Job No.: J5P3574
Route: Route 50
County: Osage

JOB SPECIAL PROVISIONS TABLE OF CONTENTS (ROADWAY)

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

Job No.: J5P3574
Route: Route 50
County: Osage


THIS SHEET HAS BEEN SIGNED, SEALED, AND DATED ELECTRONICALLY

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

***LOCHMUELLER GROUP, INC.***
*411 North 10th Street, Suite 200*
*St. Louis, MO 63101*
Certificate of Authority: F00508273
Consultant Phone: (314) 621-3395

JOB NUMBER: J5P3574
OSAGE COUNTY, MO
DATE PREPARED: 4/8/2024

ADDENDUM DATE:

Only the following items of the Job Special Provisions (Roadway) are authenticated by this seal: All (except those listed on next sheet)

Job No.: J5P3574
Route: Route 50
County: Osage


THIS SHEET HAS BEEN SIGNED, SEALED AND DATED ELECTRONICALLY.

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

***BARTLETT & WEST, INC.***
*601 Monroe St., Suite 201*
*Jefferson City, MO 65101*
Certificate of Authority: 000167
Consultant Phone:314-384-5531

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

JOB NUMBER:J5P3574
OSAGE COUNTY, MO
DATE PREPARED: 4/8/2024

ADDENDUM DATE:

Only the following items of the Job Special Provisions (Roadway) are authenticated by this seal: Work Zone Traffic Management (JSP-02-06N), Culvert Extension, Lump Sum Temporary Traffic Control JSP-22-01A

Job No.: J5P3574
Route: Route 50
County: Osage

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. 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:

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

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

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

**3.0 Coordination of Construction.**

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

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

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

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

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

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

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

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

C. 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: June 20, 2024
Contract Completion Date: December 26, 2024

**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 |
|---|---|---|
| J5P3574 | N.A | $2,300 |

**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 **$1,500** 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.

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

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

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

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

**2.0 Traffic Management Schedule.**

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

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

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

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

**2.5 Traffic Congestion.** The contractor shall, upon approval of the engineer, take proactive measures to reduce traffic congestion in the work zone. The contractor shall immediately implement appropriate mitigation strategies whenever traffic congestion reaches an excess of 10

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

**2.5.1 Traffic Safety.**

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

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

**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.

Osage County Fair (July 11-13, 2024)

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

**3.3** The contractor shall be aware that traffic volume data indicates construction operations on the roadbed between the following hours will likely result in traffic queues greater than 15 minutes. Based on this, the contractor's operations will be restricted accordingly unless it can be successfully demonstrated the operations can be performed without a 15 minute queue in traffic. It shall be the responsibility of the engineer to determine if the above work hours may be modified. Working hours for evenings, weekends and holidays will be determined by the engineer. The contractor may not work during the following listed hours:

Route 50 Eastbound:
All dates:
6:00 a.m. - 9:00 a.m. Monday through Friday
9:00 a.m. - 1:00 p.m. Saturday
Fall 2024 and Spring 2025 Semester at State Tech (Starting 8/19/2024)
9:00 a.m. – 6:00 p.m. Monday through Friday

Route 50 Westbound:
All dates:
3:00 p.m. - 6:00 p.m. Monday through Friday
5:00 p.m. - 9:00 p.m. Saturday
Fall 2024 and Spring 2025 Semester at State Tech (Starting 8/19/2024)
6:00 a.m. – 3:00 p.m. Monday through Friday

**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.

**4.2** Except as shown in the temporary traffic control sheets or approved by the engineer, at least one lane of traffic in each direction shall be maintained at all times except for brief intervals of time required when the movement of the contractor's equipment will seriously hinder the safe movement of traffic. Periods during which the contractor will be allowed to interrupt traffic will be designated by the engineer.

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

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

**1.0** The contractor shall have communication equipment on the construction site or immediate access to other communication systems to request assistance from law enforcement or other emergency agencies for incident management. In case of traffic accidents or the need for law enforcement to direct or restore traffic flow through the job site, the contractor shall notify law enforcement or other emergency agencies immediately as needed. The area engineer's office shall also be notified when the contractor requests emergency assistance.

**2.0** In addition to the 911 emergency telephone number for ambulance, fire or law enforcement services, the following agencies may also be notified for accident or emergency situation within the project limits.

| | |
|---|---|
| **Missouri State Highway Patrol**<br>1-800-525-5555 Cellular: *55<br>Troop J Headquarters<br>P.O. Box 568<br>Jefferson City, MO 65102<br>Phone: (573) 751-1000 | |
| **City of Linn Police Department** | 1200 E Main St<br>Linn, MO<br>Phone: 573-897-4234 |
| **Linn Fire Protection District** | 210 W Main St<br>Linn, MO<br>Phone: 537-291-8597 |
| | |

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

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

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

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

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

Mia Peters, P.E.
Transportation Project Manager
Central District
1511 Missouri Blvd.
Jefferson City, MO 65102

Telephone Number: 573-751-7690
Email: maria.peters@modot.mo.gov

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

G. Supplemental Revisions JSP-18-01AB

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 in its entirety and substitute the following:***

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

***Delete Sec 109.14.1 thru Sec 109.14.8 and substitute the following:***

**109.14.1 Monthly Fuel Index**. Each month, the Monthly Fuel Index will be established as the average retail price per gallon for Ultra Low Sulfur Diesel for the Midwest (PADD 2) area as posted on the first Monday of the month by the U.S. Energy Information Administration (EIA). Should the posted price not be available for any reason, the MoDOT State Construction and Materials Engineer will use reasonable methods, at their sole discretion, to establish the Monthly Fuel Index on an interim basis until the EIA resumes its publication.

**109.14.2 Fuel Adjustment Calculation**.

B = Base Fuel Index = Monthly Fuel Index in the month in which the project was let
C = Current Index = Monthly Fuel Index in the month in which the work was performed
U = Units of work performed within the current pay estimate period (applicable pay units)
F = Total Fuel Usage Factor (gal./applicable pay units)

Fuel Adjustment (Dollars) = (C – B) x U x F

**109.14.3** Each pay estimate period, a fuel adjustment payment or deduction will be applied for the quantity of work performed that period on each qualifying pay item. For calculation of the fuel adjustment, work performed on the first day of a month will generally be included with the second estimate in the previous month to keep fuel adjustments in sync with MoDOT's normal payment estimate period schedule. The Commission reserves the right to include work performed on the first day of the month with the current month to accommodate financial accounting termini, such as the beginning of the state and federal fiscal years (July 1 and October 1).

**109.14.4** If the bidder wishes to be bound by these specifications, the bidder shall execute the acceptance form in the proposal. Failure by the bidder to execute the acceptance form will be interpreted to mean election to not participate in the price adjustment for fuel.

Disposal of Blast Media and Paint Residue

**1.0 Description.** Whereas Sec 1081.10 requires delivery of Blast Media and Paint Residue (BMPR) produced from bridge coating activities to The Doe Run Company for recycling, and considering the amount of BMPR produced on all active MoDOT projects statewide at any given point in time may exceed the recycling capacity of Doe Run, this provision allows for an alternate method of disposal of BMPR. The contractor, at its discretion, can choose this disposal option or the Doe Run recycle option, when both are available. When Doe Run is not currently capable or agreeable to accept the BMPR, this alternate disposal option shall be considered mandatory, and at no additional cost to the Commission.

**2.0 Disposal in Landfill.** In lieu of delivery to Doe Run for recycling, BMPR material shall be disposed in the appropriate type of approved landfill, as determined by Toxicity Characteristic Leaching Procedure (TCLP) testing. The material must be TCLP tested to determine if it contains a level of hazardous waste such that requires disposal in a hazardous waste landfill. A sampling plan for testing shall be submitted to MoDOT for review and concurrence. Sampling shall be performed by the contractor. MoDOT will witness the sampling to ensure it is conducted per the plan submitted.

**2.1** The contractor shall submit the collected samples to a qualified third-party testing facility to perform TCLP testing. If the sample indicates that the BMPR material qualifies as hazardous waste, then the materials represented by that sample shall be delivered to a licensed hazardous

waste landfill for disposal. The contractor shall be responsible for hiring a licensed hazardous waste transporter to transport the hazardous waste to the landfill. The contractor shall comply with all applicable laws and regulations for storage and shipping of the hazardous waste material. If the testing indicates that the BMPR material qualifies as a special waste, it shall be taken to a certified landfill for disposal. The contractor shall be responsible for the transportation of the special waste material to the certified landfill. The requirement to ship the BMPR material by barrels will be waived. Any alternate containers utilized shall comply with all applicable laws and regulations for shipping this type of special waste material. Copies of all shipping manifests, landfill disposal agreements, and any other legally required documentation shall be provided to the engineer.

**3.0 Basis of Payment.** No payment will be made for any costs associated with this landfill disposal option, including, but not limited to, sampling, testing, delivery, temporary storage, or disposal fees.

H. 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.

I. 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** |
|---|---|---|
| AT&T<br>Andy Erickson<br>33 Fitzgerald<br>Camdenton, MO<br>Phone: 636-925-3787<br>Cell: 314-223-2966<br>Email: Andrew.r.erickson@att.com | Yes<br><br>See 3.0 | Communications |
| Three Rivers Electric Cooperative<br>Ted Neuner<br>1324 E Main St<br>Linn, MO 65051<br>Phone: 573-644-9000<br>Email: tneuner@threeriverselectric.com | Yes<br><br>See 4.0 | Electric |
| Osage County PWSD3<br>15 Co Rte 305<br>Linn, MO 65051<br>Scott Strope<br>Phone: 573-690-5903<br>Email:<br>stropebackhoeservice@outlook.com | Yes<br><br>See 5.0 | Water |
| City of Linn<br>Derek McCubbin<br>1200 E Main St,<br>PO Box 498<br>Phone: 573-645-5208<br>Linn City Hall Phone: 573-897-2236<br>Email: derek@cityoflinn.com | None | Sewer |

| | | |
|---|---|---|
| Ameren Missouri<br>Tammy Kolb<br>1310 Industrial Dr.<br>Jefferson City, MO 65109<br>Phone: 314-861-5114<br>Email: tkolb@ameren.com | Yes<br><br>See 6.0 | Electric |
| Cable America<br>Eric Wyant<br>11422 Schenck Dr<br>Maryland Heights, MO 63043<br>Phone: 573-647-0598<br>Email:<br>eric.wyant@fidelitycommunications.com | Yes<br><br>See 7.0 | Communications |
| Sho-Me Technologies<br>Brad Baker<br>PO Box D<br>Marshfield, MO 65706<br>Phone: 417-536-3067<br>Email: bbaker@shometech.com | Yes<br><br>See 8.0 | Communications |

**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 within the project limits.

**3.0 AT&T**

AT&T advised they have underground facilities within the project limits. AT&T advised they have a handhole and buried facilities (~STA 681+94.14 RTE 50 & STA 1+67.26 RTE CC) that are impacted by the road project. AT&T advised they plan to relocate their facilities inside the new northern R/W line. AT&T's contractor (Star Construction) plans to mobilize on site one week after Three Rivers Electric Coop. completes their relocation work in order to allow their contractor to mobilize on site and commence with AT&T's relocation work. AT&T''s relocation is shown on the contract plans. AT&T advised they will plan to complete their relocation work within four (4) weeks after Star Construction commences work. AT&T advised they are scheduled to complete their work by May 24, 2024

**4.0 Three Rivers Electric Cooperative**
Three Rivers Electric Cooperative advised they have underground and aerial utilities within project limits. Three Rivers Electric Cooperative advised they have electric lines and junction boxes to be relocated inside new north R/W (~STA 680+00 to STA 685+50 Route 50). Three Rivers Electric Cooperative advised their subcontractor in combination with Three Rivers Electric Coop field staff plan to complete all of their relocation work impacted by the road project within two (2) weeks of commencing work. AT&T advised they plan to complete all of their relocation work by April 19, 2024.

**5.0 Osage County PWSD #3**
Osage County PWSD #3 have various relocations required along north side of Route 50. All of Osage County PWSD3 relocations are included in the project plans (see Water Main Relocation JSP). Osage County PWSD #3 has retained Bartlett and West to provide design plans for the work and they will perform construction inspection for MoDOT. It should be noted that some of the relocation work will require coordination during installation of new facilities. Any questions and concerns related to the relocation of watermain facilities should be directed to Terris Cates, Senior Project Manager, Bartlett & West (terris.cates@bartwest.com).

**6.0 Ameren Missouri**
Ameren has various aerial lines power poles and guy poles to relocate within the project limits (~STA 687+96.78 to STA 703+10 Route 50). Ameren advised they plan to have all relocation work complete before the road contractor's NTP date (June 13, 2024).

**7.0 Cable America**
Cable America has communications underground coaxial and fiber in two areas of conflict within project limits. Cable America advised the following: Conflict #1: Cable America will wreck out abandoned line on west side of Route CC and relocate to east side of Route CC to avoid proposed storm sewer structures (STA 1+67.26 RTE CC). Conflict #2: Cable America will rebury the line under the North Outer Drive to 3' minimum depth. Cable America advised their relocations are schedule to be complete by March 29, 2024.

**8.0 Sho-Me Technologies**
Sho-Me Technologies advised they have various conflicts within the project limits involving buried fiber and hand holes. Sho-Me Technologies advised they plan to relocate the underground fiber cable to the back of the new MoDOT R/W line between ~STA 681+15 and 703+20. Sho-Me plans to start their relocation work one week after Three Rivers Cooperative and AT&T completes their relocation work. Sho-Me advised they only have two (2) weeks of work to complete their relocations. Sho-Me advised they plan to complete their work a week by June 13, 2024 (date of road contractor's NTP).

J. Access to Commercial and Private Entrances

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

**2.0 Construction Requirements.** On all entrances, the contractor shall keep one-half of the entrance open at all times. On narrow entrances it may be necessary for the contractor to provide

temporary aggregate to provide access to the property. The contractor shall remove and dispose of the temporary aggregate following completion of the entrance. For properties with more than one entrance the contractor may construct one entire entrance at a time with the approval of the property owner and the engineer.

**3.0 Basis of Payment.** No direct payment will be made to the contractor for any expenses incurred for compliance with this provision.

K. Property Owner Notification

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

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

L. 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.

M. Concrete Tinting

**1.0 Description.** This work shall consist of coloring the concrete truck apron as specified in the plans.

**2.0 Full Depth Colored Concrete Material – Truck Aprons**

Coloring of full depth concrete material for truck aprons shall be performed using one of the following approved coloring systems, or an equivalent approved by the engineer, or in accordance with the manufacturers recommendations:

a.) Stampcrete Integral Color, SC-21 Brick Red
b.) Solomon Colors SGS Integral Colors, 417 Brick Red
c.) Davis Colors Integral Color, 160 Brick Red

**3.0 Sample.** A minimum of 10 working days prior to the placement of the colored concrete, the contractor shall submit a sample of the colored concrete section to the engineer. The sample shall be constructed using the identical process for coloring the concrete. If, in the opinion of the engineer, changes need to be made to the color, a new sample shall be submitted before final approval will be given. The minimum size sample shall be 2 ft. by 2 ft. No direct pay will be made for providing this sample, regardless of the number of samples required by the engineer in order to achieve the desired surface and color of the concrete.

**5.0 Basis of Payment.**
Payment for full depth coloring of the 8 inch concrete apron, including all materials, equipment, labor, and any other incidental work necessary to complete this item shall be considered as completely covered by Item No. 502-99.05, Misc Concrete Truck Apron, 8" per square yard.

N. Culvert Extension

**1.0 Description.** This work shall consist of extending the reinforced box culvert at station 696+99.81 on the upstream end to accommodate roadway widening.

**2.0 Material Requirements.** All materials shall comply with the Missouri Standard Specifications for Highway Construction as referenced in sections 703, 706, and 501.

**3.0 Construction Requirements.** This work shall consist of all work to extend a single reinforced box culvert, including a Class B-1 concrete, reinforcing steel, excavation, granular backfill, and any other work necessary to extend the box culvert.

**3.1** All work shall be done in accordance with the following standard drawings:

- 703.10J, Concrete Single Box Culvert – Straight Wings (Squared);
- 703.38A, Concrete Box Culvert – Cutting Details;
- Other referenced standard drawings

**4.0 Method of Measurement.** No final measurement shall be made.

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

| Item Number | Unit | Description |
|---|---|---|
| 703-99.01 | LS | Misc. Culvert Extension |

O. Microwave Radar Detection

**1.0 Description**. This work shall consist of providing microwave radar detectors for signalized installations that will support both stop bar advance detection for high speed approaches to signalized intersections as shown in the plans. The radar units shall additionally include an integral full color camera able to stream video and detection data to local and remote monitors. The video component shall not be used for actuation of stop bar or advance detection zones. 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.** For each advanced detection zone, the following zones shall be configured:

- Stop Bar (as shown in the plans)
- Dilemma Zone
- Advance Data Collector

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

- Eastbound and Westbound US 50 at Route CC
- Eastbound and Westbound US 50 at Technology Drive

**3.0 Installation Requirements.** Provide, install and test the radar detection units and cabinet interface to detect stop bar, dilemma zone, and data collector functioThis specification sets forth the provisions for a radar detection system that detects vehicles, pedestrians, bicycles, and motorcycles on roadways approaching the signalized intersections included in the project. The radar detection system shall include the following features:

- Shall be able to configure up to 32 detection zones per sensor.
- Shall be able to operate in a temperature range between -30 degrees F and 165 degrees F
- The radar sensor shall be forward fire
- The sensor shall operate in the 24 GHz band
- The sensor shall be housed in a sealed IP-67 enclosure
- The housing shall allow the radar to be adjusted to allow proper alignment between the sensor and the traveled road surface

- The radar sensor shall have the ability to track up to 64 independent objects simultaneously with a speed detection range of 0 to 150 miles per hour +/- 1.0 miles per hour
- The video camera imbedded within the radar sensor unit shall have the following features:
    - The camera shall produce a useable video image of the features of vehicles under all roadway lighting conditions, regardless of time of day. The minimum range of scene luminance over which the camera shall produce a useable video image shall be the minimum range from nighttime to daytime, but not less than the range 0.003 lux to 10,000 lux.
    - The camera imager luminance signal to noise ratio (S/N) shall be more than 50 dB with the automatic gain control (AGC) disabled.
    - The camera imager shall employ three dimensional dynamic noise reduction (3D-DNR) to remove unwanted image noise.
    - The camera imager shall employ wide dynamic range (WDR) technology to compensate for wide dynamic outdoor lighting conditions. The dynamic range shall be greater than 100 dB.
    - The camera shall be digital signal processor (DSP) based and shall use a CCD sensing element and shall output color video with resolution of not less than 540 TV lines. The color CCD imager shall have a minimum effective area of 811(h) x 508(v) pixels.
    - The camera shall include an electronic shutter control based upon average scene luminance and shall be equipped with an auto-iris lens that operates in tandem with the electronic shutter. The electronic shutter shall operate between the range of 1/60th to 1/90,000th second.
    - The camera shall utilize automatic white balance.
    - The camera shall include a fixed focal length lens with fixed focus.

**4.0 Power and Communications.**

- Power and communications cabling shall be installed per manufacturer specifications
- The radar sensor shall operate at 48 VDC powered by a single outdoor-rated CAT5E cable connected to a power over ethernet conversion unit located in the signal cabinet
- Shielded RJ-45 connectors shall be used for connection of various hardware components of the detector system
- The ethernet cable shall convey power, communications, and video for a distance up to 1,000 feet
- Power consumption shall be 8 watts during typical operation
- SDLC Functionality - The system shall have the capability of monitoring phase information and passing that information and other system data such as “time” from the controller to radar detection processor modules. The system shall also accept data from radar processor modules and relay the information to the controller. The unit shall provide a maximum of 64 detector outputs to the controller via the SDLC interface. The interface to the controller shall be accomplished by the use of the TS-2 SDLC port and protocol in accordance with the TS-2 specifications. The module shall be able to be configured to respond to BIU addresses 8, 9, 10 and 11 or a combination thereof. One LED indicator shall be provided for the TS-2 SDLC interface. The indicator shall be used to inform the user of any communication activity on the SDLC port.

**4.1 Contact Closure Card.** Contact closure outputs shall be provided. Four (4) contact closure outputs shall be provided for the radar sensor processor in a rack-mount configuration. Additionally, the system shall allow the use of extension modules to provide up to 32 open contact

closures per radar sensor input. Each contact closure output shall be capable of sinking 30mA at 24VDC. Open contact closure outputs will be used for vehicle detection indicators as well as discrete outputs for alarm conditions. The processor outputs shall be compatible with NEMA standard detector racks assignments and installed per the manufacturer specifications.

**4.2 Lightning Surge Protection.** The radar detection system shall include surge protection hardware installed per manufacturer specifications. The hardware shall be accepted by the engineer before installation in the cabinet. Surge protection shall be provided for both input power and power connection to each sensor unit.

**5.0 Sensor Software.** The radar detection system software shall meet the following requirements:

- Detection zones shall be programmed via an embedded application displayed on a video monitor and a keyboard and a pointing device connected to the central control unit for the system. The menu shall facilitate placement of detection zones and setting of zone parameters or to configure system parameters. A separate computer shall not be required for programming detection zones or to view system operation. All programming function shall occur on live video images; no snapshots or still images are allowed.
- The sensor system software shall store up to five completely independent detection zone patterns in non-volatile memory. The system can switch to any one of the five different detection patterns within 1 second of user request via menu selection with the pointing device. Each configuration shall be uniquely labeled and able to be edited by the user for identification. The currently active configuration indicator shall be displayed on the monitor.
- The system shall detect vehicles in real time as they travel across each detection zone.
- The system shall accept new detection patterns from an external, or remote, computer through the Ethernet port when the external computer uses the correct communications protocol for downloading detection patterns. A Windows™-based software designed for local or remote connection and providing video capture, real-time detection indication and detection zone modification capability shall be provided with the system.
- The system shall have the capability to automatically switch to any one of the stored configurations based on the time of day which shall be programmable by the user.
- The system shall send its detection patterns to an external computer through the Ethernet port when requested when the external computer uses the appropriate communications protocol for uploading detection patterns.
- The system shall default to a safe condition, such as a constant call on each active detection channel, in the event of unacceptable interference or loss of the radar signal.
- The system shall default to a safe condition, such as a constant call on each active detection channel, in the event of environmental conditions impeding the radar sensor performance.
- Up to 32 detection zones per sensor input shall be supported and each detection zone must be user-sizeable to suit the site and the desired vehicle detection region.
- A single detection zone shall be able to replace multiple inductive loops and the detection zones shall be OR'ed as the default or may instead be AND'ed together to indicate vehicle presence on a single approach of traffic movement.
- When a vehicle is detected within a detection zone, a visual indication of the detection shall activate on the radar overlay display to confirm the detection of the vehicle for the zone.
- Detection shall be at least 98% accurate in good weather conditions, with slight degradation possible under adverse weather conditions (e.g. rain, snow, or fog) which reduce visibility. Detection accuracy is dependent upon site geometry, sensor placement,

and detection zone location, and these accuracy levels do not include allowances for occlusion due to sensor location.

- The system shall provide dynamic zone reconfiguration (DZR). DZR sustains normal operation of existing detection zones when one zone is being added or modified during the setup process. The new zone configuration shall not go into effect until the configuration is saved by the operator.
- Detection zone setup shall not require site specific information such as latitude and longitude to be entered into the system.
- The system shall process the radar signals from each sensor at 75mS intervals. Multiple processors shall process all radar signals simultaneously.
- The system shall process the video input from each camera at 30 frames per second. Multiple processors shall process all video inputs simultaneously.
- Detection zone outputs shall be individually configurable to allow the selection of presence, pulse, extend, and delay outputs. Timing parameters of pulse, extend, and delay outputs shall be user definable between 0.1 to 25.0 seconds.
- Up to eight (8) detection zones per sensor view shall have the capability to count the number of vehicles detected. The count value shall be internally stored for later retrieval through the Ethernet port. The zone shall also have the capability to calculate and store average speed and lane occupancy at user-selectable bin intervals of 10 seconds, 20 seconds, 1 minute, 5 minutes, 15 minutes, 30 minutes and 60 minutes.
- In addition to the count type zone, the system shall be able to calculate average speed and lane occupancy for all of the zones independently. These values shall be stored in non-volatile memory for later retrieval.
- The system shall employ color overlays on the video output.
- The system shall have the ability to show controller phase status (green, yellow, or red) for up to 8 phases. These indications shall also be color coded.
- The user shall have the ability to enable or disable the display of the phase information on the radar output.
- The system shall have the capability to change the characteristics of a detection zone based on external inputs such as signal phase. Each detection zone shall be able to switch from one zone type (i.e. presence, extension, pulse, etc.) to another zone type based on the signal state. For example, a zone may be a “count” zone when the phase is green but change to a “presence” zone type when the phase is not green. Another application would be zone type of “extension” when the signal phase is green and then “delay” when red.
- The system shall have the capability to control the output of each zone based on a minimum or maximum speed. The minimum speed can be set from 0 mph (0 kph) to 249 mph (400 kph). The maximum speed can be set between 1 mph (1 kph) to 250 mph (402 kph).
- The system software shall aid the user in drawing additional detection zones by automatically drawing and placing zones at appropriate locations with only a single click of the mouse. The additional zone shall utilize geometric extrapolation of the parent zone when creating the child zone. The process shall also automatically accommodate lane marking angles and zone overlaps.
- When the user wishes to modify the location of a zone, the system software shall allow the user move a single zone, multiple zones or all zones simultaneously.
- When the user wishes to modify the geometric shape of the zone, the system software shall allow the user to change the shape by moving the zone corner or zone sides.
- The system shall display the actual pitch angle as reported by the radar sensor.
- The system shall display the actual roll angle as reported by the radar sensor.

- On screen zone identifiers shall be modifiable by the user. The user shall be allowed to select channel output assignments, zone type, input status, zone labels or zone numbers to be the identifier.
- This section sets forth the minimum requirements for the system to provide a single point interface to remote and local users. The system shall also have the capability to stream up to four simultaneous video streams over an Ethernet interface.
- The user interface shall provide capabilities to enable multiple rack-mounted radar detection processors to be locally and remotely accessed from a single point via an Ethernet connection.
- The device shall allow the operator to view four videos simultaneously or any one video by controls embedded in the system. The on-screen display for the video stream shall provide the user with information on real-time detection per zone and signal phasing information in a user-friendly format. If the end-user is utilizing Siemens M50 or M60 controllers, additional functionality shall be provided to be compatible with the Siemens phase data I/O.
- Local user access to detection programming shall be limited to the detection processor unit that is currently being displayed on the monitor.
- All local programming and setup parameters for the detection processor shall be user accessible through the interface unit without requiring the user to swap user interface cables between video detection processors.
- Remote access to the device shall be through the built-in Ethernet port via access software running on a Microsoft Windows based personal computer.
- A Windows OS remote access firmware shall also be available for remote setup and diagnostics of the interface unit.
- The system shall support streaming video technology using H.264 standards to allow the user to monitor video detection imagery over the Ethernet interface. Motion JPEG streaming video shall not be allowed.
- The interface unit shall allow four independent streams, two from each video processor, to be transported via Ethernet to four independent streaming video players simultaneously in D1 resolution.
- The interface unit shall support the streaming and display of four concurrent streams in D1 resolution.
- The interface shall allow the user to change the unit's Ethernet network settings of IP address, subnet mask and default gateway.
- The system shall allow the user to upload new application firmware through the use of the interface, remotely or on-site.
- In addition to the primary system setup and control software, a separate Windows OS based software shall be provided that will allow users to remotely view video streams from any system configured and setup from their network. This software will allow users to view live video streams in a 2x2 or 3x3 configuration, and allow users to group any number of individual system units in the field into unique groups.
- An iOS and Android based application will be provided to remotely view video streams from the system. This application shall allow the user to choose between any number of pre-configured intersection locations. The live video from any cameras at that location will be viewable on an iOS product, including the vehicle and bicycle detections occurring in real-time.

**6.0 Construction Requirements.**

**6.1 Mounting Location.** All mounting hardware shall be installed per manufacturers specifications. The sensor unit shall be mounted as follows:

- At a height between 21 feet and 33 feet from the roadway grade directly below the sensor unit. Exact heights shall be determined by the contractor as part of testing to confirm data quality and functionality described in this specification and noted in the plans.
- The radar units shall be mounted over the center of the receiving lanes for each approach to allow for up to 600 feet detection upstream from the sensor units.
- in a forward-fire position, looking towards either approaching or departing traffic.

The preferred mounting location for each approach is shown in the plans. The contractor may adjust location if needed due to constraints with cabling, mounting or optimal detection view. Radar mounting location adjustments shall be approved by the Engineer prior to installation.

**6.2 Card Rack Interface.** Install the contact closure card in the 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 radar units or associated processor hardware shall be provided and installed by the contractor.

**6.3 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 up to one (1) day of local training after the radar detector systems have been installed and are operational.

**6.4 Acceptance Testing.** The contractor shall develop a proposed test procedure for the radar detection units and submit it to the Engineer for approval. It must include visual verification of vehicle detections being received, and verification of dilemma zone detection and outputs to a 98% level of accuracy. Count data logs shall be verified at a 95% level of accuracy. 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. Provide the Engineer a report documenting the result of the tests.

**7.0 Documentation.**

**6.1** Prior to purchasing the sensor system, the contractor shall submit a PDF of catalog cut sheets and the IP67 environmental testing results to the Engineer for approval.

**6.2** The contractor shall provide one copy of the operation and maintenance manuals for the sensor system to be stored in the cabinet, as well as an electronic PDF version.

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

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

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

**10.0 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 complete radar detection system per intersection and shall be paid at the contract unit price as follows:

| Item No. | Type | Description |
|---|---|---|
| 902-49.65 | Each | Detector, Microwave |

P. Fiber Optic Cable and Connections

**1.0 Description.** This work shall consist of installing, splicing and terminating fiber optic cables. All work and materials shall comply with Section 902.12.6 of standard specs as modified by the following.

**2.0 Materials.** Fiber optic cable shall be of loose tube construction. Provide certification by an independent testing laboratory that the cable meets all requirements of Rural Utilities Service Bulletin 1753F-601a *Minimum Performance Specification for Fiber Optic Cables* (http://rurdev.sc.egov.usda.gov/SupportDocuments/UTP_Bulletins_175__3F-601a.pdf). The cable shall be gel free, all dielectric, and have 12 fibers per tube. The cable sheath shall have length markings in feet and shall indicate that the unit of measure is feet. The cable shall have single mode fibers whose attenuation does not exceed 0.35 dB/km and 0.25 dB/km for 1310 nm and 1550 nm signals, respectively. The cable shall have a short-term tensile rating of at least 600 lbs. The cable shall have an operating temperature range of -40º C to 70º C. The cables shall be constructed with 12 fibers per tube, 6 tubes per cable (72 SMFO), or 12 fibers per tube, 4 tubes per cable (48 SMFO), or 12 fibers per tube, two tubes per cable (24 SMFO), or as 12 fibers per tube, one tube per cable (12 SMFO)

**2.1 Connectors** shall be ST compatible, with ceramic ferrules. They shall be suitable for use in traffic cabinets and shall be designed for single mode fibers.

**2.2 Pigtail.** Pigtails shall be factory-made, buffered, and strengthened with aramid yarn to reduce the possibility that accidental mishandling will damage the fiber or connection. Pigtails shall be yellow. They must use the type of connector specified in Sec 2.2 of this provision. Each must contain one fiber. Length shall suffice to provide two feet of slack after installation. No direct payment for pigtails will be made and will be subsidiary to cabinet and fiber bid items.

**2.3 Jumper.** Jumpers shall meet the requirements for pigtails but shall have a connector on each end. The second connector shall be as specified in Sec 2.2 of this provision except where a different connector is required for compatibility with the equipment to which the jumper connects. Length shall suffice to provide approximately five feet of slack after installation. Jumper cables contain a pair of fibers. Quantities shown in the plans for fiber optic jumpers were estimated to the best knowledge of the design engineer and have a built-in 20% contingency.

**2.4 Splice Trays or Cassettes.** Contractor shall be responsible to provide splice trays or cassettes that allow field connection of terminations as shown in the plans. Splice trays shall be aluminum with clear plastic covers, designed for outdoor use. Each tray shall accommodate 24 fusion splices. The trays shall have a black powder coat finish. The trays shall have both perforations for cable ties and crimp able metal tabs for buffer tube strain relief. No direct payment will be made for splice trays or cassettes and will be subsidiary to cabinet and fiber bid items.

**2.5 Rack-Mounted Interconnect Center.** An interconnect center is an Equipment Cabinet that has a patch panel built into one of its walls. Within the interconnect center, fibers in cables are spliced to pigtails and the pigtails are plugged into the patch panel from the inside. This allows jumper cables (not part of the interconnect center) to plug into the patch panel from the outside,

connecting the fibers to equipment in the cabinet or to other fibers on the patch panel. Within an interconnect center, some fibers may be spliced to the corresponding fiber in a mating cable, rather than to a pigtail. Other fibers may be coiled, unterminated. The enclosure shall have brackets and all other hardware required for rack mounting in an EIA standard 19-in. equipment rack. It shall take up no more than three rack units (1¾ inch each) in the cabinet. It shall have front and rear doors. It shall be made of powder-coated aluminum. The enclosure shall hold at least four splice trays or cassettes meeting the requirements of Sec 2.5 of this provision. Contractor shall provide enough trays for all splices made in the interconnect center. The enclosure's patch panel shall have at least 48 positions or as indicated on the plans, compatible with the connectors specified in Sec 2.2 of this provision. It shall have provisions for cable strain relief and for connector labeling.

**2.6 Wall-Mounted Interconnect Center.** The enclosure shall be designed for wall or panel mounting and occupy no more than 350 square inches of wall space. It shall be made of powder coated aluminum and have a gasketed, hinged door. It shall have provisions for cable strain relief and connector labeling. Enclosure shall be a Corning WCH-04P or pre-approved equal. It shall have a patch panel that holds 4 panels or more as indicated on the plans, compatible with the connectors specified in Sec 2.2 of this provision. It shall accommodate at least six splice trays or cassettes as specified in Section 2.5 of this provision and shall be equipped with enough trays for all the splices made in the interconnect center.

**3.0 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.

**4.0 Documentation**. Provide the Engineer with a copy of the final as-built documentation in Visio and/or MicroStation formats and any relevant notes that would aid in the understanding of the fiber configuration.

**5.0 Construction Requirements.**

5.1 **Cable Installation**. Prior to installation, perform such tests as indicated in Sec 3.6 of this provision to confirm that the cable is in good condition and complies with the specifications. Any defects found after installation will be deemed the fault of the contractor. Install the cable such that the optical and mechanical characteristics of the fiber are not degraded. Do not violate the minimum bend radius or the maximum tension, both during and after installation. Before any cable installation is performed, provide the Engineer with four copies of the cable manufacturer's recommended maximum pulling tensions for each cable size. These pulling tensions shall be specified for pulling from the cable's outer jacket. Also, provide a list of the minimum allowable cable bending radius and the cable manufacturer's approved pulling lubricants. Only those lubricants approved by the cable manufacturer will be permitted. If the cable is pulled by mechanical means, use a clutch device to ensure the allowable pulling tension is not exceeded. Also, attach a strain gauge to the pulling line at the cable exit location, and at a sufficient distance from the take-up device, such that the strain gauge can be read throughout the entire cable pulling operation. Do not leave the let-off reel unattended during a pull, in order to minimize the chance of applying excess force, center pull, or back feeding. Use an approved lubricant, in the amount recommended by the cable manufacturer, to facilitate pulling the cable. After the cable has been installed, wipe the exposed cable in a pull box, junction box, or field terminal cabinet clean of cable lubricant with a cloth before leaving the pull box, junction box, or cabinet. In each intermediate pull box, store a minimum of 50 feet of slack fiber optic cable for each cable that passes through the pull box. Store slack cable neatly on the

walls of the pull box using racking hardware acceptable to the Engineer. Additional slack cable that is included in the pay quantity includes 50 LF of each cable at a splice point within the agency fiber pull box. Seal the fiber optic cable ends to prevent the escape of the filling compound and the entry of water. Label every cable immediately upon installation. Label the cables at every point of access, including junction boxes, pull boxes, and termination points. Use self-laminating vinyl labels at least 1.5" wide and long enough that the translucent portion of the label completely covers the white area bearing the legend. The vinyl shall have a layer of pressure sensitive acrylic adhesive. The labels shall resist oil, water, and solvents and shall be self-extinguishing. The legend shall be machine printed in letters at least 3/32" high. Consult with the Engineer concerning the desired method of identifying each cable. Labeling cables is incidental to the installing the cable and will not be paid separately.

5.2 **Splicing**. Splice all optical fibers, including spares, to provide continuous runs. Splices shall be allowed only in equipment cabinets and splice enclosures except where shown on the plans. Make all splices using a fusion splicer that automatically positions the fibers using either the Light Injection and Detection (LID) system or the High-resolution Direct Core Mounting (HDCM) system. Provide all equipment and consumable supplies. Secure each spliced fiber in a protective groove. Completely re-coat bare fibers with a protective room temperature vulcanizing (RTV) coating, gel or similar substance, prior to insertion in the groove, so as to protect the fiber from scoring, dirt or micro bending. Prior to splicing to a fiber installed by others, measure and record the optical loss over that fiber. See Sec 3.6 of this provision. Use a different splice tray for each buffer tube color. If an enclosure contains multiple buffer tubes of the same color, but none of the fibers in one of the tubes are spliced to fibers in other tubes of the same color, use a separate splice tray for that tube. Splicing quantities were estimated to the best of the design engineer's knowledge and the quantity listed in the plan quantities has a built in 20% contingency.

5.3 **Terminations.** Terminate fibers by splicing them to factory-made pigtails.
Cap all connectors that are not connected to a mating connector. If the existing termination panel does not have the capacity to conform to the project documents and specifications, it is the contractor's responsibility to replace or expand the termination panel at no additional cost to the project.

5.4 **Jumper Management**. Use spiral wrap to guide and protect bundles of jumpers between the patch panel and equipment. Affix the spiral wrap to the wall of the field terminal cabinet or vertical member of the rack. Label the jumpers at each end, numbering them sequentially.

5.5 **Hardened Ethernet Switch – Commission Furnished, Contractor Installed.** The Contractor shall install layer 2 ethernet switches, power supplies, and mounting hardware furnished by the Commission. Miscellaneous cabling and hardware necessary to install the ethernet switches and connect to various signal hardware and grounding buses shall be the responsibility of the Contractor. The ethernet switches will be programmed by the Commission. The Contractor shall provide at least two (2) weeks notice of intent to install the ethernet switches, and coordinate pick up of the ethernet switch hardware from the Commission facility. Upon connection to the existing ethernet switch in the maintenance facility adjacent to the project, the Contractor shall have personnel available in the field to assist the Commission in connectivity testing to the ethernet switches and other networked devices within the project area.

**6.0 Acceptance Testing**

6.1 **General.** Test the fiber after installation, including all splicing and terminations. For each fiber optic link terminated at the field terminal cabinet patch panels, determine whether the optical loss is within the limits permitted by these specifications. A link is a continuous segment of fiber between one connector (or unterminated end) and another connector (or unterminated end).

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

- For each fiber link, the Contractor shall test one fiber strand per each tube of the fiber cable. If any individual fiber in a tube if found to be broken or nonfunctioning, the Contractor shall test at a minimum two (2) additional random fibers from the same tube to confirm that the fiber acceptance issue is not widespread. If additional fibers in tube are found to be deficient, corrective measures, including replacement of the cable through the identified trouble segment, may be required at the Engineers discretion, at no additional cost to the project.

- Calculate the maximum allowable losses for the contractor installed fiber link, both at 1310 nm and at 1550 nm. Use the following formula:

    - Maximum link loss = (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

- Provide the engineer documentation that the optical time domain reflectometer to be used in testing has been calibrated and is working properly.

- Use an optical time domain reflectometer to assess the losses along the contractor furnished and installed fiber paths. Record the result at both 1310 nm and 1550 nm. Arrange for the engineer or his representative to witness these tests.

- 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.

Test Result Documentation. Contractor shall prepare a line diagram showing each of the fiber links and the individual strands tested in this project. For the cables installed in this project, preparer shall show the field terminal cabinets, splices, and pigtails. On each line representing a link or fiber strand, 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 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.

**7.0 Basis of Payment**

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

Payment for the following bid items will be made as follows:

| Item No. | Type | Description |
|---|---|---|
| 910-83.54 | LF | Fiber Optic Cable, 48-Strand, Single Mode |
| 910-99.02 | Each | Fusion Splice, Single Mode |
| 910-99.02 | Each | Fiber Optic Pigtail, Single Mode |
| 910-99.02 | Each | Fiber Optic Jumper, Single Mode |
| 910-99.02 | Each | Rack-Mounted Interconnect Center |
| 910-99.02 | Each | Hardened Ethernet Switch – Layer 2, Install Only |

Q. Conduit

**1.0 Description.** Furnish and install conduits as shown on the plans and as described within this section. The plans depict conduit routing in schematic form only. Determine final routing based on actual field conditions at each site, including utility locator service markings, to assure no conflicts with existing utilities. Inspect the project area prior to submittal of bid to determine the types and extent of incidental removal, relocation and replacement items to include in the unit price of conduit and pull boxes.

**2.0 Material** Conduits shall meet the requirements of current MoDOT Standard Specifications Sec 1060. Non-metallic rigid conduit shall be color coded orange for communication cable and black for power cable. Pull ropes or tapes shall be polypropylene with a minimum tensile strength of 600 pounds. Pull ropes or tapes are incidental to the cost of conduit. Locator wire shall be stranded copper wire, AWG 14, type THHN, with blue insulation, and is incidental to the cost of the conduit. 2 Inch, rigid steel conduit shall be used for building entries as indicated in the plans.

**3.0 Construction Requirements.**

3.1 **General.** The contractor shall comply with Sec 902.16, except as noted in this special provision. Warning tape shall be furnished and installed in all trenches containing conduit. Pull ropes shall be furnished and installed in all empty conduit cells. Install locator wire in all underground non-metallic conduits and into each pull box or base. Affix the wire to the sidewall of each pull box. Locator wire is incidental to the conduit and will not be paid for separately. Non-metallic duct shall not be spliced. All runs shall be continuous.

3.2 **Directional Drilling**.

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

3.2.2 **Boring.** The diameter of the drilled hole shall conform to the outside diameter of the conduit

as closely as practical. Pressure grout, as directed by the engineer, to fill any voids which develop during the installation operation. Remove and replace any conduit damaged in directional drilling operations at no expense to the project.

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

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

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

3.3 **Wall and Building Penetrations.** Penetrations of existing concrete retaining walls or buildings shall be performed by the drilling, or other approved construction means, of an opening with a minimum diameter of 1 inch greater than the outside diameter of the conduit(s) to be inserted through the wall. Reinforcing bars shall be located on the fill face of any retain walls using non-destructive scanning techniques. Openings shall be located to avoid cutting or otherwise damaging reinforcing bars on the fill face side of retaining walls or damaging structural elements or equipment within buildings. Sufficiently remove any rough edges from the wall or building opening to prevent damage to the conduit(s). The penetrations shall be filled with a Type III epoxy grout conforming to Sec 1039. The cost of wall and building penetrations will be considered incidental to the unit price of conduit.

3.4 **Install Conduit into Existing Pull Box.** Where indicated on the plans, install a proposed conduit into an existing pull box. No direct payment will be made for installing conduit into an existing pull box.

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

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

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

3.4.4 Backfill shall be carefully tamped in place. All disturbed areas shall be restored in accordance with standard specifications and these provisions.

**ITS Pull Boxes.** ITS Pull boxes shall be installed per plan and as required to allow the successful installation of the fiber cables per manufactures recommendations. ITS Pull Boxes at traffic signal locations, building penetrations, or Cross-Connect cabinets shall be Class 5. ITS Pull Boxes in-line on conduit run shall be Class 2.

3.4.5 All pull boxes shall be affixed with a permanent label identifying the function of the pull box and the maintaining agency. Material, method, and legend of labeling shall be approved by the engineer.

3.4.6 All pull boxes installed within sidewalks or raised paved shoulders shall be installed flush with the surrounding pavement, with slip-resistant cover, allowing for ADA- compliant pedestrian path. Any sidewalk pavement removed and replaced shall be incidental to the cost of the conduit.

**4.0 Shop Drawing Submittal Requirements.**

4.1.1 Contractor shall develop shop drawings illustrating the material and method for externally mounting rigid conduit on bridge structures or retaining walls for new conduit segments along various routes. These shop drawings shall be submitted to the Engineer for review and approval. Contractor shall include in the bid time for two sets of revisions to the shop drawings to incorporate Engineers review comments. Final shop drawings and calculations showing support system design shall be signed and sealed by a Professional Engineer registered in the State of Missouri. Contractor shall provide Engineer with a copy of the approved final shop drawings in MicroStation and PDF format. Catalog cuts shall be provided for all conduit types.

**5.0 Basis of Payment.**

5.1 Conduit may be installed by either directional boring or trenching regardless of how installation is shown on the plans based on Contractors preferred method of installation, unless specifically noted on the plans due to some specific installation limitations. All conduit shall be paid for at the unit rate per the Bid Items below regardless of installation method.

5.1.1 The pay items for conduit and pullboxes are:

| Item No. | Type | Description |
|---|---|---|
| 910-52.00 | LF | Conduit, 2 In., Rigid, In Trench |
| 910.88.11 | EA | Pull Box, Preformed, Class 2 |
| 910-88.16 | EA | Pull Box, Preformed, Class 5 |

R. Combination Pad Mounted 120V/240V Power Supply and Lighting Controller with Uninterruptible Power Supply (UPS)

**1.0 Description.** This work shall consist of furnishing and installing combination 120/240 volt signal and lighting power supply and uninterruptible power supply (UPS).

**2.0 UPS Requirements.** The traffic signals being constructed at the intersections within the project limits shall include an "Uninterruptible Power Supply" specifically constructed and NEMA approved for traffic signal operations.

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

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

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

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

(a) High line disqualify shall be 130 VAC.
(b) High line qualify shall be 128 VAC.
(c) Low line qualify shall be 105 VAC.
(d) Low line disqualify shall be 100 VAC.
(e) Input current shall be less than 16A with nominal voltage, full load on the output and

charger set at 10A.

(f) 50/60Hz automatic frequency detection with built-in class A EMI filter and transient suppression.

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

(a) The output voltage of the UPS shall be 120 VAC ±10% in line mode.

(b) The output voltage of the UPS shall be 120 VAC ±6% in backup mode.

(c) The output frequency of the UPS shall be 60Hz ±5% in line mode.

(d) The output frequency of the UPS shall be 60Hz ±5% in backup mode.

(e) The output waveform of the UPS shall be sinusoidal.

(f) The output voltage total harmonic distortion (THD) shall be less than 3% with a resistive load.

(g) The efficiency of the UPS at nominal line voltage shall be greater than 98%.

(h) The efficiency of the UPS in backup mode shall be greater than 84%.

(i) The step-load response of the UPS shall be full recovery in ½-cycle @ 50% change with a resistive load.

(j) The transfer time of the UPS line to back up and backup to line shall be 5ms typical.

(k) The line qualification time of the UPS shall be user selectable at 3, 10, 20, 30, 40 and 50 seconds.

(l) The line qualification time of the UPS default shall be three (3) seconds.

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

(a) The nominal battery voltage of the UPS shall be 48 VDC.

(b) The battery charger current of the UPS shall be user programmable for 3, 6, and 10 A.

(c) The battery charger current default setting for the UPS shall be 6A.

(d) The battery charger in the UPS shall turn OFF when the battery temperature is 50°C.

(e) The UPS shall have a user programmable temperature compensated battery charger with setting for -2.5, -4, -5 and -6 mV/°C/Cell.

(f) The UPS shall have a temperature compensated battery charger with a default setting of -5 mV/°C/Cell. The UPS shall have a battery charge with a float voltage of 56VDC maximum.

(g) The UPS shall have a user configurable low battery warning.

(h) The UPS shall have a default low battery warning set at 47VDC to indication 40% remaining battery capacity.

(i) The UPS shall have a low battery shutdown set for 42VDC (10.5VDC per battery).

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

(a) The UPS shall have a 250VAC @ 20A input circuit breaker.

(b) The UPS shall have a 50A battery circuit breaker.

(c) The UPS shall have electronic short circuit protection when operating in backup mode.

(d) The UPS shall indicate an overload warning with a flashing alarm LED when the load is between 95% and 105% of the rated output for the UPS.

(e) The UPS shall shutdown in two (2) minutes when operating in backup mode when the load is between 106% and 115% of the rated output for the UPS, and the fault LED shall turn ON. The fault LED shall clear when the overload is removed and the utility line power returns.

(f) The UPS shall shutdown in one (1) minute when operating in backup mode when the load is greater than 115% and the fault LED shall turn ON. The fault LED shall clear when the overload is removed and the utility line power returns.

(g) The UPS shall disable the backup mode function when operating in line mode if the load exceeds 115% of the rated output for the UPS. The alarm shall be reset when the overload condition is removed.
(h) The UPS shall display an alarm LED if the battery ambient temperature is greater than 75°C and disable the backup mode function. The alarm shall clear when the battery ambient temperature is less than 70°C.
(i) The UPS shall display a fault LED when operating in backup mode and shutdown the inverter if the internal temperature is greater than 110°C. The fault shall clear when the utility power returns and the internal temperature is less than 90°C.
(j) The UPS shall have output over-voltage protection to electronically shutdown the UPS if the output voltage exceeds 132VAC.
(k) The UPS shall disable the battery charger in two (2) seconds and display an alarm LED if the battery voltage exceeds 59VDC. The alarm shall be cleared and charge enabled when the battery voltage drops to less than 57VDC.
(l) The UPS shall limit the charger voltage to 52VDC in the event the battery probe is not installed.
(m) The UPS shall have a battery circuit breaker with reverse polarity protection. The battery circuit breaker shall trip in the event the battery polarity is wired incorrectly.
(n) The UPS shall have protection for electrical backfeed to the utility that meets UL 1778 and CSA C22.2 No. 107.1.3 requirements.
(o) The UPS shall have user-selectable settings that are password protected.
(p) The UPS shall be cooled by a variable speed fan that is microprocessor and PWM controlled.
(q) The fan shall be OFF when the ambient temperature is less than 40°C.
(r) The UPS shall display an alarm LED to indicate the fan is enabled but not turning.
(s) The UPS shall have a fan that is field replaceable.

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

**2.7 Programmable Dry Contacts.** Each UPS system shall have the following requirements for the noted features relating to dry contacts:
(a) The UPS shall have six (6) sets of normally open (NO) and normally closed (NC) single pole double-throw (SPDT) dry contact relays rated for 250VAC @1A.
(b) The UPS shall have five (5) sets of dry contact relays that are user programmable, C1 through C5, and one relay contact that is factory configured, C6.
(c) The UPS shall have dry contact relays that are user programmable via either the RS-232 or (optional) Ethernet communication ports to activate under the following conditions:
(d) ON BATTERY. The relay is energized whenever the UPS switches to battery power.
(e) LOW BATTERY. The relay is energized when the battery has reached a user defined low battery level of remaining useful capacity. This alarm is latched when a qualified line

returns or the inverter shuts down. The default setting is 47VDC (~40%) of remaining useful battery capacity.

(f) TIMER 1. The relay is energized after being in backup mode for a given amount of time. This timer is adjustable from 0 to 8hr. The default setting is two (2) hours.

(g) ALARM. The relay is activated after a specific or general alarm is detected. The alarm

(h) conditions include: line frequency, low output voltage, no temperature probe, overload,

(i) unconnected batteries, high temperature (>55°C) and low temperature (<-20°C).

(j) FAULT. The relay is activated after a specific or general fault is detected. These faults

(k) include: short circuit, low battery voltage (<41VDC), high battery voltage (> 59VDC), overload and over temperature (>75°C).

(l) OFF. The relay is disabled and will not activate under any condition.

(m) TIMER 2. Same as TIMER 1.

(n) TIMER 3. Same as TIMER 1.

(o) AC/DC FAN CONTROL. The relay is activated when the battery ambient temperature is greater than 35°C or at a user programmable threshold from 25 to 55°C @ 5°C increments.

(p) The UPS shall have a default dry contact relay configuration

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

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

(a) The UPS shall have AC input and AC output terminal blocks mounted on the front panel. The terminal blocks shall be a 3 pole, 35 amp, 300 volt Eurostyle socket terminal strip (22-8 AWG).

(b) The UPS shall have six (6) user programmable dry contact relay terminal blocks on the front panel. The terminal blocks shall be 3 pole, 35 amp, 300 volt PLUGGABLE TERMINAL BLOCK (12-26 AWG)

(c) The UPS shall have one (1) user input and one (1) Automatic Transfer Switch (ATS) terminal block on the front panel. The terminal blocks shall be 3 pole, 35 amp, 300 volt PLUGGABLE TERMINAL BLOCK (12-26 AWG).

(d) The UPS shall have a DE-9 RS-232 connector on the front panel.

(e) The UPS shall have an RJ45 Ethernet connector on the front panel.

(f) The UPS shall have a battery connector on the front panel. The battery connector shall be a 50 amp SB® series type battery connector (16-6 AWG).

(g) The UPS shall have a RJ14 battery temperature probe connector on the front panel.

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

(a) The operating temperature range of the UPS shall be -40° to 55°C with the capability of operating @ 800W for up to 2hr at 74°C ambient.

(b) The storage temperature range of the UPS shall be -40° to 75°C.

(c) The operating and storage humidity (non-condensing) range of the UPS is up to 95% RH.

(d) The altitude operating range of the UPS is up to 12,000ft with a de-rating of 2°C per 1000ft above 4500ft.

(e) The UPS shall be shipped in materials designed to meet requirements for ISTA program.

(f) The UPS shall pass electrical safety standards UL1778, CSA 22.2 No. 107.3, EN50091-1- 1-2 and EN60950.

(g) The UPS shall pass emission standards FCC Subpart J Level A for conducted and

radiated EMI CISPR22, EN55022 Level A for conducted and radiated EMI.

(h) The UPS shall pass Immunity standards:
EN61000-4-2: ESD (Electrostatic discharge). EN61000-4-3: Radiated immunity.
EN61000-4-4: EFT (Electrical fast transient). EN61000-4-5: Surge.
EN61000-4-6: Conducted (Power and signal lines). EN61000-4-8: Power frequency magnetic.
EN61000-3-2: Harmonic distortion.

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

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

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

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

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

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

(a) The ABS shall be rated for 120VAC @ 20 amps.
(b) The ABS shall be shelf or rack mountable.

(c) The ABS shall connect the UPS to the load to allow the UPS to continuously power the load.
(d) The ABS shall transfer the load to utility line when there is no UPS output voltage.
(e) The ABS shall be activated by the 120VAC from the UPS.
(f) The ABS shall have a terminal block labeled “L IN”, “NEUT”, “GRD” and “L OUT”.
(g) The ABS shall have a six (6) foot line cord labeled “UPS IN”.
(h) The ABS shall have a six (6) foot line cord labeled “UPS OUT”.
(i) The ABS shall have a 5-15R duplex receptacle connected to utility line.
(j) The ABS shall have a 5-15R receptacle labeled “Optional LA-P” to facilitate a plug-in surge suppressor.
(k) The ABS shall have a 5-15R receptacle labeled “Optional Battery Heater Mat” to provide non-standby power to a battery heater mat.
(l) The ABS dimensions shall be 4.6"H x 4.75"W x 6.5"D.
(m) The ABS weight shall be 4lbs.

**2.13 Generator Transfer Switch.** Each UPS system shall include a generator transfer switch (GTS) with the following requirements:
(a) The GTS shall sense when a portable generator is connected and transfer the load to the generator after a 30s delay.
(b) The GTS shall be rated for 120VAC @ 20A.
(c) The GTS shall be shelf or rack mountable.
(d) The GTS shall have a terminal block labeled “AC INPUT”, “AC OUTPUT” and “GENERATOR INPUT”.

**2.14 UPS Batteries.** The batteries for the UPS system shall meet the following requirements:
(a) The batteries shall be Absorbent Glass Mat (AGM) type specifically designed for outdoor use.
(b) The batteries shall be designed for “Float Service” to provide 100% out-of-box runtime capacity.
(c) The batteries shall have a five (5) year full replacement, non-prorated warranty.
(d) The battery capacity rating at 20hr shall be 94Ah.
(e)The battery shall be 12VDC.
(f) The number of batteries in the system shall be four (4) or eight (8).
(g) The batteries shall be connected to provide 48VDC.
(h) Batteries for each location shall provide full power for all devices shown on the plans that are powered through the signal cabinet for three (3) hours and then send the signal into all red flash and power that state for an additional three (3) hours.

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

**2.16 Battery Charge Management System.** Each UPS system shall have a battery charge management system with the following requirements:
(a) The battery charge management system shall spread the charge voltage equally across all batteries.
(b) The battery charge management system shall compensate for batteries with different

internal resistances.
(c) The battery charge management system shall have a quality of final balance of ±100mV maximum between any two (2) batteries in the string.
(d) The battery charge management system shall have reversed polarity protection.
(e) The battery charge management system shall be designed to CSA C22.2 No. 107.1 and UL 1778 Standards for safe unattended operation.

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

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

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

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

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

S. Audible Pedestrian Push Buttons (APS) and Signing

**1.0 Description.** Audible pedestrian pushbuttons and signing will be required for all pedestrian indications at all the intersections as noted in the contract plans.

**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 adopted PROWAG requirements 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 Payment**. Payment for the audible signals will be for each unit per bid item, 902-99.02, "Audible Accessible Pedestrian Pushbutton and Sign" per each. This will include all wiring, power adaptors, and installation hardware needed. Payment for signing will be included in the pay item for the Pedestrian Push Button (APS).

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

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

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

**4.0 Basis of Payment.** The accepted quantity of the chosen option will be paid for at the contract unit bid price for Item 403-99.05, Optional Pavement, per square yard.

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

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

U. Temporary Long-Term Rumble Strips JSP-13-04C

**1.0 Description.** The work shall include furnishing, installing, maintaining and removing long-term rumble strips, as shown in the plans, or as designated by the engineer.

**2.0 Material.**

**2.1** The long-term rumble strips shall be 10 feet to 12 feet in length, fabricated from a polymer material, and be orange in color.

**2.2** The long-term rumble strips shall have a minimum width of 4 inches, but no greater than 6 inches. The long-term rumble strips shall have a minimum thickness of 0.25 inch, but no greater than 0.50 inch.

**2.3** The long-term rumble strips shall have a pre-applied adhesive backing for securing to the asphalt or concrete roadway surface.

**3.0 Construction.** Long-term rumble strips layout and spacing shall be in accordance with the plans or as approved by the engineer. The long-term rumble strips shall be installed and removed in accordance with manufacturer's recommendation. The contractor shall monitor and repair, and maintain if necessary the long-term rumble strips until removed.

**3.1** Each set shall consist of five individual strips spaced ten to twelve feet on center.

**3.2** The long-term rumble strips removal process shall not damage the roadway surface. If any damage occurs to the pavement during the removal of long-term rumble strips, the contractor shall replace or repair the damaged pavement at no cost to the Commission.

**4.0 Method of Measurement.** Measurement of long-term rumble strips will be per each complete set of five strips.

**5.0 Basis of Payment.** The accepted quantity of Temporary Long-Term Rumble Strips sets will be paid for at the contract unit price for 616-20.02, Temporary Long-Term Rumble Strips, per each set. The long-term rumble strips unit bid price shall include the cost of all labor, equipment and materials to install, maintain, and remove the rumble strips.

V. Airport Requirements

**1.0 Description.** The project is located near a public use airport or heliport or is more than 200 feet above existing ground level, which requires adherence to Federal Aviation Regulation Part 77 (FAA Reg Part 77). "Near" to a public use airport or heliport is defined as follows:

20,000 feet (4 miles) from an airport with a runway length of at least 3,200 feet
10,000 feet (2 miles) from an airport with runway length less than 3,200 feet
5,000 feet (1 mile) from a public use heliport

**2.0** The maximum height of the improvement and the equipment operating while performing the improvements was assumed to be **50.0 feet** above the current travelway during the process of evaluating the project for compliance with FAA Reg Part 77.

**2.1** If the contractor's height of equipment or if the improvement itself is beyond the assumed height as indicated in Sec 2.0, the contractor will work with the resident engineer to fill out the Form 7460-1, or revise the original Form 7460-1 based upon the proposed height and resubmit, if necessary, for a determination by FAA on compliance with FAA Reg Part 77. Further information can be found in MoDOT's Engineering Policy Guide 235.8 Airports. If the Form 7460-1 must be filed, the associated work shall not be performed prior to the FAA determination, which could take up to 45 days.

**2.2** If the contractor's height of equipment and the improvement itself is below the assumed height as indicated in Sec 2.0, no further action is necessary to fulfill the requirements set forth in FAA Reg Part 77.

**3.0** The maximum height of the signal equipment was assumed to be **36.0 feet** above the current travelway during the process of evaluating the project for compliance with FAA Reg Part 77.

**3.1 It is required that FAA Form 7460-2, Notice of Actual Construction or Alternation, be e-filed any time the project is abandoned or within 5 days after the construction reaches its greatest height in compliance with FAA Reg Part 77.**

**4.0 Basis of Payment.** There will be no direct payment for any work associated with this provision. Contract time extension will be given for the time necessary to obtain or revise the FAA permit. Any delays or costs incurred in obtaining the revised permit will be noncompensable.

W. Watermain Relocation

**1.0 Description.** Plans and specifications for the watermain relocation work are included as attachments to the contract plans and specifications. The contractor shall refer to these documents for all watermain relocation items.

X. Maintaining Shoulder Drop-off

**1.0** Project work areas shall be staged to minimize shoulder edge drop-off. Any pavement edge treatment required by Standard Plan 619.10 shall be placed at the contractor's expense. The need for edge treatment is determined by the contractor's method of operations.

**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. All costs shall be completely covered and included in the bid item prices for the aggregates for base, type A2 shoulder, asphalt concrete mixtures and optional pavement.

Y. Curb and Gutter, Special

**1.0 Description.** This work shall consist of constructing Curb and Gutter, Special as shown on the plans. All work (including materials, construction requirements, method of measurement, and basis of payment) shall follow Section 609.10 of the Missouri Standard Specifications for Highway Construction. The contractor shall refer to the plans for additional details.

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

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

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

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

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

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

(a) Incidental items necessary to complete the work, unless specifically provided as a pay item in the contract.

(b) Installing, operating, maintaining, cleaning, repairing, removing, or replacing traffic control devices.

(c) Covering and uncovering existing signs and other traffic control devices.

(d) Relocating temporary traffic control devices, including permanent traffic control devices temporarily relocated, unless specifically included as a pay item in the contract.

(e) Worker apparel.

(f) Flaggers, AFADs, PFDs, pilot vehicles, and appurtenances at flagging stations.

(g) Furnishing, installing, operating, maintaining, and removing construction-related vehicle and equipment lighting.

(h) Construction and removal of temporary equipment crossovers, including restoring pre-existing crossovers.

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

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

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

(a) The first payment will be made when five percent of the original contract amount is earned. The payment will be 50 percent of the price for LSTTC, or five percent of the original contract amount, whichever is less.

(b) The second payment will be made when 50 percent of the original contract amount is earned. The payment will be 25 percent of the price for LSTTC, or 2.5 percent of the original contract amount, whichever is less.

(c) The third payment will be made when 75 percent of the original contract amount is earned. The payment will be 20 percent of the price for LSTTC, or two percent of the original contract amount, whichever is less.

(d) Payment for the remaining balance due for LSTTC will be made when the contract has been accepted for maintenance or earlier as approved by the engineer.

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

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

AA. Access to Commercial and Private Entrances

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

**2.0 Construction Requirements.** On all commercial and residential entrances the contractor shall keep one-half of the entrance open at all times. On commercial entrances less than 20’

wide it may be necessary for the contractor to provide temporary aggregate to provide access to the property. The contractor shall remove and dispose of the temporary aggregate following completion of the entrance. For properties with more than one entrance the contractor may construct one entrance at a time with the approval of the property owner and engineer.

**2.1** The contractor shall complete the entrances as quickly as possible and shall take no longer than ***4 weeks*** to complete any one entrance unless otherwise stated elsewhere in job special provisions.

**3.0 Property Owner Agreements.** Agreements made with property owners during the negotiation of easements and rights of way listed in the Property Owner Notification special provision, shall be adhered to and shall supersede the requirements in the Access to Commercial and Private Entrances special provision.

**4.0 Basis of Payment.** No direct payment will be made to the contractor for any expenses incurred for compliance with this provision.

BB. Access to Parcel 6 Casper's Conoco

**1.0 Description.** The contractor shall complete the entrances as quickly as possible and shall take no longer than **2 weeks** to complete either entrance to the property.

**2.0 Basis of Payment.** No direct payment will be made to the contractor for any expenses incurred for compliance with this provision.

CC. Property Owner Notification

**1.0 Description.** It shall be the contractor's responsibility to inform and notify the adjacent property owner 48 hours prior to starting any construction activities that may impact driveway and parking lot access or occur along the frontage of the property owner's parcel, unless specified more specifically in a property owner agreement, or here. The notification shall be in written form and include the contractor's contact information, the Engineer's contact information, and an estimated schedule of work and the associated impacts.

Parcel 1 Contact: 100 Grande Properties, Kenneth Miller (573) 508-5359

Parcel 2 Contact: Band Properties, Caleb Bax (573) 508-3567

Parcel 4 Contact: Northern Lights Development, Steve Johannesmeyer (573) 508-4845

1.1 The following Property Owners shall be given the number of days-notice specified below.

Parcel 3: Contact owner by phone 1 week in advance of construction. Contact: Rodney Wolfe (owner) of Wolfe Apartments at (573) 291-7459.

Parcel 6: Contact owner by phone 1 week in advance of construction. Contact: Tim Thielen (owner) of Casper's Conoco at (573) 338-1744.

Parcel 7: Contact owner by phone 1 week in advance of construction. Contact: Tony Keeth (owner) of Parts City Auto Parts at (573) 280-3157.

Parcel 8: Contact tenant by phone 2 weeks in advance of construction. Contact: Brad Sieg (Director, Lakeside Books, tenant) of STAT JV I, LLC at (573) 417-3061 (office) and (573) 291-2669 (cell).

Parcels 5 & 9: Contact owners by phone at least 2 weeks in advance of construction. Contact: Amy Ames (chief of staff) (573) 897-5224 (office) and (573) 680-5257 (cell). She is very difficult to reach and rarely answers her phone, so both numbers should be used and at minimum leave voicemails for her at each number.

Parcl 10: Contact owner by phone 1 week in advance of construction. Contact: Tony Gier (owner) of Eagle Stop gas station at (573) 392-6150.

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

DD. Delayed Possession of Right of Way – Parcel 8

**1.0 Description.** The Contractor's attention is directed toward the following parcels which could be subject to delayed possession.

(a) **Parcel 8** – STAT JV I, LLC – The property rights are being acquired to construct a substantial portion of the project. Possession is estimated to be obtained by the project Notice to Proceed. By May 2, 2024, the status of the parcel will be evaluated to determine how to proceed with the project.

**1.1** The contractor shall inform itself of the location of this tract. The contractor is not allowed access to this parcel until instructed by the Engineer.

**1.2** The contractor shall schedule its work utilizing the available right of way until this tract is cleared for construction, which is estimated to be prior to the Notice to Proceed for construction. However, this date expressly is not a warranty by or contractually binding on the Commission as the date the tract will be clear for construction. No encroachment, storage of equipment and materials or construction on this tract shall be permitted until the contractor is notified by the engineer that this tract has been acquired.

**1.3** The contractor shall have no claim for damage for delay, disruption, interference or otherwise as a result of the unavailability of Parcel 8.

EE. Personal Property Within Parcels Requiring Special Attention

**1.0 Description.** The contractor's attention is directed toward the following parcels which could contain items of personal property.

(a) **Parcel 5** - REGENTS OF STATE TECHNICAL COLLEGE OF MISSOURI – There is a business sign and 3 light poles that are privately owned and still located within the right of way and/or easements.

(b) **Parcel 7** - TK RENTALS, LLC – There is a business sign that is privately owned and still located within the right of way and/or easements.
(c) **Parcel 9** - OSAGE COUNTY COMMUNITY CENTER, INC. – There is a light pole that is privately owned and still located within the right of way and/or easements.

**1.1** The Contractor shall inform itself of the location of these tracts. The contractor is allowed to access these tracts and perform construction activities therein. However, the Contractor is not allowed disturb or otherwise impede the use of the aforementioned privately owned improvements unless directed by the Engineer.

**1.2** The Contractor shall schedule its work utilizing the available right of way until this tract is fully cleared for construction, which is estimated to be prior to the Notice to Proceed for construction. However, this date expressly is not a warranty by or contractually binding on the Commission as the date the three (3) tracts will be fully clear for construction. The Engineer shall inform the Contractor when the private property has been removed from the tracts and the owner of the property has been reimbursed for the relocation of said property.
.
**1.3** The Contractor shall have no claim for damage for delay, disruption, interference or otherwise as a result of the unavailability of Parcel 8.