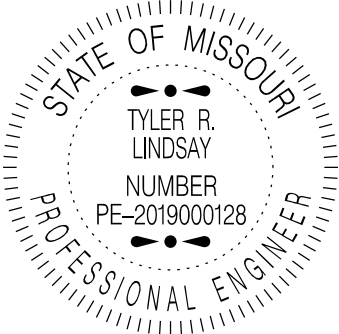


TABLE OF CONTENTS

- A. Construction Requirements
- B. Fiber Reinforced Polymer (FRP) Wrap for Concrete Columns
- C. Epoxy Pressure Injecting

 <p>TYLER R. LINDSAY NUMBER PE-2019000128</p> <p><i>Tyler Lindsay</i> 09/05/2024 10:34:05 AM TYLER R. LINDSAY - CIVIL MO-PE-2019000128</p>	<p>MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION 105 W. CAPITOL AVE. JEFFERSON CITY, MO 65101 Phone (888) 275-6636</p>
	<p>If a seal is present on this sheet, JSP's has been electronically sealed and dated.</p>
	<p>JOB NO. JNWM0068 Harrison County, MO Date Prepared: 9/5/2024</p>
<p>Only the following items of the Job Special Provisions (Bridge) are authenticated by this seal: All</p>	

JOB SPECIAL PROVISIONS (BRIDGE)

A. CONSTRUCTION REQUIREMENTS

1.0 Description. This provision contains general construction requirements for this project.

2.0 Construction Requirements. The plans and the asbestos and lead inspection report for the existing structure(s) are included in the contract in the bridge electronic deliverables zip file for informational purposes only.

2.1 In order to assure the least traffic interference, the work shall be scheduled so that a lane closure is for the absolute minimum amount of time required to complete the work. A lane 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.

2.2 Bridge work by contractor forces, including erection, rehabilitation or demolition, shall not be allowed over traffic unless a bridge platform protection system is installed below the work area except for work performed above a deck that is intact. The protection system shall be capable of catching all falling objects such as tools, overhang brackets or materials. Lifting of objects that are heavier than the capacity of the bridge protection system shall not be permitted.

2.3 Provisions shall be made to prevent any debris and material from falling onto the roadway. If determined necessary by the engineer, any debris and material that falls below the bridge outside the previously specified limits shall be removed as approved by the engineer at the contractor's expense. Traffic under the bridge shall be maintained in accordance with the contract documents.

2.4 Any damage sustained to the remaining structure as a result of the contractor's operations shall be repaired or the material replaced as approved by the engineer at the contractor's expense.

2.5 Provisions shall be made to prevent damage to any existing utilities. Any damage sustained to the utilities as a result of the contractor's operations shall be the responsibility of the contractor. All costs of repair and disruption of service shall be as determined by the utility owners and as approved by the engineer.

2.6 The contractor shall schedule the substructure repairs as one of the first orders of work so that the fiber reinforced polymer wrap for shear strengthening can be installed as required by job special provision Fiber Reinforced Polymer (FRP) Wrap for Concrete Columns.

3.0 Method of Measurement. No measurement will be made.

4.0 Basis of Payment. Payment for the above described work will be considered completely covered by the contract unit price for other items included in the contract.

B. FIBER REINFORCED POLYMER (FRP) WRAP FOR CONCRETE COLUMNS

1.0 Description. This work shall consist of designing, furnishing, and placing carbon or glass fiber reinforced polymer (FRP) composite wrap to shear strengthen the concrete column confinement for the full height of the north column from the top of the footing to the bottom of the beam cap at Intermediate Bent No. 4 of Bridge R0068 in accordance with this job special provision and as directed by the engineer.

JOB SPECIAL PROVISIONS (BRIDGE)

2.0 Materials. The storage and handling of materials for the FRP composite work shall be in accordance with the manufacturer's written recommendations in factory sealed containers with the FRP manufacturer's labels. Labels shall be intact and legible with date of manufacture and shelf life.

2.1 Material Properties.

2.1.1 The contractor shall provide a unidirectional, high-strength fiber fabric fully saturated with compatible epoxy resin per manufacturer's recommendations. FRP provided shall meet or exceed ASTM D3039 test procedure requirements (tensile modulus, stress and strain) as determined from independent laboratory testing.

2.1.2 The contractor shall provide a flexible, waterproofing, non-vapor barrier protective top coating compatible with the FRP manufacturer's recommendations to protect the FRP from ultraviolet radiation and heavy abrasion with a design life of 50 years. This protective top coating shall closely match the gray color appearance of the existing concrete color.

2.2 Product Data. Manufacturer's product data including physical and chemical characteristics, material specifications for each component, limitations on use of the system, construction or application specifications, maintenance instructions and general manufacturer's recommendations regarding each system shall be provided. Product data on the proposed primer, putty, resin, saturant, and carbon or glass fiber shall be included. Testing information on the combination of the proposed carbon or glass fiber reinforcement and epoxy when used together as a system shall be provided. The contractor shall provide certifications by the producers of the materials that all materials supplied are in accordance with all the requirements and standards of the appropriate ASTM and other agencies. Manufacturer's Material Safety Data Sheets (MSDS) for all materials to be used shall be provided.

2.3 Contractor Submittals. The contractor shall submit the following documentations and obtain approval 30 days before work commences.

2.3.1 Contractor Qualifications. The contractor shall provide a manufacturer's certification of technical training, FRP system selected, project supervisor, and documentation showing the contractor has been certified or approved by the manufacturer of the FRP system. A contractor specializing in the supply and installation of FRP repair systems with minimum of 5 years of documented experience or 25 documented similar field applications with acceptable reference letters from respective owners in performing FRP composite retrofits shall perform the work. A trained project supervisor shall remain at the work site at all times to instruct the work crew in the FRP application procedures.

2.3.2 Shop Drawings. Shop drawings shall be submitted signed and sealed by a Missouri Professional Engineer in accordance with [Sec 107](#) for Authentication of Certain Documents. Shop drawings shall include the detail of types, locations, dimensions, number of layers and splice details and orientation of all FRP materials and coatings to be installed.

2.3.3 Calculations.

2.3.3.1 Column Confinement. Signed and sealed calculations with the shop drawings shall be submitted indicating that the proposed system provides 80 percent of the confinement that the existing column concrete or column stirrup reinforcement provides, whichever is greater, for the full height of the column being repaired. The maximum strength of the confinement shall be

maintained the full height of the column being repaired. The strength of the existing concrete and reinforcing steel can be obtained from the existing plans.

3.0 Construction Requirements.

3.1 FRP Wrapping. FRP shear reinforcement shall be by complete wrapping except where objects interfere, in those places U-wrap shall be used. FRP wrapping along the portion of the member length to be strengthened may be applied continuously or as discrete strips with a maximum of 12" spacing centerline to centerline. Fibers in the FRP in its final position on the concrete component shall be oriented in the direction that maximizes the effectiveness of the FRP reinforcement. Anchorage shall be required for U-wrap and overlap shall be required for complete wrap as per the manufacturer's recommendation. Additional horizontal strips of FRP shall not be used as anchorage for FRP shear reinforcement.

3.2 Concrete Moisture Requirement. The surfaces of the concrete to receive the FRP composite shall be reasonably dry based on the following test. A 3 x 3 foot polyethylene sheet shall be taped to the existing concrete surface and at any substructure repair area. If moisture collects on the underside of the polyethylene sheet before the epoxy would cure, the concrete shall be allowed to dry longer. The concrete surface shall pass this test before the FRP can be applied.

3.3 Surface Preparation. Spalled and loose concrete shall be removed and concrete surfaces restored to their original dimensions using substructure repair in accordance with [Sec 704](#). The new concrete in the substructure repair areas shall cure for a minimum of 28 days before the FRP is applied. Concrete surfaces of existing or patched concrete to receive an application of FRP material shall be prepared by abrasive blasting or grinding to remove existing laitance and expose aggregate to a minimum ICRI-CSP3 concrete surface profile. All FRP contact surfaces shall have all laitance, dust, dirt, oil, curing compound, existing coatings and any other foreign matter removed that could interfere with the bond between the FRP system and the concrete. Localized out-of-plane variations, including form lines, shall not exceed the smaller of 1/32 inch or the tolerances recommended by the FRP manufacturer's recommendation. Sharp and chamfered corners shall be rounded off to a minimum radius of 1/2 inch by grinding or forming with the system's thickened epoxy. Variations in the radius along the vertical edge shall not exceed 1/2 inch for each foot of length.

3.4 Installation of FRP. The concrete and atmospheric temperatures shall be between 40°F and rising and 90°F and falling during installation of the FRP. Tension adhesion testing shall be conducted using ASTM D7234 with the strengths reaching 200 psi. Any failure shall exhibit failure of the concrete substrate before failure of the adhesive. Tension adhesion testing shall cease when strengths reach 200 psi. Any failure of the concrete substrate and/or FRP adhesion shall be repaired at the contractor's expense and as directed by the engineer. Two adhesion tests shall be performed for each bent having FRP being applied. The FRP shall be installed in accordance with the manufacturer's written recommendations and as required by the job special provisions.

4.0 Method of Measurement. Fiber reinforced polymer wrap will be measured to the nearest square foot based on the member surface area as detailed on the existing plans. No additional compensation will be given for the use of multiple layers of material to achieve design strength. Final measurements will not be made except for authorized changes during construction or where significant errors are found in the contract quantity. The revision or correction will be computed and added to or deducted from the contract quantity.

JOB SPECIAL PROVISIONS (BRIDGE)

5.0 Basis of Payment. Payment for the above described work, including all material, equipment, labor, excavation, shoring and any other incidental work necessary to complete this item, will be considered completely covered by the contract unit price for Fiber Reinforced Polymer Wrap.

C. EPOXY PRESSURE INJECTING

1.0 Description. Surface cracks in the north column at Intermediate Bent No. 4 shall be pressure injected with epoxy. The engineer will designate the cracks to be repaired.

2.0 Material.

2.1 Epoxy. The epoxy material shall consist of a two-component system in accordance with the requirements of ASTM C 881, Type IV, Grade 1, except that the viscosity shall be a maximum of 4.5 poise (0.45 Pa·s). The Class designation of the epoxy shall be determined according to the temperature that exists on the job.

2.2 Certification. The contractor shall furnish manufacturer's certification that the material supplied is in accordance with these specifications. The certification shall include or have attached typical test results for all specified properties required by ASTM C 881 for the injecting resin. The engineer reserves the right to sample and test any or all material supplied.

3.0 Construction Requirements. The surface to receive the epoxy grout shall be cleaned of laitance, grease and foreign matter by sandblasting. The cracks shall be cleaned of debris by using oil-free and water-free compressed air or vacuum. After the cracks are cleaned, the epoxy shall be injected in accordance with manufacturer's recommendations. The temporary surface seal and placement and method of attachment of injection ports shall be in accordance with the epoxy manufacturer's recommendations.

4.0 Method of Measurement. The extent of epoxy pressure injecting may vary from the estimated quantity but the contract unit price shall prevail regardless of the variation. The epoxy pressure injecting will be measured to the nearest linear foot (0.5 m).

5.0 Basis of Payment. Accepted quantity of epoxy pressure injecting will be paid for at the contract unit price. Payment for the above described work, including all material, equipment, labor and any other incidental work necessary to complete this item, will be considered completely covered by the contract unit price for Epoxy Pressure Injecting.