from storm drains, ditches, streams or other water bodies. Washouts should be monitored like other BMPs to ensure there are no leaks and that they are operating effectively. They should be cleaned out when they reach 75% of their design capacity. Care should be taken to ensure these structures do not overflow during storm events. Upon completion of concrete washout on the project, the engineer or inspector should ensure proper disposal of washout materials. Washout liquids can be allowed to evaporate or be pumped

out and properly disposed of. They cannot be discharged into storm drains, ditches, streams or other bodies of water. Dried concrete can be broken up and used as clean fill on the project, recycled or properly disposed of by other means.

**2.0 Basis of Payment.** No direct payment will be made to the contractor for installing, maintaining, and removing concrete washout facilities or for properly disposing of materials. The cost of complying with this requirement shall be completely covered in the contract unit price of the concrete pay items included in the contract.

U. Damage to Existing Pavement, Side Roads and Entrances

**1.0 Description.** This work shall consist of repairing any damage to existing pavement, curb, ramps and/or shoulders caused by contractor operations. This shall include damage caused either directly or indirectly by contractor operations, including but not limited to, damage caused by the traffic during contractor operations.

**2.0 Construction Requirements.** Any cracking, gouging, or other damage to the existing pavement, curb, ramps and/or shoulders, side roads, or entrances from general construction shall be repaired within twenty-four (24) hours of the time of damage at the contractor's expense. Repair of the damaged pavement, shoulders, side roads, or entrances shall be as determined by the engineer.

**3.0 Method of Measurement.** No measurement of damaged pavement, curb, ramps or shoulder areas as described above shall be made.

**4.0 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 documents.

V. Coordination with Metro Transit

**1.0 Description.** The contractor shall be required to coordinate with Metro Transit where construction operations will involve work on or around existing transit stops. It is requested that the coordination begin prior to the project Preconstruction Conference to ensure minimal disruption in service to Metro's Transit system.

**2.0 Construction Requirements.** All Metro Transit stops within the project limits shall remain open and operational throughout the duration of the project. In locations where the contractor's operations will involve work in proximity to a transit stop location, the contractor shall notify Metro Transit 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 transit users to construction hazards in proximity to all transit stops that are in service during work operations.

**2.1 Project Contacts.** The contractor shall notify the following contacts at Metro Transit to coordinate scheduling throughout the project with them or their designated representative(s).

Ms. Natalie Siebert, Senior Planner Transit Operations  
Office: (314) 982-1400 x1816  
Cell: (314) 497-4916

Email: nmsiebert@MetroStLouis.org

Mr. Lance Peterson, Director of Service Planning  
Office: (314) 982-1520  
Cell: (314) 220-6756  
Email: llpeterson@MetroStLouis.org

**3.0 Temporary Facilities.** In locations where the contractor's operations may affect a transit 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 shall be coordinated with Metro Transit. All temporary transit stops shall be located in proximity to the existing stop it is representing, accessible, clear and conspicuous to both the transit rider and facility operator, and be located where it is safe from hazards within the work area.

#### **4.0 Permanent Facilities.**

**4.1 Bus Stops.** Locations for proposed bus stops are identified in the contract plans. The contractor shall remove the existing post and anchorage system. This work shall not be paid for separately, but be included in the Lump Sum cost of Removal of Improvements. The contractor shall coordinate with Metro Transit for the delivery of the existing bus stop signs.

Bolt-down Sign Base - Upon completion of the concrete sidewalk/bus stop improvements, the contractor shall furnish and install a 10' sign post and bolt-down sign base plate for the bus stop signage. The base shall be a bolt down, breakaway sign base designed accept a 10' long standard MoDOT sign post. Base shall be suitable for installation on top of concrete sidewalk and installed with manufacturer provided hardware. Base shall not protrude into the pedestrian access route and create a trip hazard. Metro Transit will install the new/relocated bus stop sign.

See JSP Remove and Relocate Existing Sign and Signage and Pavement Marking Plans for additional information and payment of sign related items.

**4.2 Bus Shelters.** Locations for proposed bus shelters are identified in the contract plans. The contractor shall construct the concrete pad for the shelters. Shelters will be furnished and installed by Metro Transit upon completion of the pads.

**4.2 Benches.** At existing transit stops with benches, the contractor shall coordinate with Metro Transit for Metro Transit to remove the existing bench prior to contractor's activities at the location. Metro Transit shall store and reinstall the bench at the completion of the contractor's work at the transit stop location.

**5.0 Basis of Payment.** No direct payment will be made for any labor, equipment, materials, and time required to comply with this provision.

#### W. 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.

X. 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.

Y. ADA Material Testing Frequency Modifications JSP-23-01

**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 Quality Control (QC) testing frequency for the Sections identified below are to be revised as specified.

**2.0 Compaction Test on Base Rock Under Sidewalk, Curb Ramps and Paved Approaches.** (Revises ITP Sec 304.3.4) The required test frequency will 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 will be one per 500 tons.

**4.0 Concrete Plant Checklists.** (Revises ITP Sec 501) Submittal of the 501 Concrete Plant Checklist will 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, and Curb.** (Revises ITP Sec 608) The required frequency will be the first truckload for the project and each 100 CUYDs for air and slump thereafter. Strength will be verified by use of cylinders or maturity meters at a minimum rate of one per 100 CUYD.

**6.0 Paved Approaches.** (ITP Sec 608) The required testing of one test from the first truckload per day and each 100 CUYDs for air and slump will remain per ITP. Strength will be verified by use of cylinders or maturity meters at a minimum rate of one per 100 CUYD.

**7.0 Curb Concrete.** (Revises ITP Sec 609) The required frequency will be the same as Sec 5.0 above.

**8.0 Basis of Payment.** No direct payment will be made to the contractor to fulfill the above requirements.

Z. Balanced Mix Design Requirements JSP-24-01

**1.0 Description.** Balanced Mix Design (BMD) and Paver-Mounted Thermal Profiles (PMTP), as specified herein, are required on this project for all Sec 403 asphaltic concrete pavement surface

and base course mixes. BMD shall be in accordance with section 2.0. PMTP shall be in accordance with section 3.0. No additional payment will be made for compliance with these provisions.

**1.1 Rapid Penetrating Emulsion.** Should use of Rapid Penetrating Emulsion (RPE) be necessary for corrective action of longitudinal joint density, as specified elsewhere in section 2.0, RPE shall be in accordance with MoDOT JSP2303 Rapid Penetrating Emulsion (available at: [https://epg.modot.org/index.php/Job\\_Special\\_Provisions](https://epg.modot.org/index.php/Job_Special_Provisions)), except that no payment will be made for use of RPE.

**2.0** Delete Sec 403 in its entirety and substitute the following:

#### **403 ASPHALTIC CONCRETE PAVEMENT with Balanced Mix Design**

**403.1 Description.** This work shall consist of providing a bituminous mixture to be placed in one or more courses on a prepared base or underlying course as shown on the plans or as directed by the engineer. The contractor shall be responsible for QC of the bituminous mixture, including the design, and control of the quality of the material incorporated into the project. The engineer will be responsible for QA, including testing, to assure the quality of the material incorporated into the project.

**403.1.1 Naming Convention.** The nomenclature of Superpave bituminous mixture names, such as SP125CLP, will be as follows. When only the aggregate size is shown, such as SP125, the specifications shall apply to all variations of that size, such as SP125B, SP125C, SP125CLP, etc. When "x" is indicated, such as SP125xLP, specifications shall apply to all variations of mixture designs. Stone Matrix Asphalt will be generally referred to as SMA and designated by SM or SMR.

<b>Superpave Nomenclature</b>	
<b>SP</b>	<b>Superpave</b>
048	4.75mm (No. 4) nominal aggregate size
095	9.5 mm (3/8 inch) nominal aggregate size
125	12.5 mm (1/2 inch) nominal aggregate size
190	19.0 mm (3/4 inch) nominal aggregate size
250	25.0 mm (1 inch) nominal aggregate size
x	Mixture design: B, C, E or F (as described below)
LP	Limestone porphyry (when designated)
SM	Stone Matrix Asphalt (when designated)
SMR	Stone Matrix Asphalt limestone/non-carbonate (when designated)

**403.1.2 Design Levels.** The following cumulative equivalent single axle loads (ESALs) shall be used for the specified mix design. The same size aggregate mix design at a higher design traffic may be substituted at the contractor's expense for the contract specified mixture design with the approval from the engineer. Substitutions shall be done uniformly and project mixing of various designs for the same work will not be permitted. For example, an SP125B mixture may be substituted for an SP125C mixture, or SP190C for SP190E, etc. Mixture design substitution will be limited to one design level higher than that specified in the contract.

Design Traffic (ESALs)	Design
< 300,000	F
300,000 to < 3,000,000	E
3,000,000 to < 30,000,000	C
≥ 30,000,000	B

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

Item	Section
Aggregate	<a href="#">1002</a>
Asphalt Binder, Performance Graded (PG)*	<a href="#">1015</a>
Fiber Additive	<a href="#">1071</a>
Anti-Strip Additive	<a href="#">1071</a>

\*The grade of asphalt binder will be specified in the contract.

**403.2.1 Stone Matrix Asphalt.** In addition to other requirements, material for SMA mixtures shall meet the following. Coarse aggregate shall consist of crushed limestone and either porphyry or steel slag in accordance with the quality requirements of [Sec 1002](#), except as follows. The Los Angeles (LA) abrasion, when tested in accordance with AASHTO T 96, shall not exceed 40 percent based on initial ledge approval and source approval. The percent absorption, when tested in accordance with AASHTO T 85, shall not exceed 3.5 percent based on the individual fractions. The amount of flat and elongated particles, measured on material retained on a No. 4 sieve, of the blended aggregate shall not exceed 20 percent based on a 3:1 ratio or 5 percent based on a 5:1 ratio.

**403.2.2 Filler Restriction.** Rigden void content determined in accordance with MoDOT Test Method TM-73 shall be no greater than 50 percent.

**403.2.3 Fibers.** A fiber additive shall be used as a stabilizer in SMA Mixtures. Fibers shall be uniformly distributed by the end of the plant mixing process. The dosage rate for fibers shall be no less than 0.3 percent by weight of the total mixture for cellulose and no less than 0.4 percent by weight for mineral fibers.

**403.2.4 Reclaimed Asphalt.** A maximum of 30 percent virgin effective binder replacement may be used in mixtures without changing the grade of binder. The asphalt binder content of recycled asphalt materials shall be determined in accordance with AASHTO T 164, ASTM D 2172 or other approved method of solvent extraction. A correction factor for use during production may be determined for binder ignition by burning a sample in accordance with AASHTO T 308 and subtracting from the binder content determined by extraction. The aggregate specific gravity shall be determined by performing AASHTO T 209 in accordance with [Sec 403.19.3.1.2](#) and calculating the  $G_{se}$  to which a 0.98 correction factor will be applied to obtain the  $G_{sb}$  as follows:

$$G_{se} = \frac{100 - P_b}{\frac{100}{G_{mm}} - \frac{P_b}{G_b}} \quad \text{RAP } G_{sb} = \text{RAP } G_{se} \times 0.98$$

**403.2.5 Reclaimed Asphalt Pavement.** Reclaimed Asphalt Pavement (RAP) may be used in any mixture, except SMA mixtures. Mixtures may be used with more than 30 percent virgin

effective binder replacement provided testing according to AASHTO M 323 is included with the job mix formula that ensures the combined binder meets the grade specified in the contract. All RAP material, except as noted below, shall be tested in accordance with AASHTO T 327, *Method of Resistance of Coarse Aggregate Degradation by Abrasion in the Micro-Deval Apparatus*. Aggregate shall have the asphalt coating removed either by extraction or binder ignition during production. The material shall be tested in the Micro-Deval apparatus at a frequency of once per 1500 tons. The percent loss shall not exceed the Micro-Deval loss of the combined virgin material by more than five percent. Micro-Deval testing will be waived for RAP material obtained from MoDOT roadways. All RAP material shall be in accordance with [Sec 1002](#) for deleterious and other foreign material.

**403.2.6 Reclaimed Asphalt Shingles.** Reclaimed Asphalt Shingles (RAS) may be used in any mixture specified to use PG 64-22 in accordance with AASHTO PP 53 except as follows: When the ratio of virgin effective binder to total binder in the mixture is between 60 and 70 percent, the grade of the virgin binder shall be PG 52-28 or PG 58-28. Shingles shall be ground to 3/8-inch minus. Waste, manufacturer or new, shingles shall be essential free of deleterious materials. Post-consumer RAS shall not contain more than 1.5 percent wood by weight or more than 3.0 percent total deleterious by weight. Post-consumer RAS shall be certified to contain less than the maximum allowable amount of asbestos as defined by national or local standards. The gradation of the aggregate may be determined by solvent extraction of the binder or using the following as a standard gradation:

<b>Shingle Aggregate Gradation</b>	
<b>Sieve Size</b>	<b>Percent Passing by Weight</b>
3/8 in.	100
No. 4	95
No. 8	85
No. 16	70
No. 30	50
No. 50	45
No. 100	35
No. 200	25

### **403.3 Composition of Mixtures.**

**403.3.1 Gradation.** Prior to mixing with asphalt binder, the combined aggregate gradation, including filler if needed, shall meet the following gradation for the type of mixture specified in the contract. A job mix formula may be approved which permits the combined aggregate gradation during mixture production to be outside the limits of the master range when the full tolerances specified in [Sec 403.5](#) are applied.



Percent Passing by Weight							
Sieve Size	SP250	SP190	SP125	SP095	SP048	SP125xSM(R)	SP095xSM(R)
1 1/2 in.	100	---	---	---	---	---	---
1 in.	90 - 100	100	---	---	---	---	---
3/4 in.	90 max.	90 - 100	100	---	---	100	---
1/2 in.	---	90 max.	90 - 100	100	---	90-100	100
3/8 in.	---	---	90 max.	90-100	100	50-80	70-95
No. 4	---	---	---	90 max.	90-100	20 - 35	30-50
No. 8	19 - 45	23 - 49	28 - 58	32-67	---	16 - 24	20-30
No. 16	---	---	---	---	30-60	---	21 max.
No. 30	---	---	---	---	---	---	18 max.
No. 50	---	---	---	---	---	---	15 max.
No. 100	---	---	---	---	---	---	---
No. 200	1 - 7	2 - 8	2 - 10	2-10	7-12	8.0-11.0	8.0-12.0

**403.3.2 Anti-Strip Agent.** An anti-strip will be allowed by the engineer to improve resistance to stripping. Anti-strip agents and application rates shall be from a list approved in accordance with [Sec 1071](#).

**403.3.3 Porphyry Mixtures.** For LP and SMA mixtures, at least 50 percent by volume of the aggregate shall be crushed porphyry retained on the following sieves: No. 30 for SP048, No. 16 for SP095 and No. 8 for SP125. Depending on the actual gradation of porphyry aggregate furnished, the amount of crushed porphyry required may vary, however at least 40 percent by weight of crushed porphyry will be required. Steel slag may be substituted for porphyry in LP and SM mixtures, except at least 45 percent by weight of crushed porphyry and/or slag will be required. The engineer may approve the use of other hard, durable aggregate in addition to porphyry and steel slag. When an SMR mixture is designated, the mixture shall contain aggregate blends with at least 30 percent non-carbonate material in accordance with [Sec 403.3.5](#).

**403.3.4 Minimum Stone Matrix Asphalt Binder.** The percent asphalt binder for SMA mixtures shall not be less than 6.0 percent unless otherwise allowed by the engineer.

**403.3.5 Surface Mixtures.** Design level B surface mixtures and SP048NC, except as described in [Sec 403.15.3](#), containing limestone coarse aggregate shall contain a minimum amount of non-carbonate aggregate. The LA abrasion values, AASHTO T 96, of the limestone will determine the type and amount of non-carbonate aggregate required as shown in the table below. The LA abrasion value will be determined from the most recent source approval sample. In lieu of the above requirements, the aggregate blend shall have an acid insoluble residue (AIR), MoDOT Test Method TM 76, meeting the plus No. 4 criteria of crushed non-carbonate material. Non-carbonate aggregate shall have an AIR of at least 85 percent insoluble residue.

Coarse Aggregate (+ No. 4)	Minimum Non-Carbonate by Volume
Limestone, LA $\leq$ 30	30% Plus No. 4
Limestone, LA > 30	20% Minus No. 4*
Dolomite	No Requirement

\*Use for all SP095 and SP048NC containing limestone.

**403.4 Job Mix Formula.** At least 30 days prior to placing any mixture on the project, the contractor shall submit a mix design for approval to Construction and Materials. The mixture shall be designed in accordance with AASHTO R 35 or R 46 and shall be tested in accordance with



AASHTO T 312 except as noted herein. A detailed description of the mix design process shall be included with the job mix formula (JMF). Representative samples of each ingredient for the mixture shall be submitted with the mix design.

**403.4.1 Proficiency Sample Program.** Laboratories that participate in and achieve a score of three or greater in the AASHTO proficiency sample program for T 11, T 27, T 84, T 85, T 166, T 176, T 209, T 304 (ASTM C 1252), T 308 and T 312 will have the mixture verification process waived. The mix design shall be submitted to Construction and Materials for approval at least seven days prior to mixture production.

**403.4.2 Required Information.** The mix design shall include raw data from the design process and contain the following information:

- (a) All possible sources intended for use, and grade and specific gravity of asphalt binder.
- (b) Source, type (formation, etc.), ledge number if applicable, gradation, and deleterious content of each aggregate fraction.
- (c) Bulk and apparent specific gravities and absorption of each aggregate fraction in accordance with AASHTO T 85 for coarse aggregate and AASHTO T 84 for fine aggregate including all raw data.
- (d) Specific gravity of hydrated lime, mineral filler or baghouse fines, if used, in accordance with AASHTO T 100.
- (e) Percentage of each aggregate component.
- (f) Combined gradation of the job mix.
- (g) Percent asphalt binder, by weight, based on the total mixture and percent asphalt binder contributed by reclaimed asphalt materials.
- (h) Bulk specific gravity ( $G_{mb}$ ) by AASHTO T 166 Method A of a laboratory compacted mixture compacted at  $N_{design}$  gyrations.
- (i) Percent air voids ( $V_a$ ) of the laboratory compacted specimen compacted to  $N_{design}$  gyrations.
- (j) Voids in the mineral aggregate (VMA) and volume of Effective Asphalt ( $V_{be}$ ) at  $N_{design}$  gyrations.
- (k) Theoretical maximum specific gravity ( $G_{mm}$ ) as determined by AASHTO T 209, in accordance with [Sec 403.19.3](#), after the sample has been short term aged in accordance with AASHTO R 30.
- (l) The tensile strength ratio as determined by AASHTO T 283 including all raw data.
- (m) The gyratory sample weight to produce a 115 mm minimum height specimen.
- (n) Mixing temperature and gyratory molding temperature.

- (o) Number of gyrations at  $N_{\text{design}}$ .
- (p) Dust proportion ratio ( $-200/P_{\text{be}}$ ).
- (q) Bulk specific gravity ( $G_{\text{sb}}$ ) of the combined aggregate.
- (r) Percent chert contained in each aggregate fraction.
- (s) Percent of  $G_{\text{mm}}$  at  $N_{\text{initial}}$  and  $N_{\text{maximum}}$ .
- (t) Voids in coarse aggregate (VCA) for both the mixture and dry-rodded condition for SMA mixtures.
- (u) Draindown for SMA mixtures.
- (v) Performance testing results for Cracking Tolerance Index ( $CT_{\text{Index}}$ ), Critically aged Cracking Tolerance Index ( $CT_{\text{Index, Critically Aged}}$ ), Hamburg Wheel Tracking Test (HWTT), and Rutting Tolerance Index ( $RT_{\text{Index}}$ ).
- (w) Baghouse fines added for design.
  - (i) Batch and continuous mix plants – Indicate which aggregate fraction to add baghouse percentage during production.
  - (ii) Drum mix plants – Provide cold feed settings with and without baghouse percentage.

**403.4.3 Approval.** No mixture will be accepted for use until the JMF for the project is approved by Construction and Materials.

**403.4.4 Mix Formula Modification.** The JMF approved for each mixture shall be in effect until modified in writing by the engineer. When unsatisfactory results occur or should a source of material be changed, a new JMF may be required.

**403.4.4.1 Asphalt Binder Source Change.** When an asphalt binder source change includes a binder grading that differs from the original grade on the JMF, new performance testing values ( $CT_{\text{Index}}$  and  $RT_{\text{Index}}$ ) shall be provided prior to use.

**403.4.4.2 Additive Source Change.** When rejuvenators, warm mix additives, anti-strip additive, or other additives sources change; new performance testing values ( $CT_{\text{Index}}$  and  $RT_{\text{Index}}$ ) shall be provided.

**403.4.5 Design Gyrations.** The minimum number (N) of gyrations required for gyratory compaction shall be as follows:

Design	$N_{\text{design}}^a$
F	35
E	50
C	60
B	65

<sup>a</sup> SMA mixtures shall have  $N_{\text{design}}$  equal to 100.

**403.4.6 Mixture Characteristics.** When compacted in accordance with AASHTO T 312, the mixture shall meet the following criteria.

**403.4.6.1 Air Voids ( $V_a$ ).** Design air voids for SuperPave mixtures at all traffic levels shall be between 3.0 and 5.0 percent. SMA mixtures shall have a design air void of 4.0 percent.

**403.4.6.2 Voids in the Mineral Aggregate (VMA).** SuperPave mixtures shall have a minimum volume of effective asphalt, equal to the VMA minus the air voids, as shown in the chart below, with design air voids between 3.0% to 5.0% for SuperPave and shall be 4.0% for SMA. The minimum VMA shall be equal to the minimum volume of effective binder ( $V_{be}$ ) plus design air voids.

Mixture	$V_{be}$ Minimum (percent)
SP250	9.0
SP190	10.0
SP125 (except for SMA)	11.0
SP095 (except for SMA)	12.0
SP048	13.0
SMA	13.0

**403.4.7 Dust to Binder Ratio.** For all mixtures except SMA and SP048, the ratio of minus No. 200 material to effective asphalt binder ( $P_{be}$ ) shall be between 0.8 and 1.6. For SP048, the ratio of minus No. 200 material to effective asphalt binder ( $P_{be}$ ) shall be between 0.9 and 2.0.

**403.4.8 Moisture Susceptibility.** For all mixtures except SMA, the mixture shall have a tensile strength ratio (TSR) greater than 85 percent (80 percent if an approved anti-strip agent is used) when compacted to 3.7 inches with  $7 \pm 0.5$  percent air voids and tested in accordance with AASHTO T 283. SMA mixtures shall have a TSR greater than 85 (80 percent if an approved anti-strip agent is used) percent when compacted to 3.7 inches with  $6 \pm 0.5$  percent air voids and tested in accordance with AASHTO T 283.

**403.4.8.1 Minimum Tensile Strength.** All mixtures shall have a minimum allowable conditioned tensile strength of 60 psi.

**403.4.8.2 Liquid Anti-Strip Dosage.** The liquid anti-strip dosage shall be in the range recommended by the manufacturer and provided on the JMF.

**403.4.9 Draindown.** AASHTO T 305, Draindown Test, shall be performed on all SMA mixtures prior to job mix approval. The mixture shall be stabilized in such a way that the draindown of the asphalt binder shall not exceed 0.3 percent by weight of mixture.

**403.4.10 Voids in Coarse Aggregate.** The percent  $VCA_{MIX}$  of SMA mixtures shall be less than or equal to the  $VCA_{DRC}$  as determined using AASHTO T 19. This may be calculated using the following equations:

$$VCA_{DRC} = 100 \times (G_{CA} \gamma_w - \gamma_s) / G_{CA} \gamma_w$$

$$VCA_{MIX} = 100 - (P_{bp} \times G_{mb} / G_{CA})$$

$$P_{bp} = P_s \times PA_{bp}$$

Where:  $G_{CA}$  = bulk specific gravity of the combined coarse aggregate (AASHTO T 85),  
 $\gamma_s$  = unit weight of coarse aggregate in the dry-rodded condition (DRC) (lb/ft<sup>3</sup>) (AASHTO T 19),  
 $\gamma_w$  = unit weight of water (62.34 lb/ft<sup>3</sup>) ,  
 $P_{bp}$  = percent aggregate by total mixture weight retained on No. 4 sieve and  
 $PA_{bp}$  = percent aggregate by total aggregate weight retained on No. 4 sieve\*.  
 \*Use No. 8 sieve for SP095xSM

**403.4.11 Mix Design Performance Testing.** Acceptable test results meeting the criteria for the following performance tests shall be submitted with the mix design for approval. Test specimens shall be compacted to an air void content of 7.0 +/- 0.5% or 6.0 ± 0.5% for SMA mixtures.

**403.4.11.1 Cracking Tolerance Index (CT<sub>Index</sub>) Testing.** The CT<sub>Index</sub> testing shall be completed in accordance with ASTM D8225 and at a test temperature of 25 +/- 0.5 °C.

Mix Type	Minimum CT <sub>Index</sub>	CT <sub>Index</sub> , (Critically Aged)*
Non-SMA	50	Informational Only
SMA	135	Informational Only

\*Critically Aged defined as loose mix aging for 20 hours at 115° C.

**403.4.11.2 Rutting Tolerance Index (RT<sub>Index</sub>) Testing.** The RT<sub>Index</sub> testing shall be completed in accordance with ASTM D8360 and at a test temperature of 50 +/- 1°C.

PG Grade High Temperature*	Minimum RT <sub>Index</sub>
58-28H / 64-22	50
64-22H / 70-22	65
64-22V / 76-22	80

\*Determined by the binder grade specified in the contract.

**403.4.11.3 Hamburg Wheel Track (HWT).** HWT testing will be completed in accordance with AASHTO T324 at test temperature of 50 +/- 1°C and 2.44 in specimen height.

PG Grade High Temperature *	Minimum Wheel Passes	Maximum Rut Depth (in.)
58-28H / 64-22	7,500	0.38
64-22H / 70-22	15,000	0.38
64-22V / 76-22	20,000	0.38

\*Determined by the binder grade specified in the contract.

#### 403.5 Mixture Production Specification Limits.

**403.5.1 Gradation and Deleterious Content Control.** The gradation of the aggregate shall be determined from samples taken from the hot bins on batch-type or continuous mixing plants or

from the composite cold feed belt on drum mix plants. The gradation may also be obtained by sampling the mixture and testing the residual aggregate. The deleterious content of the aggregate shall be determined from samples taken from the composite cold feed belt. The RAP shall be sampled from the RAP feeding system on the asphalt plant. Gradation and deleterious shall be taken when directed by the engineer.

**403.5.1.1 Stone Matrix Asphalt Tolerances.** In producing mixtures for the project, the plant shall be operated such that no intentional deviations from the job mix formula are made. The maximum deviation from the approved job mix formula shall be as follows for SMA mixtures:

Sieve	Max. Tolerance	
	SP095	SP125
3/4 in.	---	---
1/2 in.	---	±4
3/8 in.	±4	±4
No. 4	±3	±3
No. 8	±3	±3
No. 200	±2	±2

**403.5.1.2 Mixture Tolerance.** For all other SP mixtures, the percent passing the first sieve size smaller than the nominal maximum size shall not exceed 92.0 percent, a tolerance not to exceed 2.0 percent on the No. 8 sieve from the table in [Sec 403.3.1](#), and within the range listed in [Sec 403.3.1](#) for the No. 200 sieve. The deleterious content of the material retained on the No. 4 sieve shall not exceed the limits specified in [Sec 1002.2](#).

**403.5.2 Density.** The final, in-place density of the mixture shall be 92.5 to 98.0 percent of the theoretical maximum specific gravity for all mixtures except SMA. SMA mixtures shall have a minimum density of 94.0 percent of the theoretical maximum specific gravity. The theoretical maximum specific gravity shall be determined from a sample representing the material being tested. Tests shall be taken not later than the day following placement of the mixture. The engineer will randomly determine test locations.

**403.5.2.1 Shoulder Density.** Density on non-integral shoulders shall be in accordance with [Sec 403.15.3](#).

**403.5.2.2 Integral Shoulder.** When shoulders are placed integrally with the traveled way, tests shall be taken on the traveled way.

**403.5.2.3 Longitudinal Joint Density.** Density along longitudinal joints shall be in accordance with [Sec 403.16.1](#). Pay shall be in accordance with [Sec 403.23.4.1](#).

**403.5.3 Asphalt Content.** The asphalt content (AC) shall be within ± 0.3 percent of the approved mix design.

**403.5.4 Air Voids.** Air voids shall be within ± 1.0 percent of the approved mix design at  $N_{des}$  gyrations.

**403.5.5 Cracking Tolerance Index.** Minimum  $CT_{Index}$  shall be 50 for all mixtures except SMA. SMA mixtures shall have a minimum  $CT_{Index}$  of 135.

**403.5.6 Rutting Tolerance Index.** Minimum  $RT_{Index}$  shall be based upon the high temperature asphalt binder grade in the contract in accordance with the following:

PG Grade High Temperature*	Minimum $RT_{Index}^{(a)}$
58-28H / 64-22	50
64-22H / 70-22	65
64-22V / 76-22	80

\*Determined by the binder grade specified in the contract.

<sup>(a)</sup>Mixtures not meeting the minimum  $RT_{Index}$  shall be tested by the Hamburg Wheel Track Test and meet a minimum of 1/2" rutting at the number of wheel passes required by the contract grade of the mixture.

**403.5.7 Tensile Strength Ratio (TSR).** The TSR shall be greater than or equal to 75 percent as determined from loose mixture taken from the plant and tested in accordance with AASHTO T 283. The minimum allowable conditioned tensile strength of the mixture shall be 60 psi. The liquid anti-strip dosage during production shall match the dosage listed on the JMF.

**403.5.8 Fibers.** The fiber proportioning and delivery system for SMA mixtures shall have an accuracy of 10 percent by weight of the material actually being measured in any given period of time.

**403.5.9 Moisture Content.** The asphaltic concrete mixture, when sampled and tested in accordance with AASHTO T 329, shall not contain more than 0.5 percent moisture by weight of the mixture.

**403.5.10 Contamination.** The asphaltic concrete mixture shall not be contaminated with deleterious agents such as unburned fuel, objectionable fuel residue or any other material not inherent to the job mix formula.

**403.6 Field Laboratory.** The contractor shall provide a Type 3 field laboratory in accordance with [Sec 601](#). The contractor shall furnish the bituminous mixture equipment to perform all required test methods for QC and QA work. The gyratory compactor shall be evaluated in accordance with AASHTO PP 35. An approved list will be maintained by Construction and Materials. All other equipment shall be capable of performing tests in accordance with the approved test methods.

**403.7 Bituminous Mixing Plants.** Bituminous mixing plants and preparation of material and mixtures shall be in accordance with [Sec 404](#).

**403.8 Hauling Equipment.** Trucks used for hauling bituminous mixtures shall be in accordance with [Sec 404](#).

**403.9 Pavers.** Bituminous pavers shall be self-contained units, provided with an activated screed or strike-off assembly, heated if necessary, and capable of spreading and finishing asphaltic concrete in lane widths applicable to the specified typical sections and thicknesses shown on the plans.

**403.10 Construction Requirements.**

**403.10.1 Weather Limitations.** No mixture shall be placed on any wet or frozen surface. No mixture shall be placed when either the air temperature or the temperature of the surface on which the mixture is to be placed is below 40 F. Temperatures shall be obtained in accordance with MoDOT Test Method TM 20.

**403.10.2 Substitutions.** With approval from the engineer, the contractor may substitute a smaller nominal maximum size mixture for a larger sized mixture. Specifications governing the substitute mixture shall apply. Except for a single surface layer, the total pavement thickness shall be maintained when the substitute mixture layer is reduced as allowed in [Sec 403.13](#) by increasing the thickness of other layers or courses. The contract unit price for the original mixture shall be used.

**403.11 Field Adjustments of Job Mix Formulas.** When test results indicate the mixture produced does not meet the specification requirements, the contractor may field adjust the job mix formula as noted herein. Field adjustments may consist of changing the percent binder as listed on the original approved job mix by no more than 0.3 percent. Additional fractions of material or new material will not be permitted as field adjustments. The engineer shall be notified immediately when any change is made in the cold feed settings, the hot bin settings or the binder content. A new  $G_{sb}$  shall be calculated using the new aggregate percentages. The gradation of the adjusted mixture shall meet the requirements of the mixture type specified in the contract. When the binder content is adjusted more than 0.3 percent, the mixture will be considered out of specification, and a new mix design shall be established.

**403.11.1 Field Mix Redesign.** When a new mix design will be required, the contractor will be permitted to establish the new mix design in the field. The mixture shall be designed in accordance with AASHTO R 35 or AASHTO R 46 and shall meet the mix design requirements, including performance testing and TSR requirements. A representative sample of the mixture shall be submitted with the new mix design to the Central Laboratory for mixture verification. The amount of mixture submitted for verification shall weigh at least 50 pounds.

**403.11.1.1 Approval.** New mix designs established in the field shall be submitted for approval to Construction and Materials. Upon approval, Construction and Materials will assign a new mix number to the mixture.

**403.11.1.2 Resume Production.** No mixture shall be placed on the project until the new field mix design is approved.

**403.12 Application of Prime or Tack.** The prime coat, if specified, shall be applied in accordance with [Sec 408](#). A tack coat is required on all existing pavement and shoulder surfaces that will be overlaid with a bituminous mixture. A tack coat is also required between all lifts of bituminous pavements placed within the driving and turn lanes, unless otherwise specified in the contract. All construction requirements of a tacked surface shall be in accordance with [Sec 407](#), and specified herein. The tack coat shall be applied uniformly and shall completely cover the surface upon which the bituminous mixture is to be placed. Placement of a bituminous mixture shall not be placed upon a tacked surface that is not uniformly covered or surfaces that have experienced excessive loss of tack due to tracking. Re-application of tack due to excess tracking or non-uniform coverage shall be at the contractor's expense.

**403.13 Spreading and Finishing.** The base course, primed or tacked surface, or preceding course or layer shall be cleaned of all dirt, packed soil or any other foreign material prior to spreading the asphaltic mixture. If lumps are present or a crust of mixture has formed, the entire

load will be rejected. The thickness and width of each course shall conform to the typical section in the contract. The contractor may elect to construct each course in multiple layers. The minimum compacted thickness shall be 0.75 inches for SP048, 1.25 inches for SP095, 1.75 inches for SP125, 2 inches for SP190, and 3 inches for SP250.

**403.13.1 Paving Widths.** The following shall apply for roadways constructed under traffic. For pavements having a width of 16 to 24 feet, inclusive, the asphaltic concrete pavement shall be laid in lanes approximately one half the full width of the completed pavement, and the full width shall be completed as soon as practical. Unless otherwise permitted, a single lane of any course shall not be constructed to a length that cannot be completed to full width of the pavement the succeeding operating day. For pavements greater than 24 feet wide, single lane width construction shall be limited to one day's production and completion to full width shall be accomplished as soon as practical. Uneven pavement shall be left in place for no more than seven days, unless approved by the engineer. Removal of pavement to be in accordance with this specification shall be at the contractor's expense.

**403.13.2 Segregation.** No thermal or physical mix segregation will be permitted in handling the mixture at the plant, from the truck or during spreading operations on the roadbed.

Paver Mounted Thermal Profiling (PMTP) shall be conducted in accordance with Sec 406.

All layers shall be feathered out, by hand raking, if necessary, in transitioning the depth of the surface to meet present grades at bridges or ends of projects, to provide a uniform, smooth riding surface free of irregularities. Where only the top layer of the surfacing continues across a bridge, the bottom layers shall be feathered out.

Any visual/physical segregation shall be tested in accordance with MoDOT Test Method TM 75. Mixture production shall immediately cease if either criteria of MoDOT Test Method TM 75 fail. Segregated mixture shall be removed and replaced to the limits determined by the engineer.

**403.13.3 Release to Traffic.** If the asphaltic concrete construction consists of more than a single layer, each layer shall be compacted as specified and allowed to cool to the ambient temperature before the next layer is placed. The contractor shall keep traffic off the asphaltic concrete until the surface of the asphaltic concrete is 140 F or below and the asphaltic concrete has cooled sufficiently to prevent flushing of the asphalt binder to the surface, marking or distorting the surface or breaking down the edges.

**403.13.4 Draindown.** Evidence of asphalt binder separation or draindown at delivery will be cause for rejection.

**403.13.5 Shoulder Substitution.** When a [Sec 403](#) mixture is specified for traffic lanes, the same mixture may be used for the adjacent shoulder, subject to the density requirements in [Sec 403.5.2](#).

**403.14 Spot Wedging and Leveling Course.** The engineer will specify the locations and thickness of spot wedging and the thickness of leveling course to obtain the smoothest possible riding surface. This procedure may result in spot wedging operations over small areas with feather-edging at high points and ends of wedge areas. Rigid control of the placement thickness of the leveling course shall be required. Leveling course, consisting of a layer of asphaltic concrete of variable thickness used to superelevate curves and eliminate irregularities in the existing base, shall be spread uniformly to the specified profile grade and cross section. The mixture shall be uniformly spread and compacted, with only minor segregation as accepted by



the engineer. Type SP125 or finer mixtures, as applicable, shall be used for the spot wedging and for the leveling course. Mixtures used as spot wedging and leveling courses shall be accepted in accordance with [Sec 403.23.8.3](#).

**403.15 Compaction.** After the asphaltic mixture has been spread, struck off and surface irregularities adjusted, the asphaltic mixture shall be compacted thoroughly and uniformly by rolling to obtain the required compaction while the mixture is in a workable condition. Excessive rolling, to the extent of aggregate degradation, will not be permitted. Rollers shall not be used in the vibratory mode when the mixture temperature is below 225 F. When warm mix technology is used, as approved by the engineer, rollers shall not be used in the vibratory mode when the mixture temperature is below 200 F .

**403.15.1 Rolling.** Any displacement occurring as a result of starting, stopping or changing direction of a roller, or from other causes, shall be avoided. Excess liquid, to prevent adhesion of the mixture to the rollers, will not be permitted. Diesel fuel, fuel oil or other detrimental products shall not be used as wetting agents. Along forms, curbs, headers, walls, and other places not accessible to the roller, the mixture shall be thoroughly compacted with hot hand tampers, smoothing irons or with mechanical tampers.

**403.15.2 Defective Mixture.** Any mixture that becomes loose and broken, mixed with dirt or is in any way defective shall be removed and replaced with fresh, hot mixture, which shall be compacted to conform with the surrounding area. Any area showing an excess or deficiency of asphalt binder shall be removed and replaced.

**403.15.3 Non-Traffic Areas.** [Sec 403](#) mixtures used for surfacing medians and similar areas, shoulders adjacent to rigid or flexible pavement and shoulders adjacent to resurfaced pavement shall be compacted to the specified densities for the mixture. Once an established rolling pattern has been demonstrated to provide the required density for shoulders, at the engineer's discretion, the pattern may be used in lieu of density tests provided no changes in the material, typical location or temperatures are made. Regardless of the method, density will still be required and subject to testing as deemed necessary by the engineer. In lieu of roller and density requirements, temporary bypasses to be maintained at the expense of the contractor shall be thoroughly compacted. The rolling shall be performed at proper time intervals and shall be continued until there is no visible evidence of further consolidation.

**403.15.4 Density Measurement.** Measurements for determining the in-place density of the mixture shall be taken no later than the day following placement. Measurements not obtained within the prescribed time limits shall be subject to the requirements of [Sec 403.22](#).

**403.15.4.1 Density Cores.** If a core is taken, material from underlying layers that remain adhered to the core shall be removed in a manner that does not harm the integrity of the specimen. If the contractor elects to place a lift of mixture greater than six times the nominal maximum aggregate size, cores shall be cut in half and the density of each half determined separately.

**403.15.4.2 Nuclear/Alternative Methods.** In-place asphalt density may be obtained by nuclear or alternative methods in accordance with MoDOT TM-41. The nuclear/alternative calibration locations shall be conducted within a trial section in accordance with [Sec 405.4.8](#).

**403.15.5 Intelligent Compaction.** Intelligent Compaction requirements in accordance with Section 405 shall not apply unless required by job special provision. Intelligent compaction shall be conducted on the traveled way to monitor the optimum roller passes at a mean temperature

above 180 F in accordance with Sec 405. Passing Segments shall have a minimum of 85% coverage at or above the optimum number of passes. Segments with between 85% and 70% coverage will be called moderate segments. Any segment with less than 70% coverage at the optimum number of passes shall be a Deficient Segment. If 70% of the target IC-MV is not obtained, the segment shall be flagged accordingly in the Veta project file. All segments with a mean temperature of less than 180 F at the optimum pass shall be considered deficient.

**403.15.6 Surface Smoothness.** The finish of the pavement surface shall be substantially free from waves or irregularities and shall be true to the established crown and grade. The pavement surface shall be thoroughly tested for smoothness by profiling or straight edging in accordance with [Sec 610](#).

**403.16 Joints.** Transverse joints shall be formed by any method that will produce a dense, vertical section for use when laying is resumed. When a transverse vertical edge is to be left and opened to traffic, a temporary depth transition shall be built as approved by the engineer. The joint formed when the fresh mixture is placed shall be dense, well sealed, and the grade, line and surface texture of the succeeding surface shall conform to that of the joined surface. If directed by the engineer, the transverse joint shall be painted with a light coating of liquid asphalt. Hand manipulation of the mixture shall be minimized to avoid unsightly surface texture.

**403.16.1 Joint Composition.** Longitudinal joints shall be formed by the use of an edging plate fixed on both sides of the finishing machine. Care shall be taken to obtain a well bonded and sealed longitudinal joint by placing the hot mixture in a manner ensuring maximum compaction at this point. If directed by the engineer for properly sealing the longitudinal joint, a light coating of bituminous material shall be applied to the exposed edge before the joint is made. Each side of the joint shall be flush and along true lines.

**403.16.2 Joint Offset.** The longitudinal joint in any layer shall offset that in the layer immediately below by a minimum of 6 inches; except, the joints in the completed surfacing shall be at the lane lines of the traveled way or other required placement width outside the travel lane. The placement width shall be adjusted such that pavement marking shall not fall on a longitudinal joint.

#### **403.17 Quality Control.**

**403.17.1 Quality Control Operations.** The contractor shall maintain equipment and qualified personnel to perform all QC field inspection, sampling and testing as required by this specification. All contractor personnel included in the QC operation shall be qualified by the MoDOT Technician Certification Program. Under no circumstances will unqualified personnel be allowed to perform QC sampling or testing. Personnel will be disqualified if acceptable methods and procedures are not followed.

**403.17.1.1 Asphalt Test Results.** The contractor shall record all test results and furnish a copy, including all raw data, to the engineer no later than the beginning of the day following the test. The contractor shall maintain all test results in an organized format and shall be available to the QA inspector at all times. Scale readings and other measurements not directly recorded by electronic media shall be recorded in an organized format. Printouts from gyratory compactors and asphalt content devices shall be retained as part of the testing records.

**403.17.2 Bituminous Quality Control Plan.** Prior to approval of the trial mix design by the engineer, the contractor shall submit a QC Plan to Construction and Materials for approval. The QC Plan shall include:

(a) The contractor representative in charge of QC and the project level representative if different from the contractor representative. Contact information should be recorded for these individuals.

(b) Lot and subplot sizes and how they will be designated.

(c) Performance testing, volumetrics, and asphalt content sampling, fabrication, and testing plan.

(d) The test method for determining asphalt content and density determination. If cores are to be cut, the number of cores shall be specified.

(e) Intelligent Compaction (if included in contract) and Paver Mounted Thermal Profiler base station and cellular reception plan.

(f) A proposed independent third party name, contact, address, and phone number for dispute resolution.

**403.17.2.1 Third Party.** The third party shall be independent of the contractor, MoDOT consultants and all project subcontractors or suppliers on each specific project. All testing of material for dispute resolution shall be performed by an approved laboratory. Approved laboratories shall be AASHTO Accreditation Program certified in the areas of the material being tested.

**403.17.2.2 Plant Calibration.** Plant calibration shall be performed by the contractor in accordance with [Sec 404](#), and records shall be made available to the engineer.

**403.17.2.3 Retained Samples.** All samples taken by the contractor, including but not limited to tested aggregate, volumetric and density samples, shall be retained for the engineer until the contractor's and engineer's tests are complete and accepted unless otherwise instructed. This includes  $CT_{Index}$  and  $RT_{Index}$  results. These samples shall be maintained in clean covered containers, without contamination, readily accessible to the engineer. The retained sample's identification shall consist of, but is not limited to:

(a) Time and date sampled.

(b) Product specification number.

(c) Type of sample, i.e. belt, bin, stockpile.

(d) Lot and subplot designation.

(e) Sampler/Tester.

(f) Project Job Number.

**403.17.2.3.1 Retained Loose Mix Material.** All loose mix samples for determination of volumetrics, performance tests, asphalt binder content and TSR shall be taken from the plant at random as designated by the engineer. Loose mix material shall be taken, identified, and retained for the engineer.

**403.17.2.4 Performance Test Specimens and Loose Mix Sample.** All loose mix samples for determination of performance tests, volumetrics, asphalt binder content and TSR shall be taken at the plant at random intervals as designated by the engineer. All QC/QA loose mix samples shall be taken by the contractor. Non-TSR performance test specimens shall be fabricated by the contractor. The engineer shall be present when taking loose mix samples and fabricating specimens for QA testing. Companion samples shall be identified and retained for the engineer.

**403.17.3 Quality Control Laboratory.** All QC mixture testing shall be performed in an approved laboratory.

**403.17.3.1 Calibration Schedule.** The contractor shall calibrate or verify all significant test equipment associated with tests covered in this specification. Intervals as set by the contractor shall not exceed the following limits:

Equipment - Test Method (AASHTO)	Requirement	Interval (Month)
Performance Testing Load Frames – R 18	Calibrate	12
Hamburg Wheel Track Test - R 18	Calibrate	12
Gyratory Compactor - T 312	Calibrate – $1.16 \pm .02^\circ$ internal angle	12 <sup>a</sup>
Gyratory Compactor - T 312	Verify	Daily
Gyratory Molds - T 312	Check Critical Dimensions	12
Thermometers - T 209, T 166, T 312	Calibrate	6
Vacuum System - T 209	Check Pressure	12
Pycnometer (Flask) - T 209	Calibrate	Daily
Binder Ignition Oven - T 308	Verify	12 <sup>b</sup>
Nuclear Content Gauge – T 287 or MoDOT TM 54	Drift & Stability – Manuf. Recommendation	1
Mechanical Shakers - T 27	Check Sieving Thoroughness	12
Sieves	Check Physical Condition	6
Weighted Foot Assembly - T 176	Check Weight	12
Mechanical Shaker - T 176	Check Rate & Length of Throw	12
Liquid Limit Device - T 89	Check Wear & Critical Dimensions	12
Grooving Tool - T 89	Check Critical Dimensions	12
Ovens	Verify Temp. Settings	4
Balances	Verify	12 <sup>b</sup>
Timers	Check Accuracy	6

<sup>a</sup>Calibrate and/or verify after each move.

<sup>b</sup>Verify after each move.

**403.17.3.1.1 Inventory.** An inventory of all major sampling, testing, calibration, and verification equipment, including the serial number or other identifying number shall be maintained.

**403.17.3.1.2 Calibration Records.** Calibration and verification records shall include but are not limited to:

- (a) Detailed results of the work performed (dimensions, mass, force, temperature, etc.)
- (b) Description of the equipment calibrated including identifying number.
- (c) Date the work was performed.

- (d) Identification of the individual performing the work.
- (e) Identification of the calibration or verification procedure used.
- (f) The previous calibration or verification date and next due date.
- (g) Identification of any in-house calibration or verification device used (including identification to establish traceability of items such as standard masses, proving rings, standard thermometers, balances, etc.).

**403.17.3.2 Record Retention.** Test records shall be maintained to permit verification of any test report. Records pertaining to testing, equipment calibration and verification, test reports, internal quality systems review, proficiency sample testing, test technician training and evaluation and personnel shall be retained in a secure location for a minimum of three years.

**403.17.3.3 Test Method Availability.** A current copy of all test methods and procedures shall be maintained in the QC laboratory at all times for reference by the technicians. Examples of report formats and procedures may be found in AASHTO R 18.

**403.18 Quality Assurance.** All QA field inspection, sampling and testing will be performed by a qualified MoDOT technician. The QA inspector shall have free access to any and all testing equipment used by the mixture producer and any workbooks, records or control charts maintained by the mixture producer for the QC process. The QA inspector shall also have sufficient access to the plant grounds to assure compliance with the approved QC Plan.

**403.18.1 Assurance Testing.** At the plant, the contractor shall sample, condition, fabricate, and provide the  $CT_{Index}$  and  $RT_{Index}$  test specimens and provide loose mix material for all QA testing at the provided random tonnage in the presence of the engineer. The engineer will independently test the specimens and/or mixture at the frequency listed in Sec 403.19.3. The independent samples shall be of sufficient size to retain half for possible disputes.

The engineer's test results, including all raw data, will be made available to the contractor when completed and no later than the next working day.

**403.18.2 Core Chain of Custody.** QA density cores shall be sealed in approved tamper-evident containers immediately after extraction in the presence of the engineer.

**403.18.3 Federal Highway Administration Requirements.** Performance and acceptance of QC/QA testing under these specifications shall not eliminate any FHWA requirements for acceptance of the material.

**403.19 Acceptance of Material.** Acceptance of bituminous mixture will be based on lots. With the exception of density, asphalt material will be sampled at the asphalt plant in lots or sublots on a random basis through the use of a random number system and evaluated using a Quality Level Analysis (QLA). A QLA will determine payment based on a combination of the total PWL ( $PWL_t$ ) determined for each pay factor item for each lot of material produced.

**403.19.1 Random Numbers.** The engineer will generate random numbers. Random numbers will be based upon tonnage.

**403.19.2** A lot shall consist of a maximum of 6,000 tons. The maximum subplot size shall be 1500 tons and each lot shall contain no less than 4 sublots. Sublots from incomplete lots shall be combined with the previous complete lot for determination of pay factors. When no previous lot exists, the mixture shall be treated in accordance with Sec 403.23.8.1. A new lot shall begin when the asphalt content of a mixture is adjusted in accordance with Sec 403.11 or if there is an asphalt binder grade change or an additive source change.

**403.19.3 Test and Pay Factor Items.** As a minimum, the contractor and engineer shall test in accordance with the following table. The number of random tests per subplot may be increased per the contractor's QC plan. The QC plan shall state the test and testing frequency. All random tests shall be used in the pay factor determination. Where multiple test methods are allowed, the contractor shall designate the test method to be used in the QC Plan. Final payment will be based on the indicated pay factor items.

Tested Property	Test Method	Contractor Frequency	Engineer Frequency
<b>Pay Factors</b>			
Mat Density (% of theoretical maximum density) <sup>(a)</sup>	MoDOT TM 41, AASHTO T 166 or AASHTO T 331	1 Sample / Sublot	1 Sample / Lot
Asphalt content	AASHTO T 164, or MoDOT Test Method TM-54, or AASHTO T 287, or AASHTO T 308	1 / Sublot	1 / Lot
V <sub>a</sub> , N <sub>des</sub>	AASHTO T 312 and R 35	1 / Sublot	1 / Lot
CT <sub>Index</sub>	ASTM D 8225	1 / 3000 tons	1 / 12,000 tons
<b>Pay Factor Adjustments</b>			
Unconfined Longitudinal Joint Density <sup>(a)</sup>	MoDOT TM 41, AASHTO T 166 or AASHTO T 331	1 Sample / Sublot	1 Sample / Lot
Intelligent Compaction	Sec 405	Continuous	10% of travelway of one roller
RT <sub>Index</sub>	ASTM D 8360	1 / 3000 tons	1 / 12000 tons
Tensile Strength and TSR	AASHTO T 283	1 / 12000 tons (maximum)	1 / Project
<b>Temperatures</b>			
Mix Temperature at Plant	----	1 / Sublot	1 / Day
Temperature of Base and Air	----	As Needed	As Needed

(a) Core samples shall consist of one core. Up to two additional cores, as stated in the QC Plan, may be obtained at the same offset within one foot of the randomly selected location. If more than one core is obtained, all cores shall be combined into one sample.

#### **403.19.3.1 Test Method Modification.**

**403.19.3.1.1 Binder Ignition Modification.** Asphalt content determination in accordance with AASHTO T 308, Section 6.9.1 shall be modified by adding the following: If the calibration factor

exceeds 1.0 percent, lower the test temperature to  $800 \pm 8$  F and repeat test. Use the calibration factor obtained at 800 F even if it exceeds 1.0 percent. If RAP is used, the binder ignition oven shall be calibrated in accordance with MoDOT Test Method TM 77. At the engineer's discretion, testing may be waived when production does not exceed 200 tons per day. The contractor shall certify the proper proportions of a previously proven mixture were used.

**403.19.3.1.2 Rice Test.** When the water absorption of any aggregate fraction is greater than 2.0 percent, the test method for determining theoretical maximum specific gravity, AASHTO T 209, shall be modified as follows: After completing the procedure in accordance with Section 9.5.1 or 9.5.2, drain water from the sample. To prevent loss of fine particles, decant the water through a paper towel held over the top of the container. Spread the sample before an electric fan to remove surface moisture. Weigh at 15-minute intervals, and when the loss in mass is less than 0.05 percent for this interval, the sample may be considered to be surface dry. This procedure requires about 2 hours and shall be accompanied by intermittent stirring of the sample. Break conglomerations of mixture by hand. Take care to prevent loss of particles of mixture. Calculate the specific gravity of the sample by substituting the final surface-dry mass for A in denominator of Equations 2 or 3.

**403.19.3.1.3 Mixture Bulk Specific Gravity.** Determining bulk specific gravity using paraffin-coated specimens, AASHTO T 275, shall not be used when required by AASHTO T 166. Alternate methods are AASHTO T 331 and ASTM D1188. The surface of specimens prepared for testing by these methods may have the surface texture removed by sawing a minimal amount. Specimens shall be securely held in a jig or other clamping device to eliminate distortion and retain a face parallel to the original surface. Measurements for lift thickness shall be made prior to sawing.

**403.19.3.1.4 QC and QA Mix Sampling and Preparation.** All loose mix shall be sampled at the plant by the contractor during production in accordance with AASHTO R 97 and split to the appropriate size in accordance with AASHTO R 47. After QC has been notified of the random sample, the first truck shall be sampled as directed by the engineer. If the random number for multiple tests overlap, the contractor shall complete the first testing requirements and then immediately proceed with the second testing requirements. The contractor shall wait 30 minutes after sampling loose mix before fabricating specimens for  $CT_{Index}$  and  $RT_{Index}$  testing. Loose mix temperatures shall not drop below the molding temperature. The 30 minutes shall start when all the material for the loose mix sample has been obtained and the time this occurs shall be recorded. All specimens shall be fabricated as soon as possible after the 30 minute delay. QC and QA samples shall be taken and fabricated by the contractor at separate random times.

The following table details the minimum number of specimens required for QC or QA testing:

Test Method	Minimum Number of Specimens	Molded Specimen Height (mm)
<b>Required Fabrication for CT<sub>Index</sub> and RT<sub>Index</sub></b> <b>QC Frequency: 1 Set per 3000 tons</b> <b>QA Frequency 1 Set per 12000 tons</b>		
Cracking Tolerance Index (CT <sub>Index</sub> )	5 Compacted Specimens	62 <sup>(b)</sup>
Rutting Tolerance Index (RT <sub>Index</sub> )	3 Compated Specimens	62 <sup>(b)</sup>
Retained Loose Mix <sup>(a)</sup> (QA sample only)	125 lbs	N/A
<b>Required Fabrication for Volumetrics and % Asphalt Content</b> <b>QC Frequency: 1 Set per subplot</b> <b>QA Frequency 1 Set per Lot</b>		
% Asphalt Content	1 Sample	N/A
Theo. Max SG of mixture, Gmm	1 Sample	N/A
% Air Voids	2 Compacted Specimens	N <sub>Design</sub>
Retained Loose Mix <sup>(c)</sup>	30 lbs	N/A
<b>Required Sampling for TSR</b> <b>QC Frequency: 1 Sample per 12,000 tons</b> <b>QA Frequency: 1 Sample per Project</b>		
Tensile Strength Ratio (TSR)	250 lbs	N/A

- (a) Retained loose mix for Hamburg verification of mixture not meeting minimum RT<sub>Index</sub> thresholds  
(b) 95 mm specimen height for SP250 mixes  
(c) Retain at least 30 pounds of loose mix material for dispute resolution.

The CT<sub>Index</sub> test shall be based upon five compacted specimens tested, discard the single highest and lowest values, and average the three remaining values.

The RT<sub>Index</sub> test shall be based upon the average of three compacted specimens.

Volumetric testing shall be based upon the average of two compacted specimens.

**403.19.3.1.5 Molding Performance Samples.** The specimens shall be compacted to an air void content of 7.0 +/- 0.5% or 6.0 ± 0.5% for SMA mixtures. The compacted test specimens shall be allowed to cool to 77 +/- 5° F prior to determining the air void content.

**403.19.3.1.6 Records.** Compaction temperature, times in and out of the oven, gyratory specimen weights and times, and sample identification shall be recorded.



#### **403.20 Miscellaneous Applications.**

**403.20.1 Small Quantities.** Small quantities are less than 6000 tons for the pay item quantities of each separate mixture and the following shall apply:

(a) A field laboratory will not be required for monitoring mixtures. All required QC and QA testing shall be performed in an approved laboratory.

(b) No Performance Testing is required and acceptance shall be in accordance with Sec 403.23.8.1. Density, % AC, and % Air Voids shall be performed at a frequency of no less than one per day if production does not exceed 1000 tons and at a frequency of no less than two per day if production exceeds 1000 tons. Independent or retained sample QA tests shall be performed at least once per project, as indicated.

**403.20.2 Base Widening and Entrances.** For base widening mixture and entrance work, the following will apply:

(a) All base widening shall be constructed in accordance with [Sec 401.7](#) and subsections.

(b) The minimum density of these mixtures shall be attained as specified herein, except, compaction may be performed in accordance with [Sec 403.15.3](#).

**403.20.3 Dispute Resolution.** When there are significant discrepancies between the engineer's and the contractor's test results, dispute resolution procedures will be used.

**403.20.3.1 Cease Work.** The contractor's operations may be required to cease until the dispute is resolved if the test results indicate the mixture is subject to failure.

**403.20.3.2 Third Party Resolution.** The first step in dispute resolution will be to identify differences in procedures and correcting inappropriate procedures before moving to third party resolution. If that does not resolve the dispute, either the contractor or the engineer may request the approved QC Plan third party involvement. The recommendations of the approved third party shall be binding on both the engineer and contractor.

**403.20.3.3 Third Party Payment.** The contractor shall be responsible for the cost associated with the third party testing and resolution if the final result indicates the engineer's test results were correct. Likewise the Commission will be responsible for the cost associated with the third party testing and resolution when the final result indicates the contractor's results were correct.

**403.20.3.4 Other Adjustments.** The contractor shall not be entitled to any additional payment for costs incurred due to use of the dispute resolution procedures such as, but not limited to, those for delay, cessation of operations, costs to subcontractors, etc. The engineer may give consideration to adjustment of working days if warranted.

**403.20.3.5 Dispute with CT<sub>Index</sub> and RT<sub>Index</sub> Results.** If QA and QC results for CT<sub>Index</sub> or RT<sub>Index</sub> do not compare favorably, the first step will be to identify differences in procedures, including specimen aging. If that does not resolve the dispute, the QA CT<sub>Index</sub> result shall be averaged with the QC CT<sub>Index</sub> result to determine pay. If RT<sub>Index</sub> results are in dispute, QC shall fabricate specimens for Hamburg testing in the presence of the Engineer using the retained loose mix material. Retained loose mix material from the QC sample shall be used to fabricate specimens

unless otherwise directed by the Engineer. Specimens shall be sent to the Engineer for Hamburg testing to determine specification compliance.

#### **403.21 General Requirements.**

**403.21.1 Sequence of Operations.** To reduce inconvenience to the traveling public during widening or surfacing, the contractor will not be permitted to place any final surface course until the base widening, the leveling course and the binder course have been completed throughout the entire combination of sections, unless otherwise authorized by the engineer. The proper condition of the base widening, the leveling course, and the binder course, at the time of placing the surface course, shall be the contractor's responsibility.

**403.21.2 Pavement Marking.** If the contractor's work has obliterated the existing pavement marking on resurfacing projects open to through traffic, the pavement marking shall be replaced in accordance with [Sec 620](#).

**403.21.3 Surfaced Approaches.** At locations designated in the contract or as specified by the engineer, approaches shall be primed in accordance with [Sec 408](#) and surfaced with Type SP125 asphaltic concrete. The asphaltic concrete surface shall be placed in accordance with the details shown on the plans or as specified by the engineer. Approaches shall not be surfaced until after the surface course adjacent to the entrance is completed. Any work required to condition and prepare the subgrade on the approaches will be at the contractor's expense.

**403.21.4 Filling Drain Basins.** If shown on the plans, existing drain basins shall be filled to the top of the lip with plant mix bituminous base course or asphaltic concrete from the pavement edge to the edge of the shoulder. Any difficulty or delay created by this requirement will be at the contractor's expense.

**403.21.5 Pavement Repairs (Blow-Ups).** A blow-up will be considered that area where excessive expansion has resulted in distress to the existing pavement. Blow-ups occurring prior to the application of the tack coat on the existing surface will normally be repaired by the Commission. Blow-ups occurring after the application of the tack coat shall be repaired by the contractor by removing the distressed concrete and replacing the pavement in accordance with [Sec 613](#).

#### **403.22 Method of Measurement.**

**403.22.1 Weight Determination.** The weight of the mixture will be determined from the batch weights if a batch-type plant is used, and will be determined by weighing each truck load on scales in accordance with [Sec 310](#) if other types of plants are used. Measurement will be made to the nearest 0.1 ton for the total tonnage of material accepted.

#### **403.22.2 Full Depth.**

**403.22.2.1** The final driving surface area, for the full depth of the pavement, will be used as the area for all underlying bituminous lifts and will not include the additional quantity needed to construct the 1:1 slope.

**403.22.2.2** Final measurement of the completed pavement will not be made except for authorized changes during construction, or where appreciable errors are found in the contract quantity. Where required, measurement of the pavement complete in place will be made to the nearest 0.1

square yard. The revision or correction will be computed and added to or deducted from the contract quantity.

#### **403.22.3 Alternate Overlay.**

**403.22.3.1 Field Established Quantity.** When bid as an alternate to a Portland cement concrete overlay, the contractor shall establish the existing roadway profile and set the final overlay profile. The engineer may adjust the final profile as needed. The tons of hot mix asphalt required will be determined by the engineer from the set or adjusted profile. This quantity will be the field established plan quantity.

**403.22.3.2 Overlay Measurement.** Final measurement of the completed pavement will be based on the field established plan quantity except for authorized changes during construction. The revision or correction will be computed and added to or deducted from the contract quantity. Measurement of the pavement complete in place will be made to the nearest 0.1 ton.

**403.22.4 Pavement Testing.** The finished courses shall have the nominal thickness shown on the plans. Tests will be conducted to ensure that each course is being constructed to proper thickness, composition, and density. The contractor shall cut samples from any layer of the compacted mixture at locations designated by the engineer. QA samples shall be cut and delivered to the engineer no later than the end of the next day following the laydown operation. If the samples are not cut and delivered as stated, the asphaltic laydown operation may be suspended and a deduction of 5 percent per day of the contract unit price of the representative material may be applied, until samples are cut and delivered to the engineer. Samples may be obtained by either sawing or drilling 4-inch minimum diameter cores. Each sawed sample shall consist of a single piece of the pavement of the size designated by the engineer, but no larger than 12 inches square.

**403.22.4.1 Pavement Thickness.** Lift thickness may be determined by the average thickness of cores taken for density measurements for each lot. Total thickness samples for new full depth asphalt pavements shall be obtained after all bituminous construction is completed on the project and shall be taken at locations specified by the engineer. For the purpose of determining the constructed thickness of full depth pavement, cores shall be taken at random intervals in each traffic lane at the rate of one core per 1000 feet or increment thereof, or at any other locations as may be determined by the engineer and measured in accordance with AASHTO T 148. Sections of any asphaltic concrete determined to be 0.5 inches or more, less than the thickness shown on the plans, shall be corrected by the contractor. No payment will be made for any costs incurred by the contractor in correcting pavement deficient in thickness. Each core is representative of the pavement thickness for a distance extending one-half the distance to the next core, measured along centerline, or in the case of a beginning or ending core, the distance will extend to the end of the pavement.

**403.22.4.2 Surface Restoration.** The surface from which samples have been taken, including those for density measurements, shall be restored by the contractor with the mixture then being produced no later than the next day of plant operation, if construction is still active. If bituminous construction has been completed, the surface from which samples have been taken shall be restored within 48 hours with an approved commercial mixture or with cold patch mixtures acceptable to the engineer.

**403.23 Basis of Payment.**

**403.23.1 Percent Within Limits.** PWL will be based on the mean, standard deviation and quality index of each lot's test results. The upper PWL ( $PWL_u$ ) and lower PWL ( $PWL_l$ ) is determined from the table in [Sec 502.15.8](#). For Upper or Lower Quality Index values less than zero, the value in the Table shall be subtracted from 100. Total percent within limits,  $PWL_t$ , is:  $PWL_t = (PWL_u + PWL_l) - 100$ . For Density of SMA mixes the  $PWL_u$  shall be 100.

The mean is:  $\bar{x}_a = (\sum x_i)/n$

Where:  $\bar{x}_a$  = Average of the individual values being considered

$\sum x_i$  = The summation of all the individual values being considered

$n$  = The number of individual values under consideration

The Standard Deviation is:  $s = (\sum (x_i - \bar{x}_a)^2 / (n - 1))^{1/2}$

The Upper Quality Index is:  $Q_u = (USL - \bar{x}_a)/s$

The Lower Quality Index is:  $Q_l = (\bar{x}_a - LSL)/s$

Where:  $Q_u$  = Upper Quality Index

$Q_l$  = Lower Quality Index

USL = Pay Factor Item Upper Spec Limit

LSL = Pay Factor Item Lower Spec Limit

**403.23.1.1 Quality Level Analysis.** The engineer will make the QLA no more than 24 hours after receipt of the contractor's test results, by determining the  $PWL_t$  for each designated pay factor item.

**403.23.1.1.1 Acceptance.** The contractor's test results will be used when applicable to determine the PWL, provided the contractor's QC tests and the engineer's QA tests compare favorably, and provided the engineer's inspection and monitoring activities indicate the contractor is following the approved QC Plan.

**403.23.1.1.2 Comparison.** Favorable comparison will be obtained when the engineer's QA test results on a production sample are within two standard deviations or the comparison limit, whichever is greater, of the mean of the contractor's test results for that particular lot. Comparison limits for QC average results are as follows: air voids within  $\pm 0.5$  percent, asphalt content within  $\pm 0.2$  percent, and density within  $\pm 1.3\%$ . QA  $CT_{Index}$  results shall be within  $\pm 30$  of the QC testing that falls nearest result for SuperPave and  $\pm 60$  for SMA. For the  $CT_{Index}$  test, if all QC and QA are greater than 80 for SuperPave mixes and greater than 190 for SMA mixes, then results are considered comparable. QA  $RT_{Index}$  results shall be within  $\pm 15$  percent of the QC testing that falls nearest. Further comparisons may be made by using F & t testing at a significance level of 1 percent as directed by the engineer.

**403.23.1.1.3 Outliers.** No test result shall be discarded, except individual test results on a lot basis may be checked for an outlier in accordance with the statistic T in ASTM E 178, at a significance level of 5 percent. If an outlier is found, material from the retained QA sample may be tested, in the presence of the engineer, to determine a replacement test value. The replacement test value shall be used in the PWL determination.

**403.23.1.1.4 Roadway/Shoulder Lots.** For the purpose of QLA, mixture placed on the traveled way and placed on the traveled way and shoulders integrally, shall be accounted for in a regular

lot/sublot routine. Mixture placed on shoulders only shall be accounted for in a shoulder lot/sublot routine.

**403.23.1.1.5 Random Sampling.** For the purpose of QLA, all mixture produced at the plant and placed on the roadway shall be subject to random testing. Mainline density measurements at the roadway shall not be taken within 6 inches of an unconfined longitudinal joint. Random samples taken in the same day may be separated by 200 tons.

**403.23.2 Pay Factors.** The total pay factor ( $PF_T$ ) for each lot will be equal to the weighted sum of the pay factors (PF) for each pay factor item for each lot, and is determined as follows:

$$PF_T = + (0.5) PF_{\text{Density}} + (0.25) PF_{Va} + (0.25) PF_{AC}$$

The  $PF_T$  for each lot, on the shoulder or otherwise when the density pay factor is not directly included, will be equal to the weighted sum of the PF for each pay factor item for each lot, and will be determined as follows:

$$PF_T = (0.5) PF_{Va} + (0.5) PF_{AC}$$

The PF for each pay factor item for each lot will be based on the  $PWL_t$  of each pay factor item of each lot and will be determined as follows:

When  $PWL_t$  is greater than or equal to 90:  $PF = 0.3 PWL_t + 73$ ;

When  $PWL_t$  is greater than or equal to 70 and  $PWL_t$  is less than 90:  $PF = 0.5 PWL_t + 55$ ;

When  $PWL_t$  is less than 70:  $PF = 2 PWL_t - 50$ ;

**403.23.2.1 Density Pay Factor.** The theoretical maximum specific gravity of the mixture, as determined for each subplot and the bulk specific gravity of no less than one core from each subplot, will be used to perform the QLA for the percent of theoretical maximum density. Thick cores required to be cut in half in accordance with [Sec 403.15.4](#) shall effectively double the number of sublots for cores. When density is not used as a pay factor, additional adjustment of the contract unit price will be based on the table in [Sec 403.23.8.1](#).

**403.23.2.2 Asphalt Content Pay Factor.** The QLA will be performed using the asphalt content test results from each lot.

**403.23.2.3 Air Voids Pay Factor.** Two gyratory specimens shall be compacted for each subplot and the average of the two specimens will be used to calculate the volumetrics of the subplot. The air voids shall be determined from the gyratory compacted specimens. The air voids for the QLA shall be those calculated using the average bulk specific gravity of the gyratory compacted specimens and the theoretical maximum specific gravity of the mixture determined for the subplot of material.

**403.23.2.4  $CT_{\text{Index}}$  and TSR Pay Factor.** The contract unit price for each 3,000 tons or fraction thereof for all mixtures shall be adjusted based on the average  $CT_{\text{Index}}$  results for the tonnage according to the following table provided that acceptable  $RT_{\text{Index}}$  or Hamburg and TSR results are obtained. The lower adjusted contract unit price from the  $CT_{\text{Index}}$  and TSR results shall apply.

SuperPave Mixtures		
Cracking Tolerance Index (CT <sub>Index</sub> )	Tensile Strength Ratio (TSR) <sup>(a)</sup>	Percent of Contract Price
40 – 49	70 – 74 %	97%
50 – 99	75 – 84 %	100%
100 or Greater	85 % or Greater	103%
SMA Mixtures		
Cracking Tolerance Index (CT <sub>Index</sub> )	Tensile Strength Ratio (TSR) <sup>(a)</sup>	Percent of Contract Price
80 – 134	70 – 74 %	97%
135 – 239	75 – 84 %	100%
240 or Greater	85 % or Greater	103%

(a) If an approved liquid anti-strip is used, the TSR limit to receive full incentive is 80 %.

The QLA shall be performed using each Density, % Air Void, and % Asphalt Content result within the lot.

**403.23.3 Removal of Material.** All lots of material with a  $PF_T$  less than 50.0 shall be removed and replaced with acceptable material by the contractor.

Any subplot of material with a percent of theoretical maximum density of less than 90.5 percent or greater than 98.5 percent shall be removed and replaced with acceptable material by the contractor. For SMA mixtures, any subplot of material with a percent of theoretical maximum density of less than 92.0 percent shall be removed and replaced with acceptable material by the contractor.

Any material with a CT<sub>Index</sub> less than 40 shall be removed and replaced with acceptable material by the contractor. For SMA mixtures, any material with a CT<sub>Index</sub> less than 80 shall be removed and replaced with acceptable material by the contractor.

Any subplot of material with air voids in the compacted specimens less than 1.5 percent or tonnage of material not meeting the minimum RT<sub>Index</sub> shall be evaluated with Hamburg testing and removed and replaced with acceptable material by the contractor if the rut depth is greater than 1/2-inch at the designated number of wheel passes.

Any material with TSR results below 70% or minimum conditioned tensile strength below 60 psi are considered unacceptable and will be subject to removal, production shall cease, the mixture reverified, and other payfactors incentives shall not be applied.

No additional payment will be made for such removal and replacement. The replaced material will be tested at the frequencies listed in [Sec 403.19](#). Pay for the material will be determined in accordance with the applicable portions of [Sec 403.23](#) based on the replacement material.

**403.23.4 Pay Factor Adjustments.** If any payment reductions are necessary, the lower adjusted contract unit price of the total payfactor ( $PF_T$ ) and unconfined longitudinal joint density adjustment will apply. Intelligent Compaction (IC) adjustment (if required by contract) may affect  $PF_{Density}$ . Pay factor adjustments are as follows:

**403.23.4.1 Unconfined Longitudinal Joint Density Adjustment.** The minimum density of all traveled way pavement within 6 inches of a longitudinal joint, including the pavement on the traveled way side of the shoulder joint, shall not be less than 90.5 percent of the theoretical maximum specific gravity for SuperPave mixtures and above 92.0 percent of the theoretical maximum specific gravity for SMA mixtures. The density of the longitudinal joint when confined will be included in the evaluation of the remainder of the mat. Pay adjustments will be in accordance with the following table and will be applied to the corresponding tonnage represented by the core(s).

Pay adjustments due to longitudinal joint density will apply to the full width of the lane paved. The average of joint cores from each subplot will determine specification compliance. If payment reductions are necessary, the lowest  $PF_{Total}$  shall apply. Adjustments due to joint density will apply to the subplot from which the cores are obtained.

<b>Longitudinal Joint Density</b>	
Field Density (Percent of Laboratory Max. Theoretical Specific Gravity)	Percent of Contract Unit Price
<b>SuperPave Mixtures</b>	
$\geq 90.5$	$PF_{Total}$ not changed by longitudinal joint density
89.5 – 90.4	Maximum $PF_{Total} = 100\%$ ; Correction Required <sup>(a)</sup>
$< 89.5$	Remove and Replace
<b>SMA Mixtures</b>	
$\geq 92.0$	$PF_{Total}$ not changed by longitudinal joint density
90.0 – 91.9	Maximum $PF_{Total} = 100\%$ ; Correction Required <sup>(a)</sup>
$< 90.0$	Remove and Replace

(a) Correction requires spraying rapid penetrating emulsion on deficient density areas in accordance with JSP2303. All costs associated with correction shall be at the contractor's expense with no additional payment.

**403.23.4.2 Intelligent Compaction Adjustment.** When Intelligent Compaction is included as a pay item in the contract, sublots shall have a minimum of 85 % roller coverage and a mean temperature above 180 °F at the optimum number of roller passes of the traveled way. Pay adjustments will be in accordance with the following table and will be applied to the corresponding subplot that falls within the corresponding IC segment:

<b>Intelligent Compaction</b>	
Percent Roller Coverage at Optimum Pass Count	Percent of Contract Unit Price
$\geq 85 \%$	Payment adjustment due to intelligent compaction does not apply
$< 85$	Verify core density in accordance with Sec 405



If roller coverage is less than 85%, the lower adjusted contract unit price of the PWL or unconfined joint density adjustment will apply. Adjustments due to roller coverage will apply to the corresponding sublots. The roller coverage per subplot shall be the average roller coverage for the days the subplot was paved weighted by the tons paved per day.

Any subplot with roller coverage less than 70 percent shall be subject to the core density verification as directed by the engineer. Pay adjustments shall be in accordance with Sec 405.

**403.23.4.3 Smoothness Adjustment.** The contract unit price for all mixes, except wedge or level course, will be adjusted in accordance with [Sec 610.5](#). The contract unit prices for asphaltic concrete pavement will be considered full compensation for all materials entering into the construction of the pavement and for the cost of the smoothness testing and correction.

**403.23.4.4 Paver Mounted Thermal Profiler.** The contract unit price for all mixes, except wedge or level course, will be adjusted in accordance with Sec 406. The contract unit prices for asphaltic concrete pavement will be considered full compensation for all materials entering into the construction of the pavement and for the cost of the PMTP testing and correction.

**403.23.4.5 Intelligent Compaction.** If Intelligent compaction is not included as a pay item in the contract, then all specification requirements and pay adjustments pertaining to Intelligent Compaction will not apply. If pay items for Intelligent Compaction are included in the contract, then all specification requirements and pay adjustments pertaining to Intelligent Compaction shall apply.

**403.23.5 Aggregate Variation.** Due to possible variations in the specific gravity of the aggregates, the tonnage of mixture used may vary from the proposal quantities. No adjustment in contract unit price will be made because of such variation.

**403.23.6 Compacted Samples.** Payment for obtaining and delivering samples of compacted mixture from the pavement and replacing the surface will be made per sample at the fixed price specified in [Sec 109](#). No direct payment will be made for samples taken for QC and QA testing.

**403.23.7 Payment for Pavement Repairs (Blow-ups).** Payment for repairing blow-ups will be made in accordance with [Sec 104](#).

#### **403.23.8 Miscellaneous Applications.**

**403.23.8.1 Small Quantities.** Small quantities are defined in [Sec 403.20.1](#). Unless the contractor has elected to use the normal evaluation in the Bituminous QC Plan for small quantities, the following shall apply for each separate mixture qualifying as a small quantity

(a) QLA and PWL shall not apply.

(b) Mixtures shall be within the specified limits for % Air Voids, % AC, and density. In addition to any adjustments in pay due to profile, the contract unit price for the mixture represented by each set of cores will be adjusted based on actual field density above or below the specified density using the following schedule:



Field Density (Percent of Laboratory Max. Theoretical Density)	Pay Factor (Percent of Contract Unit Price)
<b>For all SP mixtures other than SMA:</b>	
92.5 to 98.0 inclusive	100
90.5 to 92.4 inclusive	Correction <sup>(a)</sup>
Above 98.0 or Below 90.5	Remove and Replace
<b>For SMA mixtures:</b>	
>94.0	100
92.0 to 93.9 inclusive	Correction <sup>(a)</sup>
Above 98.0 or Below 92.0	Remove and Replace

- (a) Correction requires spraying rapid penetrating emulsion on deficient density areas in accordance with JSP2303. All costs associated with correction shall be at the contractor's expense with no additional payment.

**403.23.8.2 Base Widening and Entrances.** For base widening mixtures and entrance work, QLA and PWL will not be required. Payment for these mixtures will be made at 100 percent of contract unit price for material that otherwise meets the specifications.

**403.23.8.3 Single Lift on Unmilled Surface or Leveling Course Work.** For resurfacing projects specifying a single lift on an unmilled surface, surface mixture of 3,000 tons or more, or for leveling course work, the following shall apply to the traveled way mixture. All bituminous mixture QC/QA requirements shall apply, except the density pay factor designated in [Sec 403.23.2](#) will not be directly included in the total pay factor. In lieu of that, one density sample shall be taken per subplot and the pay adjustment for density will be made using the table in [Sec 403.23.8.1](#).

### 3.0 Insert Sec 406 Paver-Mounted Thermal Profiles:

#### 406 Paver-Mounted Thermal Profiles

**406.1 Description.** This work shall consist of continuous thermal profiling of the asphalt mat temperature behind the trailing edge of the paver screed plate during placement operations using a Paver-Mounted Thermal Profile System (PMTPS). This work shall be completed in accordance with the general principles set forth in AASHTO R 110 "Standard Practice for Continuous Thermal Profile of Asphalt Mixture Construction", and specifically as stated in the following sections.

**406.2 Required Measurements.** PMTPS measurements are required on the full width of paving of each asphalt lift. Collection of data shall include shoulder pavement when placed simultaneously with the mainline. The shoulder paving data will be filtered out using Veta during data processing. PMTPS data collection is not required in the following exceptions:

- (1) PMTPS measurements are not required on auxiliary lane tapers, ramps, shoulders (not paved simultaneously with mainline), cross-overs, non-continuous turn lanes, loops, bypass lanes, acceleration/deceleration lanes, intersecting streets, roundabouts, and partial lane width widenings.
- (2) PMTPS measurements are not required for a total net paving length less than 2 lane miles.
- (3) PMTPS measurements are not required on asphalt lift thicknesses less than 1-inch.

**406.3 Equipment Requirements.** The PMTPS shall consist of the following components listed.

- (1) Temperature sensor to continuously monitor surface temperature of mat.
  - a. Longitudinal and lateral surface temperature readings shall be collected at 12-inch or less intervals at all paving speeds with an X-Y accuracy of plus or minus 1-inch.
  - b. Surface temperatures shall be collected for the full width paved in one pass (including any shoulders paved simultaneously with mainline).
  - c. Surface temperature sensors(s) shall have a temperature range of at least 140 °F to 480 °F. Sensory accuracy shall be plus or minus 3.6 °F, or plus or minus 2.0 percent of sensor reading, whichever is greater.
- (2) Global Navigation Satellite System (GNSS) receiver to capture coordinates of the surface temperature readings. GNSS accuracy shall be plus or minus 2 inches or less in X and Y directions when intelligent compaction is being used. A base station shall be required at any locations having poor cellular reception to obtain required accuracy. When intelligent compaction is not being used GNSS accuracy shall be plus or minus 4 ft or less in the X and Y directions and ground distance sensor shall be within plus or minus 1/1000 ft.
- (3) Onboard data acquisition with a minimum of the following capabilities:
  - a. Displays (in real-time) map of the surface temperature readings.
  - b. Displays total distance, paver speed and location.
  - c. Reports surface temperature readings and GNSS status.
  - d. Provides real-time statistical summaries of surface temperature readings.
  - e. Allows operator to define data lot currently being placed per AASHTO PP 114.
  - f. Stores data internally until data transfer.
  - g. Automatically transfers data to cloud storage or other approved methods.

**406.3.1 System Setup on Pavers.** Pavers shall be instrumented with the PMTP system for the full paving width and shall collect measurements no less than 3-feet and no greater than 12-feet from the trailing edge of the screed plate. Other objects shall not obstruct surface temperature measurements and GNSS accuracy.

**406.4 Construction Requirements.**

**406.4.1 Temperature Verification.** Temperature verification shall follow AASHTO R110-22, Section 6 Calibration. A record of each verification shall be submitted to the SharePoint prior to the start of the project.

**406.4.2 Data Management.** PMTP data files shall be compatible with the Veta software. The contractor shall supply the engineer with the manufacturer's PMTPS Computer Software 14 days

prior to beginning work and until ninety days after completion of all work. If Cloud Storage or Cloud Computing is used, the engineer shall be supplied one user ID with full access for the same time-period specified. If cloud storage is not used Raw PMTP data files shall be downloaded once per day and uploaded to the appropriate MoDOT IC-PMTP SharePoint site before the start of the next day's production. The following data management requirements shall apply:

- (1) The PMTP data files should be directly transferred from cloud storage to Veta. Other methods shall be approved by the engineer.
- (2) The PMTP Veta files shall be appropriately formatted and filtered in accordance with MoDOT IC-PMTP protocol.
- (3) Date and time stamp of PMTP shall be checked and verified to reflect the local time zone for both mapped and exported data.

**406.4.3 Quality Control.** The following shall apply to the Contractor's Quality Control for PMTP.

- (1) The contractor shall have a properly trained person listed in the QC Plan that has completed a Veta training course within the last 2 years to perform the PMTP data collection and file management for the project.
- (2) The PMTP system shall have a documented annual calibration before beginning construction.
- (3) For each run, the thermal profile shall be divided into 150-foot sublots at the full paving width and partial data sublots as follows:
  - (a) Combine partial data sublots less than 75-feet with the previous data sublot.
  - (b) Treat partial sublots greater than 75-feet as one data sublot.
  - (c) Sublots shall not extend over multiple days, different lifts, or paving directions.
- (4) Veta files shall be completed and uploaded with the appropriate naming convention in accordance with MoDOT IC-PMTPS Protocol. Appropriate naming convention can be found in the IC-PMTP Document Helper located in the [Intelligent Compaction SharePoint site](#). The completed Veta files shall have the appropriate filters applied with the summary data transferred to the Summary Report. An up-to-date Summary Report shall be provided to the engineer two days prior to the 1<sup>st</sup> and 15<sup>th</sup> of each month.
- (5) **PMTP Quality Control Plan.** A pre-activity meeting shall be required prior to mainline paving. The PMTP Quality Control Plan shall be submitted to the engineer at least 2 weeks prior to the mainline paving pre-activity meeting. The plan at minimum shall include the following:
  - (a) A list of personnel previously trained
  - (b) Detailed daily verification procedure for checking the RTK-GNSS of PMTP
  - (c) Procedure for downloading PMTP data from the instrument
  - (c) The procedure for training operators or other project staff

- (e) Detailed daily verification procedure for checking the temperature sensor on the PMTP
- (f) The name of the designated PMTP Quality Control Technician
- (g) Procedure for submitting data
- (h) Contact information for technical support staff
- (i) Anticipated cellular service and GNSS coverage throughout entire project
- (j) A list of the control points with either UTM or State Plane Coordinates established by the contractor if a base station is required.

**406.4.4 Quality Assurance (QA) Testing.** The Engineer will use a Forward Looking InfraRed (FLIR) camera to verify the contractor's PMTP system. QA tests shall be taken at random locations twice per day. The contractor shall assist the engineer with the placement of the event marker.

The QA tests using the FLIR data QA tool shall compare favorably, according to the instructions found in the IC-PMTP Document Helper located in the [Intelligent Compaction SharePoint site](#). If results do not compare favorably, the contractor's PMTPS shall be verified by the manufacturer. In the case that the PMTPS is required to be sent off to the manufacturer and the contractor is not able to provide a replacement, the contractor will be allowed to continue paving with the verification by the engineer using a FLIR camera for acceptance only.

**406.4.5 Thermal Segregation.** Thermal segregation will be calculated by using the Differential Range Statistics (DRS) under the parameters of AASHTO R110 in each 150-foot subplot.

The Veta analysis with the appropriate filters applied shall exclude the following surface temperature readings from each subplot:

- (1) Surface temperature readings less than 180°F.
- (2) Surface temperature readings within 2 ft. prior to and 8 ft. after paver stops that are greater than 1 minute in length.

The thermal segregation categories are based on the Differential Range Statistics (DRS), as shown in the table below.

Differential Range Statistics (DRS)	Thermal Segregation Category
$DRS \leq 25.0^{\circ}F$	Low
$25^{\circ}F < DRS \leq 35^{\circ}F$	Moderate
$35^{\circ}F < DRS \leq 50^{\circ}F$	Moderate-High
$DRS \geq 50^{\circ}F$	Severe

**406.4.6.1 Incentive/Disincentive.** Incentive/disincentive adjustments shall be made for each subplot in accordance with the following:

Thermal Segregation Category	Adjustment per 150 ft. Sublot
Low	\$40 Incentive
Moderate	\$40 to \$0 Incentive (Linear)
Moderate-High	\$0 to -\$40 Disincentive (Linear)
Severe	-\$40 Disincentive and Reviewed by Engineer

**406.5 Loss of Data.** If data collection ceases as a result of circumstances reasonably beyond the control of the contractor, the contractor will be allowed to continue the days paving, but the paved sublots will not be eligible for 406 PMTP Incentive. The engineer must be notified immediately of the issue and shall determine if the contractor has made a reasonable effort to resolve the issue. A meeting with the engineer shall be held to determine how to proceed if the issue is expected to extend into the next day's paving. Failure to notify the engineer of the issue at hand will result in the paved sublots to receive a minus \$40 deduct.

**406.5.1 GNSS Obstructions.** A base station shall be used at any locations having poor cellular reception. Isolated areas influenced by a GNSS obstruction may be excluded from DRS computation provided that the following conditions are satisfied:

- (1) The position data is present
- (2) The GNSS Reception Mode as recorded by the onsite equipment indicates that an obstruction is present
- (3) The location is properly flagged in the Veta project file and the location is identified in the bi-weekly report
- (4) The total of these areas is no more than 5% of any single day's production.

**406.5.2 QA Acceptance.** When PMTP data is not available, paved sublots will be accepted by verification using the FLIR camera. Temperature differentials greater than 50°F are subject to removal.

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

AA. Median Island Cut-Throughs

**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	Type / 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 In. Concrete Median Strip	S.Y.
502-11.12	12" Concrete Pavement Non-reinforced	S.Y.
608-10.12	Truncated Domes	S.F.

**BB. ADA Curb Ramp**

**1.0 Description.** This work shall consist of constructing new concrete curb ramps that are compliant with current Americans with Disabilities Act (ADA) and MoDOT guidelines at locations shown on the plans and as directed by the engineer.

**1.1** The contractor shall ensure that the persons establishing the grades of the ADA facilities have a copy of ADA related provisions at hand for reference. If it is found that written provisions for ADA facilities are not at hand, the engineer may cause ADA work to be ceased until a copy arrives.

**2.0 Construction Requirements.** Except as noted herein, all applicable provisions in Sec 608 of the Standard Specifications shall apply to the construction of the curb ramps.

**2.1** The following shall be included in the cost of a new ADA ramp:

- (a) Excavation and preparing of the subgrade prior to placement of the aggregate base
- (b) 4" Type 5 Aggregate Base underneath the new ramp
- (c) Everything shown in the various figures of ADA ramp curb types on Standard Plan 608.50 shall be poured as 7" concrete. This includes all area of ramp, level landing pads and any flares included in the per each ADA Ramp.
- (d) Variable height curb along the roadway within the limits of the new ADA ramp
- (e) Variable height curb along the backside of the new ADA ramp
- (f) Concrete median used to separate direction of travel within a dual perpendicular ramp
- (g) Furnishing and installing any reinforcement needed as shown in the plans for curbs taller than 8"
- (h) Tinting of concrete surface as required in the plans
- (i) Sod next to the curb ramp
- (j) Saw Cuts needed for the removal of the existing concrete area where the new ADA ramp is being constructed

- (k) Removal of the existing concrete area where the new ADA ramp is being constructed

**2.1.1** Regardless of the number of ramp areas or surfaces having a maximum ramp slope of 1V:12H (8.33%) that are constructed for a particular type of ADA Curb Ramp, the contractor **will not** be paid for additional number of ramps at that location. See special sheet for curb ramp pay limits. Exception: **Dual Perpendicular Ramps and Blended Transitions** will be paid as 2 each.

**2.2** The following shall be paid for separately in the cost of a new ADA ramp:

- (a) Truncated Domes

**2.2.1** Detectable warning surfaces shall be provided, where a curb ramp, landing, or blended transition connects to a street. Where commercial or private driveways are provided with traffic control devices or otherwise are permitted to operate like public streets, detectable warnings should be provided at the junction between the pedestrian route and the street. See plans for additional details.

**2.2.2** The truncated domes shall come from Materials' Pre-Qualified List FS-1067 Table 1 from the following link:

<https://www.modot.org/materials>

**2.3 Gutter Correction.** The contractor shall establish the grade of the flow line of the gutter before establishing the grades of ADA facilities. The gutter line shall be free flowing with no ponding next to the curb. Under-performing gutters shall be replaced with a concrete curb and gutter or a minimum 1.75-inch-thick asphalt mill and fill. Running or standing storm water shall not be pushed out into the roadway where it may be splashed on pedestrians by passing vehicles or cause a hydroplaning hazard. An asphalt mill and fill shall be a minimum of 1.75 inches thick and the edges shall be at a smooth milled butt joint. The contractor shall use an approved BP-1 mix for all corner asphalt mill and fill work unless another surface asphalt mix is specified elsewhere in the contract. Asphalt mill and fill is included in the work of ADA Curb Ramps. If asphalt mill and fill is needed at a corner without any other ADA work, it will be found as a separate line item in this contract.

## **2.4 Design Plans**

**2.4.1** Recommendations for the design type of each curb ramp to be built on this project are shown on the plans. Curb ramps constructed by the contractor may vary from the original design, with approval from the engineer, in size, shape, and location as necessary to comply with ADA laws. It is the contractor's responsibility to inspect locations in the field before bidding to verify quantities needed to satisfy this provision. No additional pay will be made to the contractor if the original design is adjusted, and a different ramp type is constructed instead of the recommended/suggested in the plans.

**2.4.2** ADA provides some exceptions to ramp slope where space limitations exist. The apparent construction limits shown on the plans are not considered a space limitation. The contractor shall not place any ADA exceptions without consulting the Engineer on a case-by-case basis.

**2.4.3 Special Sheet.** A special sheet shows the pay limits for each standard ADA ramp type used by MoDOT. This special sheet is not intended to replace the Standard Plans, Standard

specifications or MoDOT's ADA checklist but is intended only to provide consistency regarding pay lengths/limits within the St. Louis District.

As shown on this special sheet, 15 feet beyond the landing is considered part of the ADA ramp. Payment for the ramp will be 15 feet beyond the landing and no adjustment in sidewalk length/quantity will be made if this **15-foot ramp length** is adjusted by the contractor in the field.

**2.4.4** When a project is **only** replacing ADA Curb Ramps at intersections, a warping panel shall be included and considered incidental to the cost of the new ADA Curb Ramp. When a project is also constructing new sidewalk tied into the new ADA Curb Ramp, this warping panel shall be paid for within the sidewalk pay item. A warping panel consists of tying in an ADA compliant cross slope to an existing cross slope.

**2.5 Median or Median Island Cut-throughs.** If there is an actual ramp with a slope not exceeding 8.33% (1V:12H) 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, as noted below. If the pedestrian path cuts through an island or median, then this area is not considered a ramp and will be paid for with individual items necessary to construct this pedestrian path.

**2.6 Prosecution of Work.** The contractor shall have all necessary personnel, equipment, and materials at hand for all work at each location before the work begins so that work may proceed without delay.

**3.0 Method of Measurement.** Final measurement will not be made for each ramp 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.

**4.0 Basis of Payment.** The accepted quantity of ADA compliant curb ramps will be paid at the contract unit price for the following items:

Pay Item Number	Type / Description	Unit
608-10.12	Truncated Domes	SF
608-99.02	7 In. Concrete Curb Ramp	Each

#### CC. Curb Ramps and Sidewalk Construction Requirements

**1.0 Description.** Construction of concrete curbs, aprons, curb ramps, transition areas, sidewalk and landings shall be in accordance with applicable portions of Sections 608 & 609 of the Standard Specification and Standard Plans for Highway Construction 608.10, as shown on the plans, and shall meet ADA requirements.

**2.0 Construction Requirements.** The following requirements shall be applicable to construction of this project. The work shall include, but is not limited to, sidewalk construction including landings, joint construction, aggregate base, compaction, apron modifications, transition area, curb ramp construction, Type S Curb or Integral Curb installation (as required), tie bars or dowel bars (as required), clean-up, etc. for each location shown on the plans.



**2.1** A one-half (1/2) inch joint filler shall be placed between all new pedestrian facilities and existing immovable improvements to remain in place such as power poles, fire hydrants, building foundations, pull boxes, manholes, etc.

**2.2** Extreme care shall be taken when removing sidewalk adjacent of existing building foundations. This may require additional saw cutting, hand work, time, equipment, materials or other, to avoid damaging the building foundation. All foundations damaged due to the contractor's activities will be completely repaired in kind as approved by the engineer.

**2.3** Existing curb, curb and gutter, sidewalk, shoulders, etc. that are adjacent to a designated curb ramp and/or sidewalk improvement area that is damaged during construction shall be replaced/repared to match existing materials and condition.

**2.4** Variable height curb along the roadside may be constructed monolithic or separate depending on construction operations. Integral curb shall be doweled to the existing gutter or pavement. - Integral or Type S-curb shall be used along the existing right-of-way when constructing curb ramps as shown on the plans. The cost of the curb is included in pay limits of the curb ramp.

**2.5** Curing compound for all concrete construction shall be a clear or translucent color. The white pigmented option or other colored compound will not be allowed.

**2.6** Adjacent grass areas, landscaping, irrigation lines, pavement, etc. disturbed by curb ramp or sidewalk construction shall be repaired or replaced to match or exceed existing conditions. Sod quantities are included for adjacent areas. More or less sod may be required depending on actual field conditions.

**2.7** Saw cuts for pavement and sidewalks shall be full depth or a minimum of 6 inches, whichever is less. Saw cuts are incidental to Removal of Improvements and Linear Grading for ADA Facilities.

**2.8** Closed pedestrian facilities create barriers to access for non-motorized users. Therefore the Contractor shall make every reasonable effort to minimize closures of sidewalk and curb ramps. Prior to the removal of existing pedestrian facilities, the contractor shall confirm crew availability and predicted weather conditions allow replacement and opening of the pedestrian facility within 14 days of closing.

**3.0 Method of Measurement.** Curb ramps and concrete sidewalk will be measured to the nearest 1/10 square yard. Measurement of incidental items required to complete all aspects of construction for the above noted items at each new curb ramp and sidewalk location will not be made individually unless specified elsewhere in the contract.

**4.0 Basis of Payment.** All costs incurred by the contractor by reason of compliance to satisfy the above requirements shall be considered incidental to and completely covered by the contract unit price for each of the pay items within the contract.

DD. Modified Concrete Curb and Gutter

**1.0 Description.** This work shall consist of furnishing and installing a concrete curb and gutter with a 2.0 foot wide gutter at the locations shown on the plans.

**2.0 Material Requirements.** All materials shall be in accordance with Sec 609 and Sec 706 except as noted in the plans.

**3.0 Construction Requirements.** All work performed shall be done in accordance with Sec 604 except as noted in the plans.

**4.0 Method of Measurement.** This curb will be measured to the nearest whole linear foot. The sidewalk and aggregate base in front of the curb shall be measured and paid for separately.

**5.0 Basis of Payment.** Payment for compliance with this provision, including all labor, materials, time and equipment, will be considered completely covered by the following contract item:

Pay Item Number	Type / Description	Unit
609.99.03	Modified Concrete Curb & Gutter	Linear Foot

EE. Concrete Sidewalk and Curb Jointing at Utility Poles

**1.0 Description.** Contractor shall provide longitudinal and transverse jointing for concrete sidewalk and concrete curbing to direct pedestrians around utility poles. The longitudinal and transverse jointing shall be completed to provide separation from the pedestrian access route on the sidewalk from utility poles.

**2.0 Construction Requirements.** At each utility pole located within the sidewalk or curbing adjacent to sidewalk, concrete jointing/edging shall be provided to a depth of ¾-inch. The jointing shall be as per direction of Engineer.

**2.1** Jointing to be completed to guide sidewalk users around utility poles. The length of longitudinal joints shall be a length of 10-feet (maximum length of 15-feet) at each utility pole. Transverse short jointing shall be completed within the longitudinal joint at 12-inch intervals.

**2.2** Jointing pattern shall be approved by Engineer as part of the pre-concrete placement conference.

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

FF. Contractor Furnished Surveying and Staking

In addition to the requirements of Section 627 of the Missouri Standard Specifications for Highway Construction, the following shall apply:

**1.0 Description.** The contractor will be responsible for all layout required on the project. All staking required to ensure that improvements installed on this project meet the ADA requirements is the sole responsibility of the contractor. This responsibility will include, but not limited to the following: Construction signs, curb ramp, landing, and sidewalk construction, truncated dome installation, quantity verification, curb construction, pavement marking, pedestrian signal modifications, median strip/island construction and modifications, etc.

**1.1** The above list is not all inclusive. The contractor shall have the primary responsibility for these operations. The contractor shall provide the Resident Engineer with a staking plan layout

for approval prior to the installation of signs. The RE will also provide assistance during this layout provided a request is submitted to the RE or Construction Project Manager 48 hours in advance. This will ensure that all permanently mounted traffic control devices remain consistent with District policy and avoid re-staking. If the contractor installs any signs without engineer approval, all costs associated with re-staking and/or relocation will be at the contractor's expense.

**1.2** The intent of this provision is to increase the quality of our work zones and minimize negative impacts to the contractor's schedule that can result from delays in staking.

**1.3** Any adjustments to the plan quantities or line numbers established in the contract shall be approved by the Engineer.

**2.0 Basis of Payment.** No direct payment will be made to cover the costs associated with these additional requirements. All costs will be considered completely covered by the lump sum bid price submitted for Contractor Furnished Surveying and Staking.

GG. Saw Cutting for Removal of Improvements

**1.0 Description.** Saw cutting will be necessary for removal of improvements in certain locations as depicted in the contract plans. A number of the locations and estimated saw cut lengths have been identified and quantified in the table for Removal of Improvements that has been included in the Schedule of Quantities. The list included within the Schedule of Quantities may not be all inclusive and the contractor's means and methods may require an alternate removal method be employed.

**2.0 Construction Requirements.** All materials and work performed for this item shall be in accordance with Sec 202.

**2.1 Exception for Full Depth Pavement Repair Saw Cutting.** This JSP does not apply to the perimeter and internal saw cutting required for full depth pavement repairs, which shall be governed by the requirements of Sec 613.

**3.0 Method of Measurement.** With the exception of full depth pavement repairs, no measurement shall be made for saw cutting.

**4.0 Basis of Payment.** With the exception of full depth pavement repairs, all saw cutting shall be considered incidental to and completely covered by the contract unit price for Item No. 202-20.10, "Removal of Improvements", per lump sum. No direct payment will be made for any labor, equipment, materials, and time required to comply with this provision.

HH. 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, 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	Misc. Modified Linear Grading, Class 2

II. 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.

JJ. Asphalt Coldmilling / Paving Requirement

**1.0 Description.** Asphalt coldmilling / paving requirement for the project.

**2.0 Construction Requirements.** Asphalt coldmilled pavement areas shall be filled with the corresponding asphaltic concrete mixture during the same work shift.

**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.

KK. Optional Pavements JSP 06-06H

**1.0 Description.** This work shall consist of a pavement composed of either Portland cement concrete or asphaltic concrete constructed on a prepared subgrade for the base of the pavement structure. The 2" surface course shall be SP125CLP w/ PG 70-22, per the Pavement Type Selection Letter. 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 aggregate base will be as shown on the plans.

**2.3** The grading shown on the plans was designed for the either pavement option, as they are the same thickness. For projects with grading in the contract, there will be no adjustment of the earthwork quantities due to adjusting the roadway subgrade for optional pavements.

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

**2.5** 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** For projects with previously graded roadbeds, any additional quantities required to bring the roadway subgrade to the proper elevation will be considered completely covered by the pay item for Subgrading and Shouldering.

**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.

LL. Non-Tracking Tack JSP-24-02

**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.

**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.

MM. Optional Temporary Pavement Marking Paint NJSP-18-07F

**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 2026, as allowed herein. PPMP is defined as Standard Waterborne Paint and High Build Waterborne Paint and does not include Sec 620.20.3 Durable Pavement Markings.

**1.1** No application of PPMP shall occur between October 1, 2025 and March 1, 2026, both dates inclusive, except as stated herein. When the contractor has begun application of PPMP prior to October 1, 2025, 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, 2025, 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, 2026. All PPMP shall be completed prior to June 1, 2026. 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, 2025, even when there is sufficient time to complete the PPMP prior to October 1, 2025. 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 2026, 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, 2026, 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, 2026.

**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

NN. 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 marking 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



**OO. Island Tubular Markers**

**1.0 Description.** This work shall consist of constructing tubular markers on raised islands at the locations indicated in the plans and directed by the Engineer.

**2.0 Requirements.** Island tubular markers shall have a height of 18-inches as noted in the plans, 2 reflective bands with super high intensity prismatic sheeting in accordance to 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. Posts shall be in the shape of a "T" with a width of 3 inches and a depth of 2 inches. Posts shall be capable of recovering from repeated vehicle impacts. Posts 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 markers shall be mounted using proper sized anchor bolts according to manufacturer's specifications.

**4.0 Method of Measurement.** Measurement for installation of tubular marker with base will made per each. The removal of any existing tubular markers, anchors, adhesive, locking base, etc. will not be measured or quantified.

**5.0 Basis of Payment.** All labor, equipment, and materials necessary to install tubular markers will be paid for under as shown below. Payment for removal of any existing tubular markers, anchors, adhesive, locking base, and all labor, equipment and materials incidental to this work, will be considered incidental to Item No. 202-20.10, "Removal of Improvements."

Item Number	Unit	Description
620-99.02	Each	18 In. Yellow Island Tubular Markers
620-99.02	Each	18 In. White Island Tubular Markers

**PP. Walk/Cover & Gutter**

**1.0 Description.** This work shall consist of constructing the Walk/Cover and Gutter as detailed in the plans at various locations within the project. This item is intended to convey roadway drainage from the edge of pavement to the back of sidewalk/swale, under the proposed sidewalk.

**2.0 Construction Requirements.** All materials and work performed for this item shall be in accordance with Sections 608 and 609, along with other applicable sections and standards to constructed Walk/Cover and Gutter.

**3.0 Method of Measurement.** The measurement for Walk/Cover and Gutter shall be measured per each. It shall include all necessary excavation, reinforcement, thickening of concrete, additional sidewalk width, gutter, reinforcement, base aggregate, and any other necessary items

needed to install the Walk/Cover and Gutter in accordance with the plans, details, specifications, and standard drawings 608.40.

**4.0 Basis of Payment.** Payment for the accepted quantity for the Walk/Cover and Gutter will be made in accordance with the contract unit bid price for the item listed below and includes all labor, equipment, materials, and time required to comply with this provision. All costs associated with this work shall be considered completely covered by Item No. 609-99.02, "Misc. Walk/Cover and Gutter", per each.

QQ. Pavement Marking Layout

**1.0 Description.** The striping lane lines on sections of roadway with multiple traffic lanes in one direction shall be placed in a manner in which the start and stop points for all intermittent lane lines match and line up even transversely across all traffic lanes. For all installations of intermittent pavement markings care should be taken to align the skips longitudinally to consistently match the spacing of the existing UIP intermittent lane lines at both start and end points of the improvement section.

**2.0 Construction Requirements.** The contractor shall submit to the Engineer for review and approval a pavement marking installation plan. This plan will include the contractor's proposal for installing the intermittent pavement markings to meet the requirements outlined above.

**2.1** Final striping will not begin until the contractor has received approval of the pavement marking installation plan.

**3.0 Basis of Payment.** All cost and expenses incurred by the contractor in fulfilling the requirements of the provision shall be considered incidental to pavement marking costs.

RR. Adjust to Grade Items

**1.0 Description.** This work shall consist of adjusting water valves, gas valves, basins/inlets, manholes, lighting pull boxes, and signal 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 adjustments shall be made to match the final proposed grade. Various pull boxes are called out to be relocated and adjusted to grade. The relocation of these pull boxes is included in the adjust to grade pay item. Adjusting rings shall not exceed 12 inches in height.

**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 are called out in the plans as "adjust inlet top". Adjustments shall be completed so that the finished sidewalk, ramp, approach, or pavement meets current ADA standards.

**2.2 Concrete Collars.** Damaged concrete collars on manholes shall be replaced as directed by the Engineer. The replacement concrete collars shall be 4 inches deep and 18 inches wide around the manhole.

**3.0** The contractor is advised that Metropolitan St. Louis Sewer District, MoDOT, MAWC, and Spire Gas have manholes and valves, located within the islands/roadway/sidewalk that will require adjustments. The Contractor shall adjust these facilities to grade as necessary. The Contractor shall contact the respective utility regarding any questions regarding the adjustment of these facilities.

**3.1** The contractor shall notify the engineer if manholes or pull boxes belonging to utilities other than Metropolitan St. Louis Sewer District or MoDOT, are encountered that will require adjustment. The contractor shall coordinate work with the affected utility to ensure that the completed facilities meet ADA requirements.

**3.2** No direct payment will be made for any required hauling, cutting, joining, backfilling, or adjusting rings, or any other requirements necessary to fulfill this provision. No direct payment will be made to recover the cost of equipment, labor, materials, or time required to fulfill the above provision.

**3.3 Basis of Payment.** All costs associated with compliance with this special provision for all material, equipment, and labor shall be completely covered by the contract unit price for:

Item Number	Unit	Description
604-20.10	Each	Adjusting Manhole
604-20.20	Each	Adjusting Basin or Inlet
604-99.02	Each	Adjusting Water Valve to Grade
604-99.02	Each	Adjusting Gas Valve to Grade
604-99.02	Each	Adjusting Pull Box to Grade
604-99.02	Each	Adjusting Telephone Manhole to Grade

**4.0** Pull boxes, valves or manholes not owned by MoDOT or specified as required work by the Contractor may require adjustment due to work in the contract. The Contractor shall contact the respective utility owners regarding any questions about the adjustment of these facilities. The Contractor shall contact the respective utility owner, at least 3 weeks prior to adjustment of these facilities to allow the utility owner to make necessary adjustments. The Contractor shall coordinate with the respective utility owners for scheduling and providing the necessary grade requirements for each adjustment. Payment for all necessary work required for the coordination for the scheduling, grading requirements and adjustments of these facilities shall be at no direct pay.

**4.1** The Contractor shall directly contact Utility Companies to verify location of facilities and status of relocation/adjustment work. The contractor shall coordinate construction activities with Utility companies and take measures to ensure the integrity of the existing facilities are not disturbed until such time as the Utility Companies have completed the adjustment work.

SS. Additional Coldmilling at Curb Inlet Openings

**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. These photo's are not project specific, and serve as general guidance of an unacceptable clear opening:



**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 disturbance. No direct payment will be made for materials, equipment, time, or labor, which is performed under this provision.

#### TT. Drainage Maintenance During Construction

**1.0 Description.** The contractor's attention is called to the drainage construction. The Contractor is required to maintain drainage during construction and to ensure that the existing drainage system continues to convey all storm water until the new structures and pipes are in place.

**2.0 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.

#### UU. MSD As-Built Submittals (24MSD-00236)

**1.0 Description.** Metropolitan St. Louis Sewer District (MSD) requires as-built drawings of the constructed drainage facilities to be submitted for their records. The contractor shall perform all work necessary to produce and submit the final as-built drainage plans to MSD, per MSD's as-built submittal requirements. The contractor shall submit the MSD as-builts for 24MSD-00236 and subsequent revisions after all drainage structures related to the project have been constructed or adjusted.

1.1 The contractor shall provide a copy of the as-built drainage plans to the MoDOT engineer at the time of the MSD submittal.

**2.0 Basis of Payment.** No direct payment will be made for this item and shall be considered incidental to the following:

<u>Item Number</u>	<u>Type</u>	<u>Description</u>
627-40.00	Lump Sum	Contractor Furnished Surveying and Staking

VV. MSD Drainage Structures

**Description**

**1.0 Description.** Metropolitan St. Louis Sewer District (MSD) standard drainage structures will be used on this project at the locations specified on the plans. Contractor shall follow the Metropolitan St. Louis Sewer District Standard Specifications for Sewers and Drainage Facilities (2023 edition) for standard details.

**2.0 Basis of Measurement.** Measurement will be made for each structure for the vertical distance between the elevation of the top structure and the elevation of the flowline at the structure base and will include all necessary assemblies associated with that structure, such as adapter rings, joints, connectors, grade adjustment rings, waterproofing required to adhere to MSD standards for storm drainage structures.

**MSD PCC 42" Manhole** includes 1-standard MSD Frame and Cover

**MSD PCC Single Street Inlet – 42" Base** includes 1-MSD standard 42" base, Single Curb Inlet Unit, Inlet Stone and Cover

**MSD PCC Double Street Inlet** includes 1- MSD standard Double Inlet Base, PCC Unit "B" and 2- inlet stone and cover.

**3.0 Basis of Payment.** Payment for work associated with these drainage structures will include the entire cost for all assemblies necessary to furnish and install the entire structure, including all materials, equipment, labor and work will be made under the bid items for MSD drainage structures included in the contract.

The accepted quantity for drainage structures will be paid for at the contract unit price for:

<u>Item Number</u>	<u>Type</u>	<u>Description</u>
731-99.03	Linear Feet	MSD PCC 42" Manhole
731-99.03	Linear Feet	MSD PCC Single Street Inlet – 42" Base
731-99.03	Linear Feet	MSD PCC Double Street Inlet

WW. Replacing Existing Drainage Structure Tops

**1.0 Description.** Replacing existing drainage structure tops will be required at the locations specified on the plans. Contractor shall field verify existing structures to determine proper type and size prior to ordering. Contractor shall follow the Metropolitan St. Louis Sewer District Standard Specifications for Sewers and Drainage Facilities (2023 edition) Sewer standard details, material specifications, and construction requirements. If the existing structure is not an MSD standard, Missouri Department of Transportation Standard Plans

will be used. Drainage structures tops within sidewalks and curb ramps shall have stable, firm and slip resistant surfaces, have flush transitions, and meet the change in level requirements.

**2.0 Basis of Payment.** Payment for work associated with replacing existing drainage structure tops will include all labor and material necessary to perform this task.

The accepted quantity for replacing existing drainage structure tops will be paid for at the contract unit price for:

<u>Item Number</u>	<u>Type</u>	<u>Description</u>
731-99.02	Each	Replace Existing Grate Inlet Top
731-99.02	Each	Replace Existing Manhole Top
731-99.02	Each	Replace Existing Curb Inlet Top
731-99.02	Each	Replace Existing Grate Inlet & Side Intake Top
731-99.02	Each	Replace Existing Curb Inlet Top with Grate Inlet Top

XX. Sodding

**1.0 Description.** The contractor shall install sod on all disturbed areas except for surfaced areas, solid rock, and slopes consisting of primarily broken rock.

**2.0 Construction Requirements.** The contractor shall use sodding as specified for all disturbed areas shown in the plans. Seedbed preparation will be in accordance with Sec 801 and placement shall be accomplished in accordance with Sec 803. The contractor shall place the sodding **within fourteen (14) calendar days** of ground disturbance to reduce soil erosion or as approved by engineer. Disturbed area shall not exceed maximum of 1 acre at one time for all locations combined on the project.

**2.1** Temporary seeding may be utilized to fulfill maximum land disturbance requirement or at the discretion of the contractor. No direct payment will be made for temporary seeding addressing land disturbance.

**2.2** Acceptance will be in accordance with Sec 803.4.

**3.0 Basis of Payment.** Payment for sod, including seedbed preparation will be considered completely covered by the contract unit price for Item No. 803-10.00A, "Turf Type Tall Fescue Sodding", per square yard.

YY. Guidance for Temporary Seeding

**1.0 Description.** The contractor shall provide temporary seeding at the locations as directed by the engineer.

**2.0 Construction Requirements.** All work performed and materials for these items shall be in accordance with Sec 805 and 806 and the plans.

**3.0 Locations.**

**3.1 Temporary Seed and Mulch.** This project is expected to be performed in more than one construction season. As such, there may be erodible areas that will require protection during off-season periods. Temporary seeding and mulching shall be provided in accordance with Sec 806.50.

**3.2 Permanent Seed and Mulch.** Due to the urban nature of this corridor, sodding is the preferred method for re-establishment of turf growth. There may, however, be locations where sodding is less practical, such as on the slopes near bridges. All areas where seed and mulch will be applied in lieu of sodding shall be approved by the engineer.

**4.0 Method of Measurement.** Measurement will be made in accordance with Sec 805 for permanent seeding and Sec 806 for temporary seeding.

**5.0 Basis of Payment.** Payment for the accepted quantity for temporary seed and mulch will be made in accordance with the contract unit bid price for the item listed below and includes all labor, equipment, materials, and time required to comply with this provision.

Item No.	Unit	Description
806-10.17	Acre	Temporary Seeding and Mulching

## **ZZ. 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 the MoDOT.

**2.2** The contractor is strongly advised to drive/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.

## **AAA. Removal and Delivery of Adopt-A Highway Signs**

**1.0 Description.** All Commission-owned Adopt-A-Highway 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 Adopt-A Highway signs shown in the plans shall be removed from the sign supports and structures, disassembled, stored, transported, and delivered by the contractor to the Maintenance Building.

**2.2** The contractor shall contact the Commission's representative 72 hours prior to each delivery by calling the phone number listed below to receive the appropriate Maintenance Building to drop off the sign.

Teresa Gentry  
Phone: 314-343-7382

**2.3** The contractor shall exercise reasonable care in the handling of the equipment during the removal and transportation. Delivery shall be within 4 working days of removal. All items returned shall be tagged with the date removed, project number and location/intersection.

**4.0 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.

### **BBB. 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.

#### CCC. Remove and Relocate Existing Sign

**1.0 Description.** Existing signs interfering with the construction of the sidewalk and other improvements shall be removed, salvaged, and reinstalled on new posts as shown in the plans. All work, including the post type, height and base anchors/sleeves to be furnished, shall be in accordance with Section 903 of the Missouri Standard Specifications for Highway Construction except as modified herein.

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

**2.1** Signs will be removed from their existing sign supports and relocated to new sign supports. The existing sign supports shall be disposed. Any signs damaged due to the contractor's construction activities will be replaced in kind at the contractor's expense.

**2.2** STOP signs shall remain visible at all times. Therefore, the STOP signs may need to be temporarily mounted on supports, similar to temporary traffic control sign supports, until they can be moved to their ultimate location. The Contractor may also elect to install the STOP sign in the final location if doing so will not interfere with construction of ADA facilities. No direct pay will be made to remove signs from their existing sign support, temporarily mount the signs, and move them to the ultimate location.

**2.3** The Contractor may be required to drill through existing concrete to install PSST sign support sleeves/anchors. Such core drilling is incidental to the sign relocation work and shall be performed at no direct pay.

**2.4** See JSP "Coordination with Metro Transit" for additional information and requirements at Bus Stops.

**3.0 Method of Measurement.** The measurement for Remove and Relocate Existing Sign shall be measured by each installation of existing sign. It shall include all necessary new foundations, posts, breakaway assemblies, anchors, brackets and any other necessary items needed to reinstall the signs in accordance with the plans, specifications and standard drawings for Section 903.

**4.0 Basis of Payment.** Payment for the accepted quantity for Remove and Relocate Existing Sign will be made in accordance with the contract unit bid price for the items listed below and includes all labor, equipment, materials, and time required to comply with this provision.

Item No.	Unit	Description
903-1270A	Lin. Ft.	2 inch PSST Post – 12 ga.
903-1271A	Each	Driven Post Anchor for 2 inch PSST – 12 ga.
903-9902	Each	Remove and Relocate Existing Sign
903-9902(1)	Each	Bolt Down Sign Base Plate

Note the removal and proper disposal of the existing sign posts will not be paid for separately, but included in the Lump Sum unit price for Removal of Improvements (202-20.10).

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

**1.0 Delete Sec 616.11 and insert the following:**

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

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

**2.0 Delete Sec 616.12 and insert the following:**

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

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

- (i) Provide and maintaining work zone lighting and work area lighting.

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

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

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

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

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

### EEE. Top Mount Light 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	30 Ft. Top Mount Light Pole	Each
901-99.02	45 Ft. Top Mount Light Pole	Each

FFF. 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 luminaries 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-A Luminaire	Each
901-99.02	Top Mounted LED-B Luminaire	Each

GGG. Disposition of Existing Signal/Lighting and Network Equipment JSP-15-05A

**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:

Mr. Dennis Hixson, Traffic Supervisor, Preventative Maintenance/ITS  
Cell: (314) 565-6726

Mr. Ron Mize, Traffic Supervisor, Emergency Signal Maintenance  
Cell: (314) 565-6727

Brian Ducote, Interim Lighting and Locate Supervisor  
Cell: (314) 681-8395

**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.

#### HHH. Maintenance of Roadway Lighting

**1.0 Description.** This work shall consist of maintaining the operation of the existing roadway lighting during the construction of the project.

**2.0 Construction Requirements.** Contractor shall schedule/stage work such as to minimize the duration that any roadway lighting will not be operational. Contractor shall provide a schedule of when the roadway lighting will not be operational to the Engineer for review and approval.

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

#### III. 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

**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

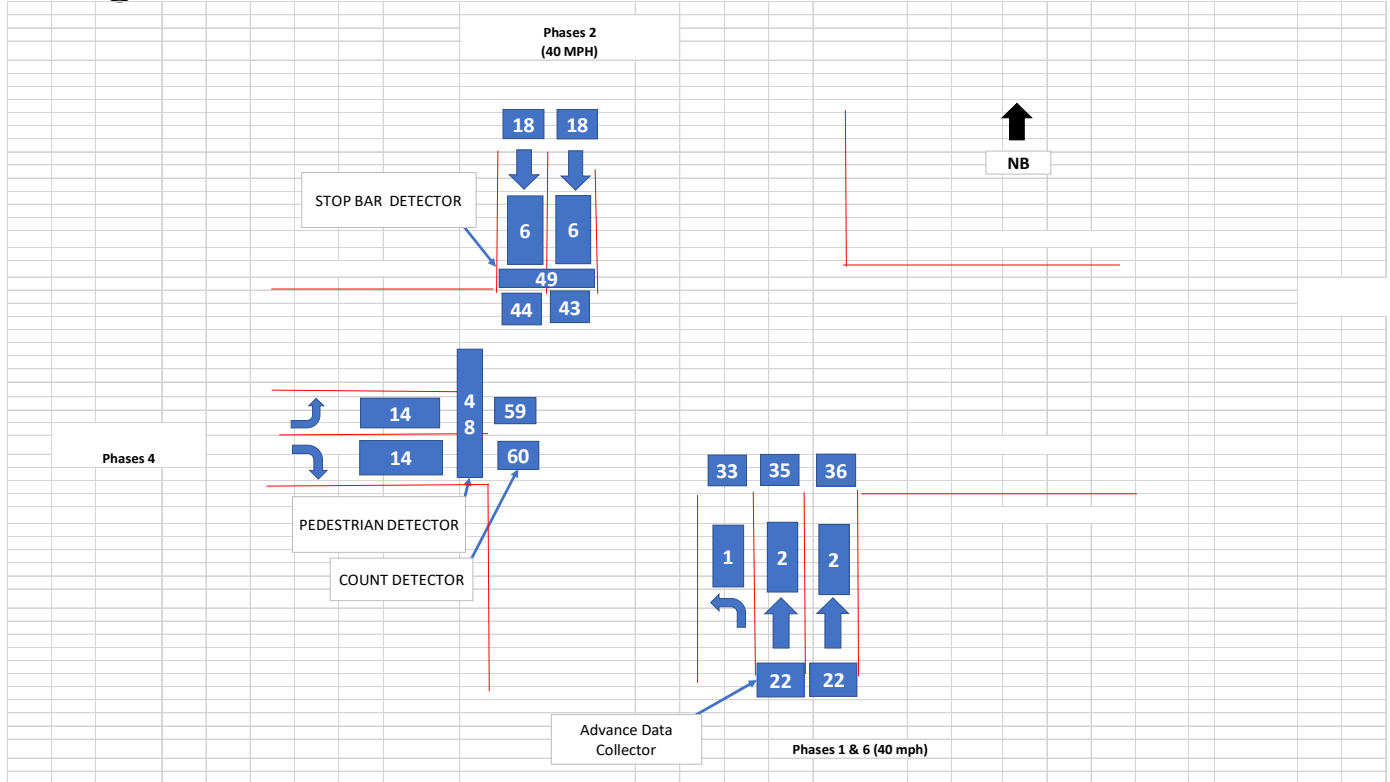
### JJJ. SL District Traffic Signal Detection System

**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.

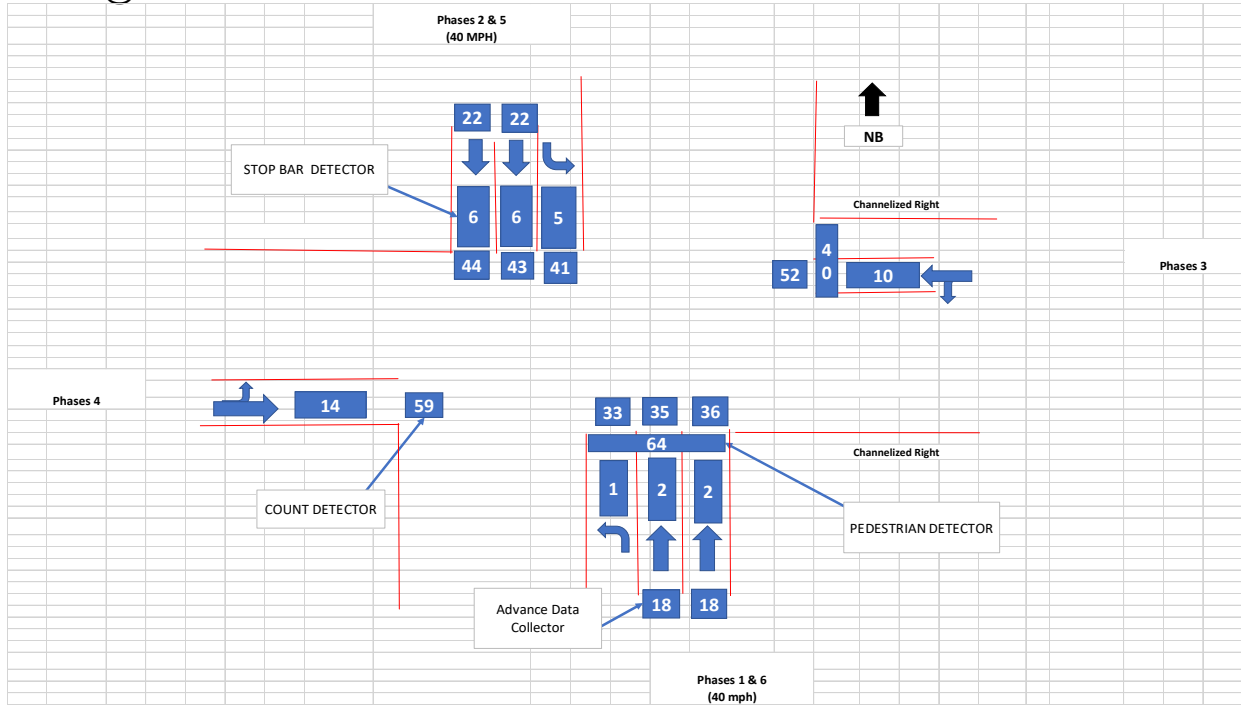
**2.0 Detector Zones.** The following detector zones shall be placed as shown in the plans:

- 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)

MO 21 @ Lutheran HS S

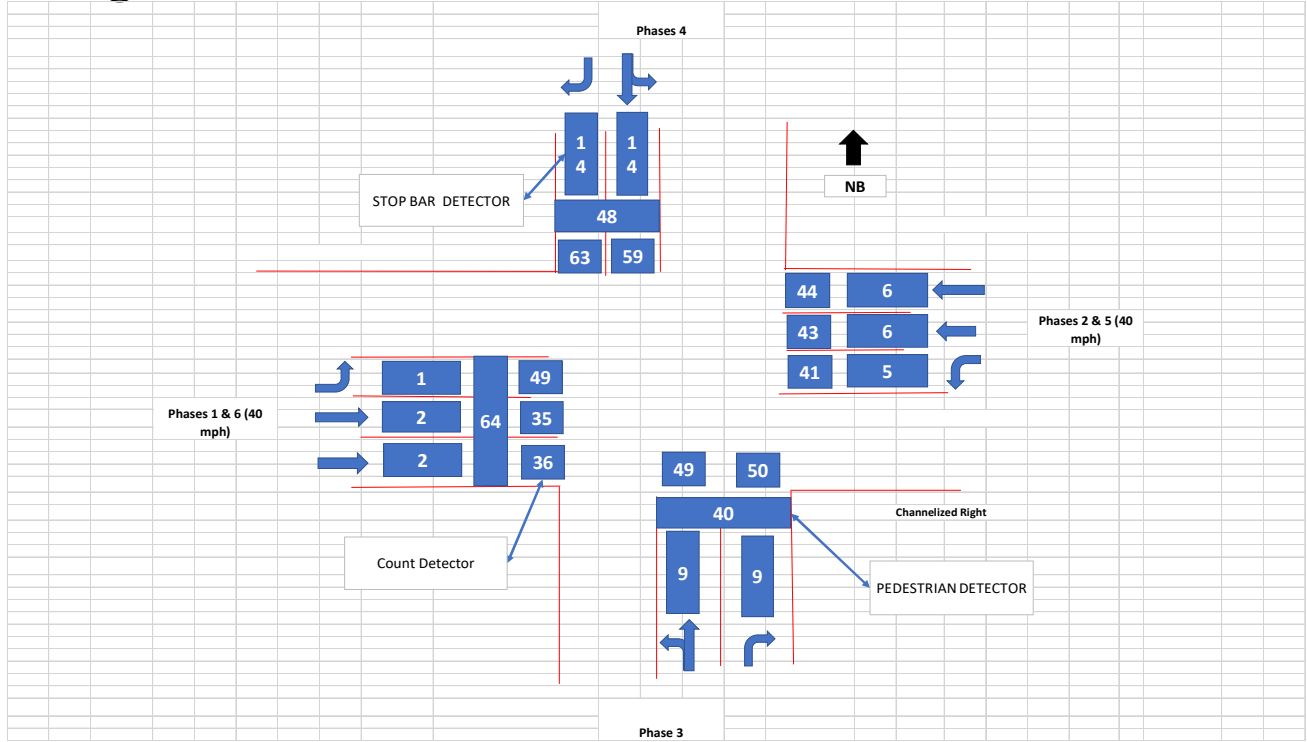


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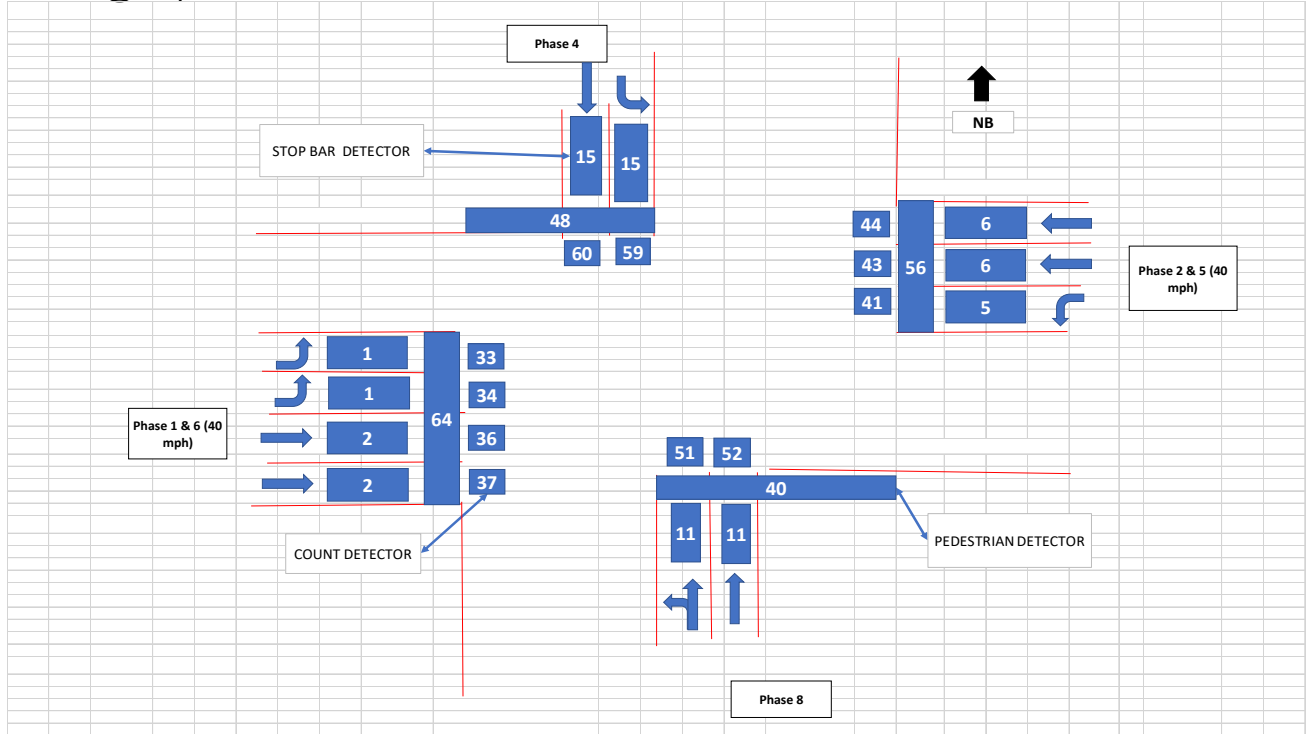




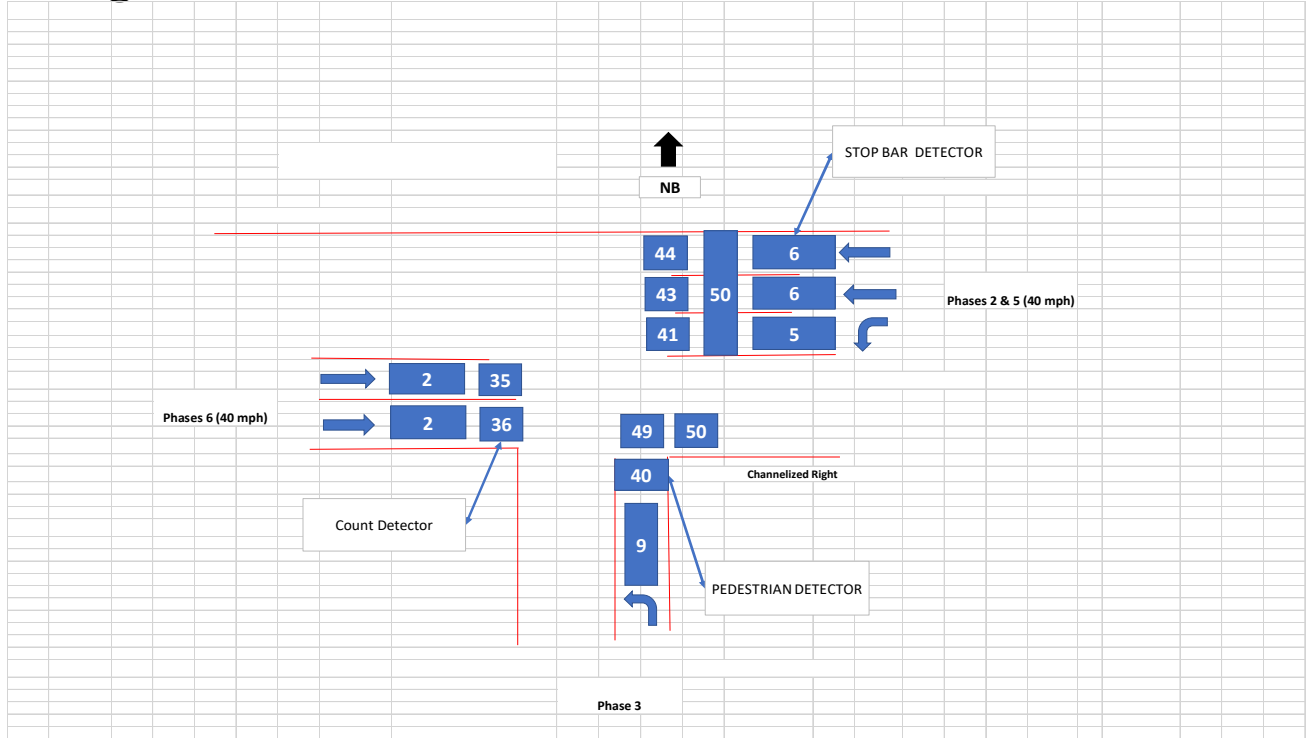
MO 21 @ Musick Ave



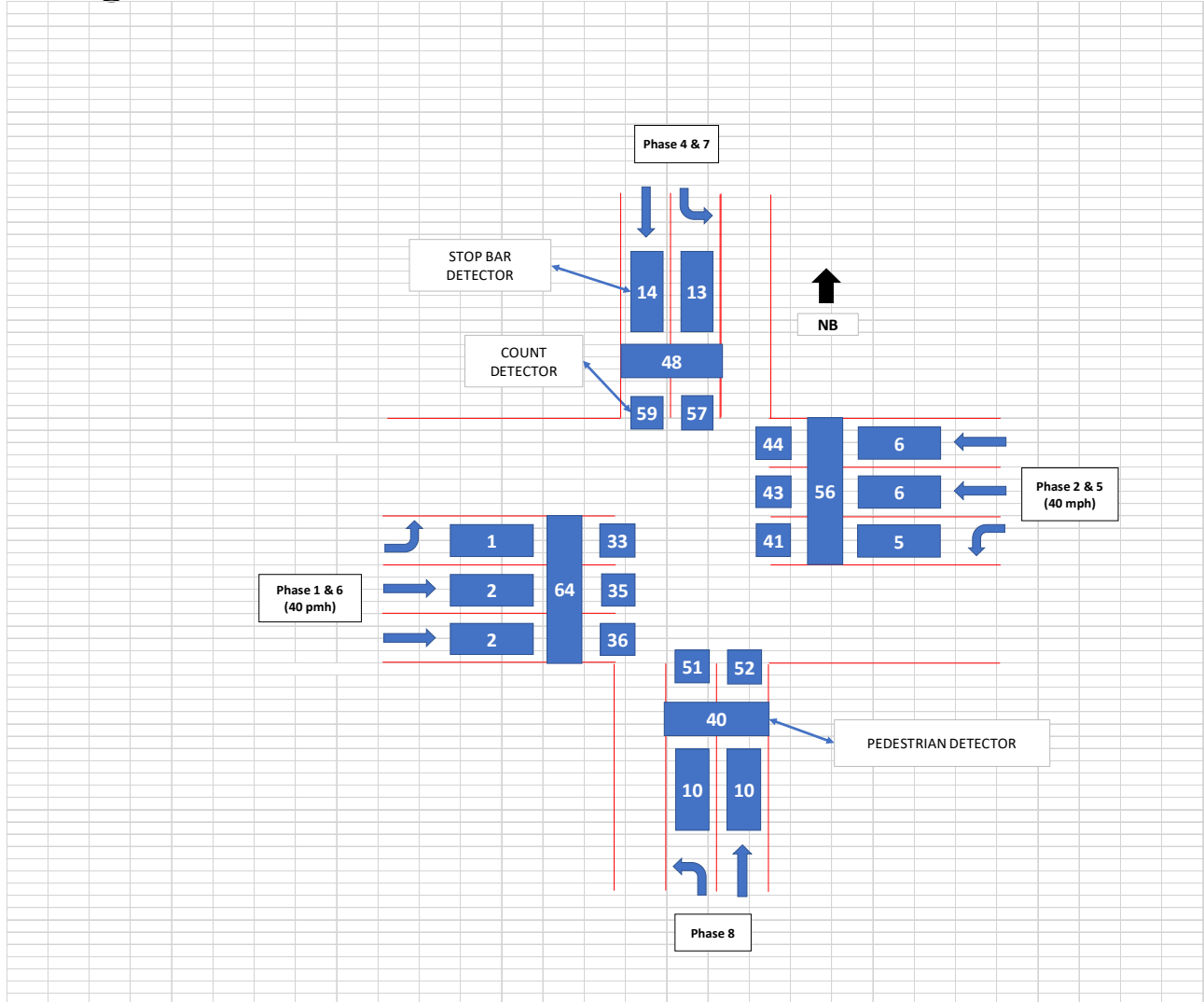
MO 21 @ Baptist Church Rd



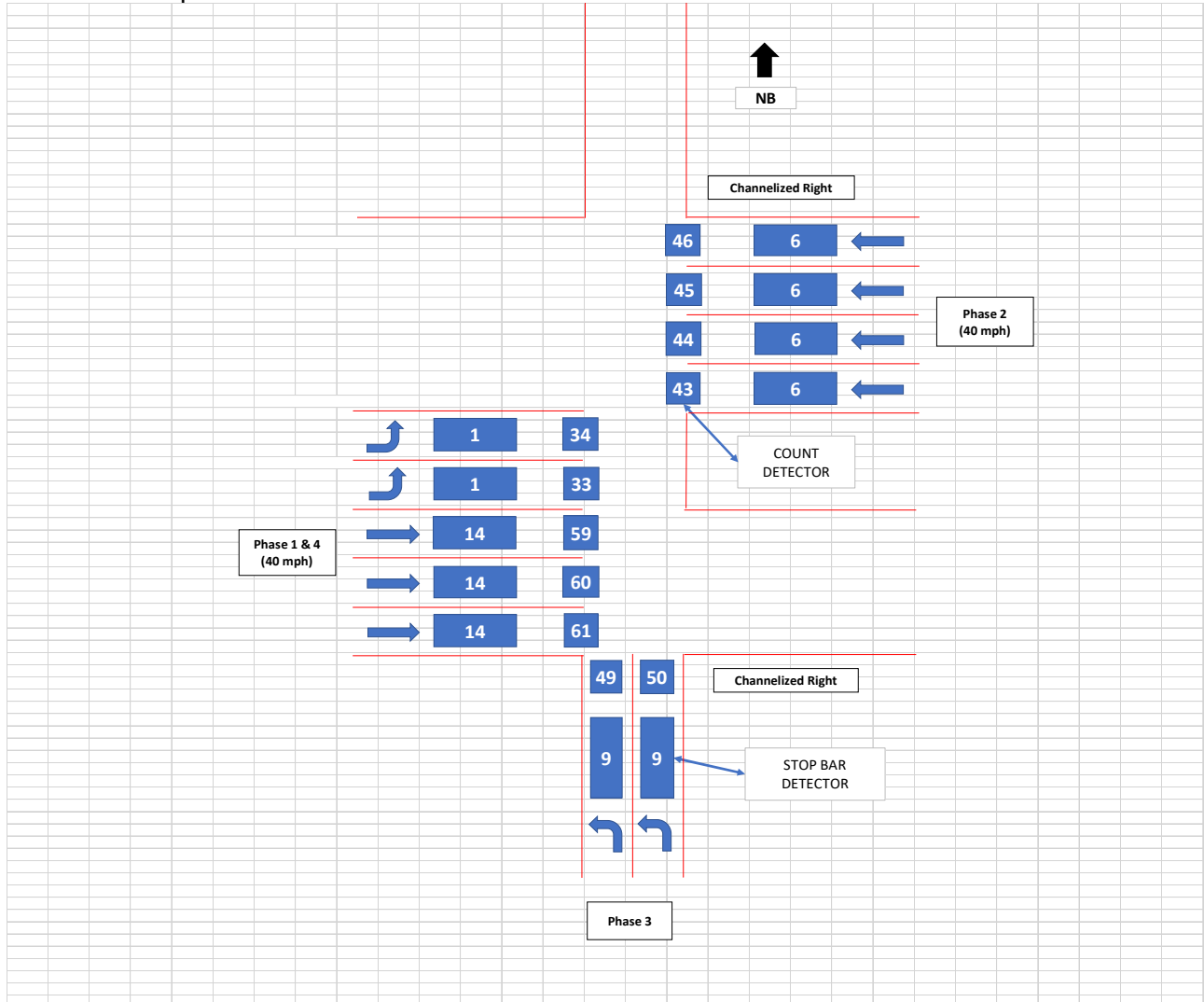
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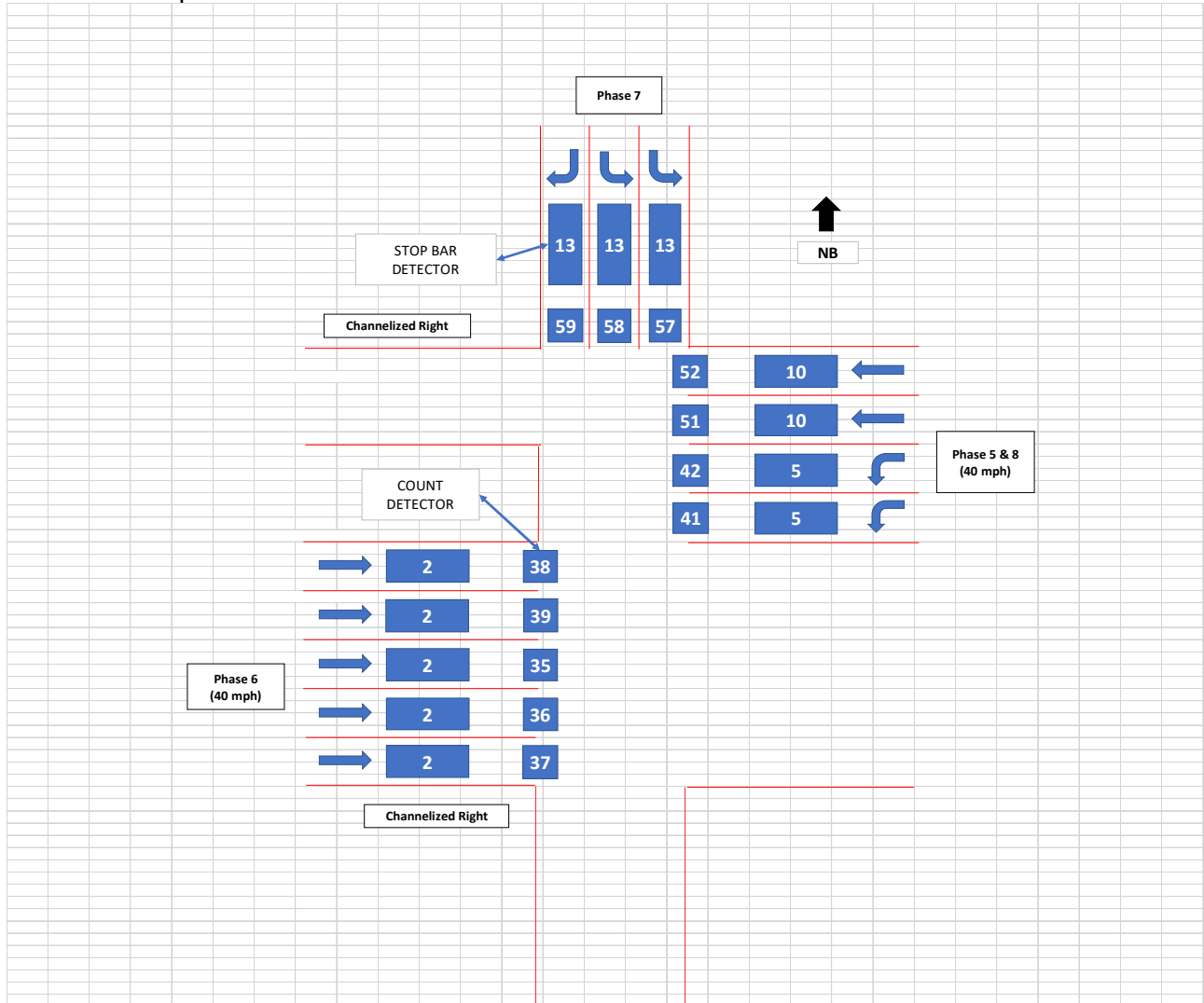
MO 21 @ Concord School Road



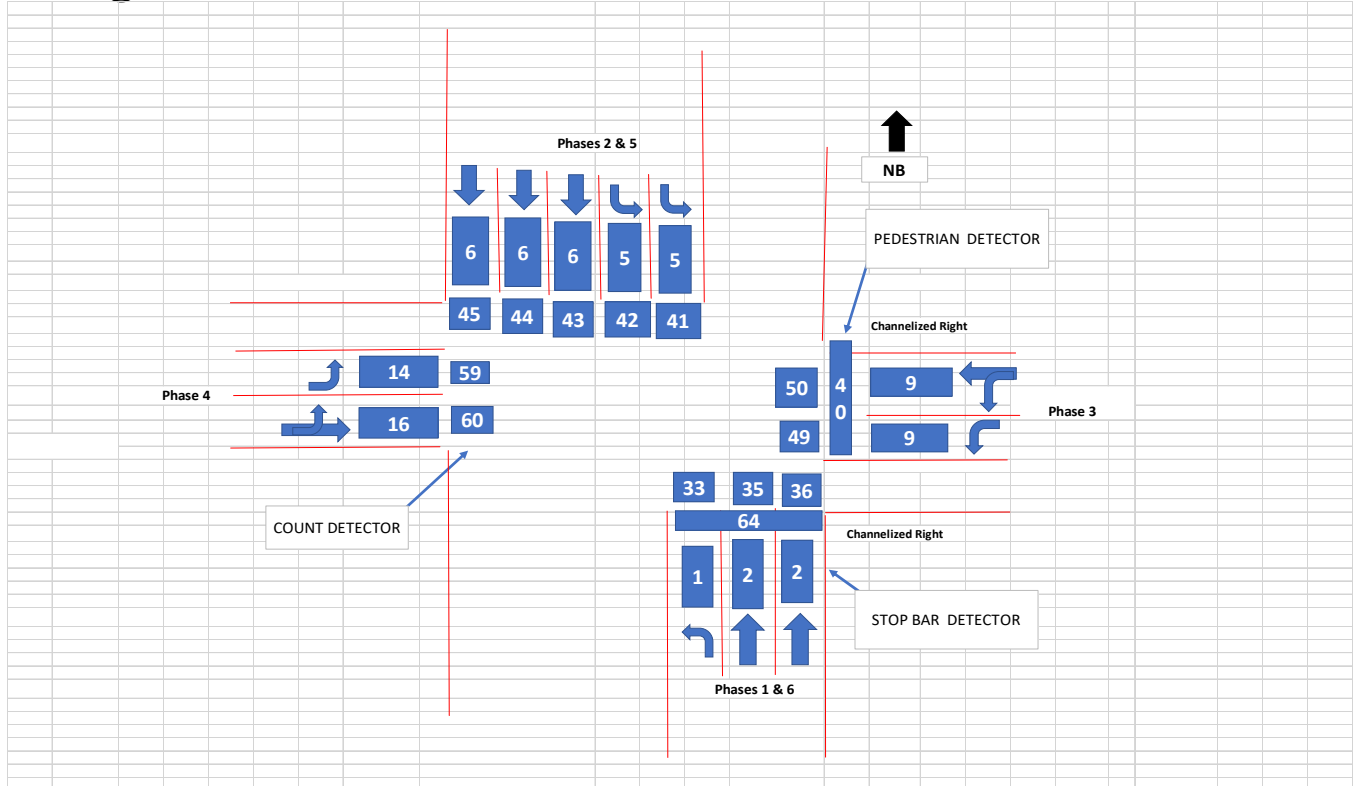
I-270 NB Ramps



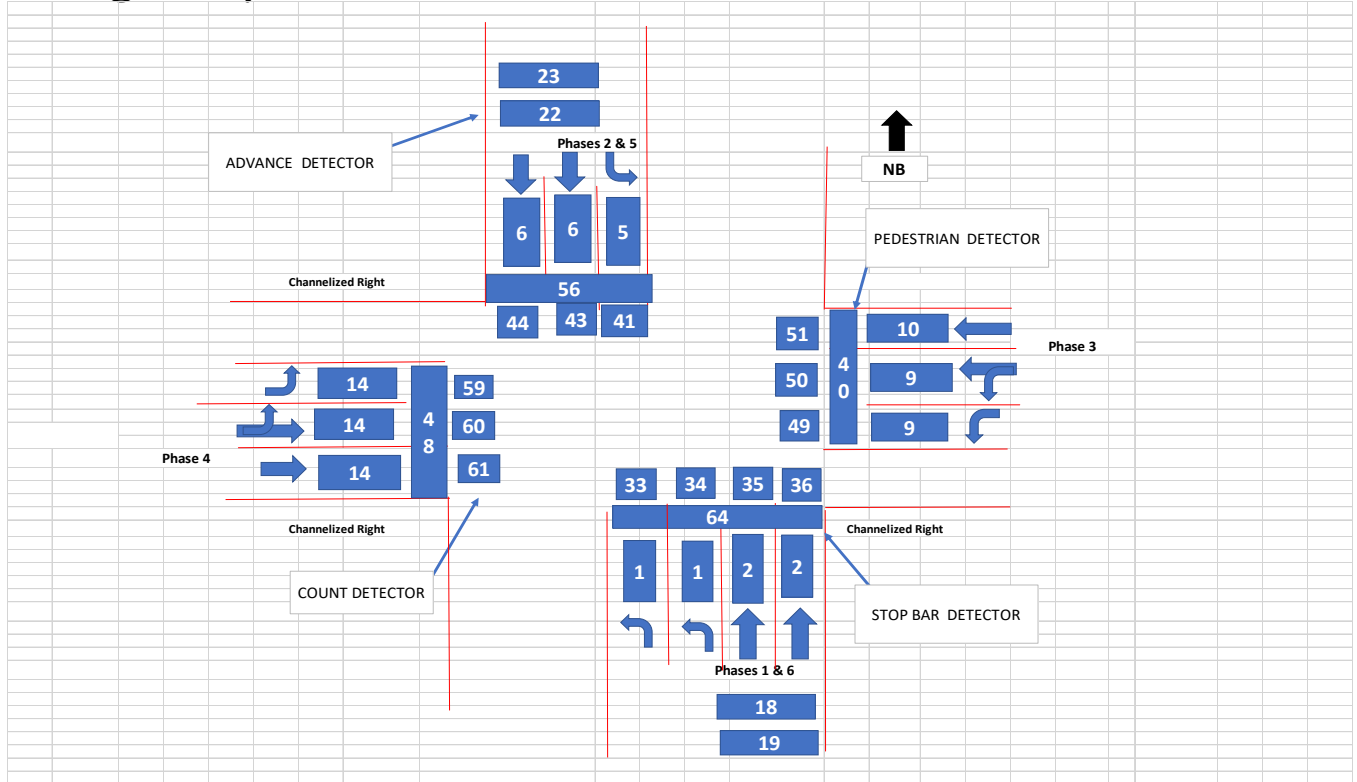
I-270 SB Ramps



MO-21 @ Mattis

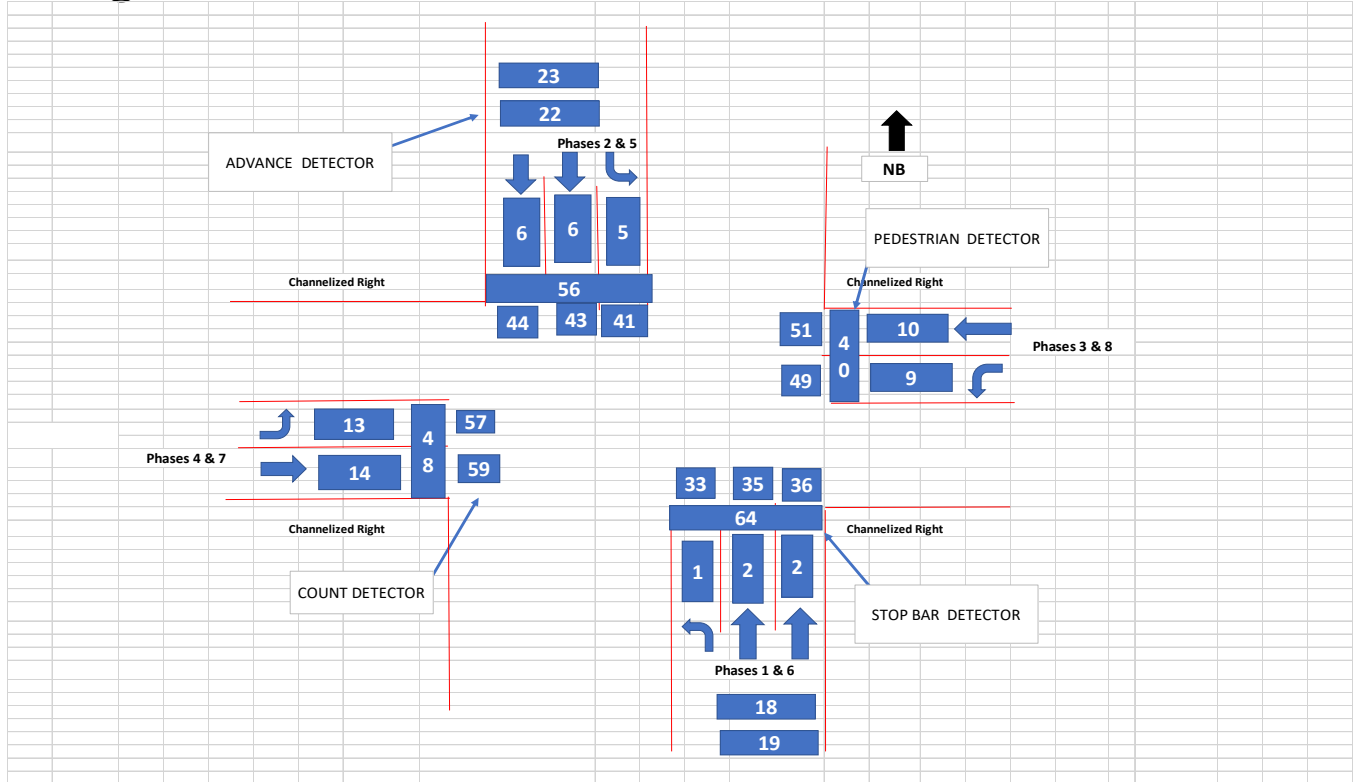


MO-21 @ Kennerly

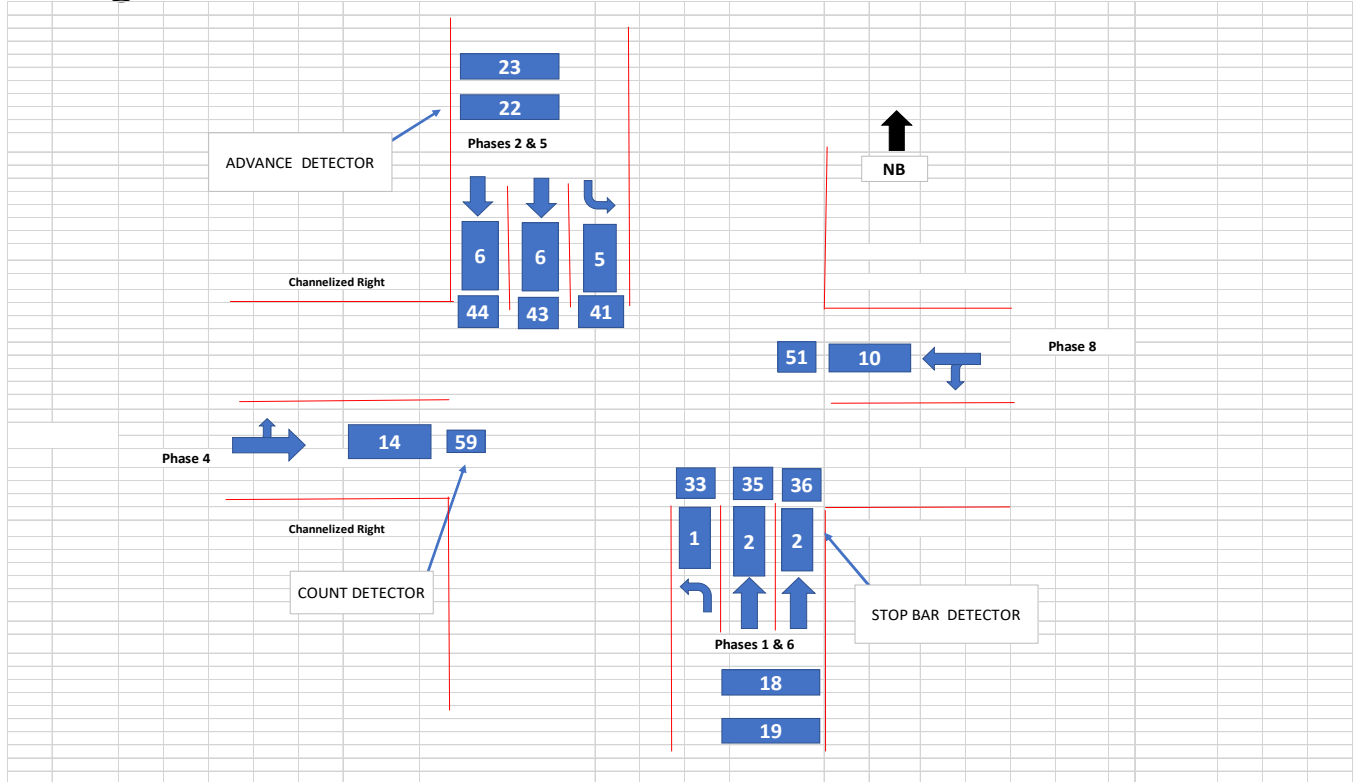




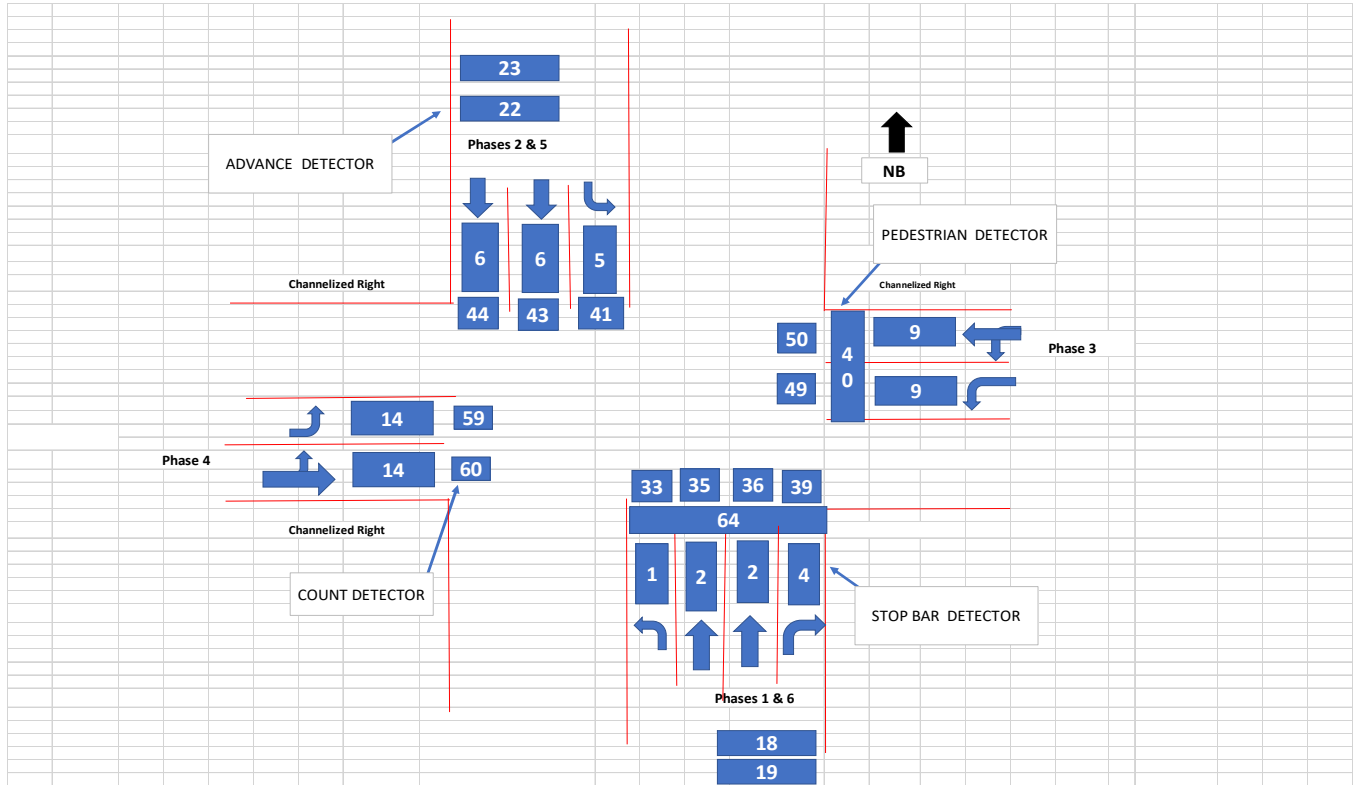
MO-21 @ Schuessler



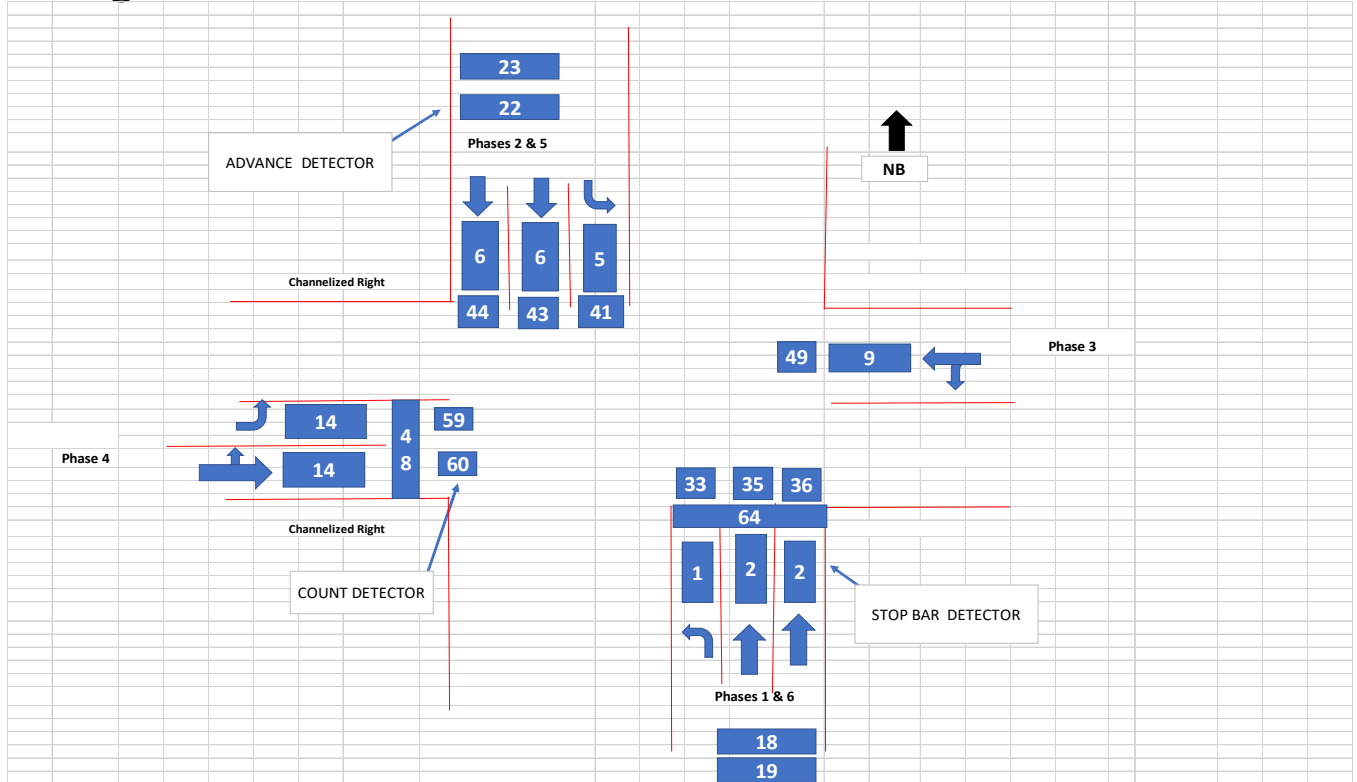
MO-21 @ Bauer



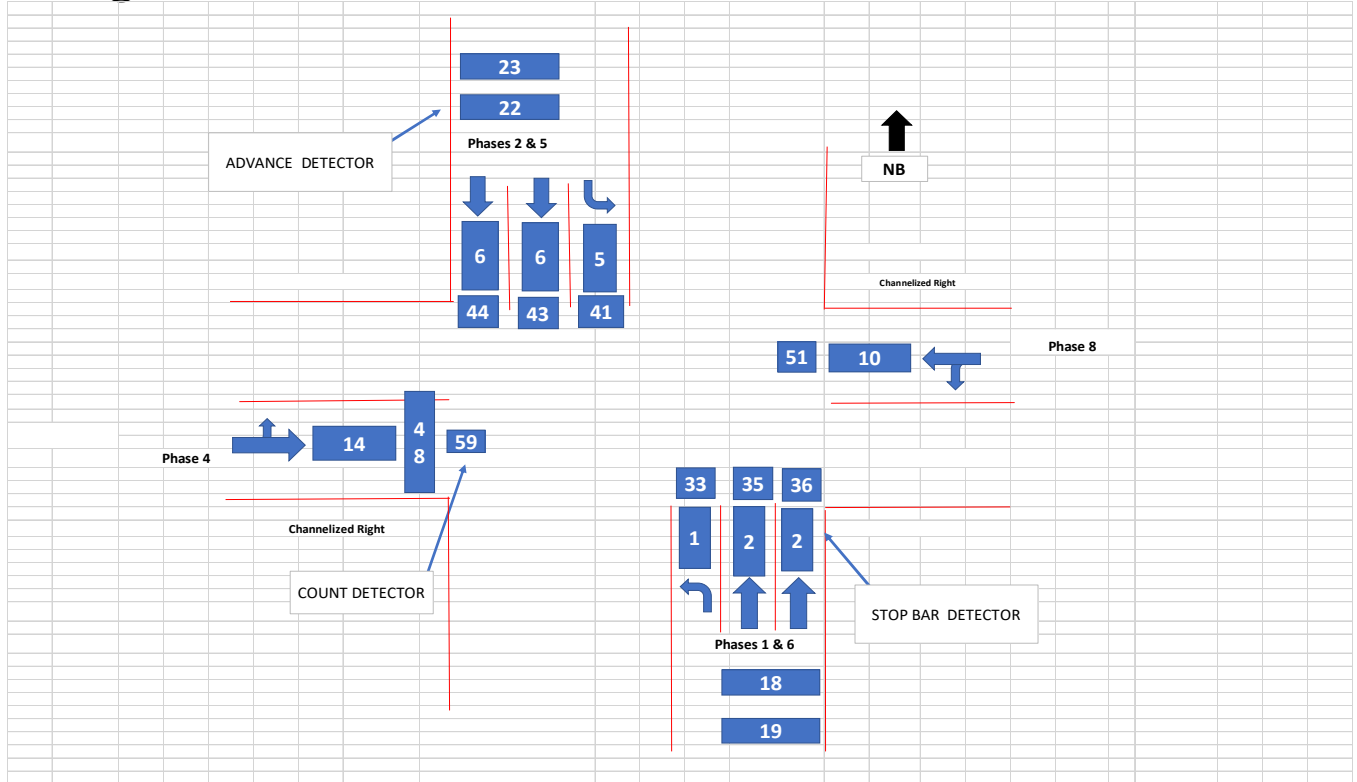
MO-21 @ Butler Hill



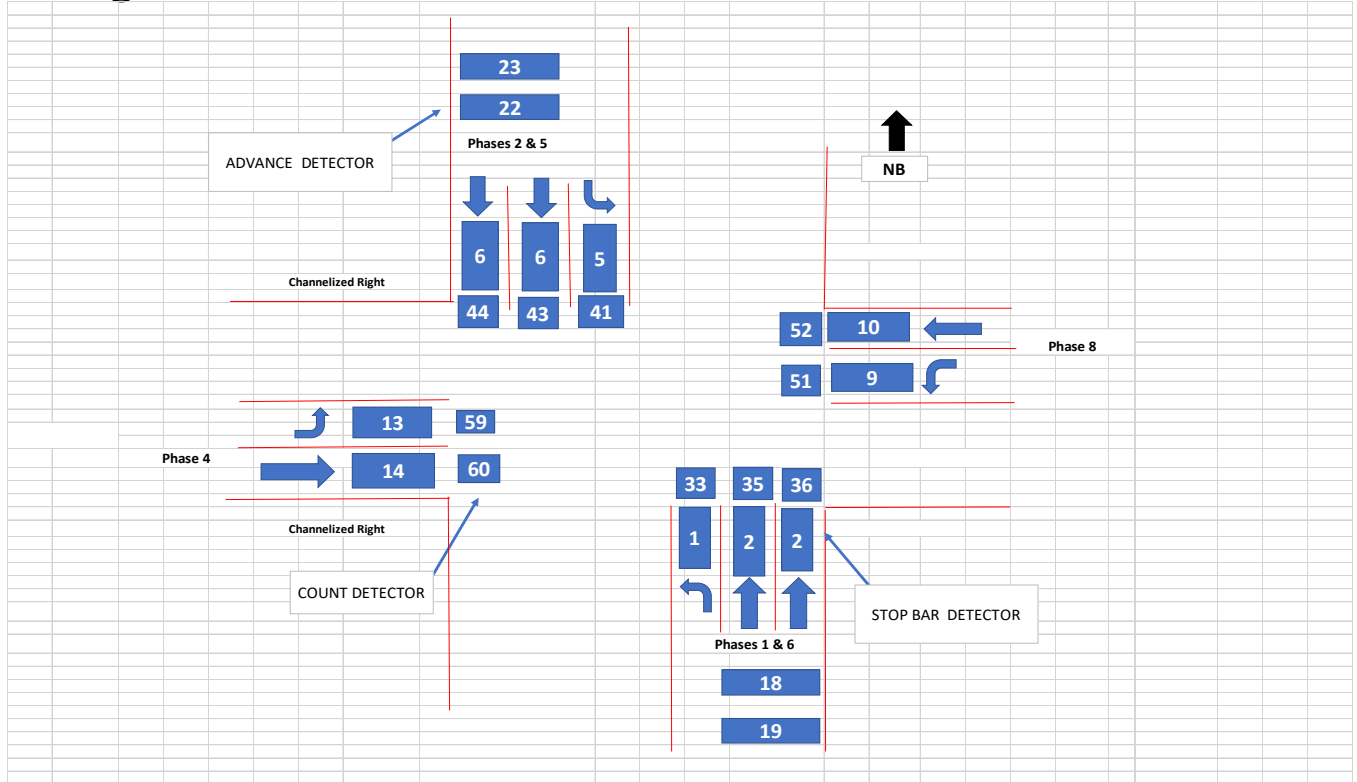
MO-21 @ Old Tesson



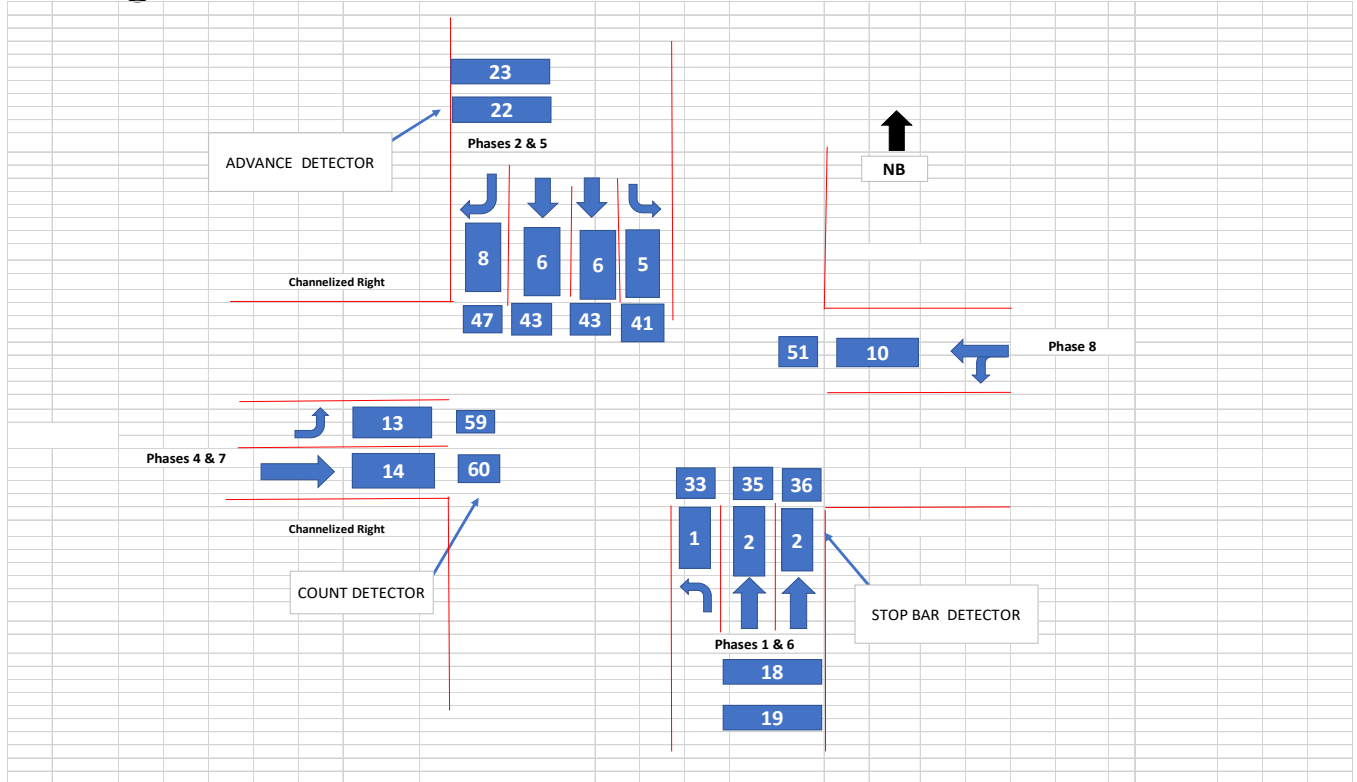
MO-21 @ Cedar Plaza



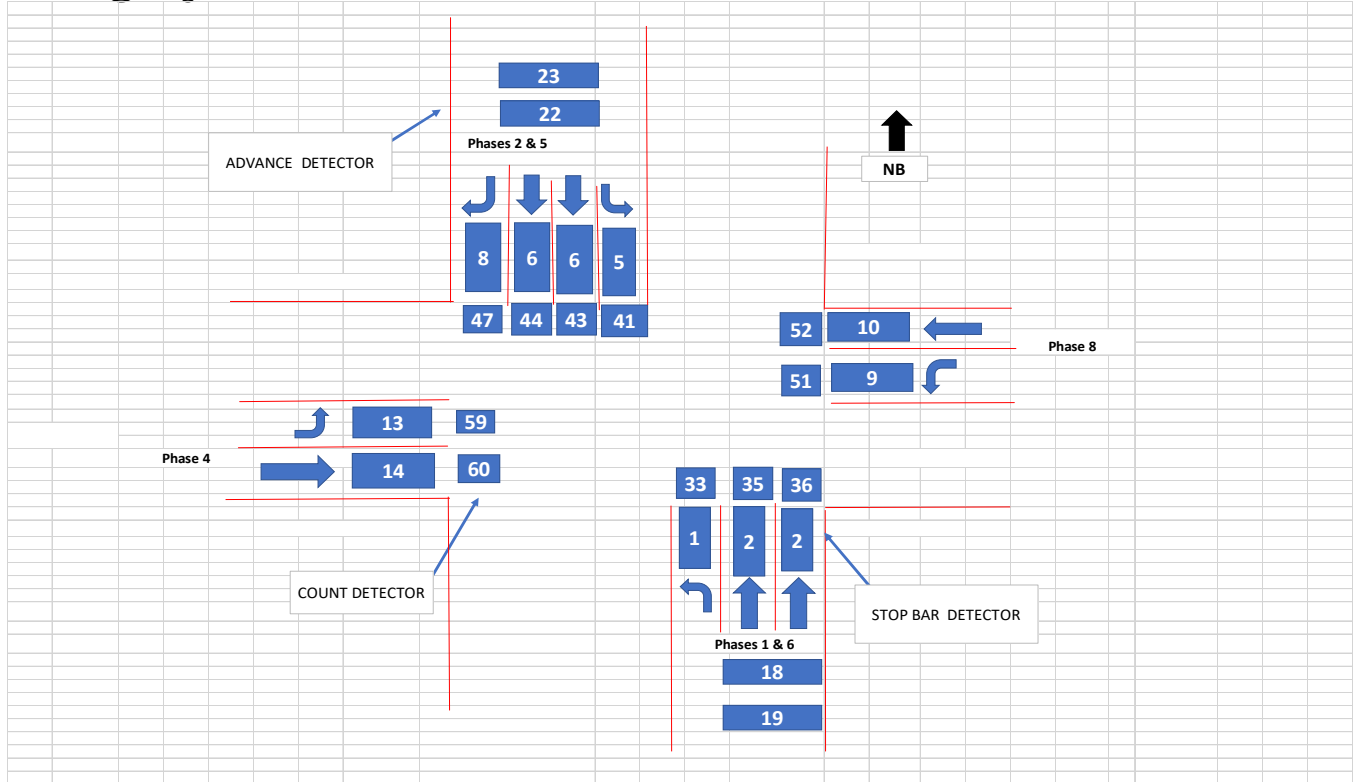
MO-21 @ Duessel



MO-141 @ Suson Hills

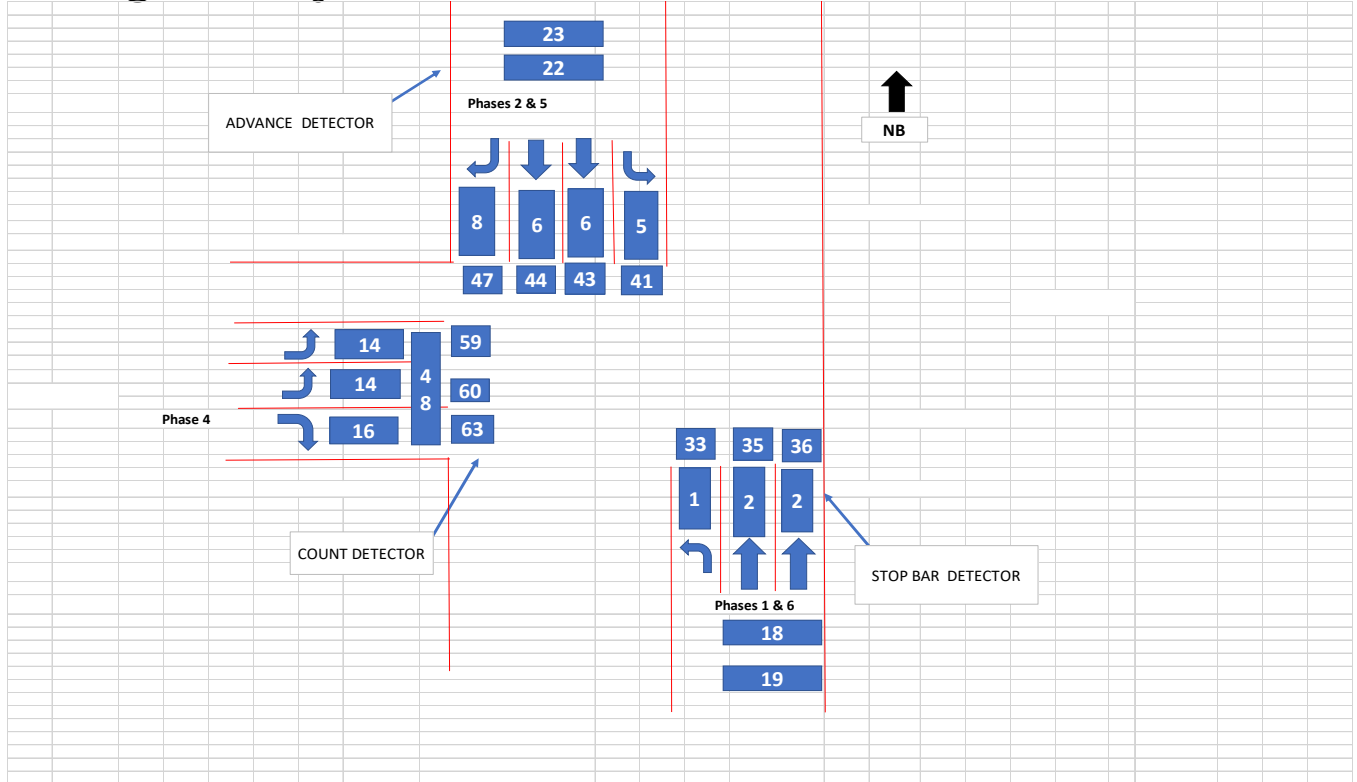


MO-21 @ Hagemann

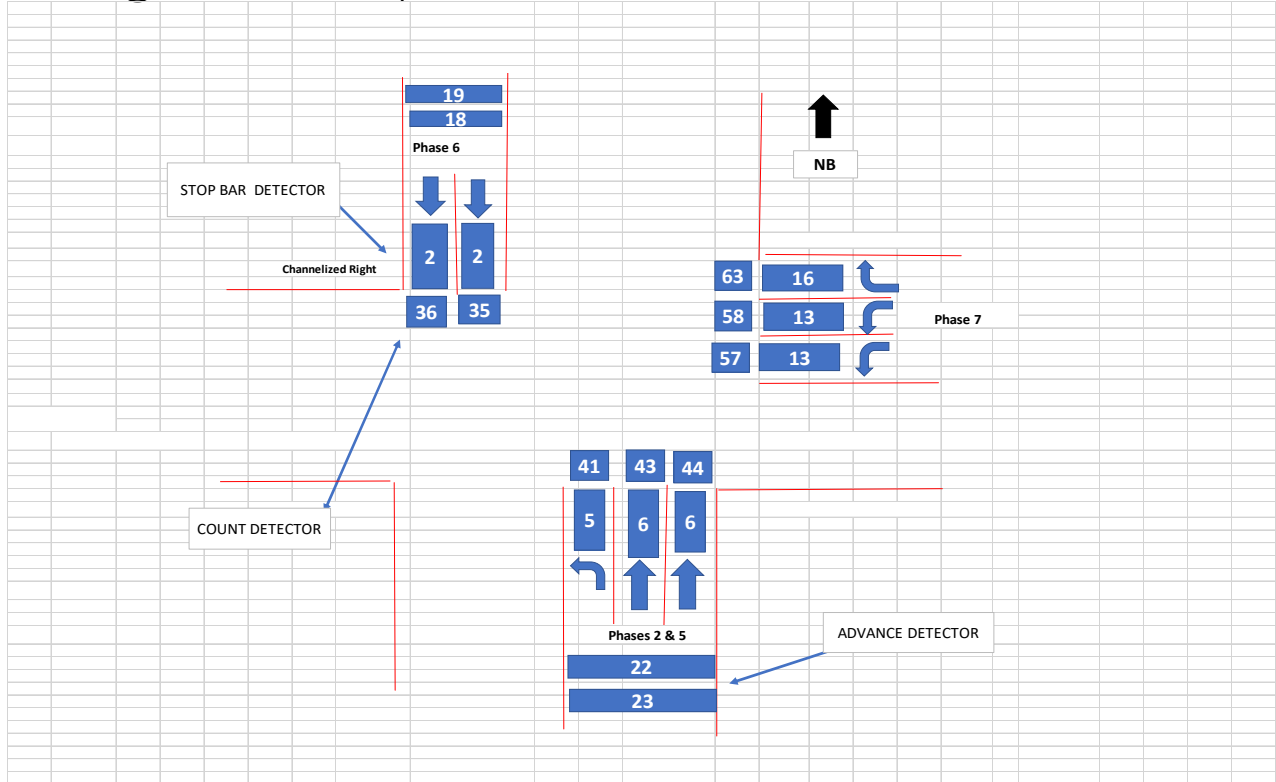




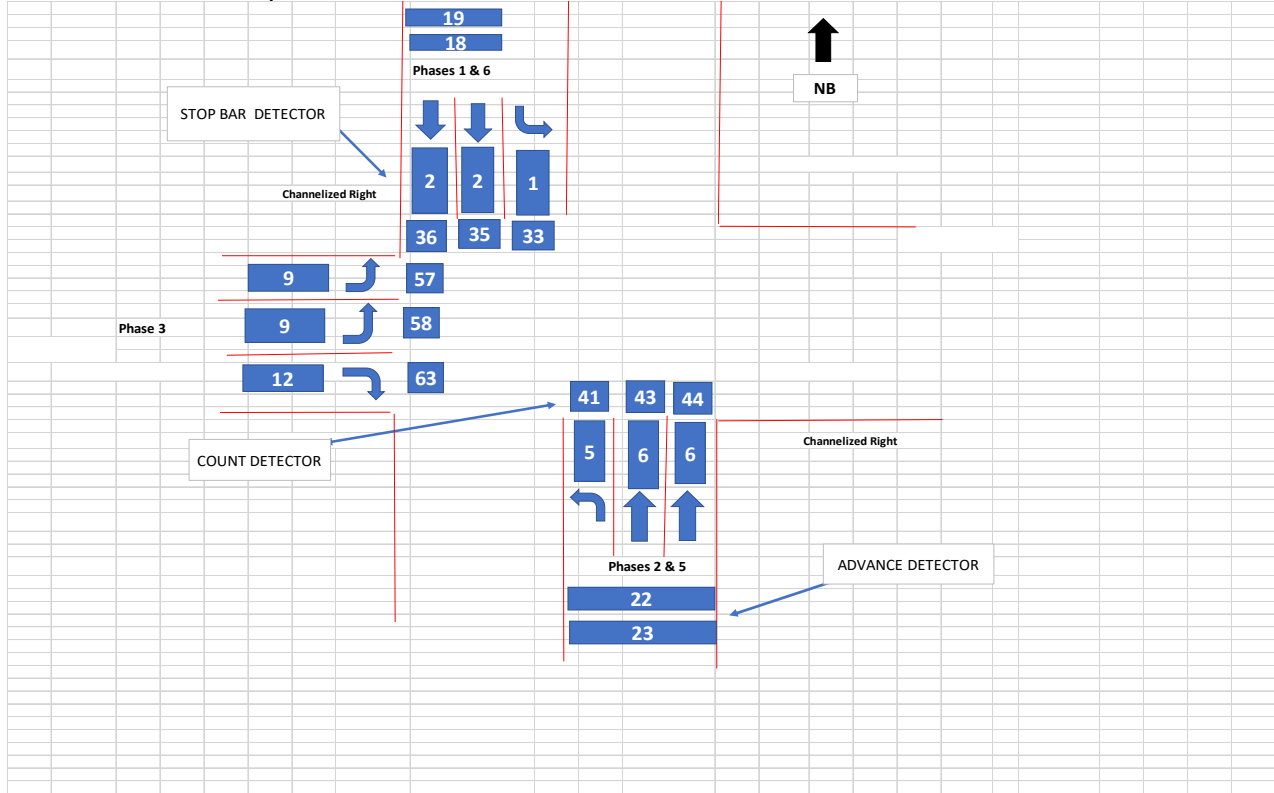
MO-141 @ Walden Ridge



MO-141 @ MO-21 North Ramps



## MO-141 South Ramps



**2.1 Dilemma Zones.** Dilemma zone detection shall be required for the following approaches for high speed dilemma zone detection:

- MO-21 @ MO-141 North Ramps
- MO-21 @ MO-141 South Ramps
- MO-21 @ Walden Ridge Drive
- MO-21 @ Duchesne Parque Drive/Hagemann Rd
- MO-21 @ Sunset Hills Drive
- MO-21 @ Dussel Lane
- MO-21 @ Tesson Rise Drive/Cedar Plaza
- MO-21 @ Old Tesson Ferry Rd.
- MO-21 @ Butler Hill Rd./Butler Spur Rd.
- MO-21 @ Bauer Rd.
- MO-21 @ Schuessler Rd.
- MO-21 @ Kennerly Rd.

Dilemma 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 5 secs Travel time	Advance Detector Placement 8 seconds travel time
35 mph	260	415
40 mph	295	470
45 mph	330	530
50 mph	370	590
55 mph	405	645
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.

**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 without the addition of another device:

- Speed
- Volume
- Lane Occupancy
- Vehicle Classification
- 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:

- Induction Loop
- Video Image
- Radar

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 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.

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

**4.2.1 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.

**4.2.2 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.

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

**4.2.3 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).

**4.2.4 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.

**4.2.5 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.

**4.2.6 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.

**4.2.7 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.

**4.2.8 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.

***[INSTRUCTIONS: Only use this paragraph when retrofitting a signalized intersection].*** For TS1 systems, the video detection system shall be equipped with a TS1 detector interface for a minimum of 32 detector outputs. Logic output levels shall be compatible with the TS1. A subminiature "D" connector on the video detection system shall be used for interfacing to these outputs.

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.

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

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

**4.3.1 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.

#### **4.3.2 Material**

**4.3.2.1 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.

- WAVETRONIX SmartSensor
  - Matrix

Provide a radar detection system with the following features.

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

**4.3.2.2 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.

- WAVETRONIX SmartSensor
  - Advance
  - Advance Extended
- Iteris Vector
- In addition to the specifications listed in Section 4.3.2.1, the detection range shall also cover the dilemma zone distances prescribed in section 2.1.

#### **4.3.2.3 Power and Communications.**

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

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

**4.3.2.5 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.

#### **4.3.3 Construction Requirements.**

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

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

***{NOTE: Adjust 4.3.3.2 depending on the availability of an induction card rack in cabinets}***

**4.3.3.2 Induction Card Rack Interface.** {Install the contact closure card in the existing induction card rack} **or** {Install a 4-position induction card rack with power supply} and configure based on manufacturer's instructions to provide all needed detection outputs. Any power supply cards for the induction card rack needed for proper operation of the CTAD shall be provided and installed by the contractor.

**4.3.3.3 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 are operational.

**4.3.3.4 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.

#### **4.3.4 Documentation and Software.**

**4.3.4.1** 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.

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

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

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

**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 Detection System

#### KKK. MoDOT TS2 Type 1 Cabinet Assembly

**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 the following pay item:

Item No.	Description	Unit
902-42.83	Controller Assembly Housing, NEMA TS2 Controller	Each

**6.1** 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.

LLL. Pedestrian Push Button Stanchion

**1.0 Description.** This work shall consist of installing push button stanchions at the locations shown on the plans.

**2.0 Material Requirements.**

**2.1 Post.** Posts shall be 54-inch long 4-inch diameter (4.5-inch O.D) schedule 40 aluminum pipe.

**2.2 Foundation.** Concrete and reinforcing shall comply with Sec 902.

**3.0 Construction Requirements.** The post shall be installed on top of a breakaway pedestal base mounted to a foundation in the sidewalk or raised median. The foundation shall be constructed as part of the sidewalk or raised median and have an 18-inch diameter and 12-inch depth. The breakaway pedestal base shall be mounted to the sidewalk or raised median foundation using proper sized anchor bolts according to manufacturer's instructions.

A slip form connection shall be provided on the wiring in the breakaway pedestal base to sever the connection in the event that the push button post is struck by a vehicle. Access to wiring shall be provided through an access panel in the breakaway pedestal base as well as the pipe post cap. The cap shall be secured and weather proofed when it is not opened for access.

The final product shall meet or exceed Americans with Disabilities Act (ADA) requirements for pedestrian facilities.

**4.0 Method of Measurement.** Final measurement of pedestrian push button stanchion will be made per each. This shall include the dome cap, post, breakaway base, anchor rods, concrete forming tube, concrete, removal of existing concrete medians, median strips or concrete pavement, and all miscellaneous appurtenances to construct the post as shown on the plans.

**5.0 Basis of Payment.** Payment for furnishing all labor, equipment, materials, labor, and tools necessary to place remote pedestrian pushbutton posts shall be completely covered by the contract unit price for:

Item No.	Description	Unit
902-99.02	Pedestrian Push Button Stanchion, 4.5 FT.	Each

MMM. 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.	Description	Unit
902-99.02	Network Connected Signal Monitor	Each

NNN. Coordination with MoDOT Signal Shop for Cabinet Entry

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

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

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

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

#### OOO. Partial Acceptance of Signalized Intersections

**1.0 Description.** This work shall consist of maintaining operational signals and detection (both stopbar and advanced) throughout the construction staging, in accordance with Sec 902 and except as approved by the engineer. At the engineer's option, MoDOT may accept intersections for maintenance prior to final acceptance.

**1.1** Once an intersection is complete, including but not limited to completion of construction, acceptance of all ADA facilities, and successful testing and operation of signal equipment, the engineer may partially accept that intersection for MoDOT's maintenance prior to Final Acceptance of the entire project.

**2.0 Basis of Payment.** No direct payment will be made for the cost of equipment, labor, materials or time required to fulfill this provision.

#### PPP. 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:

- MO-21 @ MO-141 North Ramps
- MO-21 @ MO-141 South Ramps
- MO-21 @ Walden Ridge Drive
- MO-21 @ Duchesne Parque Drive/Hagemann Rd
- MO-21 @ Sunset Hills Drive
- MO-21 @ Dussel Lane
- MO-21 @ Tesson Rise Drive/Cedar Plaza
- MO-21 @ Old Tesson Ferry Rd.
- MO-21 @ Butler Hill Rd./Butler Spur Rd.
- MO-21 @ Bauer Rd.
- MO-21 @ Schuessler Rd.
- MO-21 @ Kennerly Rd.
- MO-21 @ Mattis Rd.
- MO-21 @ I-270 South Ramps
- MO-21 @ I-270 North Ramps
- MO-21 @ Concord School Rd.
- MO-21 @ E Concord Rd.
- MO-21 @ Baptist Church Rd.
- MO-21 @ S Lindbergh Blvd.
- MO-21 @ Musick Avenue/Green Park Rd.
- MO-21 @ Reavis Rd.
- MO-21 @ Lutheran HS South

**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:

- MO-21 @ MO-141 North Ramps
- MO-21 @ MO-141 South Ramps
- MO-21 @ Walden Ridge Drive
- MO-21 @ Duchesne Parque Drive/Hagemann Rd
- MO-21 @ Sunset Hills Drive
- MO-21 @ Dussel Lane
- MO-21 @ Tesson Rise Drive/Cedar Plaza
- MO-21 @ Old Tesson Ferry Rd.
- MO-21 @ Butler Hill Rd./Butler Spur Rd.
- MO-21 @ Bauer Rd.



- MO-21 @ Schuessler Rd.
- MO-21 @ Kennerly Rd.
- MO-21 @ Mattis Rd.
- MO-21 @ I-270 South Ramps
- MO-21 @ I-270 North Ramps
- MO-21 @ Concord School Rd.
- MO-21 @ E Concord Rd.
- MO-21 @ Baptist Church Rd.
- MO-21 @ S Lindbergh Blvd.
- MO-21 @ Musick Avenue/Green Park Rd.
- MO-21 @ Reavis Rd.
- MO-21 @ Lutheran HS South

**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:

- Proposed Timing Plan changes and any models
- Anticipated locations of concern
- 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.
- 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:

- Intersection Impact
- Construction Stage Traffic Switch
- Response to Customer Concern
- New Intersection Turn-On (along with any subsequent revisions)
- Final completion of improvements
- 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.

- Power Meter 1 – Away from power meter with meter centered
- Power Meter 2 – Close up with power meter number
- Cabinet 1 – Away with cabinet centered and door closed
- Cabinet 2 – Close up of entire cabinet with door opened
- Cabinet 3 – Close up of center cabinet interior
- Cabinet 4 – Close up of left cabinet interior
- Cabinet 5 – Close up of right cabinet interior
- Cabinet 6 – Close up of back panel
- Cabinet 7 – Close up of switch
- 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.

- Experience submittal
- Preliminary Traffic Mitigation Plan
- Notification of Detour Implementation
- Time Base Reports, As Needed
- Complaint Resolutions
- Audible pedestrian signal voice message files
- Traffic Signal Database versions (in PDF format)
- Traffic signal photos
- Notification of Restoration to Normal Operations
- 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	Description	Unit
902-99.01	Traffic Signal Maintenance & Programming	Lump Sum

QQQ. 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.

- MO-21 @ MO-141 North Ramps
- MO-21 @ MO-141 South Ramps
- MO-21 @ Walden Ridge Drive
- MO-21 @ Duchesne Parque Drive/Hagemann Rd.
- MO-21 @ Sunset Hills Drive
- MO-21 @ Dussel Lane
- MO-21 @ Tesson Rise Drive/Cedar Plaza
- MO-21 @ Old Tesson Ferry Rd.
- MO-21 @ Butler Hill Rd./Butler Spur Rd.
- MO-21 @ Bauer Rd.
- MO-21 @ Schuessler Rd.
- MO-21 @ Kennerly Rd.
- MO-21 @ Mattis Rd.
- MO-21 @ I-270 South Ramps
- MO-21 @ I-270 North Ramps
- MO-21 @ Concord School Rd.
- MO-21 @ E Concord Rd.
- MO-21 @ Baptist Church Rd.
- MO-21 @ S Lindbergh Blvd.
- MO-21 @ Musick Avenue/Green Park Rd.
- MO-21 @ Reavis Rd.
- MO-21 @ Lutheran HS South

**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  $\frac{1}{2}$ -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°C) and low temperature (<-20°C).
- (j) FAULT. The relay is activated after a specific or general fault is detected. These faults
- (k) include: short circuit, low battery voltage (<41VDC), high battery voltage (> 59VDC), overload and over temperature (>75°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°C or at a user programmable threshold from 25 to 55°C @ 5°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° to 55°C with the capability of operating @ 800W for up to 2hr at 74°C ambient.
- (b) The storage temperature range of the UPS shall be -40° to 75°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°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
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902-99.02	Combination Pad Mounted 120V/240V Power Supply	Each
And Lighting Controller with UPS		

RRR. Install MoDOT Furnished IP-Addressable Power Strip

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

**2.0 Installation Requirements.** The contractor shall mount the power strip on the back side of the ITS Type 7 ITS cabinet (or any open space of other ITS cabinets away from the door) and on any open space of the 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.

**3.0 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.

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

Item Number	Unit	Description
910.99-02	Each	Install MoDOT Furnished IP-Addressable Power Strip

SSS. ITS Conduit

**1.0 Description.**

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

**2.0 Materials.**

**2.1** Use PVC conduit meeting the requirements of Sec 1060.

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

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

**3.0 Construction Requirements.**

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

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

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

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

### **3.2 Directional Drilling.**

**3.2.1 Preliminary Site Work.** Determine all utility locations near the path of the proposed bore, including depth. Use this information to avoid damage to utilities and/or facilities within the work area. Provide this information, including the sources, to the engineer a minimum of five working days prior to boring. Do not bore until the engineer approves that submittal. Prior to boring, expose all utilities for which it is customary and safe to do so.

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

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

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

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

### **3.3 Intercept Existing Conduit with Proposed Pull Box.**

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

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

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

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

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

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

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

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

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

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

### **3.4 Install Conduit into Existing Pull Box.**

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

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

**3.4.3** Install the conduit.

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

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

#### 4.0 Basis of Payment.

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

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

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

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

Item No.	Type	Description
910-99.02	Each	Install Conduit Into Existing Box

#### TTT. Fiber Optic Cable Installation, Relocation, and Replacement

**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.

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

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

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

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

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

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

**2.8 Rack-Mounted Patch Panel Enclosure.** The enclosure shall have brackets and all other hardware required for rack mounting in an EIA standard 19-in. equipment rack. However, alternate forms of mounting will be permitted if more practical at a particular location. The enclosure shall take up no more than five rack units (1¾ inch each) in the cabinet. It shall be

made of powder-coated aluminum. Provide patch panel modules that are compatible with the connectors specified in section 2.3 of this provision, as needed. These enclosures are typically used in network node cabinets.

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

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

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

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

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

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

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

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

**2.9.7** Designed for butt splicing.

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

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

### **3.0 Construction Requirements.**

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

### **3.2 Cable Installation.**

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

**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.

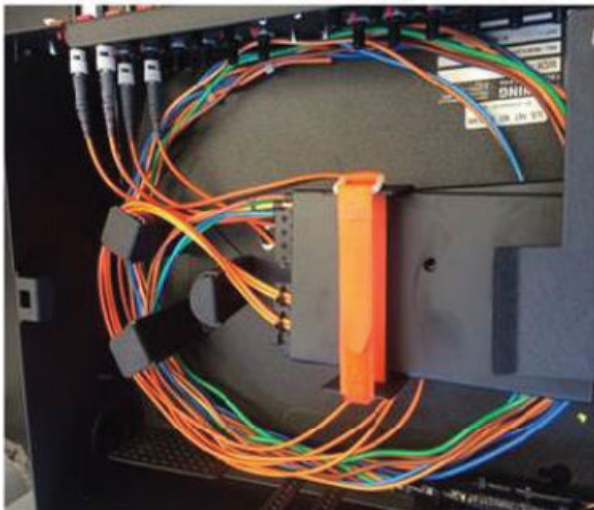
**3.3.4** Use a different splice tray for each buffer tube color. If an enclosure contains multiple buffer tubes of the same color, but none of the fibers in one of the tubes are spliced to fibers in other tubes of the same color, use a separate splice tray for that tube.

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

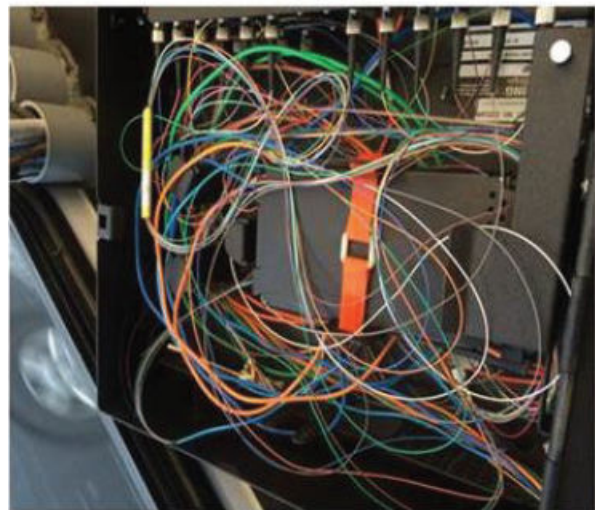
**3.5 Tracer Wire.** The contractor shall install a jacketed #14 AWG XHHW-2 standard blue tracer wire (also known as the locator wire) in conduit with new or replaced fiber optic cable(s). In the pull box nearest to the ITS or signal cabinet connect the tracer wire to a ground rod with a ground rod clamp 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.

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

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

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

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

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

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

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

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

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

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

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

**4.3 Test Result Documentation.** Prepare a 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 the new or relocated fiber optic cable, acceptance testing, 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
910-99.03	Linear Foot	Fiber Optic Cable, 24 Strand, Single Mode

#### UUU. Install or Relocate Existing & New Communication Equipment

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

#### **2.0 Materials.**

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

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

### 3.0 Construction Requirements.

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

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

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

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

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

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

**4.0 Basis of Payment.** Measurement and payment for communication equipment installation will be on a per cabinet basis. The unit price shall include patch cords, cabling, assistance to Commission staff in getting the equipment operational, documentation, and all miscellaneous hardware required for a safe, fully operational system. Payment will be made as follows:

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

VVV. 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	Q6155-E 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
910-99.03	LF	CCTV Camera Cable

## WWW. CCTV Camera Relocation

**1.0 Description.** The contractor shall remove the existing stand-alone CCTV camera assembly on pole (camera, cable, PoE (Power over Ethernet) power injector, surge arresters, power pack, encoder, device server, extension pipe, etc.) from existing location to new location as shown on the plans and test it for proper operation. The CCTV camera pole shall be installed on a new concrete foundation, and the existing foundation shall be removed.

## **2.0 Materials Requirements.**

**2.1** Foundation. Concrete and reinforcing shall comply with Sec 901.

## **2.0 Construction Requirements.**

**2.1** Before removing the existing CCTV camera assembly, the contractor shall inspect all related CCTV camera parts and report to the SLITS Group via an email to [SLITS@modot.mo.gov](mailto:SLITS@modot.mo.gov) any damage or concern items. Also verify with the SLITS Group that the camera has a quality images and the pan-tilt-zoom works properly.

**2.2** The contractor shall replace the CCTV cable from the switch to the pole location. Either an outdoor rated Cat-5 cable or manufacturer provided composite cable (power plus network), depending on the type of camera in place, shall be used with no substitution of cable types allowed. Contractor will provide documentation for either type of cable. In cases where a

composite cable is used and the PoE, surge arrester or power pack is damaged, the contractor shall replace them with the MoDOT furnished parts respectively.

**2.3** The contractor shall exercise reasonable care in the handling of the equipment during removal, temporary storage, and installation. Should any of the equipment be damaged by the contractor's negligence, it shall be replaced at the contractor's expense.

**2.4** The contractor shall install the existing CCTV camera assembly or those parts required in Section 2.2 at the new CCTV pole location as shown on the plans, make all necessary connections, program the CCTV camera per manufacturer specifications, and work with the SLITS Group to test the relocated camera for proper operation.

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

**4.1** After installing the camera assembly, test it using manufacturer recommended procedures to demonstrate that high quality video is be transmitted and that the pan, tilt and zoom functions are operating properly. Also, use a device that measures resistance to ground using the three-point fall-of-potential method to demonstrate that the resistance from the air terminal to ground does not exceed 8 ohms. If the installed camera assembly fails to operate properly, and the problem cannot be fixed by changing the wiring or setup parameters, the camera assembly will be deemed defective and the contractor shall return it to the manufacturer for replacement. Except for costs borne by the manufacturer under his warranty agreement, the cost of replacement shall be borne entirely by the contractor.

**5.0 Basis of Payment.** Measurement and payment for camera assembly removal and installation includes cables, testing, grounding, and all miscellaneous hardware required for a safe, fully operational relocated camera assembly. Installation of new foundation and removal of existing foundation is incidental to the following pay item. Payment will be made as follows:

Item No.	Description	Unit
910-99.02	Remove and Relocate Existing CCTV Camera	Each

#### **XXX. 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 the extension pole includes materials, installation and all miscellenious hardware required for a fully operational system.

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

YYY. 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.

ZZZ. ITS Asset Management Tool

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

**2.0 Construction Requirements.**

**2.1** Contractor shall provide any relevant notes to a specific location that can be entered into the tool to aid in the understanding of the device configuration and location. At a minimum, this will include providing the required latitude and longitude coordinates of each pull box, DMS, CCTV, node cabinet, conduit, cable, and fiber, along with any serial numbers and/or identification information. The Contractor shall locate the conduit every 100 feet using a GIS locating device that is accurate to the nearest foot. The Contractor shall provide a GIS based map of the conduit route and a complete listing of all of map coordinates in an electronic format. Population of the

fiber management tool will be required for all devices that have been installed to date as well as any devices installed under this contract.

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

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

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

**2.5** A PDF and Visio format of all relevant fiber splicing shall be posted into the Tool's perspective ITS and Signal cabinets.

### **3.0 Acceptance Testing.**

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

**3.2** Commission staff shall verify population of the fiber management tool, including accuracy and completeness of details for each component prior to acceptance and payment.

**4.0 Measurement and Payment.** Measurement and Payment for items covered by this specification include the population and acceptance testing, in addition to all materials and equipment necessary for a fully operational system.

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

#### **AAAA. MoDOT ITS Equipment within Project Limits**

**1.0 Description.** . MoDOT owned fiber optic cable and conduit, critical MoDOT power supplies and power cables, and pull boxes for fiber and power cabling and other above and underground ITS (Intelligent Transportation System) facilities are present within the limits of this project. Damage or interruption of these items can cause extensive outages to the MoDOT network.

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

**2.1** The contractor shall not modify any existing network or electrical connections within equipment cabinets, unless coordinated with MoDOT ITS staff. Existing connections

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

**3.0 Liquidated Damages.** In the event of damage, if the system is not repaired and in full operation within 4 hours of the damage occurring, or within the timeframe agreed upon, the contractor will be charged with a liquidated damage specified in the amount of \$100.00\_per hour for each full hour that the system is not fully operational. This damage will be assessed independently of the liquidated damages specified elsewhere in the contract.

**3.1** The MoDOT Engineer will also have the option of issuing a work order for MoDOT's on-call ITS Maintenance contractor to make repairs, if it is the Engineer's opinion that the contractor creating the damage will not be able to make repairs in a timely manner. Contractor's reimbursement for MoDOT expense for this option shall be in addition to the liquidated damages.

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

**BBBB. Removal of Existing Fiber Optic Cable**

**1.0 Description.** This work shall consist of removal of the existing fiber cable and the tracer wire, if applicable, from existing conduit as shown on the plans. Installation of the new fiber optic cable shall be paid under separate pay item.

**2.0 Construction Requirements.** The removal of existing fiber optic cables be completed as approved by the Engineer and shall conform to current Missouri Standard Specifications for Highway Construction.

**2.1.1** Signal conduit, pull box, or other signal cable damage by construction activity shall be replaced by the contractor at the contractor's expense.

**2.1.2** Existing, unused fiber optic cable and tracer wire shall be removed between Geyer Rd and Old Sappington Rd traffic signal cabinets, as well as between the Crestview Lane and Route P traffic signal cabinets as noted in the quantity sheet (including approximate linear feet of fiber) or shown in the plans.

**2.1.3** MoDOT's ITS Asset Management Tool (currently the Nexus system) shall be updated to indicate the removal and replacement of the fiber optic cable as shown on the plans.

**2.1.4** See separate Job Special Provision for specific guidance regarding update to the MoDOT ITS Asset Management Tool.

**2.1.5** The existing conduit containing the existing, unused fiber optic cable may be abandoned.

**2.1.6** Any unused pull box, owned by MoDOT, within this project limits shall be removed and filled properly.

**2.1.7** No direct pay shall be made for the removal of pull boxes to satisfy the requirement of this provisions.

**2.1.8** The Contractor shall not disturb any pull box owned and maintained by other agencies within this project limits.

**3.0 Acceptance Testing.** Contractor shall demonstrate that all existing fiber has been removed and all original connection points at the upstream intersection are clean and free of obstruction. No direct payment will be made for this testing.

**4.0 Measurement and Payment.** All costs associated with this work shall be considered completely covered by the following pay item. Please see the above noted segments and the plans for details.

Item No.	Type	Description
910.99.01	Lump Sum	Removal of Existing Fiber Optic Cable

#### CCCC. 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 of 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 of 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.

Sensys Travel Time In-Pavement Wireless System Intersections within the project limits:

- MO-21 @ MO-141 North Ramps
- MO-21 @ MO-141 South Ramps
- MO-21 @ Sunset Hills Drive
- MO-21 @ Butler Hill Rd./Butler Spur Rd.
- MO-21 @ I-270 South Ramps
- MO-21 @ I-270 North Ramps
- MO-21 @ E Concord Rd.

#### **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	Description	Unit
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910-99.02	Remove In-Pavement Wireless Detection System Per Intersection	Each
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#### DDDD. AUDIBLE PEDESTRIAN PUSHBUTTONS AND SIGNING

**1.0 Description.** Audible pedestrian pushbuttons and signing will be required for all pedestrian indications at all the intersections.

**2.0 Installation.** Audible signals should be installed as part of a pushbutton assembly.

#### **3.0 Equipment.**

**3.1 Walk Indications.** Accessible pedestrian signals shall have both audible and vibrotactile walk indications.

**3.2 Vibrotactile.** Vibrotactile walk indications shall be provided by a tactile arrow on the pushbutton that vibrates during the walk interval. Tactile arrow shall be located on the pushbutton that vibrates during the walk interval. Tactile arrow shall be located on the pushbutton, 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.

**3.3 Audible.** Accessible pedestrian signals 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.

**3.4 Pushbutton signage.** In addition to standard pedestrian sign requirements, all pushbuttons for the locations mentioned in 1.0 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.** Accessible pedestrian signals (APS) shall include street name information aligned parallel to the crosswalk direction and shall comply with Revised Draft Guidelines for Accessible Public Rights-of-Way R409.3 or shall provide street name information in audible format.

#### **4.0 Performance.**

**4.1 Audible Locator Tone.** Locator tone that 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. 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.** Acknowledge tone that tells the pedestrian that they have placed a call and informational message that tells the pedestrian to "Wait to cross" street name at intersecting street name.

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

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

**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.** Payment for the audible signals will be for each unit per bid item, 902-99.02, "Audible Pedestrian Pushbutton and Signing with Verbal Walk Message", per each. This will include all wiring, power adaptors, pusbuttons and installation hardware needed. Payment for signing and mounting hardware will be included in the pay item for audible pedestrian pushbutton. All costs incurred for complying with this provision including labor shall be considered completely covered by the contract unit price for:

Item Number	Type	Description
902-99.02	EA	Audible Pedestrian Pushbutton and Signing with Verbal Walk Message

## EEEE. 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

FFFF. Advanced Warning System Assembly

**1.0 Description.** This work shall consist of furnishing, installing and putting into operation an advanced warning system assembly.

**2.0 Sign.** Sign shall be manufactured by Aailed Technologies Corporation, AV-200 Series: LED Enhanced Traffic Sign and catalog cuts of the signs provided to the City of St. Charles for approval prior to procurement of material and participant in maintenance agreement prior to procurement. Sign will be a 36" W3-3 SIGNAL AHEAD with 8 flashing amber LEDs.

**3.0 Sign post.** Post shall be 15-foot and powder coated black to match other new signal installations in the City of St. Charles.

**4.0 Coordination with signal controller.** Advanced Warning System shall have capability to coordinate with the traffic signal controller. The LEDs shall flash during a buffer, yellow and red periods for traffic on northbound Muegge Road.

**5.0 Communication.** Advanced warning system shall be able to coordinate with the controller via radio communications. Contractor shall confirm that line of sight between radios installed at the advanced warning system assembly and at the new signal cabinet, and successful communication is provided for the assembly.

**6.0 Power.** Advanced warning system assembly shall be solar powered.

**7.0 Miscellaneous.** All bracketing, mounting hardware and miscellaneous components needed for powering the signs will be considered incidental to this pay item.

**8.0 Basis of Payment.** This work shall be paid for at the contract unit price for item number ADVANCED WARNING SYSTEM ASSEMBLY, lump sum, and shall include the cost of equipment, labor, materials, excavation, and time required to complete said work.

Item Number	Type	Description
902-99.02	Each	Signal Ahead Sign with Solar

GGGG. Reinstall Ethernet Bridge Radio

**1.0 Description.** The contractor shall install MoDOT furnished radio kit which consists of radio, PoE and mounting brackets and program it for proper operation per manufacturer's specifications per plan.

**2.0 Requirements.** An Ethernet bridge radio shall be reinstalled on existing signal mast arms at the intersections as shown in the plans. Hardware to mount the integrated radios on the mast arms shall be provided by the contractor for each mounting location. Outdoor rated Category 5E cables shall be provided to connect the power injector to the Ethernet switch in the signal cabinet, and the power injector to the radio. The radio must be tested in combination with other radios prior to acceptance.

**3.0 Construction Requirements.** Construction requirements shall conform to Sec 902 and 1092. The integrated Ethernet bridge radios shall be mounted directly to the signal mast arm using an approved bracket.

**4.0 Testing.** The items of work described in this provision are not complete until network communications testing has been completed to the satisfaction of the Engineer.

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

**6.0 Basis of Payment.** Payment for the reinstalling of Ethernet bridge radios at signalized intersections will be made by Item No. 902-99.02, "Reinstall Ethernet Bridge Radio," per each and shall be considered full compensation for all contractor-provided equipment, connection cables, installation of non-contractual items, labor, and material to complete the described work.

Item No.	Type	Description
910-99.02	Each	Reinstall Ethernet Bridge Radio

#### HHHH. Truck Mounted Attenuator (TMA) for Stationary Activities JSP-23-04

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

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

**2.1 (insert title of Work Activity 1) –** (Drafter Note: This section should clearly explain the intended use of the TMAs for the project. Identified by the physical work location and type of operation as appropriate. Bidders should be able to understand when and where TMAs are to be used for the project to be able to appropriately bid. Examples include:

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

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

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

**612.5.1.1** Payment for TMAs required for stationary work activities will be paid for at the contract unit bid price for Item 612-30.01, Truck Mounted Attenuator (TMA), per lump sum. The lump sum payment includes all work activities that require a TMA, regardless of the number of deployments,

relocations, or length of time utilized. No payment will be made for repair or replacement of damaged TMAs.

### IIII. School Signal Flasher

**1.0 Description.** A school signal flasher will be used to notify approach traffic of school traffic activity occurring at and/or near a signalized intersection.

**1.1** The school flasher shall operate through logic gates within the controller. The Contractor shall provide a document to the traffic engineer with the proposed logic gate information for review and approval. The Contractor shall also supply a traffic signal controller that satisfies the ATC controller JSP and provides the ability to operate flashers via logic gates.

**1.2** The Contractor shall notify the Commission's Area Traffic Engineer or Contractor's traffic engineer (depending on assignment) at least 24 hours of school signal flasher activation.

**2.0 Basis of Payment.** There will be no direct pay for complying with this provision.

### JJJJ. 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 moving the pedestrian barricades 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 of the proposed improvements have been constructed.

**3.0 Method of Measurement.** Measurement for ADA Compliant Movable Barricade will be made per each for each 6 foot (minimum) unit provided.

**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 the ADA Compliant Barricade.

Item Number	Unit	Description
616-99.02	Each	Misc. ADA Compliant Movable Barricade

### KKKK. MoDOT's Construction Workforce Program NJSP-15-17A

**1.0 Description.**

**1.1** Projects utilizing federal funds include contract provisions for minority and female workforce utilization in the various trade crafts used to complete construction contracts. These federal contract workforce goals are described in the section labeled “Notice of Requirement for Affirmative Action to Ensure Equal Employment Opportunity”. These goals are included in all MoDOT federal aid contracts and are under the authorization and enforcement of the U.S. Department of Labor (US DOL).

**1.2** The Federal workforce requirement (Goals – TABLE 1) is authorized in 41 CFR Part 60-4 and Executive Order 11246 which set Equal Employment Opportunity goals with Affirmative Action requirements.

**1.3** The required federal aid workforce provisions noted above, coupled with the following additional contract provisions, constitute MoDOT’s Construction Workforce Program herein called Program.

**1.4** This provision does not require pre-qualification nor is it a condition of award.

**1.5** The Program does not eliminate or limit any actions the US DOL may take in relation to this contract’s federal provisions.

**1.6** The Program goals included in the contract are separate from any Disadvantaged Business Enterprise (DBE) or On-The-Job (OJT) training provision that may be included as contract provisions. DBE and OJT goals may or may not be included in a contract based on the individual size of contracts, type of contract work, anticipated length of contract, available and willing resources or other reasons.

**1.7** Contractor, for the purpose of this provision, means the prime contractor and any and all subcontractors.

**1.8** It is expected that the contractor recognizes the construction workforce goals for both minority and female workers in the project’s county and make efforts to attain those goals, if possible, through the existing workforce makeup of the prime (including subcontractors) that will be on the project and/or through hiring opportunities that may arise for the project. However, it is not the intent of this provision to compel any contractor to displace existing workforce or move workers around to just meet the workforce goals.

**1.9** If the contractor’s existing Missouri construction workforce meets or exceeds the federal workforce goals established in Table 1, then the OJT goal (Training Provision) if included in the contract, does not be apply.

**1.10 Contractor’s Workforce Plan.** The Contractor shall submit its Workforce Plan a minimum of 1 week before construction starts. One plan shall be submitted for the project that shall include the cumulative planned workforce of the prime and subcontractor(s). The contractor shall prepare the plan, for total minority and female utilization, regardless of the craft. The Engineer will provide the Contractor with comments regarding their Workforce Plan prior to the start of construction. Once work starts, all monthly reporting shall include the craft of each worker reported. If the contractor’s plan includes project manager, direct project support roles, project testers or other project professionals, these designations should also be included in addition to the workers designated by craft such as laborer, operator, carpenter, ironworker and others.

**1.11** The plan accepted by the engineer before the start of construction will be the effort expected of the prime contractor to maintain during the life of the project.

**1.12** If the contractors planned project workforce plan (including OJT hours if included in the contract) is short of the goals included in Table 1, there is opportunity for the contractor to receive a reimbursement of \$10.00 / hour for any new project minority and female hires needed through the remainder of the project. The reimbursement is applicable to work that qualifies for prevailing wage under the federal Davis-Bacon Act, [40 U.S.C. §§ 3141–3148](#), in accordance with an approved workforce plan. Any reimbursement must be pre-approved by the Engineer. The reimbursement is provided as a remedy to the contractor and as an aid in the long-term growth of experienced persons in the building of roads and bridges in Missouri. The contractor shall manage the plan through the life of the project as described in the plan or as modified, in coordination with the Engineer. The total amount available per project is not capped.

**1.13** The Contractor's workforce plan may include existing construction support and professional services staff.

**2.0 Forms and Documentation.** The bidder must submit the following documents if awarded the contract:

**Cumulative Workforce Utilization Reports.** This report is contract specific. One report shall be submitted to the Engineer by the 15<sup>th</sup> of each month. The report will be used to report the total workforce compliance data for the prime contractor and all subcontractors retained by the contractor on the Commission's construction contract. The reporting shall include the workforce hours per each craft broken down by gender and ethnicity. Construction Support, testing and other professional services hours shall be included as these hours are part of the overall plan. The report will include the previous month's hours worked for the project. For projects less than 60 days in length, only one report with total hours worked by classification is required at substantial completion of construction.

### **3.0 Methods for Securing Workforce Participation and Good Faith Efforts.**

**3.1** By submitting a bid, the Bidder agrees, as a material term of the contract, to carry out MoDOT's Construction Workforce Program by making good-faith efforts to utilize minority and female workers on the contractor's job sites to the fullest extent consistent with submitting the lowest bid to MoDOT. The Bidder shall agree that the Program is incorporated into this document and agree to follow the Program. If a bidder is unable to meet the workforce goals at the time of bid, it shall be required to objectively demonstrate to MoDOT that the goals have been met or demonstrate a good faith effort has been made with the level of effort submitted prior to the start of construction.

**3.2** The Engineer, through consultation with MoDOT's External Civil Rights (ECR's) Division, may determine that the contractor has demonstrated that good-faith efforts to secure minority and female participation have been made.

**3.3** In evaluating good-faith efforts, the ECR's Division will take into consideration the affirmative actions listed in the Federal Provisions (including provisions of Executive Order 11246).

**3.4** MoDOT's Program allows the contractor flexibility to implement a project specific workforce and improve the diversity of their existing workforce that can be utilized across various areas of the state to meet future MoDOT Program goals and Federal Provisions.

**3.5** If the contractor's approved plan changes during the project and/or the available workforce changes from what is approved at any time, it is the contractor's responsibility to remedy, in coordination with MoDOT's ECR Division, the conditions as outlined and made available through this provision.

**4.0 Compliance Determination. (Required with project closeout)** All documentation and on-site information will be reviewed by MoDOT's ECR Division in making a determination of whether the contractor made sufficient good faith efforts to meet the compliance with MoDOT's Construction Workforce Program.

**5.0 Liquidated Damages.** If the contractor elects to not submit a workforce plan prior to work starting or fails to fulfill their workforce plan committed to prior to the start of construction, the contractor will be required to establish a good-faith effort determination, as to why either of these events occurred. MoDOT may sustain damages, the exact extent of which would be difficult or impossible to ascertain, as this impacts the cost of future road and bridge construction. Therefore, in order to liquidate those damages, MoDOT shall be entitled, at its sole discretion, to deduct and withhold the following amounts: **The sum of one thousand five hundred (\$1,500)**

**6.0 Administrative Reconsideration.** The contractor shall be offered the opportunity for administrative reconsideration upon written request related to findings and/or actions determined by MoDOT's ECR's Division. The Administrative Reconsideration Committee shall be composed of individuals not involved in the original MoDOT determination(s).

**7.0 Available Pre-Apprentice Training Programs.** The Commission has established a labor force recruiting program intended to assist contractors in identifying, interviewing and hiring qualified job applicants. MoDOT strongly encourages the hiring of individuals from the MoDOT funded pre-apprentice training programs.

**8.0 Independent Third-Party Compliance Monitor (Monitor).** MoDOT may utilize a monitor that will be responsible for tracking the project's workforce utilization for the information the contractor submits. The contractor and its subcontractors shall allow the monitor access to their reports, be available to answer the monitor's questions and allow the monitor to access to the site and to contractor and subcontractor employees. The monitor shall abide by the contractor's project site protocols.

**9.0 Regional Diversity Council (Council).** (Applicable to the Kansas City and St. Louis District regions only) The Council shall consist of local community leaders, leadership of local construction trades, MoDOT staff, Industry representation, and a representative(s) from the Federal Highway Administration. The Council will meet quarterly and evaluate the workforce activity per each project according to the following criteria:

- a. Review monthly workforce reports.
- b. Review progress toward the stated project workforce program.
- c. Review findings of Administrative Reconsideration hearings.
- d. Recommend *other* workforce actions to MoDOT.

## **10.0 Federal Workforce Goals.**

Female Participation for Each Trade is 6.9% Statewide for Missouri.

Minority Participation for Each Trade is shown below in Table 1.



**TABLE 1:**

<b>County</b>	<b>Goal (Percent)</b>	<b>County</b>	<b>Goal (Percent)</b>
Adair	4	Linn	4
Andrew	3.2	Livingston	10
Atchison	10	McDonald	2.3
Audrain	4	Macon	4
Barry	2.3	Madison	11.4
Barton	2.3	Maries	11.4
Bates	10	Marion	3.1
Benton	10	Mercer	10
Bollinger	11.4	Miller	4
Boone	6.3	Mississippi	11.4
Buchanan	3.2	Moniteau	4
Butler	11.4	Monroe	4
Caldwell	10	Montgomery	11.4
Callaway	4	Morgan	4
Camden	4	New Madrid	26.5
Cape Girardeau	11.4	Newton	2.3
Carroll	10	Nodaway	10
Carter	11.4	Oregon	2.3
Cass	12.7	Osage	4
Cedar	2.3	Ozark	2.3
Chariton	4	Pemiscot	26.5
Christian	2	Perry	11.4
Clark	3.4	Pettis	10
Clay	12.7	Phelps	11.4
Clinton	10	Pike	3.1
Cole	4	Platte	12.7
Cooper	4	Polk	2.3
Crawford	11.4	Pulaski	2.3
Dade	2.3	Putnam	4
Dallas	2.3	Ralls	3.1
Daviess	10	Randolph	4
DeKalb	10	Ray	12.7
Dent	11.4	Reynolds	11.4
Douglas	2.3	Ripley	11.4
Dunklin	26.5	St. Charles	14.7
Franklin	14.7	St. Clair	2.3
Gasconade	11.4	St. Francois	11.4
Gentry	10	Ste. Genevieve	11.4
Greene	2	St. Louis City	14.7
Grundy	10	St. Louis County	14.7
Harrison	10	Saline	10
Henry	10	Schuyler	4
Hickory	2.3	Scotland	4
Holt	10	Scott	11.4

Howard	4	Shannon	2.3
Howell	2.3	Shelby	4
Iron	11.4	Stoddard	11.4
Jackson	12.7	Stone	2.3
Jasper	2.3	Sullivan	4
Jefferson	14.7	Taney	2.3
Johnson	10	Texas	2.3
Knox	4	Vernon	2.3
Laclede	2.3	Warren	11.4
Lafayette	10	Washington	11.4
Lawrence	2.3	Wayne	11.4
Lewis	3.1	Webster	2.3
Lincoln	11.4	Worth	10
		Wright	2.3

**STANDARD FEDERAL EQUAL EMPLOYMENT OPPORTUNITY CONSTRUCTION  
CONTRACT SPECIFICATIONS (EXECUTIVE ORDER 11246)**

This contractor and subcontractor shall abide by the requirements of 41 CFR 60-1.4(a), 60-300.5(a) and 60-741.5(a). These regulations prohibit discrimination against qualified individuals based on their status as protected veterans or individuals with disabilities, and prohibit discrimination against all individuals based on their race, color, religion, sex, sexual orientation, gender identity or national origin. Moreover, these regulations require that covered prime contractors and subcontractors take affirmative action to employ and advance in employment individuals without regard to race, color, religion, sex, sexual orientation, gender identity, national origin, disability or veteran status.

As used in these specifications:

"Minority" includes;

- (i) Black (all person having origins in any of the Black African racial groups not of Hispanic origin);
- (ii) Hispanic (all persons of Mexican, Puerto Rican, Cuban, Central or South American or other Spanish Culture or origin, regardless of race);
- (iii) Asian and pacific islander (all persons having origins in any of the original peoples of the Far East, southeast Asia, the Indian Subcontinent, or the Pacific Islands; and
- (iv) American Indian or Alaskan Native (all persons having origins in any of the original peoples of North American and maintaining identifiable tribal affiliations through membership and participation or community identification).

LLLL. Supplemental Revisions JSP-18-01DD

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](http://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.

Pavement Marking Paint Requirements for Standard Waterborne and Temporary

1.0 Description. High Build acrylic waterborne pavement marking paint shall be used in lieu of standard acrylic waterborne pavement marking paint for all Standard Waterborne Pavement Marking Paint items and all Temporary Pavement Marking Paint items. Paint thickness, bead type, bead application rate, retroreflectivity requirements, and all other specifications shall remain as stated in the Missouri Standard Specifications for Highway Construction, except as otherwise amended in the contract documents.

2.0 Material Requirements. Material requirements for Sec 620.20.2.5 Standard Waterborne Paint, and Sec 620.10.2 Temporary Pavement Marking Paint shall be per Sec 1048.20.1.2 High Build Acrylic Waterborne Pavement Marking Paint.

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

15.0 Data Collection from Bidders for DBE and Non-DBE Subcontractors, Suppliers, Manufacturers and/or Brokering used and not used in bids during the reporting period. MoDOT is a recipient of federal funds and is required by 49 CFR 26.11, to provide data about its DBE program. The information shall consist of all subcontractor quoting received for actual use and of consideration by the prime bidder. MoDOT will be requesting this information from bidding prime contractors and will provide prime bidders a form to submit the data by the last day of each month for the current letting. The information shall only include the names of both DBE and non-DBE companies that the prime bidders received quotes. MoDOT will then contact the DBEs and non-DBE subcontractors and request additional information from DBE and non-DBE subcontractors including current year of gross receipts and number of years in business. The information provided by the prime bidders shall not include any bid quote pricing regardless if it was used or not. This information will aid MoDOT in the determination of the availability of DBEs and will be used in subsequent availability studies.