

JOB SPECIAL PROVISIONS TABLE OF CONTENTS (ROADWAY)

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

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ADDITIONAL INFORMATION ATTACHED:

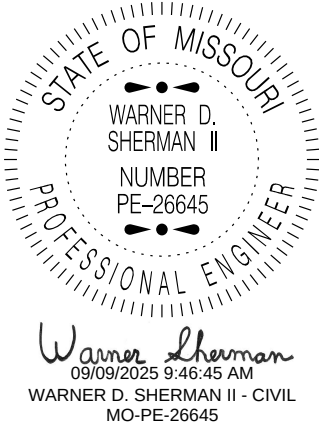
APPENDIX A - 161kV Transmission Modification IFC Package

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	MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION 105 W. CAPITOL AVE. JEFFERSON CITY, MO 65102 Phone 1-888-275-6636
	If a seal is present on this sheet, JSP's have been electronically sealed and dated.
	JOB NUMBER: J8S0836D GREENE COUNTY, MO DATE PREPARED: 07-28-2025
	ADDENDUM DATE:
Only the following items of the Job Special Provisions (Roadway) are authenticated by this seal: All	

JOB
SPECIAL PROVISION

A. General - Federal JSP-09-02L

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

1.1 This contract requires payment of the prevailing hourly rate of wages for each craft or type of work required to execute the contract as determined by the Missouri Department of Labor and Industrial Relations and requires adherence to a schedule of minimum wages as determined by the United States Department of Labor. For work performed anywhere on this project, the contractor and the contractor's subcontractors shall pay the higher of these two applicable wage rates. State Wage Rates, Information on the Required Federal Aid Provisions, and the current Federal Wage Rates are available on the Missouri Department of Transportation web page at www.modot.org 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 2025 Missouri Standard Plans
For Highway Construction

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

B. Contract Liquidated Damages JSP- 13-01D

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

2.0 Period of Performance. Prosecution of work is expected to begin on the date specified below in accordance with Sec 108.2. Regardless of when the work is begun on this contract, all

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work on all projects shall be completed on or before the date specified below. Completion by this date shall be in accordance with the requirements of Sec 108.7.1.

Notice to Proceed: December 08, 2025
Contract Completion Date: May 01, 2028

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

Project	Calendar Days	Daily Road User Cost
J8S0836D	875	\$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 **\$3000** per calendar day for each calendar day, or partial day thereof, that the work is not fully completed. For projects in combination, these damages will be charged in full for failure to complete one or more projects within the 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 for managing work zone delays 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 **15 minutes** to prevent congestion from escalating beyond this delay threshold. If disruption of the traffic flow occurs and traffic is backed up in queues equal to or greater than the delay time threshold listed above, then the contractor shall immediately review the construction operations which contributed directly to disruption of the traffic flow and make adjustments to the operations to prevent the queues from reoccurring. Traffic delays may be monitored by physical presence on site or by utilizing real-time travel data through the work zone that generate text and/or email notifications where available. The engineer monitoring the work zone may also notify the contractor of delays that require prompt mitigation. The contractor may work with the engineer to determine what other alternative solutions or time periods would be acceptable. When a Work Zone Analysis Spreadsheet is provided, the contractor will find it in the electronic deliverables on MoDOT's Online Plans Room. The contractor may refer to the Work Zone Analysis Spreadsheet for detailed information on traffic delays.

2.5.1 Traffic 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:

Existing Route MM:

7:00 a.m. – 6:00 p.m. Monday through Friday

3:00 p.m. – 5:00 p.m. Saturday
(Sunday no constraints)

New Route MM and 60 Intersection:

7:00 a.m. – 8:00 a.m. and 12:00 p.m. – 6:00 p.m. Monday through Friday
(Saturday and Sunday no constraints)

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 6:00 p.m. to 7:00 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. A CMS with communication interface is required and paid for as pay item 616-10.99.

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 – Troop D: 417-895-6868 Missouri Highway Patrol – Troop A: 816-622-0800	
MoDOT Customer Service: 417-895-7600	
Greene County Sheriff – (417) 868-4041	Greene County Office of Emergency Management – (417) 869-6040
Christian County Sheriff – (417) 581-2332	Christian County Office of Emergency Management – (417) 582-5400
Republic City Fire – (417) 732-3800	Republic City Police – (417) 732-3900
Springfield City Fire – (417) 874-2300	Springfield City Police – (417) 864-1810
Emergency Only Numbers	
911	
*55 cell phone – Missouri Highway Patrol	
417-864-1160 – MoDOT Incident Management Coordinator	

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

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

Warner “Bud” Sherman PE, Project Contact
Southwest District
3025 East Kearney St.
Springfield MO 65803

Office Telephone Number: 417-895-7690
Mobile Telephone Number: 417-224-1938
Email: Bud.Sherman@modot.mo.gov

1.1 All questions concerning the bid document preparation can be directed to the Central Office – Design as listed below.

Telephone Number: (573) 751-2876

Email: BCS@modot.mo.gov

2.0 Upon award and execution of the contract, the successful bidder/contractor shall forward all questions and coordinate the work with the engineer listed below:

Brad Gripka, Resident Engineer
Southwest District
2459 North Mayfair
Springfield, MO 65803

Office Telephone Number: 417-895-6720
Mobile Telephone Number: 417-834-6976
Email: Donald.Gripka@modot.mo.gov

F. Supplemental Revisions JSP-18-01JJ

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

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

- Stormwater Compliance Requirements

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

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

1.2 Reporting of Off-Site Land Disturbance. If the project includes any planned land disturbance on the project site, prior to the start of work, the contractor shall submit a written

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

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

2.1 Duties of the WPCM:

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

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

be installed prior to commencement of grading operations, and any issues relating to compliance with the Stormwater requirements that could arise in the course of construction activity at the project.

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

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

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

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

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

- **Delete Sec 106.9 in its entirety and substitute the following:**

106.9 Buy America Requirements.

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

106.9.1 Buy America Requirements for Iron and Steel.

On all federal-aid projects, the contractor's attention is directed to Title 23 CFR 635.410 *Buy America Requirements*. Where steel or iron products are to be permanently incorporated into the contract work, steel and iron material shall be manufactured, from the initial melting stage through

the application of coatings, in the USA except for “minimal use” as described herein. Furthermore, any coating process of the steel or iron shall be performed in the USA. Under a general waiver from FHWA the use of pig iron and processed, pelletized, and reduced iron ore manufactured outside of the USA will be permitted in the domestic manufacturing process for steel or iron material.

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

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

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

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

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

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

106.9.4.2 Items designated as Category 2 will include all other steel or iron products not in Category 1 and permanently incorporated in the project. Category 2 items shall consist of, but not be limited to items such as fencing, guardrail, signing, lighting and signal supports. The prime contractor is required to submit a material of origin form certification prior to incorporation into the project from the fabricator for each item that the product is domestic. The Certificate of Materials Origin form ([link to certificate form](#)) from the fabricator must show all steps of manufacturing,

including coating, as being completed in the United States and in accordance with CFR Title 23 Section 635.410 Buy America Requirements and be signed by a fabricator representative. The engineer reserves the right to request additional information and documentation to verify that all Buy America requirements have been satisfied. These documents shall be submitted upon request by the engineer and retained for a period of 3 years after the last reimbursement of the material.

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

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

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

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

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

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

106.9.7 Buy America Requirements for Manufactured Products.

Manufactured products means:

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

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

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

- Third-Party Test Waiver for Concrete Aggregate

1.0 Description. Third party tests may be allowed for determining the durability factor for concrete pavement and concrete masonry aggregate.

2.0 Material. All aggregate for concrete shall be in accordance with Sec 1005.

2.1 MoDOT personnel shall be present at the time of sampling at the quarry. The aggregate sample shall be placed in an approved tamper-evident container (provided by the quarry) for shipment to the third-party testing facility.

2.2 AASHTO T 161 Method B Resistance of Concrete to Rapid Freezing and Thawing, shall be used to determine the aggregate durability factor. All concrete beams for testing shall be 3-inch wide by 4-inch deep by 16-inch long or 3.5-inch wide by 4.5-inch deep by 16-inch long. All beams for testing shall receive a 35-day wet cure fully immersed in saturated lime water prior to initiating the testing process.

2.3 Concrete test beams shall be made using a MoDOT approved concrete pavement mix design.

3.0 Testing Facility Requirements. All third-party test facilities shall meet the requirements outlined in this provision.

3.1 The testing facility shall be AASHTO accredited.

3.1.1 For tests ran after January 1, 2025, accreditation documentation shall be on file with the Construction and Materials Division prior to any tests being performed.

3.1.2 Construction and Materials Division may consider tests completed prior to January 1, 2025, to be acceptable if all sections of this provision are met, with the exception of 3.1.1. Accreditation documentation shall be provided with the test results for tests completed prior to January 1, 2025. No tests completed prior to September 1, 2024, will be accepted.

3.2 The testing facility shall provide their testing process, list of equipment, equipment calibration documentation, and testing certifications or qualifications of technicians performing the AASHTO T 161 Procedure B tests. The testing facility shall provide details on their freezing and thawing apparatus including the time and temperature profile of their freeze-thaw chamber. The profile shall include the temperature set points throughout the entirety of the freeze-thaw cycle. The profile shall show the cycle time at which the apparatus drains/fills with water and the cycle time at which the apparatus begins cooling the specimens.

3.3 Results, no more than five years old, from the third-party test facility shall compare within ± 2.0 percent of an independent test from another AASHTO accredited test facility or with MoDOT test records, in order to be approved for use (e.g. test facility results in a durability factor of 79, MoDOT's recent durability test factor is 81; this compared within +2 percent). The independent testing facility shall be in accordance with this provision. The comparison test can be from a different sample of the same ledge combination.

3.4 When there is a dispute between the third party durability test results and MoDOT durability test results, the MoDOT durability test result shall govern.

3.5 Test results shall be submitted to MoDOT's Construction and Materials division electronically for final approval. Test results shall include raw data for all measurements of relative dynamic modulus of elasticity and percent length change for each individual concrete specimen. Raw data shall include initial measurements made at zero cycles and every subsequent measurement of concrete specimens. Raw data shall include the cycle count and date each measurement was taken. Test results shall also include properties of the concrete mixture as required by AASHTO T 161. This shall include the gradation of the coarse aggregate sample. If AASHTO T 152 is used to measure fresh air content, then the aggregate correction factor for the mix determined in accordance with AASHTO T 152 shall also be included.

4.0 Method of Measurement. There is no method of measurement for this provision. The testing requirements and number of specimens shall be in accordance with AASHTO T 161 Procedure B.

5.0 Basis of Payment. No direct payment will be made to the contractor or quarry to recover the cost of aggregate samples, sample shipments, testing equipment, labor to prepare samples or test samples, or developing the durability report.

- ***Delete paragraph 15.0 of the General Provision Disadvantaged Business Enterprise (DBE) Program Requirements and substitute the following:***

15.0 Bidder's List Quote Summary. MoDOT is a recipient of federal funds and is required by 49 CFR 26.11 to provide data about its DBE program. All bidders who seek to work on federally assisted contracts must submit data about all DBE and non-DBEs in accordance with Sec 102.7.9. MoDOT will not compare the submitted Bidder's List Quote Summary to any other documents or submittals, pre or post award. All information will be used by MoDOT in accordance with 49 CFR 26.11 for reporting to USDOT and to aid in overall DBE goal setting.

- **Add Sec 102.7.9 to include the following:**

102.7.9 Bidder's List Quote Summary. Each bidder shall submit with each bid a summary of all subcontractors, material suppliers, and service providers (e.g. hauling) considered on federally funded projects pursuant to 49 CFR 26.11. The bidder will provide the firm's name, the corresponding North American Industry Classification System (NAICS) code(s) the firm(s) were considered for, and whether or not they were used in the bid. The information submitted should be the most complete information available at the time of bid. The information shall be disclosed on the Bidder's List Quote Summary form provided in the bidding documents and submitted in accordance with Sec 102.10. Failure to disclose this information may result in a bid being declared irregular.

G. Winter Months Requirements JSP-15-07A

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

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

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

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

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

H. Liquidated Damages Specified – Route MM between Stone Falls Road and US 60 (Construction Phase 1A) JSP-93-28A

1.0 Description. If MM between Stone Falls Road and US 60 is not complete and open to traffic after a maximum of 90 day closure, the Commission, the traveling public, and state and local police and governmental authorities will be damaged in various ways, including but not limited to, increased construction administration cost, potential liability, traffic and traffic flow regulation cost,

traffic congestion and motorist delay, with its resulting cost to the traveling public. These damages are not reasonably capable of being computed or quantified. Therefore, the contractor will be charged with liquidated damages specified in the amount of **\$3,000** per day for each day, or partial day thereof, that this location is not complete and open to traffic in excess of the limitation as specified elsewhere in this special provision. It shall be the responsibility of the engineer to determine the quantity of excess closure time.

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

I. Quality Management NJSP-15-22

1.0 Quality Management. The contractor shall provide Quality Management as specified herein to ensure the project work and materials meets or exceeds all contract requirements.

1.1 The contractor shall provide Quality Control (QC) of the work and material, as specified herein, to ensure all work and material is in compliance with contract requirements. QC staff shall perform and document all inspection and testing. The QC inspectors and testers may be employed by the contractor, sub-contractor, or a qualified professional service provided by the contractor.

1.2 The engineer will provide Quality Assurance (QA) inspection. The role of QA is to verify the performance of QC and provide confidence that the product will satisfy given requirements for quality.

1.3 The contractor shall designate a person to serve as the project Quality Manager (QM). The QM shall be knowledgeable of standard testing and inspection procedures for highway and bridge construction, including a thorough understanding of the Missouri Standard Specifications. The QM shall be responsible for the implementation and execution of the Quality Management Plan and shall oversee all QC responsibilities, including all sub-contract work. The QM shall be the primary point of contact for all quality related issues and responsibilities, and shall ensure qualified QC technicians and inspectors are assigned to all work activities. The QM should be separate from the manager of the work activities to effectively manage a QC program.

1.4 Any QC personnel determined in sole discretion of the engineer to be incompetent, derelict in their duties, or dishonest, shall at a minimum be removed from the project. Further investigation will follow with a stop work notification to be issued until the contractor submits a corrective action report that meets the approval of the engineer.

2.0 Quality Management Plan. The contractor shall develop, implement and maintain a Quality Management Plan (QMP) that will ensure the project quality meets or exceeds all contract requirements, and provides a record for acceptance of the work and material. A sample QMP, which shows minimum requirements, is provided on the MoDOT website at: www.modot.org/quality.

2.1 The QMP shall address all QC inspection and testing requirements of the work as described herein. A draft QMP shall be submitted to the Resident Engineer for review at least two weeks prior to the pre-construction conference. An approved QMP is required at least two weeks prior to the start of work, unless otherwise allowed by the engineer. Physical work on the project shall not begin prior to approval of the QMP by the engineer.

2.2 The approved QMP shall be considered a contract document and any revisions to the QMP will require approval from the engineer.

2.3 The following items shall be included in the Quality Management Plan:

- a) Organizational structure of the contractor's project management, production staff, and QC staff, specific to this project.
- b) Name, qualifications and job duties of the Quality Manager.
- c) A list of all certified QC testers who will perform QC duties on the project, including sub-contract work, and the tests in which they are certified.
- d) A list of all QC inspectors who will perform QC inspection duties on the project, including sub-contract work, and the areas of inspection that they will be assigned.
- e) A procedure for verifying documentation is accurate and complete as outlined in Section 3.
- f) A procedure describing QC Inspections as outlined in Section 4.
- g) A procedure describing QC Testing, as outlined in Section 5, including a job specific Inspection and Test Plan (ITP).
- h) A procedure describing Material Receiving as outlined in Section 6.
- i) A list of Hold Points that are not included in the checklist forms, as outlined in Section 8.
- j) A procedure for documenting and resolving Non-Conforming work as outlined in Section 9.
- k) A procedure for tracking and documenting revisions to the QMP.
- l) A list of any approved changes to the Standard Specifications or ITP, including a reference to the corresponding change order.
- m) Format for the Weekly Schedule and Work Plans as outlined in Section 10, including a list of activities that will require pre-activity meetings.

3.0 Project Documentation. The contractor shall establish a Document Control Procedure for producing and uploading the required Quality Management documents to a MoDOT-provided server. The document management software used by MoDOT is Microsoft SharePoint®.

Contractors do not need to purchase Microsoft SharePoint®, however, it is recommended that new users acquire some basic training to better understand how to use this software. MoDOT does not provide the software training, but there are several online vendors who do. Contractors are required to use Microsoft Excel® and Microsoft Word® with some documents.

3.1 The contractor shall utilize the file structure and file naming convention provided by MoDOT. A sample file structure is available on the MoDOT website.

3.2 Documents (standard forms, reports, and checklists) referenced throughout this provision are considered the minimum documentation required. They shall be obtained from MoDOT at the following web address: www.modot.org/quality. The documents provided by MoDOT are required to be used in the original format, unless otherwise approved by the engineer. Any alteration to these forms shall be approved by the engineer.

3.3 Timely submittal of the required documents to the MoDOT document storage location is essential to ensure payment can be processed for the completed work. Submittal of the documents is required within 12 hours of the work shift that the work was performed, or on a document-specific schedule approved by the engineer and included in the QMP.

3.4 The contractor shall establish a verification procedure that ensures all required documents are submitted to the engineer within the specified time, and prior to the end of each pay period for the work that was completed during that period. Payment will not be made for work that does not include all required documents. Minimum documents that might be required prior to payment include: Test Reports, Inspection Checklists, Materials Receiving Reports, and Daily Inspection Reports.

3.5 The contractor shall perform an audit at project closeout to ensure the final collection of documents is accurate and complete.

4.0 Quality Control Inspections. The QMP shall identify a procedure for performing QC inspections. QC inspections shall be performed for all project activities to ensure the work is in compliance with the contract, plans and specifications.

4.1 The QM shall identify the QC inspectors assigned to each work activity. The QC inspectors shall inspect the work to ensure the work is completed in accordance with the plans and specifications, and shall document the inspection by completing the required inspection checklists, forms, and reports provided by MoDOT. Depending on the type of work, the checklists may be necessary daily, or they may follow a progressive work process. The frequency of each checklist shall be stated in the QMP. The contractor may propose alternate versions of checklists that are more specific to the work.

4.2 A Daily Inspection Report (DIR) is required to document pertinent activity on the project each day. This report shall include a detailed diary that describes the work performed as well as observations made by the inspection staff regarding quality control. The report shall include other items such as weather conditions, location of work, installed quantities, tests performed, and a list of all subcontractors that performed work on that date. The report shall include the full name of the responsible person who filled out the report and shall be digitally signed by an authorized contractor representative.

4.3 External fabrication of materials does not require further QC inspection if the product is currently under MoDOT inspection or an approved QC/QA program. QC inspection and testing required in the production of concrete for the project shall be the responsibility of the contractor.

4.4 The contractor shall measure, and document on the DIR, the quantity for all items of work that require measurement. Any calculations necessary to support the measurement shall be included with the documentation. The engineer will verify the measurements prior to final payment.

5.0 Quality Control Testing. The QMP shall identify a procedure for QC testing. The contractor shall perform testing of the work at the frequency specified in the Inspection and Test Plan (ITP).

5.1 MoDOT will provide a standard ITP and the contractor shall modify it to include only the items of work in the contract, including adding any Job Special Provision items. The standard ITP is available on the MoDOT website at www.modot.org/quality. The contractor shall not change the specifications, testing procedures, or the testing frequencies, from the standard ITP without approval by the engineer and issuance of a change order.

5.2 Test results shall be recorded on the standard test reports provided by the engineer, or in a format approved by the engineer. Any test data shall be immediately provided to the engineer upon request at any time, including prior to the submission of the test report.

5.3 The contractor shall ensure that all personnel who perform sampling and/or testing are certified by the MoDOT Technician Certification Program or a certification program that has been approved by MoDOT for the sampling and testing they perform.

5.4 If necessary, an independent third party will be used to resolve any significant discrepancies between QC and QA test results. All dispute resolution testing shall be performed by a laboratory that is accredited in the AASHTO Accreditation Program in the area of the test performed. The contractor shall be responsible for the cost to employ the third party laboratory if the third party test verifies that the QA test was accurate. The Commission shall be responsible for the cost if the third party test verifies that the QC test was accurate.

6.0 Material Receiving. The QMP shall identify a procedure for performing material receiving. Standard material receiving forms will be provided by the engineer.

6.1 The procedure shall address inspections for all material delivered to the site (excluding testable material such as concrete, asphalt, aggregate, etc.) for general condition of the material at the time it is delivered. The material receiving procedure shall record markings and accompanying documentation indicating the material is MoDOT accepted material (MoDOT-OK Stamp, PAL tags, material certifications, etc.).

6.2 All required material documentation must be present at the time of delivery. If the material is not MoDOT accepted, the contractor shall notify the engineer immediately and shall not incorporate the material into the work.

7.0 Quality Assurance. The engineer will perform Quality Assurance inspection and testing (QA) to verify the performance of QC inspection and testing. The frequency of the QA testing will be as shown in the ITP, but may be more frequent at the discretion of the engineer. The engineer will record the results of the QA testing and inspection and will inform the contractor of any known discrepancies.

7.1 QA is responsible for verifying the accuracy of the final quantity of all pay items in the contract. This includes taking measurements on items that require measurement and other items that are found to have appreciable errors.

7.2 QA inspection and test results shall not be used as a substitute for QC inspection and testing.

7.3 QA will be available for Hold Point inspections at the times planned in the Weekly Schedule. The inspections may be re-scheduled as needed, but a minimum 24-hour advance notification from the contractor is required unless otherwise approved by the engineer.

8.0 Hold Points. Hold Points are events that require approval by the engineer prior to continuation of work. Hold Points occur at definable stages of work when the succeeding work depends on a QA review of the preceding work before work can continue.

8.1 A list of minimum Hold Points will be provided by the engineer and shall be included in the QMP. The engineer may make changes to the Hold Point list at any time.

8.2 Prior to all Hold Point inspections, QC shall provide the engineer with the Daily Inspection Reports, Inspection Checklists, Test Reports, and Material Receiving Reports for the work performed leading up to the Hold Point. If the engineer identifies any corrective actions needed during a Hold Point inspection, the corrections shall be completed prior to continuing work. The engineer may require a new Hold Point to be scheduled if the corrections require a follow-up inspection.

9.0 Non-Conformance Reporting. Non-conformance reports shall be issued by the contractor for work that does not meet the contract requirements. Non-conforming work includes work, testing, materials and processes that do not meet contract requirements. The contractor shall establish a procedure for identifying and resolving non-conforming work as well as tracking the status of the reports.

9.1 Contractor QC staff or production staff should identify non-conforming work and document the details on the Non-Conformance Report form provided by MoDOT. QA staff may also initiate a non-conformance report.

9.2 In-progress work that does not meet the contract requirements may not require a non-conformance report if production staff is aware of the issue and corrects the problem during production. QC or QA may issue a non-conformance report for in-progress work when documentation of the deficiency is considered beneficial to the project record.

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

9.4 For recurring non-conformance work of the same or similar nature, a written Corrective Action Request will be issued by QC or QA. The contractor shall then establish a procedure for tracking the corrective action from issuance of the request to implementation of the solution. Approval from the engineer is required prior to implementation of the proposed corrective action. The contractor shall notify the engineer after the approved corrective action has been implemented.

10.0 Work Planning and Scheduling. The contractor shall include Quality Management in all aspects of the work planning and scheduling. This shall include providing a Weekly Schedule, a Work Plan for each work activity, and holding pre-activity meetings for each new activity.

10.1 A Weekly Schedule shall be provided to the engineer each week that outlines the planned project activities for the following two-week period. This schedule shall include all planned work, identification of all new activities, traffic control events, and requested Hold Point inspections for the period. Planned quantity of materials, along with delivery dates should also be included in the schedule.

10.2 A Work Plan shall be submitted to the engineer at least one week prior to the pre-activity meeting. The Work Plan shall include the following: a safety plan, list of materials to be used, work sequence, defined responsibilities for QC testing and inspection personnel, and stages of work that will require Hold Point inspections.

10.3 A pre-activity meeting is required prior to the start of each new activity. The purpose of this meeting is to discuss details of the Work Plan and schedule, including all safety precautions. Those present at the meeting shall include: the production supervisor for the activity, the Quality Manager, QC inspection and testing staff, and QA. The Quality Manager will review the defined responsibilities for QC testing and inspection personnel and will address any quality issues with the production staff. Attendees may join the meeting in person or by phone or video conference.

11.0 Basis of Payment. Payment for all costs associated with developing, implementing and maintaining the Quality Management Plan, providing Quality Control inspection and testing, and all other costs associated with this provision, will be considered included in the unit price of each contract item. No direct pay will be made for this provision.

J. 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.

K. Utilities JSP-93-26F

1.0 For informational purposes only, the following is a list of names, addresses, and telephone numbers of the known utility companies in the area of 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	Yes (see 2.0 – 2.2)	Communications
AT&T – Transmission Lenny Vohs 1425 Oak Street Kansas City, MO 64106 Phone: 816-275-4014 Email: lv2121@att.com SDT Solutions, LLC (contract engineer) Kevin Wingard 2749 NW Hunter Dr., Suite E Blue Springs, MO 64015 Phone: 580-931-7688	Yes (see 3.0 – 3.2)	Communications

Email: kwingard@sdt-1.com

Sparklight (Cable America)
TJ Steinert
655 N. Hillside Ave.
Republic, MO 65738
Phone: 417-353-6769
Email: TJ.Steinert@sparklight.biz

No

Communications

City Utilities of Springfield - Electric T&D
Seth Day
301 E. Central St.
Springfield, MO 65801
Phone: 417-831-8712
Email: seth.day@cityutilities.net

Yes
(see 4.0 – 4.2)

Power

City Utilities of Springfield - Gas
Ryan Jeppson
301 E. Central St.
Springfield, MO 65801
Phone: 417-831-8643
Email: ryan.jeppson@cityutilities.net

Yes
(see 5.0)

Gas

City Utilities of Springfield - SpringNet
Eric Cochran
301 E Central St.
Springfield, MO 65801
Phone: 417-831-8612
Email: ecochran@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 6.0)

Signals, Lighting, ITS

Spire Energy
Richi Garcia
3025 SE Clover Drive
Lee's Summit, MO 64082
Phone: 816-507-0713
Email: richi.garcia@spireenergy.com

Yes
(see 7.0)

Gas

City of Republic
4221 S. Wilson's Creek Blvd.
Republic, MO 65738

Yes
(see 8.0 – 8.2)

Water & Sewer

Angel Falig
Phone: 417-732-3415
Email: afalig@republicmo.com
Eric Brown
Phone: 417-732-3411
Email: ebrown@republicmo.com

Total Highspeed Internet	No	Communications
Chris Harness		
1091 W. Kathryn St.		
Nixa, MO 65714		
Phone: 417-720-0676		
Email: charness@totalhighspeed.net		

Liberty Utilities (EDE)	Yes	Power
Allec Uber	(see 9.0 - 9.2)	
3400 S. Kodiak Road		
Joplin, MO 64804		
Phone: 417-291-0170		
Email: allec.uber@libertyutilities.com		

Ozark Electric Coop.	Yes	Power
Dan Lohkamp	(see 10.0)	
2007 James River Ct.		
Nixa, MO 65714		
Phone: 417-838-4283		
Email: dlohkamp@ozarkelectric.com		

Southwestern Power Administration (SWPA)	Yes	Power
Joseph Gonzalez-Cruz	(See 11.0-11.4)	
One West Third St. Suite 1500		
Tulsa, OK 74103		
Phone: 918-595-6711		
Email: joseph.gonzalez-cruz@swpa.gov		
Toth & Associates		
Lewis Wiles		
1550 E. Republic Rd		
Springfield, MO 65804		
Phone: 417-300-3146		
Email: lwiles@tothassociates.com		

Mediacom	No	Communications
Kyle Keller		
1533 S. Enterprise Ave.		
Springfield, MO 65804		
Phone: 417-496-8577		
Email: kkeller@mediacomcc.com		

1.1 Disclaimer and Verification of Utility Information. 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 AT&T Distribution.

2.1 Existing Route MM. AT&T Distribution has copper and fiber facilities running parallel to Route MM along the west side of the roadway throughout the project limits. They also have copper and fiber facilities running parallel to FR160 along the north side of the roadway. These facilities will be impacted by the proposed roadway widening and roundabout construction. AT&T has completed their relocation plans and acquired the necessary materials. They will be relocating back to either the new R/W and/or permanent easements being acquired for the project. AT&T's placement and final cutover is contingent upon the acquisition of the new R/W and permanent easement on Parcel 6.

2.2 US60. AT&T Distribution has copper and fiber facilities running parallel to US60 on both sides of the roadway. The facilities on both the north and south side will be impacted by the intersection improvements at US60 and Stone Creek. AT&T has completed their relocation plans and acquired the necessary materials. They will be relocating back to either the new R/W and/or permanent easements being acquired for the project. AT&T's placement and final cutover on the south side of US60 is contingent upon the acquisition of the new R/W and permanent easement on Parcel 17.

3.0 AT&T Transmission.

3.1 Facilities. AT&T Transmission has a direct buried 96 count toll fiber running parallel to SPA's 161kV electric transmission line. The toll fiber runs along the south side of SPA's easement and crosses relocated Route MM near Sta 17+98. Due to the added fill required for the proposed roadway profile grade, AT&T will be exposing the existing fiber and installing split duct over it as a means of protection. In the process, AT&T will be adding an additional parallel maintenance

conduit. The split duct and maintenance conduits will terminate at new handholes set near the new R/W line. At the time of project advertisement, AT&T was in the process of finalizing their relocation plan. Once AT&T's relocation plan has been approved and reimbursement funds have been obligated, AT&T will perform the necessary relocation work. It is anticipated it will take AT&T's contractor two weeks to complete the work.

3.2 Ground Improvements. The proposed roadway plans call for ground improvements to Sta 17+50. AT&T's toll fiber will fall within these limits on the right side of relocated Route MM. The roadway contractor is strictly prohibited from performing any ground improvements within 3ft of the existing toll fiber. The resulting restricted area will be a 6ft width strip centered about the existing fiber. The roadway contractor shall exercise caution when working near AT&T's toll fiber. Any damage to the toll fiber due to the contractor's operations will be solely at the contractor's expense including any lost user fees associated with the toll fiber.

4.0 City Utilities - Electric.

4.1 Primary Power. CU has existing three phase overhead power running parallel to existing Route MM along the west side of the roadway. The powerline will be impacted by the proposed lighting at Haile Street and at the roadway widening for the proposed roundabout at Route MM and FR160. CU is planning to raise the primary to mitigate the lighting impact at Haile Street. They intend to relocate the parallel primary at the roundabout to the new proposed easements on Parcels 3 & 6. CU also has an existing overhead three phase line on the north side of FR160 being impacted by the proposed roundabout. CU plans to relocate the impacted poles to the new R/W. At the time of project advertisement, CU was still in the process of finalizing their relocation plans. CU anticipates their relocation work to take 5 weeks to complete once they are given notice to proceed. The notice to proceed is contingent upon MoDOT's acquisition of the new R/W and permanent easements on Parcel 3 & 6 and the obligation of relocation funds.

4.2 Secondary Power. The proposed improvements call for a new Type 2 power supply in the northwest quadrant of Route MM and FR160 for the roundabout lighting. The power source for the power supply will come from CU's relocated pole which has not been finalized. The roadway contractor will be required to install the secondary pedestal and riser conduit near CU's relocated pole. The roadway contractor will be required to pick up any CU provided items from their stockroom located at 742 N. Belcrest and transport these items to the site for installation. The contractor shall coordinate construction activities with CU's Contract Inspector, Corey Bryan (417-450-7347). All work performed for the future ownership/maintenance of City Utilities shall conform to their standard drawing located at: <https://www.cityutilities.net/business/construction/> CU Electric will not install a meter in the new power supply until it has been inspected and approved by the City of Republic. MoDOT will be responsible for submitting the MEP application to Republic Builds. The contractor will be required to pay the \$50 fee for the MEP permit. The contractor shall notify building inspector Jeremy Simpson (417-732-3021) a minimum of two weeks prior to needing the final electrical inspection. All costs required for compliance with this special provision shall be included in the contractor's submitted unit price for item 901-86.12 Power Supply Assembly, Type 2, per each.

5.0 City Utilities – Gas. City Utilities has a 4" plastic gas main running parallel to US60 along the north side of the roadway. They also have a 2" plastic gas main running parallel to Stone Creek along the west side of the roadway. Both mains will be impacted by the intersection

improvements at US60 and Stone Creek. City Utilities intends to relocate both gas mains back to the new R/W following the sight triangles through the intersection similar to Republic's water main relocation. At the time of project advertisement, City Utilities was still in the process of finalizing their gas relocation plans. When done, they will evaluate their operations schedule to see if they have capacity to perform the relocation work using internal crews. If not, City Utilities will advertise the gas relocation work. City Utilities is anticipating their gas relocation work will be performed in the first quarter of 2026.

6.0 MoDOT – Signals, Lighting, ITS. The proposed roadway improvements include various MoDOT signal, lighting, and ITS additions/revisions. 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, lighting, and ITS items included within the roadway contract.

7.0 Spire Energy. Spire has a 2" steel gas main running along the south side of FR160. The gas main transitions to 4" for the crossing of existing Route MM. North of FR160, the gas main transitions back down to 2" steel and extends north along the east side of existing Route MM. South of FR160, Spire has a 2" plastic main running south along the west side of existing Route MM. All the gas mains running parallel to existing Route MM will be impacted by the proposed roadway widening and roundabout construction. Spire intends to relocate the parallel gas main back to the new east R/W along Parcels 1, 2, 4, & 5. Spire will relocate the parallel main along the west side of existing Route MM back to the new R/W and/or permanent easement along Parcels 3 and 6. Spire is anticipating it will take 4 weeks to complete their relocation work. At the time of project advertisement, Spire was still in the process of finalizing their relocation plans. Spire's final relocation work and cutover is contingent upon the acquisition of the new R/W and permanent easements on Parcel 6.

8.0 City of Republic. The City of Republic has water and sanitary sewer facilities that will be impacted by the proposed roadway improvements. The City's water and sewer relocations are included as part of the roadway contract. The roadway contractor shall be responsible for acquiring the necessary materials and installing those materials in accordance to the plans provided and Republic's Construction Specifications located at:

<https://www.republicmo.com/DocumentCenter/View/193>

The City of Republic will be performing the construction inspection for the water and sanitary sewer relocations within the contract. The roadway contractor shall provide a minimum of 48 hours of advance notice to the City's inspector for all requested approvals. The City's inspector shall have sole authority to approve and/or reject the relocation work performed by the roadway contractor. Any deficiencies noted shall be correct by the roadway contractor to the approval of the City's inspector. All costs associated with compliance of this special provision shall be completely covered in the contractor's submitted bid prices for the water and sanitary sewer items included within the roadway contract.

8.1 Water. The City has a 12" PVC main in the northwest quadrant of Route MM and FR160 that will be impacted by the proposed roundabout. The proposed intersection improvements on US60 at Stone Creek will impact the City's 12" PVC mains on the north and south sides of US60.

The water relocation work on the south side of US60 will be contingent upon the acquisition of the R/W and permanent easements on Parcel 17.

8.2 Sanitary Sewer.

8.2.1 Description. Sanitary sewer line will be replaced in two sections on this project. The first will be between Haile Street and MoDOT proposed roundabout along EX. ROUTE MM alignment from approximate STA 178+56 to 184+62. The existing 10" PVC force main will be removed during construction and relocated with 605.8' of new 10" PVC force main.

Existing 12" PVC gravity sanitary sewer pipe near approximate STA 15+14 on PROPOSED ROUTE MM alignment will be abandoned and relocated with 408.2' of 12" SDR 26 PVC encased for 340' in 20" steel casing. This pipe will connect existing manhole A-35 (UIP) to New 5' manhole A-34.

All sewer installations will be made in accordance with City of Republic plans and specifications as shown in attached bidding documents. Contractor shall notify Department of Public Works a minimum of 7 days prior to the start of the City's sewer relocation. Angel Falig will serve as the City's contact and can be reached at 417-732-3415.

8.2.2 Basis of Payment. Payment for the City's sanitary sewer relocation work will be made at the contract unit bid price for the quantity of bid items installed. The cost for any incidental items associated with the installation of the City's sanitary sewer relocation shall be completely covered under the unit bid prices for sanitary sewer items. Final acceptance of the sanitary sewer relocation work will be contingent upon the acceptance of City of Republic Department of Public Works and the Commission's representative. Any allowance for time extensions, that results from a delay in DNR permit clearance, will be covered under Sec 108.14 of the current Missouri Standard Specifications for Highway Construction.

8.2.3 DNR Permit. Pursuant to the Missouri Clean Water Law, a General Permit for Sewer Extension Construction to City of Republic for Route MM Sanitary Sewer Realignment has been obtained. For permit information, see **Appendix B**.

8.2.4 Special Notes Regarding Utility Relocations

8.2.4.1 The Contractor shall be advised of utility relocations that may impact the construction schedule for this project. The Contractor shall be responsible for coordinating his construction operations with those construction operations of the utility companies noted above.

8.2.4.2 The sewer must be satisfactorily constructed prior to placing the roadway base for the pavement widening. The Contractor is responsible for the sanitary sewer relocations included in this project and shall consider this when determining his schedule.

8.2.5 Contractor's Responsibility.

8.2.5.1 The Contractor for this project will be responsible and is required to call for utility locates prior to performing any excavation work within the project limits. Calling for utility locates will not relieve the Contractor of his liability for utility damages caused by excavating operations

performed by the Contractor and/or any of his subcontractors. The Contractor shall be solely responsible for all costs, fines, and penalties associated with the repair of any damaged utility caused by the actions of the Contractor and/or any subcontractor within the limits of the project.

8.2.5.2 The Contractor shall plan his work in such a manner as to be able to continue his operations in the event of any utility conflict at an isolated location within the project limits. Any delays as a result of the conflict shall not be just cause for any claims or compensation against the Commission.

8.2.1 Gravity. Near Route MM Sta 184+38, the existing 12" PVC sewer main and associated manhole is to be extended west beyond the grading limits. The existing 12" PVC main crossing relocated Route MM near Sta 16+36 will be realigned and encased under the new utilizing new manholes set over the existing gravity main near the new R/W lines.

8.2.2 Force Main. On the west side of existing Route MM, the 10" PVC force main will be relocated from Hailey Street going south to the new manhole set with the gravity line extension noted above.

9.0 Liberty Utilities (EDE).

9.1 161kV Transmission. Liberty has a 161kV circuit supported by steel poles along the east side of existing Route MM. This facility is critical infrastructure to Liberty's system. The proposed roadway improvements took this into consideration and were designed to have minimal impact to Liberty's facilities. Liberty is agreeable to have minimal new fill placed near their steel poles. Under no circumstance will the contractor be allowed to remove any existing fill around their steel poles. The contractor is also advised to exercise extreme caution when working near the steel poles as to not damage the pole or grounding equipment. Any damage caused by the contractor's operations shall be repaired and/or replaced to Liberty's satisfaction solely at the contractor's expense.

9.2 Secondary Power. The power to the existing signal at US60 and Stone Creek is supplied by an existing Liberty secondary pedestal. This existing pedestal falls within the limits of the roadway widening on the west side of Stone Creek and will need to be relocated. Liberty will be installing a new secondary pedestal near the new R/W line along the proposed sight triangle. The power for the relocated signal cabinet, relocated ITS cabinet, and relocated lighting controller will come from Liberty's new secondary pedestal. The signal plans call for relocating the existing Type 2 power supply (and battery backup) which is functioning as a disconnect. The contractor shall furnish and install one 2" conduit with 3-1C#8 from Liberty's new secondary pedestal to the relocated Type 2 power supply. All costs required for compliance with this special provision shall be included in the contractor's submitted unit price for relocating the existing Type 2 power supply.

10.0 Ozark Electric Cooperative (OEC). Ozark Electric has a three-phase aerial line running parallel to FR103 along the west side of the roadway. East of FR103, OEC has a three-phase aerial line running parallel to US60 on the north side and a single-phase aerial line running parallel to the south side of the roadway. The primary power along US60 is not in conflict with the proposed improvements. The three phase along the west side of FR103 was in conflict with the proposed roadway realignment south of US60. OEC has completed their relocation to reconfigure

the span arrangement on the three-phase line to avoid the realignment of FR103. There are no other known conflicts with OEC facilities within the project limits.

11.0 Southwest Power Administration (SWPA).

11.1 Disclaimer and Verification of Utility Information. 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 damage that may arise from any error in the information. It is, therefore, the responsibility of the contractor to verify the above listing information indicating the existence, location and status of any facility. Such verification includes direct contact with the listed utilities.

11.2 Potholing of Utilities. At the time of project advertisement, several utility owners were in the process of potholing their facilities in close proximity of the new signal bases. Potholing is not anticipated to be completed prior to the scheduled project letting date. The results from the potholing will be available to the roadway contractor. The contractor is advised there may be other locations where potholing will be necessary to confirm the exact location of buried utilities. The contractor shall be responsible for any additional potholing not performed by the utility company. No direct payment will be made for compliance to this specification.

11.3 Overhead Primary Electric. SWPA has overhead transmission 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 the 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.

11.3.1 Toth & Associates. For questions about Section 1.3.2, please contact Lewis Wiles or Joshua Sirb at Toth & Associates, 1550 East Republic Road Springfield, MO, 65804, or by phone at 417-888-0645.

11.3.2 Overhead Power Materials Specifications. For materials specifications, please see **Appendix A**.

11.4 Coordination with SWPA. Work on SWPA transmission lines shall be closely coordinated between the Contractor and SWPA personnel, and SWPA shall be notified as soon as work on their facilities is complete.

11.4.1 Advance Notice of Outage. The construction contractor should provide SWPA with at least two weeks' advance notice prior to mobilizing to the site. This is for SWPA's awareness and,

if necessary, to allow a representative to be present to ensure minimum clearance requirements are met. For outage coordination, the contractor shall submit a written outage request to SWPA at least fourteen (14) calendar days before beginning any transmission line work. The proposed outage dates must be submitted a minimum of 6 months in advance. Construction work that does not require an outage may proceed at any time, including prior to submitting the outage request.

11.4.2 Maximum Outage Time. The maximum outage duration is based on the realistic time required to complete the work. The contractor shall factor in any concrete foundation work and associated curing periods.

L. Trenching and Backfilling for Utilities

1.0 Aggregate Materials. Clean base aggregate type A1 Coarse Stone: Angular crushed; free of shale, clay, friable material and debris; graded in accordance with ASTM C136 ASTM D2487, within the following limits:

Sieve Size	Percent Passing
2 inches	100
1 inch	95 to 100
3/4 inch	95 to 100
5/8 inch	75 to 100
3/8 inch	55 to 85
No. 4	35 to 65
No. 16	15 to 35
No. 40	10 to 25
No. 200	5 to 10

1.1 Aggregate type A2, Pea Gravel: Crushed stone, free of clay, shale, organic matter; graded in accordance with ASTM C136, ASTM D2487; to the following limits:

1.1.1 Minimum Size: 1/2 inch.

1.1.2 Maximum Size: 5/8 inch.

2.0 Fill Materials Acceptable material for foundation and backfill include Class IA, Class IB, Class II, Class III, and Class IVA as classified by ASTM D2487. Class IVB shall not be used for any part of utility construction, and Class V shall only be used as topsoil covering over trenches. Only Class IA and under certain conditions Class IB materials shall be used for utility embedment. The ASTM D2487 manufactured aggregates and soils are as follows:

2.0.1 Class IA – open graded, clean manufactured aggregates including angular crushed stone, angular crushed rock, or angular crushed gravel with little or no fines. This material is suitable for all application (foundation, bedding, haunching, embedment, initial backfill, and final backfill), except where high groundwater level, a hydraulic gradient or other conditions may cause migration of fines from adjacent soil causing loss of pipe support.

a) For use as foundation, bedding, haunching, embedment, and initial backfill with nominal pipe sizes of 8-inch through 15-inch, the percentage passing sieve sizes are as follows:

Sieve Size	Percent Passing
5/8 inch	100
No. 4	≤ 10%
No. 200	≤ 5%

b) For use as foundation, bedding, haunching, embedment, and initial backfill with nominal pipe sizes of 16-inch or larger, the percentage passing sieve sizes are as follows:

Sieve Size	Percent Passing
1 1/2 inch	100
No. 4	≤ 10%
No. 200	≤ 5%

2.0.2 Class IB – dense graded, clean, manufactured and processes aggregates including

Pipe	Average OD	Minimum (inches)	Trench	Width
ASTM D3034 SDR 35	8.400 inch	24.4		
ASTM D3034 SDR 35	10.500 inch	26.5		
ASTM D3034 SDR 35	12.500 inch	28.5		
ASTM D3034 SDR 35	15.300 inch	31.3		

angular crushed stone, angular crushed rock, and angular crushed stone/angular sand mixture with little or no fines, graded to minimize migration of adjacent soil. This material is suitable for all applications including high groundwater levels and hydraulic gradient provided it is sized and processed to minimize migration of adjacent material. This material used for embedment must be compacted to 85% standard proctor density and tested to ensure proper compaction.

3.0 Excavating. Cut trenches sufficiently wide to enable installation, pipe embedment compaction, and to allow inspection. Cut trenches sufficiently deep to provide the minimum pipe bedding requirements. Trench width shall be adequate to allow for the use of compaction equipment from trench foundation through embedment but particularly in the haunch zone, to allow joining procedures including gasket checking to be done, and to allow soil density testing. The minimum trench width shall be the greater of pipe outside diameter (OD) plus 16 inches or pipe OD times 1.5 plus 12 inches. The following table shows minimum trench widths:

3.1 Contractor shall not open more trench in advance of pipe laying in any given workday. No

unprotected open trenches shall be allowed. Depending on the circumstances, protected open cuts may be allowed, pending pre-approval by the Engineer and the City.

3.2 All trench excavation shall be open cut from the surface unless tunneling is approved by the Engineer or City and is specified on the drawings.

3.3 Hand trim excavation when required to save or protect trees, culverts, utilities, or other structures above or below ground.

3.4 Remove loose matter, lumped subsoil, boulders, and rock up to 1/3 cubic yard measured by volume. Remove water or materials that interfere with work.

3.5 Correct areas over excavated in accordance with the following backfilling specifications or use the approved aggregate type.

3.6 Trench bottoms shall be firm, dense, and thoroughly compacted and consolidated, and shall be free from mud and muck. Contractor shall cut out soft areas in the bottom of the trench and backfill with additional pipe embedment material. For unstable soils, over excavate to the depth shown on the plans and replace with acceptable material (generally Class IA or IB as appropriate) and compact in six-inch maximum layers.

3.7 Utilities must be installed immediately after trenches are completely prepared. Open trenches will not be allowed to sit idle without utility installation and shall be backfilled as soon as utilities have been installed within a section of trench.

4.0 Pipe Embedment and Encasements.

4.1 Granular Pipe Embedment.

4.1.1 Class IA, aggregate type bedding shall be used for all sanitary sewer installations. Refer to Standard Drawings for Trench and Pipe Bedding.

4.1.2 Place and compact the bottom layer at the proper grade to receive and uniformly support the pipe barrel. Compact in six-inch layers maximum.

4.1.3 Place pipe embedment material on a suitably prepared subgrade in lifts not exceeding six (6) inches and bring up evenly on both sides of the pipe. Do not dump embedment material over the side of trench in any manner that will bring earth into the bedding or displace the pipe.

4.1.4 Form a depression under each joint where the bell or coupling is not in contact with the granular embedment. Compact, vibrate, or slice with a shovel in such a manner that material fill will take its final compaction and provide uniform and solid bearing under the pipe and its haunches.

4.1.5 The Contractor shall contact the Engineer for inspection of, but not limited to, the granular embedment depth under the pipe, the pipe, pipe connections, and concrete cradles prior to covering the pipe.

4.1.6 Place and compact the sides simultaneously to firmly hold and maintain the pipe in proper position and alignment.

4.1.7 Place and compact the remaining granular embedment to a minimum height of twelve (12) inches above the top of pipe. Extend the granular embedment to full depth of the trench up to the bottom of the new or existing improvement in the following locations.

- a) Under any street, road, alley, highway shoulder, etc.
- b) Under any pavement, driveway, curb, parking lot, sidewalk, etc.

4.1.8 Compact the granular embedment in 8" loose lifts to 95% Standard Proctor Density.

4.1.9 Blasting will not be allowed, unless approved and procedures are developed by the Engineer, and submitted to the City for acceptance.

4.2 Drainage.

4.2.1 Trenches across roadways, driveways, or sidewalks adjacent to drainage ditches or water courses shall not be backfilled prior to completion of backfilling the trench on the upstream side to prevent impounding water after the pipe has been laid.

4.2.2 Backfilling shall be performed such that no water will accumulate in unfilled or partially filled trenches.

4.2.3 All material deposited in roadway ditches or other water courses as a result of excavation activities shall be removed immediately after backfilling is completed. The ditches or water courses shall be restored to their original condition, with no obstruction of surface drainage or excessive erosion.

4.3 Alignment and Grade.

4.3.1 The alignment and grade or elevation of each pipe line shall be fixed and determined by means of offset stakes. Vertical and horizontal alignment of pipes and the maximum joint deflection shall conform to requirements of other sections.

4.3.2 Trenches shall be carefully excavated so that the minimum cover over top of pipe shall be forty-two (42) inches to surface grade. See standard drawings for further information.

4.4 Concrete Encasements and Cradles

4.4.1 Install to the dimensions designed. Start and terminate at a pipe joint. Do not include joints at either end of the encasement or cradle.

4.4.2 Support and anchor pipe during installation to prevent dislocation or flotation.

4.4.3 Do not use heavy equipment directly over the encasement or cradle if grade is less than two feet above the encasement or cradle.

4.4.4 Do not place backfill until concrete has reached 50% of its strength.

5.0 Backfilling

5.1 The Contractor shall contact the Engineer for inspection of, but not limited to, the granular embedment depths and concrete encasements prior to beginning backfilling.

5.2 Backfill trenches to contours and elevations with unfrozen fill materials.

5.3 Systematically backfill to allow maximum time for natural settlement. Do not backfill over porous, wet, frozen, or spongy subgrade surfaces.

5.4 Place and compact materials in an equal continuous layer not exceeding 6 inches of compacted depth.

5.5 Maintain optimum moisture content of fill materials to obtain the designed required compaction density not less than 90% Standard Proctor Density. Where granular material is required to be extended to the top of the trench, the minimum compaction density shall be 95% Standard Proctor Density.

5.6 If specified density cannot be obtained with available materials, Contractor shall furnish and haul granular fill material or suitable earth at his expense. Remove surplus fill or unsuitable materials from the site.

5.7 Contractor shall place at least six (6) inches of topsoil (Class V), at the top of the trenches that are to be covered with sod or seeded in accordance with other sections.

M. Site Sanitary Sewerage Systems

1.0 Pipe Materials

1.1 Gravity sewer: Ductile Iron material or SDR 26 PVC as shown; inside nominal diameter as specified on the drawings (8 inches minimum).

1.2 Force main: ASTM D2241-SDR21, PVC material; inside nominal diameter as specified on the drawings (4 inches minimum).

2.0 Pipe Accessories

2.1 Pipe joints: Bell and spigot style gasket sealed joint end. Compression gasket rims for force main.

2.2 Gravity sewer fittings: Same material as pipe, molded or formed to suit pipe size and end design in required tees, bends, elbows, clean-outs, reducers, traps and other configurations.

2.3 Force main fittings: Mechanical joint, ductile iron, standard thickness, to meet all applicable

ASTM standards.

3.0 Installation Pipe

3.1 Install pipe, fittings, and accessories in accordance with applicable ASTM standards and manufacturer's instructions. Seal joints watertight.

3.2 Lay pipe to slope gradients noted on plan and profile drawings (0.50% minimum and 10.0% maximum) with a maximum variation from true slope of 1:1000. Under no circumstances shall pipe be laid in water and no pipe shall be laid under unsuitable weather or trench conditions.

3.3 Every precaution shall be taken to prevent foreign material from entering the pipe while it is being installed. No debris, tools, clothing, or other materials shall be placed in the pipe.

3.4 Whenever pipe laying is stopped, the open end of the line shall be sealed with a watertight plug.

3.5 Install bedding at sides and over top of pipe to minimum compacted thickness of 12 inches; compacted to 95 percent.

3.6 Force mains: Concrete reaction or thrust blocking should be provided at each valve, bend, tee and at reducers or fittings where changes occur in pipe diameter or direction. Avoid placing pipes with high points or air pockets in the system.

4.0 Sanitary sewer and water main locations:

4.0.1 Horizontal separation: Sanitary sewer and water mains shall be separated horizontally by at least 10 feet as indicated in the standard drawings. Should local conditions prevent a lateral separation of 10 feet and the City has given their approval, a water main may be laid in a separate trench or on an undisturbed earth shelf located on one side of the sewer line and at such an elevation that the bottom of the water main is at least 24 inches above the top of the sewer line. This vertical separation must be maintained for a normal distance of 10 feet.

4.0.2 Vertical separation: Where sanitary sewer and water mains must cross, the sanitary sewer main must be laid at such an elevation that the top of the sanitary sewer main is at least 24 inches below the bottom of the water main, and a full length of sanitary sewer pipe must be centered under the water main to be crossed so that the joints will be equally distant from the water main and as remote therefrom as possible.

4.0.3 Special conditions: Where conditions prevent the minimum vertical separation as set forth above from being maintained or where it is necessary for the water main to pass under a sewer line, the water main (if newly installed) must be encased with the same type of pressure pipe, which must extend on each side of the crossing until the normal distance from the water main to the sewer is at least 10 feet. In making such crossings, a full length of pipe must be centered over or under the sewer to be crossed so that the joints will be equally distant from the sewer and as remote therefrom as possible. If the water main exists, the sanitary sewer main shall be encased in concrete at a length

making the end points at least 10 feet from the water main.

5.0 Acceptance Tests for Sewers

5.1 Scope of work: The work shall consist of furnishing all labor, equipment, tools and materials, and the performance of any or all acceptance tests as required by the drawings, specifications, or inspector of the governing agency having authority over the installation.

6.0 General requirements

6.0.1 The Contractor shall furnish the Engineer with every reasonable facility for ascertaining whether or not the work performed was in accordance with the requirements and intent of the plans and specifications. Any work done (except excavation) or material used without suitable supervision or inspection by the Engineer may be ordered removed and replaced at the Contractor's expense.

6.0.2 The Contractor is responsible for providing the personnel and equipment necessary to run the tests. The project representative or inspector shall observe test and record testing information in the permanent record.

6.0.3 Prior to backfilling, the Contractor shall provide facilities to the Engineer to make a visual observation test of the straightness of each section of sewer between two adjacent manholes by either a laser beam or lamping.

6.0.4 After substantial completion of the work, which includes jetting, backfilling, and rough cleanup, or from time to time as the work progresses, the Contractor shall, under the direction of the Engineer, make such tests of the entire work or any part thereof as may be required to demonstrate the efficiency of the sewer and its components. Any test conducted must be performed 30 days or greater after final backfill is in place. If required, the Contractor shall make such openings as the Engineer may direct and shall restore the part of the work so disturbed to the satisfaction of the Engineer. Should any part of the work be found faulty in any respect, the Contractor shall repair such defects or replace them with new work as may be directed by the Engineer.

6.0.5 Pressure testing prior to backfilling is discouraged due to safety concerns.

6.1 Acceptance tests for gravity sewers - deflection testing

6.1.1 Contractor shall clean pipe of excess mortar, joint sealant and other dirt debris prior to acceptance.

6.1.2 The Contractor will be required during construction to install a line throughout the entire length of the sewer project. This line will be used for running a mandrel through the lines. The ends of the line will be secured in a manner satisfactory to the Engineer to ensure that the line will not be removed from the sewer before inspection. The line to be installed shall be 1/4 inch nylon or polypropylene yellow or white rope.

6.1.3 A mandrel will be furnished by the contractor to use to mandrel all sewer lines in checking

for the presence of any misaligned, displaced, or broken pipe and the presence of visible infiltration, debris or other defects. All mandrelling must be done in the presence of the Engineer.

6.1.4 Mandrel diameter shall be equal to 95 percent of the inside diameter of the pipe. All tests shall be performed without mechanical pulling devices thirty (30) days after final backfill has been placed. No pipe shall have a deflection greater than 5%. The following shall be used for mandrel sizing, and the Contractor shall confirm the size of mandrel used with the Engineer:

6.1.5 The Contractor shall correct all defects found during mandrelling operations prior to conducting leakage test.

6.2 Acceptance test for gravity sewers - air leakage testing

6.2.1 An air leakage test shall be performed in accordance with ASTM F1417-92 on the full length of all sewer lines and lateral lines prior to acceptance.

6.2.2 Contractor must perform air tests on all pipe less than eighteen (18) inch diameter and may be required to perform air tests for all pipe sizes.

6.2.3 The Contractor must furnish all facilities required including necessary piping connections, test pumping equipment, pressure gauges, bulkheads, regulator to avoid over pressurization, and all miscellaneous items required.

6.2.4 The pipe plug for introducing air to the sewer line shall be equipped with two taps. One

tap be to	Nominal Pipe Size (inches)	Minimum Pipe Diameter (inches)	95% Deflection Mandrel Diameter (inches)	will used
	8	7.665	7.28	
	10	9.563	9.08	
	12	11.361	10.79	
	15	13.898	13.20	

introduce air into the line being tested, through suitable valves and fittings, so that the input air may be regulated. The second tap will be fitted with valves and fittings to accept a pressure test gauge readable from ground level indicating internal pressure in the sewer pipe. The pressure test gauge will also be used to indicate loss of air pressure due to leaks in the sewer line.

6.2.5 The pressure test gauge shall meet the following minimum specifications:

- Size (diameter): 4 to 4 1/2 inches.
- Pressure range: 0 to 30 PSI.
- Figure intervals: 0.5 psi increments.
- Pressure tube: Bourdon Tube or diaphragm.
- Accuracy: +/- 0.25 percent of maximum scale reading.

f) Dial: White coated aluminum with black lettering, 270 degree arc.

g) Pipe connection: Low male 1/2 inch NPT.

6.2.6 Calibration data will be supplied with all pressure test gauges. Certification of pressure test gauge will be required from the gauge manufacturer. This certification and calibration data will be available to the Engineer whenever air tests are performed. The test gauges shall be calibrated at least every six months.

6.2.7 The Contractor shall test each reach of sewer pipe between manholes after completion of installation of all utilities.

6.2.8 The Contractor shall plug ends of line and cap or plug all connections to withstand internal pressure. One of the plugs provided must have two taps for connecting equipment. After connecting air control equipment to the air hose, monitor air pressure so that internal pressure does not exceed 5.0 psig. After reaching 4.0 psig, throttle the air supply to maintain between 4.0 and 3.5 psig for at least two (2) minutes in order to allow equilibrium between air temperature and pipe walls. If the time in seconds, for the air pressure to decrease from 3.5 psig to 2.5 psig is greater than that shown in the table below, the pipe shall be presumed free of defects.

Pipe dia.	100ft.	150ft.	200ft.	250ft.	300ft.	350ft.	400ft.
(in)	Specification for time length, min:sec						
4	1:53	1:53	1:53	1:53	1:53	1:53	1:53
6	2:50	2:50	2:50	2:50	2:50	2:50	2:51
8	3:47	3:47	3:47	3:47	3:48	4:26	5:04
10	4:43	4:43	4:43	4:57	5:56	6:55	7:54
12	5:40	5:40	5:42	7:08	8:33	9:58	11:24
15	7:05	7:05	8:54	11:08	13:21	15:35	17:48

6.2.9 If the air test fails to meet the above requirements, repeat test as necessary after all leaks and defects have been repaired. Prior to acceptance, all constructed sewer lines shall satisfactorily pass the low-pressure air test.

6.2.10 In areas where groundwater is known to exist, the Contractor shall install one-half inch diameter capped pipe nipple, approximately 10 inches long, through manhole wall on top of one of the sewer lines entering the manhole. This shall be done at the time the sewer line is installed. Immediately prior to the performance of the acceptance test, groundwater level shall be determined by removing pipe cap, blowing air through the pipe nipple into the ground so as to clear it, and then connecting a clear plastic tube to the pipe nipple. The hose shall be held vertically and a measurement of height in feet of water shall be taken after the water stops rising in this plastic tube. The height in feet shall be divided by 2.3 to establish the pounds of pressure that will be added to all readings.

6.2.11 In high groundwater conditions, the Contractor may be allowed upon receiving prior approval by the City to conduct infiltration and exfiltration acceptance testing in lieu of air leakage testing. This test shall be conducted in accordance with ASTM C969 standards.

6.3 Acceptance tests for force mains: All force main piping shall be subject to a hydrostatic and leakage test.

6.3.1 Hydrostatic tests. (Warning: The testing methods described below are specific for water-pressure testing only. These procedures should not be applied for air-pressure testing because of the serious safety hazards involved.)

- a) The hydrostatic test shall be conducted in accordance with AWWA Standards, at a test pressure which is 150% of the working pressure at the point of the test, but not less than 125% of the normal working pressure at the highest elevation. If a pump is part of the system, then the pump shut off head should be considered.
- b) The test pressure shall be determined from the following formula: (If the head pressure is not specified on the plans, then use pipe capacity in psi.) Test Pressure = Total design head pressure X 0.433 X 1.5.
- c) The test pressure must be between 100 and 150 psi and maintain ($\pm$ 5 psi) for at least 2 hours. The test pressure may be maintained longer as is necessary for time to inspect the pipeline for visible leaks and as is required to obtain a reasonable time for leakage measurement.
- d) The test pressure shall not exceed pipe or thrust-restraint design pressures.
- e) Valves shall not be operated in either direction at a differential pressure exceeding the rated valve working pressure. Use of a test pressure greater than the rated valve pressure can result in trapped test pressure between the gates of a doublegate valve. For tests at these pressures, the test setup should include a provision, independent of the valve, to reduce the line pressure to the rated valve pressure on completion of the test. The valve can then be opened enough to equalize the trapped pressure with the line pressure, or fully opened if desired.
- f) The test pressure shall not exceed the rated pressure of the valves when the pressure boundary of the test section includes closed, resilient-seated gate valves or butterfly valves.
- g) The system shall be filled very slowly with water at a rate of 1 fps (2 fps max.) while venting all air from the system. If permanent air vents are not located at all high points, the Contractor shall install corporation cocks at such points so that the air can be expelled as the line is filled with water. After all of the air has been expelled, the corporation cocks shall be closed and the test pressure applied. At the conclusion of the pressure test, the corporation cocks shall be removed and plugged or left in place at the discretion of the Engineer.

- h) While the system is under pressure, all exposed pipe and appurtenances shall be inspected for leaks. All visible leaks shall be repaired or replaced, and the test repeated until all visible leakage has been stopped and the allowable leakage requirements have been met.

6.3.2 Leakage test. The leakage test shall be conducted concurrently with the hydrostatic test. Leakage shall be considered as the volume of water added to maintain the test pressure to within 5 psi determined by the formula above. The leakage test shall be conducted in accordance with Manual M23 of the AWWA specifications. Allowable leakage must not exceed the volumes specified below for each 1,000 feet (or 50 joints) of the particular diameter of pipe being tested:

Pipe Size (dia.)	Allowable Leakage		
	Average Test Pressure in Line		
	100 psi	125 psi	150 psi
4"	0.27 gallons / hr.	0.30 gallons / hr.	0.33 gallons / hr.
6"	0.41 gallons / hr.	0.45 gallons / hr.	0.50 gallons / hr.
8"	0.54 gallons / hr.	0.60 gallons / hr.	0.66 gallons / hr.
10"	0.68 gallons / hr.	0.76 gallons / hr.	0.83 gallons / hr.
12"	0.81 gallons / hr.	0.91 gallons / hr.	0.99 gallons / hr.

$$L = \frac{ND\sqrt{P}}{7400}$$

Where: L = allowable leakage, gph

N = number of joints in the length of pipeline tested

D = nominal diameter of the pipe, in.

P = average test pressure during the leakage

6.3.3 If testing results show leakage greater than the allowable maximum, the defective pipe and joint(s) shall be located and repaired. When repair work is complete, tests shall be performed again to determine that leakage is within the allowable limit.

N. Sanitary Sewer Relocation

1.0 Description. This work consists of relocating sanitary sewer at two locations. All Materials and installation shall comply with City of Republic standard specifications.

2.0 Method of Measurement. Final measurement will not be made.

3.0 Basis of Payment. The sanitary sewer for both locations, complete and in-place, will each be paid for at the contract unit price for the following bid items:

<u>Bid Item No.</u>	<u>Description</u>	<u>Units</u>
603-99.23	Sewer {Relocation – Location 1}	Lin. Ft.
603-99.23	Sewer {Relocation – Location 2}	Lin. Ft.
603-99.23	Sewer {Sanitary Sewer Manhole}	Lin. Ft.
603-99.23	Sewer {20" Steel Casing}	Lin. Ft.

O. Manholes and Covers

1.0 Products and Materials. Manhole sections: Circular, reinforced precast concrete in accordance with ASTM C478.

1.1 Gaskets

1.1.1 Mastic Fed Spec SS S 210; K.T. Snyder Ram-Nek; Hamilton Kent, Kent Seal #2; or approved equivalent.

1.1.2 Rubber Neoprene or other synthetic, 40 plus or minus 5 hardness when measured by ASTM D2240, Type A durometer.

1.1.3 Slip-on rubber manhole adapter as manufactured by Fernco or equivalent.

1.1.4 Cast-in pipe gasket as manufactured by A-LOK Products, Inc. or equivalent conforming to ASTM C-923.

1.2 If the Contractor desires to suggest changes, modifications or alternatives, the Contractor shall submit, in writing, a description of the proposed changes or modifications for review by the City and Engineer.

2.0 Components.

2.1 Manhole lid and frame: Neenah; Deeter; or approved equivalent, ASTM A48, Class 30B cast iron construction, machined flat bearing surface, removable closed lid design; live load rating suitable for H-20 load requirements of 16,000 lbs.; having lid molded with and identifying use such as sanitary sewer or sewer.

2.2 Wetwell lid and frame: Neenah; Deeter; U.S. Foundry; or approved equivalent, aluminum construction with a 300 psf live load rating, or approved equivalent.

2.3 Manhole steps: As per Manufacturer.

3.0 Configuration.

3.1 Shaft construction: Concentric and cylindrical with eccentric cone top section; lipped male/female joints; sleeved to receive pipe sections.

3.2 Clear inside dimensions: 48 inch or 60 inch for inside drop manhole structures. For wetwells, minimum inside diameter shall be based on capacity requirements.

3.3 Design depth: As indicated.

3.4 Clear lid opening: 24 inches. Manholes shall include self-sealing lid and concealed pick holes. Wetwells shall include a reinforced concrete top with opening for surface mounted lift station or with embedded aluminum access hatch for submersible lift stations. Top shall match wet well sections and sealed with mastic gasket.

3.5 Pipe entry: Provide precast openings with gasketed fittings as required.

3.6 Steps: 12 inches wide, 16 inches on center vertically, set into manhole wall.

4.0 Examination. Verify calculated rim elevation agrees with actual finish grade found at site. Contractor shall inform the City and make adjustments as necessary to the manhole component make-up.\

4.1 Waterproofing of manholes: Surface preparation and application shall comply with manufacturer's recommendations. Contractor and manufacturer are advised that surface preparation and waterproofing application shall occur at manufacturer's plant, prior to shipment, and comply with paint manufacturer's recommendations. Exteriors of precast sections shall be waterproofed with a minimum 15.0 MILS DFT coating of Coal Tar paint 47 - BX4 or equivalent.

5.0 Placing Manhole Sections. Provide six (6) inches of compacted granular fill (Class IA) beneath bottom.

5.1 Place manhole sections plumb and level, trim to correct elevations, anchor to base pad (if necessary). Provide a double row of mastic gasket to seal joints between sections. Fill inside of void between precast sections with non-shrink grout. Trowel smooth.

5.2 Cut and fit for pipe and gasketed fittings. Install an "A-LOK" flexible rubber gasket; Fernco slipon rubber manhole adapter; or approved equivalent at the entrance hole. Sleeve openings are acceptable for pump outlet piping. A non-shrink grout shall be installed around outlet pipe penetrations.

5.3 Grout base of shaft sections to achieve slope to exit piping (if base has not been precast as part of the manhole). Trowel smooth. Contour as required.

5.4 The flow channel of base shall conform in shape and slope to that of the sewer and shall be finished as smoothly as possible to provide a roughness coefficient nearly equal to that of the pipe. Changes in flow direction shall not exceed 90 degrees. Where a junction of two or more lines occur, a separate channel shall be constructed for each incoming line with the channels gradually merging ahead of the outlet using uniform curves.

5.5 Set cover frames and covers level without tipping, to correct elevations. Set frame level so that top of cover is two (2) inches higher than finish grade or as indicated on drawings.

6.0 Acceptance Tests

6.1 Scope of work: The work shall consist of furnishing of all labor, equipment, tools, and materials, in the performance of any acceptance test.

6.1.1 All manholes and wetwells must be tested to assure water tightness.

6.1.2 Existing manholes must be tested prior to excavation and after pipe installation and

backfilling. If vacuum test fails on initial test, cease excavation at this area and notify the City and the Engineer. Any repairs to existing manholes necessary to pass the vacuum test are the responsibility of the Contractor.

6.1.3 After the manhole is in place and backfilled to finish grade, the Contractor shall plug the inlet and outlet sewer feeds in a watertight manner. The manhole will then be tested using a vacuum test. Wetwells may be tested using either a water-test or a vacuum test. Tests must be performed in the presence of the Engineer or his representative.

6.2 Vacuum testing manholes: The Contractor shall furnish all facilities required, including necessary piping connections, test pumping equipment, pressure gauges, bulkheads, regulator to avoid over pressurization and all miscellaneous items required.

6.2.1 Calibration data will be supplied with all pressure test gauges. Certification of vacuum test gauges will be required from the gauge manufacturer. This certification and calibration data will be available to the Engineer whenever air tests are performed.

6.2.2 Test each manhole and appurtenances in accordance with ASTM C1244-93 after the complete installation. Stabilize the vacuum at 10 inches Hg (Mercury). After pressure has stabilized, the gauge is allowed a maximum of 1 inch Hg drop during the test period. The required minimum test period is as follows for all sizes and manhole depths:

Manhole Depth (feet)	Manhole Diameter (inches)					
	42	48	54	60	66	72
8	17	20	23	26	29	33
10	21	25	29	33	36	41
12	25	30	35	39	43	49
14	30	35	41	46	51	57
16	34	40	46	52	58	67
18	38	45	52	59	65	73
20	42	50	58	65	72	81
22	46	55	64	72	79	89
24	51	59	69	78	87	97
26	55	64	75	85	94	105
28	59	69	81	91	101	113
30	63	74	87	98	108	121

6.2.3 If the vacuum test fails to meet the above requirement, repeat test as necessary. Repair all leaks and defects.

P. Crushed Aggregate

1.0 Description. This work shall consist of furnishing and placing crushed aggregate for the removal of existing pipes under pavement. This work and material shall be in accordance with Section 1005 except as follows.

2.0 Construction Requirements. The contractor shall furnish, haul and spread crushed aggregate for pavement repair due to pipe removal as approved by the engineer.

3.0 Method of Measurement. Measurement of material furnished for crushed aggregate shall be made in accordance with Section 1005, excluding any deductions for moisture.

4.0 Basis of Payment. The accepted quantity of crushed aggregate will be paid for by the contract unit bid price for Item No. 310-99.10, Crushed Aggregate, per ton.

Q. Alternates for Pavements JSP-96-04G

1.0 Description. This work shall consist of a pavement composed of either portland cement concrete or asphaltic concrete, constructed on a prepared subgrade in accordance with the standard specifications and in conformity with the lines, grades, thickness and typical cross sections shown on the plans or established by the engineer.

1.1 Separate pay items, descriptions and quantities are included in the itemized proposal for each of the alternates. The bidder shall only bid one of the alternates and leave the contract unit price column blank for any pay item listed for any other alternate. If the bidder leaves any value in the unit price column for another alternate other than the one they are bidding, the bid will be rejected.

2.0 Mainline Pavements

2.0.1 A sum of \$492,500 will be added by the Commission to the total bid using an asphalt alternate for the Mainline for bid comparison purposes to factor in life cycle cost analysis of the roadway. The additional amount added will not represent any additional payment to be made to the successful bidder and is used only for determining the low bid.

2.1 The quantities shown for each alternate reflect the total square yards of pavement surface designated for alternate pavement types as computed and shown on the plans. No additional payment will be made for asphaltic concrete mix quantities to construct the required 1:1 slope along the edge of the pavement, or for tack applied between lifts of asphalt.

2.2 The grading shown on the plans was designed for the concrete pavement alternate.

2.4 Pavement alternates composed of Portland cement concrete shall have contrast pavements for intermittent markings (skips), dotted lines, and solid intersection lane lines. The pavement markings shall comply with Sec 620. No additional payment will be for the contrast pavement markings.

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

4.0 Basis of Payment. The accepted quantity of the chosen alternate and other associated items will be paid for at the unit price for each of the appropriate pay items included in the contract.

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

4.2 For projects with grading in the contract, there will be no adjustment of the earthwork quantities due to adjusting the roadway subgrade for alternate pavements.

R. Concrete and Asphalt Joint Sealer

1.0 Description. This work shall consist of furnishing and installing concrete and asphalt joint sealer where new permanent pavement abuts existing pavements or along seams between varying types of pavement (asphalt/concrete).

2.0 Materials. Concrete and asphalt joint sealer shall be in accordance with Standard Specification 1057.5 and ASTM D 6690, Type II.

3.0 Basis of Payment. No direct pay will be made for Concrete and Asphalt Joint Sealer. All costs associated with placement of concrete and asphalt joint sealer shall be considered incidental to costs for alternate pavements

S. Truck Apron (Pigmented and Textured)

1.0 Description. Truck Apron shall be constructed for large vehicle off-tracking. This work shall consist of pigmenting, texturing, and sealing the concrete to give the appearance of brick pavers for the low-profile truck apron in the roundabout.

2.0 Materials. Truck Apron shall be 8.5-inch-thick concrete pavement with baskets. The Manufacturer shall submit to the Engineer, setting forth the brand name, designation (if any), composition and general description of the material to be used in the process of pigmenting. The manufacturer shall submit typical amounts of material to be used in the mixing of the concrete.

2.1 Pigment. Pigment shall be red in color and shall be free from oil, grease, dirt, and nonferrous particles and shall cause no deleterious effects to the concrete mix. The manufacturer shall guarantee that all materials used in the pigmenting process will have no deleterious effects on the strength and overall integrity of the concrete.

3.0 Texturing. After surface irregularities have been removed, the concrete shall be given a uniform surface finish to give the appearance of brick pavers. The method by which the surface is textured is left to the discretion of the Contractor. A stamp or roller device is preferred to

maintain consistency. Hand texturing will be permitted in irregular areas where, in the opinion of the Engineer, a stamp or roller device would no longer be beneficial or would not give a satisfactory appearance to the surface of the concrete. Prior to placing the concrete, the Contractor and Engineer shall review all perceived areas where hand texturing may be necessary. The Engineer shall make all efforts to minimize the amount of area to be hand textured. The material used for tinting shall be mixed into the concrete prior to being placed. The contractor shall not be allowed to just place the tinting material on the surface. Tar paper shall be required around the border of the form so that the surrounding pavement will not be marred or stained.

4.0 Construction Requirements. Truck Apron shall be constructed with Medium to Dark Red Tinted Concrete in accordance with the requirements in Sec 501, 502, Sec 608, Sec 1056.

5.0 Method of Measurement. Concrete areas shall be computed to the nearest 1/10 square yard.

6.0 Basis of Payment. Payment for the above described work including all materials, equipment, labor, and any other incidental work necessary to complete the item shall be completely covered by the contract unit price for the following item:

502-99.05, 8.5 in. Truck Apron (Pigmented & Textured), per square yard

T. Truck Mounted Attenuator (TMA) for Stationary Activities JSP-23-04

1.0 Description. Provide and maintain Truck Mounted Attenuators (TMA) in accordance with Sec 612 and as specified herein.

2.0 Construction Requirements. Truck Mounted Attenuators (TMA) shall be used for the work activities indicated in the plans or specified herein.

2.1 Activity for which TMA is to be provided: US 60 widening. Truck Mounted Attenuators (TMA) will be provided by the contractor for all work performed along US 60 (Sta. 228+50 to 248+18.97). When active construction is taking place

3.0 Method of Measurement. No measurement will be made for Truck Mounted Attenuators (TMA).

4.0 Basis of Payment. Delete Sec 612.5.1 and substitute with the following:

612.5.1 No payment will be made for truck mounted attenuators (TMAs) used in mobile operations or for any TMAs designated as optional.

612.5.1.1 Payment for TMAs required for stationary work activities will be paid for at the contract unit bid price for Item 612-30.01, Truck Mounted Attenuator (TMA), per lump sum. The lump sum payment includes all work activities that require a TMA, regardless of the number of deployments, relocations, or length of time utilized. No payment will be made for repair or replacement of damaged TMAs.

U. Red Signal Ahead Sign with Led Light NJSP-17-10A

1.0 Description. This work shall consist of providing and installing red signal ahead sign with an attached LED assembly at locations shown on the plans for the signalized intersection.

2.0 Materials

2.1 The red signal ahead sign shall conform to the material requirements as outlined in Sec 1042. The sign shall have black lettering over yellow sheeting conforming to the dimensions as shown in the plans.

2.2 The LED assembly shall consist of a singular sealed polycarbonate modular unit. The modular unit shall have a red lens with either a red or black background. The word "RED" shall be illuminated using the red LED lights. Each letter of the word "RED" shall consist of two rows of 1/8 inch LED lights arranged in a sequence so no adjacent LEDs are in series. Each row of LED lights used for the letters shall be spaced so that the out to out dimension for the LED rows is 5/8 inch (3/8 inch clear spacing between the 1/8 inch LED lights). Each letter in the word "RED" shall have an out to out dimension of 6-1/8 inches tall by 4-1/8 inches wide. The letters in the word "RED" shall be spaced to provide 2-5/8 inch gap between the "R" and the "E" and the "E" and the "D". The modular unit shall be securely mounted to the Signal Ahead sign with a minimum of four anchoring screws.

2.3 The LEDs used in the modular unit shall have an intensity of 4500 millicandela per LED at a 30 degree viewing angle and be powered by 12 volt alternating current at less than 3 amps. The power to the LEDs shall be supplied by means of an electric transformer mounted in the pedestal base where 120 volt alternating current will be provided from the signal controller cabinet.

3.0 Construction Requirements. The contractor shall install the signal ahead sign with the LED assembly at the location shown in the plans. The red signal ahead sign shall be mounted to the signal posts supported by a Type C base. Rubber grommets shall be used to protect the LED leads going through the signal post. The contractor shall mount the transformer inside the pedestal base. All splices shall be waterproof.

4.0 Method of Measurement. For the basis of this contract, the red signal ahead sign and attached LED assembly shall be considered as a single unit. Both the sign component and the LED assembly component must be satisfied before any acceptance can be made. Measurement will be made per each unit installed by the contractor and accepted by the engineer.

5.0 Basis of Payment. Accepted red signal ahead sign and LED assembly will be paid for at the contract unit bid price for the item 903-99.02, "Red Signal Ahead Sign with LED Light", per each. No additional payment will be made for any labor, equipment, mounting hardware, time, or materials necessary to fulfill the requirements of this special provision.

V. Disposition of Existing Signal, Lighting and Network Equipment JSP-15-05A

1.0 Description. This work shall consist of the disposition of existing signal, lighting, and network equipment as shown on the plans and delivering it to the specified MoDOT maintenance lot.

2.0 Construction Requirements. All controllers, cabinets, cabinet equipment, network equipment, DMS equipment, antennas, radios, modems, and other equipment noted in the plans shall be removed by the contractor and delivered to the following location:

Springfield Maintenance Lot
2455 N. Mayfair
Springfield, MO 65803

2.1 The contractor shall notify the Commission's representative 24 hours prior to each delivery by calling the contact listed below.

Joe Dotson, Urban Traffic Supervisor
Phone: (417) 895-7599 or (417) 733-0664

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

2.3 Equipment shown on the plans for removal not listed in section 2.0 above shall become the property of the contractor and removed from the project.

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

W. Signal Detection Disconnection

1.0 Description. The contractor shall contact the Traffic Management Center to coordinate a new signal timing at a minimum of 2 working days prior to the disconnection of the signal's detection capabilities or prior to the milling of an approach with inductive loop detection.

2.0 Contact Information

Melanie Belote, Traffic Studies Specialist
Southwest District Traffic Management Center
Telephone Number: 417-829-8056
Cell Number: 417-689-3783
Email Melanie.Belote@modot.mo.gov

3.0 Basis of Payment. No direct pay will be made to the contractor to recover the cost or time required to fulfill the above provisions.

X. Relocate Fiber Optic (FO) Cable

1.0 Description.

MoDOT owns existing fiber optic cable at the following intersection:

Route 60 and Stone Creek Drive (Proposed Route MM / FR 103 intersection)

This cable is used for ITS purposes (signal interconnect, automated traffic counts, CCTV camera, etc.). The fiber optic cable is being impacted by the proposed roadway improvements. This work shall consist of disconnecting the fiber optic cable from the existing splice cabinet, pulling the fiber back to a point beyond the roadway impacts, reinstalling the existing cable back through a new conduit system, and reconnecting the fiber back up to a new fiber splice cabinet.

2.0 Construction Requirements.

2.1 Rte60 and Stone Creek Drive FO West. The contractor shall disconnect the fiber from the existing splice cabinet in the northwest quadrant then pull the cable back through the existing conduit system to the proposed pullbox F1 location, northwest near station 233+30. After the new conduit system w/ pullboxes and new fiber splice cabinet have been installed, the contractor shall pull the existing fiber back east to the new fiber cabinet and make the necessary connections.

2.2 Rte60 and Stone Creek Drive FO East. The contractor shall disconnect the fiber from the existing splice cabinet in the northwest quadrant then pull the cable back through the existing conduit system to the proposed pullbox F2 location, northeast near Sta 254+40. After the new conduit system w/ pullboxes and new fiber splice cabinet have been installed, the contractor shall pull the existing fiber back west to the new fiber cabinet and make the necessary connections.

2.3 Construction Operations. The contractor shall be responsible for furnishing and installing the new conduit, pullboxes, the concrete base, and the fiber optic splice cabinet along with any necessary interface equipment. The contractor shall perform the fiber optic cable relocation as shown in the plans making all connections within the fiber optic splice cabinet. The contractor shall leave 25ft of coil in each in-line pullbox with the 100 foot of coil placed in the first pullbox from the splice cabinet. In the event the fiber is to be disconnected for an extended period of time, the contractor shall coil the fiber at the last pullbox and delineate the coil to prevent accidental damage.

2.4 Expectation. The contractor shall exercise reasonable care in the handling of the fiber optic cable during the extraction, storage and reinstallation of the fiber optic cables. MoDOT currently has a fully functional ITS network at this location. MoDOT will require a fully functional system after the contractor has performed the fiber optic relocation work. Failure to meet this expectation will result in complete replacement of the fiber optic cable in kind (24 count – 18SM/6MM) and length from splice cabinet to splice cabinet solely at the contractor's expense. Under no circumstance will the contractor be allowed to make a repair using an in-line splice between fiber splice cabinets.

3.0 Method of Measurement. Measurement for fiber relocation will be made for one direction only to the nearest linear foot. If 500ft of fiber is being pulled back and that same 500ft is reinstalled through a new conduit run, the measurement will be for 500ft. Measurement for additional one-way fiber pull will be made to the nearest linear foot.

4.0 Basis of Payment. Payment for furnishing and installing the conduit, pullboxes, and splice cabinet will be made for each respective bid item included in the roadway contract. The cost for relocating the existing ITS fiber cable shall be paid for at the contract unit bid price for Pay Item No. 902-99.03 Fiber Optic Relocation, per Linear Feet.

Y. Retroreflective Backplates

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

2.0 System Requirements. Signal retroreflective backplates shall meet the minimum requirements in Sec 1092. Yellow reflective tape shall not be accepted.

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

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

5.0 Payment. No direct payment will be made for retroreflective backplates.

Z. Uninterruptable Power Supply

1.0 Description. This work shall consist of providing and installing an “Uninterruptible Power Supply” (UPS) system at US 60 & MM. The system shall be specifically constructed and approved for the use with the 2070 signal controller.

1.1 In order to match other systems used in the area, the UPS shall be an Alpha FXM 1100 system. The system shall be comprised of the following items:

- 1 each Alpha outdoor enclosure S6, w/Generator option ATS/MBS & Auto GTS, battery
- cable kit (ALPHA-026-53-26)
- 1 each Novus FXM 1100 Battery backup unit without Ethernet (ALPHA-017-230-21)
- 1 each 48V Alpha guard battery monitor (ALPHA-012-306-21)
- 4 each Alpha Gel battery 195GXL (ALPHA-181-230-10)

2.0 Installation. The UPS system shall be installed as per the manufacturer’s recommendations. The system shall be mounted to the new Power Disconnect (paid as a Type 2 power supply) as designated in the project plans. The UPS cabinet shall contain circuitry to separate auxiliary equipment (lighting) from primary equipment (signal controller cabinet) during battery backup operation. In addition, the cabinet shall have circuitry to switch the signal from normal operation to flash operation during battery backup operation.

3.0 Communications.

3.1 The UPS cabinet shall have Ethernet connection capability.

3.1.1 Ethernet Cable. Any Ethernet cable run outside of the signal cabinet shall be environmentally hardened, shielded, and outdoor rated 350 MHz Category 5e cable. The cable shall be riser rated, 24 AWG solid copper, have Polyolefin insulation, UV and oil resistant PVC jacket. Pair 1 shall be Blue, White/Blue, Pair 2 shall be Orange, White/Orange, Pair 3 shall be Green, White/Green and Pair 4 shall be Brown, White/Brown. The operating temperature shall be from -40°C to +70°C. The cable shall conform to the following standards: ISO/IEC 11801 Category 5e, NEMA WC 63, and ANSI/TIA/EIA 568-B.2 Category 5e. The cable shall be without splicing or joints for any single run. The contractor shall obtain instructions from the manufacturer about alternate architecture when length of a single run of CAT 5e cable exceeds 320 feet.

3.1.2 RJ-45. The RJ-45 plug connectors shall be used at the UPS and signal cabinet. The supplier of the UPS shall approve the Category 5e cable, RJ-45 connector and crimping tool, and the manufacturer's instructions must be followed to insure proper connection.

4.0 Construction Requirements. Construction requirements shall conform to Sec 902.

5.0 Method of Measurement. Method of measurement shall conform to Sec 902.

6.0 Basis of Payment. All costs incurred by the contractor for furnishing, installing, configuring and placing the UPS into operation, furnishing, installing and connecting the Ethernet cable, including all incidentals shall be considered as included in and completely covered by the contract unit price for item 902-99.02, Uninterruptible Power Supply, per each.

6.1 No direct payment will be made for programming the UPS.

AA. ITS/Fiber Splice Cabinet

1.0 ITS/Fiber Splice Cabinet.

1.1 ITS/Fiber Splice Cabinet Requirements. 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.

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.

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

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.

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). 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.

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.

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. 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. 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.

1.5 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, shall be paid for under Pay Item No. 902-42.95, Splice Cabinet.

BB. Cat 5e/Cat 6 Ethernet Cable

1.0 Cat 5e/Cat 6 Ethernet Cable Requirements. The cable shall be outside plant rated (OSP), consisting of four (4) balanced twisted pairs of solid copper conductors, surrounded by a water blocking gel and designed for use in 10BASE-T through 1000BASE-T Ethernet networks. It shall be jacketed with a sunlight and abrasion resistant black, polyethylene outer jacket. The following performance compliance standards apply:

ANSI/TIA-568-C.2
 ANSI/ICEA S-107-704-2012
 RoHS-compliant/RoHS 2-compliant
 REACH-compliant

CC. Contractor Furnished, Contractor Installed Radar Detection System

1.0 Description. This work shall consist of providing radar detection for all traffic signal installations. The radar detection shall be in accordance with the standard specifications and installed to provide detection at locations as shown on the plans or as directed by the engineer in accordance with Sec 902.

2.0 Equipment. Radar equipment must meet or exceed all the following requirements.

- (a) Equipment must be FCC certified.
- (b) Equipment must meet all NEMA TS2-2003 specifications for traffic control equipment.
- (c) Each radar unit must be composed of multiple sensors to establish two-dimensional coverage.
- (d) Radar Detection must be compatible with SDLC inputs.

3.0 Construction Requirements. The contractor shall be responsible for providing and installing all necessary items to make the new radar detection system operational with stop bar presence detection for each lane of travel. Input BIU 9 shall be used for presence detector inputs according to the following chart.

Vehicle Detection Assignments					
PRESENCE DETECTION	BIU	IO	Detector	Call Phase	Mvmt
	BIU 9	1	1	1	SBL
		2	2	2	NBT
		3	3	3	EBL
		4	4	4	WBT

	5	5	5	NBL
	6	6	6	SBT
	7	7	7	WBL
	8	8	8	EBT
	9	9		
	10	10	2	NBR*
	11	11		
	12	12	4	WBR*
	13	13		
	14	14	6	SBR*
	15	15		
	16	16	8	EBR*

*Right turn presence detection only used if the RT lane is signalized

3.1 Presence Zones for left turn lanes shall be assigned to Radar Channel 1. Presence Zones for through lanes shall be assigned to Radar Channel 2. Presence Zones for signalized RT lanes, if needed, shall be assigned to Radar Channel 3. All detector programming shall be approved by the MoDOT signal engineer.

4.0 Method of Measurement. Method of measurement will be per intersection, complete in place including all necessary incidental items to complete the work. An intersection is defined as all legs in each direction including all lanes on each leg of the intersection.

5.0 Basis of Payment. Payment for the installation of the radar detection system will be completely covered by the contract unit price for Pay Item No. 902-99.02, Contractor Furnished, Contractor Installed Radar Detection System, per each.

DD. Reusing and Relocating/Reinstalling Wavetronix Radar Detection System

1.0 Description. This work shall consist of reinstalling the existing Wavetronix detection system at the intersection of Haile Street and Route MM.

2.0 Material Requirements. The existing radar detection materials will be reused. New cabling may be required.

3.0 Construction Requirements. Contractor shall install the existing Wavetronix Matrix sensors, sensor mounting brackets, harness, junction boxes, interface unit and cable according to the plans and all applicable User Guides provided at www.wavetronix.com.

4.0 Equipment. All equipment related to radar detection that will not be reinstalled shall be delivered to the following location. The contractor must notify Commission's representative 24 hours prior to delivery.

Springfield Maintenance Lot
2455 North Mayfair
Springfield, MO 65803
Joe Dotson, (417) 895-7599 or (417) 733-0664

4.1 The contractor shall exercise reasonable care in the handling of the equipment during the removal, transportation, and reinstallation. Should any of the equipment be damaged by the contractor's negligence, it shall be replaced at the contractor's expense.

5.0 Basis of Payment. The removal and reinstallation of the existing radar detection system shall be considered completely covered by the contract unit price for Item No. 902-99.01, "Removal and Reinstallation of Existing Radar Detection System", per lump sum.

EE. Type C Signal Post with 62 FT Mast Arm

1.0 Description. Certain intersections as shown in the plans will require a longer than standard mast arm

1.1 Signal structures and foundations which will exceed the dimension limits shown on the standard plan sheets in section 902 and any other installation where the details of construction are not furnished in the contract plans, shall be designed by a professional engineer in accordance with the 2001 AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals, 4th Edition, and latest interims. The structure shall be designed as Importance Category I for fatigue with a 50-year design life. The contractor shall submit a set of shop detail drawings including weld procedure specifications and design computations for MoDOT records and reference. The submitted drawings and calculations shall be signed and sealed in accordance with the laws relating to Architects and Professional Engineers (Chapter 327, RSMO) and shall include a title block or summary sheet which lists and certifies that the product meets all of the specified design criteria.

2.0 Basis of Payment. Payment All items including concrete post base, post, mast arm, and any required mounting hardware will be considered completely covered by pay item 902-99.02 "Post Type C, 62 FT Arm", per each.

FF. Delayed Receipt of Railroad Clearance Certification

1.0 Description. The contractor should be aware that MoDOT has not received the required Railroad Clearance certification at the time of advertisement for bid; however, MoDOT anticipates that the required Railroad Clearance Certification will be provided prior to the project's "Notice to Proceed" date for construction operations. If MoDOT cannot provide the Railroad Clearance certification prior to the project's "Notice to Proceed" notification, the contractor will not have access to any Burlington Northern Santa Fe Railroad property until the Railroad Certifications have been provided to and reviewed by FHWA.

2.0 Basis of Payment. No direct pay shall be provided for any labor, equipment, time or materials necessary to complete this work. The contractor shall have no claim, or basis for any

claim or suit whatsoever, resulting from compliance with this provision. Any allowance for time extensions, that results from a delay in railroad clearance, will be covered under Sec 108.14 of the current Missouri Standard Specifications for Highway Construction.

GG. Railroad Engineering

1.0 Description. In addition to the railroad requirements outlined in JSP HH the contractor shall be aware that the railroad companies, including but not limited to BNSF Railway Company (BNSF RR), Missouri and Northern Arkansas Railway Company (MNA RR) and Union Pacific are likely to place additional requirements regarding oversight of contractor process and review of plans on the portions of this project constructed on Railroad Right of Way. This bid item is being provided to allow the contractor to bid these costs as they anticipate. All such costs should be placed under railroad engineering.

2.0 Requirements. The contractor shall be required to submit plans to the railroad companies for review and approval. The plans shall be signed and sealed by a professional engineer licensed to practice in the state of Missouri. Examples of plans required for submittal include a track protection plan, lift plan for girder erection (including any tie down requirements during handling/delivery), a forming plan and an excavation/shoring plan.

2.1 The contractor shall receive approval from the BNSF Railway Company and any other impacted railroad company for each plan prior to any work starting that is applicable to the plan.

2.2 If the contractors critical path is impacted by these requirements, it will be considered excusable but not compensable provided the plan is provided to the Railroads representative 45 days prior to the anticipated work starting so they have an opportunity to review. Start dates for individual activities will be determined based on the contractors approved progress schedule.

2.3 For additional information about the requirements for this project, the contractor should call the BNSF RR Manager of Public Projects provided in JSP HH.

3.0 Basis of Payment. All costs incurred for complying with this provision to provide track protection plans, lift plans, boomed equipment plans, tie down systems, pouring plans and excavation plans shall be considered completely covered by the contract unit price for Pay Item 618-10.10, Railroad Engineering, per lump sum.

3.1 Any additional requirements made by the RR for signed and sealed plans and other additional requirements not listed in this JSP will be reimbursed to the contractor for actual cost incurred. The contractor shall not receive any overhead or profit to comply with this JSP.

HH. Special Provisions for Protection of BNSF Railway Company Interests

To Report an Emergency on the railroad call: (800) 832-5452

Greene County:

- Route MM new alignment, New MoDOT bridge A9472 over BNSF, US DOT# TBD, MP TBD, Cherokee Sub in Republic, MO
- At-grade crossing closures:
 - Existing Route MM & Farm Road 168 – DOT 673274J MP 248.09
 - Farm Road 170 – DOT 673275R MP 248.90
 - Haile Street & Orr Street – DOT 673272V MP 246.93

1.0 Authority of Railroad Engineer and Commission's Representative.

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

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

1.3 The Contractor must adhere to all other BNSF Railway policies and procedures not specifically mentioned in these special provisions. These can be found at:

<http://www.bnsf.com/in-the-community/public-projects/index.page>

2.0 Contractor's indemnity Obligations to the Railroad.

2.1 The term "contractor" as used in this special provision includes any and all subcontractors. The contractor shall indemnify, defend and hold harmless the Railroad from and against any and all loss, damage, claims, demands, causes of action, costs and expenses of whatsoever nature arising out of injury to or death of persons whomsoever, or out of damage to or destruction of property whatsoever, including, without limitation, damage to fiber optic, communication and other cable lines and systems, where such injury, death, damage or destruction results from any cause arising out of work performed by the contractor pursuant to the agreement between Railroad and the Commission for the project, and shall also release the Railroad from and shall waive any claims for injury or damage to equipment or other property, which may result from the construction, maintenance and operation of railroad tracks, wire lines, fiber optic cable, pipe lines and other facilities on said right of way of the Railroad by the contractor. **THE LIABILITY ASSUMED BY THE CONTRACTOR WILL NOT BE AFFECTED BY THE FACT, IF IT IS A FACT, THAT THE DAMAGE, DESTRUCTION, INJURY, DEATH, CAUSE OF ACTION OR CLAIM WAS OCCASIONED BY OR CONTRIBUTED TO BY THE NEGLIGENCE OF THE RAILROAD, THE RAILROAD'S AGENTS, SERVANTS, EMPLOYEES OR OTHERWISE, EXCEPT TO THE EXTENT THAT SUCH CLAIMS ARE PROVEN BY ANY CLAIMANT TO HAVE BEEN PROXIMATELY CAUSED BY THE INTENTIONAL MISCONDUCT OR SOLE OR GROSS NEGLIGENCE OF THE RAILROAD.** The contractor's indemnity shall include loss of profits or revenue arising from damage or destruction to fiber optic, communication and other cable lines and systems.

2.2 In addition to the indemnity obligations contained in the preceding paragraph, the contractor shall indemnify, defend, and hold harmless the Railroad from any claims, expenses, costs,

actions, demands, losses, fines, penalties, and fees, of whatsoever nature arising from, related to or connected, in whole or in part, with the following:

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

3.0 Notice of Starting Work.

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

- (a) At least 30 days in advance of the date the contractor proposes to begin work on Railroad's right of way, the contractor shall give the Railroad written notice to the address below with copy to the Engineer who has been designated to be in charge of the work.

Ms. Kara Brockamp
Manager of Public Projects
BNSF Railway
4515 Kansas Ave. Building 4B, 3rd Floor
Kansas City, KS 66106
720-355-4532
Kara.brockamp@bnsf.com

- (b) Obtain written or electronic authorization from the Railroad to begin work on the Railroad's right of way, such authorization to include an outline of specific conditions with which contractor shall comply.
- (c) Obtain the insurance coverage required in Section 14.0 of this job special provision. Contractor shall submit written evidence of such coverage to Railroad prior to commencing any work.
- (d) Prior to performing any work on Railroad's property, right-of way or in an area that may impact Railroad's operations, the contractor's employees, representatives, or agents who are regularly assigned to perform work on the project shall complete the safety orientation training available on the internet at www.contractororientation.com, hereinafter called, "Internet Safety Orientation". If the contractor's employee, representative or agent is not regularly assigned to perform work on the project, hereinafter called "Flexible Worker(s)", the contractor shall ensure that any Flexible Worker receives appropriate safety training prior to performing any work on the Railroad's property, right-of way or in an area that may impact the Railroad's operations. The content of safety training for Flexible Workers shall include the information covered in the Internet Safety Orientation. The approximate cost of the Internet Safety Orientation is \$11 per person, subject to annual escalation.

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

4.0 Submittals and Actions Required During Construction Phase:

4.1 The Agency shall be the main contact for BNSF throughout the project. Agency shall be included on all correspondence relating to BNSF. **BNSF will NOT accept submittals directly from the Agency's Contractor.**

4.2 BNSF will hire a consultant team to perform the duties of an Inspector/Coordinator, (I/C) on behalf of BNSF for the duration of the field construction of the project. The cost of the I/C will be reimbursable to BNSF by the Agency or their Contractor.

4.2.1 BNSF requires the I/C team be involved in the project throughout the construction phase to represent BNSF.

4.2.2 The I/C has authority to remove a contractor's employee from BNSF property if that employee fails to comply with the BNSF safety policy, does not have proper PPE or otherwise ignores instructions regarding work on BNSF right-of-way. The I/C has authority to shut down work on BNSF right-of-way if the contractor works in a manner that is in violation of BNSF's safety policy or FRA regulations. Anytime instructions to the contractor by BNSF or the I/C are not complied with, the project may be shut down. All equipment and personnel will be removed from BNSF property until issues causing the shutdown are resolved to BNSF's satisfaction.

4.3 Agency must hold a pre-construction meeting with contractor and BNSF prior to work beginning on BNSF property.

4.3.1 The Pre-Construction meeting shall not be held until 30 days after I/C has been selected – this allows time for the I/C to become familiar with the project.

4.3.2 Recommend scheduling two weeks prior to construction commencing to allow for adjustment to work plans, if needed.

4.4 Required Construction Submittals: (Allow for 4 weeks for BNSF to review submittals)

- (a) All submittals should flow from the Contractor to the Agency, to the I/C Consultant, to the BNSF Project Engineer, (PE), and to BNSF Structures with responses back through the same communication chain. **BNSF will not accept submittals directly from the Contractor.**
- (b) Any changes to the work governed by a submittal requires that the submittal be re-accepted by BNSF before the work commences.
- (c) Examples of construction submittals required include but are not limited to:

Contractors Safety Action Plan, Fire Prevention Plan, Proposed Project Schedule, Demolition, Shoring, Falsework and Lifting of Materials.

4.4.1 The following submittals will require a Professional Engineer, (PE) stamp:

- (a) Critical Pick Plan (75% of capacity of crane, or multi-crane pick)
- (b) Lifted Material Plan (Placement or Removal) – When lift is within temporary construction clearances and when lift is within 25' of the centerline of the nearest track
- (c) Demolition Plan
- (d) Temporary Shoring Plan
- (e) Bracing Design Plan (non-standard only per DOT)

4.4.2 For overpasses, Agency shall submit as-built plans of the structure, including final clearance dimensions to the I/C. Vertical clearance must be measured from the Top of Rail, horizontal clearance must be measured from the nearest track centerline.

4.4.3 OPERATIONALLY CRITICAL WORK AND SUBMITTALS: (4 to 6 weeks review timeline)
All OC work requires a submittal and acceptance by BNSF.

- (a) Operationally Critical (OC) submittals are those that have the potential to affect the safe operation of trains and will need to be reviewed carefully. Work must be monitored to ensure it conforms to the submitted/accepted plan.
- (b) In-person safety review meetings will be required with BNSF representative, I/C, Contractor, and Agency representative for all OC work and must be documented. The purpose of the meeting is to ensure all parties understand BNSF requirements and are following the applicable submittals. When a track work window is required the meeting shall occur at least 48 hours in advance of work starting.
- (c) **Submittals must meet the requirements of the UP Railroad - BNSF Railway Guidelines for Railroad Grade Separation Projects. Submittals must also follow the requirements outlined in BNSF Review Comment Sheets, Use of Cranes & Lifting of Materials Submittal Schedule, BNSF Guidelines for Preparation of Bridge Demolition & Removal Plan and the BNSF-UPRR Guidelines for Temporary Shoring. Some submittals are required to be sealed by a licensed professional engineer.**
 - a. See Table 3-1 for Overhead Structures in UP Railroad - BNSF Railway Guidelines for Railroad Grade Separation Projects
 - b. See Table 3-2 for Underpass Structures UP Railroad - BNSF Railway Guidelines for Railroad Grade Separation Projects
 - c. Examples of OC submittals included in the above are:
 - i. Shoring (Follow BNSF-UPRR Guidelines for Temporary Shoring)
 - ii. Falsework

- iii. Demolition (Need plans for substructure and superstructure. Follow BNSF Guidelines for Preparation of Bridge Demolition & Removal Plan)
- iv. Erection (overhead and underpass structures)
- v. Construction Phasing Plans
- d. Additional OC submittals required, but not included in the Guidelines are:
 - i. All work plans that remove tracks from service (track outage windows require a detailed Gantt chart when greater than 2 hours)
 - ii. Contingency plans
 - iii. Additional OC submittals may be required on a project by project basis.

4.5 Prior to any work commencing on BNSF right of way:

- (a) Contractors C/C-1 or Right of Entry must be fully executed and their insurance must be approved before they can perform work on BNSF property. Proof of Contractors insurance approval must be produced to the BNSF PE and the I/C.

4.6 Contractor must adhere to all other BNSF policies and procedures not specifically mentioned in this agreement.

5.0 Interference with Railroad Operations.

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

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

5.3 Should conditions arising from, or in connection with the work require that immediate and unusual provisions be made to protect the Railroad's operations and property, the contractor shall make such provisions. If in the judgment of the Railroad Engineer, or the Engineer if the Railroad Engineer is absent, such provision is insufficient, the Railroad Engineer or Engineer may require or provide such provisions as deem necessary. In any event, such provisions shall be at the contractor's expense and without cost to the Railroad or the Commission.

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

Railroad's records. These records shall be provided by the Railroad, upon request, to the Commission or the Commission's contractor.

6.0 Track Clearances.

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

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

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

7.0 Construction Procedures.

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

- (a) Subject to the inspection and review of the Railroad.
- (b) In accordance with the Railroad's written outline of specific conditions.
- (c) In accordance with this special provision.

7.2 Excavation. The subgrade of an operated track shall be maintained with the berm edge at least 12 feet from centerline of track and not more than 26 inches below top of the rail. The contractor will not be required to make existing section meet this specification if substandard, in which case the existing section will be maintained. The contractor shall cease all work and notify the Railroad immediately before continuing excavation in the work area if obstructions are encountered which do not appear on the drawings. If the obstruction is a utility and the owner of the utility can be identified, then the contractor shall also notify the owner immediately. If there is any doubt about the location of underground cables or lines of any kind, no work shall be performed until the exact location has been determined. There will be no exceptions to these instructions. Additionally, all excavations shall be conducted in compliance with applicable Occupational Safety and Health Act regulations and, regardless of depth, shall be shored where there is any danger to tracks, structures or personnel. Any excavations, holes or trenches on the Railroad's property shall be covered, guarded and/or protected when not being worked on. When leaving work site areas at night and over weekends, the areas shall be secured and left in a condition that will ensure that Railroad's employees and other personnel who may be working or

passing through the area are protected from all hazards. All excavations shall be back filled as soon as possible.

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

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

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

7.6 Blasting.

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

- (a) Blasting shall be done with light charges under the direct supervision of a responsible officer or employee of the contractor.
- (b) Electric detonating fuses shall not be used because of the possibility of premature explosions resulting from operation of two-way train radios.
- (c) No blasting shall be done without the presence of the Railroad Engineer. At least 72 hours advance notice to the person designated in the Railroad's notice of authorization to proceed as mentioned in Section 3.2 of this job special provision, the contractor shall be

required to arrange for the presence of the Railroad Engineer and such flagging as the Railroad may require.

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

7.6.2 The Railroad Engineer will:

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

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

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

7.8 Storage of Materials and Equipment.

7.8.1 The contractor shall not store or stockpile construction materials or equipment closer than 25 feet to the centerline of the nearest railroad track or on the Railroad's property not covered by construction easement, contractor's permit, lease or agreement. Additionally, the contractor shall not store or leave materials or equipment within 250 feet of the edge of any highway/rail at-grade crossings. Further, both sides of a main track shall remain unobstructed for a distance of 10 feet from the exterior edge of the track at all times to allow for stopped train inspection.

7.8.2 Machines or vehicles shall not be left unattended with the engine running. Parked machines or equipment shall be in gear with brakes set and with blade, pan or bucket lowered to the ground if so equipped. All grading or construction machinery that is left parked near the track unattended shall be effectively immobilized so that unauthorized persons cannot move such equipment.

7.9 Cleanup. Upon completion of the work, the contractor shall remove from within the limits of the Railroad's right of way, all machinery, equipment, surplus materials, falsework, rubbish or temporary buildings of the contractor, and leave said right of way in a neat condition satisfactory to the Railroad Engineer.

7.10 Buried Cable and Other Buried Facilities.

7.10.1 The contractor is placed on notice that fiber optic, communication and other cable lines and systems, collectively the "Lines", owned by various telecommunications companies may be

buried on Railroad's property or right of way. The locations of the buried Lines, pipelines or utility facilities have been included on the plans based on information from the telecommunications companies, pipeline operators, or utilities, as the case may be. The contractor shall be responsible for contacting the Railroad Engineer, the Railroad's 24-hour information number (1-800-533-2891), the telecommunications companies, pipeline operators and utilities and notifying them of any work that may damage the buried Lines, pipelines, utility facilities and/or interfere with their service. The contractor shall verify the location of all buried Lines, pipelines and utility facilities shown on the plans or marked in the field in order to establish their exact locations prior to or while doing work on the Railroad's property or right of way. The contractor shall also use all reasonable methods when working on the Railroad's property or right of way to determine if any other buried Lines, pipelines, or utility facilities exist on the Railroad's property or right of way.

7.10.2 Failure to mark or identify the buried Lines, pipelines or utility facilities will be sufficient cause for the Railroad Engineer to stop construction at no cost to the Commission or Railroad until these items are completed. The contractor shall be responsible for the rearrangement of any buried facilities, Lines, pipelines, or utility facilities determined to interfere with the construction. The contractor shall cooperate fully with any telecommunications companies, pipeline operators and utility facility owners in performing such rearrangements.

8.0 Damages. The Railroad will not assume liability for any damages to the contractor, contractor's work, employees, servants, equipment, and materials caused by railroad traffic. Any cost incurred by the Railroad for repairing damages to Railroad's property or to property of the Railroad's tenants, licensees, easement grantees and invitees caused by or resulting from the contractor's operations shall be paid directly to the Railroad by contractor.

9.0 Flagging Services.

9.1 When Required. Under the terms of the agreement between the Commission and the Railroad, the Railroad has sole authority to determine the need for flagging required to protect the Railroad's operations. In general, the requirements of such services will be whenever the contractor's personnel or equipment are, or are likely to be, working on the Railroad's right of way within 25 feet of the centerline of any track, or across, over, adjacent to, or under a track, or when such work has disturbed or is likely to disturb a railroad structure or the railroad roadbed or surface and alignment of any track to such extent that the movement of trains must be controlled by flagging, or reasonable probability of accidental hazard to Railroad's operations or personnel. Normally, the Railroad will assign one flagger to a project; but in some cases, more than one may be necessary, such as yard limits where 3 flaggers may be required. However, if the contractor works within distances that violate instructions given by the Railroad Engineer or performs work that has not been scheduled with the Railroad Engineer, flaggers may be required full time until the project has been completed.

9.2 Scheduling and Notification.

9.2.1 Not later than the time that approval is initially requested to begin work on the Railroad's right of way (30 days), contractor shall furnish to the Railroad and the Commission a schedule for all work required to complete the portion of the project within Railroad's right of way and arrange for a job site meeting between the contractor, the Engineer, and the Railroad Engineer. Flaggers

may not be provided until the job site meeting has been conducted and the contractor's work scheduled.

9.2.2 The contractor shall be required to give the Railroad Engineer at least 30 days of advance written notice of intent to begin work within Railroad's right of way in accordance with this special provision. Once begun, if such work is then suspended at any time, or for any reason, the contractor shall be required to give the Railroad Engineer at least 5 working days of advance notice before resuming work on Railroad's right of way. Such notices shall include sufficient details of the proposed work to enable the Railroad Engineer to determine if flagging will be required. If such notice is in writing, the contractor shall furnish the Engineer a copy; if notice is given verbally, the notice shall be confirmed in writing with copy to the Engineer. If flagging is required, no work shall be undertaken until the flagger or flaggers are present at the job site. Obtaining a flagger or flaggers may take up to 30 days to obtain initially from the Railroad. When flagging begins, the flagger is usually assigned by the Railroad to work at the project site on a continual basis until no longer needed and cannot be called for on a spot basis. If flagging becomes unnecessary and is suspended, obtaining a flagger or flaggers may take up to 30 days to again obtain from the Railroad. Due to Railroad labor agreements, 10 working days notice may be necessary before flagging services may be discontinued and responsibility for payment stopped. Notification for flagging should be addressed to:

Joseph Day, Roadmaster
BNSF Railway
Joseph.Day@bnsf.com
1-573-352-0003

9.2.3 If, after the flagger is assigned to the project site, emergencies arise which require the flagger's presence elsewhere, then the contractor shall delay work on the Railroad's right of way until such time as the flagger is again available. Any additional costs resulting from such delay shall be borne by the contractor and not the Railroad.

9.2.4 The contractor shall provide a temporary structure to provide shelter from weather conditions for the person(s) providing flagging protection service on behalf of the Railroad as described herein. The structure shall be provided in an area immediately accessible to the Railroad's main track and the construction site, and be equipped with telephone service, lighting, and desk.

9.3 Payment.

9.3.1 The Commission will pay the Railroad directly for the cost of flagging services associated with the project by deducting the amount from the normal contractor payments.

9.3.2 The Railroad shall submit progress invoice to the Engineer during the time flagging services are required. A final invoice shall be submitted to the Engineer within 180 days of completion of the project. This is defined as the point in time at which the Commission and the Railroad both accept the project and the contractor is relieved of contractual obligation. Should the invoice not be received within this time period, the Railroad will be responsible for obtaining payment directly from the contractor.

9.3.3 Should a dispute between the Railroad, the Commission and the contractor develop concerning the cost of flagging service or should the contractor fail to promptly pay the Railroad for flagging services, the full amount of the Railroad's invoice will be deducted from the contractor's payment request. However, The Commission will send only 95 percent of the amount requested to the Railroad. The Commission will make a corrected payment once a settlement is reached between the Railroad, the Commission, and the contractor.

9.3.4 The contractor shall be responsible for arranging needed flagging services as required by the Railroad to accomplish the highway improvement.

9.3.5 The cost of flagging service is approximately \$1500 per day based on an 8-hour workday and a 40-hour work week. This cost includes the base pay for the flagger, overhead, and per diem charge for travel expenses, meals, and lodging. The charge to the contractor by the Railroad will be the actual cost based on the rate of pay for the Railroad's employees who are available for flagging service at the time the service is required. Work by a flagger in excess of 8 hours per day or 40 hours per week but not more than 12 hours a day will result in overtime pay at 1 ½ times the appropriate rate. Work by a flagger in excess of 12 hours per day will result in overtime pay at 2 times the appropriate rate. If work is performed on a holiday, the flagging rate is 2 ½ times the normal rate. Railroad expenses incurred preparing and handling invoices will also be charged to the contractor and/or the Commission. Charges to the contractor and/or the Commission by the Railroad shall be in accordance with applicable provisions of Volume 1, Chapter 4, §3 and Volume 6, Chapter 6, §2, Subsection 1 of the Federal-Aid Highway Program Manual issued by the Federal Highway Administration, including all current amendments. Flagging costs are subject to change. The above estimates of flagging cost are provided for information only and are not binding in any way. Each time a flagger is called, the minimum period for billing will be the 8 hour basic day unless the flagger can be assigned to other Railroad work during the work day.

9.3.6 A maximum of one hour travel time each way per day per flagger will be required for travel to and from the project.

9.4 Verification.

9.4.1 Any complaints concerning a flagger shall be resolved in a timely manner. If need for a flagger is questioned, please contact the Railroad Engineer and Ms. Kara Brockamp, Manager of Public Projects at 720-355-4532. All verbal complaints shall be confirmed in writing by the contractor within 5 working days with copy to the Railroad Engineer and Engineer. All written correspondence shall be addressed to Ms. Brockamp as shown in Section 3.1 of this job special provision.

9.4.2 The Railroad flagger assigned to the project will be responsible for notifying the Engineer upon arrival at the job site on the first day, or as soon thereafter as possible, that flagging services begin and on the last day that flagger performs such services for each separate period that services are provided. The Engineer will document such notification in the project records.

10.0 Haul Across Railroads.

10.1 Where the plans show or imply that materials of any nature must be hauled across the Railroad's tracks, unless the plans clearly show that the Commission has included arrangements for such haul in the agreement with the Railroad, the contractor shall be required to make all necessary arrangements with the Railroad regarding means of transporting such materials across the Railroad's tracks. The contractor shall be required to bear all costs incidental to such crossings, including flagging, whether services are performed by contractor's own forces or by Railroad's personnel.

10.2 No crossing may be established for use of the contractor for transporting materials or equipment across the tracks of the Railroad unless specific authority for the installation, maintenance, necessary watching and flagging thereof and removal, all at the expense of the contractor, is first obtained from the Railroad Engineer.

11.0 Work for the Benefit of the Contractor. All temporary or permanent changes in wire lines or other facilities which are considered necessary to the project are shown on the plans, and are included in the agreement between the Commission and the Railroad or will be covered by appropriate revisions to same which will be initiated and approved by the Commission and/or the Railroad. Should the contractor desire any changes in addition to the above, then contractor shall make separate arrangements with the Railroad for same to be accomplished at the contractor's expense.

12.0 Cooperation and Delays. The contractor shall arrange a schedule with the Railroad for accomplishing staged construction involving work by the Railroad or tenants, licensees, easement grantees and invitees of the Railroad. In arranging a schedule, the contractor shall ascertain, from the Railroad, the lead time required for assembling crews, materials and make due allowance. No charge of claims of the contractor against the Railroad will be allowed for hindrance or delay on account of railway traffic for any work done by the Railroad, other delay incident to or necessary for safe maintenance of railway traffic, or for any delays due to compliance with this special provision.

13.0 Trainman's Walkways. Along the outer side of each exterior track of multiple operated track and on each side of single operated track, an unobstructed continuous space suitable for trainman's use in walking along trains shall be maintained extending to a line not less than 12 feet from centerline of track. Any temporary impediments to walkways and track drainage encroachments or obstructions allowed during work hours while Railroad's protective service is provided shall be removed before the close of each work day. Any excavation near the walkway, the contractor shall install a handrail with a 12 feet minimum clearance from centerline of track.

14.0 Insurance. The amount of work to be performed upon, over or under Railroad's right of way is estimated to be one percent of the contractor's total bid for the project.

14.1 In addition to any other forms of insurance or bonds required under the terms of the contract and specifications, Contractor must, at its sole cost and expense, procure and maintain during the life of this Agreement the following insurance coverage:

- (a) Commercial General Liability insurance. This insurance shall contain broad form contractual liability with a combined single limit of a minimum of \$5,000,000 each occurrence and an aggregate limit of at least \$10,000,000 but in no event less than

the amount otherwise carried by the contractor. Coverage must be purchased on a post 2004 ISO occurrence form or equivalent and include coverage for, but not limit to the following:

- Bodily Injury and Property Damage
- Personal Injury and Advertising Injury
- Fire legal liability
- Products and completed operations

This policy must also contain the following endorsements, which must be indicated on the certificate of insurance:

- The definition of insured contract must be amended to remove any exclusion or other limitation for any work being done within 50 feet of railroad property.
- Waiver of subrogation in favor of and acceptable to Railroad.
- Additional insured endorsement in favor of and acceptable to Railroad.
- Separation of insureds.
- The policy shall be primary and non-contributing with respect to any insurance carried by Railroad.

It is agreed that the workers' compensation and employers' liability related exclusions in the Commercial General Liability insurance policy(s) required herein are intended to apply to employees of the policy holder and shall not apply to Railroad employees.

No other endorsements limiting coverage as respects obligations under this Agreement may be included on the policy with regard to the work being performed under this agreement.

(b) Business Automobile Insurance. This insurance must contain a combined single limit of at least \$1,000,000 per occurrence, and include coverage for, but not limited to the following:

- Bodily injury and property damage
- Any and all vehicles owned, used or hired

The policy shall also contain the following endorsements or language, which shall be indicated on the certificate of insurance:

- Waiver of subrogation in favor of and acceptable to Railroad.
- Additional insured endorsement in favor of and acceptable to Railroad.
- Separation of insureds.
- The policy shall be primary and non-contributing with respect to any insurance carried by Railroad.

(c) Workers Compensation and Employers Liability insurance including coverage for, but not limited to:

- Contractor's statutory liability under the worker's compensation laws of the state(s) in which the work is to be performed. If optional under State law, the insurance must cover all employees anyway.
- Employers' Liability (Part B) with limits of at least \$500,000 each accident, \$500,000 by disease policy limit, \$500,000 by disease each employee.

This policy shall also contain the following endorsements or language, which shall be indicated on the certificate of insurance:

- Waiver of subrogation in favor of and acceptable to Railroad.
- (d) Railroad Protective Liability insurance naming only the Railroad as the Insured with coverage of at least \$5,000,000 per occurrence and \$10,000,000 in the aggregate. The policy Must be issued on a standard ISO form CG 00 35 10 93 and include the following:
- Endorsed to include the Pollution Exclusion Amendment (ISO form CG 28 31 10 93)
 - Endorsed to include the Limited Seepage and Pollution Endorsement.
 - Endorsed to include Evacuation Expense Coverage Endorsement.
 - Endorsed to remove any exclusion for punitive damages.
 - No other endorsements restricting coverage may be added.
 - The original policy must be provided to the Railroad prior to performing any work or services under this Agreement

In lieu of providing a Railroad Protective Liability Policy, Licensee may participate in Licensor's Blanket Railroad Protective Liability Insurance Policy available to contractor.

14.2 Other Requirements:

14.2.1 All policies (applying to coverage listed above) must not contain an exclusion for punitive damages and certificates of insurance must reflect that no exclusion exists.

14.2.2 Contractor agrees to waive its right of recovery against Railroad for all claims and suits against Railroad. In addition, its insurers, through the terms of the policy or policy endorsement, waive their right of subrogation against Railroad for all claims and suits. The certificate of insurance must reflect the waiver of subrogation endorsement. Contractor further waives its right of recovery, and its insurers also waive their right of subrogation against Railroad for loss of its owned or leased property or property under contractor's care, custody, or control.

14.2.3 Contractor is not allowed to self-insure without the prior written consent of Railroad. If granted by Railroad, any deductible, self-insured retention, or other financial responsibility for claims must be covered directly by contractor in lieu of insurance. Any and all Railroad liabilities that would otherwise, in accordance with the provisions of this Agreement, be covered by contractor's insurance will be covered as if contractor elected not to include a deductible, self-insured retention or other financial responsibility for claims.

14.2.4 Prior to commencing the Work, contractor must furnish to Railroad an acceptable certificate(s) of insurance including an original signature of the authorized representative evidencing the required coverage, endorsements, and amendments and referencing the contract audit/folder number if available. Contractor shall notify Railroad in writing at least 30 days prior to any cancellation, non-renewal, substitution, or material alteration. Upon request from Railroad, a certified duplicate original of any required policy must be furnished. Contractor should send the certificate(s) to the following address:

Railroad:

BNSF Railway Company
P.O. Box 140528
Kansas City, MO 64114
Toll Free: 877-576-2378
Fax number: 817-840-7487
Email: BNSF@certfocus.com
www.certfocus.com

Commission:

Dave Ahlvers / Ms. Brandi Baldwin
State Construction and Materials Engineer
MoDOT
P.O. Box 270
Jefferson City, MO 65102

14.2.5 Any insurance policy must be written by a reputable insurance company acceptable to Railroad or with a current Best's Guide Rating of A- and Class VII or better, and authorized to do business in the state(s) in which the service is to be provide.

14.2.6 Contractor represents that this Agreement has been thoroughly reviewed by contractor's insurance agent(s)/broker(s), who have been instructed by contractor to procure the insurance coverage required by this Agreement. Allocated Loss Expense must be in addition to all policy limits for coverages referenced above. Not more frequently than once every five years, Railroad may reasonably modify the required insurance coverage to reflect then-current risk management practices in the railroad industry and underwriting practices in the insurance industry.

14.2.7 If any portion of the operation is to be subcontracted by contractor, contractor must require that the subcontractor provide and maintain the insurance coverages set forth herein, naming Railroad as an additional insured, and requiring that the subcontractor release, defend and indemnify Railroad to the same extent and under the same terms and conditions as contractor is required to release, defend, and indemnify Railroad herein.

14.2.8 Failure to provide evidence as required by this section will entitle, but not require, Railroad to terminate this Agreement immediately. Acceptance of a certificate that does not comply with this section will not operate as a waiver of contractor's obligations hereunder.

14.2.9 The fact that insurance (including, without limitation, self-insurance) is obtained by contractor will not be deemed to release or diminish the liability of contractor including, without limitation, liability under the indemnity provisions of this Agreement. Damages recoverable by Railroad will not be limited by the amount of the required insurance coverage.

14.2.10 For purposes of this section, Railroad means "Burlington Northern Santa Fe LLC", "BNSF RAILWAY COMPANY" and the subsidiaries, successors, assigns and affiliates of each.

14.2.11 Railroad will not accept binders as evidence of insurance, the original policy shall be provided. The named insured, description of the work and designation of the job site to be shown on the Policy are as follows:

(a) Named Insured: BNSF Railway Company

(b) Description and Designation:

Job No. J8S0836D

Greene County

- Route MM new alignment, Construction of new MoDOT bridge A9472 over BNSF, US DOT# TBD, MP TPD, Cherokee Sub in Republic, MO
- At-grade crossing closures:
 - Existing Route MM & Farm Road 168 – DOT 673274J MP 248.09
 - Farm Road 170 – DOT 673275R MP 248.90
 - Haile Street & Orr Street – DOT 673272V MP 246.93

14.2.12 The contractor must notify BNSF Manager of Public Projects at Kara.Brockamp@bnsf.com, when applying for railroad insurance coverage.

14.3 If any part of the work is sublet, similar insurance and evidence thereof in the same amounts as required of the prime contractor, shall be provided by or in behalf of the subcontractor to cover the subcontractor's operations. Endorsements to the prime contractor's policies specifically naming subcontractors and describing their operations will be acceptable for this purpose.

14.4 All Insurance hereinbefore specified shall be carried until all work required to be performed under the terms of the contract has been satisfactorily completed within the limits of the Railroad's right of way as evidenced by the formal acceptance by the Commission. Insuring Companies may cancel insurance by permission of the Commission and Railroad or on 30 days written notice to the Railroad and Commission.

15.0 Hazardous Materials Compliance and Reporting. Contractor shall be responsible for complying with all applicable federal, state and local governmental laws and regulations, including, but not limited to environmental laws and regulations (including but not limited to the Resource Conservation and Recovery Act, as amended; the Clean Water Act, as amended; the Oil Pollution Act, as amended; the Hazardous Materials Transportation Act, as amended; and the Comprehensive Environmental Response, Compensation and Liability Act, as amended), and health and safety laws and regulations. In addition to the liability provisions contained elsewhere in this job special provision, the contractor hereby indemnifies, defends, and holds harmless the Railroad for, from and against all fines or penalties imposed or assessed by federal, state and local governmental agencies against the Railroad which arise out of contractor's work under this special provision. Notwithstanding the preceding sentence, the contractor will not be liable for pre-existing hazardous materials or hazardous substances discovered on Railroad's property or right of way so long as such hazardous materials or hazardous substances were not caused by (in whole or in part) contractor's work, acts or omissions. If contractor discovers any hazardous waste, hazardous substance, petroleum, or other deleterious material, including but not limited to any non-containerized commodity or material, on or adjacent to Railroad's property, in or near any surface water, swamp, wetlands or waterways, while performing any work under this special provision, the contractor shall immediately:

- (a) Notify the Railroad's Resource Operations Center at (800) 832-5452, of such discovery.
- (b) Take safeguards necessary to protect employees, subcontractors, agents and/or third parties.
- (c) Exercise due care with respect to the release, including the taking of any appropriate measure to minimize the impact of such release

16.0 Personal Injury Reporting. The Railroad is required to report certain injuries as a part of compliance with Federal Railroad Administration ("FRA") reporting requirements. Any personal injury sustained by any employee of the contractor, subcontractor, or contractor's invitees while on the Railroad's property shall be reported immediately, by phone or mail if unable to contact in person, to the Railroad's representative in charge of the project. The Non-Employee Personal Injury Data Collection Form is to be completed and sent by Fax to the Railroad at (817) 352-7595 and to the Railroad's Project Representative no later than the close of shift on the date of the injury.

17.0 Failure to Comply. In the event the contractor violates or fails to comply with any of the requirements of this special provision, the below orders will be applied. Any such orders shall remain in effect until the contractor has remedied the situation to the satisfaction of the Railroad Engineer and the Engineer.

- (a) The Railroad Engineer may require that the contractor to vacate the Railroad's property.
- (b) The Engineer may withhold all monies due to the contractor until contractor has remedied the situation to the satisfaction of the Railroad Engineer and the Engineer.

18.0 Payment for Cost of Compliance. No separate payment will be made for any extra cost incurred on account of compliance with this special provision. All such cost shall be included in the contract unit price for other items included in the contract. Railroad will not be responsible for paying the contractor for any work performed under this special provision.

18.1 If applicable to the project, the contractor must submit a plan for demolition, falsework, lifting plans over the Railroad property, shoring plans, and any other applicable plans the Railroad may require as well as means and methods to the Railroad for review and approval. All plans submitted to the Railroad must be signed and sealed by Professional Engineer licensed in the State of Missouri. These plans can be submitted along with the Right of Entry application; however, the Right of Entry will not be approved until all required plan submittals are approved by the Railroad. The Railroad may also require an onsite inspector to assure the work is carried out in accordance with the Railroad approved plans.

18.1.1 Payment for plan submittal, Railroad plan review and Railroad inspection fees.

The contractor shall be responsible for all costs associated with the generation and submittal of Railroad plans required for the right of entry agreement. The Commission will be responsible for

and directly pay the Railroad for all Railroad review fees associated with these plan submittals and any onsite inspection and management fees charged by the Railroad. A line item (Railroad Plan Submittal) is provided for all costs associated with the generation and submittal of plans required for the Railroad right of entry agreement.

Item No.	Unit	Description
618-10.15	LS	Railroad Plan Submittal

II. Construction Phasing

1.0 Description. Construction phasing shall be as outlined in this Job Special Provision. Any changes to construction phasing shall be approved by Engineer prior to construction.

2.0 General Scope and Requirements. The work included in this Job Special Provision shall consist of providing all labor, equipment, materials and performing all operations necessary to complete the intended improvements of this project.

2.1 Phasing. Construction phasing shall be as follows.

- (a) **Phase 0:** This phase shall include the sanitary sewer relocation and SWPA electric modifications. The SWPA work will extend into other phases.
- (b) **Phase 1A:** This phase shall consist of improvements south of the transmission line to the southern project limit of US 60. Includes at-grade crossing closures (Farm Rd. 103 and Farm Rd. 164).
- (c) **Phase 1B:** This phase shall consist of soil treatment for the bridge.
- (d) **Phase 2A:** Includes construction of the roundabout and existing Rte. MM widening to Haile Street.
- (e) **Phase 2B:** Includes the embankment construction on both sides of the bridge.
- (f) **Phase 3:** Bridge construction.
- (g) **Phase 4:** Railroad crossing and the remaining at-grade crossing closures, removals and any remaining work.

3.0 Basis of Payment. Payment for all costs associated with developing, implementing and maintaining Construction Phasing and all other costs associated with this provision, will be considered included in the unit price of each contract item. No direct pay will be made for this provision.

JJ. Right-of-Way Clearance – Delayed Possession

1.0 Description. The right of way for this project has been acquired except for

Parcel 1 (City of Republic) – RW

Parcel 3 (Peyton Paisley (Amazon)) – RW, PE, and TCE

Parcel 6 (Samson N Pleasant and Steve F Pleasant) – RW, PE and TCE

Parcel 7 (Magellan Midstream Partners LP) – RW

Parcel 8 (City of Republic) – RW

Parcel 12 (Stone Creek Development LLC) – RW

Parcel 17 (Republic Partners LLC) – RW and PE

Parcel 18 (Vermeer Great Plains, Inc) – RW and TCE

Parcel 19 (PIG FARM, L.L.C) – RW

Parcel 20 (Jim Champieux) – Access Rights

Parcel 21 (Arvest Bank) – RW and PE

Right of Way use within Greene County and City of Republic ownership:

Greene County and the City of Republic grant the right to use the right-of-way of public roads, streets alleys and any other property owned by Greene County or the City of Republic as necessary for construction of said public improvements. This granting of rights will be by way of a County and Municipal Agreements to be obtained by the October 17, 2025 letting date.

1.0 The contractor shall inform itself of the location of this tract. No encroachment, storage of equipment and materials or construction on these tracts shall be permitted until notification by the engineer is given that these tracts have been acquired.

1.1 The contractor shall schedule its work utilizing the available right of way until these tracts are cleared for construction, which is estimated to be December 8, 2025. However, this date expressly is not a warranty by or contractually binding on the Commission as the date the five 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.

1.2 The contractor shall have no claim for damage for delay, disruption, interference or otherwise as a result of the unavailability of **Parcels listed above in Item 1.0.** 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.

KK. Property Owner Notification

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

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

LL. Permanent Pavement Marking

This work shall consist of furnishing and placing permanent centerline, edge line, lane line markings, and preformed thermoplastic pavement marking, as specified, at locations shown on the plans or as approved by the engineer. The preformed thermoplastic pavement marking includes, but not limited to, 24" White (Stop Bars & Crosswalks) and 24" Yellow (Hash Mark), Turn Arrows, Yield Markings, and the word "ONLY". This work shall be in accordance with Section 620 and specifically as follows.

2.0 Construction Requirements. On roadways open to traffic, permanent centerline, edge line, and lane line markings shall be in place no later than five days after the final paving operations. This requirement applies per individual route if multiple routes are included in a contract or if a 15 mile section of an individual route is open to traffic within a contract. This requirement also applies to divided highways, once a directional segment of 15 mile, or the entire directional segment if less than 15 miles, is paved and open to traffic within a contract. To fulfill this requirement, the contractor may have to mobilize more than once for the installation of permanent centerline, edge line, and lane line markings. The contractor shall place the preformed thermoplastic pavement marking after the permanent centerline, edge line, and lane line marking is installed by the contractor or by others. The contractor will have 5 five days after the permanent centerline, edge line, and lane line markings are placed to start the preformed thermoplastic pavement marking installation and shall be placed in accordance with manufacturer's recommendations or as approved by the engineer.

3.0 Basis of Payment. The accepted quantity of permanent pavement marking paint and preformed thermoplastic pavement marking will be paid for at the contract unit price for each of the pay items include in the contract. Payment will be considered full compensation for all labor, equipment, material or time necessary to complete the described work including any other incidental items.

MM. Removal of Improvements

The contractor shall familiarize themselves with the size and scope of removals for this project. Removals will be done by phase, corresponding with the construction phasing. This specification is provided to identify project removals above and beyond typical on a project of this scope and size.

1.0 Scope of Work. The contractor is directed to the following tracts and the removals associated with each:

BNSF Railroad – Removals include: 3 (3) paved at-grade crossings. The contractor shall notify BNSF prior to any removal activities within BNSF right-of-way. Ditch lines shall be restored as shown in the plans. All trash and debris shall be removed from BNSF right-of-way prior to project being considered complete.

The Contractor shall inform itself of the location of these tracts. No encroachment, storage of equipment and materials or construction on these tracts shall be permitted until notification by the Engineer is given that these tracts have been acquired as specified in these job special provisions.

1.1 Removals within MoDOT Right-of-Way. This project includes removals within MoDOT's existing right-of-way. Removals within the right-of-way shall be completed as follows:

Truck parking/shoulder along US 60, log mile 263.927 to log mile 265.570 – These areas of pavement shall be removed as part of Phase 4 construction.

Existing Route MM between log mile 0.083 & 0.103 – Removals shall not extend onto BNSF property. See plan sheet 31 for details

Existing Route MM between log mile 0.112 and 0.124 – Removals shall not extend onto BNSF property. See plan sheet 31 for details

1.2 Removals within Greene County Right-of-Way. This project includes removals within Greene County existing right-of-way. Removals within the right-of-way shall be completed as follows:

Existing Farm Road 103 between US 60 and Sta. 8+50 – See plan sheet 30 for details.

US 60 connection to Farm Road 170 – See plan sheet 31 for details

Existing Haile St/Orr St. at railroad crossing – See plan sheet 31 for details

US 60 connection to Farm Road 164 – See plan sheet 32 for details

The existing ditch line along Route 60 shall be restored where these removals take place. The ditches shall be graded to drain following the existing drainage patterns.

2.0 Basis of Payment. Payment for all costs associated with these removals will be considered included in the lump sum price contract item for REMOVAL OF IMPROVMENTS. No direct payment will be made for this provision.

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

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

2.0 Material.

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

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

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

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

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

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

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

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

OO. Tree Clearing Restriction

1.0 Description. The project is within the known range of the federally endangered Indiana bat, northern long-eared bat, and proposed endangered tricolored bat. These bats are known to roost in trees with suitable habitat characteristics during summer months.

1.1 MoDOT has determined that suitable trees for one or more of these bat species exist within the project area.

1.2 To avoid negative impacts to these bat species, removal of any trees/limbs greater than three (3) inches in diameter shall only occur between October 16 and March 31.

2.0 Basis of Payment. No direct pay shall be provided for any labor, equipment, time, or materials necessary to complete this work.

PP. Notice to Bidders

1.0 Description This provision is provided to notify bidders of items/conditions specific to the J8S0836D roadway project.

2.0 Construction Phasing. Job Special Provision II has been provided as the preferred schedule for construction activities. Contractor shall be familiar with the construction phasing, as well as the completion dates as specified in Special Provision B and H.

3.0 BNSF Railroad. This project includes construction activities on and near the BNSF Railway's right of-way. Contractor shall be familiar with Special Provision FF, Special Provision GG and

Special Provision HH and any additional requirements for construction activities on or near railroad right-of-way.

4.0 Right-of-Way. This project is being let with partial right-of-way clearance. Contractor shall be familiar with the parcels that have been cleared at time of letting, and shall not encroach on any parcel until such notice is given, see Special Provision JJ. MoDOT will notify Contractor as parcels are acquired.

5.0 Ground Improvements. Ground improvements are included in this project scope. Contractor shall have familiarity and experience with wick drains to ensure proper ground improvement.

6.0 Utilities. Some utility relocation work may be continuing (or may still be underway) after the project is awarded. Contractor shall plan accordingly and adjust sequence of operations to accommodate any utility relocation activity. See Special Provision K – Utilities.

7.0 City of Republic Sanitary Sewer. Sewer main relocations for the the City of Republic are included in this project. The exact locations of the sewer mains shown on the plans are approximate. See Special Provision K – Utilities.

8.0 Tree Clearing. Tree clearing for construction is being completed by MoDOT forces. MoDOT forces will clear all trees with suitable bat habitat during the required October 16 through March 31 timeframe. See Special Provision OO for further information.

9.0 Basis of Payment. This provision is being provided to alert bidders of specific provisions included with this project. No additional payment beyond what is specified in each provision referenced above will be made for this provision.

QQ. DBE Prompt Payment Reporting JSP-24-05B

1.0 Description.

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

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

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

1.4 Upon completion of the first pay estimate on the contract, Signet will automatically send an email to the prime contractor prompting registration. The prime will be required to pay a one-time,

fixed fee of \$1,000 for this contract directly to the Signet vendor. Use of Signet to track DBE payments will be available for the life of the contract, regardless of the contract value, contract duration, number of subcontractors, or payments reported. No additional fee will be charged to subcontractors that are required to report payments or DBEs that are required to verify payments through Signet. The contractor may also, at no additional cost, report payments through Signet to subcontractors that are not DBEs.

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

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

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

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

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

2.2 The payer must report the following information within Signet:

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

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

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

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

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

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

RR. Damage to Existing Pavement, Shoulders, Side Roads, and Entrances

1.0 Description. This work shall consist of repairing any damage to existing pavement, shoulders, side roads and entrances caused by contractor operations. This shall include, but is not limited to, damage caused by the traffic during contractor operations within the project limits including the work zone signing.

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

3.0 Method of Measurement. No measurement of damaged pavement or shoulder areas or damaged side roads or entrances as described above shall be made.

4.0 Basis of Payment. No payment will be made for repairs to existing pavement, shoulders, side roads or entrances damaged by contractor expenses.

SS. Access to Commercial Properties

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

1.1 The contractor shall contact each business to advise them of the work that will take place before working around each business entrance. In some cases where a property has more than

one entrance, the property owner may have a preference on whether to have one entrance closed while working around it or whether to have the entrances worked around one-half at a time. The contractor is required to do the work according to each individual property owner's preference. The contractor is not to disturb any existing trees, landscaping, small block walls or irrigation lines. The contractor will solely be responsible for repairing any damage to the property caused by contractor operations.

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

TT. Contractor Furnished Surveying and Staking

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

1.0 Description. The Contractor shall be responsible for all layout required on the project. This responsibility shall include, but not be limited to the following: Construction signing, transition milling, pavement marking, etc. Additionally, this work shall consist of placing hub stakes to monitor settlement in fills greater than 20 feet in height.

1.2 Requirement. Fill embankments greater than 20 feet in height shall be monitored for settlement under the observation of the Engineer. Once embankment construction is completed, or as directed by the engineer, a series of hub stakes shall be installed in the subgrade for the purpose of monitoring settlement. The stakes shall be located and surveyed approximately 50 feet apart or as directed by the Engineer. Elevations of the stakes shall be initially recorded and then obtained every 2 weeks. A copy of the survey record shall be forwarded to the Engineer after each survey interval. In addition, surveying and elevations will be required for the geotechnical instrumentation and may be required for Wick Drain installation as indicated in Job Special Provision JJJ and KKK. Settlement shall be considered complete when it is less than 0.01 foot per two-week period for two consecutive weeks.

1.1 The above list is not all inclusive. The Contractor shall have the primary responsibility for these operations. The Contractor shall provide the Resident Engineer (RE) with a staking plan layout for the approval prior to the installation of signs. The RE will also provide assistance during this layout provided a request is submitted to the RE or Construction Project Manager forty-eight (48) hours in advance. This will ensure that all permanently mounted traffic control devices remain consistent with District polity and avoid re-staking. If the Contractor installs any signs without engineer approval, all costs associated with re-staking and/or relocation will be at the contractor's expense.

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

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

2.0 Method of Measurement: Measurement shall be in accordance with Sec 627.3.

3.0 Basis of Payment. Basis of Payment shall be in accordance with Sec 627.4. No direct payment will be made to cover the costs associated with these additional requirements. All costs will be considered completely covered by the unit bid price submitted for Contactor Furnished Surveying and Staking.

UU. Contractor Furnished Surveying And Staking For ADA

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

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

1.1 The above list is not all inclusive. The contractor will have the primary responsibility for these operations. Concerning the traffic control devices, the contractor shall provide the Resident Engineer with a layout plan for approval prior to the installation of signs. The RE will provide assistance for this layout provided a request is submitted to the RE or Construction Project Manager 48 hours in advance. This will ensure that all permanently mounted traffic control devices remain consistent with District policy and avoid re-staking. If the contractor installs any signs without engineer approval, all costs associated with re-staking and/or relocation will be at the contractor's expense.

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

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

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

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

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

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

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

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

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

3.0 Coordination of Construction.

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

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

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

4.0 Final Acceptance of Work. The contractor shall provide the completed ADA Checklist to the engineer at the semi-final inspection. ADA improvements require final inspection and compliance with the ADA requirements and the ADA Checklist. Each item listed in the checklist must receive either a "YES" or an "N/A" score. Any item receiving a "NO" will be deemed non-compliant and shall be corrected at the contractor's expense unless deemed otherwise by the

engineer. Documentation must be provided about the location of any non-compliant items that are allowed to remain at the end of the construction project. Specific details of the non-compliant items, the ADA requirement that the work was not able to comply with, and the specific reasons that justify the exception are to be included with the completed ADA Checklist provided to the engineer.

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

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

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

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

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

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

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

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

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

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

XX. ADA Compliant Moveable Barricade

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

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

3.0 Method of Measurement. Measurement for ADA Compliant Moveable Barricade will be made per each for each 6 feet (min.) unit provided.

4.0 Basis of Payment. Payment for all work necessary to fulfill the requirements noted above shall be considered completely covered in the contract unit price for Pay Item No. 616-99.02, ADA Compliant Moveable Barricade, per each. No direct payment will be made for any necessary relocation of the ADA compliant barricade.

YY. Curb Ramps And Sidewalk

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

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

The following requirements shall be applicable to construction of this project:

- Existing curb, curb and gutter, sidewalk, shoulders, etc. that are adjacent to a designated curb ramp and/or sidewalk improvement area that is damaged during construction shall be replaced/repared to match existing materials and condition.
- Variable height curb along the roadside may be constructed monolithic or separate depending on construction operations. Integral curb shall be doweled to the existing gutter or pavement.
- Integral or Type S-curb shall be used along the existing right-of-way when constructing curb ramps as shown on the plans. The cost of the curb is included in pay limits of the curb ramp.

- The transition area shall be 8" thick and tied to the existing roadway pavement and existing paved approach or sidewalk it is matching.
- Curing compound for all concrete construction shall be a clear or translucent color. The white pigmented option or other colored compound will not be allowed.
- Adjacent grass areas, landscaping, irrigation lines, pavement, etc. disturbed by curb ramp or sidewalk construction shall be repaired or replaced to match or exceed existing conditions. Sod quantities are included for adjacent areas. More or less sod may be required depending on actual field conditions.

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

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

ZZ. Linear Grading for ADA Facilities

1.0 Description. This work shall consist of altering the existing roadside features to the required grade and cross sections shown in the plans (if applicable), or to comply with typical sections, running slopes, drop-off and side-slope standards, consistent with the guidelines set forth in the Americans with Disabilities Act (ADA). This work shall be in accordance with Sections 202 and 207 and accompanying provisions except as modified herein.

2.0 Construction Requirements. The roadside shall be brought to the required grade and cross section as established in Section 1.0 of this provision, to a uniform appearance, free of sharp breaks or humps. Minor deviations will be allowed, to take advantage of favorable topography, as approved by the engineer.

2.1 The contractor shall remove all existing roadside improvements necessary to facilitate the new sidewalk and curb ramp construction, along with any other roadside removal items at, or adjacent to the pedestrian pathway, as noted in the plans or as approved by the engineer. This shall include the removal and/or saw cutting at existing raised islands or median strips to construct the pedestrian pathway. The contractor shall pay special care to existing utility facilities to be used in place or relocated by others.

2.2 The contractor shall be responsible for all excavation and embankment work necessary to facilitate construction of new ADA compliant facilities; normally consisting of subgrade and subsequent finished grading for sidewalks, curbs, curb ramps; and may include miscellaneous grading work for items such as ditches, entrances, paved approaches, driveways and pipes, at or adjacent to proposed new sidewalk facilities.

2.3 By this provision, it may be necessary to excavate, stockpile, and haul some material within the project limits. Due to staging and/or Right-of-Way constraints, it may be necessary to waste unusable material off of Right-of-Way, and/or haul a replacement volume of material back to achieve the desired grades.

2.4 All removals of Portland or Asphaltic Concrete performed under this provision will require saw cutting a neat/clean edge along the removal lines at no direct pay, unless otherwise provided for in the contract.

3.0 Method of Measurement. Measurement of Linear Grading for ADA Facilities will be made along the length of the new sidewalk and/or curb ramp installed, along each side of the roadway where sidewalk work is to be performed. Measurement will be made to the nearest 1-foot for each sidewalk work area, totaled, and paid to the nearest 1-foot for final pay. Final field measurement will not be required except where appreciable errors are found, or authorized changes have been made.

4.0 Basis of Payment. The accepted quantities of Linear Grading for ADA Facilities will be paid for at the contract unit price for item 207-99.03, Linear Grading for ADA Facilities, Linear Foot, and will be considered as full compensation for all labor, equipment, material, waste fees, disposal agreements, material acquisition, or other construction costs involved to complete the described work.

4.1 No direct payment will be made for "REMOVAL OF IMPROVEMENTS" associated with the removal and disposal of sidewalks, curbs, curb ramps, entrances, and other incidentals required for construction of the new sidewalk and/or curb ramps.

AAA. Modified Type A Gutter and Steel Plate

1.0 Description. This work shall consist of constructing Modified Type A Gutter with Steel Plates as shown on the plans and in accordance with Section 609 of the Standard Specifications, and specifically as follows.

2.0 Construction Requirements. The contractor shall refer to the special sheets detailing the locations with Modified Type A Gutter and Steel Plates. The contractor shall also pay special attention during construction to ensure proper drainage is achieved upon completion of construction.

2.1 The ½" steel slip-resistant plate shall be installed flush with the top of the Modified Type A Gutter and secured to the top of the angle iron. The steel slip-resistant plate shall have a minimum static coefficient of friction of 0.6 and be ADA compliant since it is installed in the pedestrian access route.

3.0 Method of Measurement. Modified Type A Gutter will be measured to the nearest linear foot. Measurement will be made along the flow line of the limits of the Modified Type A Gutter. The Steel Plates will be measured to the nearest square foot. Measurement will be made along the centers of the top of the plate along the width and length of the plates.

4.0 Basis of Payment. All labor, equipment and materials required to construct the Modified Type A Gutter and Steel Plate as designated on the plans and by this specification, complete in place with all incident costs included, shall be included in the unit bid price for the following items:

Item No. 6049904, Steel Plate, 1 SF

Item No. 6099903, Modified Type A Gutter, 1 LF

BBB. Sodding And Fertilizing

1.0 Description. This work shall consist of installing sod and fertilizer in accordance with Sections 801 and 803 of the Standard Specification.

2.0 Construction Requirements. Sod shall be installed at all locations as shown on the plans or where the contractors operations have disturbed adjacent, existing grass landscapes or as approved by the engineer. Fertilizer shall be applied to all sodded locations per Manufacturers Recommendations. The type of sod and fertilizer shall be as noted below.

<u>Fertilizer</u>
Starter Fertilizer 12-12-12 or 10-10-10

<u>Sod</u>
Turf Type Tall Fescue

3.0 Method of Measurement. Measurement of sodded areas shall be made to the nearest square yard. The area required for fertilizer shall match the final area for sod. Plan quantities were estimated from sidewalk locations with adjacent grassy areas. More or less quantity of said materials may be needed depending upon construction requirements at each location. The Engineer shall verify and approve the contractor's location and quantity of newly sodded areas.

4.0 Basis of Payment. All costs incurred by the Contractor by reason of compliance to satisfy the above requirements shall be considered incidental to and completely covered in the bid item 803-10.00A, Turf Type Tall Fescue Sodding, measured per square yard.

CCC. Excess Material

1.0 Description. There will be excess material excavated on this project that will not be needed for completion. The contractor shall be responsible for disposing of this excess material off of the right-of-way.

2.0 Basis of Payment. No direct payment will be made for overhaul, compaction, seeding or any other items needed for the disposal of this material.

DDD. Drainage System Inspection

1.0 Drainage System Inspection Requirements.

All drainage systems shall be inspected by video method before paving completed surface over drainage structures.

EEE. Field Verification of Existing Drainage Structures

1.0 Description. Contractor is responsible for field verifying the location and elevations of existing structures and pipes prior to beginning construction on each proposed structure. There is no direct payment for field measurements of existing structures.

FFF. Group A Horizontal Elliptical Pipe

1.0 Description. This work shall consist of providing and installing Group A horizontal elliptical pipes of the diameter or shape designated in the plans, laid upon a firm bed and backfilled as specified. The contractor may use any of the permissible types of pipes specified for Group A that can be manufactured as an elliptical to meet the required sizes. This work shall be in accordance with Section 724 and any of the sections referenced within.

2.0 Method of Measurement. Final measurement will not be made.

3.0 Basis of Payment. The Group A horizontal elliptical pipe, complete and in-place, will be paid for at the contract unit price for the following bid item:

<u>Bid Item No.</u>	<u>Description</u>	<u>Units</u>
726-99.03	19 In. X 30 In. Group A Horizontal Elliptical Pipe	Lin. Ft.

GGG. 27" Group B Pipe and Flared End Section

1.0 Description. This work shall consist of providing and installing Group B pipes and flared end section of the diameter or shape designated in the plans, laid upon a firm bed and backfilled as specified. The contractor may use any of the permissible types of pipes specified for Group B that can be manufactured to meet the required sizes. This work shall be in accordance with Section 724 and any of the sections referenced within.

2.0 Method of Measurement. Final measurement will not be made.

3.0 Basis of Payment. The 27" Group B pipe and flared end section, complete and in-place, will each be paid for at the contract unit price for the following bid items:

<u>Bid Item No.</u>	<u>Description</u>	<u>Units</u>
725-99.03	27 In. Pipe Group B	Lin. Ft.
732-99.02	27 In. Group B Flared End Section	Each

HHH. Special Design Reinforced Concrete Pipes and Flared End Sections

1.0 Description. This specification covers the contract requirement for use of special design reinforced concrete pipes and flared end sections.

1.1 Amend section 726.1.4 of the Standard Specifications to include the following:

726.1.4.1 For fill heights greater than 20 feet, reinforced concrete pipe will be specified on the plans. The contractor shall provide the design, bedding and compaction details to the engineer in accordance with Sec 726.1.4.2 and obtain acceptance of the design prior to installation of the reinforced concrete pipe. A special designed hydraulically equivalent reinforced concrete box culvert may be used in lieu of the special designed culverts shown.

726.1.4.2 Four copies of the design computations and shop drawings reflecting design and stress details, signed and sealed by a professional engineer registered in the state of Missouri, shall be submitted to the engineer and be accepted in writing prior to fabrication of the reinforced concrete pipe. Shop drawings shall include complete details required for reinforced concrete pipe fabrication including wall thickness, concrete design strength, the type, size and placement of reinforcement, and the inside and outside dimensions.

2.0 Basis of Payment. All labor, equipment, material and engineering costs to complete the described work shall be completely covered by item numbers:

726-99.03	30 IN RCP (Special Design)
732-99.02	30 IN Precast Concrete FES (Special Design)

III. Ground Improvements

1.0 Description: Ground improvements are required to accelerate the consolidation settlement of the bridge approach roadway embankments. Ground improvements shall be in accordance with the job special provisions, contract plans and as directed by the Engineer. This work shall consist of furnishing design calculations, shop drawings, materials, and labor necessary to construct vertical wick drains and sand drainage blanket, or other approved ground improvement methods over the horizontal limits specified on the contract plans or as modified on the approved shop drawings.

2.0 General Scope and Requirements. The work included in this Job Special Provision shall consist of providing an engineered design, all labor, equipment, materials, water, and power; performing all operations necessary to complete the intended improvements for the project; cleaning up the area upon completion of the work; and providing all other operations that are incidental to the work specified herein. Key aspects of the work to be performed or furnished by the Contractor include, but are not limited to, the following:

1. Complete an engineered ground improvement design
2. Complete additional testing of existing soil conditions as necessary to complete the design.
3. Coordinate with relevant utility companies to avoid damage to utilities including, but not limited to, sewer, gas, water, and telecommunication lines.

4. Construct vertical wick drains and sand drainage blanket of the spacing and thickness shown in the approved shop drawings.
5. Lay out the vertical wick drains and sand drainage blanket in accordance with the approved shop drawings.
6. Pre-boring as required through obstructions or stiff layers of subsurface.
7. Provide appropriate equipment and experienced operators for the installation of the ground improvements.
8. Furnish material for the ground improvements.
9. Conduct testing of the ground improvements.
10. Control and dispose of water resulting from ground improvement construction operations. Comply with all local, state, and federal environmental requirements
11. Demobilize equipment and clean up the site.
12. Monitoring of settlement and pore pressure. See Job Special Provision LLL and MMM.

2.1.1 The Contractor, with approval of the Engineer, may use alternative methods of ground improvements other than the vertical wick drains and sand drainage blanket discussed herein. Requirements in this Job Special Provision shall still apply to the greatest extent applicable, including required submittals and performance requirements. Alternative methods shall be designed in accordance with applicable AASHTO or similar industry standards.

3.0 Preconstruction Submittals.

3.1 The Contractor shall submit to the Engineer for review the following at least thirty (30) calendar days prior to commencing the ground improvements work.

3.2 Qualifications. Submit evidence of successful installation of vertical wick drains and sand drainage blanket on three (3) or more projects for similar applications of highway embankments or retaining walls using the same installation technique within the past ten (10) years. Attach references that include the name, address, and telephone number of the owner of the specific projects. In addition, resumes of the following key personnel shall be included in the submission:

Project Manager
Superintendent(s)
Project Engineer(s)
Equipment Operator

The field superintendent shall have a minimum of three (3) years of experience installing the stone columns using the proposed technique. The equipment operator shall have a minimum of one (1) year of experience operating equipment for similar vertical wick drains and sand drainage blanket construction.

If during the construction, the Contractor proposes to change any of the key personnel, the resume of the proposed replacement person shall be submitted and approved by the Engineer prior to assuming responsibilities on the project.

3.3 Design. Submit ground improvement design calculations meeting the minimum requirements of this Job Special Provision and sealed in accordance with the laws relating to architects and professional Engineers (Chapter 327, RSMo.). This design shall be considered as the approved shop drawings for the ground improvements.

3.4 Related Work. Related work shall not begin until the submittals have been received, reviewed, and accepted in writing from the Engineer. The Contractor shall allow the Engineer fourteen (14) calendar days to review the submittals after the complete final set has been received. Additional time required due to incomplete or unacceptable submittals shall not be cause for delay or impact claims. All costs associated with incomplete or unacceptable submittals shall be the responsibility of the Contractor.

4.0 Materials.

4.1 Ground improvements shall be in accordance with the job special provisions, contract plans and as directed by the Engineer. See, including but not limited to, as indicated in Job Special Provision JJJ, KKK, LLL and MMM.

4.2 Water. Clean water, free of all substances deleterious to the work, shall be used.

5.0 Equipment.

5.1 Equipment shall be in accordance with the job special provisions, contract plans and as directed by the Engineer. See, including but not limited to, as indicated in Job Special Provision JJJ, KKK, LLL and MMM.

6.0 Design. Regardless of the method chosen, the ground improvement shall meet the following performance requirements.

- (a) Provide an analysis of time to reach 90% consolidation and proposed settlement waiting period after embankment construction using the provided soils report and any additional subsurface information obtained by the Contractor.
- (b) Settlement shall be considered complete when it is less than 1/8-inch per two week period for two consecutive weeks.
- (c) Layout drawing showing the planned location and limits for all ground improvements.
- (d) Summary of material documentation to verify compliance with the contract plans, specifications, and job special provisions
- (e) The design shall be compatible with other elements of the project.
- (f) The design shall provide guidance on construction activities such that global stability and slope stability are adequately maintained.

- (g) The design recommendations shall achieve theoretical post construction settlement of less than 1-inch.

6.1 Layout drawing for vertical wick drains and sand drainage blanket should include plan view and cross section with planned location and limits. Additionally, layout drawing should indicate planned drainage paths and embankment monitoring instrumentation devices system.

6.2 The ground improvement shall, at a minimum, extend from Sta 4+50 to 8+85 and Sta 12+15 to 17+50.

6.3 The ground improvement shall extend from the bottom of the modified subgrade to the underlying limestone or shale bedrock.

6.4 The vertical wick drains and sand drainage blanket design need not consider seismic loadings unless otherwise required as part of the performance requirements shown on the plans.

6.5 The vertical wick drains and sand drainage blanket design shall consider accommodations for utilities and drainage pipes.

7.0 Construction of Ground Improvements

7.1 Vertical wick drains and sand drainage blanket construction, testing and settlement monitoring shall be in accordance with the job special provisions, contract plans and as directed by the Engineer. See, including but not limited to, as indicated in Job Special Provision JJJ, KKK, LLL and MMM.

7.2 Ensure a geotechnical professional Engineer shall be on site during ground improvements installation. This geotechnical professional Engineer shall be designated by the Engineer of Record for the approved shop drawings for the ground improvements.

7.3 Pre-boring may be required due to the presence of cobbles and boulders to achieve ground improvement to underlying bedrock. Pre-boring should be anticipated and shall be as directed by the Engineer.

8.0 Method of Measurement. No measurement will be made.

9.0 Basis of Payment. Payment for the above-described work, including all material, equipment, labor and any other incidental work necessary, shall be considered completely covered under the contract lump sum price for Ground Improvement.

JJJ. Vertical Wick Drains

1.0 Description. The work shall consist of installing prefabricated vertical wick drains at the locations and to such elevations as indicated on the approved shop drawings or as directed by the Engineer.

2.0 General Requirements. It shall be the responsibility of the contractor to furnish all necessary material, labor and equipment for the purpose of installing vertical wick drains according to the

approved shop drawings and provisions of the contract. No direct payment will be made for drains that are defective, either in terms of material or as a result of unacceptable installation methods.

3.0 Installation. The wick drain locations shall be located, numbered, and staked by the contractor. The contractor shall take the necessary precautions to protect and preserve the stakes. The locations of the installed wick drains shall not vary by more than 6 inches from the locations indicated on the approved shop drawings.

3.1 Where shown on the plans and or as directed by the engineer, vertical wick drains shall be installed prior to the placement of the sand drainage blanket and prior to the placement of the embankment.

3.2 The contractor shall demonstrate that his or her equipment, methods, and materials produce a satisfactory installation in accordance with these specifications. For this purpose, the contractor shall install six trial drains at locations within the work area, as designated by the engineer. Provide an additional six trial drains for wick drains with pre-boring or pre-auguring, as designated by the engineer.

3.3 Any drains that deviate from the plan location by more than 6 inches, or that are damaged or improperly installed, will be rejected. Rejected drains may be removed or abandoned in place, at the contractor's option. Replacement drains shall be offset approximately 18 inches from the location of the rejected drain as directed by the engineer. All rejected drains will be replaced at the contractor's expense.

3.4 Drains shall be installed vertically, within a tolerance of not more than 0.25 inches per foot. The equipment shall be carefully checked for plumbness and the contractor shall provide the engineer with a suitable means of verifying the plumbness of the mandrel and of determining the depth of the drain at any time.

3.5 Splices or connections in the vertical drain material shall be done according to the manufacturer's recommendations to ensure continuity and no diminishing of the flow characteristics of the wick material. Splices shall be a minimum of 6 inches in length. The prefabricated drain shall be cut such that at least a 6-inch length protrudes above the top of the sand drainage blanket, at each drain location.

3.6 The contractor shall be permitted to use auguring or other methods to clear obstructions and to facilitate the installation of the drains through the working platform or a stiffer natural deposit above the compressible soil strata. The depth to which pre-auguring is used shall be subject to the approval of the engineer but should not extend more than one (1) foot into the underlying compressible soils.

3.7 Where obstructions are encountered within the compressible strata, which cannot be penetrated by auguring, or spudding, the contractor shall abandon the hole. At the direction of the engineer, the contractor shall then install a new drain no more than 18 inches from the obstructed drain. A maximum of two attempts shall be made, as directed by the engineer, to install a new drain for each obstructed drain. If the drain still cannot be installed to the design tip elevation, the drain location shall be abandoned and the installation equipment should be moved to the next drain location.

3.8 Installation of the drains should be coordinated with placement of geotechnical instrumentation as shown on the approved shop drawings. Special care should be taken to install drains in such a manner so as not to disturb instrumentation already in place. The replacement of instrumentation damaged as a result of the contractor's activities will be the responsibility of the contractor.

4.0 Equipment. Vertical drains shall be installed with equipment, which will cause a minimum amount of disturbance to the sand drainage blanket or the subsoil during the installation. The prefabricated drains shall be installed by pushing or vibrating a mandrel or sleeve through the soils to the required depth. Jetting shall not be permitted for installation of the drain, except with the approval of the engineer, to lubricate the mandrel when working in highly plastic clays.

4.1 The mandrel shall protect the prefabricated drain material from tears, cuts and abrasions during installation and shall be withdrawn after the installation of the drain. The drain shall be provided with an anchor plate or rod at the bottom to anchor the drain at the required depth at the time of mandrel removal. The projected cross-sectional area of the mandrel and anchor combination shall not be greater than 12 square inches.

4.2 At least 3 weeks prior to the installation of the wick drains, the contractor shall submit to the engineer for review the details, sequence and method of the installation. The submittal shall, as a minimum, contain the following specific information:

- Size, type, weight, maximum pushing force, and configuration of the installation rig.
- Dimensions and length of mandrel.
- Details of drain anchorage.
- Detailed description of proposed installation procedures.
- Proposed methods of overcoming obstructions.
- Proposed methods for splicing drains.

4.3 Acceptance of the contractor's methodology by the engineer will not relieve the contractor of his/her responsibility to install wick drains in accordance with the approved shop drawings and specifications. If, at any time, the engineer considers that the method of installation does not produce a satisfactory drain, the contractor shall alter his method and/or equipment as necessary to comply with the approved shop drawings and specifications.

5.0 Materials. Wick drains shall be a prefabricated type with a corrugated plastic drainage core wrapped on all sides with non-woven synthetic geotextile filter fabric with an effective opening size of not greater than 210 microns.

5.1 The cross-sectional area of the wick drain material shall consist of a continuous plastic drainage core wrapped in a non-woven geotextile material. The geotextile wrap shall be tight around the core and shall be securely seamed in a manner that will not introduce any new materials nor present an obstruction that will impede flow in the channels of the core.

5.2 The contractor shall submit a five (5) foot sample of the vertical drain material to the engineer prior to usage and shall allow three weeks for evaluation of the material. The sample shall be stamped or labeled by the manufacturer as being representative of the drain material having the specified trade name. Approval of the sample material by the engineer shall be required prior to site delivery of the wick drain material.

5.3 The contractor shall state which wick drain product he/she intends to install at the time of the pre-construction conference. The drains shall be free of defects, rips, holes or flaws. During shipment, the drain shall be protected from damage, and during storage on-site, the storage area shall be such that the drain is protected from sunlight, mud, dirt, dust, debris and detrimental substances. Manufacturer certification shall be provided for all drain material delivered to the project.

6.0 Method of Measurement. No measurement will be made. Vertical wick drains shall be installed as shown on the approved shop drawings.

7.0 Basis of Payment. Payment for vertical wick drains and the above-described work, including all material, equipment, labor and any other incidental work necessary, shall be considered completely covered under the contract unit price for Item No. 605-99.01, "Ground Improvements" per Lump Sum.

7.1 This price shall be full compensation for the cost of forming the drain, furnishing wick material in order to produce the required end result in accordance with the approved shop drawings and specifications, and shall also include the cost of furnishing all tools, materials, labor, equipment and all other costs necessary to complete the required work.

7.2 No direct payment will be made for unacceptable drains or for any delays or expenses incurred through changes of method or equipment where directed the engineer, but the costs of such shall be included in the contract unit price for this work. The cost of constructing the sand drainage blanket and installation of instrumentation is included in the contract unit price for Item No. 605-99.01, "Ground Improvements" per Lump Sum.

KKK. Sand Drainage Blanket

1.0 Description. The work shall consist of furnishing all necessary materials and equipment to construct a sand drainage blanket to form a horizontal drainage layer between the proposed embankment and what is considered the ground surface. Thickness of the sand drainage blanket per the approved shop drawings.

2.0 Material. The sand drainage blanket shall be constructed of a clean, free-draining, natural sand meeting the following gradation requirements:

Sieve	3/8"	#4	#20	#50	#100	#200
Percent						
Passing	95-100	85-100	40-80	5-40	0-10	0-3

The Contractor, with approval of the Engineer, may use alternative granular drainage blanket.

3.0 Installation. The sand drainage blanket shall be constructed to the specified thickness and within the limits and grades shown on the approved shop drawings. Sand may be placed by end dumping or other approved method, and spread uniformly over the site to the limits shown on the approved shop drawings.

3.1 Prior to installation of sand drainage blanket, complete clearing and grubbing as well as over excavation of organic or unsuitable materials.

3.2 The horizontal sand drainage blanket shall cover the entire area enclosed by the wick drain boundary indicated on the approved shop drawings. The blanket will extend to the toe of the embankment as indicated on the approved shop drawings. The drainage blanket shall be placed on a 1.0% grade (sloping in direction to a nearby ditch) on the prepared ground surface. The contractor shall maintain the sand drainage blanket in a fashion that keeps the sand daylighted at the toe of slope or as indicated on the plans through completion of the project. Areas that are to be daylighted shall be wrapped with a geotextile filter as indicated on the plans.

3.3 Immediately prior to placement of the embankment, the sand drainage blanket shall be reshaped to conform to the limits shown on the approved shop drawings.

4.0 Method of Measurement. No measurement will be made. The sand drainage blanket shall be placed within the limits shown on the approved shop drawings. The thickness of the sand drainage blanket will be per the approved shop drawings. No extra measurement of any other kind will be allowed in computing the amount of sand placed outside the limits as specified herein or as directed by the engineer. The subsurface drainage geotextile filter fabric shall be installed within the limits shown on the approved shop drawings.

5.0 Basis of Payment. Payment for the sand drainage blanket, subsurface drainage geotextile and the above described work, including all material, equipment, labor and any other incidental work necessary, shall be considered completely covered under the contract lump sum price for Ground Improvement. No additional payment will be made for additional sand placed because of settlement.

LLL. Geotechnical Instrumentation

1.0 Description. The work shall consist of constructing and installing settlement gauges and pore pressure measuring devices as indicated in the contract documents.

2.0 General Requirements. It shall be the responsibility of the contractor to furnish all necessary material, labor, and equipment for the purpose of constructing and installing settlement gauges and pore pressure measuring devices in accordance with the standard specifications and standard drawings, Embankment Monitoring, Section 204. At the locations indicated, pore pressure measuring devices will serve a dual purpose. They will monitor the pore pressure that develops in the foundation materials as embankments are constructed and shall serve as settlement gauges for the purpose of collecting settlement data in addition to the settlement gauges shown in the contract documents.

3.0 Embankment Monitoring. In lieu of paragraph 204.10.3.5 of the Standard Specifications. The successful bidder shall obtain and record all measurements and elevations necessary for accurate determination of settlement prior to, during, and after completion of embankment construction. Initial elevations of the settlement gauges and the pore pressure measuring devices shall be obtained prior to the commencement of the embankment construction. Settlement data elevations shall be obtained and recorded at a minimum once every two weeks during and after embankment construction until the settlement is complete. Approach slab and pavement

construction shall not begin until after proposed settlement waiting period for Structure A9472 from Stations 4+50 to 8+85 and from 12+15 to 17+50 after the embankment construction is complete, or until settlement is complete. Additionally, pre-boring is required for bridge end bents piles driving prior to the proposed settlement waiting period.

3.1 Settlement is considered complete when the settlement data indicates the settlement is equal to or less than 1/8-inch in a two week period for two consecutive two week periods.

4.0 Basis of Payment. Measurement and payment of pore pressure measuring devices and settlement gauges shall be as defined in Sec 204.20.6. Payment for locating and the collection of settlement data will be under Contractor Furnished Surveying and Staking, Item No. 627-40.00.

MMM. Embankment Construction Fill Monitoring

1.0 Description. This work shall consist of constructing the embankment associated with referenced drainage structure. A Geotechnical Investigation for Structure A9472 encountered soft compressible foundation materials.

2.0 Construction. Type B Pore Pressure Measuring Devices shall monitor the foundation materials and govern the rate of placement of the embankment and a soil surcharge construction. Type B Pore Pressure Measuring Devices shall be at locations shown in the contract documents and in accordance with Standard Specifications 203, 204 and with Standard Plans. The surcharge shall be nine feet in height above the roadway subgrade from station 4+50.00 to 8+85.00 and station 12+15.00 to 17+50.00. The surcharge shall remain in place for a minimum of five months after its construction. Pore Pressure Measuring Devices will also serve as settlement gauges. Elevations of the top of the Pore Pressure Measuring Devices shall be obtained and recorded in accordance with Job Special Provision LLL.

3.0 Basis of Payment. No direct payment will be made to the contractor to recover the cost of equipment, labor, materials or time required for construction and disposal of soil surcharge. The work for constructing the Pore Pressure Measuring Devices shall be measured and Payment for all expenses incurred shall be considered as included in and completely covered by the contract unit price for Item No. 204-30.10, "Pore Pressure Measuring Device", per each.

NNN. Class IV Reinforced Concrete Pipe Culverts and Flared End Sections

1.0 Description. This work shall consist of providing and installing Class IV reinforced concrete pipe culverts and flared end sections of the diameter or shape designated in the plans, laid upon a firm bed and backfilled as specified. Fill heights less than one foot over pipe culvert requires concrete pipe culverts. This work shall be in accordance with Section 724 and any of the sections referenced within.

2.0 Method of Measurement. Final measurement will not be made.

3.0 Basis of Payment. The Class IV reinforced concrete pipe culverts, complete and in-place, will each be paid for at the contract unit price for the following bid items:

<u>Bid Item No.</u>	<u>Description</u>	<u>Units</u>
726-99.03	30 In. Class IV Reinforced Concrete Pipe Culvert	Lin. Ft.
732-99.02	30 In. Precast Concrete Flared End Section	Each

000. Existing Power Supply and Signal Controller Relocation

1.0 Description. This work shall consist of removing, reinstalling, and placing back into operation the existing signal controller and Type 2 Power Supply located in the northwest quadrant of the intersection of Stone Creek Dr. (future Route MM) and US 60 as detailed in the plans.

2.0 Construction Requirements. Construction requirements shall be in accordance with plan details and shall conform to Sec. 902.

3.0 Method of Measurement. Final measurement will not be made.

4.0 Basis of Payment. All costs for the removal, reinstallation, and placing back into operation of the existing Type 2 Power Supply and signal controller at the intersection of Stone Creek Dr. and US 60 will be made at the contract unit price for the following items:

<u>Bid Item No.</u>	<u>Description</u>	<u>Units</u>
902-99.02	Relocate Existing Type 2 Power Supply	Each.
902-99.02	Relocate Existing Signal Controller	Each

PPP. CCTV Cable, Cat 5

1.0 Description. This work shall consist of furnishing and installing new CCTV cable as indicated on the plans or as directed by the engineer.

1.1 The CCTV cable installed shall be compatible with the CCTV camera installed at the designated intersection.

2.0 Method of Measurement. Measurement of the CCTV cable shall be made per linear foot.

3.0 Basis of Payment. All costs associated with this work shall be considered completely covered as follows:

<u>Item No.</u>	<u>Type</u>	<u>Description</u>
910-99.03	LF	CCTV Ethernet Cable

QQQ. Tubular Support, Type S-2318, Span 50 FT

1.0 Description. This work shall consist of providing and installing a Type S Sign Truss, S-2318-50 at the location shown in the plans. All work shall be in accordance with Section 903.

2.0 Materials. All materials shall be in accordance with Sections 903, and all referenced sections.

3.0 Method of Measurement. The Type S Sign Truss, S-2318-50 shall be measured per each.

4.0 Basis of Payment. The accepted Type S Sign Truss, S-2318-50 will be paid for at the contract unit price bid for item 903-99.02, TUBULAR SUPPORT, S-2318, SPAN 50 FT. Such payment shall constitute full compensation for all materials, labor, tools, and equipment necessary to complete the construction item. 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.

RRR. Tubular Support, Type S-2316.5, Span 45 FT

1.0 Description. This work shall consist of providing and installing a Type S Sign Truss, S-2316.5-45 at the location shown in the plans. All work shall be in accordance with Section 903.

2.0 Materials. All materials shall be in accordance with Sections 903, and all referenced sections.

3.0 Method of Measurement. The Type S Sign Truss, S-2316.5-45 shall be measured per each.

4.0 Basis of Payment. The accepted Type S Sign Truss, S-2316.5-45 will be paid for at the contract unit price bid for item 903-99.02, TUBULAR SUPPORT, S-2316.5, SPAN 45 FT. Such payment shall constitute full compensation for all materials, labor, tools, and equipment necessary to complete the construction item. 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.



Primary Construction
(Labor and Material)

HWY MM 161KV TRANSMISSION MODIFICATION:

Greene County Job No. J8S0836D

ISSUED FOR BID: October 2025

Bidder:



1550 East Republic Road
Springfield, MO 65804
tothassociates.com
417.888.0645

Table of Contents

HWY MM 161KV TRANSMISSION
MODIFICATION:
Greene County Job No. J8S0836D

1	Project Summary
2	Exhibit A: Construction Specifications
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4	Exhibit C: Geotech Report
5	Intentionally Blank

ELECTRICAL

I hereby specify that the documents intended to be authenticated by my seal are limited to the Specification Sections listed below, and I hereby disclaim any responsibility for all other specifications, estimates, reports or other documents or instruments relating to or intended to be used for any part or parts of the project unless such documents bear my signed and dated seal.

Specification Sections:

Exhibit A – Construction Specifications

Exhibit B – Steel Pole Specifications

Engineer – Electrical
Toth and Associates, Inc.
1550 E Republic Road
Springfield, Missouri 65804
417-888-0645
Missouri COA# E-2004004242

Joshua P. Sirb
MO# PE-2021019772



Digitally signed by Joshua P. Sirb
Date: 2025.07.18 17:01:16-05'00'
JOSHUA P. SIRB - ENGINEER
MO# PE-2021019772

Project Summary

1. Project Description

MODOT is receiving proposals for rebuilding a 161kV transmission line approximately 0.63 miles long that will cross Highway MM. The project is located in Greene County, Missouri. Outages will need to be coordinated with SWPA well in advance of construction and coordination with MoDOT will need to occur to account for traffic control. The project will also cross over a railroad, a transmission line, and a distribution line.

The typical tangent structure is a direct-embed galvanized steel H-frame structure. A three-pole deadend direct-embed guyed structure will be installed on the west side of the project, whereas a three-pole deadend pier-mounted structure will be installed on concrete piers located on the east side. The contractor will be expected to verify the final drilled pier foundation design with engineer before commencing work.

The transmission conductor to be installed between the two new deadend structures is 1192.5 ACSR (Grackle), the OPGW is AFL DNO-12519, and the OHGW is 7/16" EHS. This project will also include replacing the existing OPGW and OHGW one span beyond the new steel deadend structures and attaching onto the existing wood structures where the new OPGW splice cans will be located.

The Contractor shall examine the work site to determine the access to the structures and difficulty of construction of this project. As part of the work, the Contractor may need to create roads, install culverts, matting or use specialized equipment, to access portions of the ROW. Construction of such temporary or permanent features such as matting, culverts, and roads are considered part of the Contractor's "means and methods" and will not be itemized for compensation unless the Owner has accepted unit pricing in writing before construction of such features. At no time will additional compensation be awarded to the Contractor for specialized equipment to access or work at the project site. As much as possible, the Contractor shall limit their movement to existing roads/trails and minimize building new temporary access roads.

2. Project Schedule

Milestone	Milestone Completed
Bid Opening	
Contract Execution	
Owner Furnished Materials Available*	
Mobilization & Construction Start	
Project Completion Date**	

*All milestones following Owner Furnished Material Available will be extended 1 day for each day Contract Execution is delayed.

**Liquidated Damages described in RUS Form 830 page 15 will be applied based on number of days "Project Completion Date" is late.

2.1. Continuous Operations. Every reasonable effort will be made to permit the Contractor to maintain a continuous construction operation along the right-of-way. However, this may not, in all instances, be possible due to contingencies that are outside of the control of the Owner such as extreme weather events. Such eventualities will be subject to Article II, Section 1b of the contract RUS Form 830; under these circumstances, the Contractor shall not be entitled to extra compensation for non-continuous operations.

2.2. Subject to Interruption. The Contractor's work on existing structures is continuously subject to the approval of the Owner's designated representative. The Owner reserves the right to stop any and all work on existing structures deemed not satisfactory. The Contractor will not be entitled to any additional compensation for reasonable stoppage of work on existing structures.

2.3. Construction Staking by Engineer. Contractor is responsible for providing the Engineer with 2 weeks' advance notice for any staking needed for construction. Once placed, construction stakes are the responsibility of the Contractor; the Owner reserves the right to withhold from the Contractor's compensation the cost of any re-staking required after initial construction stakes are placed.

2.4. Outages. Outages will need to be coordinated with SWPA well in advance of construction and coordination with MoDOT will need to occur to account for traffic control.

2.5. Material Delivery. Contractor to furnish all material.

2.6. Storm Work. If emergency storm work opportunities are available during the contract period, the Contractor may leave the project IF the Owner approves a release to do so and the Contractor must return immediately upon completion of the storm work. No extension of time shall be granted for the Contractor leaving the project site for Storm Work. Owner has first right of refusal to crews under contract for their own storm work.

Exhibit A:

Construction Specifications

EXHIBIT A:
CONSTRUCTION SPECIFICATIONS

Agency/Form No.	Form Title/Description	Pages
Exhibit A	Construction Specifications	1-6
RUS Form 224	Bulletin 1724E-224	7-29
Assembly 00	Foundations General Construction Specifications	GS 1-6
Assembly 5.1	Drilled Concrete Piers and Shafts Specification	S5.1 1-17

EXHIBIT A:

Construction Specifications

1. Scope of Work

1.1. Introduction. Contractor shall be responsible for the general construction activities, including but not limited to, procurement of material not included in the List of Owner Furnished Material, construction management, construction activities, and commissioning of the work. The scope of work shall include all tasks and equipment necessary to provide the Owner a complete and functional distribution line to the new substations and switchgears in conformance with specifications and terms of this Contract.

The Contractor shall be solely responsible for the Contractor's work methods and work procedures in constructing and installing the assembly units described herein. All work shall be completed in a professional manner by skilled craftsmen/personnel in the appropriate trade who are properly trained for their respective assignments.

1.2. Construction Management. The Contractor shall be responsible for the overall management of construction including planning, organizing, scheduling, progress reporting, procurement (as necessary), procurement management/handling, safety, quality assurance and control, and general construction administration.

1.3. Construction Activities and Commissioning. Construction activities and commissioning performed by the Contractor shall consist of necessary material handling, technical advisory services, supervision, labor and construction to install and make ready for turnover of the Facilities. Contractor will perform construction services required to complete the work as described below and in the accompanying specifications. The construction activities and commissioning, as a minimum, shall include the following:

1.3.1. Site preparation, including appropriate disposal of spoils. Cutting or clearing of brush that is incidental to the work is the responsibility of the Contractor and will not receive additional compensation unless agreed to in a change order before the work is completed.

1.3.2. Materials handling, including receiving (or picking up) and storing materials, offloading direct-delivered materials, incidental trips to Owner's warehouse for miscellaneous items, loading and unloading of poles, moving poles to their staked location, and insurance to cover loss of the materials, etc.

1.3.3. Installation and transfer of transmission/distribution facilities and installation/transfer of new/ existing distribution facilities.

1.3.4. Installation of conductor and overhead ground wire (OHGW/OPGW).

1.3.5. Construction services and third-party testing for the following:

1.3.6. Scheduling of activities, including coordination with Others onsite.

- 1.3.7.** Temporary office space, warehouse, sanitation, heating, telephone, site security, staff accommodations and housing, and tool room facilities and supplies as required for the performance of the field services included in the scope of services.
 - 1.3.8.** Temporary utilities such as water, electric lighting, electric power, fire protection, and sanitary facilities, where necessary.
 - 1.3.9.** Erection aids including cranes, scaffolding, tools, consumable supplies and expendable devices as required for the work.
 - 1.3.10.** Clean up, removal, and disposal of trash, litter, garbage, and for the restoration of all areas used during the course of this contract. Contractor shall be responsible for appropriate and legal off-site disposal of any nonhazardous or non-contaminated material that is encountered during construction.
 - 1.3.11.** Compliance with all federal, state, and local ordinances. Construction delays associated with non-compliance with regulations including the foregoing shall not be considered excusable delays.
 - 1.3.12.** Locating all potentially conflicting telephone, water, gas, electric, sewer, fiber optic, TV cables or other utilities which may be encountered during the performance of the work and taking every precautionary measure to protect those lines and appurtenances both above and below the ground surface. If an underground facility is found to be in conflict with the transmission line project, the Contractor shall immediately notify the Owner. Any damages caused by the Contractor to any underground installation including wires, cables, gas, oil or water pipes, drainage tiles, road culverts are the sole responsibility of the Contractor.
 - 1.3.13.** Providing adequate construction access roads to and throughout the site and maintaining all natural drainage and water course unobstructed or providing other equal courses effectively placed. The Contractor shall maintain the access and drainage facilities in such a manner as to afford vehicular access to the major work areas and prevent accumulations of surface water. There shall be no additional compensation for installation or removal of temporary culverts, access roads, or other related items that may be used during construction to access the ROW.
 - 1.3.14.** Warning signs, flagmen, trench covers, etc. as required for public safety and state and county regulations.
 - 1.3.15.** Completion of Punch List Items prior to Final Acceptance. Contractor shall cause its work involving Punch List Items to be complete prior to Final Acceptance and completion of such items shall not to interfere with operation of the facilities.
 - 1.3.16.** Upon completion of the construction of the facilities, the Contractor and Owner's representative shall perform a walkthrough of the complete installation to determine if conditions required for Completion have been satisfied. The Contractor shall deliver to the Owner a written notice certifying Construction Completion.
- 1.4. Exclusions.** The following activities are not included in the Contractor's scope of work:

1.4.1. Intentionally Blank.

2. Owner Furnished Material

- 2.1.** Contractor will be responsible for the transporting of poles to stakes at no extra cost to the Owner.
- 2.2.** Contractor shall furnish personnel and equipment to load all Owner Furnished Material at the Owner's warehouse onto suitable conveyances and transporting the equipment to the work site as well as unloading, sorting, inspecting, storing, and cataloging of all received items.
- 2.3.** Once material has been reconciled by the contractor, the contractor shall store all materials and equipment normally requiring protection on arrival at the site under weatherproof coverings and protect the materials from damage and theft during construction until final completion and acceptance. The Owner shall be released from liability once the material has been reconciled to the contractor.

3. Right-of-Way

- 3.1.** The Contractor agrees to operate within the confines of the right-of-way (except where work may be done from paralleling and adjacent roadways). In the event the Contractor considers additional access desirable, the Contractor may, after approval by the Owner, contact the affected landowner for additional access. Written landowner consent must be obtained by the Contractor and approved by the Owner before right-of-way operations proceed. Notwithstanding any provision to the contrary herein, if the additional access is, for any reason not obtained, the Contractor will construct using the right-of-way initially obtained by the Owner.
- 3.2.** The Contractor shall limit the movement of its crews and equipment so as to minimize the damage to crops, orchards, and the right-of-way in general, and shall endeavor to avoid marring the lands with vehicular equipment. Contractor shall maintain public access to roads and driveways as much as is practical.
- 3.3.** Any and all damages caused by the Contractor on or off the right-of-way shall be repaired by the Contractor. All repairs shall be subject to the approval of the affected landowner or government agency. All repairs shall be completed in a timely fashion to the satisfaction of the Owner and no later than the end of the line project.
- 3.4.** Upon completion of the specified work, the Contractor shall restore all fencing and ROW to the same or better condition, subject to the Owner's review and acceptance.

4. Permits and Authorizations

- 4.1.** The Owner will obtain crossing permits for highways, railroads, power lines, communication lines, and other utilities as required.
- 4.2.** Contractor shall perform work in a manner that satisfies any and all requirements of crossing or intersecting permits issued by the proper authorities for highway, pipeline, railway, and other types of pre-existing improvements. Contractor shall make arrangements with the

owners of these facilities regarding rules, regulations, and permissible times for making the crossings.

- 4.3.** All other necessary permits or authorizations, fees, and inspections required by federal, state, and city or local authorities will be furnished by the Contractor at the Contractor's expense.

5. Safety

- 5.1.** The Contractor shall be solely responsible for the safety of the Contractor's crews, the general public and others for all work related to the construction of this project by the Contractor. The Contractor is responsible to initiate, maintain, and supervise all elements of Contractor's safety program. Contractor shall also comply with all reasonable safety standards, rules, or requirements promulgated by Owner, if any.

6. Reporting

- 6.1.** The Contractor shall maintain daily, weekly, and monthly records of construction activities. Upon request by the Owner, the Contractor shall provide reports of construction progress on a daily, weekly, or monthly basis.
- 6.2.** The Contractor shall maintain appropriate Safety and Accident Reports for Contractor and Subcontractors; the Contractor shall timely submit a copy of each Accident Report to the appropriate Owner's representative.

7. Additional Terms of Payment

- 7.1.** Payment will not be made for any assembly attached to the pole until the pole has been installed.
- 7.2.** The Contractor shall not be entitled to compensation for any additional work performed or materials supplied not covered by unit prices in the contract unless such additional work or material is approved by the Owner, in writing, before the work is performed or the materials are obtained.
- 7.3.** Change Orders. Prior to approval, all change orders must be submitted in writing, prior to any work being performed to the Owner/Engineer. The submittal shall include the following:
1. Reason change order is necessary.
 2. Cost estimate to do the required work that is either not clearly defined or outside the scope of work defined by the contract. (Include T&E estimates).
 3. If this work will extend the completion date stated in the Contract.

Upon receipt of the submittal, the Engineer will review and approve or reject the Change Order as soon as possible to cause minimum interruption to the flow of work or delays in schedule.

If the Change Order is approved, the Engineer will notify the contractor in writing that work can proceed. The approved Change Order may be submitted for payment after all work is

completed and inspected by the Engineer or a member of the Engineers/Owners group. If the cost of the Change Order is greater than the estimated cost, the Change Order will require further review and documentation justifying the increase, before payment can be made. If there is an itemized unit that is similar in cost and labor to what is necessary for the Change Order work, the Engineer may ask if the contractor is willing to use that price to expedite approval and avoid further delays. No Change Order will be approved without the above requirements being met.

8. Technical Requirements and Specifications

8.1. General. The technical requirements and specifications in this contract describe the minimum level of quality of materials and work. The project shall be constructed in accordance with the parameters of the contract. Details are further specified in the Contractor's Proposal Information, Construction Drawings, and Construction Specifications provided in this and other Exhibits and incorporated herein by reference.

8.1.1. If the Contractor identifies an ambiguity in the specifications or drawings, it is the Contractor's responsibility to disclose any and all such ambiguities as well as the Contractor's corresponding assumptions as part of its initial bid. If the ambiguity leaves room for the Contractor to choose from multiple options, the Contractor shall base its bid price on the more conservative option and state what option was selected. As such, any further clarifications by the Engineer regarding such ambiguity should only serve to reduce the cost; no additional compensation for said ambiguity will be given.

8.1.2. If a discrepancy arises between the Contractor's interpretation of the design or specifications and the Owner's interpretation of the same, the Contractor understands and hereby agrees to perform and if necessary re-perform its work to the Owner's satisfaction at no additional cost to the Owner.

8.1.3. All work which is manifestly necessary to carry out the intent of the drawings and specifications or which is customarily performed for such work shall be included in the Contractor's proposal unless expressly indicated otherwise.

8.1.4. The Contractor is required to define any deviations from this specification, which, in the opinion of the Contractor, would improve the quality, appearance or performance or the facility. The deviations from these documents require written approval by Owner.

8.1.5. The work shall conform to the applicable RUS standards, NESC standards, and the codes and standards referenced in the specifications.

8.2. Materials

8.2.1. No Contractor furnished material shall be substituted for material provided by the Owner. Contractor shall not provide material to replace material originally furnished by Owner which was lost, stolen, damaged, or otherwise not available for use unless written approval is provided by Owner. Contractor shall be responsible for the replacement cost of material that is lost, stolen, damaged or not otherwise available for

use including labor, transportation, and related expense to load and transport replacement material for the original material supplied by the Owner which was lost, stolen, damaged, or otherwise rendered unserviceable after being issued to the Contractor.

- 8.2.2.** In addition to the requirements of Article I, Section 2 of the RUS Form 830 with respect to Contractor Furnished Material, it shall be the Contractor's further responsibility to ensure that Contractor Furnished Material meet the Owner's internal standards for material.

8.3. Methods

- 8.3.1. General.** During construction activities, the Contractor shall be responsible for the following:

- 8.3.1.1.** NESC minimum ground clearance will be maintained at all times.
- 8.3.1.2.** No structures with large angles will be left unattended with guys removed.
- 8.3.1.3.** Guard structures will be used at all conductor and road crossings. All costs associated with guard structures will be included in the "Conductor Assembly Unit" section of the Contractor's Itemized Proposal.

8.3.2. Anchors

- 8.3.2.1.** Anchors shall be installed in line with the strain of the guys.
- 8.3.2.2.** Anchors will be installed as specified in RUS Bulletin 1724E-224, incorporated herein by reference.
- 8.3.2.3.** The Owner will stake where anchors are to enter the ground.
- 8.3.2.4.** Screw anchors shall be installed and torqued by means of a torque measuring device. Installation torque and quantity of extensions and lengths utilized are to be documented by contractor and submitted to Owner/Engineer for each anchor location.

9. Work to be Completed by Others

- 9.1.** At times, while the contractor is on site, the Owner/Engineer and others may also be on site to accomplish work. All parties shall coordinate with the Owner and each other to ensure work is completed per the specifications and in a safe manner. Other on-site personnel may include, but not be limited to:

- 9.1.1.** Owner/Owner Representative

1. GENERAL

1.1 Standard of Work and Schedules

1.1.1 All work must be performed in a thorough and proficient manner in accordance with the plans, specifications, and construction drawings.

1.1.2 In accordance with the requirements of 7 CFR 1724, Subpart E, Electric System Design, the latest edition of the National Electrical Safety Code (NESC), American National Standards Institute (ANSI) C2, must be followed wherever applicable to the work, except where local regulations or specification requirements are more stringent, in which case the more stringent requirements must govern. The NESC may be obtained from the Institute of Electrical and Electronics Engineers, Inc., 445 Hoes Lane, P.O. Box 1331, Piscataway, N.J., 08855-1331, USA, or at <http://standards.ieee.org/nesc/>.

1.2 Technical Specifications: The following sections form the technical specifications (engineer to complete):

<u>General</u>	<u>Structure Erection</u>
<u>Clearing</u>	<u>Guys and Anchors</u>
<u>Access</u>	<u>Grounding and Bonding</u>
<u>Steel Poles</u>	<u>Insulators and Hardware</u>
<u>Pole Top Assemblies</u>	<u>Conductors and OHGW</u>
<u>Structure Assembly</u>	

1.3 Drawing and Maps

1.3.1 All drawings and maps accompanying this specification or listed herein must be considered a part of these plans and specifications. The specific drawings included as part of this technical specification are listed and indexed in Section 12, Drawings.

1.3.2 If the drawings specify a requirement different from the written specifications, the specifications must govern.

1.4 Locations of Structures and Appurtenances: Structures, anchors, ~~access roads~~, and other major items to be constructed must be placed in locations determined and staked by the engineer and as shown on the plan and profile drawings. The contractor is responsible for verifying the location of structures and appurtenances to be installed.

1.5 Safety

1.5.1 The work must be performed in accordance with all applicable Federal, State, and local safety laws and regulations. This includes but not limited to Federal and State OSHA (Occupational, Safety and Health Administration) regulations.

1.5.2 The contractor shall be responsible for the observance of proper safety practices and the avoidance of damage to property by all personnel engaged in the work.

1.5.3 The contractor shall take all steps necessary to prevent damage to or interference with existing power lines, communication facilities, roadways, railroads, waterways, buried cables, pipelines, and other facilities adjacent to or crossing the project right-of-way.

1.5.4 The contractor shall develop and maintain for the duration of this contract a safety program which will provide for compliance with applicable provisions of the National Electrical Safety Code and Federal, State, and local safety laws and regulations. The contractor shall designate a qualified employee to supervise the safety program and ensure compliance with applicable safety laws and regulations.

1.5.5 Structures and Conductors in the Vicinity of Airports or Exceeding 200 Feet in Height - In cases where structures or conductors will exceed a height of 200 feet, or are within 20,000 feet of an airport, the nearest regional or area office of the FAA must be contacted and if required, FAA Form 7460-1, "Notice of Proposed Construction or Alteration," is to be filed.

This will be completed by the Owner if necessary.

1.5.6 All temporary safety grounding installed during construction shall be removed by the contractor before the lines are ready for service.

1.6 **Definitions**

1.6.1 Borrower - an entity which borrows or seeks to borrow money from, or arranges financing with the assistance of the Agency through guarantees, lien accommodations or lien accommodations.

1.6.2 Construction unit means a specifically defined portion of a construction project containing materials, labor, or both for purposes of bidding and payment.

1.6.3 Contractor means a person or firm furnishing materials or performing construction at a specified price.

1.6.4 Engineer means a registered or licensed person who may be a staff employee or outside consultant who provides engineering services. Engineer also includes duly authorized assistants and representatives of the licensed person.

1.6.5 Owner means the borrower.

1.6.6 Owner-furnished materials means materials or equipment or both supplied by the borrower for installation by the contractor.

1.7 **Abbreviations**

ANSI	American National Standards Institute
CFR	Code of Federal Regulations
FAA	Federal Aviation Administration
IEEE	Institute of Electrical and Electronics Engineers
NESC	National Electrical Safety Code
OHGW	Overhead Ground Wire

1.8 **Special Requirements** (to be completed by the engineer):

2. CLEARING

2.1 General Requirements

2.1.1 Clearing units specified may cover full width right-of-way clearing, selective clearing, tree topping, spraying of herbicides, or other forms of right-of-way preparation. Only those areas shown on the drawings or specified by the engineer shall be cleared in accordance with the applicable clearing units. Isolated ("danger") trees to be removed will be marked in the field by the engineer.

2.1.2 Only such vegetation should only be removed as necessary to permit construction, operation, and maintenance of the transmission line. Care must be taken to prevent denuding of ground cover and erosion of the soil.

2.2 Clearing Methods and Equipment

2.2.1 Unless otherwise specified, all timber to be cleared must be felled. The removal of brush must meet State and/or Federal permit requirements and be in a manner so as to reduce the overall impact on the root structure of the ground cover.

2.2.2 Equipment must be in good repair and appropriate for the types of clearing specified.

2.2.3 When specified in the right-of-way construction units, stumps left in place must be treated with a heavy application of an appropriate herbicide approved by the engineer. Chemical treatment of stumps must occur as soon as possible after cutting. The chemical application must be sufficient to saturate the entire aboveground surface of the stump and cause a small amount to run down the sides and collect at the base to penetrate below the ground line into the roots. Any stumps showing resurgent growth prior to completion of line construction must be treated to kill all such growth.

2.2.4 Chemical sprays or herbicides must only be used with the approval of the engineer, and only in areas so designated for their use. Herbicides must be applied in accordance with the manufacturer's recommendations and only by a licensed/certified applicator. The chemical sprays and herbicides must meet the environmental requirements of all governing agencies. Spraying must be performed in such manner, at such pressure, and under such wind conditions that drift of spray material to adjacent plants, animals, or persons will be avoided.

Application of chemical sprays or herbicides must not be made:

- a) when the ground is continuously frozen;
- b) when the ground is adjacent to streams or other water bodies;
- c) when the ground is or may be flooded during the period in which the herbicide retains its toxicity; or
- d) when the ground is a marsh or other wetland.

2.2.5 If required by paragraph 2.3, "Special Requirements," stumps must be removed.

2.2.6 The landowner's written permission must be received prior to cutting trees outside the right-of-way.

2.2.7 Disposal of trees, brush, branches, and refuse must be in accordance with the methods specified in the construction units and must meet permit requirements.

2.2.8 Avoid clearing vegetation in riparian areas to the extent possible. A vegetative buffer zone should be left along creeks and streams to minimize siltation and sedimentation and prevent adverse impacts to riparian habitat.

2.3 Special Requirements (to be completed by the engineer):

3. ACCESS

3.1 Ingress and Egress

3.1.1 The activities of the contractor are to be restricted to the area along the right-of-way.

3.1.2 Where access to the right-of-way is across private property, the owner, tenant, or occupant shall be contacted to obtain permission for ingress and egress to the right-of-way. Such arrangements, including obtaining releases for damage, must be made by (engineer to check one):

- a. The borrower or owner..... ☐
- b. The contractor..... ☒ in conjunction with Owner.
- c. Other (specify) ☐

3.1.3 Access across public land must be accomplished as described in paragraph 3.6, "Special Requirements."

3.2 Fences and Gates

3.2.1 Where fences must be cut to allow access for the work, gates must be installed as shown on the drawings or as directed by the engineer. All material and labor required for such installations must be furnished by the contractor per bid unit.

3.2.2 Types and details of gate construction must be shown on the drawings or approved by the engineer.

3.2.3 Brace posts must be installed at each fence cut to ensure that adjacent fence spans will not become slack. A wire fence must not be cut until it is secured to the brace post.

3.2.4 All gates must be closed and locked when required by the landowner.

3.2.5 Gate units may include removal of the gate after construction of the line is complete. In those cases as determined by the engineer, the contractor shall remove the gate and restore the fence. All labor and material required must be furnished by the contractor. If removal is required, gate material must be disposed of in a manner acceptable to the engineer.

3.3 Access Roads

3.3.1 Access road construction may be required as a part of the work. Where specified, roads must be of the type, dimensions, and grades shown on the drawings, and must be located as shown on the drawings and as staked by the engineer.

3.3.2 Borrowed material for access road fill must be a compactible granular material suitable for such a purpose, free of brush, refuse, or organic material. Fill must be compacted by the use of suitable heavy construction equipment. The finished road must be maintained smooth and free of ruts and sink holes until completion of construction. Water bars, drainage ditches, or other special requirements as called for on the drawings must be installed in accordance with the plans and specifications. All materials and labor required for such work must be furnished by the contractor.

3.4 Culverts: Culvert pipes must be installed as shown on the drawings or as directed by the engineer. Each pipe must be of a type, diameter, and length as specified and must be properly set, backfilled, and tamped. All required labor and material must be provided by the contractor.

3.5 Restoration: The contractor shall have a continuous cleanup program throughout construction. The contractor shall restore the land that is crossed to its original condition. This restoration includes the removal of deep ruts and the disposal of foreign objects such as stumps or chunks of concrete. It also includes smoothing and reseeding damaged vegetation areas with vegetation similar to the original, cleaning out gullies, and restoring terraces. Roads existing prior to construction must be restored to equal or better than their original condition.

3.6 Special Requirements (to be completed by the engineer):

4. STEEL POLES

4.1 Reference to Drawings

4.1.1 The pole lengths and designations shall agree with the Pole Units specified for the structures to be erected as tabulated in the Transmission Construction Units and shown on the plan and profile drawings.

4.2 Pole Inspection, Handling, and Distribution

4.2.1 The contractor shall inspect all poles upon delivery and immediately notify the owner of freight damage discovered or misfabrication of poles.

4.2.2 Poles shall be handled according to the manufacturer's instructions. The contractor will obtain the instructions from the manufacturer. The handling and loading steel members shall be accomplished with care to prevent damage to the members and their finishes. Shaft sections shall be properly blocked and secured to minimize movement when transported by the contractor. Blocks and straps shall be properly padded to minimize abrasion of the shaft finish. Poles shall not be rolled or dragged on the ground without authorization from the engineer.

4.2.3 Poles or components damaged during handling by the contractor shall be replaced by the contractor at no expense to the owner. With the consent of the owner, minor repairs may be made under the direction of the manufacturer.

4.2.4 Spliced shaft segments will be properly identified so that the sections for each structure can be segregated upon arrival at their destination.

4.2.5 If poles are stored after delivery, they should be stored in a horizontal position with suitable cribbing on firm soil. Cribbing should be properly padded to minimize abrasion of the shaft finish. Stacking of steel poles is not allowed. Stored poles shall not be allowed to come in contact with standing water or the ground.

4.2.6 The contractor shall provide all cribbing and blocks for storing the poles.

4.2.7 Poles spotted along the right-of-way near future setting locations shall be located away from traveled ways, residential areas, off the ground, and secured to prevent movement.

4.3 Shaft Assembly

4.3.1 The sections should be blocked up so that they are reasonably level, taking care not to put a block in a splice area. The pole section should be so oriented that conductor arms, steps, etc., may be added later without having to rotate the structure.

4.3.2 Appropriate jacking devices should be used for pulling slip-jointed sections tightly together using methods and jacking force specified by the manufacturer. Force should be exerted on both sides of the joint simultaneously and the sections should be telescoped until the jacking force is obtained. With the full jacking force obtained, the overlap between sections shall be within the minimum and maximum range according to the manufacturer's specifications. Lubricants shall not be used on the pole unless authorized by the engineer. The engineer shall be consulted for any deviations that occur. The engineer may accept, reject, or specify a remedy.

4.4 Field Drilling

4.4.1 The engineer and manufacturer must be notified and their approval must be obtained for the drilling of any holes in a steel pole or component. In some applications, the interior of the tubular pole or component may be factory sealed and protected from corrosion. Drilling a hole would remove the seal and allow air or moisture into the unprotected tubular steel member.

4.4.2 Where holes are required and are approved by the engineer to be field drilled, the contractor shall carefully drill the holes using a bit 1/16 inch larger than the diameter of the bolt to be inserted. After drilling a hole, the steel shall be protected against corrosion. Galvanized steel poles shall utilize a zinc enriched coating approved by the engineer. Painted poles shall utilize touch-up paint provided by the manufacturer.

4.5 Special Requirements (to be completed by the engineer):

5. POLE TOP ASSEMBLIES

5.1 Reference to Drawings

5.1.1 The pole top assembly unit consists of all items shown in the list of materials on the transmission line structure drawings, ~~Part 2~~.

5.1.2 Unless shown in the list of materials on the drawings, the pole top assembly unit does not include other units such as pole units, pole grounding units, foundation units, guying assembly units and anchor units.

5.2 Handling of Materials

5.2.1 Care shall be exercised in the handling of all materials. Defective or damaged material shall not be installed.

5.2.2 The contractor shall furnish the necessary equipment to load and haul to the job site all owner-furnished materials. The contractor shall bear the cost of all handling; such as loading, hauling, and unloading.

5.2.3 If framing members (crossarms, bracing, and X-braces) are stored after delivery, they must be arranged with care and placed on blocking at least one (1) foot above ground to prevent contact with standing water or the ground. No crossarm shall have an unsupported length greater than 20 feet. The blocking shall be provided by the contractor and included in the contract's unit prices. Materials sensitive to weather damage shall be protected.

5.2.4 Care shall be exercised in handling crossarm assemblies, pole band assemblies, and other factory subassemblies to prevent loss of components for which the contractor is responsible.

5.2.5 Materials or equipment shall not be placed where it will be damaged by or cause damage to vehicular traffic, livestock, persons, and property.

5.3 Special Requirements (to be completed by the engineer):

6. STRUCTURE ASSEMBLY (Steel Poles)

6.1 Reference to Drawings

6.1.1 The contractor shall assemble each structure using the assemblies designated on the plan and profile drawings and as shown on the structure and assembly drawings ~~in Part 2~~.

6.1.2 Connection details to assemble each structure are referenced on the structure drawings and included with the plans and specifications.

6.2 Structure Framing

6.2.1 The contractor shall frame structures on flat or uniformly sloping terrain located at or near the structure site. A structure may be framed after the poles are set, if approved by the engineer. Framing on rolling terrain where poles become unsupported shall be avoided. If assembly on uniform terrain is not possible, the contractor shall temporarily support the pole and structure components with hardwood cribbing.

6.2.2 After the shaft sections are assembled, crossarms, hardware, climbing devices, insulators, etc., can be attached to the structure. The contractor shall take extra care to avoid damaging climbing devices during lifting or handling.

6.2.3 Bolts shall be properly tightened to prevent compressing the pole or components or overstressing the bolts. The method and torque used in tightening bolts shall be per the pole manufacturer's guidelines.

6.2.4 All hardware at a connection shall be compatible with the fastener diameter. The holes in the hardware shall be 1/16 of an inch greater than the fastener diameter, unless otherwise noted.

6.2.5 Fasteners shall be sized so that they extend not less than 1/2 of an inch or more than 2-1/2 inches beyond the face of the last nut or locknut. Bolts shall not be cut off unless approved by the engineer.

6.2.6 Pole ground wires shall be installed when specified and as shown on the plan-and-profile and/or structure drawings.

6.2.7 Guying attachments, where specified, shall be oriented as shown on the transmission line structure and guying attachment drawings ~~in Part 2~~.

6.2.8 The contractor shall check the end fittings of crossarms, davit arms, braces, X-braces, and other factory assembled components to verify that all factory-installed hardware is secured in accordance with manufacturer's specifications. The cost of retightening factory-installed hardware, if required, shall be included in the contractor's unit cost for pole top assemblies.

6.3 Special Requirements (to be completed by the engineer):

7. STRUCTURE ERECTION

7.1 Reference to Drawings

7.1.1 The contractor shall verify structure locations prior to erecting structures. Structures and specified assemblies must be erected at locations shown on the plan-and-profile drawings.

7.1.2 Tangent structures shall be erected as shown on the transmission line structure drawings in ~~Part 2~~. Single pole structures or center of H-frames shall be placed on the survey centerline, unless offset to the left or right of the survey centerline by the dimension shown on the guying guide drawings or plan-and-profile drawings.

7.1.3 Angle structures and deadend structures shall be erected as shown on the structure drawings, guying guide drawings, and plan-and-profile drawings. The angle structure shall be offset to the left or right of the survey centerline so all poles are offset by the dimension shown on the guying guide or plan-and-profile drawings.

7.2 Structure Erection

7.2.1 Tangent structures with single crossarms shall be erected with crossarms on alternating sides of the poles. At crossings and long spans, crossarms shall be mounted on the face of the structure away from the crossing or long span. Crossings include highways, railroads and any other overhead utility.

7.2.2 The contractor shall not overstress any members or connections when installing structures.

7.2.3 The contractor shall ensure hardware, bolts, nuts and locknuts shall be tightened after erection of the structure as specified by the engineer per manufacturer's specifications.

7.2.4 Lifting and erection of the steel structure shall be according to the manufacturer's instructions. Chokers must be tight around the pole and a positive stop against sliding shall be provided. Slings shall be composed of nylon unless approved by the engineer. Use of any other sling material shall be approved by the owner. Bare steel cables shall not be used as a string.

7.2.5 After the shaft sections are assembled, crossarms, hardware, climbing devices, insulators, etc., can be attached to the structure. The contractor shall take extra care to avoid damaging climbing devices during lifting or handling.

7.2.6 During structure erection, slings, ropes, banding, tie downs, or other material shall not be applied to, or allowed to lie on insulators and/or components. For non-ceramic insulators, the sheathing material over the fiberglass rod shall be inspected, and if any damage (i.e., cuts, scrapes or tears in the rubber material) is found to be caused by the contractor and that could allow moisture to penetrate to the fiberglass rod, the contractor shall replace the insulators at the contractor's expense. Non-ceramic insulators and other fiberglass components shall not be bent or twisted.

7.3 Excavation, Setting, and Backfill

7.3.1 All poles shall be embedded in soil to a minimum depth of 10 percent of the pole length ~~plus 2 feet or~~ to an embedment depth specified on drawings, ~~whichever is greater~~. Depth of the hole shall not be less than that specified nor more than 3 inches deeper. Where the ground is sloping, the embedded depth of multiple pole structures shall be as shown on the drawings.

7.3.2 Pole excavation shall be performed by auger, clamshell, or hand, and shall include removal of all materials necessary to provide a clean vertical hole to the required depth.

7.3.3 Blasting prior to excavating is only allowed with the engineer's and owner's approval; and only if an applicable permit is obtained. Care shall be exercised by the contractor when blasting in the vicinity of structures, utilities, etc., to prevent damage of any type. The contractor is responsible for any damage caused by blasting activity.

7.3.4 The stability of existing structures and facilities shall not be impaired or endangered by excavation work. Sheet piling and shoring shall be provided by the contractor as required to protect and maintain the stability of existing structures and facilities and the sides of excavations and trenches until they are backfilled. Sheet piling, bracing and shoring shall be designed and built to withstand all loads caused by earth movement or pressure, and shall maintain the shape of the excavation under all circumstances.

7.3.5 The contractor shall provide casing where required to maintain the stability of an excavated pole hole. Casing shall be designed and built to withstand all loads caused by earth movement or pressure and shall maintain the shape of the excavated pole hole under all circumstances. The casing shall be removed during backfill placement. Other methods to maintain stability of an excavated pole hole shall require prior approval of the engineer.

7.3.6 Poles shall be set and backfilled within 24 hours after excavation of the pole hole unless otherwise approved by the engineer. When poles are not immediately set and backfilled, the excavations shall be protected with a suitable barrier to prevent injury or damage to persons, equipment or livestock.

7.3.7 The contractor shall provide casing where required to maintain the stability of an excavated pole hole. Casing shall be designed and built to withstand all loads caused by earth movement or pressure and shall maintain the shape of the excavated pole hole under all circumstances. The casing shall be removed during backfill placement. Other methods to maintain stability of an excavated pole hole shall require prior approval of the owner.

7.3.8 Pole holes shall be a minimum of 8 inches larger in diameter than the butt diameter of the pole. When pole bearing plates are used, pole holes shall be the minimum diameter necessary for installation of the pole and the bearing plate. The excavated hole shall be at least as large at the bottom as at the top. Alternative methods of pole setting may be used only with the approval of the engineer.

7.3.9 After excavation of a stable pole hole, any accumulated water or frozen material shall be removed from the hole prior to setting the pole. Contractor shall provide suitable granular backfill material (~~see drawing TM-101 in Part 2~~) to level the bottom of a hole. Any soil added to level the bottom of a dry hole shall be compacted to a density greater than or equal to the density of the surrounding undisturbed soil before the pole is set.

7.3.10 Pole backfill material shall be approved by the engineer. The engineer's approval will be based on the compactibility of the native soil and its suitability for providing a dense supportive soil mass, free of voids, organic, or other deleterious material and, not frozen. Where excavated material is not suitable for backfill as required by the engineer, the contractor shall furnish suitable granular imported material for this purpose which shall be paid in accordance with the unit price for granular backfill for poles (~~See drawing TM-101, Part 2~~).

7.3.11 Poles shall be set plumb before and after the backfill is placed. If the poles are out of plumb, the backfill shall be removed and replaced. Plumbing of poles by pushing or pulling the

structure shall not be permitted. The tolerance for plumbness shall be 1/2 inch in 10 feet of height.

7.3.12 Structures, prior to backfilling, shall be aligned with the conductor support at right angles ($\pm 1^\circ$) to the centerline of the transmission line except at angle structures where the arm shall bisect the angle ($\pm 1^\circ$). Install crossarms level, except for raked structures, regardless of the terrain by varying the setting depths of the poles. The maximum deviation of the crossarm from the horizontal measured from end to end shall not exceed 1/2 inch for each 10 feet of arm length.

7.3.13 Backfill shall be placed around the pole in layers not exceeding 6 inches in depth, with each layer mechanically tamped before the next layer is added. The backfill shall be compacted to a density equal to or greater than that of the surrounding undisturbed soil.

7.3.14 Each pole shall be backfilled from bottom to top by one laborer shoveling fill and two others using mechanical or pneumatic tampers. If imported granular backfill (~~TM-101, Part 2~~) is used, two mechanical or pneumatic tampers or two vibrating rods may be used to compact the imported granular backfill.

7.3.15 Backfill soil shall be banked up and tamped around the pole to a height of 6 inches above the natural grade, and shall be sloped away from the pole.

7.3.16 The backfill shall not extend higher than the below-grade protective coating. In situations where this cannot be avoided, the pole shall be properly protected against corrosion prior to backfilling and according to the manufacturer's instructions.

7.3.17 Structures shall be grounded as soon as practical after they are erected.

7.3.18 After completion of wire stringing, all poles shall be reinspected to verify that poles remain plumb and the backfill has not settled. If settlement occurs, the engineer shall determine if backfill shall be added and tamped or if the backfill shall be completely removed and replaced. Added backfill shall be recompact as previously specified. If required by the engineer, the backfill is to be completely dug out and replaced, the pole shall be readjusted, if necessary, and the backfill compacted as previously specified. This work shall be done at no additional cost to owner.

7.3.19 All excess excavated material and unused imported materials shall be disposed of properly after backfill operations are completed. When approved by the engineer, surplus excavated soil may be carefully spread and leveled on the surface of the ground near the structure and in a manner to minimize damage to the surrounding environment.

7.4 Special Requirements (to be completed by the engineer):

Any casings or other temporary measures required to successfully excavate the hole and set the pole shall be the responsibility of the Contractor and included as part of the "BARRELING" pricing. Temporary anchoring of the pole may be required to prevent uplift forces due to ground water. There will be no additional compensation for these measures. Methods used shall be submitted to and approved by the Engineer.

Any labor or material required to install casings or remove water shall be included in the "BARRELING" construction units.

If casing removal is not possible, casings may be left in place with approval of the Engineer.

Casings that are left in place will require a concrete mix, approved by the Engineer, to be installed between the casing and the surrounding ground to fill all voids.

8. Guys and Anchors

8.1 Reference to Drawings

Guys and anchors shall be installed at locations shown on the drawing or specified by the engineer. The engineer will stake all anchor rod locations. The contractor shall check locations of anchors before installation.

8.2 General Installation Requirements

8.2.1 Anchor rods shall be installed in line with the guy wire and installed so that not more than 8 inches of rod (including eye) remain out of the ground after guy tension is applied. In cultivated fields or other locations deemed necessary, the projection of the anchor rod above earth may be increased to a maximum 12 inches to prevent burial of the rod eye.

8.2.2 Anchors shall be of the type, size, and depth as shown on the drawings.

8.2.3 Slope of the anchor rod shall be the same as the guy.

8.2.4 The engineer may require the use of other type anchors whose installation shall follow the manufacturer's recommendations if ground conditions make the installation of the anchors shown on the construction drawings impossible.

8.2.5 The engineer must approve in writing, the excavated hole and anchor before the anchor hole is backfilled. The holes shall be backfilled and tamped in the same manner as is required for steel pole backfilling. Onsite suitable native soil or approved imported granular material shall be used for anchor backfill.

8.2.6 Power installed screw anchors shall be installed with the appropriate size and type of equipment in accordance with the engineer's requirements and manufacturer's recommendations. Screw anchors shall not be reversed to meet the requirements of projection of the rods above the ground. ~~The engineer shall approve the final projection and witness all installations.~~

8.2.7 Where required by the engineer, anchors shall be tested to 50 percent of their designated ultimate rated capacity. All material and labor required for testing of the anchors shall be furnished by the contractor and included in the unit costs for testing anchors.

8.2.8 Guys shall be installed and attached to the structures as shown on the transmission line structure drawings before conductors or overhead ground wires are strung. Each guy shall be pre-tensioned to remove any slack in the guy. Guys will be re-tensioned after the conductors and overhead ground wires are installed to plumb the poles and to equalize tensions in the guys. If slack guys are found, they shall be re-adjusted so that all guys in any structure have approximately equal tension. The final tension in the guys and the plumb of the poles shall meet the approval of the engineer.

8.3 Special Requirements (to be completed by the engineer):

Anchors shall be tested in accordance with the anchor drawings. The cost for the testing shall be included as part of the anchor assembly.

9. GROUNDING AND BONDING

9.1 Reference to Drawings: All structures must be grounded as shown on the plan-and-profile drawings and transmission line structure drawings, and subject to the following provisions.

9.2 Structure Grounding

9.2.1 The engineer may require that ground resistance measurements be made for each structure and that additional grounding be added to that already provided by the basic structure grounding assemblies.

9.2.2 Where structure grounding tests are required by the engineer, the contractor shall measure the ground resistance of the external ground after the structure is erected, but before the ground rod is attached to the pole. The method of measuring ground resistance must be subject to the approval of the engineer. The contractor shall provide a written report and a sketch of the ground resistance tests at each structure.

9.2.3 All labor and materials for ground resistance measurements and installation of additional grounding must be provided by the contractor and must be covered by the unit costs for testing and for grounding units.

9.2.4 The contractor shall install counterpoise only after approval of the engineer.

9.2.5 Overhead ground wire and optical ground wire (OPGW) shall be bonded to the pole as required by the drawings. Steel poles shall be bonded to the ground rod or counterpoise as specified by the drawings.

9.3 Fence and Gate Grounding: Fence and gate grounds must be installed as shown on the drawings. All labor and material required must be furnished by the contractor at the unit prices for fence and gate grounding.

9.4 Special Requirements (to be completed by the engineer):

10. INSULATORS AND HARDWARE

10.1 Reference to Drawings: Insulator and hardware assemblies must be fully assembled and installed as shown on the drawings. Items of hardware and insulators must be inspected for missing parts, defects, and proper fit before installation. Defective or missing pieces must be replaced.

10.2 Handling and Storage for all Insulators

10.2.1 Insulators and hardware must be stored in their appropriate shipping containers until installation. They must be properly supported and stacked so as not to damage the individual items. They must be blocked up off the ground so that they cannot come in contact with the ground or standing water.

10.2.2 Insulators must be carefully handled to prevent damage to the porcelain skirts, pins, galvanizing, and cotter keys. A cradle or other suitable device must be used to hoist all insulator strings whenever the quantity exceeds 6 units per string.

10.2.3 Insulators that are cracked, chipped, or damaged in any way must be replaced with units that are not defective. The cost for replacement of previously accepted units must be borne by the contractor.

10.2.4 All insulators must be wiped clean with a clean, soft, nonabrasive cloth.

10.3 Additional Handling and Storage for Polymer Insulators

10.3.1 Handling practices for non-ceramic composite insulators are different from those used for ceramic insulators. A single cut, puncture, or tear in the polymeric housing material covering the fiberglass reinforced plastic (FRP) rod may expose the rod to moisture and eventually cause mechanical failure of the insulator. The contractor shall be careful not to cut, puncture or tear polymer insulators.

10.3.2 Polymer insulators shall be stored and transported to the job site in their original shipping containers. If the insulators are stored outside of their shipping containers, the polymers should never be lying down against the ground, walked on, stacked on top of each other, or transported hanging over the tailgate of a pickup truck. Composite insulators shall be stored in a manner to prevent damage by rodents.

10.3.3 Care should be taken when unpacking polymer insulators to ensure that the polymeric housing is not cut or punctured. Insulators should be inspected for damage after removal from shipping containers. Any damage found shall be reported to the engineer immediately.

10.3.4 Composite insulators shall not be lifted by their weathersheds. Long suspension insulators shall be carried by two workers and, if lifting with a rope or strap, attach it only to the insulator end fittings. Long suspension insulators should also be supported in the middle by workers to avoid bending since suspension insulators are generally not designed for bending or compressive loads.

10.3.5 Composite insulators should be stored and transported in their shipping cartons, or equivalent protection. If composite insulators are removed from their original shipping containers and then transported to the job site, extreme care should be taken at all times to avoid damaging the polymeric housing material. No sharp objects, materials, tools, or corona rings should be placed either on top, or situated below the insulators. Insulators should not be stacked

directly on one another (the end fitting of one may cut into the polymer housing or another).

10.3.6 Composite insulators should not be tied down with rope over the housing material during transport or transported on overhead racks of line crew trucks where bending of the insulator occurs.

10.4 Installation of All Insulators

10.4.1 All connections must be made in accordance with the drawings. Bolts must be torqued to the manufacturer's specifications. Cotter keys, where required, must be fully inserted.

10.4.2 Cotter key eyes on insulators and hardware items must be oriented toward the structure, or in such a way as to facilitate easy removal during hot line maintenance.

10.4.3 Pins and bolts to insulator string assemblies must be oriented with the head upright wherever possible.

10.4.4 Pin-type insulators must be tight on the pins. On tangent structures, the top groove must be in line with the conductor after tying in.

10.4.5 After installation, insulators should not be climbed on. Conductors should not be temporarily laid on the sheds or housing of composite or on the bells or posts of porcelain. Insulators should be kept clean of dirt and contaminants, specifically electrical contact compounds.

10.5 Additional Installation Requirements for Polymer Insulators

10.5.1 During installation, composite insulators should not be subjected to any loads that it would not normally see in service. Composite insulators shall not be subjected to any torque forces.

10.5.2 Insulators should not be lifted by their polymer sheds. Slings or pulling ropes should never be placed over the sheds or housing.

10.5.3 The insulator should be thoroughly inspected before and after installation. Damaged insulators should not be used and should be marked for inspection by qualified utility personnel.

10.5.4 Corona or grading rings shall be installed per manufacturer's recommendations.

10.6 Special Requirements (to be completed by the engineer):

11. CONDUCTORS AND OVERHEAD GROUND WIRES

11.1 General

11.1.1 All conductor and overhead ground wire installation work must be done in accordance with the manufacturer's recommendations and the IEEE Standard 524, Guide to the Installation of Overhead Transmission Line Conductors. If there is a discrepancy between the guide and the manufacturer's recommendation, the contractor should follow the manufacturer's recommendation. The following provisions are for tension stringing of conductors and overhead ground wires. IEEE Standard 524 may be obtained from the Institute of Electrical and Electronics Engineers, 445 Hoes Lane, P.O. Box 1331, Piscataway, N.J., 08855-1331, USA or at <http://shop.ieee.org/ieeestore/>

11.1.2 It is very important to avoid damaging the wire or the associated fittings in any way. It is the contractor's responsibility to protect the wire and fittings against damage. If the wire and associated materials are damaged due to the contractor's mishandling, negligence, or faulty equipment, the contractor shall repair or replace the damaged sections, including furnishing of necessary materials, in a manner satisfactory to the owner and at no additional cost to the owner.

11.2 Handling and Storage

11.2.1 Reels of wire must be stored off the ground and adequately supported so as to avoid damage to the reel, protective covering, and wire. Wire and reels must be kept free of standing water, excessive dust, and mud, and stored no closer than 50 feet from an energized portion of a substation or transmission line. The conductor must be covered.

11.2.2 Protective covering must be removed at the job site and the outside layer of each reel must be examined by the contractor and the engineer to be sure that the wire is in good condition and that no nails, staples, or other sharp objects, which could damage the wire during unreeling, protrude on the inside of the reel heads.

11.2.3 Identification tags and markers must be retained on the reels. For future reference, the contractor shall record ~~on forms supplied by the engineer~~, the reel number, length of wire, net weight, and the structure numbers where the wire was installed.

11.2.4 Conductor reels should not be rolled. They should be lifted or transported by a reel dolly. If they do need to be rolled to a location where they can be easily handled, they should be rolled in the direction that would tend to tighten rather than loosen the conductor on the reel.

11.3 Tools and Equipment

11.3.1 Tools and equipment for wire work must be of the proper size and type for the job and must be in good working condition. Sheaves, tensioners, pullers, wire grips compressors, and dies must be properly sized for the specific wires to be installed.

11.3.2 Stringing blocks must be neoprene lined, free running, and of the proper diameter and groove size for the wire being pulled.

11.3.3 Tensioner bullwheels must be neoprene lined and of the proper size and design for the wire being pulled.

11.3.4 V-Groove pullers shall not be used for annealed aluminum conductors including but not limited to ACSS (Aluminum Conductor Steel Supported) and ACSS/TW (Trapezoidal Shaped Strand Concentric - Lay Stranded Aluminum Conductors, Steel Supported) wire.

11.4 Guard Structures

11.4.1 Guard structures must be furnished and installed by the contractor, where required, to prevent the conductor or overhead ground wires which are being pulled from coming into contact with existing overhead electric supply lines, communication lines, roads, highways, and railroads crossed by the transmission line. All labor and materials required must be furnished by the contractor and included in the unit cost for conductor units.

11.4.2 If not part of the right-of-way agreement previously executed, permission to install guard structures on private property or public highway right-of-way must be obtained by (engineer to check one):

	<u>Private</u>	<u>Public</u>
a. The borrower or engineer	☐	☐
b. The contractor	☒	☒

11.4.3 After completion of all wire work, the contractor shall remove the guard structures, fill and tamp all pole holes, and restore the right-of-way and access to its original condition.

11.5 Stringing

11.5.1 The method of installing the conductor and the overhead ground wire must be as designated by the engineer. When controlled tension stringing is specified, it must be performed in accordance with IEEE Standard 524, Guide to the Installation of Overhead Transmission Line Conductors, and subject to the manufacturer's concurrence (engineer to check one for each):

Conductor Installation

a. Controlled Tension Stringing ☒
b. Other (specify)..... ☐

Overhead Ground Wire Installation

a. Controlled Tension Stringing ☒
b. Other (specify) ☐

11.5.2 The precise stringing procedure which the contractor intends to use must be submitted to the engineer for review and approval prior to any wire work. This procedure must include a description of all major pieces of equipment to be used, number of crews, composition and responsibilities of each crew, proposed equipment set up locations, wire reel locations, locations of all splices, and locations and descriptions of temporary snubs and anchors.

11.5.3 Extreme care must be exercised during the wire stringing operation to avoid damage to conductor or overhead ground wire strands. If damage is found, the stringing must be stopped. Damage is defined as any deformity of the wire which can be detected by sight or touch. Kinked, twisted, abraded, "bird-caged," or flattened wire will not be allowed to remain on the line. Any wire so damaged must be repaired or replaced by the contractor at his own expense and to the satisfaction of the engineer.

11.5.4 The contractor shall continuously inspect the wire as it leaves the reels. If the wire has an accumulation of dirt, oil, grease, or any other foreign substance, such substance must be removed as the wire leaves the reels during the stringing operation by a method approved by the engineer.

11.5.5 Wire tension during stringing must be high enough to ensure that the wire does not drag across the ground, underbrush, trees, towers, fences, guard structures, or any other surface other than the stringing sheaves. A stringing tension of not less than 50 percent nor more than 80 percent of the initial sagging tension should be used.

11.5.6 No more than two reels of wire per phase may be pulled at a time. Full tension compression splices must not be pulled through the stringing blocks.

11.5.7 When stringing wire on H-frame structures, the center phase must always be pulled first. The outside phases must be pulled alternately in successive pulls. If all three phases are strung in one pull, the middle phase must lead the outer phases by not less than 100 feet.

11.5.8 Wire must not be pulled during adverse weather conditions or when such conditions are imminent as determined by the engineer.

11.5.9 The air temperature at the time and place of stringing must be determined by a certified thermometer.

11.5.10 For conductor wires with more than one layer of annealed aluminum strands (i.e. – ACSS, Aluminum Conductor Steel Supported), the contractor shall use a minimum of two grips per wire.

11.6 Sagging

11.6.1 Wires must be sagged to the proper tensions in accordance with the initial stringing sag and tension tables provided by the engineer. Sags will be checked by sighting with target and transit as indicated in the IEEE Standard 524. Sags must be within a tolerance of +3 and -0 inches of the specified values. When approved by the engineer, sags may be checked by the return wave method.

11.6.2 The air temperature at the time and place of clipping in must be determined using a certified thermometer. The temperatures at which the conductor is sagged in and the spans in which sags are measured must be recorded, and the information given to the engineer.

11.6.3 In hilly or mountainous terrain, the offset clipping method may be required in order to ensure equalized tensions and plumbing of insulators on suspension structures. Calculations for offset clipping/sag corrections must be done and values for sagging must be furnished by the engineer. The contractor shall furnish all stringing set up information to the engineer at least 6 weeks prior to the sagging operations. The contractor shall keep a record of sag data.

11.6.4 The contractor shall select the length of each sag and the sag-checking spans, subject to the review and approval of the engineer. The contractor's sagging method must result in uniform tensions throughout the sag and the allowable sag tolerances must not be exceeded.

11.6.5 The contractor shall budget the stringing time so that a reel of wire is sagged within 72 hours after the start of the stringing operation. If this is not possible in isolated areas, the engineer shall be consulted regarding the necessity of using creep correction factors with the specified chart sags.

11.6.6 The contractor shall make any necessary adjustments in the wires or clamps at any time during the construction period to ensure that the wire is at the proper tension, sags are within tolerance, suspension insulator strings and overhead ground wire assemblies hang plumb.

11.7 Clipping, Deadending, and Splicing

11.7.1 The contractor shall take into consideration the strength limitations of all structures in so far as the application of temporary wire stringing loads. All temporary back snubs and pull-downs on structures other than strain structures must be carefully planned and must meet the approval of the engineer.

11.7.2 Use of wire reels must be carefully planned to minimize the number of full tension splices. There must never be more than one compression fitting per wire in any span and splices must not be located within 25 feet of a conductor support. Splices must not be located in spans over roads, railroads, and utility crossings, or in the spans adjacent to the crossing span. Splices must also not be located in the span where the conductor is to be deadended.

11.7.3 Compression deadends and splices must be installed in accordance with the manufacturer's recommendations. Conductor strands within the splice area must be carefully cleaned with a steel brush, cotton rags, and solvents. Filler compound must be furnished and pressure installed by the contractor. Special care must be exercised in making compression fittings to ensure use of proper die size, accurate cutting of wire, complete insertion of the cable strands, and pressing to produce a straight, uniform fitting. The contractor shall make up one splice and deadend to use as a sample in order to determine how much wire needs to be cut back.

11.7.4 After completion of pressing operations, the contractor shall clean the wire and fittings of excess grease and compound. All burrs and die flash marks must be removed with emery cloth.

11.7.5 U-bolts on suspension clamps and strain deadend clamps must be evenly torqued to the manufacturer's recommended values. Keeper plates must be in place and properly seated. Conductor strands within the area of the fitting must be clean. The recommended cleaning method is to use a steel brush, cotton rags, and solvents.

11.7.6 Wires must be clipped into suspension clamps within not less than 12 hours and not more than 72 hours after the start of each individual wire pulling operation. Cables must be lifted from the sheaves using standard suspension clamps or plate hooks 8 inches or larger to provide adequate support for the cables without damaging individual strands or kinking the wire.

11.7.7 With pin-type insulators, the conductors must be tied in the top groove of the insulator on tangent poles and on the side of the insulator away from the strain at angles. Factory formed ties must be installed in accordance with the manufacturer's recommendations.

11.7.8 Following completion of clipping or deadending wire, contractor shall install dampers according to manufacturers and/or engineers drawings and instructions.

11.8 Jumper

11.8.1 Jumpers must be installed as shown on the drawings. Compression jumper terminals must be used with compression deadends ~~and compression jumper connectors must be used with strain clamps.~~ The cost of installation of these items must be included with the bid units for installing conductors. All jumpers must be installed in accordance with the manufacturer's recommendations.

11.8.2 Jumper wire loops must be of sufficient length to present a smooth, uniformly curving appearance, and which do not put the jumper string of insulators in compression. Excess length of conductor from the wire stringing operation may be used to make up the jumper loops.

11.9 Temporary Grounds

11.9.1 During the wire work, the contractor shall take all necessary steps to ensure proper temporary grounding of the structures, cables, and equipment. All applicable Federal, State, and local safety regulations must be strictly followed.

11.9.2 A record of all temporary conductor grounds must be kept to ensure that they are all removed and the line can be safely energized at the end of the construction period.

11.10 Reels and Excess Conductor

11.10.1 When wire is furnished by the borrower, the contractor shall be responsible for salvaging the wire reels and all excess conductor and overhead ground wire. All such wire must be inventoried, placed on reels, and returned to the borrower or disposed of as directed by the engineer.

11.10.2 Returnable reels must be shipped back to the wire fabricators in accordance with the Owner's engineer's instruction. Nonreturnable wood reels must be disposed of in a manner meeting the approval of the engineer.

11.10.3 All costs associated with the receiving, handling, shipping, or disposal of excess wire and reels must be in the labor costs for installation of wire units.

11.11 Special Conditions (to be completed by the engineer):

Any hardware used to bond two conductors, such as u-bolt clamps, terminal pads, PG clamps, etc., must have joint compound installed per the manufacturer's recommendation. Joint compound shall be supplied by the Contractor and be of type recommended by the hardware manufacture for the connector used. The cost for the labor and material associated with installing the compound shall be included as part of the assembly unit in which the connector is specified.

12. DRAWINGS

12.1 Index of Drawings: The following drawings are part of the technical specification (engineer to complete):

HWY MM 161KV TRANSMISSION MODIFICATIONS

Missouri Department of Transportation
Jefferson City, MO

General Construction Specifications

A. Work Methods & Safety

The Contractor shall be solely responsible for Contractor's work methods and work procedures in constructing and installing the assembly units described herein. All work shall be completed in a professional manner by skilled craftsmen and personnel in the appropriate trade.

CAUTION IS TO BE OBSERVED AND PROPER SAFETY PRECAUTIONS ARE TO BE TAKEN WHEN WORKING AROUND ANY ENERGIZED CONDUCTORS AND EQUIPMENT. ENERGIZED CONDUCTORS AND EQUIPMENT ON SITE ARE TO BE CONSIDERED HAZARDOUS.

The Contractor shall be solely responsible for the safety of the Contractor's crews, the general public, and others for all work related to the construction of this project by the Contractor. Neither the Owner nor the Engineer assumes responsibility for the work methods or procedures of the Contractor.

The Contractor shall be solely responsible to abide by all Federal, State, and local laws and regulations. The Contractor shall be solely responsible for obtaining any necessary permits.

B. General Conditions

Allocation of Costs:

Each Assembly Unit represents the completed scope of work required to complete that Unit's portion of the entire project as specified in the specifications and on the drawings.

The total cost of the project shall be distributed between the Assemblies listed on the Itemized Proposal found behind Tab 1 of the contract. All Assembly Units are designated by Assembly Unit Numbers as shown on the Itemized Proposal. The Itemized Proposal sheet shall be completed in its entirety and shall contain all unit prices including labor, material and bonding costs for each Assembly Unit listed on the Itemized Proposal. Payment will be based on unit prices as defined in the Bid Documents, RUS Form 830, as amended.

The Contractor's proposal for any Assembly Unit shall include all costs of the Contractor to complete the Assembly Unit as part of the foundations. This shall include the cost of all material and labor, all overhead items of Contractor including margins, plus the Contractor's cost for supplying and using equipment, machinery, and other items, including but not limited to testing, that may be needed to complete the Assembly Unit in accordance with the specifications.

The cost to use an appropriate slurry or steel casing to prevent hole "erosion" will be the responsibility of the Contractor.

Cost of fuel used by the Contractor for vehicles, equipment, and machinery shall also be included in the Contractor's Assembly Unit price. No additional allowances will be permitted to the Contractor for the Assembly Units bid herein by the Contractor. (This does not cover items covered in amended quantities per Bid Documents, RUS Form 830.)

The work scope for any given Assembly Unit shall be deemed to include installation of the proper materials and inclusion of provision therefore in the prices of that Assembly Unit. As such, the omission of any minor part from the discussion of the scope of work defined for a given Assembly Unit shall not provide the Contractor any grounds for claiming recovery of costs related to said part.

The Assemblies outlined on the drawings and in the specifications are meant to cover the completed scope of work required to complete the project. However, the presence of Assemblies covering all categories of work or materials required to complete the project are not guaranteed.

If the Contractor believes there to be any significant category of work including labor or materials required to complete the job, which is not covered by an Assembly in the scope of the specifications provided herein then the Contractor shall notify the Engineer immediately.

If the Contractor believes there to be an ambiguity in the specifications or drawings, it is the Contractor's responsibility to disclose any and all such ambiguities as well as the Contractor's corresponding assumptions as part of the initial bid. If the Contractor perceives ambiguity that leaves room for the Contractor to choose from multiple options, the Contractor shall base its bid price on the more conservative option and state what option was selected. As such, any further clarifications by the Engineer regarding such ambiguity should only serve to reduce the cost; no additional allowance for said ambiguity will be given.

Accuracy of Drawings & Specifications:

Notes, figures, and writings on the drawings must be strictly followed since they constitute an integral part of the drawings and specifications. The specifications and drawings are presumably correct. However, complete accuracy of specifications and drawings is not guaranteed. Material counts have been provided as a convenience. Absolute accuracy of material counts is NOT guaranteed. It is solely the Contractor's responsibility to verify material quantities required and to supply sufficient materials to construct the project as described herein and shown on the drawings. No allowances will be given for additional material unless the project scope is changed after bidding.

Any errors or discrepancies discovered during the course of construction shall be immediately reported to the Engineer with no further work completed on said items until the proper method for correcting the discrepancy is determined by the Engineer. In the event of a question arising as to the true intent and meaning of the Plans and Specifications, the Engineer's interpretation shall be final and conclusive.

Preconstruction Meeting:

After acceptance of the Contractor's proposal by the Owner, but before any work begins, a preconstruction meeting shall be conducted. This meeting shall include at a minimum the Contractor's Project Manager and Project Supervisor/Foreman, the Owner's representative, and a representative of the Owner's Engineer.

At the meeting general guidelines and procedure will be reviewed. The preconstruction meeting shall not be considered as a substitute for the requirements of the contract documents, specifications, and drawings.

Damage to Materials, Equipment, or Work Accomplished:

The Contractor shall exercise care around work and equipment completed or installed by others as well as all existing equipment and fixtures. Any damage to work accomplished by others or material installed by others or existing equipment and fixtures during Contractor's course of construction shall be the Contractor's responsibility. All costs including but not limited to taxes, shipping, other fees related to repair or replacement of said items shall be borne by the Contractor. The Owner shall have sole authority to determine whether damaged equipment will be repaired or replaced. If repaired, then repair methods shall first be approved by the Owner. If replaced, item shall be of the exact make and model as the original unless otherwise directed by the Owner.

The Contractor shall be responsible for locating any and all buried pipes, water, and communication lines that will conflict with construction. Any damages caused to any underground or overhead lines, pipes, wires, cables, or circuits shall be the responsibility of the Contractor.

C. Materials**General:**

Required material as designated in the specification or on the drawings shall be provided by the Contractor unless designated as "Owner Furnished." Materials listed as Owner Furnished herein will be supplied by the Owner.

All equipment shall be installed in accordance with the manufacturer's recommendations, these specifications, and supplemental instructions which may be issued by the Owner. In the case of a discrepancy between the Manufacturer's instructions and these specifications or supplemental instructions, discrepancies shall be immediately reported to the Owner's representative with no further work completed on said items until the proper method for correcting the discrepancy is determined by the Owner and Owner's representative.

The drawings and specifications listed herein and attached hereto, collectively, show the specifications of the material and equipment shown thereon. The drawings and specifications in the attached List of Drawings are made a part of these contract documents.

Owner Furnished Material (OFM): (Anchor Bolt Cages)

Article I, Section 3 of the modified RUS Form 830 in this Contract details contractual arrangements for "Owner Furnished Materials" and Exhibit C of this Contract details the materials to be furnished by the Owner. The work to be accomplished under the applicable Assembly Units includes acceptance and handling of the "Owner Furnished Materials."

Owner Furnished Material will be provided as specified on drawings and in the contract documents. OFM will be available at the Owner's Facilities or will be delivered to the job site by the materials supplier.

Delivery of OFM:

OFM Delivered to Owner's Facilities:

All materials ordered by the Owner and delivered to the Owner's Facilities will be accepted, unloaded, and stored by the Owner. The Contractor shall request permission to receive such materials and upon permission by the Owner to receive, shall furnish the necessary carrier to haul. The Contractor shall furnish the necessary labor and equipment to load and secure the cargo; however, the Owner will provide assistance with loading equipment if deemed appropriate by the Owner and such request is made with the request to receive. A materials receipt, in a format set forth by the Owner, shall be signed by the Contractor's personnel for all items received.

OFM Delivered to Job Site:

All materials ordered by the Owner and delivered to the site shall be inspected, accepted, and received, including being inventoried with quantities checked against required quantities listed on the drawings and in the specifications by the Contractor. The Contractor shall be responsible to determine if the correct quantities of materials were delivered and promptly notify the Owner if they were not.

All such shipments will be prepaid under contractual arrangements between the Owner and the applicable Supplier. The Contractor shall provide all labor, materials, and equipment to inspect, accept delivery of, and unload the materials. The Contractor shall sign all freight bills and shall deliver one copy of each bill to the Owner's material clerk.

The Contractor shall be fully responsible for all materials accepted under terms of the contract documents.

The Contractor shall immediately notify the Owner of any materials received in a damaged condition and shall not accept such damaged materials until a complete listing of damage is made and agreed on by the carrier and the Owner or the Owner's representative.

The Contractor shall be responsible for cleanup of all debris and site restoration after each shipment is received.

Damage to OFM:

Any damage to OFM, including but not limited to damage that may occur during the process of loading, transporting, and unloading will be repaired or replaced by the Contractor. All costs including but not limited to taxes, shipping, and other fees related to repair or replacement of said items shall be borne by the Contractor. The Owner will have sole authority to determine whether damaged material will be repaired or replaced. If repaired, then repair methods shall be first approved by the Owner. If replaced, item shall be of the exact make and model as the original unless otherwise directed by the Owner.

Estimated Delivery Dates for Major Equipment:

TBD.

D. Introduction

This project consists of concrete piers and will need to be installed for a three-pole deadend galvanized str located on the east side of the highway, all located in Greene County, Missouri. These foundations are designed to support steel monopoles for rebuilding a 161kV transmission line.

Applicable voltages present on site and near the site include:

Transmission Voltage	<u>161kV</u>	Distribution Voltage	<u>12.5 kV</u>
Station Service (Secondary)	<u>N/A</u>	Station Service Primary	<u>N/A</u>

The Contractor shall perform all work pursuant to contract documents as specified herein and on the drawings.

E. General Scope

The general scope of work will be to drill the 3 required pier holes and remove the spoils from the site, install Contractor provided re-bar and concrete, provide casing or slurry during drilling and pouring, and install owner furnished anchor-bolt cages.

The Contractor shall perform all required work to complete the job, except work designated to be completed by others pursuant to the drawings and specifications provided.

Work to be Completed by Others:

During part of the time that Contractor is on site, the Owner and others may be on site to accomplish work. All parties shall coordinate with the Owner and each other to ensure work is completed pursuant to the specifications and in a safe manner. Work that will be accomplished by others at the same time that Contractor is on site will be as follows:

- None

Overview of Work to be Completed by Contractor:

The following is an overview of items to be completed by the Contractor. The list is general and not intended as a complete list. Detailed specifications and contract requirements providing information beyond the general list are included elsewhere herein and on the drawings. Work is to be in conformance with RUS (Rural Utilities Service) standards, and standards and requirements of the National Electrical Safety Code (NESC), the National Electrical Code (NEC) and other applicable entities. All work described in this section and elsewhere in the specifications and on the drawings shall be completed by the Contractor.

F. Detailed Scope of Assemblies

Install rebar, anchor bolts, concrete

Unit of Measure: Lot

OFM: Yes X No (anchor bolts only)

All materials not furnished by the Owner but included on the drawings and on the material lists and as included in these specifications shall be furnished by the Contractor.

Contractor shall be responsible for removing any trash or debris as well as repairing any damage to the subgrade or other areas of the site that may have occurred during construction of this Assembly.

Scope:

The foundation unit will include all labor and material (anchor bolts are owner-furnished) to install rebar, anchor bolts, and concrete as specified in **TA Assembly 5.1: Drilled Piers** and **Sheet MMR.T07.02**, herein. The foundation unit includes Two (3) caissons. If the Contractor is not also drilling the holes, then the Contractor will be required to coordinate its schedule with the drilling contractor. Line outages will need to be coordinated with SWPA well in advance of construction and coordination with MoDOT will need to occur to account for traffic control

ASSEMBLY 5.1 - DRILLED CONCRETE PIERS AND SHAFTS SPECIFICATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Dry-installed drilled piers.
 - 2. Slurry displacement-installed drilled piers.
 - 3. Dry-installed or slurry displacement-installed drilled piers at Contractor's choice.
- B. Contractor shall furnish all services, materials, products, accessories, tools, equipment, transportation, labor, and supervision required for installed drilled concrete piers including defining concrete mix requirements, installing reinforcement steel, installing anchor bolts, concrete placement, concrete finishing, concrete curing, casing, and dewatering.
- C. All work shall be done in a neat and workmanlike manner. Special care shall be taken to ensure that all piers are installed in the correct locations, in the correct position, and with the correct orientation.
- D. If a conflict occurs between this specification and the drawings, the more stringent requirement shall govern.

1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site at least 10 working days prior to the Contractor beginning any pier construction work.
 - 1. Review methods and procedures related to drilled piers including, but not limited to the following:
 - a. Review geotechnical report and any additional investigative boring information.
 - b. Discuss existing utilities and subsurface conditions.
 - c. Review coordination with temporary controls and protections.
 - d. Review of drilled pier installation and concrete placement plan.
 - e. If slurry is used to construct the piers, the frequency of scheduled site visits to the project site by the slurry manufacturer's representative will be discussed.
 - 2. Those attending the meeting shall include:
 - a. The superintendent, on site supervisors, and other key personnel identified by the Contractor as being in charge of excavating the pier, placing the casing and slurry as applicable, placing the steel reinforcing bars, and placing concrete.

- b. The project engineer, key inspection personnel, and appropriate representatives of the Owner.
- B. If the Contractors key personnel change, or if the Contractor proposes a significant revision of the approved drilled pier installation and concrete placement plan, an additional meeting may be held at the request of the Engineer before any additional pier construction operations are performed.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. As part of the bid/proposal Contractor shall submit a project reference list to the Engineer for review, verifying the successful completion by the Contractor of at least 3 separate past projects within the last 3 years with drilled piers of similar size (diameter and depth) and difficulty to those shown on the plans, and with similar subsurface geotechnical conditions. References shall include a brief description and current owner contact information.
- C. Design Mixtures: For each concrete mixture. Submit alternative design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.
 - 1. Include cylinder test history report, for each batch plant. Mix Designs shall be submitted for review at least 15 days prior to the placement of concrete of that mix design. The mix design shall include aggregate gradations, admixtures, aggregate reactivity, and certified reports of material tests on which the design is based.
- D. Shop Drawings: For concrete reinforcement, detailing fabricating, bending, supporting, and placing.
- E. At least four weeks prior to the start of drilled pier construction the Contractor shall submit a drilled pier installation and concrete placement plan including techniques proposed to install the drilled pier foundations and proposed personnel to the Engineer for review. At a minimum the plan shall describe the following:
 - 1. Description of the overall construction operation sequence and the sequence of drilled pier construction when in groups or lines.
 - 2. Equipment to be used and detailed plan for accessing the project site. Include list, description and capacities of proposed equipment, including but not limited to cranes, drills, bailing buckets, final cleaning equipment and drilling unit. As appropriate the narrative shall describe why the equipment was selected and describe equipment suitability to the anticipated site and subsurface conditions.
 - 3. List identifying the on-site supervisors and drill rig operators assigned to the project. The list shall contain a detailed summary of each individuals experience in drilled pier construction operations, and placement of assembled reinforcing cages, anchor bolts, and concrete in drilled piers. On-site supervisors shall have a minimum of two years' experience in supervising construction of drilled pier foundations of similar size (diameter and depth) and difficulty to those shown in the plans, and similar geotechnical conditions to those described in the geotechnical report. Project management level positions indirectly supervising on-site drilled pier operations will not be acceptable for

this experience requirement. Drill rig operators shall have a minimum two years' experience.

4. Proposed means and methods of stormwater pollution prevention and/or erosion and sediment control, and any permits that will be obtained by the contractor based on the contractors anticipated disturbance area. Include detailed procedures to prevent loss of slurry or concrete into waterways, sewers and other areas to be protected.
5. Details of drilled pier excavation methods, including proposed drilling methods, methods for cleanout of the bottom of the excavation hole, and a disposal plan for the excavated material and drilling slurry. If appropriate this shall include review of method suitability to the anticipated site and subsurface geotechnical conditions including boulders and obstruction removal techniques if such are indicated in the Contract subsurface geotechnical information or Contract Documents.
6. Details of methods to be used to ensure drilled pier hole stability (i.e., prevention of caving, bottom heave, "quick" soil conditions etc. using temporary casing, slurry or other means) during excavation and concrete placement. The details shall include a review of method suitability to the anticipated site and subsurface geotechnical conditions.
7. Methods to address soil or water movement, sidewall stability, loss of ground, and means of control.
8. Dewatering plan.
9. Detailed procedures for mixing, using, maintaining, and disposing of drilling slurry. A detailed mix design and a discussion of its suitability to the anticipated subsurface geotechnical conditions shall also be provided for the proposed slurry.
10. The submittal shall include a detailed plan for quality control of the selected slurry, including tests to be performed, test methods to be used, and minimum and/or maximum property requirements which must be met to ensure that the slurry functions as intended, considering the anticipated subsurface conditions and pier construction methods, in accordance with the slurry manufacturers recommendations. The detailed testing plan shall at a minimum meet the requirements of ACI 336.1 and FHWA GEC 10.
11. Details of concrete placement, including time schedule, proposed equipment and procedures for delivering concrete to the drilled pier, placement of concrete into the pier, operational procedures for pumping, and a sample uniform yield form to be used by the contractor for plotting the volume of concrete placed versus the depth of pier for all pier concrete placement.
12. Procedures for tremie methods used, including initial placement and raising of the tremie or pump line during placement, and size of tremie and pump lines.
13. Details of procedures to prevent loss of slurry or concrete into waterways, sewers, and other areas to be protected.
14. If tremie work is proposed, the work shall comply with ACI 304. Submit tremie plan at least 15 days prior to placing any concrete.
15. Method of consolidation.
16. Where temporary casing is used, details of the method to extract the temporary casing and maintaining pier reinforcement in proper alignment and location and maintaining the concrete slump to keep concrete workable during casing extraction.
17. Details and procedures for protecting existing structures, utilities, roadways and other facilities during drilled pier installation.
18. Curing procedures.
19. Hot/cold weather concrete installation procedures in accordance with ACI 305R and ACI 306.1.
20. The Engineer will review the drilled pier installation and concrete placement plan. At the option of the Owner, a meeting may be scheduled following review of the Contractors

initial submittal of the plan. Those attending the plan submittal meeting shall include the following:

- a. The superintendent, on-site supervisors, and other contractor personnel involved in the preparation and execution of the plan.
 - b. The project engineer and other personnel involved with the structural, geotechnical, and construction review of the piers.
21. The contractor shall submit any significant updates or modifications to the drilled pier installation and concrete placement plan whenever such updates or modifications are proposed to the Engineer.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer, land surveyor, and testing agency.
- B. Welding certificates.
- C. Material Certificates: From manufacturer, for the following:
 1. Cementitious materials.
 2. Admixtures.
 3. Steel reinforcement and accessories.
- D. Material Test Reports: For each material below, by a qualified testing agency:
 1. Aggregates: Include service record data indicating absence of deleterious expansion of concrete due to alkali aggregate reactivity.
- E. Field quality-control reports.

1.6 CLOSEOUT SUBMITTALS

- A. Record As-Built drawings.

1.7 QUALITY ASSURANCE

- A. Installer Qualifications: An experienced installer that has specialized in drilled-pier work, with a past record of performance that includes at a minimum 10 years of service and successful completion of at least 5 projects with similar soil conditions, pier sizes, depths, and volumes of work contained in this project.
- B. Testing Agency Qualifications: Qualified according to ASTM C 1077, ASTM D 3740, and ASTM E 329 for testing indicated.
- C. Drilled-Pier Standard: Comply with provisions in ACI 336.1, "Reference Specifications for the Construction of Drilled Piers," unless modified in this Section.
- D. Record and maintain information pertinent to each drilled pier and cooperate with the independent testing and inspecting agency to provide data for required reports.

E. Welding Qualifications: Qualify procedures and personnel according to the following:

1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."
2. AWS D1.4/D1.4M, "Structural Welding Code - Reinforcing Steel."

1.8 FIELD CONDITIONS

A. Existing Utilities: Locate existing underground utilities before excavating drilled piers. If utilities are to remain in place, provide protection from damage during drilled-pier operations.

1. Should uncharted or incorrectly charted piping or other utilities be encountered during excavation, adapt drilling procedure if necessary to prevent damage to utilities. Cooperate with Owner and utility companies in keeping services and facilities in operation without interruption. Repair damaged utilities to satisfaction of utility owner.

B. Interruption of Existing Utilities: Do not interrupt any utility to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary utility according to requirements indicated:

1. Notify Owner no fewer than two days in advance of proposed interruption of utility.
2. Do not proceed with interruption of utility without Owner's written permission.

C. Project-Site Information: A geotechnical report has been prepared for this Project and is available for information only. The opinions expressed in this report are those of geotechnical engineer and represent interpretations of subsoil conditions, tests, and results of analyses conducted by geotechnical engineer. Owner is not responsible for interpretations or conclusions drawn from this data.

1. Make additional test borings and conduct other exploratory operations necessary for drilled piers.
2. The geotechnical report is included elsewhere in the Project Manual.

D. Survey Work: Engage a qualified land surveyor or professional engineer to perform surveys, layouts, and measurements for drilled piers. Before excavating, lay out each drilled pier to lines and levels required. Record actual measurements of each drilled pier's location, shaft diameter, bottom and top elevations, deviations from specified tolerances, and other specified data.

1. Record and maintain information pertinent to each drilled pier and indicate on record Drawings. Cooperate with Owner's testing and inspecting agency to provide data for required reports.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Drilled-Pier Standard: Comply with ACI 336.1 except as modified in this Section.

2.2 STEEL REINFORCEMENT

- A. Reinforcing Bars: ASTM A 615/A 615M, Grade 60, deformed.

2.3 CONCRETE MATERIALS

- A. Cementitious Material: Use the following cementitious materials, of same type, brand, and source, throughout Project:
 - 1. Portland Cement: ASTM C 150/C 150M, Type I or Type II.
 - a. Fly Ash: ASTM C 618, Class C or Class F.
 - b. Ground Granulated Blast-Furnace Slag: ASTM C 989, Grade 100 or 120.
- B. Normal-Weight Aggregate: ASTM C 33/C 33M, graded, 3/4-inch- nominal maximum coarse-aggregate size. Provide aggregate from a single source with documented service record data of at least 10 years' satisfactory service in similar applications and service conditions using similar aggregates and cementitious materials.
 - 1. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.
- C. Water: ASTM C 94/C 94M and potable.
- D. Calcium chloride is not permitted.
- E. Chemical Admixtures: Provide admixtures certified by manufacturer to be compatible with other admixtures and that do not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride.
 - 1. Water-Reducing Admixture: ASTM C 494/C 494M, Type A.
 - 2. Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type D.
 - 3. High-Range, Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type G.
 - 4. Plasticizing and Retarding Admixture: ASTM C 1017/C 1017M, Type II.
- F. Sand-Cement Grout: Portland cement, ASTM C 150/C 150M, Type II; clean natural sand, ASTM C 404; and water to result in grout with a minimum 28-day compressive strength of 1000 psi, of consistency required for application.

2.4 STEEL CASINGS

- A. Steel Pipe Casings: ASTM A 283/A 283M, Grade C, or ASTM A 36/A 36M, carbon-steel plate, with joints full-penetration welded according to AWS D1.1/D1.1M.
- B. Corrugated-Steel Pipe Casings: ASTM A 929/A 929M, steel sheet, zinc coated.
- C. Liners: Comply with ACI 336.1.
- D. Casing and/or liner shall be of sufficient strength to withstand handling stresses, drilling stresses, concrete pressures, and surrounding earth and groundwater pressure.

2.5 SLURRY

- A. Slurry: Pulverized bentonite, pulverized attapulgite, or polymers mixed with water to form stable colloidal suspension; complying with ACI 336.1 for density, viscosity, sand content, and pH.

2.6 CONCRETE MIXTURES

- A. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, according to ACI 301.
 - 1. Use a qualified testing agency for preparing and reporting proposed mix designs for laboratory trial mix basis.
 - 2. The concrete mix shall be dense, homogeneous, fluid and resistant to segregation, and shall consolidate under self-weight. The concrete mix shall have a set time that ensures that fluidity is maintained throughout the pier concrete placement and removal of temporary casing if used.
- B. Cementitious Materials: Limit percentage, by weight, of cementitious materials other than portland cement according to ACI 301 limits as if concrete were exposed to deicing chemicals.
- C. Limit water-soluble, chloride-ion content in hardened concrete to 0.15 percent by weight of cement.
- D. Proportion normal-weight concrete mixture as follows:
 - 1. Exposure Class: ACI 318 F2, S0, W2, C1
 - 2. Compressive Strength (28 Days): 4500 psi.
 - 3. Maximum Water-Cementitious Materials Ratio: 0.45.
 - 4. Minimum Slump: Capable of maintaining the following slump until completion of placement:
 - a. 4-6 inches for dry, uncased, or permanent-cased drilling method.
 - b. 6-8 inches for temporary-casing drilling method.
 - c. 7-9 inches for slurry displacement method.
 - 5. Air Content: Air content of fresh concrete shall be 6% plus or minus 1.5%.
 - a. Exposure Classes F2 and F3: 6 percent, plus or minus 1.5 percent at point of delivery for concrete containing 3/4-inch nominal maximum aggregate size.
 - 6. Limit water-soluble, chloride-ion content in hardened concrete to 0.15 percent by weight of cement.

2.7 REINFORCEMENT FABRICATION

- A. Fabricate steel reinforcement according to CRSI's "Manual of Standard Practice" and ACI 117 Specification for Tolerances for Concrete Construction and Materials.

2.8 CONCRETE MIXING

- A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94/C 94M, and furnish batch ticket information.
 - 1. When air temperature is between 85 and 90 deg F, reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F, reduce mixing and delivery time to 60 minutes.
 - 2. Maintain concrete temperature to not exceed 90 deg F.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, vibration, and other hazards created by drilled-pier operations.
- B. The contractor shall notify the owner and engineer immediately of any substantial variance between actual field conditions and those reported. If rock is encountered or if there are any substantial discrepancies between top of rock depth anticipated based on subsurface investigation results the Contractor shall notify the Engineer and Owner immediately.
- C. Prior to construction the Contractor shall verify that all pier locations are free from underground interferences such as sewers, drains, gas pipes, water pipes, electricity, underground structures, whether or not the location and depth of any of the foregoing has been previously recorded on the plans or in any other documentation. The Contractor is responsible for all locates on the work. Any obstructions encountered shall be reported to the Owner and Engineer.

3.2 EXCAVATION

- A. Unclassified Excavation: Excavate to bearing elevations regardless of character of surface and subsurface conditions encountered. Unclassified excavated materials may include rock, soil materials, and obstructions.
 - 1. Obstructions: Unclassified excavation may include removal of unanticipated boulders, concrete, masonry, or other subsurface obstructions. No changes in the Contract Sum or the Contract Time are authorized for removal of obstructions.
 - 2. Obstructions: Unclassified excavated materials may include removal of unanticipated boulders, concrete, masonry, or other subsurface obstructions. Payment for removing obstructions that cannot be removed by conventional augers fitted with soil or rock teeth, drilling buckets, or underreaming tools attached to drilling equipment of size, power, torque, and downthrust necessary for the Work is according to Contract provisions for changes in the Work.
 - 3. "Rock Excavation" is defined and shall be understood to mean the removal of bedrock or individual stones or boulders with largest dimension exceeding 1/2 the design diameter. Measurement of the rock excavation shall be the vertical distance from the contact with rock to the depth to which rock is removed. This distance shall be multiplied by the design pier area to determine rock excavation volume. Contractor shall notify Owner and

Engineer immediately if unanticipated rock is encountered. Blasting shall not be performed without written consent of the Owner.

- B. Prevent surface water from entering excavated shafts. Conduct water to site drainage facilities.
- C. The contractor bears full responsibility for selection and execution of the method(s) of stabilizing and maintaining the drilled pier excavation. The walls and bottom of the drilled pier excavation shall be protected so that side wall caving and bottom heave are prevented from occurring, and so that the soil adjacent to the pier is not disturbed. The Contractor may excavate the drilled pier without excavation protection provided the Contractor can demonstrate that the soil/rock is stable and above the water table and zones of seepage. Acceptable protection methods include the use of casing, drilling slurry, or both.
- D. Excavate shafts for drilled piers to indicated elevations. Remove loose material from bottom of excavation.
 - 1. Excavate bottom of drilled piers to level plane within 1:12 tolerance.
 - 2. Maximum deviation of a single foundation including anchor bolt assembly from a location shown on the drawings shall not exceed 0.0625 inches.
 - 3. The variation in elevation of the bottoms of the foundation shall be plus 6 inches.
 - 4. The variation in the diameter of any drilled pier shall be plus 0.5 inches.
 - 5. Vertical: 2 (two) percent plumbness over the entire length of excavated shaft.
 - 6. Remove water from excavated shafts before concreting.
 - 7. Excavate rock sockets of dimensions indicated.
- E. Notify and allow testing and inspecting agency to test and inspect bottom of excavation. If unsuitable bearing stratum is encountered, make adjustments to drilled piers as determined by Engineer.
 - 1. Do not excavate shafts deeper than elevations indicated unless approved by Owner and Engineer.
 - 2. Payment for additional authorized excavation is according to Contract provisions for changes in the Work.
 - 3. Contractor shall provide equipment for checking bearing dimensions and alignment of each pier.
- ~~F. End Bearing Drilled Piers: Probe with auger to a depth of 96 inches below bottom elevation of shaft, and visually inspect and classify soil. Verify continuity and thickness of strata.~~
 - ~~1. Test first three drilled piers and one of every six drilled piers thereafter.~~
 - ~~2. Fill auger probe holes with grout.~~
- G. Excavate shafts for closely spaced drilled piers and for drilled piers occurring in fragile or sand strata only after adjacent drilled piers are filled with concrete and allowed to set.
- H. Slurry Displacement Method: Stabilize excavation with slurry, the slurry level in the excavation shall be maintained to obtain hydrostatic equilibrium throughout the construction operation at height required to provide and maintain a stable hole, but not less than 60 inches above ground-water level and above unstable soil strata to prevent caving or sloughing of pier. Maintain slurry properties before concreting. Notify Engineer and Owner immediately of all pier instabilities

throughout construction. Owner reserves right to stop construction until instabilities are addressed to satisfaction of Engineer and Owner.

1. Excavate and complete concreting of drilled pier on same day, or redrill, clean, and test slurry in excavation before concreting.
 2. The Contractor shall clean, re-circulate, de-sand, or replace the slurry as needed in order to maintain required slurry properties.
 3. Slurry Technical Assistance: If slurry is used the manufacturer's representative shall
 - a. Provide technical assistance for the use of the slurry.
 - b. Shall be at the site prior to introduction of the slurry into a drilled hole.
 - c. Shall remain at the site during the construction and completion of a minimum of one drilled pier to adjust the slurry mix to the specific site conditions.
 - d. After the manufacturer's representative is no longer present at the site, the Contractor's employee trained in the use of the slurry shall be present at the site throughout the remainder of the pier slurry operations for this project to perform the duties specified above.
- I. Temporary Casings: Install watertight steel casings of sufficient length and thickness to prevent water seepage into shaft; to withstand compressive, displacement, and withdrawal stresses; and to maintain stability of shaft walls.
1. Remove temporary casings, maintained in plumb position, during concrete placement and before initial set of concrete.
- J. Tolerances: Construct drilled piers to remain within ACI 336.1 tolerances.
1. If location or out-of-plumb tolerances are exceeded, provide corrective construction. Submit corrective construction proposals to Engineer for review before proceeding.

3.3 PERMANENT STEEL CASING INSTALLATION

- A. Install permanent steel casings of minimum wall thickness indicated and of diameter not less than diameter of drilled pier.
1. Install casings as excavation proceeds, to maintain sidewall stability.
 2. Fabricate bottom edge of lowest casing section with cutting shoe capable of penetrating rock and achieving water seal.
 3. Connect casing sections by continuous penetration welds to form watertight, continuous casing.
 4. Remove and replace or repair casings that have been damaged during installation and that could impair strength or efficiency of drilled pier.
 5. Fill annular void between casing and shaft wall with grout.
- B. Corrugated-Steel Casings: Provide corrugated-steel casings formed from zinc-coated steel sheet.
1. Corrugated casings may be delivered in sections or panels of convenient length and field connected according to manufacturer's written instructions.

3.4 STEEL REINFORCEMENT INSTALLATION

- A. Comply with recommendations in CRSI's "Manual of Standard Practice" for fabricating, placing, and supporting reinforcement.
- B. Clean reinforcement of loose rust and mill scale, earth, and other materials that reduce or destroy bond with concrete.
- C. Fabricate and install reinforcing cages symmetrically about axis of shafts in a single unit.
- D. Accurately position, support, and secure reinforcement against displacement during concreting. Maintain minimum cover to reinforcement. Contractor shall install additional bracing as required to maintain rebar cages shape while installing in excavation and during concrete placement.
- E. Use templates to set anchor bolts, leveling plates, and other accessories furnished in work of other Sections. Provide blocking and holding devices to maintain required position during final concrete placement.
- F. Protect exposed ends of extended reinforcement, dowels, or anchor bolts from mechanical damage and exposure to weather.
- G. Reinforcement shall not be spliced, unless approved by Engineer. Splice shall be in accordance with ACI 318 Sections 12.14 and 12.15.
- H. Reinforcing shall be inspected by the Owner prior to placing any concrete.
- I. Rolling centering devices for reinforcing steel shall be used to minimize the disturbance of the pier sidewalls and to facilitate removal of casing during concrete placement. Centering devices shall be composed of rollers aligned to allow the travel of the cage along the wall of the drilled pier excavation without dislodging soil or debris. The rollers shall be fabricated of plastic, concrete or mortar and not fabricated out of steel in such a way that a corrosion path to reinforcement could be introduced. Flat or crescent shaped centralizers should not be used in an uncased pier. Centering devices shall be used within one foot of the bottom and at intervals not exceeding five feet along the length of the pier. Each level of centralizers shall be rotated 45 degrees in the horizontal plane relative to the level below.
- J. Non-corrosive bottom supports shall be provided to ensure that the reinforcing is the correct distance above the bottom of the pier. The bottom supports shall not be used to support the weight of the cage.

3.5 ANCHOR BOLTS

- A. Owner shall provide assembled galvanized anchor bolts and shall include galvanized nuts and washers if required.
- B. Contractor shall verify that sizes, dimensions, layout, and quantities are consistent with reviewed structure drawings.

- C. Anchor bolt clusters shall be accurately positioned. Contractor shall accurately set the bolts and provide supporting and bracing materials to maintain the required positions.
- D. Prior to concrete placement the threads on the upper end of each anchor bolt shall be protected to prevent the adherence of concrete. When installed the bolts shall be clean and the portions embedded in the concrete shall be free of deleterious substances which would adversely affect the bond between the concrete and the bolts.
- E. Concrete shall not be placed until after Owner has observed the excavation and placement of anchor bolts. However, such observation does not relieve the contractor of its responsibility to install the anchor bolts as specified.

3.6 CONCRETE PLACEMENT

- A. Place concrete in continuous operation and without segregation immediately after inspection and approval of shaft by a qualified Special Inspector and testing agency.
- B. Concrete shall be placed in the drilled piers as soon after excavation as possible. Concrete shall be deposited continuously and as rapidly as possible until the unit being poured is complete.
- C. The concrete shall be conveyed from the mixer to the place of final deposit by methods that will prevent the separation or loss of material.
- D. No concrete shall be placed in standing or running water without permission of the Owner, following approval of a depositing method.
- E. Concrete shall be deposited directly against native undisturbed soil.
- F. Concrete requiring re-tempering shall be wasted.
- G. Dry Method: Place concrete to fall vertically down the center of drilled pier without striking sides of shaft or steel reinforcement.
 - 1. Where concrete cannot be directed down shaft without striking reinforcement, place concrete with chutes, tremies, or pumps.
 - 2. Vibrate concrete above bottom of anchor bolts.
- H. Slurry Displacement Method: Place concrete in slurry-filled shafts by tremie methods or pumping. Control placement operations to ensure that tremie or pump pipe is embedded no less than 60 inches into concrete and that flow of concrete is continuous from bottom to top of drilled pier.
- I. Coordinate withdrawal of temporary casings with concrete placement to maintain at least a 60-inch head of concrete above bottom of casing.
 - 1. Vibrate concrete after withdrawal of temporary casing above bottom of anchor bolts.
- J. Screed concrete at cutoff elevation level and apply scoured, rough finish. Where cutoff elevation is above the ground elevation, form top section above grade and extend shaft to required elevation.

- K. The concrete placement time shall commence at the mixing of the concrete and extend through to the completion of placement of the concrete in the drilled pier excavation, including removal of any temporary casing. For wet placement methods, the placement time shall start at the batching of the initial load of concrete to be placed in the pier. Prior to concrete placement, the Contractor shall provide test results of both a trial mix and a slump loss test conducted by an approved testing laboratory using approved methods to demonstrate that the concrete meets this defined placement time limit. The concrete mix shall maintain a slump of 4 inches or greater over the defined placement time limit as demonstrated by trial mix and slump loss tests. The trial mix and slump loss tests shall be conducted at ambient temperatures appropriate for site conditions. Ambient air temperature at the time of concrete placement shall not be greater than the ambient temperature at the time of the concrete trial tests and slump loss tests.
- L. Throughout the underwater concrete placement operation, the discharge end of the tube shall remain submerged in the concrete at least five feet and the tube shall always contain enough concrete to prevent water from entering. The concrete placement shall be continuous until the work is completed, resulting in a seamless, uniform pier. If the concrete placement operation is interrupted, the Engineer may require the Contractor to prove by core drilling or other tests that the drilled pier contains no voids or horizontal joints at no cost to the owner. If testing reveals voids or joints, the Contractor shall repair them or replace the drilled pier at no expense to the Owner.
- M. The Contractor shall complete a concrete yield plot for each wet pier poured by tremie methods. This yield plot will be submitted to the Owner within twenty-four (24) hours of completion of the concrete pour
- N. The Contractor shall not perform casing installation or drilled pier excavation operations within a clear distance of three diameters of a newly poured drilled pier within twenty (24) hours of the placement of concrete and only when the concrete has reached a minimum compressive strength of 1800 psi.
- O. Protect concrete work, according to ACI 301, from frost, freezing, or low temperatures that could cause physical damage or reduced strength.
 - 1. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.
 - 2. Do not use calcium chloride, salt, or other mineral-containing antifreeze agents or chemical accelerators.
- P. If hot-weather conditions exist that would seriously impair quality and strength of concrete, place concrete according to ACI 301 to maintain delivered temperature of concrete at no more than 90 deg F.
 - 1. Place concrete immediately on delivery. Keep exposed concrete surfaces and formed shaft extensions moist by fog sprays, wet burlap, or other effective means for a minimum of seven days.

3.7 TREMIES

- A. When placing concrete underwater, the Contractor shall use a concrete pump or gravity tremie. A tremie shall have a hopper at the top that empties into a watertight tube at least eight inches in

diameter. If a pump is used, a watertight tube shall be used with a minimum diameter of four inches. The discharge end of the tube on the tremie or concrete pump line shall include a device to seal out water while the tube is first filled with concrete. In lieu of a seal at the discharge end of the pipe, the Contractor may opt to place a “Pig” or “Rabbit” in the hopper prior to concrete placement which moves through the tremie when pushed by the concrete, forcing water or slurry from the tremie pipe.

- B. The hopper and tubes shall not contain aluminum parts that will have contact with the concrete. The inside and outside surfaces of the tubes shall be clean and smooth to allow both flow of concrete and the unimpeded withdrawal of the tube during concrete placement.

3.8 FINISHING

- A. The top surface of the pier shall be formed and finished to conform to the detail shown on the drawings. The top surface shall be domed not less than 1 inch to allow water to shed off the pier. All depressions shall be removed to prevent ponding. In general, a trowel finish on the concrete is required. Care shall be taken in the steel troweling not to bring excessive fine material to the surface. Only skilled finishers shall perform concrete finishing.
- B. All exposed concrete shall be properly cured for 7 days by moist curing using a wetted burlap, Kraft paper, or polyethylene sheets to prevent evaporation, or by spray application of a liquid membrane-forming compound conforming to ASTM C309 type 1. The membrane shall be installed per the manufacturers written installation instructions.
- C. After form removal of forms all fins, small projections, or other surface irregularities shall be removed.
- D. Metal form ties extending from the surface of exposed concrete shall be removed.
- E. Honeycombed areas shall be removed and patched with grout. A bonding agent meeting the requirements of ASTM C1059 shall be applied to areas that will receive grout.

3.9 DEWATERING

- A. The contractor shall be responsible for having readily available pumps, hose lines, and other equipment as may be required to control water inflow and to dewater excavations prior to and during placement of concrete.
- B. If groundwater inflow is determined to be excessive by Owner for placement of concrete, slurry displacement method shall be employed in the construction of the drilled pier.

3.10 FIELD QUALITY CONTROL

- A. Special Inspections: Engage a qualified special inspector to perform the following special inspections:
 - 1. Drilled piers.
 - 2. Excavation.
 - 3. Concrete.

4. Reinforcing steel.
 5. Steel reinforcement welding.
- B. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
- C. Testing agency shall report results of tests and inspections, in writing, to Owner, Engineer, Contractor, and concrete manufacturer within 48 hours of inspections and tests.
1. Test reports shall include reporting requirements of ASTM C31/C31M, ASTM C39/C39M, and ACI 301.
- D. Drilled-Pier Tests and Inspections: For each drilled pier before concrete placement.
1. Soil Testing: Bottom elevations, bearing capacities, and lengths of drilled piers indicated have been estimated from available soil data. Actual elevations and drilled-pier lengths and bearing capacities are determined by testing and inspecting agency. Final evaluations and approval of data are determined by Engineer.
- E. Concrete Tests and Inspections: ASTM C 172/C 172M except modified for slump to comply with ASTM C 94/C 94M.
1. Testing Frequency: Obtain one composite sample for each day's pour of each concrete mixture exceeding 5 cu. yd., but less than 25 cu. yd., plus one set for each additional 50 cu. yd. or fraction thereof.
 - a. When frequency of testing provides fewer than five compressive-strength tests for each concrete mixture, testing to be conducted from at least five randomly selected batches or from each batch if fewer than five are used.
 2. Slump: ASTM C94/C94M:
 - a. One test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mixture.
 - b. Perform additional tests when concrete consistency appears to change.
 3. Air Content: ASTM C231/C231M pressure method, for normal-weight concrete.
 - a. One test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
 4. Concrete Temperature: ASTM C1064/C1064M:
 - a. One test hourly when air temperature is 40 deg F and below or 80 deg F and above, and one test for each composite sample.
 5. Unit Weight: ASTM C567/C567M fresh unit weight of structural lightweight concrete.
 - a. One test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
 6. Compression Test Specimens: ASTM C31/C31M:
 - a. Cast and laboratory cure two sets of two 6-inch by 12-inch or three 4-inch by 8-inch cylinder specimens for each composite sample.
 - ~~b. Cast, initial cure, and field cure two sets of two 6-inch by 12-inch or three 4-inch by 8-inch cylinder specimens for each composite sample.~~
 7. Compressive-Strength Tests: ASTM C39/C39M.
 - a. Test one set laboratory-cured specimens at seven days and one set of specimens at 28 days.
 - ~~b. Test one set field cured specimens at seven days and one set of specimens at 28 days.~~

- c. A compressive-strength test to be the average compressive strength from a set of specimens obtained from same composite sample and tested at age indicated.
 8. ~~If strength of field-cured cylinders is less than 85 percent of companion laboratory-cured cylinders, Contractor shall evaluate operations and provide corrective procedures for protecting and curing in-place concrete.~~
 9. Strength of each concrete mixture is satisfactory if every average of any three consecutive compressive-strength tests equals or exceeds specified compressive strength and no compressive-strength test value falls below specified compressive strength by more than 500 psi.
 10. Report test results in writing to Engineer, concrete manufacturer, and Contractor within 48 hours of testing. List Project identification name and number, date of concrete placement, name of concrete testing and inspecting agency, location of concrete batch in Work, design compressive strength at 28 days, concrete mixture proportions and materials, compressive breaking strength, and type of break for both 7- and 28-day tests in reports of compressive-strength tests.
 11. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Engineer but not be used as sole basis for approval or rejection of concrete.
 12. Additional Tests: Testing and inspecting agency to make additional tests of concrete if test results indicate that slump, compressive strengths, or other requirements have not been met, as directed by Engineer.
 - a. Continuous coring of drilled piers may be required, at Contractor's expense, if temporary casings have not been withdrawn within specified time limits or if observations of placement operations indicate deficient concrete quality, presence of voids, segregation, or other possible defects.
 13. Perform additional testing and inspecting, at Contractor's expense, to determine compliance of replaced or additional work with specified requirements.
 14. Correct deficiencies in the Work that test reports and inspections indicate do not comply with the Contract Documents.
- F. An excavation, concrete, or a drilled pier will be considered defective if it does not pass tests and inspections.
- G. Contractors Quality Control staff shall prepare test and inspection reports for each drilled pier. Submit to Engineer within 48 hours of the completion of concrete placement of the pier. The report shall contain at a minimum the following:
1. Actual top and bottom elevations.
 2. Actual drilled-pier diameter at top, bottom, and bell.
 3. Top of rock elevation.
 4. Description of soil materials.
 5. Description, location, and dimensions of obstructions.
 6. Final top centerline location and deviations from requirements.
 7. Variation of shaft from plumb.
 8. Shaft excavating method.
 9. Design and tested bearing capacity of bottom.
 10. Depth of rock socket.
 11. Levelness of bottom and adequacy of cleanout.
 12. Properties of slurry and slurry test results at time of slurry placement and at time of concrete placement.
 13. Ground-water conditions and water-infiltration rate, depth, and pumping.

14. Description, purpose, length, wall thickness, diameter, tip, and top and bottom elevations of temporary or permanent casings. Include anchorage and sealing methods used and condition and weather tightness of splices if any.
15. Description of soil or water movement, sidewall stability, loss of ground, and means of control.
16. Bell dimensions and variations from original design.
17. Date and time of starting and completing excavation.
18. Inspection report.
19. Condition of reinforcing steel and splices.
20. Position of reinforcing steel.
21. Concrete placing method, including elevation of consolidation and delays.
22. Elevation of concrete during removal of casings.
23. Locations of construction joints.
24. Concrete volume.
25. Concrete testing results.
26. Remarks, unusual conditions encountered, and deviations from requirements.

- H. Batch Tickets: For each load delivered, submit three copies of batch delivery ticket to testing agency, indicating quantity, mix identification, admixtures, design strength, aggregate size, design air content, design slump at time of batching, and amount of water that can be added at Project site.

3.11 DISPOSAL OF SURPLUS AND WASTE MATERIALS

- A. Disposal: Remove surplus satisfactory soil and waste material, including unsatisfactory soil, trash, and debris, and legally dispose of it off Owner's property.
- B. Contractor shall dispose of all water, drilling slurry, excess concrete debris and spoil as required by the project permits, specifications, and local and state regulatory requirements.

END OF SECTION

Exhibit B:

Steel Pole Specifications

EXHIBIT B:
STEEL POLE SPECIFICATIONS

Agency/Form No.	Form Title/Description	Pages
Exhibit B	General Specifications	1-4
RUS Form 204	Specs. For Steel Single Pole and H-Frame Structures	1-17
RUS Form 214	Specs. For Standard Class Steel Transmission Poles	1-20



Missouri Department of Transportation

“HWY MM 161KV TRANSMISSION MODIFICATIONS”

Galvanized Steel Pole Requirements

General Specifications must be applied to all structures in this package.

1. All Structures shall be Galvanized.
2. Fabricator to follow RUS Bulletin 1724E-204 "Specifications for Steel Single Pole and H-Frame Structures" (Latest Revision) & 1724E-214 "Specifications for Standard Class Steel Transmission Poles" (Latest Revision), ASCE 48-19 (or latest revision) Design of Steel Transmission Pole Structures or latest version, and American Welding Society (AWS), Structural Welding Code AWS D1.1 (Latest Revision), as well as national, state, and local codes and standards.
3. Toth and Associates to review vendor assembly drawings and calculations used for the design of each structure. Review of drawings and calculations does not relieve the vendor of responsibility for adequacy of the design, the correctness of the dimensions, details of the drawings and the proper fit up of all parts of the structure. Toth and Associates is responsible for providing loading requirements adequate for steel transmission pole structure design.
4. Attachment detail requirements will be submitted with geometric structure drawings. The vendor/fabricator will notify Toth and Associates of any attachment detail requirements that cannot be met or are of a conflicting nature. Any requirement not provided or that does not exist in ASCE 48 (latest revision) shall be at the Vendor's discretion.
5. Details herein are only typical of the shapes and dimension desired. Fabricator may propose alternative connection for approval.
6. Ground Collars, on direct embedded structures shall have a minimum thickness of 3/16" and a length of 4'-0". Locate collars on the centerline of the designated ground line.
7. For direct embedded structures, 'CorroCote' or equivalent coating shall be applied on the exposed surface from butt of the pole to the 2" below the top of the ground collar. The 'CorroCote' coating shall be feathered at the top edge to avoid water accumulation.
8. For foundation type structures, anchor bolt cages are to be designed and provided with the structures. Anchor bolts shall be designed to be equally spaced around the circumference of the pole and shall be symmetrical about both the transverse and longitudinal axis of the layout.
9. For multisided sections, a flat side shall be on the 0-180° Axis.
10. Plastic Plugs shall be installed in all nuts welds to the structures and all tapped holes.
11. Structure shall be designed to eliminate water and refuse traps.
12. All arms, bolts and material shall be designed to withstand all loads provided without permanent deformation.

13. Pole Top shall be covered with 3/16" steel plate pole cap.
14. Step Clips shall be installed at 1'-6" staggered spacing. For structures with distribution underbuild, Step Clips shall start 5' above distribution arm and stop 2' below top of pole. For structures without underbuild, Step Clips shall start 8' above ground line and stop 2' below top of pole.
15. A weld bead or v-notch shall be provided on each pole section to align pole base, and additional pole sections.
16. Fabricator shall indicate maximum bolt torque on erection drawings.
17. The owner will provide all labor equipment and material for unloading poles at the project site. A pole is considered delivered when the pole is lifted from the trailer or semitrailer of the delivery carrier. Bidder shall provide a minimum of 48 hours' notice in advance of delivery.
18. Delivery shall be coordinated with the client prior to shipping, unless previously coordinated with Toth Representative and site contractor.
19. Bidder shall package structure hardware such that each structure has an associated hardware kit. A 10% overage in structure hardware shall be included with each structure kit.
20. Bidder to provide PLS-POLE BAK (.bak) files for each load and design drawings.
21. Bidder to provide PLS-POLE Steel Pole Library (.spp) with all pole files included in a single file.
22. Awarded bidder will provide a Quality Assurance and Quality Control Inspection plan in accordance with RUS Bulletin 1724E-204 "Specifications for Steel Single Pole and H-Frame Structures" (Latest Revision) & 1724E-214 "Specifications for Standard Class Steel Transmission Poles" (Latest Revision), ASCE 48-19 (or latest revision) Design of Steel Transmission Pole Structures. American Welding Society (AWS), Structural Welding Code AWS D1.1 (Latest Revision), as well as national, state, and local codes and standards.
23. Owner has the right to enforce a 3rd party inspection of the manufacturer's plant to verify QA-QC procedures are being followed as well as all structures are being completed as designed and per codes listed above.
24. Fabricator to provide signed and sealed final drawings by an MO licensed professional engineer.
25. Steel pole drawings, load tables, and specs shall be used for bidder's steel pole design. Provided PLS POLE bak files and lca files are for reference only.

Fabrication Priority and Latest Delivery Dates:

Anchor Bolt Cage: Please provide best lead time possible

Steel Poles: Please provide best lead time possible

SPECIFICATIONS FOR STEEL SINGLE POLE AND H-FRAME STRUCTURES

1. SCOPE

This specification covers the design, materials, welding, inspection, protective coatings, drawings and delivery of steel transmission single pole and H-frame structures. The proposal submitted by the manufacturer shall include field bolts, locknuts, vangs, attachment provisions for arms and/or insulators, anchor bolts, base plates, and other necessary items to make a complete structure.

2. DEFINITIONS

Camber - Pole curvature, induce in fabrication, used to counteract predetermined pole deflection, such that the pole will appear straight under a specified load condition.

D/t - the ratio of the diameter of a tubular pole to the steel plate thickness.

Engineer - a registered or licensed person, who may be a staff employee or an outside consultant, and who provides engineering services. Engineer also includes duly authorized assistants and representatives of the licensed person.

Factored load - The maximum design load which includes the appropriate load factor specified.

Groundline - a designated location on the pole where the surface of the ground will be after installation of a direct embedded pole.

Load factors (LF) - a multiplier which is applied to each of the vertical, transverse and longitudinal structure loads to obtain a factored load.

P-delta ($P-\Delta$) moment - secondary moment created by the vertical loads acting on the structure when the structure deflects from its unloaded position.

Point of fixity - location on the pole at groundline or below groundline where the maximum moment occurs.

Pole twist - spiral rotation of a pole section relative to the pole end. It is caused by the residual stress in the steel as received from the mill, the clamping force holding the tube shells together and the heat applied during the seam welding process.

Raking - the practice of installing a straight pole out of plumb, or at an inclined angle

w/t - Ratio of the width of the pole (flat-to-flat) to the plate thickness

UNC – Unified Coarse Threads

3. CODES AND STANDARDS

Codes, standards, or other documents referred to in this specification shall be considered as part of this specification. The following codes and standards are referenced:

- a. American Society of Civil Engineers (ASCE) Standard, Design of Steel Transmission Pole Structures, ASCE 48, latest edition.
- b. American Society for Testing and Materials (ASTM), various standards, latest revision.
- c. American Concrete Institute (ACI), Building Code Requirements for Reinforced Concrete, ACI 318, latest edition.
- d. American Welding Society (AWS), Structural Welding Code, AWS D1.1, latest edition.
- e. American National Standards Institute (ANSI), National Electrical Safety Code, ANSI C2, latest edition.
- f. Society for Protective Coatings (SSPC, formerly Steel Structure Painting Council)/ National Association of Corrosion Engineers (NACE) Surface Preparations Specification, SSPC/NACE SP-6/NACE 3.

4. CONFLICT BETWEEN THIS SPECIFICATION, DRAWINGS, AND REFERENCED DOCUMENTS

In the event of conflict between this specification and the above referenced documents, the requirements of this specification shall take precedence. In the case of conflict between several referenced documents, the more stringent requirement shall be followed. If a conflict exists between this specification or the referenced documents and the attached drawings, the attached drawings shall be followed. If clarification is necessary, contact the owner or owner's representative.

5. GENERAL REQUIREMENTS

The design, fabrication, allowable stresses, processes, tolerances, and inspection shall conform to the ASCE Standard, Design of Steel Transmission Pole Structures (ASCE 48), latest edition, with the following additions and/or exceptions:

- a. Design
 - (1) Pole designs shall be prepared from the attached configuration drawings (Attachments A and B of this Specification) and design loads (Attachment B of this Specification). The structure shall be capable of withstanding all

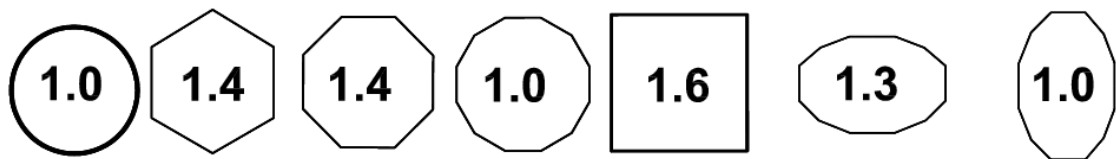
specified loading cases including secondary stresses from foundation movements and pole deflection (P-Δ) when specified in Attachment B of this Specification but not considering the possible restraining effect of conductors or shield wires. The structure shall withstand the loads without failure, permanent distortion, or exceeding any specified deflection limitations.

- (2) Wind pressures shown in the loading criteria shall be multiplied by the appropriate shape factor applied to the poles. Pressures in psf shall be computed as follows:

$$p = W \times C_d$$

Where p = pressure on projected area of the pole normal to wind, W = wind pressure, and C_d = shape (or drag) factor.

Shape factors for computing the wind on poles are:



- (3) The maximum design unit stress shall be the minimum yield strength as stated in applicable ASTM specifications for the particular application and types of loads, including load factors.
- (4) Poles shall be designed with a minimum number of joints. Field welding shall not be allowed as part of the design of a new pole. The shaft joints to be made in the field shall be slip joints or bolted flange joints. Slip joint length shall be at least 1-1/2 times the largest inside diameter of the female section. Bolted flange joints shall be used for medium angle and heavy angle guyed structures and X-braced H-frame structures. If approved by the owner or owner's representative, a strap across the pole splice to prevent separation of the male and female sections of the pole may be used for X-braced H-frame structures. Approval must be obtained prior to bid.

Manufacturer shall verify slip joint fit before shipment. Joints should not interfere with joints, step nuts, ladder clips, or jacking nuts.

Sufficient jacking lugs and permanent orientation marks shall be provided at all slip joints to ensure proper alignment and complete overlap of the joint.

- (5) The factored load in guys shall not exceed 65 percent of the rated breaking strength of the guy.

- (6) Design of anchor bolts shall be in accordance with the ACI-318, latest Edition, Building Code Requirements for Reinforced Concrete, assuming a concrete strength as specified by the owner.

When anchor bolts are specified, they shall have the top 2 feet galvanized. Anchor bolts shall be threaded at the top end a distance equal to the baseplate thickness plus the thickness of two anchor bolt nuts plus 2-1/2". Each anchor bolt shall include two heavy hex nuts.

Welding on anchor bolts will only be allowed in the bottom 12 inches. Only one length of anchor bolt shall be used on each pole. Anchor bolts/clusters shall be plainly marked to indicate the structure type, structure number, orientation, and top of concrete.

Anchor bolts shall be designed to be shipped as a rigid cage with top and bottom plates holding the anchor bolts in place. The anchor bolt thread shall be protected during shipping. The anchor bolts shall be welded to the holding plate in the bottom of the cage. The top template shall be designed to be removable and to support the assembled cage during lifting and setting operations without detrimental deformations. Bolt clusters shall be designed to be rigid enough to withstand the normal jolts of shipping, handling and installation with no displacement of bolts from the proper positions within the cluster.

The removable template at the top shall be marked to show the centerline for tangent structures and the angle bisector for angle structures. Matching marks are to be on the base plate of the structure so proper alignment can be made.

- (7) Minimum plate thickness for all pole components shall be 3/16 inch.
- (8) Structures which are to be direct embedded shall have bearing plates and ground sleeves. Bearing plates shall have a diameter not more than 2 inches greater than the maximum pole diameter.

Galvanized poles shall have a drain hole at the bottom. The drain hole shall not be more than 20% of the bottom plate surface area. When a painted finish is specified, poles shall be hermetically sealed. Ground sleeves shall have a minimum length of 3 feet for single pole structures and 4 feet for H-frames.

The ground sleeve shall have a minimum thickness of 3/16 inch and shall be centered at the groundline. A seal weld shall be provided around the ground sleeve. The ground sleeve shall not be considered in strength calculations.

- (9) Poles shall have nearly a uniform taper throughout their entire length. The maximum difference in tapers between two pole sections measured by the diameters shall be .20 inch/ft. for poles with variable taper.
- (10) Poles with elliptical cross sections shall have a minor axis dimension equal to at least 75 percent of the major axis dimension.
- (11) All unguyed angle poles or unguyed tangent deadends shall be precambered to remain plumb when the calculated deflection at the top of the pole exceeds 1.5 percent of the pole height under an initial conductor tension loading of 60°F, no wind, and no load factors. Pole height shall be the height of the pole from the top of the baseplate, or designated groundline, to the top. Tangent poles with unbalanced vertical loadings shall be precambered for the previously stated conditions.
- (12) Arms shall be designed so the end of the arm is at the specified height under a loading of initial conductor tension, 60°F, no wind, and no-load factors. Arms shall not deflect vertically more than 12 inches at the end of the arm under heavy ice conditions (without any load factors applied).

Arms shall be upswept or straight, tapered, steel tubular members, of any cross-sectional type, which meet the dimensions shown on the attached drawings (Attachment D of this Specification).

Arm end plate connection details for hardware attachment shall be typical of those shown on the attached drawings. The arms shall be hermetically sealed when a painted finish is specified. Galvanized arms shall have drain holes where appropriate. If weathering steel is used for the arms, attachments and the arm shall be designed to avoid trapping or holding moisture.
- (13) Lifting lugs are optional. The manufacturer shall supply all instructions for handling and erection of poles and arms.
- (14) In the design of connections for vangs, brackets, or stiffeners attached to the pole shaft, care shall be taken to distribute the loads sufficiently to protect the wall of the pole from local buckling.
- (15) Each pole shall be permanently marked on the pole shaft 60 inches above groundline and on the bottom of baseplate or bearing plate with the following identifying information: structure type, height, structure number, factored groundline moment, owner name, and date manufactured. The method of identification shall be approved by the owner.
- (16) Weathering steel structures shall be designed to eliminate water and refuse traps.

Tubular sections shall be sealed from moisture entering the inside of the pole. Factory drilled pole holes shall be plugged to prevent moisture intrusion during shipping. For field drilled poles and factory drilled poles, manufacturer shall provide silicon sealant to seal all through-bolt holes. Nondrilled poles when assembled shall be effectively sealed to prevent moisture intrusion.

Connections shall be designed to reduce the effect of pack-out by preventing moisture from entering the joint or by designing the connection to allow moisture to easily drain off.

Plastic plugs shall be installed in all nuts welded to the structure and all tapped holes.

(17) Application requirements: (See Attachment C of this Specification)

b. Materials

- (1) All materials shall comply with the applicable requirements of ASTM specifications. Any modifications to ASTM specifications must be approved by the owner's representative prior to bidding.
- (2) Poles, arms and conductor brackets shall conform with ASTM A36, ASTM A572, ASTM A588, ASTM A871 or ASTM A595.
- (3) Base plate shall conform with ASTM A572, ASTM A588, ASTM A633, or ASTM A595.
- (4) Anchor bolts shall conform to ASTM A615, Grade 60 or 75.
- (5) Other bolts and nuts shall conform, as applicable, to ASTM A307, ASTM A325, ASTM A354, or ASTM A394. Locknuts shall be provided for each structure bolt, or American Nut Company (ANCO) type self-locking nuts may be used. Locknuts shall be the galvanized MF type or ANCO type.
- (6) Anchor bolts, structural plate, and weld material shall meet ASCE requirements for Charpy tests.
- (7) For galvanized structures, steel used for the pole shaft and arms shall have a silicon content less than .06 percent.

c. Fabrication

- (1) All welding shall be in accordance with the AWS D1.1, latest edition. Welders shall be qualified in accordance with AWS D1.1 welding procedures.

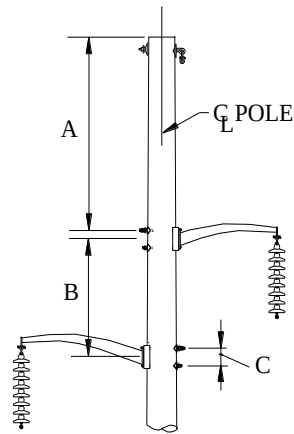
- (2) One hundred percent penetration welds shall be required in, but not limited to, the following areas:
 - circumferential welds (C-welds) joining structural members;
 - longitudinal welds in the female portion of the joint within the slip joint area;
 - welds at the butt joints of back-up strips; and
 - base plate to shaft weld.
 - longitudinal welds within 3 inches of C-welds, flange welds, base welds and ends of tubes.
- (3) Full penetration or equivalent 90 percent partial penetration with fillet overlay shall be used for arm-to-arm base, vang-to-plate shaft, and arm box joints.
- (4) Quality and acceptability of every inch of the full penetration welds shall be determined by visual and ultrasonic inspection.
- (5) All other penetration welds shall have 60 percent minimum penetration. Quality and acceptability of all welds other than full penetration welds shall be determined by visual inspection, supplemented by magnetic particle, ultrasonic or dye penetrant inspection.
- (6) All weld back-up strips shall be continuous the full length of the welds. Care shall be exercised in the design of welded connections to avoid areas of high stress concentration which could be subject to fatigue or brittle fractures.
- (7) Field welding shall not be permitted except with owner's approval and the manufacturer's direction in repairing a pole.
- (8) All parts of the structure shall be neatly finished and free from kinks or twists. All holes, blocks, and clips shall be made with sharp tools and shall be clean-cut without torn or ragged edges.
- (9) Before being laid out or worked in any manner, structural material shall be straight and clean. If straightening is necessary, it shall be done by methods that will not damage the metal.
- (10) Shearing and cutting shall be performed carefully and all portions of the work shall be finished neatly. Copes and re-entrant cuts shall be filleted before cutting.

- (11) All forming or bending during fabrication shall be done by methods that will prevent embrittlement or loss of strength in the material being worked.
- (12) Holes for connection bolts shall be 1/16 inch larger than the nominal diameter of the bolts. Holes in the flange plates for bolted splices shall be 1/8 inch larger than the bolt diameter. Holes in the base plates for anchor bolts shall be 3/8 inch larger than the nominal diameter of the anchor bolts. The details of all connections and splices shall be subject to the approval of the owner or his representatives.
- (13) Holes in steel plates which are punched must be smooth and cylindrical without excessive tear out or depressions. Any burrs that remain after punching shall be removed by grinding, reaming, etc.
- (14) Holes of any diameter may be drilled in plate of any thickness. Care shall be taken to maintain accuracy when drilling stacks of plates.
- (15) Holes may be made by use of a machine guided oxygen torch. Flame cut edges shall be reasonably smooth and suitable for the stresses transmitted to them.
- (16) Field drilled holes must be approved by the owner. If the manufacturer is aware of the owner's intent to field drill holes, the manufacture must supply a galvanizing touch-up kit for galvanized poles or a silicon sealant for weathering steel poles.

d. Tolerances

Manufacturing tolerances shall be limited to the following:

Pole Length	<u>One piece</u> : ± 2 inches, or ± 1 inch $\pm 1/8$ inch per 10 feet of length, whichever is greater (i.e. - 120 foot pole shall have a length of 120 feet $\pm 2\frac{1}{2}$ inches)
	<u>Assembled pole with flange connections</u> : same as for one piece <u>Assembled pole with slip joint connections</u> : The accumulation of the slip joint tolerances not to exceed -6", +12"
Pole Diameter	-0 inch, +1/4 inch
Pole End Squareness	$\pm 1/2$ inch per foot of pole diameter
Pole Sweep	1/8 inch per 10 feet of pole length
Pole Twist	Limit twist to $1^\circ/10'$ of length, not to exceed 4° /tube segment. Overall structure twist shall be limited to 10° for embedded and 6° for base plated structures. Connections for all appurtenances to the pole shall account for the pole twist and should align vertically.
Slip Joint tolerances	Tolerances per manufacturer's recommendations and total pole length requirements above.

Location of Groups of Bolt Holes from Top of Pole	±1.0 inches (tolerance to dimension 'A', Figure 2)	 FIGURE 2
Location of Centerline Between Groups of Bolt Holes	±1.0 inch (tolerance to dimension 'B', Figure 2)	
Location of Holes Within a Group of Bolt Holes	±1/8 inch (tolerance to dimension 'C', Figure 2)	
Bolt Hole Alignment	Not to vary from the longitudinal pole centerline of that group of holes by more than 1/16 inch	
Location of Identification Plate	±2.0 inch	

e. Grounding

- (1) A grounding connection shall be welded to the pole shaft, 18 inches above the groundline or 6 inches above the ground collar. The grounding connection will be either the two-hole NEMA pad, or a nut, or a threaded insert installed in the pole, or an approved alternative.
- (2) Grounding pad face shall not be painted or covered with other coatings. The grounding nut thread and grounding pad threads shall be protected from coatings.
- (3) Threaded inserts installed for grounding shall be made of Type 316 stainless steel and provided with standard 1/2 inch, 13 UNC threads. Threads shall be protected from coatings.

f. Climbing Devices

- (1) Design Loads
 - (a) Step Bolts and removable steps: The step bolts, removable steps and attachment to the pole shall be designed to support a minimum of a 300-pound worker and equipment multiplied by a load factor as

defined in paragraph 5.f.(2). The load shall be at the outer edge of the step or bolt.

- (b) Removable Ladders: The ladder and each attachment to the pole shall be designed to support a minimum of a 300-pound worker and equipment multiplied by a load factor as defined in paragraph 5.f.(2). The load shall be at the outer edge of the step or bolt.

(2) Load Factor

A load factor of 2.0 shall be applied to the design loads in 5.6.1. These loads shall be supported without permanent deformation.

(3) Location

Climbing devices shall start 8 feet above groundline and extend to the pole top unless specified by the owner. The climbing device shall be spaced such that each step is 1 foot 6 inches apart and orientated to provide maximum ease of climbing. They shall be located to avoid interference with other attachments

g. Finishes

- (1) The following finishes are acceptable: galvanizing, zinc primer and painting, weathering steel, and below grade coating.

- (a) Galvanizing - All structures and structural components which are hot-dip galvanized shall meet all the requirements of ASTM A123 or ASTM A153. Measures shall be taken to prevent warping and distortion according to ASTM A384 and to prevent embrittlement according ASTM A143. Poles made of ASTM A588 steel shall not be galvanized due to the high silicon content of the steel. One gallon of zinc enriched paint shall be provided with each five poles.

- (b) Zinc Primer and Painting - ~~Poles which are to be painted shall be hermetically sealed to prevent corrosion of interior surfaces. After shot or sand blasting and cleaning in accordance with the surface preparations specification, SSPC/NACE SP-6/NACE 3, a zinc primer of 3 mils dry film thickness (DFT) and two coats of finish paint, each 3 mils DFT shall be applied to all exterior surfaces in accordance with the paint supplier's recommendations. One gallon each of primer and finish paint shall be supplied with each five poles. A guarantee against flaking or fading of the paint for a minimum of 5 years shall be provided.~~

- (c) Weathering Steel - ~~Steel shall conform to ASTM A588 or A871. After fabrication, poles made of weathering steel shall be cleaned of oil,~~

~~scale, etc., in accordance with the surface preparation specification SSPC/NACE SP-6/NACE 3, to ensure uniform and rapid formation of the protective oxide layer.~~

- (d) Coatings for the Embedded Portion of the Pole - When poles are to be directly embedded, a 16 mil (minimum dry film thickness), two component hydrocarbon extended polyurethane coating that is resistant to ultraviolet light shall be applied on the exposed surface of the embedded portion of the pole. The coating shall extend from the butt to the top of the ground sleeve. Other coatings shall be approved by the owner prior to their use.
- (2) Bolts and nuts with yield strengths under 100,000 psi shall be hot-dip galvanized per ASTM A153 and ASTM A143, or mechanically coated with zinc in accordance with ASTM B454, Class 50. Bolting materials with yield strengths in excess of 100,000 psi shall not be hot-dip galvanized. Instead, they shall be painted with zinc enriched paint or mechanically coated with zinc per ASTM B454, Class 50.
- (3) Compliance with coating thickness requirements shall be checked with a magnetic thickness gauge.

h. Inspection and Testing

- (1) The owner and the owner's designated agents shall have free entry at all times while work is being carried on, to all parts of the manufacturer's plant to inspect any part of the production of the poles covered by this specification.
- (2) Steel members which are bent or warped or otherwise improperly fabricated shall be properly repaired or replaced.
- (3) The cost of tests made by the manufacturer (except full scale load tests on poles), including cost of the certified test reports shall be considered included in the price.
- (4) The manufacturer shall make tests in accordance with ASTM A370 and ASTM A673 to verify that the material used in the structures meets the impact properties.
- (5) Mill test reports showing chemical and physical properties of all material furnished under this specification shall be maintained by the manufacturer for a period of 5 years and shall be traceable to the structure.
- (6) All plates over 1-1/2 inches thick shall be ultrasonically tested to assure against defects which could lead to lamellar tearing.

- (7) Welders or welding operators shall be qualified in accordance with the provisions of AWS D1.1.
- (8) The manufacturer shall make certified welding reports for each structure. The reports covering welding shall include all welds of each structure. Each weld shall be clearly identified; and the report shall consist of the method of testing, whether the weld is acceptable, the identification of the structure, the date, and the name and signature of the inspector.

i. Structure Testing

- (1) The structures which are to have full-scale load tests performed on them are listed in Attachment C of this Specification.
- (2) Details of the test procedures and methods of measuring and recording test loads and deflections shall be specified by the manufacturer prior to testing and shall be subject to the review and approval of the owner or his representative.
- (3) Deflections shall be recorded in the transverse and longitudinal directions when applicable. Deflection measurements shall be taken under the no load condition both before and after testing.
- (4) Material procurement for test poles shall be identical to material procurement procedures for regular production run poles.
- (5) A full report listing results shall be submitted after completion of all testing. Copies of mill test reports shall be included in the load test report. The report shall also include a complete description of the load tests with diagrams and photographs.
- (6) The owner or his representative reserves the right to be present during testing and shall be notified 2 weeks prior to the start of structure fabrication.

j. Shipping

- (1) Each shipment shall be accompanied by a list of all parts, identifiable by structure type and number. Arms, bolts and miscellaneous hardware will be identified by the list for match up with the respective pole shaft. All parts required for any one structure shall be in one shipment, if possible.
- (2) The owner and owner's representative shall be notified prior to shipment that such shipment is to take place, and they reserve the right to inspect the components prior to shipment. The notification shall give quantities, weight, name of common carrier used, and expected time of arrival.

- (3) The anchor bolts shall be welded to the holding plate in the bottom of the cage. A removable template shall be used at the top of the cage and shall be marked to show the centerline for tangent structures and the angle bisector for angle structures. Matching marks are to be on the base plate so proper alignment can be made. Bolt clusters shall be rigid enough to withstand the normal jolts of shipping and handling with no displacement of bolts from the proper positions within the cluster.
- (4) Unless otherwise agreed to by the owner, the anchor bolt cage shall be shipped at least 30 days prior to pole shipment.
- (5) Salt-treated wood blocking and urethane foams shall not be used when shipping or storing steel poles.

6. INFORMATION TO BE SUPPLIED BY THE MANUFACTURER

a. Information to be supplied with the proposal (Attachment E of this Specification).

- (1) Calculated shipping weight of each structure excluding anchor bolts. Separate weights shall be given for arms and poles.
- (2) Calculated shipping weight of anchor bolts.
- (3) Factored groundline reactions in poles and guy wires.
- (4) Anchor bolt size, length and locations (bolt circle diameters).
- (5) Type of material of major components (ASTM number).
- (6) Description of pole shaft, including thickness, length, diameter, cross-sectional geometry, and method of fastening each shaft component.
- (7) Data showing the design of the arm, arm connections, arm attachment plates and brackets.
- (8) Sketches or draft drawings of structure and structure attachments.

b. Documentation to be supplied for the owner's approval prior to fabrication

Documentation includes final design calculations for pole shaft, base plate, anchor bolts, arms, and other appurtenances, including their connections for all structures. The following information shall be supplied:

- (1) For the loading cases with load factors, the total shear, axial forces, moments, stresses or stress ratios, section moduli, cross-sectional areas, deflections w/t's for polygonal and D/t's for round cross sections at all splices, at arm attachment points (top and bottom), and at least every 10 feet along the pole.
 - (2) For the critical loading case, shear and axial forces, moments, stresses, section moduli, cross-sectional areas at the arm connections, bolt stresses in the arm connection, and deflection at the end of the arm.
 - (3) Anticipated deflections at the top of the pole and at the ends of the arms shall be indicated for each pole for the normal, everyday loading condition of 60°F, no wind, no load factors.
 - (4) For all specified loading cases, reactions and groundline moments shall be supplied.
 - (5) Detail drawings for each structure type giving weights of structure components, dimensions, and bill of materials.
 - (6) Assembly instructions and erection drawings. Slip joint lengths and allowable tolerances. Special handling instructions.
- c. Final Documents shall be supplied to the owner for the items in Section 6.b.(5), after erection of all structures and prior to final payment.
- d. Test Reports (as requested).
- (1) Certified mill test reports for all structural material.
 - (2) Certified welding reports for each structure.
 - (3) Impact property test reports showing that the material used in the structures meets the impact properties.
 - (4) Test reports on coating thickness.
 - (5) Report of structure testing, when required, including photographs, diagrams, load trees, etc.

7. APPROVAL, ACCEPTANCE, AND OWNERSHIP

- a. Final designs must be approved by the owner or owner's representative before material ordering and fabrication. Material ordering and fabrication prior to approval will be at supplier's risk. It is understood that award of this contract does not constitute acceptance of design calculations submitted with the bid, if corrections are required in the final structure designs due to manufacturer's errors, omissions, or misinterpretations of the specifications, the quoted price shall not change. Approval of the drawings and calculations by the owner or the owner's representative does not relieve the supplier of responsibility for the adequacy of the

design, correctness of dimensions, details on the drawings, and the proper fit of parts.

- b. After delivery, the poles will be inspected and shall be free of dirt, oil blisters, flux, black spots, dross, tear-drop edges, flaking paint or zinc; and in general, shall be smooth, attractive, and unscarred. Poles not meeting this requirement shall be repaired or replaced by the fabricator at no additional cost to the owner.
- c. All final drawings shall become the property of the owner, who shall have full rights to reproduce drawings and use them as the owner sees fit, including submitting them to other vendors for the purpose of obtaining bids on future steel pole purchases.

8. LIST OF ATTACHMENTS TO THIS SPECIFICATION

- ~~Attachment A, Structure Dimensions and Other Information (to be completed by the engineer)~~
- ~~Attachment B, Design Loads (to be completed by the engineer)~~
- Attachment C, Application Requirements (to be completed by the engineer)
- ~~Attachment D, Drawings (to be completed by the engineer)~~
- ~~Attachment E, Bid Summary-Design Information, Weights, and Costs (to be completed by the manufacturer and submitted with proposal)~~

Attachment C. Application Requirements

1. Pole deflection limitations
 - a. Means of achieving..... Pole Strength
 - b. Amount of..... See Drawings
 - c. Loading conditions for..... See Drawings
2. Foundation type..... Direct Embed/Pier Mounted
 - a. Design concrete compressive strength (psi).. 4500
 - b. Maximum anticipated foundation rotation measured from the vertical axis(degrees) and maximum anticipated deflection at the groundline (inches)..... See drawings
3. Special Charpy requirements..... ACSE 48-19
4. Maximum diameter (flat-to-flat) at groundline (inches).....
 - a. Tangent: N/A
 - b. Angle: N/A
 - c. Deadend: N/A
5. Maximum taper (inches/foot) based on total difference between top and bottom diameters. N/A
6. Guy wire modulus of elasticity..... 25,000 KSI
7. a. Surface protection desired..... Galvanized
 - b. If painted, color desire.....
8. a. Climbing device desired..... Step Clips
 - b. Quantity of removable ladders or step bolts. 0
9. Unguyed angle poles to be raked or precambered..... N/A
10. Unguyed tangent deadends to be raked or precambered..... N/A
11. Grounding plate or nut..... NEMA 2 hole pad

Attachment C. Application Requirements
(Cont'd)

12. Component weight restrictions.....

N/A
13. Pole length restrictions.....

N/A
14. Delivery schedule.....

See Specifications
15. Free on board destination.....

X

16. Structures to be tested:

Structure Type	Load Cases to be Tested
a.	N/A
b.	
c.	

17. Miscellaneous

Final calculations and pole drawings be signed and sealed by the manufacturer's Professional Engineer Licensed in Missouri prior to delivery of the poles.

SPECIFICATIONS FOR STANDARD CLASS STEEL TRANSMISSION POLES

1. **SCOPE:** This specification covers the design, materials, welding, inspection, protective coatings, drawings and delivery of unguyed standard class, direct embedded, steel transmission poles. The poles are to be used in single pole, unguyed situations.

2. **DEFINITIONS**

Appurtenance – Any hardware or structural members that are attached to the pole to make a complete structure.

Bearing Plate – A plate at the base of the pole that is intended to transfer the vertical loads of the pole.

Charpy Impact – The impact properties of the material which are used to evaluate the susceptibility of structural steel to brittle fracture. See ASTM A370 and ASCE 48 for details.

Crook – A localized deviation from straightness that causes the centerline of one section of the pole not to align with the centerline of another section of the pole.

Circumferential Weld /C-weld – A weld perpendicular to the long axis of a structural member.

D/t – The ratio of the diameter of a tubular pole to the plate thickness.

Engineer – A registered or licensed person, who may be a staff employee or an outside consultant, and who provides engineering services. Engineer also includes duly authorized assistants and representatives of the licensed person.

Ground Collar – An additional steel plate jacket that encapsulates the portion of the buried pole immediately above and below the *groundline*.

Group of Bolt Holes – All of the holes in which an appurtenance will be attached.

Guyed Structure – A structure in which cable supports are used to increase its lateral load resistance.

Groundline – A designated location on the pole where the surface of the ground will be after installation of a direct embedded pole. The groundline location will be used to locate the *ground collar* and other attachments to the pole.

Flanged Connection/splice – A bolted type connection.

Factored Load – The maximum design load that includes the appropriate load factor specified.

In-Line Face – The face of the pole which “faces” an adjacent structure in the line.

Longitudinal Weld – A weld parallel to the long axis of a structural member.

Manufacturer – The company responsible for the fabrication of the poles. The manufacturer fabricates the poles based on the design drawings developed by the structural designer, which is the manufacturer’s engineer responsible for the structural design of the poles.

Load Factors (LF) – A multiplier, which is applied to each of the vertical, transverse and longitudinal structure loads to obtain a *factored load*.

Owner – The Rural Utilities Service borrower or owner's representative.

P-delta ($P-\Delta$) Moment – A measure of the increase in bending moment resulting from a structure’s displacement under load.

Pole Height – For this bulletin, this term is used interchangeably with *pole length*.

Pole Length – The length from the pole top to the bearing plate on the pole bottom.

Pole Sweep – The measure of deviation from straightness along the length of the pole.

Point of Fixity – The point where the maximum moment occurs. The actual location of this point is dependent on the characteristics of soils around the embedded portion of the pole. For this specification it will be assumed to be equal to 7 percent of the pole length.

Pole Twist – spiral rotation of a pole section relative to the pole end. It is caused by the residual stress in the steel as received from the mill, the clamping force holding the tube shells together and the heat applied during the seam welding process.

Slip Connection/splice – A telescoping type connection of two tapered tubular pole sections.

Standard Class Pole – A direct embedded steel pole that is designed according to a standardized strength and loading criteria established by the owner.

Taper – The change in diameter of a tubular section from its base to its top.

Tip Load – The horizontal load that is applied to the standard class pole at a distance of 2 feet from the pole top.

Yield Strength – The minimum stress at which a material will start to physically deform without further increase in the load or which produces a permanent 0.2 percent deformation. This is also known as the elastic limit of the material.

Ultimate Moment Capacity – The moment that is developed in the pole at the time the yield strength of the pole is realized.

w/t – Ratio of a flat width of a multisided pole to the thickness of the steel plate.

Weathering Steel – Steel that conforms to ASTM A588 or A871. This steel forms a natural protective oxide layer on the surface.

3. CODES AND STANDARDS

Codes, standards, or other documents referred to in this specification shall be considered as part of this specification. The following codes and standards are referenced:

- a. American Institute of Steel Construction (AISC), “Specification for the Design, Fabrication and Erection of Structural Steel for Buildings,” latest edition.
- b. American Society of Civil Engineers (ASCE) Standard, “Design of Steel Transmission Pole Structures,” ASCE 48, latest edition.
- c. American Society of Testing and Materials (ASTM), various standards, latest revision. Referenced ASTM specifications:

A6/A6M	Specification for General Requirements for Rolled Structural Steel Bars, Plates, Shapes, and Sheet Piling
A36/A36M	Specification for Carbon Structural Steel
A123/A123M	Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
A143	Practice for Safeguarding Against Embrittlement of Hot-Dip Galvanized Structural Steel Products and Procedure for Detecting Embrittlement
A153/153M	Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware
A325	Specification for High-Strength Bolts for Structural Steel Joints
A354	Specification for Quenched and Tempered Alloy Steel Bolts, Studs, and Other Externally Threaded Fasteners
A370	Test Methods and Definitions for Mechanical Testing of Steel Products

- | | |
|------------|--|
| A384 | Practice for Safeguarding Against Warpage and Distortion During Hot-Dip Galvanizing of Steel Assemblies |
| A570/A570M | Specification for Steel, Sheet and Strip, Carbon, Hot-Rolled, Structural Quality |
| A572/A572M | Specification for High-Strength Low-Alloy Columbium-Vanadium Structural Steel |
| A588/588M | Specification for High Strength Low-Alloy Structural Steel with 50 ksi Minimum Yield Point to 4 in. Thick |
| A595 | Specification for Steel Tubes, Low-Carbon, Tapered for Structural Use |
| A607 | Specification for Steel, Sheet and Strip, High-Strength, Low-Alloy, columbium or Vanadium, or Both, Hot-Rolled and Cold-Rolled |
| A673/A673M | Specification for Sampling Procedure for Impact Testing of Structural Steel |
| A871/A871M | Specification for High Strength Low-Alloy Structural Steel Plate with Atmospheric Corrosion Resistance |
| B695 | Specification for Coatings of Zinc Mechanically Deposited on Iron and Steel |
| B696 | Specification for Coatings of Cadmium Mechanically Deposited |
- d. American Welding society (AWS), Structural Welding Code, AWS D1.1, latest edition.
- e. American National Standards Institute (ANSI), National Electrical Safety Code, ANSI C2, latest edition.
- f. Society for Protective Coatings (SSPC, formerly Steel Structure Painting Council)/ National Association of Corrosion Engineers (NACE) Surface Preparations Specification, SSPC/NACE SP-6/NACE 3.

4. CONFLICT BETWEEN THIS SPECIFICATION, DRAWINGS, AND REFERENCES DOCUMENTS

In the event of conflict between this specification and the above referenced documents, the requirements of this specification shall take precedence. In the case of conflict between several referenced documents, the most stringent requirement shall be followed. If a conflict exists between this specification or the referenced documents and the attached drawings, the attached drawings shall be followed. If clarification is necessary, contact the owner.

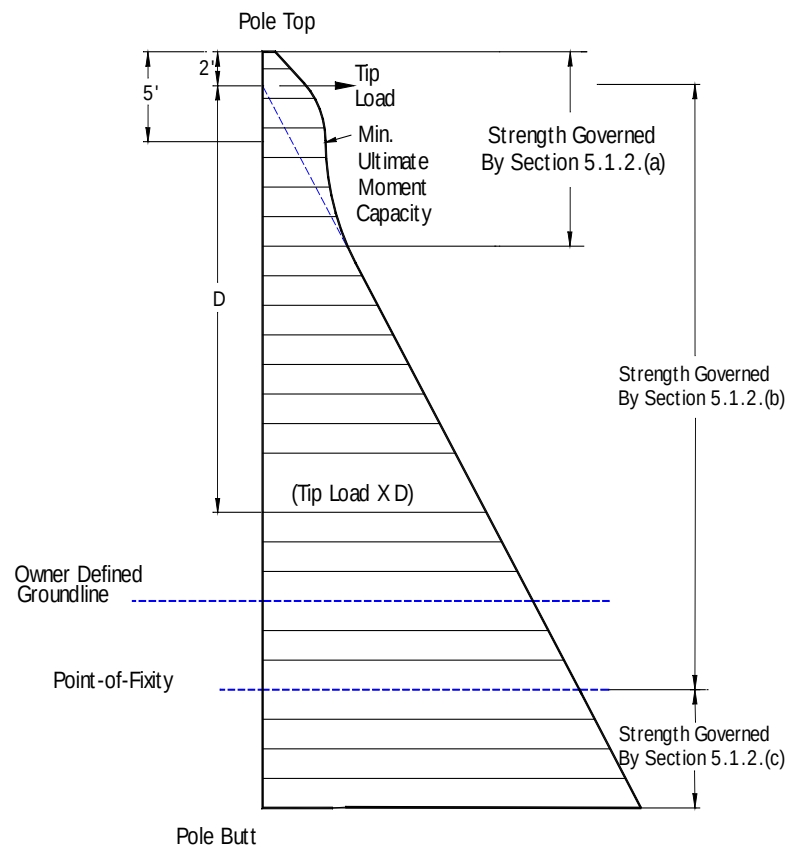
5. GENERAL REQUIREMENTS

The design, fabrication, allowable stresses, processes, tolerances, and inspection shall conform to ASCE Standard, "Design of Steel Transmission Pole Structures" (ASCE 48), latest edition, with the following additions and/or exceptions:

a. Design Requirements

- (1) Pole designs shall be prepared for the attached Standard Class design loads. The poles shall be designed to meet ASCE 48, "Design of Steel Transmission Pole Structures", design methods. The point-of-fixity shall be considered to be located at a distance from the pole bottom that is equal to 7 percent of the pole length. The pole shall be symmetrically designed such that the strength required in any one direction shall be required in all directions about the longitudinal axis.
- (2) Using the corresponding values in Table 1, the poles shall be designed for the following requirements as illustrated by Figure 1.
 - (a) The pole shall develop the minimum ultimate moment capacity required in Table 1 at a distance of five feet from the pole top.
 - (b) The pole shall develop the minimum ultimate moment capacity above the point-of-fixity that is calculated by multiplying the tip load in Table 1 by the distance to the tip load.
 - (c) The geometry and taper of the pole shall be uniform throughout their entire length (top to butt).

Figure 1
Minimum Ultimate Moment Capacity Diagram along the Pole



- (3) The poles shall be designed to withstand the specified tip loading in Table 1 without exceeding a pole deflection of 15 percent of the pole length above the point of fixity when tested in accordance with ASCE 48.
- (4) Overall length of poles shall be designed and manufactured in incremental lengths of 5 feet.

Table 1
Strength Requirements

Standard Class Designations for Steel Poles	Minimum Ultimate Moment Capacity At Five Feet From Pole Top (Ft.-Kip)	Horizontal Tip Load Applied 2 Ft from Pole Top (Lbs.)
S-12.0	96	12,000
S-11.0	88	11,000
S-10.0	80	10,000
S-09.0	72	9,000
S-08.0	64	8,000
S-07.4	57	7,410
S-06.5	50	6,500
S-05.7	44	5,655
S-04.9	38	4,875
S-04.2	32	4,160
S-03.5	27	3,510
S-02.9	23	2,925
S-02.4	19	2,405
S-02.0	15	1,950

- (5) Poles shall be designed for the loads generated from handling and erecting without causing permanent deformation or damage to the pole when handled according to the manufacturer's instructions. Handling and erecting loads shall include but not be limited to, a one-point (tilting) pickup and a two-point (horizontal) pickup.
- (6) The maximum design unit stress shall be the minimum yield strength as stated in applicable ASTM specifications for the particular application and types of loads, including load factors.
- (7) Minimum plate thickness for all pole components shall be 3/16 inch.
- (8) The owner shall provide the pole manufacturer with the load capabilities, attachment method, and attachment location of the appurtenances. The pole manufacture shall verify that the pole will not have a localized strength problem at the attachment point.
- (9) All poles shall have bearing plates. Bearing plates shall have diameter not more than 2 inches greater than the maximum diameter at the pole butt.
- (10) Galvanized poles shall have a drain hole at the bottom. This hole shall not be greater than 20 percent of the bottom plate surface area.

- (11) Grade and type of steel shall be uniform for the poles.
- (12) Ground collars to protect the pole groundline area from corrosive environments are required per Attachment B. Length of the ground collar shall be as specified in Attachment B.
- (13) Ground collars shall have a minimum thickness of 3/16 inch; shall be centered at the groundline; and shall not be considered in strength calculations. A seal weld shall be provided around the ground collar at the top and bottom of the ground collar.
- (14) The top of the pole shall be permanently covered with a structural steel plate that is bolted or otherwise permanently attached to the pole. The pole shall be delivered with the pole cover attached in place.
- (15) Lifting lugs are optional. The manufacturer shall supply all guidelines for handling and erection of poles and arms.
- (16) In the design of connections for vangs, brackets, or stiffeners attached to the pole shaft, care shall be taken to distribute the loads sufficiently to protect the wall of the pole from local buckling.
- (17) Weathering steel structures shall be designed to eliminate water and refuse traps. The tubular sections shall be sealed from moisture entering the inside of the pole. Factory drilled holes shall be plugged to prevent moisture intrusion during shipping. Connections shall be designed to reduce the effect of pack-out by preventing moisture from entering the joint or by designing the connection to allow moisture to easily drain off.
- (18) Plastic plugs shall be installed in all nuts welded to the structure and all tapped holes.
- (19) Pole design and design calculations shall be the responsibility of the manufacturer.
- (20) Poles shall be designed with the minimum number of joints.
- (21) Field welding is not normally permitted. In rare instances, it will be permitted to make minor repairs. All welds must be approved by the owner and must follow the manufacturer's direction.
- (22) Flange connections for weathering steel poles shall be designed to avoid pack-out.
- (23) Application requirements: (See Attachment B of this Specification)

b. Materials

- (1) All materials shall comply with the applicable requirements of ASTM specifications. Any modifications from ASTM specifications must be approved by the owner or the owner's representative.
- (2) Steel utilized for the purposes of making poles shall conform with the following ASTM Specifications: ASTM A36, ASTM A570, ASTM A572, ASTM 588, ASTM A607, ASTM A871 or ASTM A595, and must be qualified to the requirements contained in ASTM A6/A6M-96b.
- (3) Structural plate, and weld material, shall conform to ASTM A370 and ASCE 48. Plates shall be heat-lot tested in conformance with ASTM A 673 Charpy V-Notch Impact test for properties of 15 ft-lbs. at -20°F.
- (4) For galvanized structures, steel used for the pole shaft and arms shall have a silicon content less than .06 percent.
- (5) Bolts and nuts shall conform, as applicable to ASTM A307, ASTM A325, and ASTM A354. Locknuts or American Nut Company (ANCO) type self-locking nut shall be provided for each bolt. Locknuts shall be the galvanized MF type or ANCO type. Other types of nut locking devices must be approved by the owner.

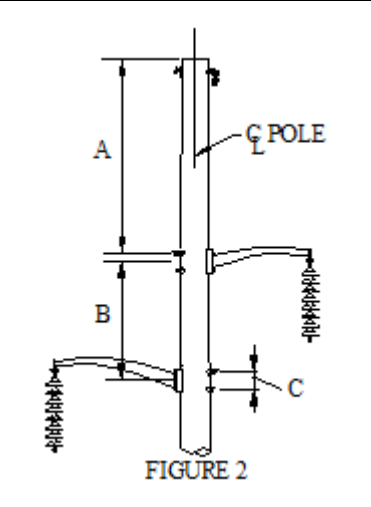
c. Fabrication

- (1) All welding shall be in accordance with the American Welding Society Code AWS D1.1, latest edition. Welders shall be qualified in accordance with AWS D1.1 welding procedures.
- (2) One hundred percent penetration welds shall be required in, but not limited to, the following areas:
 - Circumferential welds (C-welds) joining structural members;
 - Longitudinal welds in the female portion of the joint within the slip joint area plus 6 inches;
 - Welds at butt joints with back-up strips; and
 - Longitudinal welds within 3 inches of C-welds, flange welds, base welds and ends of tubes.
- (3) Full penetration, or equivalent 90 percent partial penetration with fillet overlay to develop the shaft capacity, shall be used for arm-to-arm brackets, vang-to-plate reinforcement, and arm box joints.

- (4) Quality and acceptability along the entire length of full penetration welds shall be determined by visual and ultrasonic inspection.
- (5) All other penetration welds shall have 60 percent minimum penetration. Quality and acceptability of all welds other than full penetration welds shall be determined by visual inspection, supplemented by magnetic particle, ultrasonic, or dye penetrant inspection.
- (6) All weld back-up strips shall be welded continuous for the length of the welds. Care shall be exercised in the design of welded connections to avoid areas of high stress concentration that could be subject to fatigue or brittle fractures.
- (7) Field welding shall not be permitted except with owners, or owner's representative's approval, and the manufacturer's direction in repairing the pole.
- (8) All parts of the pole shall be neatly finished and free from kinks or twists. All holes, blocks, and clips shall be made with sharp tools and shall be clean-cut without torn or ragged edges.
- (9) Before being laid out or worked in any manner, structural material shall be straight and clean. If straightening is necessary, it shall be done by methods that will not compromise the steel.
- (10) Shearing and cutting shall be performed carefully and all portions of the work shall be finished neatly. Copes and re-entrant cuts shall be finished neatly.
- (11) All forming or bending during fabrication shall be done by methods that will prevent embrittlement or loss of strength in the material being worked.
- (12) Holes for connection bolts shall be 1/8 inch larger than the nominal diameter of the bolts. Holes in the flange plates for bolted splices shall be 1/8 inch larger than the bolt diameter. The details of all connections and splices shall be subject to the approval of the owner or the owner's representative.
- (13) Holes in steel plates which are punched must be smooth and cylindrical without excessive tear out or depressions. Any burrs that remain after punching shall be removed by grinding, reaming, etc.
- (14) Holes of any diameter may be drilled in plate of any thickness. Care shall be taken to maintain accuracy when drilling stacks of plates.
- (15) Holes may be made by use of a machine guided oxygen torch. Flame cut edges shall be reasonably smooth to minimize stress concentrations.
- (16) Field drilled holes must be approved by the owner. If the manufacturer is aware of the owner's intent to field drill holes, the manufacture must supply a galvanizing touch-up kit for galvanized poles or a silicon sealant for weathering steel poles.

d. Tolerances

Manufacturing tolerances shall be limited to the following:

Pole Length	<u>One piece:</u> ± 2 inches, or ± 1 inch $\pm 1/8$ inch per 10 feet of length, whichever is greater (i.e. - 120-foot pole shall have a length of 120 feet $\pm 2\frac{1}{2}$ inches)	
	<u>Assembled pole with flange connections:</u> same as for one piece	
	<u>Assembled pole with slip joint connections:</u> The accumulation of the slip joint tolerances not to exceed – 6-inch, +12 inch	
Pole Diameter	-0 inch, +1/4 inch	
Pole End Squareness	$\pm 1/2$ inch per foot of pole diameter	
Pole Sweep	1/8 inch per 10 feet of pole length	
Pole Twist	Limit twist to $1^\circ/10'$ of length, not to exceed 4° /tube segment. Overall structure twist shall be limited to 10° for embedded and 6° for base plated structures. Connections for all appurtenances to the pole shall account for the pole twist and should align vertically.	
Slip Joint tolerances	Tolerances per manufacturer's recommendations and total pole length requirements above. See Paragraph 5.g.	
Pole Taper	See paragraph 5.a.(2)(c) .	
Location of Groups of Bolt Holes from Top of Pole	± 1.0 inches (tolerance to dimension A, Figure 2)	 FIGURE 2
Location of Centerline Between Groups of Bolt Holes	± 1.0 inch (tolerance to dimension B, Figure 2)	
Location of Holes Within a Group of Bolt Holes	$\pm 1/8$ inch (tolerance to dimension C, Figure 2)	
Bolt Hole Diameter	See Paragraph 5.c.(12) for hole diameters	
Bolt Hole Alignment	Not to vary from the longitudinal pole centerline of that group of holes by more than 1/16 inch	
Location of Identification Plate	± 2.0 inch	

e. Grounding

- (1) A grounding connection shall be welded to the pole shaft, 18 inches above the groundline or 6 inches above the ground collar. The grounding connection will be either the two-hole National Electrical Manufacturers Association (NEMA) pad, or a nut, or a threaded insert installed in the pole, or an approved alternative.
- (2) Grounding pad face shall not be painted or covered with other coatings. The grounding nut thread and grounding pad threads shall be protected from coatings.
- (3) Threaded inserts installed for grounding shall be made of Type 316 stainless steel and provided with standard ½ inch, 13 UNC threads (Unified Coarse threads). Threads shall be protected from unapproved coatings.

f. Climbing Devices

- (1) Design Loads:
 - (a) Step Bolts and removable steps: The step bolts, removable steps and attachment to the pole shall be designed to support a minimum of a 300-pound worker and equipment multiplied by a load factor as defined in paragraph 5.f.(2). The load shall be at the outer edge of the step or bolt.
 - (b) Removable Ladders: The ladder and each attachment to the pole shall be designed to support a minimum of a 300-pound worker and equipment multiplied by a load factor as defined in paragraph 5.f.(2). The load shall be at the outer edge of the step or bolt.
- (2) Load Factor: A load factor of 2.0 shall be applied to the design loads in 5.6.1. These loads shall be supported without permanent deformation.
- (3) Location: Climbing devices shall start 8 feet above groundline and extend to the pole top unless specified by the owner. The climbing device shall be spaced such that each step is 1 foot 6 inches apart and orientated to provide maximum ease of climbing. They shall be located to avoid interference with other attachments.
- (4) Finish: Step bolts, removable steps, and removable ladders shall be hot dipped galvanized. For weathering steel poles, step bolts may be weathering steel.

- (5) Intent of steps/ladder: This system is intended for climbing the pole and working on the structure. It is not intended to replace the worker's fall arrest system.

g. Splices

- (1) Poles shall be designed with a minimum number of joints. Field welding shall not be allowed as part of the design of a new pole. The shaft joints to be made in the field shall be slip joints or bolted flange joints. Slip joints shall be designed for a nominal lap that will develop the full required design strength of the pole at that point. The minimum lap shall meet the requirements of ASCE 48. All welds on both sections of the pole, in the area of the splice, shall be complete penetration welds for at least a length equal to the maximum lap dimension.
- (2) Manufacturer shall verify slip joint fit, through dimensional measurement or actual fit-up, before shipment. Joints should not interfere with threaded inserts, step nuts, ladder clips, or jacking nuts.
- (3) Sufficient jacking lugs and permanent orientation marks shall be provided at all slips joints to ensure proper alignment and complete overlap of the joint.
- (4) The axis of the pole shall not be distorted after the pole is mated. Shims shall not be allowed to straighten the pole unless approved by the owner. The owner reserves the right to reject a pole based on the improper mating of a pole splice.

h. Appurtenances

- (1) Appurtenance material shall be supplied by the owner. The owner shall provide the pole manufacturer connector and/or member locations, orientations, size, types, and strength capacities.
- (2) The steel pole manufacturer and the owner shall work together to assure design coordination and fit up of all appurtenance connections and members to poles. Also refer to paragraph 5.a.(8) of this specification.

i. Finishes

- (1) The following finishes are acceptable: Galvanizing, zinc primer combined with paint, weathering steel, and a below grade coating.
 - (a) Galvanizing – All poles and structural components which are hot-dip galvanized shall meet all the requirements of ASTM A123 or ASTM A153. Measures shall be taken to prevent warping and

distortion according to ASTM A384 and to prevent embrittlement according to ASTM A143. Poles made of ASTM A588 steel shall not be galvanized due to the high silicon content of the steel. One gallon of zinc enriched paint shall be provided with each five poles.

- (b) ~~Zinc Primer and Painting—Poles which are to be painted shall be hermetically sealed to prevent corrosion of interior surfaces. After shot or sand blasting and cleaning in accordance with the surface preparations specification, SSPC/NACE SP-6/NACE 3, a zinc primer of 3 mils dry film thickness (DFT) and two coats of finish paint, each 3 mils DFT shall be applied to all exterior surfaces in accordance with the paint supplier's recommendations. One gallon each of primer and finish paint shall be supplied with each five poles. A guarantee against flaking or fading of the paint for a minimum of 5 years shall be provided.~~
 - (c) ~~Weathering Steel—Steel shall conform to ASTM A588 or A871. After fabrication, poles made of weathering steel shall be cleaned of oil, scale, etc., in accordance with the surface preparation specification SSPC/NACE SP-6/NACE 3, to ensure uniform and rapid formation of the protective oxide layer.~~
 - (d) Coatings for the Embedded Portion of the Pole A minimum 16 mil DFT of two component hydrocarbon extended polyurethane coating that is resistant to ultraviolet light shall be applied on the exposed surface of the embedded portion of the pole. The coating shall extend from the butt to 2 inches below the top of the ground collar, or 16 inches above groundline. Other coatings shall be approved by the owner prior to their use. One-quart container of touch up shall be provided with each five poles.
- (2) Bolts and nuts with yield strengths under 100,000 psi shall be hot-dip galvanized per ASTM A153 and ASTM A143, or mechanically coated with zinc in accordance with ASTM B695, Class 50. Bolting materials with yield strengths in excess of 100,000 psi shall not be hot-dip galvanized. Instead, they shall be painted with zinc enriched paint or mechanically coated with zinc per ASTM B695, Class 50. Bolts and nuts made from weathering steel do not require a galvanizing coating.
 - (3) Compliance with coating thickness requirements shall be checked with a magnetic thickness gauge.

j. Markings

- (1) Each Pole shall be permanently marked on the pole shaft 60 inches above groundline and on the bottom side of the bearing plate with the following identifying information, unless specified otherwise by the owner:
 - Manufacturer's name
 - Month and year of manufacture
 - Length and class of pole
 - Ultimate moment capacity of the pole
 - Owner's name
 - Pole weight
- (2) The identification information listed above shall be permanently marked on the transverse side of the pole. The method of identification shall be approved by the owner. The lettering shall be at least 3/4 inch in height.
- (3) Information on the butt of the pole may be with permanent paint applied with a 1/2-inch-wide brush. Paint identification markings may not be used in any other location.
- (4) Each section of a spliced pole shall be marked such that the intended mate section can be easily identified. The markings shall be permanent and legible and contain at least the following information:
 - Pole Length and Class (each section and total pole); and
 - Structure number (if known).

k. Inspection and Testing

- (1) The owner and the owner's representative shall have free entry at all times during fabrication, to all parts of the manufacturer's plant to inspect any part of the production of the poles covered by this specification.
- (2) Steel members that are bent or warped or otherwise improperly fabricated shall be properly repaired or replaced at the sole discretion of the owner.
- (3) The cost of tests made by the manufacturer (except full scale load tests on poles), including cost of the certified test reports shall be considered included in the bid price.
- (4) The manufacturer shall make tests in accordance with ASTM A370 and A673 to verify that the material used in the structures meets the impact properties.

- (5) Mill test reports showing chemical and physical properties of all material furnished under this specification shall be maintained by the manufacturer for a period of 5 years and shall be traceable to the pole.
- (6) All plates over 1-1/2 inches thick shall be ultrasonically tested to assure against defects that could lead to lamellar tearing.
- (7) Qualification of welders or welding operators will be verified as to conformance with the provisions of AWS D1.1.
- (8) The manufacturer shall make certified welding reports for each pole. The reports covering welding shall include all welds of a pole. Each weld shall be clearly identified; and the report shall consist of the method of testing, whether the weld is acceptable, the identification of the pole, the date, and the name and signature of the inspector.

1. Full Scale Structure Testing

- (1) The poles that are to have full-scale load tests performed on them are listed in Attachment B. Cost for such test shall be the responsibility of the owner, shall be separated from the manufacturer's bid, and shall be negotiated in advance of any test preparation.
- (2) Details of the test procedures and methods of measuring and recording test loads and deflections shall be specified by the manufacturer prior to testing and shall be subject to the review and approval of the owner or the owner's representative.
- (3) Deflections shall be recorded in the transverse and longitudinal directions when applicable. Deflection measurements shall be taken under the no load condition both before and after testing.
- (4) Material procurement for test poles shall be identical to material procurement procedures for regular production run poles.
- (5) A full report listing results shall be submitted after completion of all testing. Copies of mill test reports shall be included in the load test report. The report shall also include a complete description of the load tests with diagrams and photographs.
- (6) The owner or the owner's representative reserves the right to be present during testing and shall be notified 2 weeks prior to the start of pole test.

6. SHIPPING AND DELIVERY

a. Shipping

- (1) Each shipment shall be accompanied by a bill of materials, identifiable by pole type and number. Bolts and miscellaneous hardware will be identified by the list for match up with the respective pole shaft. All parts that are required for any one pole shall be in one shipment, if possible.
- (2) The owner and owner's representative shall be notified prior to shipment that such shipment is to take place, and they reserve the right to inspect the components prior to shipment. The notification shall give quantities, weight, name of common carrier used, and expected time of arrival.
- (3) Salt-treated wood blocking and urethane foams shall not be used when shipping or storing weathering steel poles.
- (4) Transportation and site handling shall be performed with acceptable equipment and methods by qualified personnel. The manufacturer shall exercise precaution to protect poles against damage in transit.
- (5) Handling instructions shall be included with the pole shipment (if special handling is required).

b. Delivery

- (1) The owner may take delivery at a designated location with the delivering carrier's equipment. The manufacturer shall coordinate with the owner to ensure smooth and efficient delivery of poles.
- (2) The owner will provide all labor, equipment, and materials for the unloading of poles at the project site. A pole is considered delivered when the pole is lifted from the trailer or semitrailer of the delivery carrier.

7. DRAWINGS AND INFORMATION TO BE SUPPLIED BY THE MANUFACTURER

a. Information to be supplied with the proposal (See Attachment C)

- (1) Pole diameter at the top, groundline, and bottom.
- (2) The pole taper of each pole in inches/foot.
- (3) The calculated weight of each class and length of pole.
- (4) General information about each pole length and class including tip load, location of point of fixity, type of steel used for the pole (ASTM number

and yield), cross sectional shape, and connection details of multiple piece poles (slip joints/flange joints/welded to be one piece).

- (5) Calculated groundline and point-of-fixity reactions due to the tip loadings (including shear, moment, and axial reactions) in order to demonstrate conformance with the requirements of 5.1.1 and 5.1.2.
 - (6) Description of pole shaft cross section including thickness of the plate at the bottom, groundline, and at the top.
 - (7) For each standard class pole, provide pole top deflection using the specified tip loading in order to demonstrate conformance with the requirements of and 5.1.3.
 - (8) The cost of each pole by size and length. Also, the total order cost for each class and length of pole.
- b. Documentation to be supplied for the Owner's Approval Prior to Fabrication (as requested by the owner): Documentation includes final design calculations for the pole shaft at 5-foot intervals and will be based upon the pole loading shown in Table 1.

The following information shall be supplied:

- Total shear forces
 - Moment
 - Design Stress, Allowable stress, and Stress ratio
 - Section moduli
 - Cross-sectional area
 - Deflection at the pole top due to tip load
 - Detail drawings for each structure type giving weights of structure
 - Bill of materials list (if any)
 - Assembly instructions and erection drawings
(Slip joint lengths and allowable tolerances)
 - Special handling instructions (if required)
- c. Test Reports (as requested).
- Certified mill test reports for all structural material.
 - Certified welding reports for each pole.
 - Impact property test reports showing that the material used in the poles meets the impact properties.
 - Test reports on coating thickness.
 - Report of pole testing, when required, including photographs, and diagrams.

8. APPROVALS, ACCEPTANCE AND OWNERSHIP

- a. Final designs must be approved by the owner or owner's representative before material ordering and fabrication. Material ordering and fabrication prior to approval will be at supplier's risk. It is understood that award of this contract does not constitute acceptance of design calculations submitted with the bid, if corrections are required in the final structure designs due to manufacturer's errors, omissions, or misinterpretations of the specifications, the quoted price shall not change. Approval of the drawings and calculations by the owner or the owner's Representative does not relieve the supplier of responsibility for the adequacy of the design, correctness of dimensions, details on the drawings, and the proper fit of parts.
- b. After delivery, the poles will be inspected and shall be free of dirt, oil blisters, flux, black spots, dross, teardrop edges, flaking paint or zinc; and in general, shall be smooth, attractive, and unscarred. Poles not meeting this requirement shall be repaired or replaced by the manufacturer at no additional cost to the owner. Final decision to repair rather than replace a pole shall be at the owner's sole discretion.
- c. All final drawings shall become the property of the owner, who shall have full rights to reproduce drawings and use them as the owner sees fit.

9. LIST OF ATTACHMENTS TO THIS SPECIFICATION:

Attachment A, and B to be completed by the engineer. Attachment C to be completed by the manufacturer.

- ~~Attachment A, Structure Dimensions and Pole Framing Drawings~~
- Attachment B, Application Requirements
- ~~Attachment C, Bid Summary~~

Attachment B. Application Requirements
(To be Completed by the Engineer)

1. Type of finish of the pole (indicate by checking one)
 Weathering _____
 Galvanized X _____
 Zinc primer and paint _____
2. Special Charpy requirements ACSE 48-19 _____
3. Surface protection desired for embedded portion of the pole (indicate by checking one or both)
 Polyurethane Coating X _____
 Anodes _____
4. Climbing device type (indicate by checking one)
 Step Bolts X _____
 Ladder _____
 Removable Steps _____
5. Location of climbing device SEE GENERAL SPECIFICATIONS _____
6. Length of ground collar 4ft _____
7. Grounding plate or nut Nema 2 Hole Pad _____
8. Delivery schedule See Specifications _____
9. Free on board destination X _____
10. Pole test (if required) N/A _____
11. Additional Requirements (below) N/A _____

Exhibit C:
Geotech Report

GEOTECHNICAL ENGINEERING REPORT
MM REALIGN – TRANSMISSION POLE
REPUBLIC, MISSOURI

Prepared for:

Toth & Associates
1550 East Republic Road
Springfield, Missouri 65804

Prepared by:



Springfield, MO
4168 W. Kearney Springfield, MO 65803
Call 417.864.6000 Fax 417.864.6004
www.ppimo.com

PROJECT NUMBER: 24-2147

May 27, 2025

May 27, 2025

Toth & Associates
1550 East Republic Road
Springfield, Missouri 65804

Attn: Mr. Joe Rogers, Contract & Procurement Specialist
Email: jrogers@tothassociates.com

RE: Geotechnical Engineering Report
MM Realign – Transmission Pole
Republic, Missouri
PPI Project Number: 24-2147

Dear Mr. Rogers:

Attached, please find the report summarizing the results of the geotechnical investigation conducted for the proposed MM Realign – Transmission Pole in Republic, Missouri. We appreciate this opportunity to be of service and if you have any questions, please don't hesitate to contact this office.

PALMERTON & PARRISH, INC.
By:



Taylor Anderson
Taylor Anderson, P.E.
Geotechnical Engineer
May 27, 2025

PALMERTON & PARRISH, INC.
By:

Brandon R. Parrish
Brandon R. Parrish, P.E.
Vice-President

Submitted: One (1) Electronic .pdf Copy

BRP/TA/SR

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APPENDICES

Appendix I - Figures
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EXECUTIVE SUMMARY

A Geotechnical Investigation was performed for the MM Realign – Transmission Pole located in Republic, Missouri. It is understood that the Missouri Department of Transportation plans a line modification across Commercial Avenue as a part of the Highway MM Realignment. The structure is anticipated to consist of a steel monopole on a drilled pier foundation.

Based upon the information obtained from the boring drilled and subsequent laboratory testing, the site is suitable for the proposed Transmission Line Structure. Important geotechnical considerations for the project are summarized below. However, users of the information contained in the report must review the entire report for specific details pertinent to geotechnical design considerations.

- Surficial conditions within the boring consisted of lean clay fill, or fat clay with varying amounts of gravel/sand and extended to auger refusal on limestone at a depth of 7.5 ft.;
 - Drilled Pier foundation recommendations are presented in Section 8.0 and Section 9.0 of this report;
 - The project site classifies as a Site Class C depending in accordance with Section 1613 of the 2012 International Building Code (IBC); and
 - Palmerton & Parrish, Inc. should be retained for construction observation and construction materials testing. Close monitoring of foundation installation work is considered critical to achieve satisfactory foundation performance.
-

GEOTECHNICAL ENGINEERING REPORT
MM REALIGN – TRANSMISSION POLE
REPUBLIC, MISSOURI

1.0 INTRODUCTION

This is the report of the Geotechnical Investigation performed for the proposed MM Realign – Transmission Pole in Republic, Missouri. This investigation was based upon a letter proposal dated April 17, 2025, and authorized by Purchase Order 2025043001 dated April 30, 2025. The approximate site location is shown below:



The purpose of the Geotechnical Investigation was to provide information for foundation design and construction planning. Palmerton & Parrish Inc.'s (PPI) scope of services included field and laboratory investigation of the subsurface conditions in the vicinity of the proposed Transmission Line structure, engineering analysis of the collected data, development of recommendations for foundation design and construction planning, and preparation of this engineering report.

2.0 PROJECT DESCRIPTION

Item	Description
Site Layout	See Figure 1 : Boring Location Plan
Project Scope	It is understood that the Missouri Department of Transportation plans a line modification across Commercial Avenue as a part of the Highway MM Realignment.
Structures and Design Loadings	The structure is anticipated to consist of a steel monopole on a drilled pier foundation. Foundation loads are anticipated to be on the order of 37 kips vertical loading, 36 kips shear loading, and 1,320 kip-ft moment loading.
Foundation Types	Concrete drilled pier for the support of new pole structure.

3.0 SITE DESCRIPTION

Item	Description
Physical Location	East of North Commercial Avenue, approximately 0.1 miles south of East Orr Street
County	Greene
Current Ground Cover	Grass or rock covered.
Drainage Characteristics	Poor to fair.

4.0 SITE VISIT

A site visit was performed on May 23, 2025, by Mr. Taylor Anderson, P.E., to the pole location. The boring location is located just off Commercial Avenue. The site is relatively flat near the boring location but contains some gently rolling hills further away. The boring location is located off an existing ditch by the road. While flooding is not anticipated at this site, during periods of wetter weather, surficial saturated soils may be encountered due to the runoff and drainage from weather events. However, the area is grass covered, and there was little to no erosion was noted in the area. Photographs taken during the site visit are presented in [Appendix VI](#).

5.0 SUBSURFACE INVESTIGATION

Subsurface conditions were investigated through completion of one (1) subsurface boring and subsequent laboratory testing.

5.1 Subsurface Borings

The subsurface boring drilled was identified as Boring 1. The boring location was selected by Toth and Associates and staked in the field by PPI using coordinates provided by Toth and Associates and offset by PPI as required based upon existing utilities and access. The approximate boring location is shown on Figure 1, Boring Location Plan. The Missouri One-Call System was notified prior to the investigation to assist in locating buried public utilities.

A log of the boring showing descriptions of soil and rock units encountered, as well as results of field tests, laboratory tests, and a “Key to Symbols” are presented in Appendix II.

The boring was drilled on May 14, 2025, using 4.5-inch O.D. continuous flight augers powered by a CME 550X ATV-mounted drill-rig. Soil samples were collected at 2.5 to 5-foot centers during drilling. The soil was sampled using split spoon samples collected while performing the Standard Penetration Test (SPT) in general accordance with ASTM D1586. Please refer to Appendix III for general notes regarding the boring log and additional soil sampling information.

5.1.1 Rock Coring

When bedrock was encountered in the boring, rock coring procedures were implemented. Continuous rock cores were obtained using an NQ₂ double tube wireline core barrel with a diamond-impregnated bit. The rock core obtained was placed in core boxes in the order of recovery. Rock core samples were logged and photographed by a geologist or geotechnical engineer from PPI's staff. The percentage of core retrieved from each coring interval or “run” is recorded on the log forms. In addition, the rock quality designation (RQD) of the rock core was determined. “RQD” is determined by dividing the sum of the length of all individual

pieces of rock core 4 in. or longer by the length cored in a single run. Bedrock with RQD values of 90 percent or more is termed excellent, 75 to 90 percent good, 50 to 75 percent fair, 25 to 50 percent poor, and 0 to 25 percent very poor.

5.2 Laboratory Testing

Collected samples were sealed and transported to the laboratory for further evaluation and visual examination. Laboratory soil testing included the following:

- Moisture Content (ASTM D2216);
- Unconfined Compressive Strength of Rock (ASTM D7012);
- Atterberg Limits (ASTM D4318); and
- Pocket Penetrometers.

Laboratory test results are shown on the boring log in [Appendix II](#) and are summarized in the following table.

Depth (ft.)	Liquid Limit (LL)	Plastic Limit (PL)	Plasticity Index (PI)	Moisture Content (%)	USCS Symbol
3.5	105	32	73	54.2	CH

5.3 Rock Core Laboratory Testing

Rock core unconfined compressive strength testing was performed upon select samples and are presented in [Appendix IV](#) and are summarized in the table below.

Start Depth (ft.)	Unit Wt. (pcf)	Unconfined Compressive Strength			Rock Type	Relative Rock Hardness
		(ksf)	(psi)	(tsf)		
9.3	164.1	1,071	7,444	535	Limestone	Moderately Hard
13.5	165.4	1,414	9,825	707		
18.3	166.9	1,113	7,732	556		

5.4 Corrosion Testing

Corrosion testing was performed on the samples in the upper 9 feet of the subsurface exploration. Samples were sent to Midwest Laboratories to be performed. Below is

a summary of the samples with their results for corrosion testing. Corrosion testing results are presented in Appendix V.

Boring	Depth (ft.)	Oxidation Reduction Potential (mV)	Resistivity (ohm/cm)	Sulfides	Chloride ¹ (mg/L)	Sulfate (mg/L)	Conductivity (μS/cm)	pH S.U.
1	0 to 5	243	2,940	Absent	47.2	8.4	340	7.83
	5 to 9	192	3,610	Absent	36.3	8.1	277	7.65
1. N.D. = Not Detected								

5.4.1 Corrosive Potential of Soil

Based on the results of the laboratory testing, the average corrosive potentials and degradation potentials of the soils are summarized in the tables below.

Corrosion Potential of Steel							
Boring	Depth (ft.)	Resistivity (ohm/cm)	Chloride ¹ (ppm)	pH S.U.	Corrosion Potential ²		
					Resistivity	Chloride	pH
1	0 to 5	2,940	47.2	7.83	Moderate	Moderate	Mild
	5 to 9	3,610	36.3	7.65			
1. N.D. = Not Detected 2. Each column is to be used independently when evaluating potential per Palmer, J.F. (1974) "Soil Resistivity Measurements and Analysis", Materials Performance, Vol 13.							

Degradation Potential of Concrete ¹				
Boring	Depth (ft.)	Sulfate (ppm)	Exposure	Special Cement Type
1	0 to 5	8.4	Mild	None
	5 to 9	8.1		
1. Source: ACI 201.2 “Guide to Durable Concrete” Table 2.2.3				

6.0 GEOLOGY

The general site area is underlain at depth by the Mississippian Age Burlington Limestone Formation. This unit characteristically consists of coarse-grained gray limestone, which is nearly pure calcium carbonate. Isolated chert nodules and discontinuous chert layers are present throughout the formation. The upper surface of this limestone unit is generally irregular due to the effects of differential vertical weathering and solution activity. Limestone pinnacles, some of which are 10 to 15 ft. high, are common in the general area. In upland areas, overburden soils are usually composed of red clay and chert and

are residual having developed from physical and chemical weathering of the parent limestone. The chert fragments were interbedded with the limestone, but are much more resistant to weathering and retain rock-like properties. The contact between comparatively unweathered bedrock and the residual soils is usually abrupt.

The general site area is located within the Ozarks Physiographic Region of Missouri, which is characterized by rugged to rolling hill terrain, meandering streams and karst topography. Karst topography forms over areas of carbonate bedrock where groundwater has solutionally enlarged openings to form a subsurface drainage system. Springs, caves, losing streams and sinkholes are common in karst areas. Sinkholes are defined as a depression in the landscape with an internal drainage system.

Based upon readily available digital topographic information, as well as conditions encountered within the borings drilled, no indications of sinkhole activity was identified. However, the Owner and contractor should be aware that it is possible for karst features to be encountered at the project site during construction. If a karst feature is identified during site grading, PPI should be contacted immediately for evaluation on a case-by-case basis.

7.0 GENERAL SITE SUBSURFACE CONDITIONS

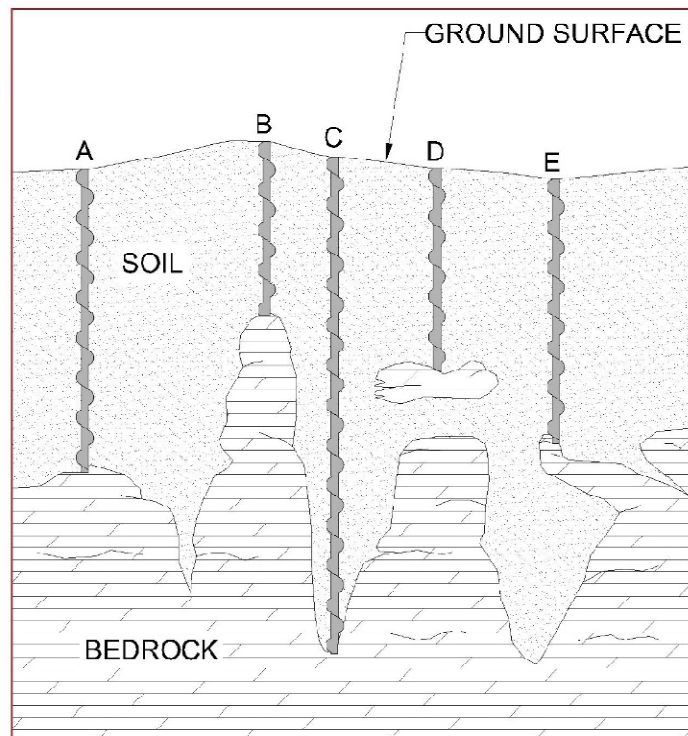
Based upon subsurface conditions encountered within the boring drilled at the project site, generalized subsurface conditions are summarized below. Soil stratification lines on the boring log indicate approximate boundary lines between different types of soil units based upon observations made during drilling. In-situ transitions between soil and some rock types are typically gradual.

7.1 Soils

Based on the results of the subsurface exploration, surficial soils primarily consist of brown lean clay fill (CL) to a depth of 2 ft. Underlying the existing fill was fat clay (CH) soils with various amounts of gravel and sand, and extended to a depth of 7.5 feet below the surface to limestone bedrock. The clay soils were noted as medium stiff to stiff in-situ.

7.2 Auger Refusal

Auger refusal is defined as the depth below the ground surface at which a boring can no longer be advanced with the soil drilling technique being used. Auger refusal is subjective and is based upon the type of drilling equipment and types of augers being used, as well as the effort exerted by the driller. Several different auger refusal conditions are possible in the general site area. These conditions are represented graphically in the adjacent figure: (A) on the upper surface of continuous bedrock, (B) on rock “pinnacles”, (C) in widened joints that may extend well below the surrounding bedrock surface, (D) slabs of unweathered rock suspended in the residual soil matrix, or “floaters”, or (E) on the upper surface of discontinuous bedrock.



Note: The bedrock conditions illustrated above are for reference only and do not indicate conditions encountered at the project site.

Due to the possibility that some or all of these features exist at this project site, estimating the exact quantity of rock excavation is difficult. Linear interpolation of apparent bedrock elevations based upon the boring data is often used but can misrepresent actual rock removal quantities where such anomalies exist.

7.3 Bedrock

The depth to top of bedrock was 7.5 feet below the existing ground surface. PPI extended the boring using augers into the limestone to assist in confirming auger refusal prior to implementing rock coring methods. Top of bedrock depths and bedrock types are summarized in the table below. Photographs of rock core are also presented below.

Boring	Top of Bedrock		Start of Rock Core	Rock Core Obtained (ft.)	Rec RQD (%)
	Depth (ft.)	Type	Depth (ft.)		
1	7.5	Limestone	9.0	10.0	$\frac{100-100-100}{77-100-100}$



7.4 Groundwater

Shallow groundwater was not observed in the borings on the date drilled down to top of bedrock. **Due to the use of fluids in rock coring, groundwater levels were not observed past the start of rock coring or 24-hour groundwater readings.** Groundwater levels should be expected to fluctuate with changes in site grading, precipitation, and regional groundwater levels. Groundwater may be encountered at shallower depths during wetter periods. Development of perched groundwater at the soil-bedrock contact can occur in the general site area.

8.0 TRANSMISSION LINE FOUNDATIONS – DESIGN RECOMMENDATIONS

The new Transmission Line structure may be supported on a drilled pier foundation bearing in bedrock. The final Site Layout is not known at this time, but subsurface conditions can vary, even within relatively short horizontal distances. Drilled piers should have the following minimum depth:

- For drilled piers bearing in bedrock, piers should be embedded a minimum of 6 feet below the existing ground surface or penetrate competent bedrock at least 1 ft. into bedrock;
- At a minimum, pier depths should be 3 times the pier diameter; and
- Final drilled pier depth will likely be deeper to resist design loads.

Drilled piers should be observed in accordance with the recommendations of this Report.

8.1 Bearing and Uplift Capacity

The Design Parameters summarized in the tables below may be utilized for Bearing and Uplift Capacity Design for drilled piers constructed as outlined in this Report. The Design Parameters below may be utilized in the computer software program CAISSON for bearing and uplift capacity design of drilled pier foundations. The tables below are presented on a “per boring” basis, based upon subsurface conditions encountered during drilling.

Bearing Capacity and Uplift Design Parameters – Boring 1			
Stratum¹	Applicable Depth	Allowable End Bearing Pressure (ksf)²	Allowable Side Friction (ksf)^{3 & 4}
Shallow Soils	Ground Surface to 1 Shaft Diameter, or 2.5 ft. (whichever is shallower)	Ignore	Ignore
Lean Clay or Fat Clay	1 Shaft Diameter or 2.5 ft. (whichever is shallower) to 7.5 ft.	Ignore	0.4
Limestone	Below 7.5 ft. (Min. 1 ft. into Bedrock)	20.0	4.0
1. If soft and/or wet soils are encountered in the planned shaft bottom during drilling, the shaft should be deepened to an acceptable bearing stratum. 2. End bearing pressure values assume a Factor of Safety of at least 3.0. 3. Side friction pressure values assume a Factor of Safety of at least 2.0. 4. Allowable side friction, in soil from 2.5 to 7.5 ft., if bearing in bedrock should be utilized for <u>uplift only</u>.			

8.2 Lateral Capacity

The Design Parameters summarized in the sections below may be utilized for Lateral Capacity Design for Drilled Piers constructed as outlined in this Report. PPI can provide additional soil parameters for lateral loading capacity analysis upon request.

8.2.1 Lateral Capacity Design with LPILE

The Design Parameters presented below are intended for use in the computer software program LPILE for lateral capacity analysis. LPILE uses finite difference computer models based on the horizontal modulus of subgrade reaction (K_h).

The values listed in the table below may be utilized for Drilled Pier Analysis in LPILE. Please also notice that the table states to “ignore” lateral support for the depth from 0 to 1 pier diameter or a minimum of 2.5 feet. This notation is intended to account for the fact that near-surface soils are significantly disturbed during drilled shaft excavation, which greatly reduces the lateral support provided. Designers should use their judgment and make an appropriate reduction of soil strength parameters in this zone.

Values summarized in the table below are based upon published correlations, and field and laboratory data collected during this subsurface investigation. Values shown below are ultimate values representative of in-situ soil/rock properties, and do not include a Factor of Safety. These values may be used to compute resistance to lateral loading of the overburden soils. **The appropriate Factor of Safety should be chosen by the designer.**

Lateral Capacity Design Parameters for Use with LPILE – Boring 1							
Stratum	Model	Applicable Depth	Soil Unit Weight ¹ , γ_m (pcf)	Cohesion ² , c (psf)	Friction Angle, ϕ	Modulus of Subgrade Reaction, K_h (pci)	e_{50} (%)
Shallow Soils	Soft Clay	Ground Surface to 1 Shaft Diameter, or 2.5 ft. (whichever is shallower)	Moist: 100 Buoyant: 38	Ignore	Ignore	Ignore	Ignore
Lean Clay or Fat Clay	Stiff Clay w/o Free Water	1 Shaft Diameter or 2.5 ft. (whichever is shallower) to 7.5 ft.	Moist: 120 Buoyant: 58	750	-	135 (Static) 55 (Cyclic)	0.012
Limestone	Strong Rock	Below 7.5 ft.	Moist: 164 Buoyant: 102	Unconfined Compressive Strength (psi)			
				7,500			

1. Buoyant unit weight is the moist unit weight minus the unit weight of water (62.4 pcf) and should be utilized below the groundwater level assumed for Design purposes. Groundwater was not encountered during drilling.

8.2.1 Lateral Capacity Design with MFAD

The lateral capacity design parameters provided below are for use with the software program MFAD. MFAD uses finite difference computer models based on the deformation modulus.

As stated in the tables below, lateral support should be ignored within 2.5 feet of the ground surface, or the depth equivalent to 1 pier diameter, whichever is less. Ignoring lateral support in this zone is intended to account for disturbance of near surface soils during drilled pier excavation, which greatly reduces the lateral support provided. Designers should use their judgement and make an appropriate reduction of soil strength parameters in this stratum within the design model.

Values summarized in the tables below are based upon published correlations, and field and laboratory data collected during this subsurface investigation. Values shown below are ultimate values representative of in-situ soil properties and do not include a Factor of Safety, except for the “Allowable Rock / Concrete Bond Strength” which includes a Factor of Safety of 2.0. These values may be used to compute resistance to lateral loading of the overburden soils. The appropriate Factor of Safety should be chosen by the Designer.

Lateral Capacity Design Parameters – MFAD – Boring 1							
<u>Stratum</u>	<u>Applicable Depth</u>	<u>Soil Unit Weight¹</u> (pcf)	<u>Effective Friction Angle</u> (deg.)	<u>Undrained Soil Shear Strength, s_u</u> (ksf)	<u>Rock Effective Cohesion, c'</u> (ksf)	<u>Deformation Modulus, E_D</u> (ksi)	<u>Allowable Rock/Concrete Bond Strength</u> (ksf) ²
Shallow Soils	Ground Surface to 1 Shaft Diameter, or 2.5 ft. (whichever is shallower)	Ignore	Ignore	Ignore	Ignore	Ignore	Ignore
Lean Clay or Fat Clay	1 Shaft Diameter or 2.5 ft. (whichever is shallower) to 7.5 ft.	$\gamma_m = 120$ $\gamma_b = 58$	-	0.75	-	0.4	-
Limestone	Below 7.5 ft.	$\gamma_m = 164$ $\gamma_b = 102$	35	-	3.0	800	20
1. Buoyant unit weight should be utilized for soils below the design groundwater level. Groundwater levels encountered during drilling are shown on PPI's boring logs in Appendix II. 2. Allowable Rock / Concrete Bond Strength Includes FS = 2.0 3. Surficial soils are often significantly disturbed during drilling, which greatly reduces the support provided. The nomenclature to "ignore" shallow soils is intended to recognize this condition. Designers should use their judgment and make an appropriate reduction of soil strength parameters in this zone.							

9.0 TRANSMISSION LINE FOUNDATIONS – CONSTRUCTION RECOMMENDATIONS

Drilled pier shafts should be drilled vertically and should be checked for plumbness prior to pier construction. Shafts should not be out of plumb more than 2 percent of the shaft length. Shafts should have a flat bottom, bearing in natural overburden soils.

9.1 Groundwater, Soft Soils, and Casing

Essentially all groundwater should be removed from the drilled pier shafts prior to concrete placement. It is anticipated that drilled pier shafts will be rock end bearing for this Project. If standing water at the bottom of the drilled pier shaft excavations results in softening and shear strength loss of the exposed bearing stratum, the affected soils should be over-excavated to the depth of suitable bearing stratum. The possible presence of soft wet soil should be anticipated, particularly near the soil-bedrock contact. Depending upon clay content, the surficial clays may exhibit sidewall

sloughing at times, possibly requiring temporary casing. Contractors should be prepared to provide casing capable of being screwed into the bedrock.

9.2 Concrete Design and Placement

Requirements for concrete strength and other concrete mix design characteristics should be specified by the Design Engineer. Method of concrete placement and vibration should also be specified by the Design Engineer. If casing is required during drilled pier construction, casing should be extracted slowly so that at least 5 feet of concrete head is always present above the bottom of the casing. In some casing, more than 5 feet of head may be required.

9.3 Construction Observation

Drilled shafts should be observed by a qualified representative of PPI to document the presence of a relatively flat pier bottom, plumb shaft, and competent bearing strata in accordance with the recommendation of this report.

10.0 SEISMIC DESIGN PARAMETERS

Seismic Design Parameters		
<u>Parameter</u>	<u>Value</u>	<u>Reference</u>
Site Class	C	2012 IBC, Section 1613.3.2 Site Classification; ASCE 7, Chapter 20

11.0 CONSTRUCTION OBSERVATION & TESTING

The construction process is an integral design component with respect to the geotechnical aspects of a project. Since geotechnical engineering is influenced by variable depositional and weathering processes and because we sample only a small portion of the soils affecting the performance of the proposed structures, unanticipated or changed conditions can be disclosed during grading. Proper geotechnical observation and testing during construction is imperative to allow the Geotechnical Engineer the opportunity to evaluate assumptions made during the design process. Therefore, we recommend that PPI be kept apprised of design modifications and construction schedule of the proposed project to observe compliance with the design concepts and geotechnical recommendations, and to allow design changes in the event that subsurface conditions

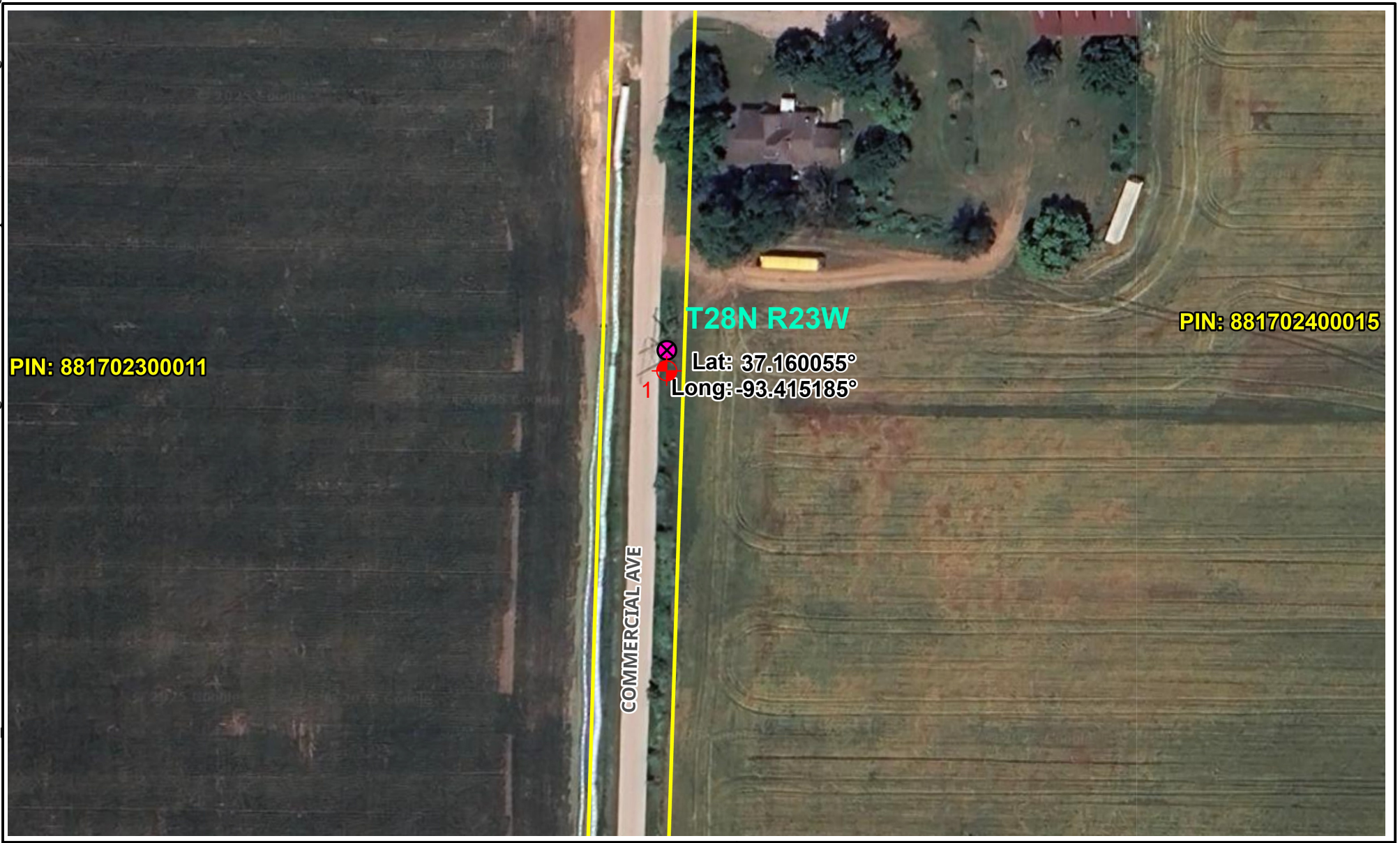
or methods of construction differ from those assumed while completing this study. We recommend that during construction all earthwork be monitored by a representative of PPI, including all foundation excavations as outlined below.

- An experienced Technician or Engineer of PPI should observe and test all drilled pier shaft excavations. Where unsuitable bearing conditions are observed, remedial procedures can be established in the field to avoid construction delays.

12.0 REPORT LIMITATIONS

This report has been prepared in accordance with generally accepted practices of other consultants undertaking similar studies at the same time and in the same geographical area. Palmerton & Parrish, Inc. observed that degree of care and skill generally exercised by other consultants under similar circumstances and conditions. Palmerton & Parrish's findings and conclusions must be considered not as scientific certainties, but as opinions based on our professional judgment concerning the significance of the data gathered during the course of this investigation. Other than this, no warranty is implied or intended.

APPENDIX I - FIGURES



LEGEND

 Boring Location

SCALE
1" = 100'

Project: MM Realign - Transmission Pole - Springfield, Missouri
Client: Toth & Associates

Boring Location Plan

DATE: May 23, 2025

Project Number: 25-2147



PALMERTON & PARRISH, INC.
GEOTECHNICAL AND MATERIALS ENGINEERS/
MATERIALS TESTING LABORATORIES / ENVIRONMENTAL SERVICES

FIGURE 1

APPENDIX II - BORING LOGS & KEY TO SYMBOLS

BORING LOG - PPI - PPI STD TEMPLATE.GDT - 5/27/25 11:27 - \\MAIN-SERVER\NETWORK\SHARED\ MASTER PROJECT FILE\2025\ MOITTOOTH & ASSO-25-2147-MM REALIGN PO 2025043001-REPUBLIC, MO-SUBBORING LOGS\25-1209 - BORING LOGS.GPJ

 4168 W. Kearney St. Springfield, MO 65803 Telephone: (417) 864-6000 Fax: (417) 864-6004		GEOTECHNICAL BORING LOG		BORING NUMBER 1	
CLIENT <u>Toth & Associates</u>		PROJECT NAME <u>MM Realign - Transmission Pole</u>			
PROJECT NO. <u>25-2147</u>		PROJECT LOCATION <u>Springfield, Missouri</u>			
DATE STARTED <u>5/14/25</u>		COMPLETED <u>5/14/25</u>		SURFACE ELEVATION _____ BENCHMARK EL. _____	
DRILLER <u>DA</u>		DRILL RIG <u>CME 550X</u>		GROUND WATER LEVELS _____	
HAMMER TYPE <u>Auto</u>		AT TIME OF DRILLING <u>None</u>			
LOGGED BY <u>EM</u>		CHECKED BY <u>TA</u>		AT END OF DRILLING _____	
NOTES <u>Offset 15 ft. south due to overhead power lines</u>					

DEPTH (ft)	DRILLING METHOD	STRATA SYMBOL	MATERIAL DESCRIPTION Unified Soil Classification System	SAMPLE TYPE NUMBER	RECOVERY % (RQD %)	CORRECTED BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	◆ DRY UNIT WT (pcf) ◆ 20 40 60 80 100 ▲ N VALUE ▲ 20 40 60 80 PL MC LL 20 40 60 80 ■ SHEAR STRENGTH (ksf) ■ 1 2 3 4				ELEVATION (ft)
0	CFA - 4.5" O.D.		TOPSOIL, Grass Covered (1") 0.1 ft	SPT 1		4-6-4 (10)		▲ ○				
FILL - LEAN CLAY, w/ Concrete Gravel, Brown, Stiff, Moist (CL) 2.0 ft												
FAT CLAY, Trace Gravel, Red, Stiff, Moist (CH)			SPT 2		5-5-5 (10)		▲ ○	105				
- Scattered Sand, Medium Stiff Below 5.5' 7.5 ft			SPT 3		3-3-4 (7)	▲ ○						
10	CORE BARREL - 2.0" I.D.		LIMESTONE, Coarse Crystalline, Light Gray, Moderately Hard, Slightly Weathered to Fresh, Medium to Thickly Bedded	NQ 1	100 (77)							
			NQ 2	100 (100)								
15			NQ 3	100 (100)								
19.2 ft	Bottom of borehole at 19.2 feet.											

KEY TO SYMBOLS - PPI STD TEMPLATE.GDT - 5/27/25 11:27 - \\MAIN-SERVER\NETWORK\SHARED_MASTER PROJECT FILE\2025_MONTTOTH & ASSO-25-2147-MM REALIGN PO 2025043001-REPUBLIC, MO-SUBBORING LOGS\25-1209 - BORING LOGS.GPJ



4168 W. Kearney St.
Springfield, MO 65803
Telephone: (417) 864-6000
Fax: (417) 864-6004

KEY TO SYMBOLS

CLIENT	Toth & Associates	PROJECT NAME	MM Realign - Transmission Pole
PROJECT NO.	25-2147	PROJECT LOCATION	Springfield, Missouri

LITHOLOGIC SYMBOLS
(Unified Soil Classification System)



CH: USCS High Plasticity Clay



CL: USCS Low Plasticity Clay



LIMESTONE: Limestone



TOPSOIL: Topsoil

SAMPLER SYMBOLS



NQ



Standard Penetration Test

WELL CONSTRUCTION SYMBOLS

ABBREVIATIONS

LL	- LIQUID LIMIT (%)	TV	- TORVANE
PI	- PLASTIC INDEX (%)	PID	- PHOTOIONIZATION DETECTOR
W	- MOISTURE CONTENT (%)	UC	- UNCONFINED COMPRESSION
DD	- DRY DENSITY (PCF)	ppm	- PARTS PER MILLION
NP	- NON PLASTIC	▽	Water Level at Time Drilling, or as Shown
-200	- PERCENT PASSING NO. 200 SIEVE	▼	Water Level at End of Drilling, or as Shown
PP	- POCKET PENETROMETER (TSF)	▽	Water Level After 24 Hours, or as Shown

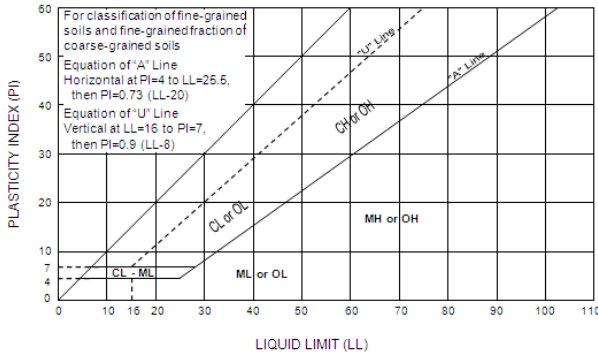
APPENDIX III - GENERAL NOTES

GENERAL NOTES

SOIL PROPERTIES & DESCRIPTIONS

COHESIVE SOILS

Consistency	Unconfined Compressive Strength (Qu)	Pocket Penetrometer Strength	N-Value
	(psf)	(tsf)	(blows/ft)
Very Soft	<500	<0.25	0-1
Soft	500-1000	0.25-0.50	2-4
Medium Stiff	1001-2000	0.50-1.00	5-8
Stiff	2001-4000	1.00-2.00	9-15
Very Stiff	4001-8000	2.00-4.00	16-30
Hard	>8000	>4.00	31-60
Very Hard			>60



Group Symbol	Group Name
CL	Lean Clay
ML	Silt
OL	Organic Clay or Silt
CH	Fat Clay
MH	Elastic Silt
OH	Organic Clay or Silt
PT	Peat
CL-CH	Lean to Fat Clay

Plasticity		Moisture	
Description	Liquid Limit (LL)	Descriptive Term	Guide
Lean	<45%	Dry	No indication of water
Lean to Fat	45-49%	Moist	Indication of water
Fat	≥50%	Wet	Visible water

Fine Grained Soil Sub Classification	Percent (by weight) of Total Sample
Terms: SILT, LEAN CLAY, FAT CLAY, ELASTIC SILT	PRIMARY CONSTITUENT
Sandy, gravelly, abundant cobbles, abundant boulders with sand, with gravel, with cobbles, with boulders	>30-50]
scattered sand, scattered gravel, scattered cobbles, scattered boulders	>15-30] – secondary coarse grained constituents
a trace sand, a trace gravel, a few cobbles, a few boulders	5-15]
	<5]
The relationship of clay and silt constituents is based on plasticity and normally determined by performing index tests. Refined classifications are based on Atterberg Limits tests and the Plasticity Chart.	

NON-COHESIVE (GRANULAR) SOILS

RELATIVE DENSITY	N-VALUE	MOISTURE CONDITION	
		Descriptive Term	Guide
Very Loose	0-4	Dry	No indication of water
Loose	5-10	Moist	Damp but no visible water
Medium Dense	11-24	Wet	Visible free water, usually soil is below water table.
Dense	25-50		
Very Dense	≥51		

**GRAIN SIZE IDENTIFICATION		
Name	Size Limits	Familiar Example
Boulder	12 in. or more	Larger than basketball
Cobbles	3 in. to 12 in.	Grapefruit
Coarse Gravel	¾-in. to 3 in.	Orange or lemon
Fine Gravel	No. 4 sieve to ¾-in.	Grape or pea
Coarse Sand	No. 10 sieve to No. 4 sieve	Rock salt
Medium Sand	No. 40 sieve to No. 10 sieve	Sugar, table salt
Fine Sand*	No. 200 sieve to No. 40 sieve	Powdered sugar
Fines	Less than No. 200 sieve	

*Particles finer than fine sand cannot be discerned with the naked eye at a distance of 8 inches.

Coarse Grained Soil Sub Classification	Percent (by weight) of Total Sample
Terms: GRAVEL, SAND, COBBLES, BOULDERS	PRIMARY CONSTITUENT
Sandy, gravelly, abundant cobbles, abundant boulders with gravel, with sand, with cobbles, with boulders	>30-50]
scattered gravel, scattered sand, scattered cobbles, scattered boulders	>15-30] – secondary coarse grained constituents
a trace gravel, a trace sand, a few cobbles, a few boulders	5-15]
Silty (MH & ML)*, clayey (CL & CH)*	<15]
(with silt, with clay)*	5-15] – secondary fine grained constituents
(trace silt, trace clay)*	<5]
*Index tests and/or plasticity tests are performed to determine whether the term "silt" or "clay" is used.	

*Modified after Ref. ASTM D2487-93 & D2488-93

**Modified after Ref. Oregon DOT 1987 & FHWA 1997

***Modified after Ref. AASHTO 1988, DM 7.1 1982, and Oregon DOT 1987

GENERAL NOTES

BEDROCK PROPERTIES & DESCRIPTIONS

ROCK QUALITY DESIGNATION (RQD)	
Description of Rock Quality	*RQD (%)
Very Poor	< 25
Poor	25-50
Fair	50-75
Good	75-90
Excellent	90-100
*RQD is defined as the total length of sound core pieces 4 in. or greater in length, expressed as a percentage of the total length cored. RQD provides an indication of the integrity of the rock mass and relative extent of seams and bedding planes.	

SCALE OF RELATIVE ROCK HARDNESS		
Term	Field Identification	Approx. Unconfined Compressive Strength (tsf)
Extremely Soft	Can be indented by thumbnail	2.6-10
Very Soft	Can be peeled by pocket knife	10-50
Soft	Can be peeled with difficulty by pocket knife	50-260
Medium Hard	Can be grooved 2 mm deep by firm pressure of knife	260-520
Moderately Hard	Requires one hammer blow to fracture	520-1040
Hard	Can be scratched with knife or pick only with difficulty	1040-2610
Very Hard	Cannot be scratched by knife or sharp pick	>2610

DEGREE OF WEATHERING	
Slightly Weathered	Rock generally fresh, joints stained and discoloration extends into rock up to 25mm (1 in), open joints may contain clay, core rings under hammer impact.
Weathered	Rock mass is decomposed 50% or less, significant portions of rock show discoloration and weathering effects, cores cannot be broken by hand or scraped by knife.
Highly Weathered	Rock mass is more than 50% decomposed, complete discoloration of rock fabric, core may be extremely broken and gives clunk sound when struck by hammer, may be shaved with a knife.

GRAIN SIZE (TYPICALLY FOR SEDIMENTARY ROCKS)		
Description	Diameter (mm)	Field Identification
Very Coarse Grained	>4.76	Individual grains can easily be distinguished by eye.
Coarse Grained	2.0-4.76	
Medium Grained	0.42-2.0	Individual grains can be distinguished by eye.
Fine Grained	0.074-0.42	Individual grains can be distinguished by eye with difficulty.
Very Fine Grained	<0.074	Individual grains cannot be distinguished by unaided eye.

VOIDS	
Pit	Voids barely seen with the naked eye to 6mm *1/4-inch)
Vug	Voids 6 to 50mm (1/4 to 2 inches) in diameter
Cavity	50 to 6000mm (2 to 24 inches) in diameter
Cave	> 600mm

BEDDING THICKNESS	
Very Thick Bedded	> 3' Thick
Thick Bedded	1' to 3' Thick
Medium Bedded	4" to 1' Thick
Thin Bedded	1-1/4" to 4" Thick
Very Thin Bedded	1/2" to 1-1/4" Thick
Thickly Laminated	1/8" to 1/2" Thick
Thinly Laminated	1/8" or less (paper thin)

DRILLING NOTES

Drilling & Sampling Symbols		
NQ – Rock Core (2-inch diameter)	CFA- Continuous Flight (Solid Stem) Auger	WB – Wash Bore or Mud Rotary
HQ – Rock Core (3-inch diameter)	SS – Split Spoon Sampler	TP – Test Pit
HSA – Hollow Stem Auger	ST – Shelby Tube	HA – Hand Auger
Soil Sample Types		
Shelby Tube Samples: Relatively undisturbed soil samples were obtained from the borings using thin wall (Shelby) tube samplers pushed hydraulically into the soil in advance of drilling. This sampling, which is considered to be undisturbed, was performed in accordance with the requirements of ASTM D 1587. This type of sample is considered best for the testing of "in-situ" soil properties such as natural density and strength characteristics. The use of this sampling method is basically restricted to soil containing little to no chert fragments and to softer shale deposits.		
Split Spoon Samples: The Standard Penetration Test is conducted in conjunction with the split-barrel sampling procedure. The "N" value corresponds to the number of blows required to drive the last 1 foot of an 18-inch long, 2-inch O.D. split-barrel sampler with a 140 lb. hammer falling a distance of 30 inches. The Standard Penetration Test is carried out according to ASTM D-1586.		
Water Level Measurements		
Water levels indicated on the boring logs are levels measured in the borings at the times indicated. In permeable materials, the indicated levels may reflect the location of groundwater. In low permeability soils, shallow groundwater may indicate a perched condition. Caution is merited when interpreting short-term water level readings from open bore holes. Accurate water levels are best determined from piezometers.		
Automatic Hammer		
Palmerton and Parrish, Inc.'s CME's are equipped with automatic hammers. The conventional method used to obtain disturbed soil samples used a safety hammer operated by company personnel with a cat head and rope. However, use of an automatic hammer allows a greater mechanical efficiency to be achieved in the field while performing a Standard Penetration resistance test based upon automatic hammer efficiencies calibrated using dynamic testing techniques.		

*Modified after Ref. ASTM D2487-93 & D2488-93

**Modified after Ref. Oregon DOT 1987 & FHWA 1997

***Modified after Ref. AASHTO 1988, DM 7.1 1982, and Oregon DOT 1987

APPENDIX IV - ROCK CORE UNCONFINED COMPRESSIVE STRENGTH RESULTS

**Unconfined Compressive Strength
of Intact Rock Core Specimens**
ASTM D7012

Project Name: MM Realign PO 2025043001
 Project No.: 25-2147
 Client: Toth & Associates
 Test Date: 5/26/2025
 Tested by: Jayden Robison



Check by: Samuel Arzouni

Laboratory Data Sheet

Bent No.	Depth (ft)	Diameter (in)	Length (in)	Weight (g)	Unit Weight (pcf)	Total Load (lbs)	Strength (psi)	Type of Rock	Remark
B1	9.33'	1.99	4.01	537.10	164.1	23153	7444	Limestone	
B1	13.5'	1.99	4.03	543.20	165.1	30559	9825	Limestone	
B1	18.3	1.99	4.00	545.20	166.9	24050	7732	Limestone	

Prepared in general accordance with ASTM D 4543

APPENDIX V - CORROSION TESTING RESULTS

25-143-4115REPORT DATE
May 23, 2025RECEIVED DATE
May 19, 2025SEND TO
27526**PAGE 1/3**ISSUE DATE
May 23, 2025

**PALMERTON & PARRISH INC
TAYLOR ANDERSON
4168 W KEARNEY ST
SPRINGFIELD MO 65803**

REPORT OF ANALYSIS

For: (27526) PALMERTON & PARRISH INC
TOTH & ASSOCIATES
13425-06

Analysis	Level Found		Reporting			Analyst- Date	Verified- Date
	As Received	Dry Weight	Units	Limit	Method		
Sample ID: B-1, 0 TO 5 FT Lab Number: 70636768 Date Sampled: 2025-05-14 0900							
Oxidation reduction potential	243		mV	1	SM 2580 B-(2009) *	Ppj2-2025/05/22	mgn8-2025/05/23
Resistivity	2940		ohm-cm	0.1	SM 2510 B-(2011)	mgn8-2025/05/23	jsp9-2025/05/23
Percent solids	83.1		%	0.01	SM 2540 G-(2015) *	kpl8-2025/05/20	jsp9-2025/05/21
Sulfide qualitative	abse nt		n/a	n/a	Commission Analytical Reactions *	Gas9-2025/05/19	jsp9-2025/05/21
Chloride	47.2		mg/L	5.0	EPA 300.0	akn1-2025/05/22	mgn8-2025/05/23
Sulfate	8.4		mg/L	7.5	EPA 300.0	akn1-2025/05/22	mgn8-2025/05/23
Conductivity	340		µS/cm	2	SM 2510 B-(2011)	Ppj2-2025/05/22	jsp9-2025/05/23
pH	7.83		S.U.	0.10	SM 4500-H+ B-(2011)	Ppj2-2025/05/22	jsp9-2025/05/22
Sample ID: B-1, 5 TO 9 FT Lab Number: 70636769 Date Sampled: 2025-05-14 0900							
Oxidation reduction potential	192		mV	1	SM 2580 B-(2009) *	Ppj2-2025/05/22	mgn8-2025/05/23
Resistivity	3610		ohm-cm	0.1	SM 2510 B-(2011)	mgn8-2025/05/23	jsp9-2025/05/23
Percent solids	74.4		%	0.01	SM 2540 G-(2015) *	kpl8-2025/05/21	jsp9-2025/05/21
Sulfide qualitative	abse nt		n/a	n/a	Commission Analytical Reactions *	Gas9-2025/05/19	jsp9-2025/05/21
Chloride	36.3		mg/L	5.0	EPA 300.0	akn1-2025/05/22	mgn8-2025/05/23
Sulfate	8.1		mg/L	7.5	EPA 300.0	akn1-2025/05/22	mgn8-2025/05/23
Conductivity	277		µS/cm	2	SM 2510 B-(2011)	Ppj2-2025/05/22	jsp9-2025/05/23
pH	7.65		S.U.	0.10	SM 4500-H+ B-(2011)	Ppj2-2025/05/22	jsp9-2025/05/22

The result(s) issued on this report only reflect the analysis of the sample(s) submitted.

Our reports and letters are for the exclusive and confidential use of our clients and may not be reproduced in whole or in part, nor may any reference be made to the work, the results, or the company in any advertising, news release, or other public announcements without obtaining our prior written authorization.

25-143-4115

REPORT DATE

May 23, 2025

RECEIVED DATE

May 19, 2025

SEND TO

27526

13611 B Street • Omaha, Nebraska 68144-3693 • (402) 334-7770

www.midwestlabs.com

PAGE 2/3

ISSUE DATE

May 23, 2025

**PALMERTON & PARRISH INC
TAYLOR ANDERSON
4168 W KEARNEY ST
SPRINGFIELD MO 65803**

REPORT OF ANALYSIS

For: (27526) PALMERTON & PARRISH INC
TOTH & ASSOCIATES
13425-06

Analysis	Level Found		Reporting			Analyst- Date	Verified- Date
	As Received	Dry Weight	Units	Limit	Method		

ppm = parts per million, ppm = mg/L

For questions please contact:

Kerri Stanek
Account Manager
kstanek@midwestlabs.com (402)590-2982

The result(s) issued on this report only reflect the analysis of the sample(s) submitted.

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25-143-4115**May 23, 2025****May 19, 2025****27526****PAGE 3/3****May 23, 2025**

**PALMERTON & PARRISH INC
TAYLOR ANDERSON
4168 W KEARNEY ST
SPRINGFIELD MO 65803**

REPORT OF ANALYSIS

For: (27526) PALMERTON & PARRISH INC
TOTH & ASSOCIATES
13425-06

Detailed Method Description(s)**Specific Conductance**

Sample analysis follows MWL EN 002 which is based on Standard Methods (SM) 2510 B. Aqueous samples or slurries are placed in a small vessel and allowed to equilibrate. A self-contained conductivity meter and probe is calibrated and the probe used to measure the electrical conductivity of the sample.

EPA 300.0 ion chromatography

Analysis follows MWL ENV 001 which follows EPA 300.0. Aqueous samples or aqueous extracts are injected into the IC instrument where the ions are separated by a column. As the ions elute from the column, they are measured by a conductivity detector and reported.

pH

Sample analysis follows MWL EN 003 which is based on Standard Methods (SM) 4500-H B. Aqueous samples (>20% volume) are allowed to equilibrate at room temperature. A pH meter and probe is calibrated and used to measure the hydronium concentration (pH) of the solution.

The result(s) issued on this report only reflect the analysis of the sample(s) submitted.

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APPENDIX VI - SITE VISIT PHOTOS





APPENDIX VII - IMPORTANT INFORMATION REGARDING YOUR GEOTECHNICAL REPORT

Important Information about This Geotechnical-Engineering Report

Subsurface problems are a principal cause of construction delays, cost overruns, claims, and disputes.

While you cannot eliminate all such risks, you can manage them. The following information is provided to help.

The Geoprofessional Business Association (GBA) has prepared this advisory to help you – assumedly a client representative – interpret and apply this geotechnical-engineering report as effectively as possible. In that way, clients can benefit from a lowered exposure to the subsurface problems that, for decades, have been a principal cause of construction delays, cost overruns, claims, and disputes. If you have questions or want more information about any of the issues discussed below, contact your GBA-member geotechnical engineer. Active involvement in the Geoprofessional Business Association exposes geotechnical engineers to a wide array of risk-confrontation techniques that can be of genuine benefit for everyone involved with a construction project.

Geotechnical-Engineering Services Are Performed for Specific Purposes, Persons, and Projects

Geotechnical engineers structure their services to meet the specific needs of their clients. A geotechnical-engineering study conducted for a given civil engineer will not likely meet the needs of a civil-works constructor or even a different civil engineer. Because each geotechnical-engineering study is unique, each geotechnical-engineering report is unique, prepared solely for the client. *Those who rely on a geotechnical-engineering report prepared for a different client can be seriously misled.* No one except authorized client representatives should rely on this geotechnical-engineering report without first conferring with the geotechnical engineer who prepared it. *And no one – not even you – should apply this report for any purpose or project except the one originally contemplated.*

Read this Report in Full

Costly problems have occurred because those relying on a geotechnical-engineering report did not read it in its entirety. Do not rely on an executive summary. Do not read selected elements only. *Read this report in full.*

You Need to Inform Your Geotechnical Engineer about Change

Your geotechnical engineer considered unique, project-specific factors when designing the study behind this report and developing the confirmation-dependent recommendations the report conveys. A few typical factors include:

- the client's goals, objectives, budget, schedule, and risk-management preferences;
- the general nature of the structure involved, its size, configuration, and performance criteria;
- the structure's location and orientation on the site; and
- other planned or existing site improvements, such as retaining walls, access roads, parking lots, and underground utilities.

Typical changes that could erode the reliability of this report include those that affect:

- the site's size or shape;
- the function of the proposed structure, as when it's changed from a parking garage to an office building, or from a light-industrial plant to a refrigerated warehouse;
- the elevation, configuration, location, orientation, or weight of the proposed structure;
- the composition of the design team; or
- project ownership.

As a general rule, *always* inform your geotechnical engineer of project changes – even minor ones – and request an assessment of their impact. *The geotechnical engineer who prepared this report cannot accept responsibility or liability for problems that arise because the geotechnical engineer was not informed about developments the engineer otherwise would have considered.*

This Report May Not Be Reliable

Do not rely on this report if your geotechnical engineer prepared it:

- for a different client;
- for a different project;
- for a different site (that may or may not include all or a portion of the original site); or
- before important events occurred at the site or adjacent to it; e.g., man-made events like construction or environmental remediation, or natural events like floods, droughts, earthquakes, or groundwater fluctuations.

Note, too, that it could be unwise to rely on a geotechnical-engineering report whose reliability may have been affected by the passage of time, because of factors like changed subsurface conditions; new or modified codes, standards, or regulations; or new techniques or tools. *If your geotechnical engineer has not indicated an "apply-by" date on the report, ask what it should be, and, in general, if you are the least bit uncertain about the continued reliability of this report, contact your geotechnical engineer before applying it.* A minor amount of additional testing or analysis – if any is required at all – could prevent major problems.

Most of the "Findings" Related in This Report Are Professional Opinions

Before construction begins, geotechnical engineers explore a site's subsurface through various sampling and testing procedures. *Geotechnical engineers can observe actual subsurface conditions only at those specific locations where sampling and testing were performed.* The data derived from that sampling and testing were reviewed by your geotechnical engineer, who then applied professional judgment to form opinions about subsurface conditions throughout the site. Actual sitewide-subsurface conditions may differ – maybe significantly – from those indicated in this report. Confront that risk by retaining your geotechnical engineer to serve on the design team from project start to project finish, so the individual can provide informed guidance quickly, whenever needed.

This Report's Recommendations Are Confirmation-Dependent

The recommendations included in this report – including any options or alternatives – are confirmation-dependent. In other words, *they are not final*, because the geotechnical engineer who developed them relied heavily on judgment and opinion to do so. Your geotechnical engineer can finalize the recommendations *only after observing actual subsurface conditions* revealed during construction. If through observation your geotechnical engineer confirms that the conditions assumed to exist actually do exist, the recommendations can be relied upon, assuming no other changes have occurred. *The geotechnical engineer who prepared this report cannot assume responsibility or liability for confirmation-dependent recommendations if you fail to retain that engineer to perform construction observation.*

This Report Could Be Misinterpreted

Other design professionals' misinterpretation of geotechnical-engineering reports has resulted in costly problems. Confront that risk by having your geotechnical engineer serve as a full-time member of the design team, to:

- confer with other design-team members,
- help develop specifications,
- review pertinent elements of other design professionals' plans and specifications, and
- be on hand quickly whenever geotechnical-engineering guidance is needed.

You should also confront the risk of constructors misinterpreting this report. Do so by retaining your geotechnical engineer to participate in prebid and preconstruction conferences and to perform construction observation.

Give Constructors a Complete Report and Guidance

Some owners and design professionals mistakenly believe they can shift unanticipated-subsurface-conditions liability to constructors by limiting the information they provide for bid preparation. To help prevent the costly, contentious problems this practice has caused, include the complete geotechnical-engineering report, along with any attachments or appendices, with your contract documents, *but be certain to note conspicuously that you've included the material for informational purposes only.* To avoid misunderstanding, you may also want to note that "informational purposes" means constructors have no right to rely on the interpretations, opinions, conclusions, or recommendations in the report, but they may rely on the factual data relative to the specific times, locations, and depths/elevations referenced. Be certain that constructors know they may learn about specific project requirements, including options selected from the report, *only from the design drawings and specifications.* Remind constructors that they may

perform their own studies if they want to, and *be sure to allow enough time to permit them to do so.* Only then might you be in a position to give constructors the information available to you, while requiring them to at least share some of the financial responsibilities stemming from unanticipated conditions. Conducting prebid and preconstruction conferences can also be valuable in this respect.

Read Responsibility Provisions Closely

Some client representatives, design professionals, and constructors do not realize that geotechnical engineering is far less exact than other engineering disciplines. That lack of understanding has nurtured unrealistic expectations that have resulted in disappointments, delays, cost overruns, claims, and disputes. To confront that risk, geotechnical engineers commonly include explanatory provisions in their reports. Sometimes labeled "limitations," many of these provisions indicate where geotechnical engineers' responsibilities begin and end, to help others recognize their own responsibilities and risks. *Read these provisions closely.* Ask questions. Your geotechnical engineer should respond fully and frankly.

Geoenvironmental Concerns Are Not Covered

The personnel, equipment, and techniques used to perform an environmental study – e.g., a "phase-one" or "phase-two" environmental site assessment – differ significantly from those used to perform a geotechnical-engineering study. For that reason, a geotechnical-engineering report does not usually relate any environmental findings, conclusions, or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. *Unanticipated subsurface environmental problems have led to project failures.* If you have not yet obtained your own environmental information, ask your geotechnical consultant for risk-management guidance. As a general rule, *do not rely on an environmental report prepared for a different client, site, or project, or that is more than six months old.*

Obtain Professional Assistance to Deal with Moisture Infiltration and Mold

While your geotechnical engineer may have addressed groundwater, water infiltration, or similar issues in this report, none of the engineer's services were designed, conducted, or intended to prevent uncontrolled migration of moisture – including water vapor – from the soil through building slabs and walls and into the building interior, where it can cause mold growth and material-performance deficiencies. Accordingly, *proper implementation of the geotechnical engineer's recommendations will not of itself be sufficient to prevent moisture infiltration.* Confront the risk of moisture infiltration by including building-envelope or mold specialists on the design team. *Geotechnical engineers are not building-envelope or mold specialists.*



Telephone: 301/565-2733

e-mail: info@geoprofessional.org www.geoprofessional.org

Intentionally Blank



Mike Kehoe
Governor

Kurt U. Schaefer
Director

OFFICIAL COPY VIA EMAIL: afalig@republicmo.com

July 18, 2025

Angel C. Falig
City of Republic
4221 South Wilson's Creek Boulevard
Republic, MO 65738

Dear City of Republic:

Pursuant to the Missouri Clean Water Law, we have issued and are enclosing a General Permit for Sewer Extension Construction to City of Republic for Route MM Sanitary Sewer Realignment. Please review the requirements of your permit.

If you were adversely affected by this decision, you may be entitled to an appeal before the Administrative Hearing Commission (AHC) pursuant to 10 CSR 20-1.020 and Sections 644.051.6 and 621.250, RSMo. To appeal, you must file a petition with the Administrative Hearing Commission within 30 days after the date this decision was mailed or the date it was delivered, whichever date was earlier. If any such petition is sent by registered mail or certified mail, it will be deemed filed on the date it is mailed; if it is sent by any method other than registered mail or certified mail, it will be deemed filed on the date it is received by the Administrative Hearing Commission. Contact information for the AHC is as follows: Administrative Hearing Commission, United States Post Office Building, 131 West High Street, P.O. Box 1557, Jefferson City, MO 65102, Phone: 573-751-2422, Fax: 573-751-5018, Website: www.oa.mo.gov/ahc.

Nothing in this permit removes any obligations to comply with county or other local ordinances or restrictions.



If you have any questions concerning this permit, please do not hesitate to contact the Water Protection Program at P.O. Box 176, Jefferson City, MO 65102, 573-751-1300.

Sincerely,

WATER PROTECTION PROGRAM

A handwritten signature in cursive script that reads "Cindy LePage".

Cindy LePage, P.E., Chief
Engineering Section

CL:fcj

STATE OF MISSOURI
DEPARTMENT OF NATURAL RESOURCES
MISSOURI CLEAN WATER COMMISSION



GENERAL PERMIT for SEWER EXTENSION CONSTRUCTION

The Missouri Department of Natural Resources hereby issues a permit to:

Construction Permit ID:	MOGC00905
Title of Project:	Republic WWTP
Owner:	City of Republic
Address:	204 N Main St Republic, MO 65738

The project will also include general site work appropriate to the scope and purpose of the project and will include all the necessary appurtenances to make a complete and usable collection system. The construction of this project will be in the vicinity of the county below and discharge to Receiving Permit ID below:

County: Greene	Receiving Permit ID: MO0022098
----------------	--------------------------------

for the construction of (described construction project):

Project is in the vicinity of FM 160 and State Hwy MM, City of Republic, Greene County. Relocation of a 10in sanitary sewer force main, and a 12in sanitary sewer gravity line along the proposed corridor which will includes 605.8 LF of 10in (AWWA C900) sanitary sewer force main, 448 LF of new 12in PVC SDR-26 gravity sewer main (SDR 26 PVC), installation of (2) new 5ft diameter manholes. There will be no new flows added to this sewer trunk main for the relocation of referenced sewer main. Wastewater will be treated at MO0022098 City of Republic WWTF, 915 North West Avenue, Republic, MO 65738. Angel F Falig, City Engineer, provided a Continuing Authority acceptance letter dated June 23, 2025. This project utilizes City of Republic Standard Sewer Specifications approved on October 16, 2023.

Construction of such proposed facilities shall be in accordance with the provisions of the Missouri Clean Water Law, Chapter 644, RSMo, and regulation promulgated thereunder, or this permit may be revoked by the Department of Natural Resources (Department). As the Department does not examine structural features of design or the efficiency of mechanical equipment, the issuance of this permit does not include approval of these features. This permit applies only to the construction of water pollution control components; it does not apply to other environmentally regulated areas.

July 18, 2025
Issue Date



John Hoke, Director
Water Protection Program

July 17, 2027
Expiration Date

APPLICABILITY

1. This permit authorizes the construction of gravity sewer extensions, force mains, and lift stations. Non-earthden flow equalization storage basins at lift stations and inline storage, which flows back into the lift station or collection system, are also included.
2. The Missouri Department of Natural Resources may require a site-specific sewer extension construction permit due to compliance and enforcement actions in accordance with 10 CSR 20-6.010(13)(C).
3. This permit does not apply to:
 - A. Earthen storage basins;
 - B. Exempt projects in accordance with 10 CSR 20-6.010(1)(B), 10 CSR 20-6.010(5)(B), and RSMo 644.051 unless requested by the applicant or required by enforcement.

PREREQUISITES:

1. The Sewer Extension Construction Permit application, appropriate fee, and documentation in accordance with 10 CSR 20-6.010(5)(G).
2. Submit the Sewer Extension Construction Permit application at least sixty (60) days in advance of the start of construction in accordance with 10 CSR 20-6.010(5)(F).
3. Submit an electronic copy of the construction permit application and documents to DNR.WPPEngineerSection@dnr.mo.gov in accordance with 10 CSR 20-6.010(5)(G)3.
4. The plans and specifications, each signed, sealed, and dated by a professional engineer registered in the State of Missouri in accordance with 10 CSR 20-8 and 10 CSR 20-6.010.
5. The Design Certification form, Engineering Report, or Summary of Design, signed, sealed, and dated by a professional engineer registered in the State of Missouri, certifying the design of the system is in accordance with 10 CSR 20-6 and 10 CSR 20-8.
6. A statement from the continuing authority, as defined in 10 CSR 20-6.010, accepting the wastewater for treatment and indicating the permitted treatment facility has the available capacity.
7. A statement from the continuing authority, as defined in 10 CSR 20-6.010, accepting responsibility for the operation and maintenance of these facilities.

PERMIT CONDITIONS:

1. This permit authorizes the activities and scope of work detailed in the plans and specifications submitted with the request.
2. The construction must be in accordance with the final plans and specifications received by the Department. Revisions that affect capacity, flow, or system layout must be approved by the Department prior to construction.

PERMIT CONDITIONS: (continued)

3. If construction will incorporate minor changes from previously submitted plans and specifications (i.e., changes that do not affect the capacity, flow, or system layout), submit an electronic copy of the as-built plans and specifications in accordance with 10 CSR 20-8.110(11).
4. State and Federal Law does not permit bypassing of raw wastewater; therefore, the applicant must take steps to ensure that raw wastewater does not discharge during construction. If a sanitary sewer overflow or bypass occurs, report the appropriate information to the Department's regional office per 10 CSR 20-7.015(9)(E) or through the Online Bypass/SSO Reporting service on the Missouri Gateway for Environmental Management (MoGEM) portal found at <https://dnr.mo.gov/data-e-services/missouri-gateway-environmental-management-mogem>.

See <https://dnr.mo.gov/document-search/missouri-gateway-environmental-management-mogem-frequently-asked-questions-pub2988/pub2988> for more information.

5. Protection of drinking water supplies must meet the requirements of 10 CSR 20-8.120(5).
 - A. There shall be no physical connections between a public or private potable water supply system and a sewer or appurtenance that would permit the passage of any wastewater or polluted water into the potable supply.
 - B. Lay sewers at least 50 feet (50') in a horizontal direction from any existing or proposed public water supply well or other water supply sources or structures.
6. Position manholes so that the top access is at or above grade level.
7. In addition to the requirements for a construction permit, see 10 CSR 20-6.200 for land disturbance requirements to obtain a Missouri State Operating Permit to discharge stormwater. The permit requires Best Management Practices sufficient to control runoff and sedimentation to protect waters of the state. Applicants shall obtain land disturbance permits through the Department's ePermitting system, available online at <https://dnr.mo.gov/data-e-services/water/electronic-permitting-epermitting>.

See <https://dnr.mo.gov/water/business-industry-other-entities/permits-certification-engineering-fees/stormwater/construction-land-disturbance> for more information.

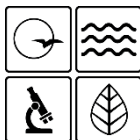
8. Entities applying for funding under 10 CSR 20-4, "Grants and Loans" will need to comply with those requirements in addition to the requirements of 10 CSR 20-8.

PERMIT CONDITIONS: (continued)

9. The Department may require a United States (U.S.) Army Corps of Engineers (COE) permit (404) and a Water Quality Certification (401) or a permit waiver for the activities described in this permit. If construction activity will disturb any land below the ordinary high water mark of Jurisdictional Waters of the U.S., then a 404/401 is required. Fulfillment of these requirements is necessary before the permit is considered valid. Since the COE makes determinations on what is jurisdictional, you must contact the COE to determine permitting requirements. You may call the Department's Operating Permits Section at 573-522-4502 for more information.

See <https://dnr.mo.gov/water/business-industry-other-entities/permits-certification-engineering-fees/section-401-water-quality> for more information.

10. If this project eliminates a wastewater treatment facility under the jurisdiction of the Department, then the applicant shall submit a full closure plan with a Facility Closure Request Form, [Form – MO 780-2512](#), to the Department's appropriate [regional office](#) for review and approval. In accordance with 10 CSR 20-6.010(12), the closure plan must meet the requirements outlined in Standard Conditions Part III of the Missouri State Operating Permit. Closure shall not commence until the Department approves the submitted closure plan.
11. If this project is part of a project to resolve an enforcement action or is receiving funding from the Department, submit a [statement of work complete](#) following the completion of construction.
12. Applicants may submit, prior to the expiration date of this permit, a written request that additional time is needed in accordance with 10 CSR 20-6.010(5)(H)3.



MISSOURI DEPARTMENT OF NATURAL RESOURCES
WATER PROTECTION PROGRAM
**APPLICATION FOR CONSTRUCTION PERMIT –
SEWER EXTENSION**

FOR DEPARTMENT USE ONLY

APP NO.	CP NO.
FEE RECEIVED	CHECK NO.
DATE RECEIVED	

NOTE ► Please Read the accompanying instructions before completing this form

1.0 APPLICATION INFORMATION (Note – If any of the questions in this section are answered NO, this application may be considered incomplete and returned.)

- 1.1 Is this a Federal/State funded project? ☒ YES ☐ N/A Funding Agency: MoDOT Project #: J8S0836D
- 1.2 Has the Department of Natural Resources approved the proposed project's engineering report*?
☐ YES Date of Approval: ☐ NO ☒ N/A
- 1.3 Is a copy of the appropriate plans* and specifications* included with this application? ☒ YES ☐ NO
If the project is using standard specifications, name of community: City of Republic
- 1.4 Is a summary of design* included with this application? ☒ YES ☐ NO
- 1.5 Is the appropriate fee or JetPay confirmation included with this application? ☒ YES ☐ NO
See Section 7.0

* Must be affixed with a Missouri registered professional engineer's seal, signature and date.

2.0 PROJECT INFORMATION**2.1 NAME OF PROJECT**

Route MM Sanitary Sewer Realignment

ADDRESS	CITY	STATE	ZIP CODE	COUNTY
Route MM	Republic	MO	65738	Greene

2.2 Legal Description: NE $\frac{1}{4}$, NW $\frac{1}{4}$, SW $\frac{1}{4}$, Sec. 2, T 28N, R 23W

2.3 Project Components (check all that apply):

☒ Gravity sewers ☐ Pumping stations ☒ Force mains ☐ Alternative sewer system ☐ Other (Describe below.)

2.4 PROJECT DESCRIPTION

Relocation of a 10" sanitary sewer force main, and a 12" sanitary sewer gravity line along the proposed corridor which will include the following:

Approximately 605.8 LF of 10" (AWWA C900) sanitary sewer force main, 448 LF of new 12" PVC SDR-26 gravity sewer main (SDR 26 PVC), installation of (2) new 5' diameter manholes. There will be no new flows added to this sewer trunk main for the relocation of referenced sewer main.

2.5 DESIGN INFORMATION

- A. Population or number of lots to be served by this extension: 0
- B. Estimated flow to be contributed by this extension: Design Average Flow: 0 gpd Design Peak Hourly Flow: 0 gph
- C. Industrial Wastes: Type: 0 Flow: 0 gpd
- D. Receiving Sewer: Size: 12 inches Capacity: gpm
- E. Does this project (check all that apply):
☒ Connect to an existing treatment plant ☐ Resolve enforcement issue ☐ Eliminate or consolidate an existing treatment plant
- F. Estimated number of onsite systems being removed: 0
- G: Estimated costs associated with piping: \$ Estimated costs associated with lift station(s): \$

3.0 PROJECT OWNER

NAME		TELEPHONE NUMBER WITH AREA CODE		EMAIL ADDRESS
City of Republic		417-732-3150		afalig@republicmo.com
ADDRESS	CITY		STATE	ZIP CODE
4221 S Wilson's Creek Blvd	Republic		MO	65738

CHARTER NUMBER (SECRETARY OF STATE) or REGISTERED AGENT

4.0 CONTINUING AUTHORITY: A continuing authority is a company, business, entity, or person(s) that will be legally responsible for ensuring compliance with the permit requirements and provide continuous stable oversight of the permitted facility or activity. The Continuing authority should be a relatively permanent entity responsible for the ongoing operation, maintenance and modernization, when needed, of the permitted facility or activity. A continuing authority is not, however, an entity or individual that is contractually hired by the permittee to sample or operate and maintain the system for a defined time period, such as a certified operator or analytical laboratory. To access the regulatory requirement regarding continuing authority, 10 CSR 20-6.010(2), please visit [Clean Water Commission Chapter 6](#). A continuing authority's name must be listed exactly as it appears on the Missouri Secretary of State's (SoS's) webpage: [Missouri Secretary of State](#), unless the continuing authority is an individual(s), government entity, or otherwise not required to register with the SoS.

NAME Angel C Falig		TELEPHONE NUMBER WITH AREA CODE 417-732-3415	EMAIL ADDRESS afalig@republicmo.com
ADDRESS 4221 S Wilson's Creek Blvd	CITY Republic	STATE MO	ZIP CODE 65738
CHARTER NUMBER (SECRETARY OF STATE)			

4.1 Has appropriate continuing authority acceptance been provided as follows:
A letter from the continuing authority accepting responsibility for continued maintenance of the sewer (if the continuing authority is different than the original owner of the construction), or a properly executed "Continuing Authority and Receiving Wastewater Treatment Facility Acceptance" Form 780-2584. ☒ YES ☐ NO ☐ N/A

5.0 ENGINEER

ENGINEER NAME / COMPANY NAME Warner Sherman		TELEPHONE NUMBER WITH AREA CODE 417-895-7690	EMAIL ADDRESS warner.sherman@modot.mo.gov
ADDRESS 3025 E. Kearney St.	CITY Springfield	STATE MO	ZIP CODE 65803

6.0 RECEIVING WASTEWATER TREATMENT FACILITY

NAME City of Republic Waste Water Treatment Plant		TELEPHONE NUMBER WITH AREA CODE 417-732-3460	EMAIL ADDRESS jasondavis@republicmo.com
MISSOURI STATE OPERATING PERMIT # MO0022098		COUNTY Greene	REMAINING CAPACITY (GPD) 839,496

6.1 If different from the owner, has a letter been provided from the receiving treatment facility demonstrating that they agree to accept the expanded flow or has a properly executed Continuing Authority and Receiving Wastewater Treatment Facility Acceptance MO 780-2584 form been provided? ☐ YES ☐ NO ☒ N/A

6.2 A letter from the receiving wastewater treatment facility, if different than the continuing authority, is included with this application.
☒ YES ☐ NO ☐ N/A

6.3 If the receiving treatment plant or continuing authority is regulated by the Public Service Commission (PSC) for sewer activities, a Certificate of Convenience and Necessity has been received? ☐ Yes – Date: ☐ No ☒ N/A

OPTIONAL QUESTIONS REGARDING MILITARY SERVICE

Have you or an immediate family member ever served in the U.S. Armed Forces?	☐ Yes ☒ No
If yes, would you like information about military-related services in Missouri?	☐ Yes ☒ No

7.0 Application Fee

☐ Check Number	☒ JetPay Confirmation Number 20066432
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8.0 PROJECT OWNER: I certify under penalty of law this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate and complete. I am aware there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

PROJECT OWNER SIGNATURE		
PRINTED NAME City of Republic - Angel Falig		DATE 6-24-2025
TITLE OR CORPORATE POSITION City Engineer, E.I.T.	TELEPHONE NUMBER WITH AREA CODE 417-732-3415	EMAIL ADDRESS afalig@republicmo.com

Mail completed copy to:

MISSOURI DEPARTMENT OF NATURAL RESOURCES
WATER PROTECTION PROGRAM
PO BOX 176
JEFFERSON CITY, MO 65102-0176

Submit completed electronic copy to:

Missouri Department of Natural Resources
at DNR.WPPEngineerSection@dnr.mo.gov

9.0 SEWER EXTENSION CHECKLIST				
SEWER EXTENSION DESIGN CERTIFICATION: Answer all questions yes or N/A. Answer N/A only if the question is clearly not applicable to the design of the proposed sewer extension.				
	REGULATION		YES	N/A
1.	8.110(3)(A)	Is the design flow based on actual flow data for an existing system?	☐	☒
2.	8.110(3)(B)	Are average design flows, peak hourly flows and I&I contributions for new systems calculated?	☐	☒
3.	8.110(9)(B)	Is there a detailed plan showing tributary area, boundaries, pertinent elevations, topography, existing and proposed facilities?	☒	☐
4.	8.120(2)	Does the sewer exclude water from roofs, streets, groundwater from foundation drains and combined wastewater?	☐	☒
5.	8.120(3)(A)	Is the pipe installation, embedment and backfill designed to prevent damage to the pipe and its joints?	☒	☐
6.	8.120(3) (A)1	Is all sewer pipe constructed with a slope to obtain mean velocities of not less than 2 feet per second?	☒	☐
7.	8.120(3)(A)2	Is the pipe covered with at least 36" of soil or sufficiently insulated to prevent freezing?	☒	☐
8.	8.120(3)(B)	Is deflection testing specified to ensure no pipe exceeds a deflection of 5% of the inside diameter?	☒	☐
9.	8.120(4)(A)	Are manholes located at the end of each line, at all changes in grade, size or alignment and at all intersections?	☒	☐
10.	8.120(4)(C)	Are manholes at least 42 inches in diameter with a clear opening of 22 inches on sewer line larger than 8"?	☒	☐
11.	8.120(4)(C)	Where cleanouts are used at the end of a lateral instead of a manhole, they are a minimum diameter of 8 inches or larger and equal to the diameter for pipes < 8"?	☐	☒
12.	8.120(4)(E)	Are the manholes watertight, constructed and installed in accordance with the manufacturer's recommendations and procedures?	☒	☐
13.	8.120(4)(F)	Do the specifications include a requirement for inspection and testing for manholes?	☒	☐
14.	8.120(5)(A)	Is the sewer free from physical connections to a potable water supply system and no water pipes come in contact with a sewer manhole?	☒	☐
15.	8.120(5)(B)	Are sewers and manholes located at least 50 feet horizontally from any existing or proposed water supply well, sources, structures?	☒	☐
10.0 PRESSURE SEWERS, GRINDER PUMP, STEP AND STEG SEWER CHECKLIST				
	REGULATION		YES	N/A
16.	8.125(5)(A)1.	Does the cleaning velocity of ≥ 2 ft/s happen more than once per day?	☐	☒
17.	8.125(5)(A)2.	Is the diameter of the pressure sewer main pipe at least 1.5"?	☒	☐
18.	8.125(5)(B)	Are appurtenances compatible with the piping system?	☒	☐
19.	8.125(5)(B)2.	Are isolation valves located: upstream of major pipe intersections; both sides of stream, bridge and RR crossings; at terminal end of system?	☐	☒
20.	8.125(5)(C)	Do service line pipes have a minimum diameter of 1.25"?	☐	☒
21.	8.125(5)(D)1.A .	Do simplex grinder pump stations service only a single equivalent dwelling unit (EDU)? i.e. 1 residence – 1 grinder pump.	☐	☒
22.	8.125(5)(D)1.B .	Are multiple unit pump stations owned, operated and maintained by an approved continuing authority?	☐	☒
23.	8.125(5)(D)3.	Is there at least 70 gallons of storage in the grinder pump unit?	☐	☒
24.	8.125(5)(D)4.	Do grinder pump stations have shutoff valves, check valves and anti-siphon valves (where siphoning could occur) that are accessible from the ground surface?	☐	☒
25.	8.125(5)(D)7., 8.130(3)(B)2.	Are units serviceable and replaceable under wet conditions without electrical hazard and is electrical equipment suitable for hazardous locations (National Electrical Code, Class I, Group D, Division 1 location)?	☐	☒
26.	8.125(5)(D)8., 8.125(2)(F)6.	Are provisions in place to avoid interruption of service due to mechanical or power failure by providing standby power, storage capacity, or interconnection with another disposal system?	☐	☒
27.	8.125(6)(D)	In a STEP system is at least one septic tank (1,000 gallons or more) provided for each EDU with 20% of tank volume dedicated to freeboard and ventilation?	☐	☒
28.	8.125(6)(F)	Are duplex pumps provided for the design flow of 1,500 gallons or greater?	☐	☒

11.0 PUMP STATION CHECKLIST				
	REGULATION		YES	N/A
29.	8.125(7)(C)	Is the minimum diameter sewer main pipe and service line of STEG sewer at least 4"?	☐	☒
30.	8.130(2)(A) 8.140(2)(B)	Is the pump station designed to withstand the 100-year flood?	☐	☒
31.	8.130(3)(A)	Is the dry well completely separate from the wet well and is a suitable and safe means of access provided to each?	☐	☒
32.	8.130(3)(B)	If the design flow is 1,500 gpd or more, are there at least 2 pumps or pneumatic ejectors provided?	☐	☒
33.	8.130(3)(D)	Are valves located outside wet well unless integral to a pump or its housing?	☐	☒
34.	8.130(3)(F) 8.140(8)(J)	Do wet and dry wells have separate ventilation systems?	☐	☒
35.	8.130(3)(G)	Does all potable water brought to pump stations comply with 8.140(7)(D)?	☐	☒
36.	8.130(6)	Is an alarm system provided with uninterrupted power?	☐	☒
37.	8.130(7)(A)	Is there 2 hours retention of the peak hourly flow for a design flow > 100,000 gpd or 4 hrs retention of the peak hourly flow for a design flow < 100,000 gpd?	☐	☒
38.	8.130(7)(B)	Are there independent utility substations provided for emergency power capable of starting and operating the pump station at its rated capacity?	☐	☒
39.	8.130(8)(A)	Is the force main velocity of ≥ 2 ft/s maintained?	☐	☒
40.	8.130	Are there complete operation instructions for the pumping stations provided that include emergency procedures, maintenance schedules, special tools and spare parts that may be necessary?	☐	☒
12.0 SUCTION LIFT PUMP AND SUBMERSIBLE PUMP STATION CHECKLIST				
	REGULATION		YES	N/A
41.	8.130(4)	Are the suction lift pumps of the self priming or vacuum priming type?	☐	☒
42.	8.130(4)(A)	Is the combined total of dynamic suction lift at the "pump off" elevation and required net positive suction head at design operating conditions less than or equal to 22 feet?	☐	☒
43.	8.130(4)(B)	Are there dual vacuum pumps capable of removing air from the suction lift pump?	☐	☒
44.	8.130(5)(A)	Are submersible pumps readily removable and replaceable without personnel entering, or disconnecting any pipe in the wet well?	☐	☒
13.0 SEWER EXTENSION CHECKLIST -- CERTIFICATION STATEMENT				
For any questions answered "N/A" provide an explanation. Also provide any useful general comments regarding design for review engineer. The proposed sewer realignment will not increase sewer flow or demand. It will also not include the construction of any lift stations or installation of pumps. The relocation of the 10" sewer force main and 12" gravity sewer main will allow for the construction of proposed road improvements by Missouri Department of Transportation (MoDOT).				
Missouri Professional Engineer's seal, signature and date: 				
Name: Warner Sherman, P.E.				
Address: 3025 E. Kearney St.				
City: Springfield		State: MO	ZIP Code: 65803	
Telephone Number with Area Code: 417-895-7690			Email: warner.sherman@modot.mo.gov	