


Job No.: J8S3239
Route: B/MM
County: GREENE

JOB SPECIAL PROVISIONS TABLE OF CONTENTS (ROADWAY)

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

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 <p>12/07/2023 4:46:08 AM Paul J. Kronlage - Civil MO PE - 023328</p>	MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION 105 W. CAPITOL AVE. JEFFERSON CITY, MO 65102 Phone 1-888-275-6636
	EFK Moen 13523 Barrett Parkway, Suite 250 St. Louis, MO, 63021 Certificate of Authority: 001578 Consultant Phone: 314-394-3100
	If a seal is present on this sheet, JSP's have been electronically sealed and dated.
	JOB NUMBER: J8S3239 GREENE COUNTY, MO DATE PREPARED: 9/11/2023
	ADDENDUM DATE:

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

JOB
SPECIAL PROVISION

A. General - Federal JSP-09-02J

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

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

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

General Provisions & Supplemental Specifications

Supplemental Plans to July 2023 Missouri Standard Plans
For Highway Construction

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

B. Contract Liquidated Damages JSP-13-01C

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

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

Job No.: J8S3239
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Notice to Proceed Date: March 11, 2024
Contract Completion Date: August 15, 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
J8S3239	157	\$3,200

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 **\$1800** per calendar day for each calendar day, or partial day thereof, that the work is not fully completed. For projects in combination, these damages will be charged in full for failure to complete one or more projects within the above specified contract completion date or calendar days.

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

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

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

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

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

2.0 Traffic Management Schedule.

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

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

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

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

2.5 Traffic Congestion. 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

3.2 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 B/MM Northbound:

6:00 a.m. - 9:00 a.m. Monday through Friday
9:00 a.m. - 1:00 p.m. Saturday

Route B/MM Southbound:

3:00 p.m. - 6:00 p.m. Monday through Friday
5:00 p.m. - 9:00 p.m. Saturday

3.3.1 The contractor shall not be allowed to close the I-44 ramp terminals at the intersection. Traffic must be maintained at all times to and from the interstate.

3.4 Any work requiring a reduction in the number of through lanes of traffic shall be completed during nighttime hours. Nighttime hours shall be considered to be 9:00 p.m. to 6:00 a.m. for this project.

4.0 Detours and Lane Closures.

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

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

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

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

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

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

Missouri Highway Patrol	(417) 895-6868
City of Republic Fire Station No. 2	(417) 501-6732
Greene County Sheriff	(417) 868-4040

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

2.2 The contractor shall notify law enforcement and emergency agencies before the start of construction to request their cooperation and to provide coordination of services when emergencies arise during the construction at the project site. When the contractor completes this

notification with law enforcement and emergency agencies, a report shall be furnished to the engineer on the status of incident management.

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

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

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

Bud Sherman P.E., Project Contact
SW District
3025 East Kearney Street
Springfield, MO 65803

Telephone Number: 417-895-7690
Email: Bud.Sherman@modot.mo.gov

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

F. Supplemental Revisions JSP-18-01AA

Compliance with [2 CFR 200.216 – Prohibition on Certain Telecommunications and Video Surveillance Services or Equipment](#).

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

Stormwater Compliance Requirements

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

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

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

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

2.1 Duties of the WPCM:

- (a) Be familiar with the stormwater requirements including the current MoDOT State Operating Permit for construction stormwater discharges/land disturbance activities; MoDOT’s statewide Stormwater Pollution Prevention Plan (SWPPP); the Corps of Engineers Section 404 Permit, when applicable; the project specific SWPPP, the Project’s Erosion & Sediment Control Plan; all applicable special provisions, specifications, and standard drawings; and this provision;
- (b) Successfully complete the MoDOT Stormwater Training Course within the last 4 years. The MoDOT Stormwater Training is a free online course available at MoDOT.org;
- (c) Attend the Pre-Activity Meeting for Grading and Land Disturbance and all subsequent Weekly Meetings in which grading activities are discussed;
- (d) Oversee and ensure all work is performed in accordance with the Project-specific SWPPP and all updates thereto, or as designated by the engineer;
- (e) Review the project site for compliance with the Project SWPPP, as needed, from the start of any grading operations until final stabilization is achieved, and take necessary actions to correct any known deficiencies to prevent pollution of the waters of the state or adjacent property owners prior to the engineer’s weekly inspections;
- (f) Review and acknowledge receipt of each MoDOT Inspection Report (Land Disturbance Inspection Record) for the Project within forty eight (48) hours of receiving the report and ensure that all Stormwater Deficiencies noted on the report are corrected as soon as possible, but no later than stated in Section 5.0.

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

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

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

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

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

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

Anti-Discrimination Against Israel Certification

By signing this contract, the Company certifies it is not currently engaged in and shall not, for the duration of the contract, engage in a boycott of goods or services from the State of Israel, companies doing business in or with Israel or authorized by, licensed by, or organized under the laws of the State of Israel, or persons or entities doing business in the State of Israel as defined by Section 34.600 RSMo. This certification shall not apply to contracts with a total potential value

of less than One Hundred Thousand Dollars (\$100,000) or to contractors with fewer than ten (10) employees.

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

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

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

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

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

Table 1 – GTR Material Properties		
Property	Test Method	Criteria
Specific Gravity	ASTM D1817	1.02 to 1.20
Metal Contaminates	ASTM D5603	$\leq 0.01\%$
Fiber Content	ASTM D5603	$\leq 0.5\%$
Moisture Content	ASTM D1509	$\leq 1.0\%^*$
Mineral Filler	AASHTO M17	$\leq 4.0\%$

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

8.2.1 GTR SPG shall be 1.15

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

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

where:

$G_{sb (JMF)}$ = bulk specific gravity of the combined aggregate including GTR

P_{bmv} = percent virgin binder by total mixture weight

P_s = percent aggregate by total mixture weight (not including GTR)

P_{GTR} = percent GTR by total mixture weight

G_{sb} = bulk specific gravity of the combined aggregate (not including GTR)

G_{GTR} = GTR specific gravity

8.4 G_{se} shall be calculated as follows:

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

8.5 P_{be} shall be calculated as follows:

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

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

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

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

Delete Sec 403.19.2 and substitute the following:

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

Delete Sec 106.9 and substitute the following:

106.9 Buy America Requirements

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

106.9.1 Buy America Requirements for Iron and Steel.

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

106.9.2 Buy America Requirements for Iron and Steel for Manufactured items.

A manufactured item will be considered iron and steel if it is “predominantly” iron or steel. Predominantly iron or steel means that the cost of iron or steel content of a product is more than 50 percent of the total cost of all its components.

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

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

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

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

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

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

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

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

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

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

106.9.6.1 Minimal Use allowance for Construction Materials other than iron or steel.

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

106.9.7 Buy America Requirements for Manufactured Products.

Manufactured products means:

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

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

process, should be treated as manufactured products, rather than as construction materials.

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

G. Utility JSP-93-26F

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

<u>Utility Name</u>	<u>Known Required Adjustment</u>	<u>Type</u>
AT&T – Distribution Scott Hall 600 St. Louis, Room 630 Springfield, MO 65806 Phone: 417-849-8265 Email: sh4949@att.com	No	Communications
City Utilities of Springfield - Electric T&D Eric Cochran 301 E. Central St. Springfield, MO 65801 Phone: 417-831-8612 Email: eric.cochran@cityutilities.net	Yes (See Sections 2.1 - 2.3.4)	Power
City Utilities of Springfield - Gas & Water Tyler Wayt 301 E. Central St. Springfield, MO 65801 Phone: 417-831-8761 Email: tyler.wayt@cityutilities.net	No	Gas & Water
City Utilities of Springfield - SpringNet Bethany Forrester 301 E Central St. Springfield, MO 65801 Phone: 417-831-8529 Email: bforrester@springnet.net	No	Communications
MoDOT – Signals, Lighting, ITS Joe Dotson 2455 N. Mayfair Ave. Springfield, MO 65803 Phone: 417-733-0664 Email: joseph.dotson@modot.mo.gov	Yes (See Section 3.0)	Signals, Lighting, ITS

City of Springfield – Traffic Tom Dancey 1107 W. Chestnut Expressway Springfield, MO 65802 Phone: 417-864-1167 Email: tdancey@springfieldmo.gov	No	Signals/ITS
City of Springfield – Clean Water Services Matt Taylor 840 Boonville Ave. Springfield, MO 65802 Phone: 417-864-1934 Email: mtaylor@springfieldmo.gov	No	Sewer
Lumen (CenturyLink National) Bobby Kennedy 3253 E. Chestnut Exp. Springfield, MO 65802 Phone: 417-860-4526 Email: bobby.kennedy@lumen.com	No	Communications
KAMO Power Jon Engelbrecht P.O. Box 577 Vinita, OK 74301 Phone: 918-256-5551 Email: jengelbrecht@kamopower.com	No	Power
Ozark Electric Cooperative Logan Haden 2007 James River Ct. Nixa, MO 65714 Phone: 417-725-5160 Email: lhaden@ozarkelectric.com	No	Power
Spire Gas Energy Ken Stegall 520 E. 5 th Street Joplin, MO 64801 Phone: 417-626-4831 Email: ken.stegall@spireenergy.com	No	Gas

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.

1.2 Overhead Primary Electric. Various utilities listed above have overhead lines within the project limits in the vicinity of the Contractor's work. The contractor shall comply with the Missouri Overhead Powerline Safety Act; this statute makes it illegal for an unauthorized person or entity to work or bring equipment within 10 feet of a high voltage line that has not been covered or de-energized. The purpose of the Missouri Overhead Powerline Safety Act is to ensure the safety of the public when working around overhead power lines. If the contractor needs line cover when working near a primary powerline, then the contractor shall notify that utility owner a minimum of 14 days in advance of needing line cover. Most power providers perform this service free of charge for municipally-driven projects. The contractor shall be responsible for any damage to the overhead lines caused by their operations. There will be no direct payment for compliance to this specification.

2.0 City Utilities Electric

2.1 Coordination with City Utilities Electric. The contractor shall be responsible for coordinating the new secondary power work with City Utilities. The contractor shall request a copy of CU Electric Line Engineering drawing number 90664 from Eric Cochran (see contact information above). The contractor will be required to pick up all CU supplied items from their stock room located at 742 N. Belcrest. The contractor shall coordinate construction activities with CU's Contract Inspector, James Dodd (417-450-7347). The contractor shall provide CU a minimum of two weeks in advance of planned construction activities for scheduling purposes. There will be no direct payment for compliance to this specification.

2.2 New Type 2 Power Supply North of I-44. A new Type 2 power supply will be required to provide electrical service for the new signal controller and ITS cabinet on the north side of I-44. The secondary power will come from the existing power pole located near Sta 38+95, 34ft Rt. City Utilities will provide the secondary pedestal and stand-off brackets for MoDOT's contractor to install. The contractor will be required to pick these items up at CU's stockroom and transport them to the site. The contractor will be responsible for providing and installing the riser conduit up the drop pole over to the secondary pedestal. The contractor will also be responsible for providing and installing the conduit and wire from the secondary pedestal over to the new Type 2 power supply. CU line crews will provide and install the pole mounted transformer and the wire down the pole over to the secondary riser and make the connection inside the riser. CU Electric will not install a meter in the new power supply until it has been inspected and approved by Greene County. MoDOT will be responsible for submitting the application to Greene County. The contractor will be required to pay the fee for the Greene County permit. All work shall conform to CU's standard drawings and MoDOT's standard plans. All costs required for compliance with this special provision shall be included in the contractor's submitted unit price for Item 902-86.20 Power Supply Assembly, Type 2, per each.

2.3 Type 2 Power Supply Modifications South of I-44.

2.3.1 Description. MoDOT has an existing Type 2 Power Supply in the southeast quadrant of the interchange. This existing power supply currently only feeds the roadway lighting. The proposed roadway improvements include the installation of a new signal controller in the southeast quadrant for the eastbound I-44 ramps. The scope of this work shall include all necessary modifications to the existing power supply to power the existing lighting controller and the new signal controller.

2.3.2 Material. The contractor shall furnish and install a new 100 Amp disconnect downstream of the meterback on the existing Type 2 Power Supply. The new disconnect shall have a minimum of 6 breaker spaces for 12 circuits and be rated for outdoor use (rainproof). The disconnect shall include breakers to provide 240V to the existing lighting controller and 120V to the new signal cabinet.

2.3.3 Construction Requirements. The contractor shall replace the existing disconnect with a new one as described in 2.3.2 above. The contractor shall utilize the existing conduit and conductors currently feeding the lighting controller for the new disconnect. The contractor shall provide and install new conduit and conductors between the proposed signal cabinet and new disconnect utilizing an LB connection at the disconnect box. The vertical conduit at the existing power supply for the signal controller shall be placed adjacent to the concrete footing on the power supply. The disconnect replacement will require temporary removal of the existing electric meter by CU. City Utilities Electric will not reinstall the meter in the existing meterback until the disconnect replacement has been inspected and approved by Greene County. MoDOT will be responsible for submitting the application to Greene County. The contractor will be required to pay the fee for the Greene County permit.

2.3.4 Method of Measurement and Basis of Payment. All costs required for compliance with this special provision shall be included in the contractor's submitted lump sum bid for Item 902-99.01, Modify Existing Power Supply.

3.0 MoDOT Signals & ITS. The proposed additions to MoDOT's signals and ITS equipment are included as part of the roadway contract. The contractor shall install and/or modify the equipment as shown in the plans and job special provisions. All costs associated with this work shall be completely covered in the contractor's submitted bid prices for the signal and ITS items included in the roadway contract.

H. Miscellaneous Construction Requirements

1.0 Clearing and Grubbing. No direct pay shall be made for any clearing or grubbing required to construct this project.

2.0 Field Verification. Plan details for this contract work are based upon available plans, utility maps, and field surveys performed in conjunction with plan preparation for this proposed work. No warranty is made on either the accuracy or completeness of these available documents. It is the contractor's (bidder's) responsibility to assess the actual field conditions and verify the location of all utilities and verify whichever dimensions are required for the performance of the work. In addition, the contractor shall be matching existing cross slopes (unless otherwise noted in the plans) and is responsible for adjusting actual propose drainage structures, if necessary, from those shown in the construction documents. No direct payment shall be made for any expense incurred by the contractor for his/her compliance with this provision.

3.0 Hauling over Streets. Streets over which hauling is performed shall be kept reasonably clean of spillers or tracked-on materials at all times and shall be thoroughly cleaned of such materials daily, within one hour after the suspension of hauling operations if said street is used by the traveling public. The contractor must be aware that emergency vehicles may be required to pass during hauling operations and the contractor shall be in a position to allow passage of such emergency vehicles. No direct payment shall be made for any expense incurred by the

contractor for his/her compliance with this provision.

4.0 All materials, time, equipment and labor required to comply with this special provision shall be considered completely covered by the bid items provided in the contract.

I. Traffic Management Coordination with Other Projects

1.0 Description. The contractor shall coordinate traffic management between the following projects within the same project limits.

No other projects with the project limits

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

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

J. Install Salvaged Mast Arm – Various Lengths

1.0 Description. This work shall consist of the contractor transporting MoDOT supplied traffic cantilever and butterfly signal poles with mast arms and installing the poles with mast arms onto new concrete foundations at the locations shown on the plans.

2.0 Coordination. The contractor shall arrange with MoDOT's signal staff a time during normal business hours to pick-up the salvaged posts and mast arms from the MoDOT maintenance lot. The contractor shall call the phone number listed below 48 hours prior to pick up for details for accessing the MoDOT storage site:

Joe Dotson, Urban Traffic Supervisor
3025 E. Kearney, MO 65803
Phone: 417-895-7599

3.0 Construction Requirements. The posts and mast arms shall be field galvanized as approved by the engineer as needed to repair any surface damage caused by contractor's handling or modifying the posts or mast arms during transport and installation.

3.1 The contractor shall be responsible for sealing existing bolt holes and providing new holes in the MoDOT supplied posts and mast arms as needed to install new traffic signal support brackets, traffic signal heads, street or regulatory signs, optional traffic detection devices, or any other equipment or devices to be supported by the posts or mast arms. New holes will be provided as indicated in the Standard Plans and Section 902.

3.2 The contractor shall install the new anchor bolts to accommodate the existing bolt hole patterns of the salvaged signal posts to be installed. Shop drawings sealed by a Professional Engineer registered in the state of Missouri shall be required for anchor bolt designs for review and approval by the engineer.

3.3 The contractor shall provide all new miscellaneous hardware that is required to install these posts and mast arms. This will include hardware missing from the MoDOT supplied posts and mast arms, including but not limited to hand hole covers, post or mast arm caps, nuts, nut covers, weather proof bushings, screens between base plates and concrete bases, or any other miscellaneous hardware required as shown on the Standard Plans.

3.4 The contractor shall confirm that the new traffic concrete signal base anchor bolt patterns match the bolt hole patterns of the MoDOT supplied poles. The contractor shall supply new nuts to secure the MoDOT supplied posts to the new concrete bases. The contractor shall confirm that the new concrete bases are of sufficient height in order for the existing posts to be placed at a sufficient height to provide vertical signal head clearances to the roadway as indicated on the Standard Plans.

3.6 Posts or mast arms damaged due to the contractor's handling shall be repaired or replaced in kind as approved by the engineer, at the contractor's expense.

4.0 Method of Measurement. Measurement shall be made per each MoDOT supplied post transported and installed in place.

5.0 Basis of Payment. All costs associated with transporting and installing salvaged signal posts and mast arms, including any additional materials, equipment, and labor, shall be considered completely covered by the contract unit price for the following items:

Item Number	Type / Description	Unit
902-99.02	INSTALL MODOT-SUPPLIED CL POST (25' MAST ARMS)	EACH
902-99.02	INSTALL MODOT-SUPPLIED CL POST (27' MAST ARMS)	EACH
902-99.02	INSTALL MODOT-SUPPLIED CL POST (34' MAST ARMS)	EACH
902-99.02	INSTALL MODOT-SUPPLIED CL POST (43' MAST ARMS)	EACH
0 2-99.02	INSTALL MODOT-SUPPLIED BL POST (2-40' MAST ARMS)	EACH

K. 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.

L. Fiber Optic Cable

1.0 Description. This work shall consist of installing new fiber cable, performing fiber splicing and termination as shown on the plans.

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

2.1 Cable. Fiber optic cable shall be loose tube, single mode dielectric cable. The cable shall be listed in the latest edition of the Rural Utilities Service (RUS) *List of Materials Acceptable for Use on Telecommunications Systems of RUS Borrowers*, category oc-d-F, and shall have a short-term tensile rating of at least 600 lbs. The cable sheath shall have length markings in feet, and shall indicate that the unit of measure is feet. The cable shall have an operating temperature range of -40° C to 70° C.

2.1.1 All fibers shall be suitable for transmission using both 1310 nm and 1550 nm wavelengths. Attenuation shall not exceed 0.35 dB/km and 0.25 dB/km for 1310 nm and 1550 nm signals, respectively.

2.1.2 The cables shall be constructed with six fibers per tube.

2.2 Splice Tray. Splice trays shall be 11.7" long, 3.9" wide, and 0.2" tall. They shall be aluminum with clear plastic covers, designed for outdoor use. Each shall accommodate 12 fusion splices. The trays shall have a black powder coat finish. The trays shall have both perforations for cable ties and crimpable metal tabs for buffer tube strain relief.

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

2.4 Pigtail. Pigtails shall be factory-made, buffered, and strengthened with aramid yarn to reduce the possibility that accidental mishandling will damage the fiber or connection. Pigtails shall be yellow. They must use the type of connector specified in Sec 2.3 of this provision. Each must contain one fiber. Length shall suffice to provide two feet of slack after installation.

2.5 Jumper. Jumpers shall meet the requirements for pigtails, but shall have a connector on each end. The second connector shall be as specified in Sec 2.3 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.

2.6 Patch Panel Module. Other contractors have equipped some cabinets with rack-mounted patch panel enclosures. Provide patch panel modules to increase the capacity of the enclosure, as needed. The modules shall be from the same manufacturer as the enclosure, and shall be compatible with the connectors specified in Sec 2.3 of this provision.

2.7 Rack-Mounted Interconnect Center. An interconnect center is a splice enclosure that has a patch panel built into one of its walls. Within the interconnect center, fibers in cables are spliced to pigtails and the pigtails are plugged into the patch panel from the inside. This allows jumper cables (not part of the interconnect center) to plug into the patch panel from the outside, connecting the fibers to equipment in the cabinet or to other fibers on the patch panel. Within an interconnect center, some fibers may be spliced to the corresponding fiber in a mating cable, rather than to a pigtail. Still other fibers may be coiled, 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 meeting the requirements of Sec 2.2 of this provision. Provide enough trays for all splices made in the interconnect center. The enclosure's patch panel shall have at least 24 positions, compatible with the connectors specified in Sec 2.3 of this provision. It shall have provisions for cable strain relief and for connector labeling.

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

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 for connector labeling.

It shall have a patch panel with at least 24 positions compatible with the connectors specified in Section 2.3 of this provision. It shall accommodate at least six splice trays as specified in Section 2.2 of this provision and shall be equipped with enough trays for all the splices made in the interconnect center.

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

3.0 Construction Requirements.

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

3.2 Cable Installation. Prior to installation, perform such tests as indicated in Sec 4.0 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.

3.2.1 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.

3.2.2 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.

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

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

3.2.5 Use an approved lubricant, in the amount recommended by the cable manufacturer, to facilitate pulling the cable. After the cable has been installed, wipe the exposed cable in a pull box, junction box, or cabinet clean of cable lubricant with a cloth before leaving the pull box, junction box, or cabinet.

3.2.6 In every intermediate pull box, store 30 feet of slack fiber optic cable for every cable that passes through the pull box. Additional slack storage, as indicated on the plans, is required in designated pull boxes. At cabinet locations, where cable runs from the pull box directly to an equipment cabinet, store 60 feet of slack fiber optic cable in the pull box. Additionally, treat the cable returning from the cabinet to the pull box as a separate cable, and store 60 feet of slack for these links. Store slack cable neatly on the walls of the pull box using racking hardware acceptable to the engineer.

3.3 Splicing. Splice the optic fibers as shown on the plans.

3.3.1 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.

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

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

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

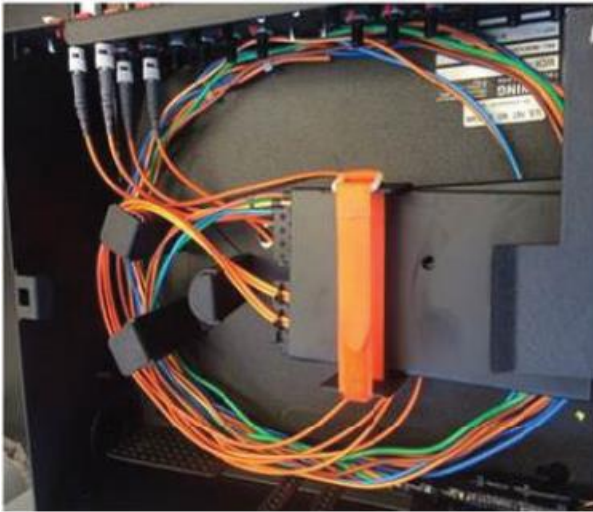
3.4 Termination. Terminate fibers by splicing them to factory-made pigtails. Cap all connectors that are not connected to a mating connector.

3.5 Tracer Wire. The contractor shall install a jacketed #14 AWG XHHW-2 standard blue tracer wire (also known as the locator wire) in conduit with new or replaced fiber optic cable(s). In every pull box connect the tracer wire to a ground rod with a ground rod clamp and provide five feet of slack. Secure the tracer wire slack in individual coils to the inside wall of each pull box. If the tracer wire already exists, the contractor shall ensure it is connected to the ground rod properly in each pull box and demonstrate a locate signal will transmit between pull boxes.

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

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

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



Acceptable



Unacceptable

4.0 Acceptance Testing

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

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

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

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

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

- (c) Calibrate an optical loss test set and provide evidence satisfactory to the engineer that the set produces accurate results at both wavelengths. This can be a demonstration that the set correctly measures the loss of a test fiber whose loss is known.
- (d) Use the test set to measure the loss of the link under test. Record the result at both 1310 nm and 1550 nm. Arrange for the engineer or his representative to witness these tests.

- (e) If the measured loss exceeds the calculated maximum, use an OTDR (Optical Time Domain Reflectometer) and other test equipment to troubleshoot the link. Take whatever corrective action is required, including cable replacement, to achieve a loss less than the calculated maximum.

4.3 Test Result Documentation. Prepare a diagram showing all of the links tested in this project. For the portions installed in this project, show the equipment cabinets, splices, and pigtails. On each line representing a link, show the maximum allowable loss and the actual loss. The actual loss shall be the one measured after all corrective actions have been taken. Submit 5 copies of this diagram to the engineer, along with the calculations for the maximum allowable loss. Submit the diagrams and calculations in an electronic format acceptable to the engineer.

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

6.0 Certifications. 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.

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 will be made as follows:

Item No.	Type	Description
910-99.03	Linear Foot	Fiber Optic Cable, 24 Strand, Single Mode
910-99.03	Linear Foot	Fiber Optic Cable, 6 Strand, Single Mode
910-99.02	Each	Fiber Optic Pigtail, SM, Furnish and Install
910-99.02	Each	Fiber Optic Jumper, SM, Furnish and Install
910-99.02	Each	Wall-Mounted Interconnect Center, Furnish and Install
910-99.02	Each	Fiber Optic Fusion Splice, SM

M. Install Communication Equipment

1.0 Description. The contractor shall install network equipment as provided by MoDOT into new cabinet, make necessary connections and test for proper network connection. This work shall be coordinated with MoDOT's ITS Group.

2.0 Materials.

2.1 All Ethernet network switches, video encoders, fiber optic data modems, and device servers will be procured by MoDOT. The contractor will be responsible for coordinating and picking up this equipment from MoDOT.

2.2 The Contractor shall furnish and install any cables or equipment such as Category 5E patch cords, power cords coax patch cords, network device surge arresters, and short serial cables, etc. as required make the communication equipment fully operational.

3.0 Construction Requirements.

3.1 Provide to the engineer a detailed schedule of installation of Contractor furnished communications equipment, at least thirty (30) days before commencing this type of work. Additionally, coordinate such work with the engineer.

3.2 The Contractor shall NOT move any cables from port to port on the network switches without prior MoDOT approval. For equipment installed in cabinets, mount the equipment in the rack as shown in the approved cabinet layout diagram or, for existing cabinets, as directed by the engineer, and connect the power cables and ground wires. If there are insufficient outlets in existing cabinets, provide Commission approved power strips as required. Connect the communication cables as shown on the connection diagrams in the plans. The equipment will be configured by the Commission, and therefore do not change any configuration settings.

3.3 Assist Commission staff in making the installed equipment operational. This may entail having a person with a cellular telephone at the cabinet reporting on results and making changes as directed by Commission staff. It may also entail installing replacement equipment when a unit cannot be made to work properly.

4.0 Basis of Payment. Measurement and payment for communication equipment installation will be on a per cabinet basis. The unit price shall include patch cords, cabling, assistance to Commission staff in getting the equipment operational, documentation, and all miscellaneous hardware required for a safe, fully operational system. Payment will be made as follows:

Item No.	Type	Description
910-99.02	Each	Install Communication Equipment

N. ITS Pull Box

1.0 Description. Furnish and install ITS Pull Boxes with concrete pads as shown on the plans.

2.0 Materials.

2.1 Pull Box. ITS pull box shall meet the requirements in Section 1062 of the Missouri Standard Specifications for Highway Construction.

2.2 Ground Rod. Ground rods shall be listed according to UL requirements as detailed in the Standard UL 467, Grounding and Bonding Equipment, and meet the requirements of NEC 250. Use electrodes that are solid copper or copper-bonded steel.

2.3 Concrete Pad. The contractor shall install a non-reinforced concrete pad around the ITS pull box as shown in the plans. The concrete used shall be a class 'B' concrete as described within Section 501 of the Standard Specifications.

3.0 Basis of Payment. Measurement and payment for ITS Pull Boxes includes excavation, materials, construction, backfill and all miscellaneous hardware required for a fully operational system. Payment will be made as follows:

Item No.	Type	Description
910-99.02	Each	Misc. ITS Pull Box, Class 2
910-99.02	Each	Misc. ITS Pull Box, Class 5

O. Conduit

1.0 Description.

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

2.0 Materials.

2.1 Use PVC conduit meeting the requirements of Sec 1060.

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

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

3.0 Construction Requirements.

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

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

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

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

3.2 Directional Drilling.

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

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

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

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

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

3.3 Intercept Existing Conduit with Proposed Pull Box.

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

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

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

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

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

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

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

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

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

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

3.4 Install Conduit into Existing Pull Box.

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

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

3.4.3 Install the conduit.

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

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

4.0 Basis of Payment.

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

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

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

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

Item No.	Type	Description
910-99.03	Linear Foot	Misc. Conduit, HDPE, Trench, 2"
910-99.03	Linear Foot	Misc. Conduit, HDPE, Drill, 2"
910-99.02	Each	Misc. Install Conduit Into Existing Box

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

1.0 General.

1.1 Description. The contractor shall remove the existing CCTV Camera Assembly at the noted intersections (if applicable) and install a Contractor furnished IP (Internet Protocol) closed circuit television (CCTV) assembly on a new 4" x 20' extension metal pole (if there is no CL type pole at the noted location; this pole shall be Contractor furnished and incidental to construction) which will be mounted to the signal up-right pole (see detail drawing), and install a Contractor

furnished power supply and surge protection in the new signal cabinet. Provide cable connecting the camera to the equipment in the cabinet and to ground, set up the camera assembly, and test for proper operation.

1.2 Compatibility. All CCTV cameras must be able to integrate with the Southwest District's latest Advanced Traffic Management System (ATMS) and its related interfaces.

2.0 Materials.

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

2.2 CCTV Camera. All CCTV cameras purchased and installed on this project shall be selected from the list below. These are the only CCTV cameras that are tested and fully functional with the version of latest ATMS software that the Southwest District is currently operating:

CCTV Manufacturer	Model	Connection Type
CostarHD (formerly known as Cohu)	4220HD RISE Dome	Outdoor cat5e
WTI	Viper H.264 HD30L	Outdoor cat5e
Axis	Q6155-E Dome	Outdoor cat5e
Bosch	MIC 7000i	Outdoor cat5e

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

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

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

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

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

3.0 Construction Requirements.

3.1 The contractor shall coordinate this work as well as any ITS (Intelligent Transportation System) network changes with MoDOT Southwest District ITS Group in advance via an email to John.Leporte@modot.mo.gov.

3.2 The contractor shall use the latest manufacture camera firmware.

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

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

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

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

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

4.0 Acceptance Testing.

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

4.2 After installing the camera assembly, test it using the same procedures used when the camera assemblies were delivered. In addition, demonstrate that the agreed upon viewing restrictions have been implemented. If the installed camera assembly fails to operate properly, and the problem cannot be fixed by changing the wiring or setup parameters, the camera

assembly will be deemed defective and the contractor shall return it to the manufacturer for replacement at Contractor's expense. Except for costs borne by the manufacturer under their warranty agreement, the cost of replacement shall be borne entirely by the contractor.

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

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

Item No.	Type	Description
910-99.02	Each	Misc. CCTV Camera Assembly
910-99.02	Each	Misc. Install CCTV Camera Assembly
910-99.03	LF	Misc. CCTV Camera Cable

Q. ITS/Fiber Splice Cabinet

1.0 Description. This work shall consist of furnishing and installing an ITS cabinet at the location shown on the plans.

1.1 ITS/Fiber Splice Cabinet Requirements

1.1.1 The cabinet shall be a Type 332 in accordance with the Traffic Signal Control Specifications published by the California Transportation and Housing Agency, Department of Transportation (Caltrans). The aluminum housing material shall be a minimum of 0.125 inches in thickness. All cabinets shall have a natural aluminum finish, free from blemishes. All seams shall be continuously welded and ground smooth. All fasteners must be stainless steel.

1.1.2 The housing shall feature two doors with latches, hinges and door gaskets. One cabinet door shall have louvers in the lower quarter and a replaceable filter for ventilation. All cabinet doors shall be equipped with No. 2 Corbin locks. Two keys shall be provided with each cabinet. An EIA 19-inch rack shall be installed including side panels where cabinet power distribution components will be mounted.

1.1.3 A thermostatically controlled fan shall be installed in the top of the cabinet capable of moving 100 CFM of ventilation airflow.

1.1.4 LED lighting fixtures suitable for mounting at the top of the 19-in rack shall be installed in both the front and rear of the cabinet. Each shall be wired through door activated switches.

1.1.5 One aluminum 19-inch rack mountable shelf shall be provided. The shelf shall be secured to the rack rails at all four corners.

1.2 ITS/Fiber Splice Cabinet Electrical Distribution. A cabinet electrical distribution system consisting of the following elements shall be installed. Components shall be neatly arranged, mounted and wired on the lower quarter of the hinge-side rack side panel.

One power wiring block for service conductors

One 20 Amp single pole unit mount, feed-through circuit breaker

One Edco SHA1210 surge suppressor or approved equivalent

One 2 – gang outlet box with duplex outlets installed (quadraplex) with cover plate

One 12 position minimum barrier type terminal strip providing access to AC+ where cabinet fan and light circuits will be landed

One 12 position minimum copper AC neutral buss with set screws

One 12 position minimum copper earth ground buss with set screws

1.3 Fiber Distribution Unit (FDU).

1.3.1 Each cabinet shall be equipped with a 19 inch rack mounted fiber distribution unit to provide a termination, splicing and connection point for fiber optic cables. The fiber distribution unit shall be modular in design and support a minimum termination/connection capacity of 48 fibers, four splice trays and strain relief for up to four cables.

1.3.2 The connector panels shall be designed to accommodate ST connectors. ST couplings with ceramic inserts shall be provided to accommodate either multi-mode or single mode fibers as appropriate. The unit shall provide both front and rear hinged door access.

1.3.3 The unit shall be constructed of aluminum. Plastic access doors will be permitted. The unit shall be positioned in the 19 inch rack as to allow fiber cables to be routed with bending radii exceeding manufacturer's recommendation. The unit shall not conflict with other cabinet components or panels.

1.4 Acceptance Testing.

1.4.1 Acceptance testing shall include a visual inspection and testing of lights, fan, power outlets. Use a device that measures resistance to ground using the three point fall-of-potential method to ensure that the resistance from the cabinet's earth ground buss to ground does not exceed 5 ohms. Install additional ground rods if necessary to achieve this requirement.

1.4.2 Provide all equipment and personnel needed to safely conduct the tests, arrange for the Engineer's representative to witness the tests, and provide a written summary indicating test results.

2.0 Basis of Payment.

Payment for the above items shall include all costs necessary to complete the work including installation, incidentals, and testing of a fully functional system. Payment will be made as follows:

Item No.	Type	Description
910-99.02	Each	Misc. ITS/Fiber Splice Cabinet

R. Fiber Media Converter/Ethernet Transceiver

1.0 Description. Install a fiber media converter (Ethernet transceiver) inside the new cabinets as shown on the plans.

2.0 Fiber Median Converter. At each location listed, provide a 10/100 Mbps single mode fiber media converter with a SC connector and at least an 15 mile range. The media converter shall include a plug-in transformer and be constructed with a removable outer case so the same unit can be used within a rack mounted cage for deployments that involve multiple Ethernet transceivers in one cabinet.

3.0 Method of Measurement. Measurement of fiber media converters will be made per each.

4.0 Basis of Payment. Accepted fiber media converters will be paid per each unit installed. No direct payment will be made for any incidental items necessary to complete the work unless specifically provided as a pay item in the contract.

Item No.	Type	Description
910-99.02	Each	Misc. Fiber Media Converter

S. CAT6 Ethernet Cable

1.0 Description. All new cable used to provide communications between the Ethernet switch and traffic signal cabinet equipment on this project shall conform to the following requirements to ensure consistency and acceptability of the system.

2.0 Materials. Provide a CAT6 cable as required per the manufacturer's specifications and recommendations to allow for direct connectivity between a field Ethernet switch and traffic signal cabinet.

2.1 Cables shall be rated for outdoor operations in the conditions (temperature range, humidity, etc.) in which the device manufacturer has specified as the acceptable range of operations.

2.2 Splices in the CAT6 cable shall not be permitted.

3.0 Method of Measurement. Measurement shall be made per linear foot.

4.0 Basis of Payment. Payment for the CAT6 Ethernet cable shall be considered full compensation for all contractor-provided equipment, connections, labor, and material to complete the installation of cable. Payment will be made at the contractors submitted unit price for:

Item No.	Type	Description
910-99.03	Linear Foot	Misc. CAT6 Ethernet Cable

T. Right of Way Clearance

1.0 Description. The right of way for this project has not been acquired.

Parcel 1- Larry Jones – Right of Way

Job No.: J8S3239
Route: B/MM
County: GREENE

Parcel 2 – I 44 Development, Inc – Right of Way and Temporary Easement
Parcel 5 – SRB Real Estate Investments, LLC – Right of Way and Permanent Easement
Parcel 6 – MGS Properties of Springfield, LLC – Right of Way and Permanent Easement
Parcel 7 – Land Solutions, LLC – Right of Way

1.1 The contractor shall inform itself of the location of these tracts. The contractor is not allowed access to these parcels for any of the road improvements other than within the existing right of way for the signal improvements.

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 February 6, 2024. However, this date expressly is not a warranty by or contractually binding on the Commission as the date the seven tracts will be clear for construction. No encroachment, storage of equipment and materials or construction on these tracts shall be permitted until the contractor is notified by the engineer that these tracts have 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 Tract 1, Tract 2, Tract 5, Tract 6 or Tract 7. The contractor may be given an extension of time upon proof of actual delay caused by the unavailability of these tracts as approved by the engineer.