Job No.: J6I3427
Route: I-55
County: St. Louis County & City

JOB SPECIAL PROVISIONS TABLE OF CONTENTS (ROADWAY)

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

Job No.: J6I3427
Route: I-55
County: St. Louis County & City

11/03/2023 10:58:48 AM
Jack W. Blakemore - Civil
MO PE-2000155321

MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION
105 W. CAPITOL AVE.
JEFFERSON CITY, MO 65102
Phone 1-888-275-6636

CRAWFORD, MURPHY & TILLY, INC.
One Memorial Drive, Suite 500
St. Louis, MO 63102

Certificate of Authority: 000631
Consultant Phone: 314-436-5500

If a seal is present on this sheet, JSP's have been electronically sealed and dated.

JOB NUMBER: J6I3427
ST. LOUIS COUNTY & CITY, MO
DATE PREPARED: 11/3/23

ADDENDUM DATE:

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

Job No.: J6I3427
Route: I-55
County: St. Louis County & City

JOB
SPECIAL PROVISION

A. General - Federal JSP-09-02J

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

1.1 This contract requires payment of the prevailing hourly rate of wages for each craft or type of work required to execute the contract as determined by the Missouri Department of Labor and Industrial Relations and requires adherence to a schedule of minimum wages as determined by the United States Department of Labor. For work performed anywhere on this project, the contractor and the contractor's subcontractors shall pay the higher of these two applicable wage rates. State Wage Rates, Information on the Required Federal Aid Provisions, and the current Federal Wage Rates are available on the Missouri Department of Transportation web page at www.modot.org under "Doing Business with MoDOT", "Contractor Resources". Effective Wage Rates will be posted 10 days prior to the applicable bid opening. These supplemental bidding documents have important legal consequences. It shall be conclusively presumed that they are in the bidder's possession, and they have been reviewed and used by the bidder in the preparation of any bid submitted on this project.

1.2 The following documents are available on the Missouri Department of Transportation web page at www.modot.org under "Doing Business with MoDOT"; "Standards and Specifications". The effective version shall be determined by the letting date of the project.

General Provisions & Supplemental Specifications

Supplemental Plans to July 2023 Missouri Standard Plans
For Highway Construction

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

B. Contract Liquidated Damages JSP-13-01C

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

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

Notice to Proceed Date: February 5, 2024
Contract Completion Date: December 1, 2025

2.1 Calendar Days. The count of calendar days will begin on the date the contractor starts any construction operations on the project.

Job Number	Calendar Days	Daily Road User Cost
J6I3427	N/A	$11,400

3.0 Liquidated Damages for Contract Administrative Costs. Should the contractor fail to complete the work on or before the contract completion date specified in Section 2.0, or within the number of calendar days specified in Section 2.1, whichever occurs first, the contractor will be charged contract administrative liquidated damages in accordance with Sec 108.8 in the amount of **$3000** per calendar day for each calendar day, or partial day thereof, that the work is not fully completed. For projects in combination, these damages will be charged in full for failure to complete one or more projects within the above specified contract completion date or calendar days.

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

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

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

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

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

2.0 Traffic Management Schedule.

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

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

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

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

2.5 Traffic Congestion – I-55 & I-44. The contractor shall, upon approval of the engineer, take proactive measures to reduce traffic congestion in the work zone. The contractor shall immediately implement appropriate mitigation strategies whenever traffic congestion reaches an excess of **10 minutes** to prevent congestion from escalating beyond this delay threshold. If disruption of the traffic flow occurs and traffic is backed up in queues equal to or greater than the delay time threshold listed above, then the contractor shall immediately review the construction operations which contributed directly to disruption of the traffic flow and make adjustments to the operations to prevent the queues from reoccurring. Traffic delays may be monitored by physical presence on site or by utilizing real-time travel data through the work zone that generate text and/or email notifications where available. The engineer monitoring the work zone may also notify the contractor of delays that require prompt mitigation. The contractor may work with the engineer to determine what other alternative solutions or time periods would be acceptable. When a Work Zone Analysis Spreadsheet is provided, the contractor will find it in the electronic deliverables on MoDOT's Online Plans Room. The contractor may refer to the Work Zone Analysis Spreadsheet for detailed information on traffic delays.

2.5.1 Traffic Congestion – Side Roads. The contractor shall, upon approval of the engineer, take proactive measures to reduce traffic congestion in the work zone. The contractor shall immediately implement appropriate mitigation strategies whenever traffic congestion reaches an excess of 10 minutes to prevent congestion from escalating to 15 minute or above threshold. If disruption of the traffic flow occurs and traffic is backed up in queues of 15 minute delays or longer, then the contractor shall immediately review the construction operations which contributed directly to disruption of the traffic flow and make adjustments to the operations to prevent the queues from reoccurring. Traffic delays may be monitored by physical presence on site or by utilizing real-time travel data through the work zone that generate text and/or email notifications where available. The engineer monitoring the work zone may also notify the contractor of delays that require prompt mitigation. The contractor may work with the engineer to determine what other alternative solutions or time periods would be acceptable.

2.5.2 Traffic Safety.

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

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

2.6 Transportation Management Plan. The contractor Work Zone Specialist (WZS) shall review the Transportation Management Plan (TMP), found as an electronic deliverable on MoDOT's Online Plans Room and discuss the TMP with the engineer during the preconstruction conference. Throughout the construction project, the WZS is responsible for updating any changes or modifications to the TMP and getting those changes approved by the engineer a minimum of two weeks in advance of implementation. The WZS shall participate in the post construction conference and provide recommendations on how future TMPs can be improved.

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

3.0 Work Hour Restrictions.

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

Memorial Day
Labor Day
Thanksgiving
Christmas
New Year's Day

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

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

3.1.2 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.

There may be events of regional significance during the duration of this project, such as specific sporting events (St. Louis Cardinals and St Louis Blues home games), events at Forest park, Tower Grove Park, or Grand Center, parades, marathons, concerts and other major St. Louis events such as the Susan G. Komen Race for the Cure, Forest Park Balloon Glow, Moonlight Ramble, and Fair St. Louis. The Engineer will advise the contractor of any such events and how they are to be handled. All lanes shall be scheduled to be open to traffic 3 hours before the event until 2 hours following the end of the event, or at the direction of the Engineer.

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

3.3 The contractor shall be aware that traffic volume data indicates construction operations on the roadbed outside the following hours will likely result in traffic queues greater than 15 minutes. Based on this, the contractor's operations will be restricted accordingly unless it can be successfully demonstrated the operations can be performed without a 15 minute queue in traffic. It shall be the responsibility of the engineer to determine if the listed work hours may be modified. Working hours for evenings, weekends and holidays shall be as specified unless modified by the engineer. Any work requiring a reduction in the number of through lanes shall be completed during the hours listed below:

I-44 WZ Hours from I-55 to Biddle

Closure Type	Working Hours	
	Weekdays	Weekend
Single lane drop	9PM-5AM (EB-44)	7PM -6AM (EB-44)
	9PM-5AM (WB-44)	7PM-7AM (WB-44)

I-55 WZ Hours from Arsenal to I-44

Closure Type	Working Hours	
	Weekdays	Weekend
Single lane drop	9PM-5AM (NB-55)	7PM -6AM (NB-55)
	9PM-5AM (SB-55)	7PM-7AM (SB-55)

Ramp lane closures at the I-55/I-44 interchange shall follow the working hours listed in the above charts for "I-44 WZ Hours from I-55 to Biddle" and "I-55 WZ Hours from Arsenal to I-44".

Contractor shall coordinate any I-55/I-44 interchange ramp lane closures with the engineer and get his/her approval prior to initiating any work.

I-55 WZ Hours for Lindbergh to Arsenal

Closure Type	Working Hours	
	Weekdays	Weekend
Single lane drop	9AM-5AM (NB-55)	24 hours
	7PM-2PM (SB-55)	
Double lane drop	8PM-5AM	7PM-9AM

Cross Road Paving Locations

Closure Type	Working Hours	
	Weekdays	Weekend
Single lane drop	8PM-5AM	7PM-8AM

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

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

4.0 Detours and Lane Closures.

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

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

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

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.

Transportation Management Center
14301 S. Outer Road
Chesterfield, MO 63017
314-275-1500

City of St. Louis Fire Department
1412 N. Jefferson Avenue
St. Louis, MO 63106
314-533-3406

Missouri State Highway Patrol (Troop C)
891 Technology Drive
Weldon Spring, MO 63304
636-537-3000

Mehlville Fire District (#5 House)
11020 Mueller Rd.
St. Louis, MO 63123
314-894-0420

City of St. Louis Police
1915 Olive Street
St. Louis, MO 63103
314-231-1212

Affton Fire Department
9282 Gravois Road
St. Louis, MO 63123
314-631-1803

St. Louis County Police
7900 Forsyth Blvd.
Clayton, MO 63105
636-529-8210

Lemay Fire Protection District
1201 Telegraph Road
St. Louis, MO 63125
314-631-4500

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.

Aaron J. Groff, Project Contact
St. Louis District
1590 Woodlake Drive
Chesterfield, MO 63017

Telephone Number: 314-453-1876
Email: aaron.groff@modot.mo.gov

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

F. Supplemental Revisions JSP-18-01AA

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

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

Stormwater Compliance Requirements

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

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

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

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

2.1 Duties of the WPCM:

(a) Be familiar with the stormwater requirements including the current MoDOT State Operating Permit for construction stormwater discharges/land disturbance activities; MoDOT's statewide Stormwater Pollution Prevention Plan (SWPPP); the Corps of Engineers Section 404 Permit, when applicable; the project specific SWPPP, the Project's Erosion & Sediment Control Plan; all applicable special provisions, specifications, and standard drawings; and this provision;

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

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

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

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

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

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

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

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

5.0 Stormwater Deficiency Corrections. All stormwater deficiencies identified in the Inspection Report shall be corrected by the contractor within 7 days of the inspection date or any extended period granted by the engineer when weather or field conditions prohibit the corrective work. If the contractor does not initiate corrective measures within 5 calendar days of the inspection date or any extended period granted by the engineer, all work shall cease on the project except for work to correct these deficiencies, unless otherwise allowed by the engineer. All impact costs related to this halting of work, including, but not limited to stand-by time for equipment, shall be borne by the Contractor. Work shall not resume until the engineer approves the corrective work.

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

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

Anti-Discrimination Against Israel Certification

By signing this contract, the Company certifies it is not currently engaged in and shall not, for the duration of the contract, engage in a boycott of goods or services from the State of Israel, companies doing business in or with Israel or authorized by, licensed by, or organized under the

laws of the State of Israel, or persons or entities doing business in the State of Israel as defined by Section 34.600 RSMo. This certification shall not apply to contracts with a total potential value of less than One Hundred Thousand Dollars ($100,000) or to contractors with fewer than ten (10) employees.

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

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

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

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

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

Table 1 – GTR Material Properties

Property	Test Method	Criteria
Specific Gravity	ASTM D1817	1.02 to 1.20
Metal Contaminates	ASTM D5603	$\leq$ 0.01%
Fiber Content	ASTM D5603	$\leq$ 0.5%
Moisture Content	ASTM D1509	$\leq$ 1.0%*
Mineral Filler	AASHTO M17	$\leq$ 4.0%

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

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

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

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

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

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

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

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

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

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

7.0 Mix Design Test Method Modification. A formal mixing procedure from the additive supplier shall be provided to the contractor and engineer that details the proper sample preparation, including blending GTR with the binder or other additives. Samples shall be

prepared and fabricated in accordance with this procedure by the engineer and contractor throughout the duration of the project.

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

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

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

8.2.1 GTR SPG shall be 1.15

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

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

$$where:$$

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

8.4 G_{se} shall be calculated as follows:

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

8.5 P_{be} shall be calculated as follows:

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

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

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

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

Delete Sec 403.19.2 and substitute the following:

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

Delete Sec 106.9 and substitute the following:

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

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

106.9.2 Buy America Requirements for Iron and Steel for Manufactured items.
A manufactured item will be considered iron and steel if it is "predominantly" iron or steel. Predominantly iron or steel means that the cost of iron or steel content of a product is more than 50 percent of the total cost of all its components.

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

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

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

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

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

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

Requirements. Any foreign steel used was submitted and accepted under minor usage". The certification shall be signed by an authorized representative of the prime contractor.

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

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

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

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

106.9.7 Buy America Requirements for Manufactured Products.
Manufactured products means:

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

G. 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.

H. 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:

Utility Name	**Known Required Adjustment**	**Type**
Ameren Missouri Keith Kennon (McKenzie District) Telephone: 314.569.8268 Email: kkennon@ameren.com	Yes	Electric
Charter Communications(Spectrum) Kenneth Williams Telephone: 314.393.2984 Email: Kenneith.Williams@charter.com	None	Communications
AT&T Distribution Cheryl Gissler Telephone: 636.479.0055 Email: CB1969@att.com	None	Communications
Enable Pipeline (MRT) George Steinacker Telephone: 314.609.3723 Email: Stenacker@enable.com	None	Gas Pipeline
City of St. Louis Water Division Mark Nankivil Telephone: 314.633.9034 Email: mdkelly@stlwater.com	None	Water

City of St. Louis Traffic Division Justin Decarlo- (Lighting) Telephone:314.803.0248 decarloj@stlouis-mo.gov	None	Lighting
Metropolitan Sewer District Dan Shepard Telephone: 314.768.2708 Email: deshep@stlmsd.com	Yes 23MSD-00289	Sewer Included in Contract
Spire Energy Brian Langenbacher Telephone: 314.768.7767 Email: brian.langenbacher@spireenergy.com	None	Gas
Lumen (Formerly LightCore) Bill Carpenter Telephone: 636.357.8296 Email: william.carpenter@lumen.com	None	Communication (Both Projects)
AT&T-t Lenny Vohs Telephone: 816.275.4014 Email: lv2121@att.com	None	Communication (Both Projects)
Verizon(MCI) Domenic DeCastro Telephone: 636.459-1600 Email: domenic.nicastro@verizon.com	None	Communication
Missouri American Water Company Dave Pruitt Telephone: 314.992.2396 Email: dave.pruitt@amwater.com	None	Water
St Louis County Highway – Traffic Division Marty Koeller Telephone: 314.615.0210 Email: mkoeller2@stlouisco.com	None	Signals, Fiber, and Lights
MoDOT Traffic Division Ron Mize Telephone: 314.565.6727 Email: ronald.mize@modot.mo.gov	None	ITS, Signals, & Lights

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 Project Specific Provisions: The Contractor shall be aware there are numerous utilities present along the routes in this contract. The locations listed below are not to be considered all inclusive.

3.0 Ameren's existing facilities within the project limits:

Ameren has many existing aerial facilities crossing I-55 throughout the project limits. Ameren has on conflict on the SB off ramp of I-55 to Union Road, as shown on roadway plan sheet 13 of 53. Ameren plans to complete their relocation by January 15, 2024.

3.1 Ameren overhead power lines needing to be covered:

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.

4.0 Charter's existing facilities within the project limits:

Charter has an aerial cable on Ameren's poles crossing I-55 throughout the entire project limits. Charter advised they do not anticipate having any conflicts on this project.

5.0 AT&T-distribution's existing facilities within the project limits:

AT&T-d has existing aerial and copper facilities located throughout the entire project limits but no known conflicts are anticipated.

6.0 Enable Pipeline's (MRT) existing facilities within the project limits:

Enable Pipeline has a pipeline located just north of Green Park Road Bridge abutment. No conflicts are anticipated.

7.0 St Louis City – Water Division's existing facilities in project limits:

City Water existing water mains located on St Louis City Streets between River Des Peres to Arsenal. No conflicts are anticipated.

8.0 City of St Louis Traffic Division's existing facilities:

St Louis City has lighting has street lights and traffic signal on St Louis City streets within St Louis City. No conflicts are anticipated. work.

9.0 MSD has existing storm and sanitary facilities within the entire project limits, MSD job no is referenced as 23MSD-00289. This work is included in the road contract.

10.0 Spire's existing facilities in the project limits.

10.1 Spire Energy has existing gas mains located in the project limits but no know conflicts are anticipated.

11.0 Lumen's (Formerly LightCore) existing facilities in the project limits:

11.1 Lumen has existing fiber located along I-55 right of way (east side) throughout the entire project limits, but no known conflicts are anticipated.

12.0 AT&T-t's existing facilities in the project limits:

AT&T-t has an existing facility located along Broadway within Job No. J6I3149 but no known conflicts are anticipated.

13.0 Verizon/MCI fiber existing facilities in the project limits**:**

Verizon has an existing facility located along Broadway within Job No. J6I3149 but no known conflicts are anticipated.

14.0 Missouri American Water Company's existing facilities in the project limits:

Missouri American Water Company has existing water mains in St Louis County right of way, but no known conflicts are anticipated.

15.0 St Louis County Traffic Division's existing facilities in the project limits:

The traffic signals in St Louis County that are not maintained by MoDOT are maintained by St Louis County Signals and Traffic in project limits. No known conflicts are anticipated. St Louis County is not part of Mo One Call. In order for the contractor to request St Lois County to locate their facilities on One Call Tickets, contractor shall email signal_locates@stlouiscountymo.gov copies of One Call Tickets Numbers crossing on St Louis County Roads within the project limits.

16.0 MoDOT Traffic Division's existing facilities in project limits:

16.1 MoDOT maintains traffic signals at all the interchanges in the entire project limits and the lights & ITS along the entire I-55 corridor. 1000 feet of MoDOT ITS fiber is set up in the road contract to adjust in case any fiber needs to be relocated due to proposed guardrail work.

I. Liquidated Damages Specified – Auxiliary Lane Construction: Gasconade to Potomac

1.0 Description. If the auxiliary lane, associated truss, overhead signs, and guardrail are not complete and open to traffic between Gasconade and Potomac on northbound I-55 within **30** calendar days of the Northbound on-ramp closure at Gasconade, 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 **$1,800** per calendar day for each full calendar day that all construction work necessary to open the northbound Gasconade on-ramp, all four lanes on northbound I-55, and the northbound auxiliary lane between Gasconade and Potomac 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.

1.2 This deduction will continue until such time as the necessary work is completed and traffic is restored.

J. 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 15th 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:

County	Goal (Percent)	County	Goal (Percent)
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).

K. Contractor Quality Control NJSP-15-42

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

2.0 Quality Control Plan.

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

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

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

3.1.1 Test results shall be reported on electronic forms provided by MoDOT. Forms and Contractor Reporting Excel2Oracle Reports (CRE2O) can be found on the MoDOT website. All required forms, reports and material certifications shall be uploaded to a Microsoft SharePoint® site provided by MoDOT, and organized in the file structure established by MoDOT.

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

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

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

4.0 Work Planning and Scheduling.

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

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

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

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

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

4.4.2 Prior to all Hold Point inspections, the contractor shall verify the work has been completed in accordance with the contract and specifications. If the engineer identifies any corrective actions needed during a Hold Point inspection, the corrections shall be completed prior to continuing work. The engineer may require a new Hold Point to be scheduled if the corrections require a follow-up inspection. Re-scheduling of Hold Points require a minimum 24-hour advance notification from the contractor unless otherwise allowed by the engineer.

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

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

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

L. 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.

M. Project Work Area Restrictions

Because the ongoing construction of the bridge rehabilitation projects (J6I3187 and J6I3149) along I-55 is not due to be completed until May 31, 2025, no paving operation will be allowed on I-55 at the following locations until June 1, 2025:

- NB I-55 from Bayless to Bates Street
- SB I-55 from Bayless to 4500 N. Broadway

The contractor may complete other items of work within these areas along I-55 with the approval of the engineer and in accordance with the "Coordination with Other Projects" special provision contained in this document.

N. Work Time Restrictions Near the Basilica of Saint Louis, King of France

Work on Walnut Street, Memorial Drive N.B. (including ramp), Ramp 3A, Memorial Drive S.B. (including ramp) (south of Market Street), Poplar Street, Spruce Street and the old cathedral entrance may only be done on weekdays due to special events at the Basilica of Saint Louis, King of France (209 Walnut Street). Contractor shall coordinate all work with the MoDOT engineer and the old cathedral in order to avoid disruption of any special events at the old cathedral.

Old Cathedral Contact Information: Tina Hodak
Telephone Number: 314-231-3250
Email: tinahodak@archstl.org

O. Use of Crossovers and Truck Entrances JSP-04-10

1.0 Description. The contractor is advised that at no time shall the contractor be allowed to use the existing median crossovers or install temporary crossovers to turn around during hauling operations or for the moving of equipment. The contractor is also prohibited from constructing any temporary entrances to the mainline of the interstate.

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 provision.

P. 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.

Item No.	Units	Description
202-20.10	L.S.	Removal of Improvements

Q. 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 and delivered to the following location:

Commission's Maintenance Lot
Building A
2309 Barrett Station Road
Ballwin, MO 63021

Email Address: SLTRS@modot.mo.gov

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

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

Mr. Brian Ducote, Traffic Supervisor, Roadway Lighting/Utility Locates
Cell: (314) 681-8395

2.0 Signal Equipment. All equipment other than network communication devices noted in 3.0 are to be transported to the address listed above. The contractor shall notify the Commission's representative 24 hours prior to each delivery by calling the phone number listed above and ask for the field traffic supervisor.

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 address listed below. The contractor shall notify the Commission's representative 24 hours prior to each delivery by calling phone number listed below and providing details for the delivery.

Commission's TMC
14301 South Outer Forty
Chesterfield, MO 63017
Phone number: 314-275-1524

4.0 The contractor shall exercise reasonable care in the handling of the equipment during the 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 202-20.10, Removal of Improvements, per lump sum.

R. Disposition of Existing Granite Curb

1.0 Description. Remove granite curb as directed by the Engineer or as shown on the plans in order to proceed with construction. Removal of granite curb shall include all non-rigid pavement removal necessary to remove the existing curb and as required to install the new work. This item shall also include the removal of all concrete attached to the "removed" granite curb.

2.0 Cuts in the roadway shall be made to the straight, true lines parallel with the new curb alignment. The existing pavement shall be saw-cut if necessary. Care shall be taken to avoid damage to pavements and to the pavement base remaining in place.

3.0 Any straight sections of granite curb that are to be removed and not used in this contract are to remain the property of the City. Excess curb sections shall be stockpiled at one location and will be delivered by the Contractor at his expense, to the storage yard at 1900 Hampton Avenue or another area as designated by the Engineer.

4.0 Basis of Payment. Payment for removal, handling and transportation of all granite curb specified shall be considered completely covered by the contract unit price for 202-20.10, Removal of Improvements, per lump sum.

Item No.	Units	Description
202-20.10	L.S.	Removal of Improvements

S. 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 Plan 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.

T. Coordination with Other Projects

1.0 Description. The contractor shall coordinate traffic management between this project and any other projects on I-55, and projects which affect I-55, including future projects. Each Contractor shall conduct their work so as not to interfere with or hinder the progress or completion of the work being performed by other Contractors. In case of dispute, the Engineer shall be the referee and the Engineer's decision shall be final and binding on all.

2.0 Coordination. The Contractor shall coordinate all limits of the project with the Missouri Department of Transportation and the St. Louis County Transportation & Public Works related to the following projects:

- Bridge Rehabilitation Projects on I-55 from Lindbergh Blvd. in St. Louis County to I-44 in St. Louis City (Job No. J6I3187 and Job No. J6I3149)
- Structural Signing Project on I-55 from Ste Genevieve County to I-44 (J6I3484)
- Bayless Avenue Bridge over Gravois Creek (Federal Project No. STP-9901(637))
- I-55 Striping Project (SL0123)
- Bridge Rehabilitation and Preventative Maintenance on I-44 on the Cole St. Viaduct in St. Louis City (Job No. J6I3540)

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

Bridge L0815 (Cole St. Viaduct in downtown St. Louis) is scheduled to be sealed with crack filler and restriped as part of Project J6I3540. Contractor shall coordinate with J6I3540 contractor and MoDOT to avoid any duplicate stripping effort on this bridge.

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

4.0 Basis of Payment. No direct payment will be made to the contractor to recover the cost of the equipment, labor, materials, or time required to for this coordination with other projects.

U. Modified Linear Grading

1.0 Description. Modified Linear Grading shall consist of any necessary clearing and grubbing in accordance with Sec 201, preparing the subgrade 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 and involve work on high banks, side hills, and rock outcroppings.

2.0 Construction Requirements. The shoulder 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 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 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 no steeper than the existing slopes with a maximum slope of 3:1 unless 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. 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 in order to stay in compliance with the Standard Plans. The need for edge treatment is determined by the contractor's method of operations.

2.4 This work may require excavation activities on rock outcroppings. No separate pay will be made for rock excavation needed to conform to the typical section as shown on the plans.

2.5 Any grading and ditch work that exists as a property owner's frontage that has been mowed and maintained by the property owner will be finish graded to a smooth and mowable surface free of rocks and debris.

3.0 Method of Measurement. Measurement will be made in accordance with Sec 207.

4.0 Basis of Payment. Payment for Modified Linear Grading shall be made and considered completely covered by the contract unit price bid for:

Item No.	Units	Description
207-99.09	Sta	Modified Linear Grading

V. Shaping Slopes Class III (Modified Material Requirements)

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 4 inches minus. Acceptance by the engineer will be made by visual inspection.

215.4 Basis of Payment. The accepted quantity, complete in place, will be paid at the contract unit bid price for:

Item No.	Units	Description
215-99.10	100 Ft	Shaping Slopes Class III – Modified Material Requirements

W. Type 5 Aggregate for Base (Variable Thickness)

1.0 Description. This work shall consist of furnishing and placing one or more courses of Type 5 aggregate on a prepared subgrade in accordance with these specifications, and as shown on the plans or as directed by the engineer. The thickness of the Type 5 aggregate for each location shall be as specified on the plans.

2.0 Material. Material for Type 5 aggregate shall be as specified in Sec 304.2.

3.0 Construction Requirements. Construction requirements for Type 5 aggregate shall be as specified in Sec 304.3.

4.0 Quality Control/Quality Assurance (QC/QA). Quality Control/Quality Assurance for Type 5 aggregate shall be as specified in Sec 304.4.

5.0 Method of Measurement. The quantity of Type 5 Aggregate for Base (Variable Thickness) will be measured in accordance with Sec 304.5.

6.0 Basis of Payment. The accepted quantity of variable thickness Type 5 aggregate base course, complete in place, will be paid for at the contract unit price for:

Item No.	Units	Description
304-99.05	Sq Yd	Type 5 Aggregate for Base (Variable Thickness)

6.1 Payment will be considered full compensation for water used in performing this work.

X. Type 5 Aggregate for Base (Cubic Yard)

1.0 Description. This work shall consist of furnishing and placing one or more courses of Type 5 aggregate on a prepared subgrade in accordance with these specifications, and as shown on the plans or as directed by the engineer. The Type 5 aggregate base (cubic yard) is being utilized as fill material between two Type D concrete traffic barriers (retaining walls) as shown in the plans.

2.0 Material. Material for Type 5 aggregate shall be as specified in Sec 304.2.

3.0 Construction Requirements. Construction requirements for Type 5 aggregate shall be as specified in Sec 304.3.

4.0 Quality Control/Quality Assurance (QC/QA). Quality Control/Quality Assurance for Type 5 aggregate shall be as specified in Sec 304.4.

5.0 Method of Measurement. Final measurement of the completed Type 5 aggregate base course will not be made except for authorized changes during construction, or where appreciable errors are found in the contract quantity. Where required, measurement of Type 5 aggregate base course, complete in place, will be made to the nearest cubic yard. The revision or correction will be computed and added to or deducted from the contract quantity.

6.0 Basis of Payment. The accepted quantity of Type 5 aggregate base course, complete in place, will be paid for at the contract unit price for:

Item No.	Units	Description
304-99.07	Cu Yd	Type 5 Aggregate for Base

6.1 Payment will be considered full compensation for water used in performing this work.

Y. 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. 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 thicker pavement option. 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 No.	Units	Description
401-99.05	Sq Yd	Optional Pavement

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.

Z. Intelligent Compaction NJSP-18-08C

1.0 Description. This work shall consist of collecting location, temperature, speed and intelligent compaction measurement values (ICMV) from properly instrumented rollers within the mainline paving limits and then submitting the Intelligent Compaction (IC) Data in the defined format. This provision shall apply for each lift of mainline pavement. This work shall be completed in accordance with the general principles set forth in AASHTO PP81-18 Standard Practice for Intelligent Compaction Technology for Embankment and Asphalt Pavement Applications, and specifically as stated in the following sections.

2.0 IC Asphalt Rollers. All asphalt rollers with the exception of the finish roller shall be properly instrumented. These instrumented rollers will be referred to as IC Rollers. Steel wheel rollers shall be self-propelled double-drum vibratory rollers equipped with accelerometers mounted to acquire signals from the vibratory response in the drum measuring the interactions between the rollers and compacted materials in order to evaluate the applied compaction effort known as the ICMV. Rubber tire rollers will not be required to collect the ICMV. IC Rollers shall

be equipped with non-contact temperature sensors for measuring pavement surface temperatures as well as a Global Positioning System (GPS) to map the roller position history.

3.0 Equipment Accuracy. IC Roller accuracy shall be in accordance with the following.

Operating Parameter	Accuracy
Global Positioning System	±50 mm (±2 in.) in the X and Y Direction
Rolling Speed	±0.5 kph (±0.3 mph)
Frequency	±2 Hz
Amplitude	±0.2 mm (±0.008 in.)
Temperature	±1.5°C (±2.7°F)

4.0 Onboard Unit. The IC Rollers shall include an integrated on-board documentation system that is capable of displaying real-time color-coded maps of IC measurement values including the stiffness response values, roller location, number of roller passes, pavement surface temperatures and line work (alignment file) if applicable. The unit shall display the current value for roller speeds, vibration frequencies and vibration amplitude of the roller drums. The operator shall have the ability to label or select each Layer ID. The display unit shall be capable of transferring the data by means of a USB port to a removable media device or wirelessly to the manufacturer's Cloud storage.

5.0 Software Requirements. The manufacturer's Intelligent Compaction software, or cloud computing, shall map and export gridded all-pass data and resemble PP81 section 4.3.5.2 as much as possible. At minimum, the exported data shall consist of the required fields in Table 5 of PP81 in order to allow adequate filtering in Veta.

6.0 Global Positioning System (GPS). Radio and receiver units shall be mounted on each IC roller to monitor the drum locations and track the number of passes of the rollers. The GPS system shall also meet the following requirements:

(a) Set all GPS devices to the Universal Transverse Mercator (UTM) coordinate system No.15 except for portions of the SE District which are No. 16, regardless of whether GPS or Grid data are originally recorded. If UTM coordinates are not available, use the State Plane coordinate system and designate the appropriate State Plane zone. The recorded coordinates shall be in US survey feet. If an alternate coordinate system is established for the construction of the project, it may be used for the IC.

(b) Provide a GPS system that can be a ground-based base station or Virtual Reference Station (VRS) to achieve Real Time Kinematic Global Positioning Systems (RTK-GPS) accuracy.

(c) Provide GPS receivers on IC Rollers and a hand-held GPS rover that reference to the same ground-based base station channel or have the same VRS subscription.

(d) Provide the recorded GPS data, whether from the IC Rollers or hand-held GPS rovers, in the following formats:

    (i) The time stamp shall be in military format (HHMMSS.SS) in local time zone. Accuracy of 0.01 second is necessary to differentiate sequence of Intelligent Compaction data points during post processing.

(ii) Provide GPS latitudes and longitudes in DDMM.MMMMMMMM or decimal degrees (DD.DDDDDDDD).

(iii) Provide grid coordinates in feet to the nearest 0.1 foot.

7.0 Rover. The contractor shall provide one fully equipped survey grade hand-held GPS rover with RTK for the duration of the contract. The rover may remain in the possession of the contractor but shall be available to the engineer as needed.

7.1 Rover Specifications. The Rover shall read GPS signals L1 C/A, L1/L2 P-Code, and L2C and Glonass signals L1/L2 CA, L1/L2 P-Code. It shall achieve horizontal accuracies of 10mm + 1 ppm RMS and vertical accuracies of 15 mm + 1 ppm RMS in RTK surveys. It shall support Network RTK using NTRIP and have an internal modem with cellular service provided. Single Baseline RTK shall also be supported with an internal UHF Radio. Training shall be provided to ensure that MoDOT personnel shall have enough knowledge of software and hardware to operate the GPS rover.

8.0 Control Points. The contractor shall establish control points on the project at locations necessary to ensure compliance with the outlined provisions.

9.0 Data Management. All submitted files shall be adequately labeled prior to submission as defined in the MoDOT IC-PMTPS Project Protocol.

9.1 Trial Section Data. The results from the trial section shall be recorded on the appropriate spreadsheet and submitted to the engineer within 24 hours of completing the trial section.

9.2 Unfiltered Raw Data. The raw IC data shall be downloaded twice per day day and uploaded to the appropriate MODOT IC SharePoint site before the start of the next day's production.

9.3 Formatted Raw Data. The formatted raw IC data shall be submitted to the engineer before the start of the next day's production. The formatted raw IC data shall be compatible with the latest version of Veta. The data shall include IC data files, core locations/data, and coordinates of daily production boundaries. The GPS and temperature verification data shall be submitted as well in a separate file. Each file shall be labeled in accordance with the current IC-IR naming protocol posted on the IC SharePoint Site.

9.4 Veta Project File. The Veta project file shall include the day's production data and be submitted to the engineer within 36 hours after completion of the day's paving. The valid Veta project file shall contain the day's IC data, core locations and paving boundaries. The IC Data shall include at a minimum roller locations, temperatures, amplitudes, frequencies and speeds as well as ICMV if the accelerometer is used.

9.5 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 without jeopardizing a portion of the lump sum payment for that day. The engineer must be notified immediately of the issue and 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 deduction from the lump sum pay item based on the percentage of the data which is lost.

9.6 Summary Report. The Summary Report shall be furnished to the engineer by the contractor two days prior to the 1st and 15th of each month which includes the roller coverage results, classification for each segment, any qualifying GPS obstructions and the mean temperature at the optimum pass count. A copy of the specific version of the Summary Report used for the current construction season can be downloaded from the Construction Forms folder on the IC SharePoint page.

10.0 Daily Verification. The surface temperature sensor and GPS on each IC Roller shall be verified each day, although a record needs only be submitted for the measurements at the start of each week. IC Roller GPS verification shall include verifying a point established by the rover for both X and Y position to an accuracy of +/- 6 Inches. The rover shall be verified for both X and Y position with a control point at the start of each day. The IC roller temperature sensor verification shall be compared with a temperature gun which has been calibrated within the past year. The IC temperatures shall compare to be within 5°F of the temperature gun measurement. A record of each verification shall be submitted to the engineer electronically as soon as possible but no later than the start of the next day's production.

11.0 IC Segments. Each IC Segment shall consist of one day's production.

12.0 Technical Support. Technical Support from the IC roller manufacturer shall include availability on an as-needed basis for the duration of the project at no cost to the Commission. The manufacturer's representative shall provide assistance with setup, verification, data management, operation, and analysis.

13.0 Training. IC training materials are available online and located on the IC SharePoint Site. The IC Quality Control Technician shall review the training materials prior to the start of the project. Equipment operators shall be knowledgeable of the equipment that will be used and trained as needed by the contractor or equipment supplier.

14.0 IC Quality Control Plan. A pre-activity meeting shall be required prior to mainline paving. The IC 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-GPS of both the IC roller(s) and rover(s)
(c) Procedure for the construction of the trial section and establishment of the optimum compaction pass count and target IC-MV value
(d) Procedure for downloading IC data from the roller(s)
(e) The procedure for training operators or other project staff
(f) Detailed daily verification procedure for checking the temperature sensor on the IC Roller(s)
(g) The name of the designated IC Quality Control Technician
(h) Procedure for submitting data
(i) Contact information for technical support staff
(j) A list of the control points with either UTM or State Plane Coordinates established by the contactor
(k) The date range when the IC component of the project will be taking place.

15.0 Coring. Cores shall be taken as typically required by the Missouri Standard Specification for acceptance of the pavement. The GPS coordinates of each core shall be collected with an accuracy of +/- 2 inches and submitted to the engineer by the start of the next day's production.

16.0 Daily Production Boundaries. The paving limits of the freshly placed mat shall be collected with an accuracy of +/- 2 inch. The edge of the new paved mainline surface shall be collected at least every 100 feet for curves and every 200 feet for tangent sections. These points shall be used to define the boundaries of each segment.

17.0 Software Access. The contractor shall supply the engineer with the manufacturer's Intelligent Compaction 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.

18.0 GPS Obstructions. Isolated areas influenced by a GPS obstruction may be excluded from % roller coverage computation provided that the following conditions are satisfied:

1) The position data is present
2) The GPS Reception Mode as recorded by the onsite equipment indicates that a 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 are no more than 5% of any single day's production.

19.0 Trial Section. Mainline paving shall begin with the construction of a trial section for each mix type. One trial section may be constructed for each mix design. The engineer shall be notified at least 48 hours prior to construction of the trial section. The trial section shall be constructed and compacted with the same equipment, progression and methods which will be used during production. The roller speed and frequency used on the trial section shall be maintained during the construction of the project. The trial section shall be constructed with sufficient passes to determine the optimum density. The trial section shall typically be 1000 feet in length, with the last 400 feet being utilized for testing, the width of one lane and shall be constructed as part of the project. Within the 400 feet long testing portion, one Evaluation Location shall be identified for each 100 feet. Flexibility will be allowed up a maximum combined length of 1500 feet in order to facilitate the construction of the trial section. Areas needed beyond the 1500 feet will be assessed as deficient. Each Evaluation Location shall be positioned away from the center of the lane due to potential overlap of roller passes during compaction. After each of the passes, the contractor shall collect a density measurement with a nuclear gauge or an approved alternate density gauge at each Evaluation Location. When approved by the engineer, initial pairs or pass groups may be completed between density measurements. The passes shall be continued until either the pavement density begins to decrease or the density measurement on two consecutive passes are within 0.2%. Following completion of the trial section, a compaction curve shall be constructed from the pass vs. density information. From this curve the optimum number of passes and optimum IC-MV shall be determined from either the peak density versus pass value or from the 0.2% increase pass versus density values. If the 0.2% increase is the determining factor, the pass prior to the 0.2% increase will be used. Cores shall be collected at each Evaluation Location after completion of the recorded passes. The density of each core shall be determined by the contractor and used to correlate with the final density collected from the nuclear gauge. If the density at the optimum pass count is determined to be outside the required acceptance range, then a new trial section shall be initiated. The trial section will not be considered for IC incentive or disincentive

payment up to the 1500 feet maximum length. Acceptance of this area will be made in accordance with section 403.23.7.4 regarding density.

19.1 Optimum Pass Count Refinement. Once the project is underway, changes in operation or roadway characteristics may require refinement of the optimum pass count. With approval of the engineer, an optimum pass count refinement may be scheduled at a predetermined time when the inspector can be in attendance. The refinement shall follow the criteria established in section 19.0 and the results from this refinement will be effective starting the day that the optimum pass count refinement takes place.

20.0 Segment Classification. Passing Segments shall have a minimum of 90% coverage at or above the optimum number of passes. Segments with between 90% 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, including areas where data is lost. 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.

21.0 Quality Assurance. Quality Assurance will be performed by means of a Commission-furnished, Commission-retained magnetic GPS system attached to the top of any IC roller. Thermal Sensors may also be installed by means of a magnetic mount. The units will be solar-powered. The contractor shall provide the engineer access to these systems and accommodate the presence of the device on the IC Roller. The engineer will conduct a QA analysis according to the NJSP1808-Form-01-DataQA-Instructions and provide the contractor pass or fail results to be recorded in the Summary Sheet. In the event that a favorable comparison is not obtained, the accuracy of each system shall be verified prior to conflict resolution being initiated. The contractor shall be responsible for not damaging the QA GPS System while on their equipment and in their possession. In the event that the unit is damaged, the contractor shall be responsible for repair or replacement up to $500.

22.0 Basis of Payment. Payment for compliance with this provision will be made at the contract unit price for

Item No.	Units	Description
403-10.58	L.S.	Intelligent Compaction

In addition, an incentive payment of $75 per 1000 feet will be made on all Passing Segments and a disincentive deduct of $75 per 1000 feet will be made on all Deficient Segments. No additional payment will be made for the equipment, software, training, survey, analysis, trial section, trial section cores or any other incidentals necessary to complete the work.

Incentive or Disincentive Payment = ((Length of Days Run) / 1000) x $75

AA. Paver-Mounted Thermal Profiles NJSP-18-09B

1.0 Description This work shall consist of collecting the paving location, surface temperature and paver stops with a Contractor supplied, Contractor retained Paver-Mounted Thermal Profile System (PMTPS) for each lift of mainline asphalt pavement. The PMTPS shall be used to continually monitor the surface temperature of the mat immediately behind the paver screed during paving operations in order to determine the thermal segregation levels for each sublot.

Data from the PMTPS shall be automatically uploaded and processed through a wireless data connection or exported to an USB drive. This work shall be completed in accordance with the general principles set forth in AASHTO PP 80-17 "Standard Practice for Continuous Thermal Profile of Asphalt Mixture Construction", and specifically as stated in the following sections.

2.0 PMTPS Equipment. The PMTPS shall consist of a temperature scanner/camera, wheel speed/distance sensor, GPS antenna, control panel and necessary cabling. The PMTPS shall measure the surface temperature over the complete paving width. The current position shall be recorded via the GPS antenna. The control panel shall feature the keys and screen displays necessary to control the system as well as the software for data recording and visualization during the paving process. The system shall provide a real-time map of the temperature readings, as well as the total number of sublots in each temperature segregation category. The system shall store the data locally on a memory stick and also upload the data directly to cloud-based software which shall be supplied by the contractor for use on this project. Logon information shall be provided to the engineer for direct access to the cloud storage. In addition, the equipment shall meet the following requirements;

Parameter	Requirement
Longitudinal and Lateral Surface	≤ 12.0 inch intervals at all paving speeds
Temperature Readings Footprints	Tolerance: ±1 inch
Surface Temperature Readings	Range: 32°F to 480°F
	Accuracy: ± 6° F
Location (x and y)	Accuracy: ± 4 feet
Ground Distance Sensor	Accuracy: ± 1/1000 feet

3.0 Verification. The system shall have a documented verification before beginning construction and a minimum of once per week for Travel Distance and Temperature.

4.0 PMTPS Training. The PMTPS Technician and individuals performing daily setup of the equipment shall be properly trained. If trained personnel are unavailable PMTPS scanning and mainline paving shall not be performed. The PMTPS Technician shall have completed a qualifying Veta training within the last 2 years.

5.0 Thermal Profile Sublots For each run, the thermal profiles shall be divided into sublots that are 150 ft. in length and of the width placed. Sublots shall not extend over multiple days, different lifts or directions.

6.0 Thermal Segregation Exclude the following surface temperature readings from each sublot: (1) Surface temperature readings less than 180°F; and (2) Surface temperature readings within 2 ft. prior to and 8 ft. after paver stops that are greater than 1 minute in length. The temperature differential is the difference between the surface temperature readings at the 98.5 and 1 percentile in each 150 ft. sublot. The thermal segregation categories are based on the temperature differential as shown in the table below.

Temperature Differential (TD)	Thermal Segregation Category
TD ≤25.0 F	Low
25.0 F < TD ≤ 50.0 F	Moderate
TD > 50.0 F	Severe

7.0 Data Management. All of the header inputs shall be correctly entered by the contractor at the start of each run. The Veta Thermal Segregation Report shall be generated and electronically submitted to the engineer for each day before the start of the next day's production, along with the Veta file. Each file shall be labeled with the corresponding production date, direction, starting and ending log mile, and lane according to the MoDOT IC-PMTPS Protocol. The contractor shall provide to the engineer a Summary Report of the daily Thermal Segregation Reports two days prior to the 1st and 15th of each month for verification. A blank copy of the Summary Report can be found in the construction forms folder on the IC SharePoint page.

8.0 Incentive/Disincentive. Incentive/disincentive adjustments shall be made for each sublot in accordance with the following:

Thermal Segregation Category	Adjustment per 150 ft. Sublot
Low	$7 Incentive
Moderate	No Pay Adjustment
Severe	$7 Disincentive

9.0 Quality Assurance (QA) Testing. The Engineer will record spot temperature readings with a calibrated infrared thermometer. 2 QA test sets each consisting of 3 spot readings at the lane quarter points will be taken for each full production day. The test sets will be taken at random locations. The contractor shall assist the engineer with determining the GPS location of each spot reading location. The recorded temperature shall be within 12°F of the temperature recorded by the thermal scanner for each location. If 4 readings from any 2 consecutive test sets fall outside of the 12°F range, then conflict resolution shall be initiated to determine corrective action.

10.0 Basis of Payment. Payment for compliance with this provision will be made at the contract unit price for:

Item No.	Units	Description
403-10.59	L.S.	Paver-Mounted Thermal Profiles

No additional compensation will be provided to the contractor for any direct or indirect cost, including scheduling delays, associated with the installation of the noted equipment, training or the affiliated data processing.

BB. Low-Tracking or Non-Tracking Tack Coat NJSP-15-15H

1.0 Description. This work shall consist of preparing and treating an existing bituminous or concrete surface with a low-tracking or non-tracking tack coat material prior to an asphalt overlay in accordance with Section 407, except as revised by this specification.

2.0 Low-Tracking or Non-Tracking Requirements. Products accepted for use as low-tracking or non-tracking tack shall not stick to the tires, tracks or other parts of paving equipment or vehicles such that the surface to be overlaid becomes visible or void of tack prior to the placement of the asphaltic concrete pavement mixture. The tack material shall exhibit a low-tracking or non-tracking characteristic within 30 minutes of being applied to the roadway. Products accepted for use shall exhibit a laboratory "no-pick-up" time of 60 minutes or less per TM-87. The product shall bond the two pavements. Products accepted for use shall exhibit a

laboratory bond strength greater than or equivalent to a standard SS-1h tack material. The test method used may be any AASHTO TM method or other approved research test methods.

2.1 Optional Application. In lieu of applying a Low-Tracking or Non-Tracking Tack, a Polymer Modified Emulsion Tack may be placed immediately ahead of the asphalt pavement as defined below in section 4.0 Optional Polymer Modified Emulsion Tack.

3.0 Equipment and Construction Requirements. All equipment and construction requirements shall be in accordance with Section 407; except as revised as follows:

3.1 Storage and Handling. All guidelines and instructions about storage and handling of the non-tracking tack product shall be followed in accordance with the product manufacturer. A copy of this in formation shall be provided to the engineer. The information shall include the application and maximum allowable temperatures for the product and the particle charge.

3.2 Distributor. The distributor shall have the full circulating and heating capabilities in the tank. If the particle charge of the low-tracking or non-tracking tack is different from the particle charge of the emulsion that was previously used then the tank shall be thoroughly cleaned prior to use, since some products are not compatible.

3.3 Curing. The low-tracking or non-tracking tack shall be allowed to cure prior to any construction traffic driving on the surface. A minimum of 15 minutes of cure time shall be allowed prior to driving on the tacked surface, unless less cure time is successfully demonstrated and approved by the engineer.

3.4 Supplier Information. The low-tracking or non-tracking tack materials are a different type of product compared to the conventional tack used in Missouri. *There may be multiple products that can meet the low-tracking or non-tracking tack requirements. All products that achieve equivalent field performance will be allowed.*

3.5 Material Requirements. All material shall be in accordance with Section 1015 of the Standard Specifications and specifically as follows:

Emulsion Properties for Low-Tracking or Non-Tracking Tack Coat			
Tests	Method	Min	Max
Viscosity, Saybolt Furol @ 25°C (77°F), s	AASHTO T 59	10	100
Storage Stability Test, 24 hr, percent	AASHTO T 59	--	1.0
Sieve Test, percent	AASHTO T 59	--	0.30
Residue by Distillation, percent	AASHTO T 59	50	
Oil Distillate by Distillation, percent	AASHTO T 59	--	1
Test on Residue from Distillation			
Penetration 25°C, 100 g, 5 s	AASHTO T 49	--	90
Solubility in Trichloroethylene, %	AASHTO T 44	97.5	--

OR

The following requirements are not intended to govern emulsified products.

PG Graded Products for Low-Tracking or Non-Tracking Tack Coat			
Tests	Method	Min	Max
Rotational Viscosity (Pa-sec) @ 302° F	AASHTO T 316 302°F	100	300
Penetration 25°C, 100 g, 5 s	AASHTO T 49	--	90
In addition to the table above, when using PG Graded Binders as tack, a certification shall be supplied to the engineer which includes test results demonstrating that the PG binder component meets the minimum requirements of a PG 58 or greater on the high end and a -22 or lower on the low end in accordance with AASHTO M320. The PG binder component shall account for at least 97% of the total product composition by volume. If using 100% PG binders, then the products shall be in accordance with Section 1015.10.			

All products that meet a laboratory "no-pick-up" time of 60 min or less and a field "no-pick-up" time of 30 min or less shall be accepted per TM-87.

4.0 Optional Polymer Modified Emulsion Tack.

4.1 Description. In lieu of using a low-tracking or non-tracking tack coat material, a Polymer Modified Emulsion Tack may be placed prior to a bituminous overlay of hot asphaltic concrete pavement. The Polymer Modified Emulsion Tack shall be spray applied immediately prior to the application of the hot asphaltic concrete pavement so as to produce a homogeneous surface in accordance with Secs 401, 402, or 403. This option will not be required solely if low tracking tack products fail to perform in the field.

4.2 Materials. The Polymer Modified Emulsion Tack shall be in accordance with Sec 1015.20.5.1.1 or Sec 1015.20.6.2.

4.3 Construction Requirements. The asphaltic concrete pavement shall be placed in accordance with Secs 401, 402, or 403, except as modified herein.

4.4 Equipment. No wheel, track or other part of the paving machine or any hauling equipment shall come in contact with the Polymer Modified Emulsion Tack before the asphaltic concrete pavement mixture is applied.

4.5 Application of Polymer Modified Emulsion Tack.

4.5.1 The Polymer Modified Emulsion tack shall be sprayed at a temperature of 120 - 180° F. The sprayer shall accurately and continuously monitor the application rate and provide a uniform coverage across the entire width to be overlaid. The application rate of the asphalt emulsion tack shall be applied at the same rate as the low-tracking or non- tracking tack coat material in accordance with Sec 407. The Engineer may make adjustments to the application rate based upon the existing pavement surface conditions and the recommendations of the Polymer Modified Emulsion Tack supplier.

4.5.2 Water may be added to SS-1hp and CSS-1hp by the emulsion manufacturer and shipped to the jobsite. No dilution shall be allowed in the field. When water is added to SS-1HP or CSS-1HP, the resulting mixture shall contain no more than 20 percent of added water. The contractor shall notify the engineer of the use of a diluted emulsion. The exact quantity of added water shall be indicated on the manufacturer's bill of lading, manifest or truck ticket. The

application rate of the resulting mixture shall be adjusted such that the original emulsion will be spread at the specified rate. No water shall be added to the CPEM-1 or PEM-1.

5.0 Method of Measurement. Measurement of asphalt emulsion to the nearest gallon shall be made as specified in Sec 1015. The measurement of asphalt emulsion shall be based upon undiluted material.

6.0 Basis of Payment. The accepted quantity of low-tracking or non-tracking tack coat or polymer modified emulsion tack will be paid for at the contract unit price for:

Item No.	Units	Description
407-10.07	Gal.	Tack Coat – Low tracking or Non-tracking

CC. Adjusting Water Valves and Meters

1.0 Description. This work shall consist of adjusting water valves and water meters as shown on the plans or as directed by the engineer.

2.0 Construction Requirements. Adjustments shall be completed so that the finished sidewalk, ramp, approach, or pavement meets current ADA standards.

3.0 Method of Measurement. Measurement for adjusting water meters and water valves will be made per each and includes all necessary material, hardware, equipment, and necessary incidental items.

4.0 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 No.	Units	Description
603-99.02	Each	Adjusting Water Meter
603-99.02	Each	Adjusting Water Valve

DD. Guardrail Grading Requirements JSP-17-02B

1.0 Description. Guardrail installation and grading shall be in accordance with Missouri Standard Specifications for Highway Construction, Missouri Standard Plans for Highway Construction, and as described herein.

2.0 Construction Requirements. When guardrail and/or end treatment removal and replacement requires grading of the shoulder and/or slopes, Section 606.3.1(b), (c), and 606.3.1.1 of the Missouri Standard Specifications shall be waived and the following shall apply:

a) Along roadways and shoulders, remove no more guardrail than can be reconstructed within seven (7) calendar days, including weekends and holidays. The seven day counting period shall start when the first piece of safety hardware is removed.

b) The active work zone area that encompasses the guardrail and/or end treatment reconstruction, shall not exceed one (1) mile in length. The contractor shall be required

to provide and maintain approved channelizing devices adjacent to the reconstruction area.

c) Only one-side of the roadway shall be worked on at the same time. Divided facilities shall be limited to work on one-side of each direction at the same time.

d) When the removal of any existing safety hardware device exposes non-breakaway obstacles, the reconstruction of the safety hardware device protecting the obstacle shall be replaced within 48 hours of removal or an approved temporary crashworthy device shall be provided, installed and maintained at the contractor's expense until the non-breakaway obstacle is permanently protected. The 48 hour counting period shall start when the first piece of safety hardware is removed.

e) Areas where guardrail and/or end treatments have been removed, but not yet replaced, shall be delineated in accordance with plans or as directed by the Engineer.

3.0 Non-Compliance. Non-compliance with this provision shall result in the immediate suspension of work in accordance with Sec 105.1.2. No work, including but not limited to additional guardrail removal and grading, shall be allowed to proceed except for work necessary to restore guardrail installation.

4.0 Basis of Payment. No direct payment will be made for compliance with this provision. Guardrail items, grading, and temporary traffic control devices will be paid for as provided in the contract.

EE. Type A Crashworthy End Terminal (MASH TL-2)

1.0 Description. This work shall consist of furnishing and installing Type A crashworthy end terminals (MASH TL-2) as shown on the plans or as directed by the engineer.

2.0 Material.

2.1 Equipment and material shall be as specified in Sec 606.30.2.1.

2.2 All Type A crashworthy end terminal (MASH TL-2) installations shall be 25 feet long. Additional MGS guardrail shall be provided by the contractor, at the contactor's expense, to increase the Type A crashworthy end terminal (MASH TL-2) to a length of 25 feet.

2.3 All Type A crashworthy end terminal (MASH TL-2) installations must be MASH Test Level 2 compliant.

2.4 All Type A crashworthy end terminals (MASH TL-2) must be on MoDOT's qualified products list.

3.0 Construction Requirements. All Type A crashworthy end terminal (MASH TL-2) fabrications and installations shall be constructed in accordance with the manufacturer's approved shop drawings, recommendations and as shown on the plans.

4.0 Method of Measurement. Measurement for Type A crashworthy end terminals (MASH TL-2) will be made for each unit assembled, installed and complete in place. Grading for Type A

crashworthy end terminals (MASH TL-2) will be measured in accordance with Miscellaneous Shaping Slopes Class III – Modified Material Requirements.

5.0 Basis of Payment. The accepted quantity of Type A crashworthy end terminals (MASH TL-2), complete in place, will be paid for at the contract unit price for:

Item No.	Units	Description
606-99.02	Each	Type A Crashworthy End Terminal (MASH TL-2)

5.1 Payment will be considered full compensation for complete installation including any backup assemblies or other items necessary for proper installation of the Type A crashworthy end terminals (MASH TL-2) as required. Grading for the Type A crashworthy end terminals (MASH TL-2) will be paid for at the contract unit price for Shaping Slopes Class III – Modified Material Requirements.

FF. Remove and Re-erect Type A Crashworthy End Terminal (MASH)

1.0 Description. This work shall consist of the complete removal and re-erection of existing Type A crashworthy end terminals (MASH).

2.0 Material. New materials, when required, shall be according to Sec. 606.2 and Sec. 606.30.2.

3.0 Construction Requirements. The removal, temporary storage, and re-erection of existing Type A crashworthy end terminals (MASH) shall be performed according to applicable portions of Sec. 606, Sec. 606.10, and Sec. 606.30.

3.1 New bolts, nuts and washers shall be used throughout in the re-erection work. Rail elements and posts that are damaged during removal or that are otherwise unsatisfactory for re-erection shall be replaced.

3.2 Where existing steel block-outs are encountered, they shall be replaced with either new wood or new plastic block-outs. The existing steel posts may be drilled to match the bolt pattern shown on the plans for the wood block-out or a new steel post shall be provided.

3.3 Existing bolts shall be removed by removing or shearing the nuts. The use of a cutting torch to remove existing bolts will not be allowed.

3.4 The complete Type A crashworthy end terminals (MASH) shall be re-erected at the locations and according to the details shown on the plans.

3.5 The removal and re-erection of Type A crashworthy end terminals (MASH) shall be completed in one construction operation during the same day.

4.0 Method of Measurement. The complete removal and re-erection of the Type A crashworthy end terminals (MASH) will be measured for payment in place at the location of re-erection in units of each according to Sec. 606.30.4.

5.0 Basis of Payment. The work of complete removal and re-erection will be paid for at the contract unit price for:

Item No.	Units	Description
606-99.02	Each	Remove and Re-erect Type A Crashworthy End Terminal (MASH)

New bolts, nuts, washer and the replacement of unsatisfactory rail elements and post will not be paid for separately but shall be included in the unit bid price for Remove and Re-erect Type A Crashworthy End Terminals (MASH).

GG. Guardrail Posts in Concrete JSP-22-02B

1.0 Description. This work shall consist of the careful removal of any posts, including but not limited to: bridge anchor section and transition section posts, that are embedded in existing concrete (drain basin or other concrete surface), the coring of new holes to install posts that fall within the limits of the concrete surface, the repair of the holes left from removal of existing posts, and the backfilling of material in the new locations in accordance with the plans and these provisions.

2.0 Construction Requirements. The contractor shall carefully saw cut around the existing guardrail posts embedded in concrete or otherwise remove the posts with minimal damage to the surrounding concrete.

2.1 Posts for the new bridge anchor section and asymmetrical transition section shall be installed in the concrete drain basin per Standard Plan 606.50. The relief slot behind the post shall be filled with coarse Type 1 Aggregate to within two (2) inches of the surface. The top two (2) inches shall be filled with compacted hot mix asphalt or a dense cold asphalt repair mix. The purpose of the capped material is to prevent water intrusion.

2.2 All voids in the concrete left from the removal of the existing posts shall be filled with concrete or compacted hot mix asphalt to a depth that matches the existing thickness of the concrete surface. Concrete bag mix (5,000 psi or greater) or a commercial mix will be allowable for this purpose.

3.0 Method of Measurement. Measurement of Guardrail Posts in Concrete will be per each new post installation that falls within the limits of the concrete surface.

4.0 Basis of Payment. All labor, equipment, and materials necessary for compliance with this provision will be paid for at the contract unit bid price for:

Item No.	Units	Description
606-99.02	Each	Guardrail Posts in Concrete

HH. Manual Sliding Gate for Parcel # 19

1.0 Description. This work shall consist of furnishing material & labor for installing a Manual Sliding Gate in accordance with Section 607 of the Missouri Standard Specifications for Highway Construction and as approved by the engineer for the entrance to the St. Mary of Victories Hungarian Catholic Church (Parcel #19) on 3rd Street.

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

2.1 Chain Link fence shall be per Section 1043 of the Missouri Standard Specifications for Highway Construction.

3.0 Requirements. The Manual Sliding Gate shall at a minimum match the existing sliding gate height and length dimensions. The gate shall also match the existing clearance from the bottom of the gate to the driveway surface. The gate shall have a method to be locked.

3.1 The contractor shall submit shop drawings for the manual gate for review and approval by the engineer.

4.0 Construction Requirements. The new driveway profile will be lowered to meet ADA Requirements for the sidewalk path. This new gate will need to be lowered to maintain the existing clearance from the bottom of the new gate to the top of the new driveway profile. In order to maintain this clearance, a concrete gutter will need to be installed behind the existing block wall so that the gate mechanism will still freely roll to operate. This concrete gutter must also maintain positive drainage.

5.0 Method of Measurement. Measurement of the manual sliding gate will be made per lump sum.

6.0 Basis of Payment. All labor, equipment, and materials necessary to install the manual sliding gate and concrete gutter will be paid for at the contract unit price for:

Item No.	Units	Description
607-99.01	L.S.	Manual Sliding Gate

II. 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

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 monitors 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.

JJ. ADA Curb Ramps

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. Providing work zone protections for pedestrians will be a primary component of this project. Specifically, this work shall consist of providing pedestrian detours, including all necessary designing of specific detour routes, placing of signing, barricades, and channelizing. Nothing in this provision shall be construed to limit contractor innovation in mitigating pedestrian traffic impacts. All revisions shall be submitted to the engineer in writing 3 days prior to approval.

1.1 The contractor shall assure that the persons establishing the grades of the ADA facilities have a copy of ADA related provisions at hand for reference including the construction ADA checklist, ADA related JSPs, plans, and standard plans. 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 for construction of curb ramps shall apply. Items and materials used for pedestrian traffic control shall be in accordance with Section 616 of the Missouri Standard Specifications for Highway Construction of the version current at the time of the bid opening, as applicable.

2.1 The area to be removed and/or constructed under this provision includes the entire curb ramp, flares, landing pads, truncated domes, sidewalk, and any curbs, including variable height curbs.

2.1.1 Asphalt Mill and fill may be necessary at the face of the ADA ramp to provide a smooth transition from the roadway to the ramp or to drain storm water away from the ADA ramp. The contractor shall establish the grade of the flow line of the gutter before establishing the grades of ADA facilities. Running or standing storm water shall not be pushed out into the roadway by the asphalt where it may be splashed on pedestrians by passing vehicles or cause a hydroplaning hazard. The 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 otherwise 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.

2.2 Recommendations for the design type of each curb ramp to be built on this project are shown on the plans. These curb ramps may vary from the original design 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.

2.2.1 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 use of these exceptions will not be considered by the engineer unless the length needed for

compliance goes beyond 10 additional feet as shown as the plans are interpreted by the engineer. The contractor shall not place any ADA exceptions without consulting the engineer on a case-by-case basis.

2.3 Work Area Safety. The contractor shall maintain a work area that is safe for pedestrians. The areas adjacent to the contractor's physical work site shall also be maintained as needed 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 foot 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 solely to avoid the need for a lane closure. Items for lane closures are provided in the plans and quantities. The contractor shall fence in his work area to provide no access to the general public during the construction of the project.

2.4 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. Curb ramp work on each street corner shall be completed 84 hours after work begins on that corner, including adjusting pull boxes, placing sod, placing curb, or any other incidental work. The contractor shall be allowed to work at no more than two corners of an intersection at any time, regardless of the amount of work at each intersection.

2.4.1 Pedestrian Detours. The contractor may exempt themselves from the above 84-hour provision by providing and maintaining a signed pedestrian detour at their own cost on a route with equal or better ADA accessibility than the closed pathway if such routes exist. Pedestrian detours shall be approved by the engineer. Since MoDOT may not own the right-of-way of the detour path, the contractor shall ascertain that the detour route will remain open during its planned use as a detour. The contractor shall inform the engineer of their plans to use a detour not less than three weeks before it is set up.

2.4.2 Detour Locations. Pedestrian detours are to cross the street or go around the block where facilities exist. It may be possible to provide one detour for more than one corner/work location; the quantity for pedestrian detours will be based on the number of work locations needing detours and not on the number of detours actually used. The detour routes shall have equal or better accessibility than existing in the construction location and shall be approved by the engineer. Detours may also use roadway shoulders with sufficient width to provide for pedestrians, and the traffic control to protect them, and where parking is not allowed, provided drainage structures are not a hazard.

At locations where an pedestrian detour is not feasible, the contractor has the option of staging work to maintain a 3' minimum pathway, providing a temporary pathway (3' minimum width) that does not reduce the number of through lanes of the roadway, or providing a full closure with signs for a maximum of 84 hours to reopen the walkway to pedestrian traffic in its final configuration. Locations for full closure shall be submitted to the engineer in writing 2 weeks prior to beginning work, and signs shall be placed announcing the closure 1 week before work begins.

2.5 Liquidated Damages. If work associated with curb ramp modification begins but is not complete and open to pedestrian traffic within **84 hours** 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 **$250.00 per hour** of delay that closes a walkway in excess of 84 hours. 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.

2.5.1 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. There shall be no permitted excuse for delay of the work, including weather.

2.6 The curb ramps to be modified per this provision vary in size. It is the contractor's responsibility to verify actual quantities needed to satisfy this provision.

2.7 The truncated domes shall come from Pre-Qualified List FS-1067 Table 1.

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.

Item No.	Units	Description
608-99.02	Each	ADA Curb Ramp With Truncated Domes
608-99.02	Each	ADA Curb Ramp Without Truncated Domes

No direct payment will be made for any excavating or preparing of the subgrade, furnishing or installing reinforcement, any incidental work required for furnishing and installing tie bars, tinting of concrete surface as required in the plans, 4" Type 5 aggregate base, truncated domes, sod, or asphalt mill and fill required to transition the new ramp to existing pavement or to drain the sidewalk, warping sidewalk to meet existing sidewalk sections, relocating or resetting granite curb, the removal and replacement of existing curb/curb and gutter, the removal of existing concrete slabs, saw cuts, or other work necessary in the satisfactory completion of this provision.

KK. 4 In. Bolt Down Bollard

1.0 Description. This work shall consist of furnishing material for and installing bollards on sidewalks as shown on the plans or as directed by the engineer.

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

2.1 Bollards shall be made of schedule 40 steel.

2.0 Requirements. Bollards shall have a height of 36 inches (above sidewalk), outside diameter of 4 inches, a cap, and no reflective banding. Bollards shall be powder coated yellow. Bollards shall have an 8"x8" base plate (0.55" thick) used to mount the bollards to the sidewalk.

3.0 Construction Requirements. Bollards shall be surface mounted on the sidewalk to indicate the designated pedestrian pathway. The sidewalk shall be cleaned of dirt and gravel before installation. Bollards shall be mounted using the manufacturer's specified anchor bolts per the special drawing included in the plans.

4.0 Method of Measurement. Measurement of bollards will be made per each.

5.0 Basis of Payment. All labor, equipment, and materials necessary to install these bollards will be paid for at the contract unit price for:

Item No.	Units	Description
608-99.02	Each	4 In. Bolt Down Bollard

LL. 8 In. Ductile Iron Bollard

1.0 Description. This work shall consist of furnishing material for and installing two bollards adjacent to relocated fire hydrant on 3rd Street South of MoDOT's maintenance entrance, as shown on Special Sheet 19 of 70 or as directed by the engineer.

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

2.1 Bollards shall be made of Ductile Iron Class 52 or 54.

3.0 Requirements. Bollards shall have a height of 36 inches (above ground) and 4 feet buried in the ground, outside diameter of ductile iron shall be 8 inches and concrete encased. Bollards shall be concrete encased inside the bollard from below the concrete median grade to the bottom of the bollard The bollard shall also be concrete encased 3 foot diameter around each bollard below the sidewalk grade to the bottom of the bollard. Bollards shall be powder coated yellow (above ground).

4.0 Construction Requirements. Two bollards shall be installed 3 feet from the center of each fire hydrant as shown on the plans or as directed by the engineer and not be installed directly over a hydrant lead.

5.0 Method of Measurement. Measurement of bollards will be made per each.

6.0 Basis of Payment. All labor, equipment, and materials necessary to install these bollards will be paid for at the contract unit price for:

Item No.	Units	Description
608-99.02	Each	8 In. Ductile Iron Bollard

MM. Hand-Railing Mounted to Concrete Retaining Wall

1.0 Description. This work shall consist of furnishing material and labor for installing a Hand-Railing Mounted to a Concrete Retaining Wall for the sidewalk ramp along Lafayette Avenue in

accordance with the Missouri Standard Specifications for Highway Construction and as approved by the engineer.

2.0 Material. All material shall be in accordance with Division 1000 - Material Details of the Missouri Standard Specifications and as shown on Standard Drawing 608.40A Handrailing of the Missouri Standard Plans for Highway Construction.

3.0 Requirements. The hand-railing shall meet all the requirements in Section R409 Handrails in the Proposed Accessibilities Guidelines for Pedestrian Facilities in the Public Right-of-Way (PROWAG).

3.1 The contractor shall submit shop drawings for the hand-railing mounted to concrete retaining wall for review and approval by the engineer

4.0 Construction Requirements. The hand-railing shall be mounted to the concrete retaining wall per the manufacturer's recommendations.

5.0 Method of Measurement. Measurement of the hand-railing will be made per linear feet.

6.0 Basis of Payment. All labor, equipment, and materials necessary to install the hand-railing will be paid for at the contract unit price for:

Item No.	Units	Description
608-99.03	LF	Hand-Railing Mounted to Concrete Retaining Wall

NN. Concrete Curb Under Guardrail

1.0 Description. This work shall consist of removing and replacing or modifying existing curb to comply with guardrail standards for a variety of concrete curb types and heights at locations shown on the plans within guardrail limits.

2.0 Construction Requirements. The contractor shall have the option of either removing and replacing existing curbs or modifying existing curbs by horizontal saw cut methods to meet the required curb height dimensions as designated in the plans. If the contractor elects to remove and replace the existing curbs, the contractor has the option to choose the most practical curb type at each location unless specified in the plans. The method of obtaining curb height compliance under guardrail shall be at the discretion of the contractor considering traffic control and safety requirements. The contractor shall inform the engineer of the types of curbs that will be used and in what locations before work begins. The contractor shall resolve any concerns expressed by the Engineer. Construction and materials shall be in accordance with Sec 609, except as modified herein. Any special materials that may be used shall be tested and approved by MoDOT Materials prior to commencing this work.

2.1 Joints shall be constructed at intervals and locations shown on the plans or as directed by the engineer.

2.2 Reinforcing steel epoxy coating shall be repaired in accordance with Section 710.3.3.

3.0 Basis of Acceptance. Acceptance of this provision will be based on visual inspection by the engineer.

4.0 Method of Measurement. Final measurement will be field verified and measured to the nearest linear foot along the curb face.

5.0 Basis of Payment. Payment for furnishing all labor, equipment, materials, seeding, mulching, grading, sawcut, erosion control, removal and traffic control including other incidentals necessary to remove and replace or modify existing curbs shall be completely covered by the contract unit price for the following pay item:

Item No.	Units	Description
609-99.03	L.F.	Concrete Curb Under Guardrail

OO. Concrete Gutter Type A (Special)

1.0 Description. This work shall consist of constructing special Type A concrete gutter as shown on the plans or as directed by the engineer. The curb height on the special Type A concrete gutter shall vary from 4 inches to 6 inches as detailed in the plans.

2.0 Material. Material for special Type A concrete gutter shall be as specified in Sec 609.10.2.

3.0 Construction Requirements. Construction requirements for special Type A concrete gutter shall be as specified in Sec 609.10.3.

4.0 Method of Measurement. Special Type A concrete gutter will be measured in accordance with Sec 609.10.4.

5.0 Basis of Payment. The accepted quantity of special Type A concrete gutter, complete in place, will be paid for at the contract unit price for:

Item No.	Units	Description
609-99.03	L.F.	Concrete Gutter Type A (Special)

5.1 No direct payment will be made for the following:

(a) Excavation below the upper surface of the special Type A concrete gutter.

(b) Any work necessary for preparing the subgrade and backfilling the compete special Type A concrete gutter.

(c) Furnishing or installing reinforcement.

PP. Partial Depth Concrete Pavement Repair Using Hot Applied Polymer Modified Repair Material NJSP-19-01A

1.0 Description. This work shall consist of removal, furnishing, and placing material to repair existing concrete pavement by performing partial depth concrete pavement repairs as specified in plans or as approved by the engineer. All work shall be in accordance with Section 613 except as herein modified.

2.0 Construction Requirements.

2.1 Individual repair areas shall be limited to approximately 24 square feet in area. Repair areas larger than 24 square feet shall be patched with a cementitious based material in accordance with Section 613.

2.2 Removal of the existing patched, spalled, delaminated, or otherwise deteriorated concrete surface shall be limited to 1/3 (one third) of the pavement thickness or 4 inches, whichever is less. Removal of concrete shall be accomplished with light jack hammers and/or a mill head designed for concrete milling. All loose materials, including milled or broken concrete or asphalt, crack seal materials, oil, sand, dust, grit, or other contaminants, shall be completely removed. Removal of material shall be in accordance with Sec 202.2.

2.3 All surfaces shall be cleaned with compressed air at a minimum of 100 psi.

2.4 Partially exposed reinforcing steel mesh shall be sandblasted clean or removed before placing patch materials. If sandblasting is used, all surfaces shall be cleaned of loose sandblasting grit with compressed air.

2.5 All surfaces of the repair area shall be primed using a primer and procedure recommended and approved by the manufacturer. Any costs related to primer shall be included in the unit cost. No direct payment will be made for the priming of the repair areas.

2.6 Material shall be placed in 1inch lifts until the repair is level with the existing pavement. Each lift shall be adequately cooled, based on manufacturer recommendations, prior to subsequent lift placement.

2.7 Repairs that are greater than 1 inch in depth require the addition of bulking aggregate 20% to 50% by volume, as recommended by the manufacturer. The bulking stone shall be double washed, dust-free 5/8 inch to 1 inch sized granite. The bulking aggregate shall be adequately heated and dried prior to placement. No direct payment will be made for costs associated with bulking stone placement.

2.8 Topping stone shall be placed on the surface of the patch to improve surface friction using a procedure recommended by the manufacturer. The topping stone shall be double washed, dust-free, angular, hard aggregate. The topping stone shall be adequately heated and dried prior to placement. No direct payment will be made for costs associated with topping stone placement.

2.9 Traffic shall not be allowed on the repair area until the patching material has adequately cooled and gained strength, as recommend by the manufacturer.

2.10 Repair areas in the roadway and shoulders shall be swept clean of all loose debris before opening to traffic.

2.11 Any patches that vary by more than ¼ inch from the existing profile of the roadway or of poor workmanship shall be removed and replaced by the contactor at the contractor's expense.

3.0 Material Requirements.

3.1 The contractor shall submit the manufacturer's specifications for the material for patching and repair to the engineer for approval. The contractor shall follow manufacturer's specifications for material preparation and placement.

3.2 Material shall be hot pour, polymer modified, resin-based concrete repair material, flexible and grey in color. Material shall provide an impermeable, voidless mass at ambient temperatures. Material is to be mixed and heated on site as recommended by the product manufacturer. The repair material shall be factory blended and in meltable bags.

4.0 Additional or Reduced Work. If additional repair work is necessary beyond what is specified in the work order or the required repair is not as extensive as originally viewed, the contractor shall contact the engineer for authorization to proceed with the additional or reduced work. The contractor shall note that with this authorization to proceed with additional or reduced work may change which unit bid item is used to calculate final payment depending on final repair quantities. Any work performed without authorization of the engineer shall be at the contractor's expense.

5.0 Method of Measurement. Measurement shall be made to the nearest pound based on the actual material used with an acceptable form of package documentation.

6.0 Basis of Payment. Payment shall be paid by the pound and shall be full compensation for all repair work including removal of loose materials, cleaning of concrete surface, and furnishing and placing material for Partial Depth Pavement Repair using flexible, hot polymer-modified repair material. All cost for the repair work, including labor, equipment, materials, and containment and disposal of material shall be included in:

Item No.	Units	Description
613-99.11	Pound	Partial Depth Concrete Pavement Repair Using Flexible, Hot Polymer Modified Repair Material

QQ. 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.	Units	Description
616-99.01	L.S.	Lump Sum Temporary Traffic Control

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

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

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

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

(a) Full Matrix - Each CMS shall be the Full Matrix type with the capability of providing one, two, and three lines of individual changeable characters with minimum heights of 52 (1300), 28 (700), and 18 (450) inches (mm), respectively. Full Matrix signs shall be capable of both static and dynamic graphics, and full display sized messages.

(b) Character Matrix (Three Line) – Each CMS shall consist of a minimum of three lines containing eight individual changeable characters per line. Each character shall be a minimum of 12 inches wide and 18 inches (450 mm) high.

(c) Sign firmware shall comply with the current FHWA and DOT (Department of Transportation) NTCIP standards and support all NTCIP mandatory objects.

(d) Physical access to the onboard computer shall be protected by a padlock or other locking handle mechanism. Electronic access to the onboard computer shall be protected by a username and password.

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

(a) The overall sign dimensions shall not be less than 72 inches (1800 mm) high x 126 inches (3150 mm) wide.

(b) The CMS shall be legible up to a distance of 650 feet (200 m) for both day and night operations and shall be visible for ½-mile (800 m) with 18 inch (450 mm) characters.

(c) When fully raised in the display position, the bottom of the CMS board shall be at least a height of 7 feet (2100 mm) from the ground and shall be able to rotate a complete

360 degrees atop the lift mechanism. A sight tube, used to aim the CMS board to oncoming traffic, shall be installed on the CMS board or mast. The CMS shall have an electrical hydraulic lifting mechanism that includes a manual lifting and lowering relief mechanism as a backup. It also must be able to be locked into various viewing angles as determined best for the motorists by the CMS operator.

(d) All LED displays and control circuitry shall be operational from -20 F (-29 C) to 120 F (50 C). The LED's shall have a rated life of 100,000 hours. The LED's shall be ITE amber in color on a flat black background.

(e) The CMS face shall be constructed that if an individual panel or pixel fails the rest of the face shall continue to display the message.

(f) The unit shall be able to withstand a 65-mph (105-kmph) maximum road wind speed. The trailer shall be able to support the fully extended CMS board in an 80-mph (130-kmph) wind load.

(g) Solar charging system shall allow for total autonomy of 24/7/365 continuous operation.

(h) All exterior surfaces except the sign face shall be cleaned, primed, and finished with two coats of Highway Safety Orange and the sign interior itself shall be cleaned and finished with one coat of corrosion inhibiting primer and two coats of flat black. The sign face shall be covered with a rigid translucent material to prevent damage to the sign face caused by the environment.

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

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

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

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

Item Number	Unit	Description
616-99.02	Each	NTCIP Compliant Changeable Message Sign (Contractor Furnished and Retained)

SS. Guardrail/Concrete Barrier Blockout Fill

1.0 Description. This work shall consist of filling in the guardrail blockout in the existing concrete barrier to allow for the appropriate connection of the new MGS bridge approach transitions section to be made as shown on the plans or as directed by the engineer.

2.0 Material. Material for guardrail/concrete barrier blockout fill shall be as specified in Sec 617.10.2.

2.1 Coarse aggregate used in Class B-1 concrete shall be Gradation E as specified in Sec 1005.2.4.

3.0 Construction Requirements. Construction requirements for guardrail/concrete barrier blockout fill shall be as specified in Sec 617.10.3.

4.0 . Method of Measurement. Measurement of guardrail/concrete barrier blockout fill will be made per each.

5.0 Basis of Payment. The accepted quantity of guardrail/concrete barrier blockout fill will be paid at the contract unit price for:

Item No.	Units	Description
617-99.02	Each	Guardrail/Concrete Barrier Blockout Fill

5.1 Payment for the Guardrail/Concrete Barrier Blockout Fill per each includes all labor, equipment, and materials necessary to fulfill the requirements of the above provision.

TT. Concrete Barrier Gap Protection Assembly

1.0 Description. This work shall consist of furnishing and installing concrete barrier gap protection assemblies as shown on the plans or as directed by the engineer.

2.0 Material. All material shall be in accordance with Division 1000, Material Details and as specified below.

2.1 Steel for angles, tubes, and bent end plates shall be ASTM A709 Grade 50.

2.2 Requirements for welded studs shall be in accordance with Sec 1037. Alternately, a 5/16” fillet weld using shielded metal arc welding will be permitted.

2.3 Steel for angles, tubes, studs and bend end plates shall be galvanized in accordance with ASTM A123 and Sec 1081.

2.4 The contractor shall use one of the qualified resin anchor systems in accordance with Sec 1039.

3.0 Construction Requirements. The concrete barrier gap protection assembly shall be constructed in accordance with the details shown in the plans.

4.0 Method of Measurement. Measurement of concrete barrier gap protection assembly, complete in place, will be made per each.

5.0 Basis of Payment. The accepted quantity of concrete barrier gap protection assembly:

Item No.	Units	Description
617-99.02	Each	Concrete Barrier Gap Protection Assembly

5.1 Payment for the Concrete Barrier Gap Protection Assembly per each includes all labor, equipment, and materials necessary to fulfill the requirements of the above provision.

5.2 The permanent concrete traffic barrier will be measured and paid for in accordance with Sec 617.10. No direct payment will be made for reinforcing steel, dowels, joint filler material, anchors, resin, sawed joints and any other ancillary work/material associated with constructing the permanent concrete traffic barrier.

UU. Concrete Traffic Barrier, Type C (Modified)

1.0 Description. This work shall consist of constructing modified Type C concrete traffic barrier as shown on the plans or as directed by the engineer.

2.0 Material. Material shall be as specified in Sec. 617.10.2.

3.0 Construction Requirements. The modified Type C concrete traffic barrier shall be constructed as detailed in the plans and in accordance with Sec 617.10.3.

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. Where required, measurement for modified Type C concrete traffic barrier will be made to the nearest ½ linear foot for each continuous length and totaled to the nearest linear foot for the sum of the lengths.

5.0 Basis of Payment. Accepted Concrete Traffic Barrier, Type C (Modified) will be paid for at the contract unit price per linear foot. No direct payment will be made for reinforcing steel, dowels, joint filler material and sawed joints.

Item No.	Units	Description
617-99.03	L.F.	Concrete Traffic Barrier, Type C (Modified)

VV. Optional Temporary Pavement Marking Paint NJSP-18-07E

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 2025, 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, 2024 and March 1, 2025, both dates inclusive, except as stated herein. When the contractor has begun application of PPMP prior to October 1, 2024, 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, 2024, 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, 2025. All PPMP shall be completed prior to June 1, 2025. 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, 2024, even when there is sufficient time to complete the PPMP prior to October 1, 2024. 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 2025, 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, 2025, 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, 2025.

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 No.	Units	Description
620-99.01	L.S.	Temporary Pavement Marking Paint

WW. Pavement Marking Removal

1.0 Description. This work shall consist of all necessary operations for removal of existing pavement marking lines and intersection markings as shown on the plans or directed by the engineer.

2.0 Construction Requirements. Construction requirements for pavement marking removal shall be as specified in Sec 620.50.2 and as specified below.

2.1 All pavement marking shall be removed by the use of the power washing method. In the event that the power washing method is unable to remove the existing pavement marking to meet the requirements in Sec. 620.5.2, an alternative removal method shall be used with the approval of the engineer.

3.0 Method of Measurement. The quantity of pavement marking removal will be measured in accordance with Sec 620.50.3.

4.0 Basis of Payment. The accepted quantity of pavement marking removal will be paid for at the contract unit price for:

Item No.	Units	Description
620-70.01	LF	Pavement Marking Removal
620-70.02	Each	Pavement Marking Removal (Symbols)

XX. Preformed Thermoplastic Contrast Pavement Markings

1.0 Description. This work shall consist of furnishing and installing preformed thermoplastic pavement marking with black contrast for white intermittent markings and white dotted lines on the concrete bridge decks and concrete approaches of the Railroad Bridge Nos. A1076 and A1276, and the 2nd Street Bridge No. A1085 as shown on the plans or as directed by the engineer.

2.0 Material. Material shall be performed thermoplastic pavement marking in accordance with Sec 620.20.3.2.2.

3.0 Construction Requirements. Construction requirements shall be in accordance with applicable portions of Sec 620.60.3.

3.1 White intermittent markings and white dotted lines on the concrete bridge decks and concrete approaches of the Railroad Bridge Nos. A1076 and A1276, and the 2nd Street Bridge No. A1085 shall have a minimum 1.5 inch black outside contrast border surrounding them. The black contrast border shall be performed thermoplastic and interconnected in the factory with the white intermittent markings and the white dotted lines. Interconnection shall be accomplished by way of heat fusion between the black contrast border and the white intermittent makings and the white dotted lines without the use of any other adhesive substances.

4.0 Basis of Payment. Payment for all labor, equipment, materials, and incidental work for furnishing and placing preformed thermoplastic pavement markings with contrast black, complete in place, will be paid for at the contract unit price for the following:

Item No.	Units	Description
620-99.03	LF	Preformed Thermoplastic Pavement Marking, 6 In. White With 1.5 In. Contrast, Black
620-99.03	LF	Preformed Thermoplastic Pavement Marking, 12 In. White With 1.5 In. Contrast, Black

YY. Preformed Thermoplastic Pavement Markings, 30 In. Midblock

1.0 Description. This work shall consist of furnishing and placing white midblock preformed thermoplastic pavement markings in accordance with Sec 620.20.

2.0 Material. All materials shall be as specified in Sec 620.20.3.2.2.

3.0 Construction Requirements. Construction requirements shall be as specified in Sec 620.20.3.2.3.

4.0 Method of Measurement. Measurement of 30-inch White Midblock pavement marking will be made per each for markings with a total measured length of 9 linear feet or less.

Measurement of 30-inch White Midblock pavement markings with a total measured length of more than 9 linear feet will be made to the nearest linear foot per block along the width of the crosswalk.

5.0 Basis of Payment. Payment for all labor, equipment, materials, and incidental work for furnishing and placing midblock preformed thermoplastic pavement markings, complete in place, will be paid for at the contract unit price for the following:

Item No.	Units	Description
620-99.02	Each	Preformed Thermoplastic Pavement Marking, 30 In. White Midblock (9 Foot Length And Under)
620-99.03	LF	Preformed Thermoplastic Pavement Marking, 30 In. White Midblock (Greater Than 9 Feet Length)

ZZ. Special Preformed Thermoplastic Pavement Markings

1.0 Description. This work shall consist of furnishing and placing special preformed thermoplastic pavement markings in accordance with the manufacturer's recommendations at locations shown on the plans or as directed by the engineer. Glass beads, when required, shall be in accordance with Sec 620.30. The geometry and dimensions of the special preformed thermoplastic pavement markings shall be as detailed in the plans and in accordance with Sec 3B.20 and Sec 9C.07 of the MUTCD.

2.0 Material. All materials shall be as specified in Sec 620.20.3.2.2.

3.0 Construction Requirements. Construction requirements shall be as specified in Sec 620.20.3.2.3 (including all subsections).

3.1 Merge arrows shall have a minimum 3 inch black outside contrast border surrounding the merge arrow. The black contrast border shall be performed thermoplastic and interconnected in the factory with the merger arrow. Interconnection shall be accomplished by way of heat fusion between the black contrast border and the merge arrow without the use of any other adhesive substances.

4.0 Method of Measurement. Measurement of special preformed thermoplastic pavement markings shall be as specified in Sec 620.20.4 (including all subsections).

5.0 Basis of Payment. Payment for all labor, equipment, materials, and incidental work (including the 3-inch black outside border surrounding the merger arrows on concrete pavement) for furnishing and placing special preformed thermoplastic pavement markings, complete in place, will be paid for at the contract unit price for the following:

Item No.	Unit	Description
620-99.02	Each	Preformed Thermoplastic Pavement Marking, Interstate Shield
620-99.02	Each	Preformed Thermoplastic Pavement Marking, “South”
620-99.02	Each	Preformed Thermoplastic Pavement Marking, “West”
620-99.02	Each	Preformed Thermoplastic Pavement Marking, Merge Arrow With 3 In. Contrast, Black
620-99.02	Each	Preformed Thermoplastic Pavement Marking, U-Turn Arrow
620-99.02	Each	Preformed Thermoplastic Pavement Marking, Combination Lt/Rt Arrow
620-99.02	Each	Preformed Thermoplastic Pavement Marking, International Symbol of Accessibility
620-99.02	Each	Preformed Thermoplastic Pavement Marking, Bike Share Arow
620-99.02	Each	Preformed Thermoplastic Pavement Marking, Bike Lane

AAA. Tier II Inlaid Pavement Arrow System

1.0 Description. This specification is for a system of internally Illuminated Recessed Pavement markers which together make an arrow to deter wrong way drivers. The system shall include an 8” wide preformed thermoplastic pavement arrow along with 8 internally illuminated recessed pavement markers per arrow (unless specified without).

2.0

For specific location layout of these arrows, the contractor shall contact:

Eddie Watkins
Traffic Operations Engineer
Phone: 314-650-5461
Email: Eddie.Watkins@modot.mo.gov

2.0 Operation Specifications. Pavement markers shall meet the following requirements:

2.1 Charge Time 3 Hours/8 Hours cloudy

2.2 Operating Time 16 Hours

2.3 Compressive Strength 239,000 N / 53,775 lbf

2.4 Water Proof Rating IP68

2.5 Operating Temperature -13°F to 158°F

2.6 Dimensions (inches) Ø 5.83" x 1.97"

2.7 Weight (pounds) 2.23#

3.0 Lighting Specifications.

Lighting Specification – Luminance (LUX)			
Function	**Color**	**3 LED**	**6 LED**
Steady	Yellow	24	34
	White	138	54.8
	Red	48	17.3
	Green	17.8	62
	Blue	90.6	47.7

4.0 Component Specifications.

Single Mono-Crystalline Solar Cell	Solar Module Size	82 x 82
	Solar Maximum Output Power	0.677W
	Solar Operating Current	2156mA
	Solar Voltage	3.15V
LED	LED Size	3528 CHIP LED + Ø10
	LED Current	20mA per each
	LED Operating Current	1.1 mA (3PCS), 6.6mW (6PCS)
	LED Voltage	3V
	LED Wattage	3.3 mW(3PCS),
	LED Quantities	3PCS / 6PCS
Pseudocapacitor	Pseudocapacitor	2.3V 120F
	Number of Semicapacitors	2pCS

5.0 Payment. Payment for all labor, equipment, materials, and incidental work for placing Tier II Inlaid Pavement Arrow System and Tier II Inlaid Pavement Arrow System (Without 8 LED Inlaid Markers), will be paid for at the contract unit price for:

Item No.	Units	Description
620-99.02	Each	Tier II Inlaid Pavement Arrow System
620-99.02	Each	Tier II Inlaid Pavement Arrow System (Without 8 LED Inlaid

BBB. Inlaid Pavement Marker Installation

1.0 Description. This work shall consist of furnishing and installing inlaid pavement markers as shown on the plans or as directed by the engineer. An inlaid pavement marker shall consist of a retro-reflective pavement marker installed below the pavement surface. The marker shall be installed with a cradle device which supports the reflector at the proper depth below the pavement and attached to the pavement with adhesive. In addition to cutting a location for the marker, a slot shall be grooved into the pavement both before and after the marker for visibility of the marker and drainage. Final product shall have two markers in place at each location.

2.0 Material. All material shall be in accordance with the following.

2.1 Marker. The marker shall have two retro-reflective lenses white facing traffic and red facing opposing / wrong way traffic to reflect incident light from opposite directions. The lens shall be hermetically sealed and permanently bonded to the marker base. The manufacturer's identification shall be molded in the face of the marker lens or on the marker body so as to be visible after installation. The reflector color shall be as shown on the plans.

2.1.1 The marker shall have nominal dimensions of 2.0 x 5.0 x 0.7 inches. The reflective surface of each lens shall be a nominal 1.93 square inches in area.

2.1.2 In addition to the requirements described, the marker/cradle system shall be National Transportation Product Evaluation Program (NTPEP) approved. The marker shall receive at a minimum an average rating of 3.0 for lens and visibility after one year of exposure on both concrete and asphalt test decks. A written request for qualification shall be sent by the manufacturer to Construction and Materials with the following information:

(a) Brand name of the product.

(b) A copy of the actual test results from NTPEP.

(c) Certification that the material meets this specification and is intended for use as described.

(d) Specific installation instructions.

2.2 Adhesive. The adhesive used to bond the marker to the pavement shall be an epoxy approved by the engineer or meet the manufacturers specifications.

3.0 Construction Requirements.

3.1 Reflector placement. A cradle shall be used to hold the marker at the correct nominal depth of 0.12 inch. The cradle shall be made of polycarbonate plastic and the net weight of the cradle and marker shall be less than 5 ounces. When installed, the marker shall be perpendicular to traffic.

3.2 Pavement groove. There shall be a groove cut both in advance and behind the marker using diamond tipped blades. The entire groove shall be cut in accordance with the manufacturer's recommendations. The groove should be straight to within 1/2 inch in 10 feet. The width of the groove shall be 5 inches or per manufacturer's specifications.

The overall length of the groove cut in the pavement surface shall be 9 feet, with markers placed 3.5 feet from either end and spaced 2.0 feet apart.

3.3 Installation. The groove and the bottom surface of the marker shall be free of scale, dirt, rust, oil, grease, or any other contaminant that might reduce bonding to the adhesive.

3.3.1 The adhesive used to install the marker shall be machine applied unless otherwise approved by the engineer. The machine mixer and applicator shall be capable of accurately and uniformly proportioning the components. The mixing chamber shall produce an epoxy adhesive of uniform color with no visible evidence of streaks on the surface or within the mixed epoxy adhesive.

3.3.2 No markers shall be installed when the ambient temperature is below 50 F (10 C), the relative humidity is above 80 percent, or the pavement surface is wet.

3.3.3 Newly placed bituminous pavement surfaces shall be allowed to cure for a minimum of seven days prior to installing reflectors.

3.3.4 A longitudinal adjustment to the location of a marker shall be made in order to avoid damage to deteriorated pavement or transverse joints. In locations where concrete and bituminous surfaces abut, markers shall be installed in the concrete surface.

3.3.5 The pavement shall be accurately cut to the marker manufacturer's specifications. The depth of the groove where the marker is to be placed shall be in accordance with manufacturer's specifications.

3.3.6 If necessary, installation grooves on crowned pavements, superelevated pavements, or ramps shall be cut as needed to provide proper marker fit.

3.3.7 The groove shall be clean and dry prior to application of the adhesive.

3.3.8 There shall be no adhesive on the lens or top of the marker.

3.3.9 When hand mixing of epoxy adhesive is permitted, no more than one quart (L) of epoxy adhesive shall be mixed at one time. The marker shall be installed within five minutes after mixing operations are started.

3.3.10 The installed marker shall be protected from traffic until the adhesive has cured according to manufacturer's recommendations. If, after the manufacturer's recommended cure time, epoxy adhesive can be penetrated by a screwdriver or other pointed instrument, the marker shall be removed, cleaned, and reinstalled.

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.

When required, measurement of inlaid pavement markers will be measured per each. 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 inlaid pavement markers will be paid at the contract unit price for:

Item No.	Units	Description
620-99.02	Each	Inlaid Pavement Marker Installation

5.1 Payment for the Inlaid Pavement Marker Installation per each includes all labor, equipment, and materials necessary to fulfill the requirements of the above provision. The cost of grooving, adhesive, and installation of two pavement markers per groove will be included in the unit cost per groove installation.

CCC. Island Tubular Marker

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

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

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

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

5.0 Basis of Payment. All labor, equipment, and materials necessary to install these markers will be paid for under:

Item Number	Type	Description
620-99.02	Each	Island Tubular Marker

DDD. Curb Reflectors

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

1.1 General. The surface of the curb to which the reflector shall be applied shall be free of dirt, curing compound, moisture, paint, or any other material which would adversely affect the bond of the adhesive. Cleaning of the surface shall be to the satisfaction of the Engineer. An adhesive, meeting the reflector manufacturer's specifications, shall be placed either on the surface or the bottom of the reflector in sufficient quantity to ensure complete coverage of the contact area with no voids present and with a slight excess after the reflector is pressed firmly in place.

The installed height of the prismatic curb reflectors shall be a maximum of 3/4 in. above the mounting surface. The unit shall have one reflective surface that is placed approximately perpendicular to the mounting surface.

1.2 Basis of Payment. Payment will be made as follows:

Item No.	Type	Description
620-99.02	Each	Curb Reflectors

EEE. Coldmilling Bituminous Pavement for Removal of Surfacing and Modified Coldmilling

1.0 Description. The contractor is advised that there are concrete pavement patches and concrete base pavement areas that will require coldmilling as part of this project. These concrete pavements will not be measured and paid for separately but shall be included in the measurement and unit cost for Coldmilling Bituminous Pavement for Removal of Surfacing or Modified Coldmilling as shown in the plans.

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 provision.

FFF. Longitudinal Pavement Grooving

1.0 Description. This work shall consist of longitudinal grooving the surface of asphaltic concrete pavement in accordance with these specifications and at the locations shown on the plans or as approved by the engineer.

2.0 Construction Requirements. Grooving shall be done using diamond blades mounted on a mulitblade arbor on a self-propelled machine, which has been built for grooving of pavement. The grooving machine shall have a depth control device that can adjust the cutting head height to maintain the depth of groove specified. The grooving machine shall also have devices to control alignment. The grooving shall be performed when temperatures are above 32ºF.

2.1 Longitudinal Grooving. Longitudinal grooves shall be parallel to the pavement centerline except in areas of lane shifts across longitudinal joints. Longitudinally grooved areas shall begin and end with lines perpendicular to the pavement centerline. Grooving shall be full pavement width to within 6 inches of the centerline longitudinal joint and within 6 inches of the longitudinal joint between the driving lane and ramp area. For asphaltic concrete pavement surfaces, the grooves shall have a minimum depth of 0.250 inch and a maximum depth of 0.375 inch. Grooves shall be cut by a blade 0.125 inch wide and shall be spaced 0.750 inch, center to center.

2.2 Groove Dimensional Variance. Grooves shall be deemed acceptable if the width of the grooves is within +/- 0.015 inch, the depth of grooves is within +/- 0.062 inch, and the spacing of the grooves is within +/- 0.125 inch.

2.3 Groove Proximity to Joints and Embedments. Grooves shall not be closer than 3 inches, nor more than 9 inches to joints parallel to the grooves. Grooves that cross a joint shall be perpendicular to that joint, except through areas of lane transitions across pavement joints. Grooves shall be terminated no more than 12 inches from any device embedded in pavement, such as metal inserts, valve boxes, access plates, or other termination points as approved by the engineer.

2.4 Pavement Maintenance and Cleaning. The slurry produced during the grooving operation shall not be permitted to accumulate on adjacent lanes. Residue resulting from the grooving operations shall be continuously vacuumed from the pavement surfaces or removed using an alternate method as approved by the engineer. Pavement shall be immediately left in a clean condition after grooving. All debris and surplus material produced during the grooving operation shall become property of the contractor and shall not be disposed of on Commission owned right-of-way.

2.5 Pavement Markings. The contractor shall wait 1 week after grooving pavement before installing final pavement markings.

2.6 Maximum Time Between Asphalt Surface Course Placement and Longitudinal Grooving. Longitudinal grooving shall be competed on newly placed asphalt surface course within 5 calendar days of asphalt surface course placement.

3.0 Method of Measurement. Pavement grooving will be measured in square yards of pavement surface grooved and accepted. No deduction will be made for grooving omissions made to avoid joints and embedments, as long as omissions are within the proximity of specification.

4.0 Basis of Payment. Payment for longitudinal grooving asphaltic concrete pavement will be made at the contract unit price for the following pay item noted below. Payment will be considered full compensation for all labor, equipment, and material to complete the described work.

Item Number	Units	Description
622-99.05	Sq Yd	Longitudinal Pavement Grooving

GGG. Inlet Top Replacement

1.0 Description. This work shall consist of removing and replacing (in kind) the existing inlet tops, grates, and bearing plates along I-55 as shown on the plans.

2.0 Construction Requirements. The contractor shall field verify the size of the inlet and required grate opening area prior to ordering the corresponding curved vane grate covers, drop inlet tops and grate and bearing plates. The contractor shall saw-cut the existing pavement or shoulder around the inlet to provide the concrete pad around the inlet top in accordance with the dimensions shown in the plans. If needed, the inlet shall be adjusted to the proper elevation.

The contractor shall also repair any damage to the inlet, inlet invert, or pipe connection to the inlet.

3.0 Method of Measurement. Measurement for replacing drop inlet tops will be per each and will include, but not limited to, saw-cutting, removing pavement, removing curb, removals of the existing inlet tops and grate and bearing plates, and furnishing and installing the new inlet tops, grates, bearing plates, and concrete curb.

4.0 Basis of Payment. Payment for furnishing the labor, materials, equipment, and excavation necessary to install the new inlet top and grate and bearing plates shall be considered completely covered by the contract unit price for:

Item No.	Units	Description
731-99.02	Each	Inlet top Replacement (In Kind)

HHH. MSD As-built Submittals (Permit# 23MSD-00289)

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-built drawings for **23MSD-00289** and subsequent revisions after all drainage structures related to the project have been constructed or adjusted.

1.1 MSD Electronic Plans Submittal Process. MSD requires that permits be submitted electronically using their new online paperless system Accela. The contractor will be required to login on to this system and upload as-builts and/or shop drawings as necessary. Additional information can be found here:

https://msdprojectclear.org/doing-business/development-review/

A direct link to the new online system can be found here:

https://aca3.accela.com/STLMSD/Login.aspx

In order to access the permit, the contractor will first need to call MSD in order to obtain access for the particular job mentioned above.

1.2 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 The Contractor shall comply with all General Construction Permitting Requirements indicated in the approved permit, which includes payment of all permit fees.

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

III. Coordination with MoDOT Signal Shop for Cabinet Entry

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

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

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

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

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

JJJ. Traffic Signal Maintenance and Programming

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

2.0 Qualified Traffic Engineer

2.1 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 defined below. The Engineer shall approve the traffic engineer prior to them being hired.

2.2 Experience. Any proposed Contractor traffic engineer shall be able to demonstrate personal successful previous experience in the following tasks:

2.2.1 Response. The Contractor's traffic engineer shall have the ability to be on site within one (1) hour of being requested.

2.2.2 Corridor Management: Time/space diagram manipulation in order to successfully adjust offsets and splits for rapidly changing traffic demands.

2.2.3 Controller Programming: Ability to program by hand and by software Phase, TBC, and Coordination levels of any Commission-owned Advanced Traffic Signal Controller.

2.2.4 Intersection Programming: Implementation of adjusted and/or new timing plans as a result of changing traffic demand.

2.2.5 Signal Software: Use and understanding of TransCore traffic control software.

2.3 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 2.2 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 Commission prior to bid.

2.4 VPN Access. The Commission operates the noted signals through a central signal system which is capable of remote adjustments to controller programming.

2.4.1 The approved contractor's traffic engineer and any staff assigned to manage the traffic signals during the project is 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 engineering staff, which will allow for remote access to the Commission's central signal control system as appropriate and the ability to interface with the noted signals on this project.

3.0 Existing Traffic Signals and Communication System

3.1 The Contractor shall notify the Engineer three (3) weeks prior to the date of bridge closure and detour implementation. The contractor shall meet with the Engineer's representatives along with representatives of any other agency whose signals are controlled by this provision to discuss their traffic mitigation plan at least one (1) week before the date of the first closure 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 signals as detailed in Paragraphs 3.2 and 3.3 below.
- Other traffic mitigation efforts

The contractor shall also reach out to the following contacts to coordinate all work on the City of St. Louis & St. Louis County's signal facilities at least two weeks prior to commencing any work. The contractor shall also notify the engineer when contacting the City or County.

Jamie Wilson, P.E.
Commissioner of Traffic
City of St. Louis Street Department
email:wilsonj@stlouis-mo.gov
314-647-3111 ext. 1101

Scott Halter
St. Louis County Dept. of Transportation
Traffic Signals
314-615-0202

3.2 Once the bridge closure has been implemented by the Contractor, the Contractor shall then be solely responsible for the following signals' controller programming until completion of all

closures necessary to complete the Contractor's work. Maintenance at these locations for items other than controller programming issues or incidents caused by controller programming or other construction done by the Contractor shall remain with the Commission. If any part of an existing traffic signal or its controller within the limits of this project has otherwise been modified or adjusted by the Contractor, or the Contractor makes any roadway changes to reduce the traffic capacity through a signalized intersection within the limits of the project, or the Contractor begins work at an intersection with signals already in operation, the Contractor shall then be solely responsible for that signal's controller programming and all signal maintenance as specified in 902.2 and 902.3, except for power costs, until Final Acceptance of the project.

Commission Signals:

- I-55 at Arsenal
- I-55 at Loughborough
- I-55 at Germania
- I-55 at Carondelet / River City Blvd
- I-55 at Bayless
- I-55 at Reavis Barracks SB Ramp
- I-55 at Reavis Barracks NB Ramp
- Route 21 @ Reavis Rd
- Route 21 @ Green Park Rd / Musick Ave
- Route 30 @ Russell Blvd / I-55 NB Off-Ramp
- Route 30 @ 12th St / Geyer Ave / I-44 & 55 NE On-Ramp
- Route 50/61/67 @ Route 21
- Route 50/61/67 @ Mueller Rd
- Route 50/61/67 @ Flori / Yuma
- Route 50/61/67 @ East Concord / Von Talge
- Route 50/61/67 @ St. John's Church / Rusty Rd
- Route 50/61/67 @ I-55
- Route 50/61/67 @ Union Rd
- Route 267 at Bayless
- Route 267 at Hoffmeister
- Route 267 at Telegraph
- Route 267 at Reavis Barracks
- I-44 at Biddle St.
- I-44 at Carr St.
- I-44 at MLK Drive
- I-44 at Morgan St.
- I-44 at Convention Plaza/4th St.
- I-44 at Washington Ave/Eads Bridges
- I-44 at Walnut St.
- I-55 at 7th St. Entrance Ramp
- Layfayette at 18th St.
- Layfayette at Truman Pkwy.
- I-55 at Russell

St. Louis County Signals:

- Union Rd at Bayless Ave / Weber Rd
- Union Rd at Reavis Barracks Rd

City of St. Louis Signals:

- Russell Blvd @ 12th St
- Russell Blvd @ 7th St
- 7th @ Sidney St
- 7th @ Park Ave
- Broadway @ Lynch St
- Broadway @ Dorcas St
- Broadway @ Arsenal St
- Arsenal St @ 9th St
- Arsenal @ Lemp St
- Broadway @ Lemp Ave
- Broadway @ Chippewa St
- Broadway @ Keokuk St
- Broadway @ Gasconade
- Broadway @ Meramec St
- Broadway @ Osceola St
- Broadway @ Maeder St
- Broadway @ Bates St
- Bates St @ Virginia St
- Broadway @ Loughborough Ave
- Loughborough Ave @ Loughborough Dr
- Broadway @ Nagel Ave
- Broadway @ E Davis St
- Broadway @ Washington Ave
- Broadway @ Marceau St
- Marceau St @ Germania St
- Convention Plaza @ 4th St
- Walnut St @ 4th St
- Spruce St @ 4th St

3.3 The Engineer shall provide to the Contactor with two (2) weeks' notice an electronic report on the existing phasing and timing of each traffic signal which may be the Contractor's responsibility to program. The Engineer shall be available to the Contractor before any changes are made to a 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 Commission's central signal control system. Once the Contractor has modified a signal or controller for any reason, the Contractor shall be solely responsible for the existing timing plans and all subsequent timing changes.

3.4 The Contractor shall notify the Engineer of the changes no later than (1) working day after changes are programmed if unable to provide advance notice as specified in 902.2.

3.5 The Contractor shall be solely responsible for maintaining the coordination at any affected signal to the satisfaction of the Engineer until completion of work as set forth in section 3.2 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 Engineer. If time clock synchronization is used, the Contractor shall verify all affected controllers are synchronized at least one (1) time per week with a report to the Engineer This report will be in the form of a documentation record as spelled out in the Work Zone Traffic Management Plan.

4.0 Existing Traffic Signal Maintenance and Response

4.1 The Contractor shall respond to any signal timing complaints or malfunction complaints for those locations detailed in Section 3.0 of this provision and as specified in Section 902.21.1. Response time shall be one (1) hour for complaints received by the contractor between 6:00 a.m. and 6:00 p.m. on non-holiday weekdays, and two (2) hours for all other times. For some cases (due to travel times or other extenuating circumstances) additional time may be acceptable within reason, but must be approved by the Engineer. These timeframes will replace the '24 hour' response time in Section 105.14 for any signal-related incidents, where the entire cost of the work, if performed by Commission personnel or a third party, will be computed as described in Section 108.9 and deducted from the payments due the Contractor.

4.2 The Contractor must supply a contact name and phone number who will be responsible for receiving signal timing complaints for the Engineer. These complaints may be forwarded directly to the Contractor by someone other than the Engineer, including but not limited to the Commission's Customer Service Representatives, and will not relieve the Contractor from properly responding based on the response times of this Provision. The Contractor shall respond to the Engineer within 12 hours of the complaint as to the remedy. The Contractor shall submit to the Engineer a weekly report of complaints received and remedies performed throughout the duration of the project.

5.0 Original Signal Controller Programming and Acceptance

5.1 The Contractor will be responsible for restoring the original signal controller programming at existing intersections and coordination plans for each intersection immediately upon bridge reopening. The Engineer shall preserve and house the original controller files and provide the Contractor with access to those files in order to perform the restoration of the original plans. Normal plan restoration can be done by a manual command in the signal control system or a preprogrammed time-of-day command change. For any locations rendered offline at the time of re-opening, these locations shall be returned to normal operation by hand. The contractor will be relieved of signal programming maintenance at an existing restored intersection once 48 consecutive hours have passed without a programming malfunction, including restoring normal signal programming to the satisfaction of the Commission.

6.0 Post Project Report

6.1 The Contractor shall submit to the Engineer a post project report, four to six weeks after the final 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 signal corridors in one electronic document.

7.0 Deliverables

7.1 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.

- Experience submittal
- Preliminary Traffic Mitigation Plan
- Notification of Detour Implementation
- Time Base Reports, As Needed
- Complaint Resolutions
- Notification of Restoration to Normal Operations
- Post Project Report

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

9.0 Method of Measurement. Method of measurement shall conform to Section 902.

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

Item No.	Units	Description
616-99.01	L.S.	Traffic Signal Maintenance and Programming

KKK. Audible Pedestrian Pushbutton 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, pushbuttons 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	Units	Description
902-99.02	Each	Audible Pedestrian Pushbutton and Signing with Verbal Walk Message

LLL. 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	Units	Description
902-99.02	Each	Countdown Pedestrian Signal Head, Type 1S

MMM. Push Button Extension

1.0 Description. This work shall consist of furnishing, installing, and placing an extension for the Accessible Pedestrian Signal (APS) push button detector. The extension should be installed according to all applicable portions of Sec. 902 and compatible with the APS assembly.

2.0 Payment. Payment for the push button extension will be for the following pay item:

Item Number	Units	Description
902-99.02	Each	Push Button Extension

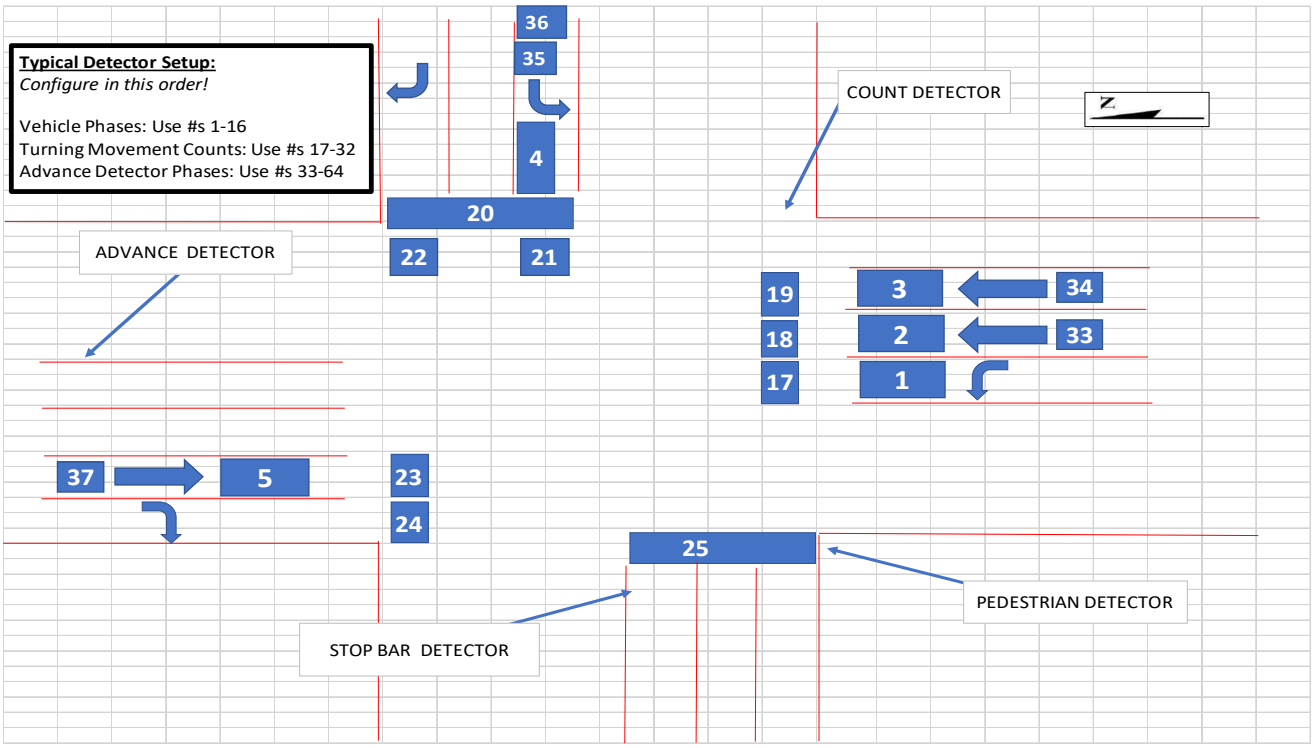
NNN. SL District Traffic Signal Detection System

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:

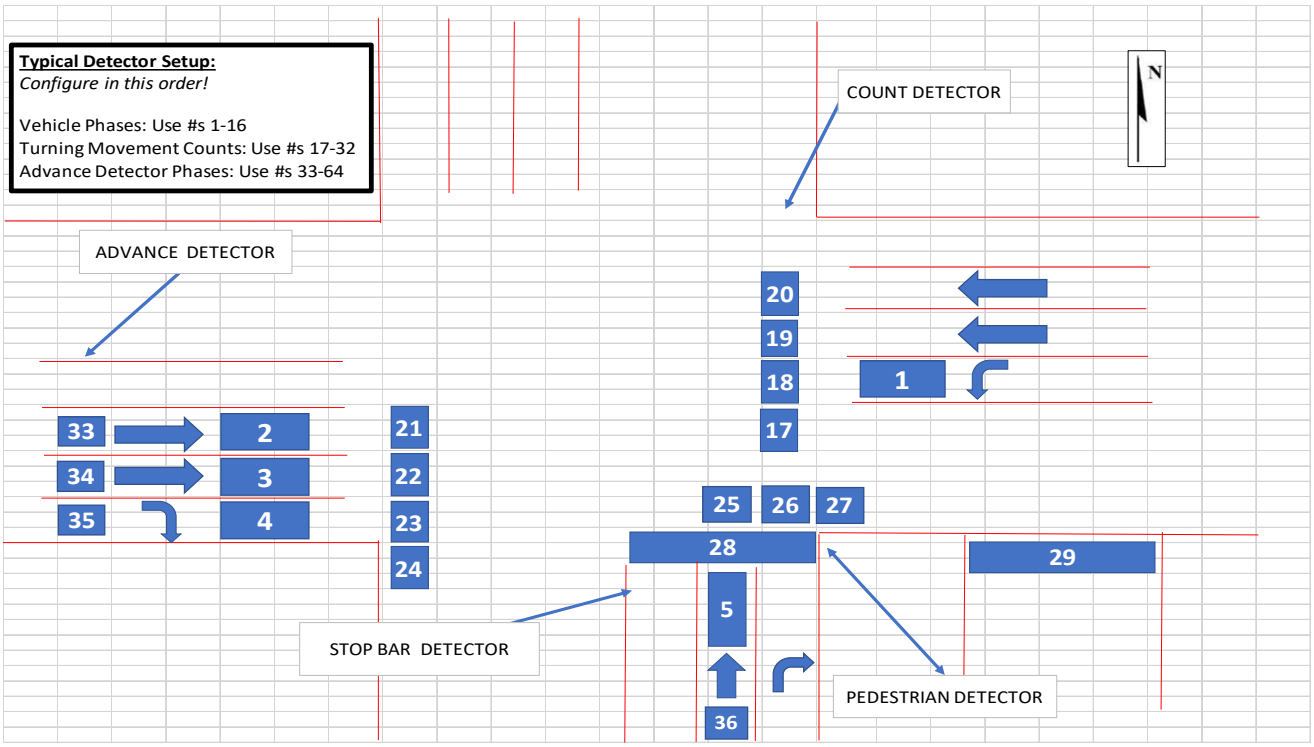
- Stop Bar Detection
- Advance Upstream (Performance Measures)
- Dilemma Zone
- Turn Counts
- Advance Video Zones (if applicable)
- Radar Zones (if applicable)
- Advance Data Collector (if applicable)
- Bicycle/Pedestrian (see Section 2.2)

7th St SB Ramp – An advanced queue detector zone shall also be provided as far back as possible in the southbound off-ramp camera view.

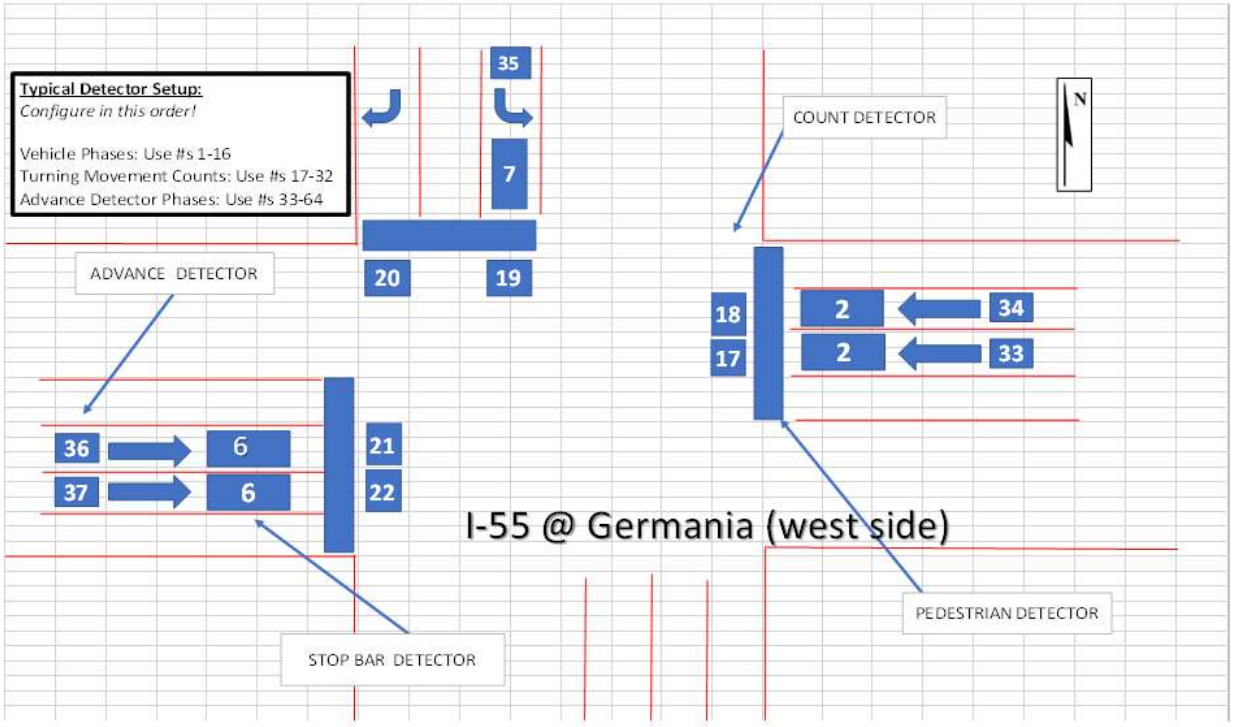


Job No.: J6I3427
Route: I-55
County: St. Louis County & City

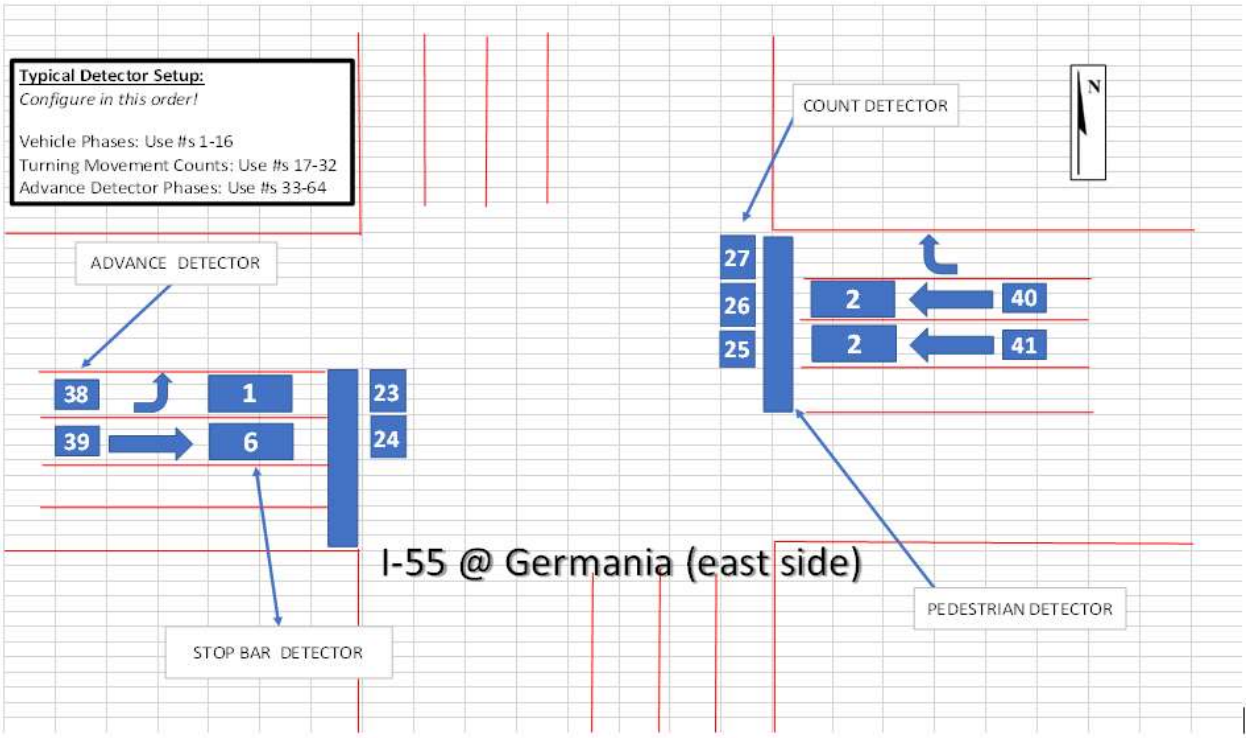
Route 30 @ I-55 NB On-Ramp/12th St/Geyer Ave:



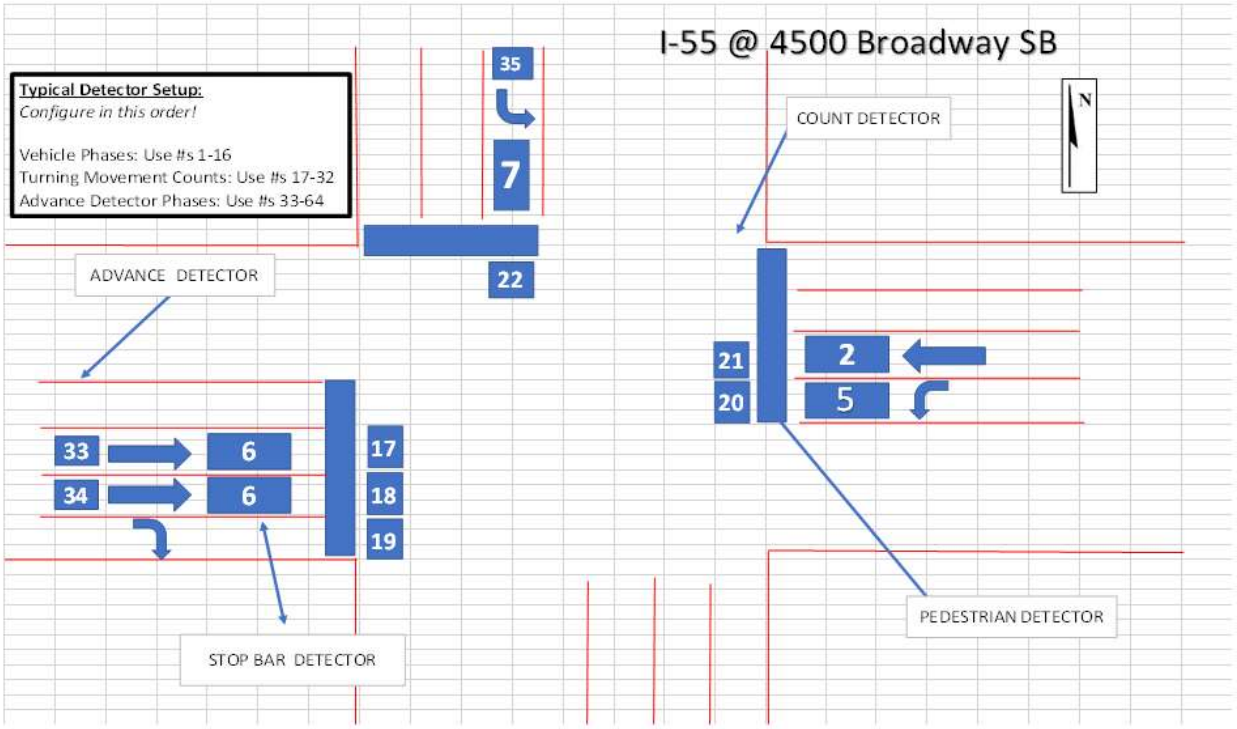
Germania St:



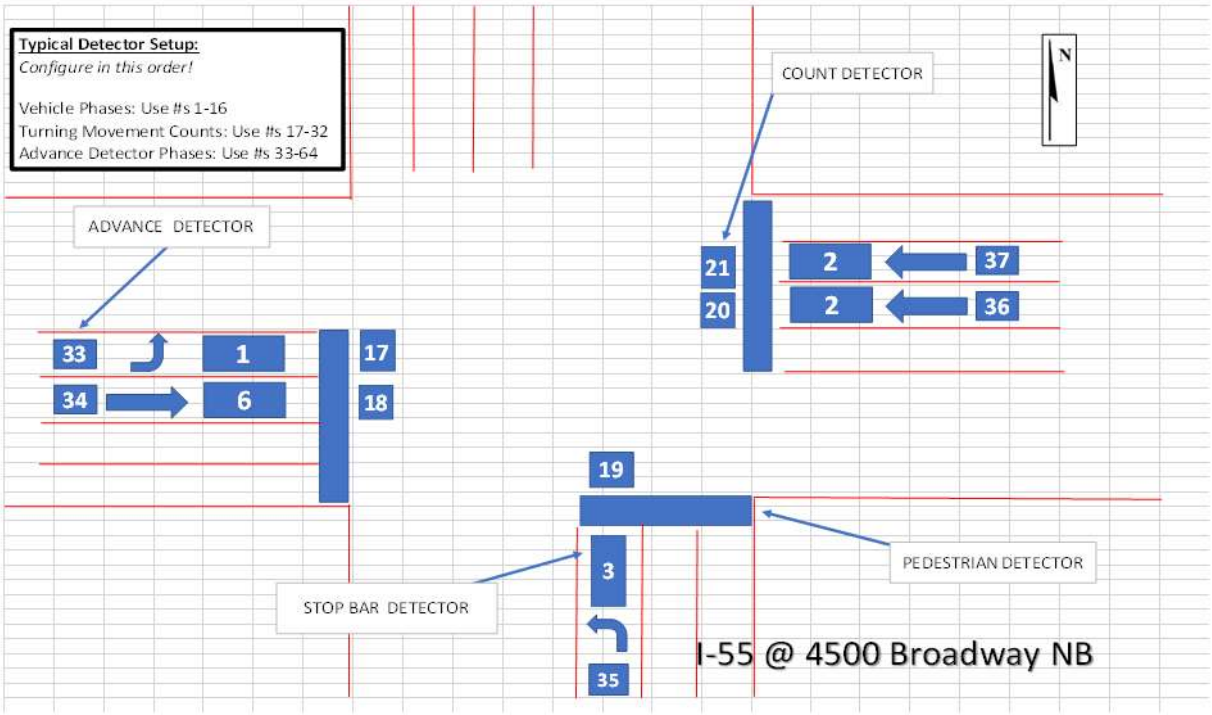
Germania St:



4500 Broadway Intersection:



4500 Broadway Intersection:



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

- None required for this project

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).

The Contractor shall also be advised that if the Iteris Vantage Next video detection system is selected for locations utilizing existing signal cabinets, the Contractor shall also procure an upgraded power supply for the video detection system per the Manufacturer's recommendations.

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.

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 manufacturer's 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.

4.3.3.2 Induction Card Rack Interface. Install the contact closure card in the existing induction card rack 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

OOO. Adjusting Pull Boxes

1.0 Description. This work shall consist of adjusting pull boxes as shown on the plans or as directed by the engineer. Existing pull boxes requiring adjustment shall be installed according to the standard plans.

2.0 Material. All material shall be in accordance with Division 1000, Material Details.

3.0 Construction Requirements.

3.1 The contractor is advised that MoDOT and the City of St. Louis have pull boxes located with the sidewalk that will require adjustments. The contractor shall adjust these facilities to grade as necessary. The contractor shall contact the respective agency regarding any questions concerning the adjustment of these facilities.

3.2 The contractor shall notify the engineer if pull boxes belonging to utilities other than those specified in the contract will require adjustment. The contractor shall coordinate work with the affected agency or utility to ensure that the completed facilities meet ADA requirements.

3.3 Adjusting pull boxes shall be completed in accordance with applicable portions or Sec 901 and Sec 902.

4.0 Method of Measurement. Measurement for adjust pull boxes will be made per each and includes all necessary material, hardware, equipment, and necessary incidental items.

5.0 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 No.	Units	Description
902-99.02	Each	Adjusting Pull Box

5.1 Pull boxes not owned by MoDOT or the City of St. Louis or specified as required work by the contract 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. There will be no direct payment for all necessary work required for coordination for the scheduling, grade requirements and adjustments of these utility facilities.

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.

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

PPP. Remove and Replace In-Pavement Wireless Detection

1.0 Description. Work under this item shall consist of removal and disposal of all Sensys wireless in-pavement detectors as shown on the plans prior to pavement improvements and install new wireless in-pavement detectors at the same locations (unless otherwise requested by the Engineer) after all pavement improvements and pavement markings are completed. Acceptance shall also include testing the system for proper operation for travel time, speed, count, and classifications as required by the manufacture specifications.

2.0 Materials.

2.1 Wireless In-Pavement Detector. The existing detectors are Sensys Networks Wireless Sensors with the ability to detect vehicles for use in signal operation, travel time, or count and classification purposes.

3.0 Construction Requirements.

3.1 The contractor shall present to the Engineer prior to the pre-construction conference written documentation of the order of work related to the disruption of the existing in-pavement detector devices. Consideration will be made to minimize the anticipated down time of the existing devices. A member of the SLITS group (must be contact via an email at SLITS@modot.mo.gov) will review and approve the schedule of the devices are used for either travel time or count (volume) and classification purposes. Contractor shall also notify the Signal Shop Supervisor via SLTRS@modot.mo.gov and the area traffic engineer.

3.2 Before any of the construction operations disrupt the existing operation of the detectors, the Contractor shall present to the Engineer certification from the manufacturer for the removal and installation of the devices in this Section.

3.3 The in-pavement sensors shall be removed from the pavement according to manufacturer's specifications and the pavement holes and surrounding disturbed areas shall be filled in and repaired with an appropriate material as approved by the engineer.

3.4 The contractor will be responsible for the proper disposal of all removed Sensys materials.

3.5 The contractor shall install all new in-pavement detector units in the pavement at the exact locations and in the exact configuration as the units were prior to removal unless otherwise indicated on the plans or by the Engineer. Contractor will be responsible to install detector units in the pavement following the manufacturer recommended procedures for installation. The detector units shall not extend above the top of the pavement.

3.6 The contractor shall use Sensys approved epoxy in orange color for in-pavement sensor installation.

3.7 The Contractor shall be responsible for securing a factory certified representative from the manufacturer for on-site assistance for a minimum of one day during installation.

4.0 Acceptance Testing.

4.1 Develop a proposed test procedure for the installed in-pavement detectors and submit it to the Engineer for approval. Each detector shall be tested separately. Revise the proposed test procedure until it is acceptable to the Engineer.

4.2 The Contractor shall confirm to the satisfaction of the Engineer that each detector's live status is viewable through the Commission's communication network and through Sensys Networks system interface before acceptance.

4.3 The Contractor shall provide all equipment and personnel needed to safely conduct the tests. Arrange for the Engineer's representative to witness the tests. Provide the Engineer a report documenting the result of the tests.

5.0 Measurement and Payment.

5.1 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	Units	Description
902-99.02	Each	Remove and Install In-Pavement Wireless Detection Sensors

QQQ. Tier III Wrong Way LED System

1.0 Description. This specification is for a Wrong Way Detection System (WWDS). Tier III Wrong Way LED System will be paid for as a pair and consist of one Master Tower and one Secondary Tower. The master tower will be located on the left and the secondary tower will be located on the right.

2.0 Specifications. System shall meet the following Specifications:

2.1 Key Components. The WWDS consists of two key components: detection hardware, and a cloud-based system management and notification service.

2.1.1 Detection Hardware.

2.1.1.1 The WWDS detection hardware shall consist of an array of redundant sensors, utilizing at least two different detection technologies, for improved accuracy and extremely low probability of false alerts.

2.1.1.2 Detection hardware shall be powered by 120VAC or solar power.

2.1.1.3 Detection hardware shall be mounted to a rigid pole, or other approved structure.

2.1.2 Cloud-Based Service.

2.1.2.1 The cloud-based service shall provide a secure user interface and shall be capable of delivering on-screen notifications with images, e-mail notifications with images, and SMS text messages, when the detection hardware has been triggered.

2.1.2.2 The cloud-based service shall not require any locally installed software applications other than an up-to-date web browser.

2.1.2.3 Historical alert data and system statistics shall be accessible through easy-to-use user-configurable reports, and shall be capable of displaying detection hardware system status, including but not limited to DC power supply voltage and cabinet temperature.

2.2 LED Signs.

2.2.1 All signs shall conform to 2009 Federal Highway Administration's MUTCD section 2A.07 on retro reflectivity and illumination. Each sign shall have eight daylight-visible LEDs that are embedded individually into 1" diameter holes around the perimeter of the sign and shall be ultrasonically welded to the sign assembly to provide maximum strength and rigidity. Each sign blank material shall be a minimum of 0.080" thick aluminum.

2.2.2 Each sign face shall consist of reflective fluorescent yellow- green or fluorescent yellow or white sheeting, as required, for an MUTCD compliant sign meeting the requirements of Sec 1042.2.7, applied to the sign blank with a protective overlay film to provide an additional layer of graffiti protection.

2.2.2.1 Shall be the specified sign legend.

2.2.2.2 Shall consist of specified quantity of high power, 1-watt LEDs.

2.2.2.3 Shall consist of specified color LEDs (amber, red, or white).

2.2.2.4 Shall have each LED sealed within a 7/8" diameter, heat-dissipating plastic enclosure to provide resistance to weather and vibration.

2.2.2.5 Shall have the LEDs wired in strings to activate simultaneously per MUTCD standards.

2.2.2.6 Shall have the LEDs wired in parallel electrically so that remaining LEDs continue to flash in the event of the failure of any individual LED.

2.2.2.7 Wiring between LEDs shall be encapsulated inside 1" x 3/8" aluminum extrusions secured to the back of each sign assembly, to provide weather resistance and protection.

2.2.2.8 Each sign shall have adequate holes for mounting to a pole or post. Optional vandal-resistant fasteners to mount the LED sign assembly to a pole or post shall be available.

2.2.2.9 UV-resistant label(s) shall be applied to the back of each sign assembly and shall include specific information such as the manufacturer, manufacturer phone number, model

number, serial number, date of manufacture and any applicable regulatory compliance information.

2.3 Required Functionality.

2.3.1 When properly installed, tested, and certified within guidelines the WWDS shall meet the following requirements.

2.3.1.1 Automatically capture images of wrong-way vehicles that proceed past the detection hardware.

2.3.1.2 Generate alerts in the cloud-based web user interface as well as e-mail and SMS alerts for all configured users.

2.3.1.3 Trigger LED-enhanced signage.

2.3.1.4 When local warning devices are incorporated with the detector, they shall be configurable and may be activated by the incoming detector's primary output, either by time-of-day, by sensing ambient light levels, or at all times. When multiple local warning devices are present in a WWDS, they shall be activated simultaneously via a 900MHz FHSS wireless transceiver and shall flash in a configurable synchronized pattern. If desired, hardwired connections to the warning devices may be used in place of the wireless transceiver.

2.4 System Testing and Certification.

To ensure proper installation, configuration, and functionality, all WWDS shall be tested and certified under the direct on-site supervision of the manufacturer. Manufacturer shall provide a written test plan to the installing agency at least 30 days prior to scheduled testing. Installing agency, or their appointed contactor, shall be responsible for full ramp closure during a portion of the nighttime testing, including all applicable management of traffic and advance motorist notification as required by the agency. Expenses for on-site testing and configuration shall be a separate pay item, and shall be quoted by the manufacturer directly.

2.4.1 The test plan shall include provisions to verify the following:

2.4.1.2 Activation of local warning devices (if equipped),

2.4.1.3 Activation of local radio-activated warning devices (if equipped),

2.4.1.4 Generation of wrong way alerts in from wrong way small, medium, and large size vehicles, in all lane positions, in a range of slow and high speeds,

2.4.1.5 Delivery of e-mail alerts to a specified user, or users,

2.4.1.6 Radar detector aim and threshold adjustment (if equipped),

2.4.1.7 Inductive Loop detector configuration and tuning (if equipped),

2.4.1.8 Confirmation camera aim and focus,

2.4.1.9 Proper installation and connection of all terminals and components,

2.4.1.10 Clear digital pictures of all system components.

2.5 General Requirements:

2.5.1 Wrong Way Detection System manufacturer must have a minimum of ten years of relevant intelligent traffic product manufacturing experience, including successful deployment of a minimum of 100 fully functional WWDS.

2.5.2 General Detection Hardware Requirements: Microwave Detectors (24 GHz Systems Only):

(a) Shall be completely sealed and protected from water intrusion,

(b) Shall have a universal mounting bracket to mount on wall, post or mast arm,

(c) Shall have a temperature range of -40 °C to 85 °C,

(d) Shall have selectable frequencies at 24 GHz with a beam angle of ± 15,

(e) Shall utilize Ethernet communication for programming,

(f) Shall be programmable to create up to eight (8) independent detection zones up to a maximum of 600 feet,

(g) Shall detect Motorcycles,

(h) Shall include a built-in self-test, including self-power usage,

(i) Shall automatically recover from power failure,

(j) Shall be protected from reverse polarity power connections and power surges,

(k) Shall be capable of detecting targets as slow as 5MPH and as fast as 150MPH

(l) Shall comply with part 15 of FCC rules,

(m) Shall operate from 12VDC to 24VDC,

(n) Shall be programmable from windows-based software.

2.5.3 Confirmation Camera:

(a) Shall include cross-line detection software analytics,

(b) Detection area and direction shall be programmable,

(c) Shall be capable of storing images saved in a buffer to capture events that occurred in the recent past,

(d) Shall have programmable event-based logic that integrates with Wrong Way Logic Controller,

(e) Shall have adjustable image settings including compression, color, brightness, sharpness, contrast, white balance, exposure control, exposure zones, backlight compensation, fine tuning of behavior at low light, and rotation,

(f) Shall have a shutter time of 1/6s to 1/24500s,

(g) Shall utilize a ¼" progressive scan RGB CMOS,

(h) Shall have a minimum of one input and one output,

(i) Shall comply with part 15 of the FCC rules,

(j) Shall operate from -4° to +122°F (-20° to +50°C),

(k) Shall have a sensor that is IP66 NEMA 4X-rated,

(l) Shall operate from 8VDC to 28VDC,

(m) Shall be programmable from windows-based software.

2.5.4 Programmable Wrong Way Logic Controller:

(a) Shall analyze discrete inputs from multiple sensors and confirmation cameras,

(b) Shall provide programmable outputs per event criteria, including sign activation and wrong way alert generation,

(c) Shall have the ability to drive two mechanical relays for integration with existing infrastructure,

(d) Shall provide a minimum of four additional GPIO for future functionality

(e) Shall include screw-type terminals for all wire connections,

(f) Shall include multiple programmable status LEDs for on-site testing and troubleshooting,

(g) Shall include a micro-USB interface for future updates,

(h) Shall operate on 9VDC to 18VDC,

2.5.5 4G LTE Cellular Gateway:

(a) Shall provide communication to cloud-based web service,

(b) Shall be offered in Verizon and AT&T variants,

(c) Shall include an integrated five-port 10/100 Ethernet switch,

(d) Shall include an integrated RS232 serial port,

(e) Shall include LED indicators for Power, WAN, Signal, RS232, Ethernet Link, and Activity,

(f) Shall comply with part 15 of FCC rules,

(g) Shall operate from -40° to +167°F (-40° to+75°C),

(h) Shall have a sensor that is IP66 NEMA 4X-rated,

(i) Shall operate on 8VDC to 30VDC,

(j) Shall be capable of Over the Air (OTA) firmware updates and remote management,

(k) Shall be capable of IPSEC VPN,

(l) Shall be programmable from windows-based software.

2.5.6 900 MHz FHSS Wireless Transceiver:

(a) Shall seamlessly integrate with programmable sign controller to ensure () synchronized activation of other radio-equipped devices in the system,

(b) Shall include an integrated LCD and two user-interface buttons for setup and troubleshooting, including readouts of flash duration and battery conditions and LED testing functionality,

(c) Shall include two LED indicators for status and troubleshooting,

(d) Shall be capable of operating as a Gateway, Node, or Repeater,

(e) Shall be capable of providing site-survey data for verification of signal strength between network devices,

(f) Shall include network-wide modification of sign controller settings and output durations, using programmability from any networked transceiver without the use of additional equipment or software,

(g) Shall operate on the license-free ISM band,

(h) Shall comply with part 15 of FCC rules,

(i) Shall operate on 3.3VDC to 15VDC,

2.5.7 Programmable Sign Controller:

(a) Shall include integrated constant-current LED drivers with two-channel output,

(b) Shall include two General Purpose Inputs and Outputs (GPIO),

(c) Shall be completely programmable, including flash pattern and duration, and LED intensity,

(d) Shall seamlessly integrate with the 900 MHz FHSS wireless transceiver to form a network of connected devices,

(e) Shall include an integrated Real Time Clock (RTC) with on-board battery backup,

(f) Shall include data-logging capabilities with selectable interval from one minute to one day,

(g) Shall include integrated time-clock functionality, including up to 16 events per day, and up to 7 selectable day types,

(h) Shall include an RS232 serial interface for local programming,

(i) Shall be programmable from windows-based software

(j) Shall be housed in a NEMA 4X enclosure

2.5.8 120VAC to 12VDC Power Supply:

(a) Shall be 120W minimum

(b) Shall be DIN rail mounted

(c) Shall be UL508 Listed

(d) Shall operate from -40° to +160°F (-40° to +71°C)

2.5.9 Solar Power Supply:

(a) The solar panel shall be up to 13.5”x15” in size and provide up to 130 watts peak total output,

(b) The solar panel shall be mounted to an aluminum bracket at an angle of 45°- 60° to provide maximum output,

(c) All fasteners used shall be anti-vandal,

(d) All solar panel connectors shall conform to Ingress Protection, IP-67 rating, dust proof, and protected from temporary immersion in water up to 1 meter deep for 30 minutes. Connectors shall be Deutsch DTM series,

(e) The solar controller shall have PWM series battery charging (not shunt),

(f) The solar controller shall have a 3-position battery select: gel, sealed or flooded,

(g) The solar controller shall have Current compensated low voltage disconnect (LVD),

(h) The solar controller shall have LED’s to indicate battery status and faults,

(i) The solar controller shall protect against short circuit, overload, reverse polarity, reverse current, high voltage, high temperature and surges from lightning and voltage spikes.

2.5.10 Primary Enclosure:

(a) Shall be constructed of 0.125" Aluminum,

(b) Shall be vented to promote airflow for internal components,

(c) Shall include screening on all vents and drains to prevent insects and other foreign matter from entering,

(d) Shall include a replaceable #2 traffic lock and keys,

(e) Shall include at least three tamper-resistant stainless-steel hinges,

(f) Shall include a removable control panel to which all control circuit components mount

(g) Shall utilize six 5/16"-18 stainless steel mounting studs that mate to a range of bracket options

3.0 Payment. Payment for all labor, equipment, materials, and incidental work for placing Tier III Wrong Way Detection Systems, will be paid for at the contract unit price for:

Item No.	Units	Description
902-99.02	Each	Tier III Wrong Way LED System

RRR. Overhead Sign Trusses

1.0 Description. This work shall consist of furnishing and installing overhead sign trusses as shown on the plans or as directed by the engineer.

2.0 Material. All material shall be in accordance with Sec 903.2 (including all subsections).

3.0 Construction Requirements. All construction requirements shall be in accordance with Sec. 903.3 (including all subsections) and Standard Plans 903.10 or 903.60.

3.1 The overhead sign truss located at Sta 758+00.00 (Sign No. 02) shall be painted black in accordance with the JSP for Painting Sign Trusses.

4.0 Method of Measurement. Measurement of overhead sign trusses of the size specified will be made per each. Measurement of concrete footings and signs will be made in accordance with Sec 903.5 (including all subsections).

5.0 Basis of Payment. Payment for all labor, equipment, materials, and incidental work for furnishing and placing overhead sign trusses, complete in place, will be paid for at the contract unit price for:

Item No.	Units	Description
903-99.02	Each	Sign No. 03, Overhead Truss, 87 Ft.-2 In.
903-99.02	Each	Sign No. 06, Overhead Truss, 84 Ft.-0 In.

5.1 Concrete footings and signs will be paid for in accordance with Sec 903.6 (including all subsections).

5.2 Painting of the overhead sign truss located at Sta 758+00.00 in accordance with JSP for Painting Sign Trusses will not be paid for separately, but shall be considered included in unit price for Sign No. 06, Overhead Truss, 84 Ft.-0 In.

SSS. Painting Sign Trusses

1.0 General.

1.1 Description. This specification includes furnishing and applying an epoxy primer and urethane finish coat painting system to new sign truss No. 06 located at Sta 758+00.00. This work shall include painting the columns which support this truss.

1.1.1 Galvanized steel coatings for steel sections shall be coated in accordance with ASTM A 123. Galvanized steel coatings for steel mounting hardware shall be coated in accordance with

ASTM A 153. Aluminum components shall be fabricated from ASTM Alloy 6061-T6 and prepared for painting as specified in this specification provision.

1.1.2 The sign truss shall be shop painted with field touch-ups as needed.

1.1.3 All incidental/related work not specifically covered in this special provision shall comply with Sec 712.12, Sec 1045.1, Sec 1045.6.5, and Sec 1045.7.5, and approved revisions at the time of project letting.

1.2 Reference Standards. The following reference standards shall govern the painting work:

1.2.1 American Society of Testing Materials (ASTM)

(a) ASTM B 117 – "Standard Practice for Operating Salt Spray (Fog) Apparatus"

(b) ASTM D 6386 – "Standard Practice for Preparation of Zinc (Hot-Dip Galvanized) Coated Iron and Steel Product and Hardware Surfaces for Painting".

1.2.2 Association for Material Protection and Performance (AMPP)

(a) SP-1 Method - Solvent Cleaning Surface Preparation Specification

(b) SP-2 Method - Hand Tool Cleaning Surface Preparation Specification

(c) SP-3 Method – Power Tool Cleaning Surface Preparation Specification

1.3 Quality Assurance. The contractor shall have a minimum of 5 years' experience of successfully completing projects of similar scope and size for the painting work contained in this specification provision. In addition, the QC manager overseeing the painting work shall be an AMPP Certified Coating Inspector.

1.3.1 The painting manufacturer shall have a minimum of 5 years' experience of successfully providing materials and completing projects of similar scope and size for the painting work contained in this specification provision.

1.3.2 The painting manufacturer shall be required to certify compliance for paint materials used and paint application work performed by the painting contractor covered by this special provision (Sec 1.4 of this provision).

1.4 Submittals. The contractor shall provide manufacturer's product data information sheets listing product properties per this specification (reference tables in Sec 2.2 of this provision) and color charts of manufacturer's available standard colors. The coatings shall be ground in pigment. Tinting will not be allowed.

1.4.1 The contractor shall provide test results, certified by an independent testing laboratory, for epoxy primer and urethane painting system verifying compliance with specified requirements.

1.4.2 The contractor shall provide manufacturer's standard written product warranty and written certification that surface preparation and painting systems products were properly applied in accordance with manufacturer's specified requirements.

1.4.3 The contractor shall comply with approval requirements for manufacturer and brand name as required by Sec 1045 for all paint materials supplied. MoDOT shall also require sampling and testing of the material to assure it meets the requirements listed herein.

1.4.4 The contractor shall provide a detailed painting plan to the engineer for approval including, but not limited to, surface preparation methods, initial shop and field touch-up application instructions and methods, material product data and color samples as well as required mock-ups, and temporary sign ground mounting plans prior to beginning painting work.

1.4.5 Acceptance of the detailed painting plan by MoDOT does not require MoDOT to accept the final product. Final acceptance will be based on all coatings meeting all testing requirements outlined in this provision.

1.5 Delivery, Storage and Handling. The contractor shall comply with painting materials manufacturer's recommendations. The contractor shall clearly label all paint containers with product name, specification, lot number, and date of manufacture, quantity of paint in container, information, and warnings as may be required by Federal and State Laws, as well as manufacturer's name and address.

2.0 Manufacturers and Materials.

2.1 Epoxy Primer and Urethane Paints. Paint shall be System G in accordance with Sec 1045 and Sec 1081.

2.1.1 Epoxy intermediate coat shall be applied at 3 mil min. – 5 mil max. (dry film thickness). Polyurethane finish coat shall be applied at 2 mil min. – 4 mil max. (dry film thickness).

2.1.2 All approved materials utilized in painting work shall be supplied by a single manufacturer for the duration of the project and shall meet or exceed the requirements stated in the above tables.

2.1.3 All material supplied under this specification provision shall be subject to timely inspection by the Commission or authorized representative. The Commission shall have the right to reject any materials supplied, which are found not to comply with the specified requirements.

2.1.4 Samples for any and all materials/ingredients used in the manufacture of the specified paint may be requested by the Commission and shall be supplied upon request along with the supplier's name and identification of the material.

2.1.5 Urethane finish coat products as specified shall be capable of easy recoating and touch-up. Surface preparation for recoat or touchup shall be limited to the use of thorough power washing only and not abrasive surface blasting/sanding preparation techniques.

2.1.6 Finish coat shall be System G (black) matching Federal Standard 595B 17038 polyurethane finish coat.

3.0 Preparation and Application Conditions.

3.1 The contractor shall coat all sign trusses indicated for painting with a high performance, multi-coat epoxy primer and urethane painting system by approved manufacturers or equal as listed in this specification provision (Sec 2.0 of this provision).

3.2 Painted finishes shall be subjected to ASTM B 117 – Salt Spray (fog) test – 1,000 hours. The coated steel shall exhibit no visible evidence of rust. The material must be submitted to MoDOT at least 41 days prior to painting to allow for this test to be performed.

3.3 Substrate preparation for epoxy primer and urethane painting applied over galvanized steel members shall be properly prepared by the contractor in accordance with paint manufacturer's recommendations for proper adhesion of primer, intermediate and finish coating products to galvanized surfaces. Suggested minimum preparation shall be as follows:

(a) AMPP SP-1: Solvent clean to remove solubles, grime etc., Spot AMPP SP-2 Hand Tool Clean, and/or SP-3 Power Tool Clean any corroded areas of the galvanized steel.

(b) Apply a 3% to 5% solution of Phosphoric Acid to galvanized steel surfaces followed by clean water rinse for newly galvanized surfaces and/or galvanized surfaces that have not weathered sufficiently prior to installation/painting.

(c) ASTM D 6386 - Use method for partially weathered galvanized steel where applicable.

3.4 Substrate preparation for epoxy primer and urethane painting applied over aluminum catwalk members shall be properly prepared by the contractor in accordance with painting manufacturer's recommendations for proper adhesion of primer, intermediate and finish coating products to aluminum surfaces. Suggested minimum preparation shall be as follows:

(a) Remove any oil or grease from the surfaces to be painted per AMPP SP-1. Profile substrate per AMPP SP-7 (brush blast) using fine abrasive or other approved method to provide a texture of fine sandpaper with a maximum profile not to exceed 1 mil.

3.5 The contractor shall apply primer and finish coat products to galvanized steel and aluminum surfaces in accordance with paint materials manufacturer's requirements and where applicable, the Missouri Department of Transportation's requirements.

3.6 The contractor shall retain painting manufacturer's representative to verify surface preparation, application and curing procedures for painting work to verify compliance with these special provisions and manufacturer's instructions/requirements (Sec 1.4 of this provision).

3.7 During any necessary field touch-ups, the contractor shall employ necessary measures to adequately protect surrounding improvements, surfaces, and vehicles from damage to surface preparation and paint application procedures. The contractor shall be responsible for the satisfactory repair of any and all damage resulting from such procedures at no cost to the Commission, and shall maintain a safe and clean working area throughout the duration of painting operations. Paint used for touch up shall be same manufacture as finish coat.

3.8 Final acceptance of painting work will be based on the manufacturer's certification (Sec 1.4 of this provision) submitted by the contractor to the engineer and upon laboratory and/or field tests results of samples of the material. The engineer reserves the right to sample and test each lot of each component prior to approval or use of the material.

4.0 Basis of Payment. This work will not be measured and paid for separately but shall be included in the unit price for Sign No. 06, Overhead Truss, 84 Ft.-0 In.

TTT. Remove and Relocate Ground Mount Sign

1.0 Description. This work shall consist of relocating and mounting existing signs, including any existing backing bars, of various sizes to new posts at locations shown on the plans or as directed by the engineer. The contractor shall be responsible for all existing signs, including any existing backing bars, to be relocated. During construction, if any sign, including any backing bars, to be relocated is lost, stolen, or damaged in any way, the contractor shall be responsible for all costs.

2.0 Construction Requirements. The contractor shall install new sign support posts at the locations shown on the plans and then relocate and mount existing signs, including any existing backing bars, to the new posts. All work shall be completed in accordance with the construction requirements of Sec 903.

3.0 Method of Measurement. Measurement will be made per each for relocating and mounting existing signs, including any existing backing bars, to new posts. Measurement for any concrete footings, structural steel posts, pipe posts, perforated square steel tubes and anchor sleeves, and breakaway assemblies will be made in accordance with Sec 903.

4.0 Basis of Payment. All costs incurred for relocating and mounting existing signs, including existing backing bars, to new posts at the locations shown on the plans, complete in place, will be paid for at the contract unit price for the following bid item noted below. Payment for all other labor, equipment, material, and incidental items will be considered completely covered by the bid items included in the contract.

Item No.	Units	Description
903-99.02	Each	Remove and Relocate Ground Mount Sign

UUU. Sign Bracket Assembly

1.0 Description. This work shall consist of the furnishing and installing sign bracket assemblies to an existing traffic signal mast arm as shown on the plans or as directed by the Engineer.

2.0 Material. All materials shall be as specified in Sections 902 and 903.

3.0 Construction Requirements. The sign bracket assembly will be as shown in Standard Plan 902.40, except that the height of the mounting angle shall be increased to 53” to accommodate the signs to be installed on the bracket. Bolts, nuts, washers, clamps and sign bracket assemblies shall be hot-dip galvanized or stainless steel. Clamps shall be fabricated of high strength low alloy steel. Additional hardware may be required to prevent the sign bracket assembly from rotating around the tubular mast arm. Before acceptance, the contractor shall demonstrate or provide documentation for the engineers written approval that the sign bracket assembly clamp will not slip or rotate about the tubular traffic signal mast arm.

An alternate design other than that shown on the Standard Plans for the sign bracket assembly may be submitted and used if approved in writing by the Engineer.

Sign number eleven (11) as shown in the plans shall be mounted to the sign bracket assembly in accordance with Standard Plan 903.02 and Sec 903, for nominal spacing between signs and bolt hole locations.

The proposed sign assembly shall be mounted to the sign bracket assembly so that a minimum clearance of sixteen (16) feet is provided between the bottom of the sign assembly and the surface of the roadway pavement.

4.0 Method of Measurement. Measurement of sign bracket assemblies will be made per each for each separate sign bracket assembly placed on the existing traffic signal mast arm.

5.0 Basis of Payment. Sign bracket assemblies will be paid for at the contract unit price per each as noted below:

Item No.	Units	Description
903-99.02	Each	Sign Bracket Assembly

VVV. Remove and Relocate Overhead Truss Mounted Signs

1.0 Description. This work shall consist of removing existing signs from existing overhead trusses and relocating them to new overhead trusses as shown on the plans or as directed by the engineer.

2.0 Material. All material shall be in accordance with Sec 903.2 (including all subsections).

3.0 Construction Requirements. The existing overhead signs shall be removed from the existing overhead sign trusses and relocated to the new overhead trusses as applicable. Installation of relocated signs shall be according to Sec 903.3.5 and the following.

The existing signs and supporting channels shall be installed on the new overhead sign trusses as applicable using new mounting hardware. When necessary, new holes shall be drilled in the existing support channels/brackets, or new support channels/brackets provided, to fit the new overhead sign trusses.

4.0 Method of Measurement. Measurement will be made per square foot for removing and relocating overhead truss mounted signs, including new mounting hardware and any required new support channels/brackets, to new overhead trusses.

4.1 Basis of Payment. All costs incurred for removing and relocating overhead truss mounted signs, including new mounting hardware and any required new support channels/brackets, to new overhead trusses at the locations shown on the plans, complete in place, will be paid for at the contract unit price for the following bid item noted below.

Item No.	Units	Description
903-99.04	Sq Ft	Remove and Relocate Overhead Truss Mounted Sign

WWW. 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 contactor 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.

XXX. MoDOT ITS Assets Relocation

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

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

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

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

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

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

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

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

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

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

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

(a) If the link includes fiber installed by others, use an optical loss test set to measure and record the optical loss over that portion of the link before it is spliced to new fiber.

(b) Calculate the maximum allowable loss for the completed link, both at 1310 nm and at 1550 nm. Use the following formula:

Maximum link loss = Measured loss over portion installed by others
+ (Fiber length in km) x (0.35 for 1310 nm and 0.25 for 1550 nm)
+ (Number of fusion splices) x (0.05)
+ (Number of mechanical splices [for temp. connection]) x (0.3)

+ (Number of connections) x (0.5)

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

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

(d) Use the test set to measure the loss of the link under test. Record the result at both 1310 nm and 1550 nm. Arrange for the engineer or his representative to witness these tests.

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

3.6.02 Test Result Documentation. Prepare a diagram showing all of the links tested in this project. For the portions installed in this project, show the equipment cabinets, splices, and pigtails. On each line representing a link, show the maximum allowable loss and the actual loss. The actual loss shall be the one measured after all corrective actions have been taken. Submit 5 copies of this diagram to the engineer, along with the calculations for the maximum allowable loss. Submit the diagrams and calculations in an electronic format acceptable to the engineer.

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

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

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

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

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

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

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

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

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

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