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JOB SPECIAL PROVISIONS (BRIDGE)

Job No. J6P3554  
Route 370  
St. Louis/St. Charles County

"THIS MEDIA SHOULD NOT BE CONSIDERED A CERTIFIED DOCUMENT."	<b>MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION</b> 105 W. CAPITOL AVE. JEFFERSON CITY, MO 65101 Phone (888) 275-6636
	<b>HDR ENGINEERING</b> 401 South 18 <sup>th</sup> St. Suite 300 St. Louis, MO 63103  Certificate of Authority #000856 Consultant Phone #314-425-8300
	If a seal is present on this sheet, JSP's has been electronically sealed and dated.
	JOB NO. J6P3554 St. Louis & St. Charles Counties, MO Date Prepared: 6/24/2025
Only the following items of the Job Special Provisions (Bridge) are authenticated by this seal: A - DD	

JOB SPECIAL PROVISIONS (BRIDGE)

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A. CONSTRUCTION REQUIREMENTS

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

**2.0 Construction Requirements.** The plans, shop drawings and asbestos and lead inspection report(s) for the existing structure are included in the contract with 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 allowed.

**2.3** Qualified special mortar shall be a qualified rapid set concrete patching material in accordance with [Sec 704](#). A qualified rapid set concrete patching material will not be permitted for repairing concrete deck (half-soling), deck repair with void tube replacement, full depth repair, modified deck repair and substructure repair (formed) unless a note on the bridge plans specifies that a qualified special mortar may be used.

**2.4** Provisions shall be made to prevent any debris and materials from falling into the river or onto the roadway or trail. 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. River navigation under the bridge shall be maintained in accordance with the contract documents. Traffic under the bridge shall be maintained in accordance with the contract documents.

**2.5** 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.

**2.6** 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.

**2.7** A washer shall be required under head and nut when any reaming is performed for bolt installation.

**2.8** SSPC-SP2 and SSPC-SP-3 surface preparation shall be in accordance with the environmental regulations in [Sec 1081](#) and collection of residue shall be in accordance with [Sec 1081](#) for collection of blast residue. SSPC-SP6, SSPC-SP10 and SSPC-SP-11 surface preparation shall be in accordance with the approved blast media and environmental regulations in [Sec 1081](#) and collection of blast residue shall be in accordance with [Sec 1081](#).

**2.9** 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 Recoating Information.**

**3.1 Straps Removal.** Exposed portions of straps for stay-in-place forms shall be removed prior to surface preparation. Straps need not be removed in areas that are not being painted. Flame cutting will not be permitted. The contractor shall exercise care not to damage the existing structure during removal. 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.

**3.2 Slab Drains and Stay-In-Place Forms.** The stay-in-place forms and slab drains shall not be recoated, overcoated or damaged during the painting operation. Any portion of the slab drain bracket that is blast cleaned shall be recoated with System I or System L. Any damage sustained 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.

**3.3 Existing Bridge Information.** The informational plans may be used by bidders in determining the amount of steel to be cleaned and recoated or overcoated with the full understanding that the State accepts no responsibility for accuracy of the estimated tons of existing steel shown in the table below. The bidder's acceptance and use of the estimate shown below shall be no cause for claim for any final adjustment in the contract unit price for the work involved in repainting. Each bidder is expected to carefully examine the structure(s), investigate the condition of existing paint and prepare an estimate of quantities involved before submitting a bid. Surface preparation and application of field coatings to the structural steel shall be based on the contract plan quantities. No final measurements will be made. The proposed paint system and original paint system for the continuous composite plate girder spans are the same as shown below. See contract plans for limits of surface preparation, prime and finish coat for plate girder spans.

<b>Bridge No.</b>	<b>Proposed Paint System</b>	<b>Estimated Tons – Truss Span</b>	<b>Original Paint System</b>	<b>Lead Based</b>
A45576 & A45577	System I or System L	2,507 tons (*) 2,507 tons (*)	System C	No

(\*) Includes the truss and the full truss floor system. See contract plans for limits of surface preparation, prime and finish coat for truss and floor system elements.

**3.4 Environmental Contact.** Environmental Section may be contacted at the below address or phone number. The Missouri Department of Health may be contacted at (573) 751-6102.

MoDOT - Design Division - Environmental Section  
PO Box 270  
105 W Capitol Ave., Jefferson City, MO 65102  
Telephone: (573) 526-4778

**3.5 Approved Smelter and Hazardous Waste Treatment, Storage and Disposal Facility.**

The following is the approved smelter and hazardous waste treatment, storage and disposal facility:

Doe Run Company - Resource Recycling Division - Buick Facility  
Highway KK  
Boss, MO 65440  
Telephone: (573) 626-4813

**3.6 Impermeable Surface Limits.** For the duration of cleaning and recoating the truss spans, the truss span superstructure in any span shall not be draped with an impermeable surface subject to wind loads for a length any longer than 1/4 the span length at any one time regardless of height of coverage. Simultaneous work in adjacent spans is permissible using the specified limits in each span.

**4.0 Navigation Requirements.**

**4.1** All work shall be performed so that the free flow of navigation is not unreasonably interfered with, the navigable depths are not impaired and navigation lighting is visible at all times. Any floating equipment or vessels working in the channel shall display lights and signals as required by the current "Inland Navigation Rules". If scaffolding or nets are suspended below low steel in the navigation span, the U.S. Coast Guard district office shall be advised so that the temporary reductions in clearance for river traffic can be checked for reasonableness and appropriate notices can be published. The work platforms shall be no lower than 1 foot below low steel in the navigation span (Span 12(1C) - 13(2C)). Positive precautions shall be taken to prevent the accidental dropping of spark producing, flame producing, lighted or damaging objects onto barges or vessels passing beneath the bridge. All flame cutting, welding or other similar spark producing operations shall be ceased over the channel when vessels are passing beneath the bridge.

**4.2** The contractor shall be responsible for submitting a work plan to the engineer for review. When the engineer is in concurrence with the work plan, the engineer will forward the material to the U.S. Coast Guard district office for approval. The U.S. Coast Guard will require at least 30 days to review the work plan prior to any work beginning. The work plan shall be submitted to the District Commander, Western Rivers Operation, Eighth Coast Guard District, Bridge Branch.

**5.0 Method of Measurement.** No measurement will be made.

**6.0 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. MoDOT ACCESS FOR BRIDGE INSPECTIONS**

**1.0 Description.** The contractor will provide access to MoDOT personnel and equipment to complete the biennial bridge inspection for each structure when requested. The inspections are anticipated to occur in Spring 2027.

**2.0 Timing.** MoDOT will coordinate with the contractor to identify a time when the inspections can be completed. The inspection shall occur before traffic is shifted. The inspection for each bridge is anticipated to take two (2) weeks to complete.

**3.0 Notification.** The contractor shall notify the following MoDOT personnel 30 days prior to shifting traffic:

Joe Molinaro  
District Bridge Engineer  
(314) 453-1760  
[joseph.molinaro@modot.mo.gov](mailto:joseph.molinaro@modot.mo.gov)

Adam Zentz  
Bridge Inspection Engineer  
(573) 508-7769  
[adam.zentz@modot.mo.gov](mailto:adam.zentz@modot.mo.gov)

**4.0 Method of Measurement.** There will be no measurement for this access.

**5.0 Method of Payment.** The contractor will not receive compensation for providing access to MoDOT.

**C. STRUCTURAL STEEL REQUIREMENTS**

**1.0 Description.** This provision contains general structural steel requirements for this project.

**2.0 Material.** All material shall be in accordance with Division 1000, Material Details, and specifically as shown below. The gray epoxy-mastic primer (non-aluminum) shall be compatible with concrete and produce a dry film thickness of no less than 3 mils (75 µm).

Item	Section
Structural Steel Construction	<a href="#">712</a>
Gray Epoxy-Mastic Primer (non-aluminum)	<a href="#">1045</a>
Structural Steel Fabrication	<a href="#">1080</a>
Coating of Structural Steel	<a href="#">1081</a>

**3.0 Construction Requirements.**

**3.1** Before fabrication of new metalwork, the contractor shall make the necessary measurements in the field to verify dimensions of the existing structure where new members are affected. Any deviation of the dimensions shown on the plans shall be called to the engineer's attention. The contractor shall be responsible for developing all required dimensional adjustments and

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coordinating the implementation of the dimensional adjustments with all involved fabricators and subcontractors.

**3.2** Prior to erection of the new structural steel, the steel that is to remain shall be carefully inspected for irregularities. If such irregularities are found, the irregularities shall be brought to the attention of the engineer.

**3.3** Holes in the new diaphragm or cross frame connection plates and angles may be used as a template for drilling the holes in the existing material.

**3.4** A minimum edge distance shall be maintained for all field drilled holes. The minimum edge distance for bolts shall be as shown in table below measured from the centerline of holes.

<b>Bolt Diameter</b>	<b>Minimum Edge Distance</b>
<b>inch (mm)</b>	<b>inch (mm)</b>
3/4 (19.0)	1-1/4 (32)
7/8 (22.2)	1-1/2 (38)
1 (25.4)	1-3/4 (45)

**3.5** The surfaces of existing steel that will become faying surfaces for non-slip critical new connections, typically secondary members, shall be cleaned according to the manufacturer's recommendation and with a minimum of SSPC-SP-3 surface preparation and coated with one prime coat of Gray Epoxy-Mastic Primer (non-aluminum) in accordance with [Sec 1081](#). The surfaces of existing steel that will become faying surfaces for slip critical new connections, typically primary members, shall be in accordance with contact surfaces in [Sec 1081](#). Primary member connections include girder/beam splices, end diaphragms and intermediate diaphragms in curved structures.

**3.6** Exposed girder/beam areas that are not faying surfaces or not covered by concrete that are scratched, damaged by the contractor or by field welding operations shall be touched up with Gray Epoxy-Mastic Primer (non-aluminum) in accordance with [Sec 1081](#). The areas shall receive the coating system as shown on the plans.

**4.0 Method of Measurement.** No measurement will be made.

**5.0 Basis of Payment.** Payment for the above described work will be considered completely covered by the contract unit price for the structural steel items included in the contract. No payments or adjustments will be made where new members are affected due to any deviation of the dimensions shown on plans or shop drawings.

**D. REMOVAL OF EXISTING BEARINGS**

**1.0 Description.**

**1.1** This work shall consist of but is not limited to raising and supporting existing girders and/or beams at the locations specified on the plans, removing and disposing of the existing bearings and anchor bolts and performing all other required preparations prior to installing new bearings and anchor bolts as shown on plans.

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**1.2** The responsibility for the design and construction of falsework required to support the girders and/or beams during bearing removal and new bearing installation shall rest solely with the contractor. The design shall ensure that the falsework can support all applicable dead loads and any construction loads. The design shall also provide an adequate factor of safety when selecting the temporary support members. The falsework design and working plans including detailed computations shall be signed, sealed and stamped by a registered professional engineer in the State of Missouri in accordance with Authentication of Certain Documents in [Sec 107](#).

**1.4** Existing bearing top plates shall be removed in Unit 5 only as shown in the plans and girder surfaces cleaned and coated before placement of new bearings. The removal of the existing bearing top plate and cleaning shall be completed in such a manner as to not cause any damage to the existing bottom flange. Method of removal shall be as approved by the engineer.

**2.0 Construction Requirements and Materials.**

**2.1 Raising and Supporting the Superstructure.**

**2.1.1** Before beginning operations, the contractor shall submit to the engineer for review the method and sequence of operation proposed to be used in performing this work. The contractor shall exercise caution when supporting the structural steel and shall raise the girders and/or beams the minimum extent necessary to perform this work with a maximum raise of 1/4 inch. Raising the girders and/or beams at the location of reset bearings shall be performed in a manner to prevent any damage to the adjoining steel. The lifting operation shall be performed only when authorized, but such authorization shall not relieve the contractor of responsibility for the safety of the operation or for damage to the structure. Any damage caused by the contractor's operations shall be repaired at the contractor's expense as approved by the engineer.

**2.1.2** Temporary timber supports (bearing stiffeners) shall be placed between the girder and/or beam flanges at each jacking location to prevent flange rotation. Permanent steel stiffening angles shall be designed and attached to the beam web when the beam web thickness is not adequate to support the jacking load.

**2.1.3** Raising the girders and/or beams shall be performed simultaneously on one pier at a time and shall be performed in a manner to prevent any damage to the adjoining steel.

**2.1.4** Existing end diaphragms at bent locations may require loosening or be completely removed in order to install new anchor bolts and bearings as authorized by the engineer.

**2.1.5** Bolts of existing end diaphragms that must be loosened or removed shall be replaced with like size galvanized high strength bolts with washer under head and nut.

**2.2 Bearing Removal.**

**2.2.1** After the structural members are supported, the contractor shall remove the existing bearings.

**2.2.2** The contractor shall remove the existing anchor bolts to one inch below the concrete surface or to the extent needed for installation of the new anchor bolts as required by the plans and as authorized by the engineer. Where indicated on the plans, the resultant holes shall be filled with a qualified special mortar in accordance with [Sec 704](#).



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**2.3 Cleaning and Painting.** Faying surfaces where existing end diaphragms will be reconnected and inside of drilled holes and the bottom surface of existing flange which will become faying surfaces of new connections shall be cleaned and painted with one coat of gray epoxy-mastic primer (non-aluminum).

**3.0 Method of Measurement.** Final measurement for removal of the existing bearings and preparation for the installation of the new bearings will be made per each.

**4.0 Basis of Payment.** Payment for furnishing and placing all temporary falsework (including stiffeners), materials, removals, disposal of all falsework, labor, tools, equipment and all incidentals necessary to complete this item will be considered completely covered by the contract unit price for Removal of Existing Bearings.

E. REMOVE AND REPLACE BARRIER CURB

**1.0 Description.** This work shall consist of all items necessary to remove portions of the existing barrier curb and replace with barrier curb at locations of expansion joint replacement as shown on the plans.

**2.0 Construction Requirements.** The construction requirements for this work shall be in accordance with Sec 216 and Sec 703 and as noted in the plans.

**3.0 Method of Measurement.** Remove and Replace Barrier Curb will be measured to the nearest linear foot.

**4.0 Basis of Payment.** 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 Remove and Replace Barrier Curb per linear foot.

F. DIAMOND GRINDING

**1.0 Description.** This work will only be performed at the discretion of the engineer and will be underrun if not required by the engineer. This work shall consist of grinding the new concrete surface to provide good riding characteristics, a surface texture and proper drainage. If the engineer determines it necessary to provide good riding characteristics, grinding shall be performed on all or part of the bridge approach slabs and sealed in accordance with [Sec 703.3.8](#). The finished surface shall be in accordance with [Sec 703.3.7](#) and as shown on the plans or as directed by the engineer except as modified below.

**2.0 Equipment.** The equipment shall be of a size that will grind a strip at least 3 feet wide using diamond blades and shall not cause spalls at cracks, joints or other locations.

**3.0 Construction Requirements.** The construction operation shall be scheduled and proceed in a manner that produces a uniform finished surface. Auxiliary or ramp lane grinding shall transition from the edge of the mainline as required to provide drainage and an acceptable riding surface.

**3.1** Deck repair, if required, shall be completed prior to any grinding.

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**3.2** Grinding shall be accomplished in a manner that eliminates joint or crack faults and provides lateral drainage by maintaining a constant cross slope between grinding extremities in each lane. A maximum tolerance of 1/16 inch will be allowed for adjacent sides of joints and cracks, except that under no circumstances shall the grinding depth exceed 1/4 inch from the top of the original surface. When grinding across faulted joints, a minimum of a 20-foot transition onto the approach side slab shall be used.

**3.3** The cross slope of the pavement shall be as shown on the plans and shall have no depressions or misalignment of slope greater than 1/4 inch in 12 feet when measured with a 12-foot straightedge placed perpendicular to the centerline. Areas of deviation shall be reground. Straightedge requirements will not apply across longitudinal joints or outside the ground area.

**3.4** As soon as practical after grinding, the surface will be straight edged longitudinally, and all variations exceeding 1/8 inch in 10 feet will be plainly marked. Areas of deviation shall be reground.

**3.5** Substantially all of the pavement surface shall be textured. Extra depth grinding to eliminate minor depressions in order to provide texturing on 100 percent of the pavement surface will not be required. No unground surface area between passes will be permitted, except as specified otherwise in the contract documents.

**3.6** The grinding process shall produce a final pavement surface that is true to grade and uniform in appearance with a longitudinal line-type texture. The line-type texture shall contain parallel longitudinal corrugations that present a narrow ridge corduroy-type appearance. The peaks of the ridges shall be approximately 1/32 inch higher than the bottoms of the grooves. The grooves shall be evenly spaced. There shall be approximately 50-55 grooves per foot, measured perpendicular to the centerline.

**3.7** The contractor shall remove and dispose of all residue from the grinding in a manner and at a location to satisfy environmental regulations. The contractor shall have the engineer's approval for the method of spreading and disposal of the residue prior to beginning any grinding operations.

**3.8** Solid residue shall be removed from the pavement surface before any residue is blown by traffic action or wind.

**3.9** Residue shall not be permitted to encroach on open lanes.

**3.10** The residue shall not enter into gutters or closed drainage systems.

**3.11** The contractor may disperse residue onto unpaved shoulders, adjacent roadside embankments, or median ditch areas of divided highways where the residue runoff can percolate into the soil, unless specified otherwise in the contract. The spread rate shall not generate surface runoff. If surface runoff occurs at a grinding location, the contractor shall haul the residue to an approved location at the contractor's expense.

**3.12** Discharge of any residue runoff shall not flow into adjacent rivers, streams, lakes, ponds or other open bodies of water.

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**3.13** Residue shall not be spread within 100 feet of any streams, lakes or other open bodies of water, or within 15 feet of a water filled ditch.

**3.14** The contractor shall use appropriate equipment and methods so the discharging of the residue does not cause erosion of soil or damage to established vegetation along the roadway. The contractor shall repair and reseed any areas where the discharge of grinding residue causes damage to roadway slopes or vegetated areas at the contractor's expense.

**3.15** If the solids concentration of discharged residue at any particular area is determined to be excessive by the engineer, the contractor shall provide equipment and material to flush the areas with water as directed by the engineer, at the contractor's expense.

**3.16** The pavement shall be cleaned prior to opening to traffic as directed by the engineer.

**4.0 Smoothness Requirements.**

**4.1** No diamond grinding shall be performed until the pavement has attained a strength sufficient to be opened to all types of traffic. All diamond grinding shall be completed on any section prior to opening that section to other than construction traffic, unless approved by the engineer.

**4.2** The engineer will be the sole authority for determining if the driving surface is sufficiently smooth.

**4.3** The engineer will evaluate the smoothness of the concrete wearing surface after the concrete has cured and direct the contractor to diamond grind where deemed necessary.

**4.4** After initial diamond grinding operations, if any, the engineer will again evaluate the smoothness of the concrete wearing surface and approach slab, repeating as many times as necessary to achieve the desired surface smoothness.

**4.5** Any deficiencies in the final surface due to improper contractor operations or equipment shall be corrected by the contractor at the contractor's expense.

**4.6** All areas shall be tested with a 10-foot straightedge in accordance with section 3.4 of this job special provision.

**5.0 Method of Measurement.** Measurement for diamond grinding will be made to the nearest square yard. Measurement will be based upon the area of initial diamond grinding completed as directed by the engineer. Subsequent passes of diamond grinding over a previously ground area will not be measured. No deduction will be made for gaps to avoid striping or raised pavement markers. No additional measurement will be made for diamond grinding bridge approach slabs.

**6.0 Basis of Payment.** Payment for diamond grinding will be paid for at the contract unit price per square yard. Payment for diamond grinding will be considered full compensation for all labor, equipment, material, and incidentals to complete this work, including hauling and disposal of grinding residue and cleaning the pavement prior to opening to traffic.

**G. 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 at the locations as shown on bridge plans and as directed by the engineer.

**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 stirrups/spiral reinforcement provides at the locations indicated on the plans. The strength of the confinement shall vary when the spacing of the column stirrups/spiral reinforcement varies as shown on the existing plans. Strength of the existing concrete and reinforcement 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 contract 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.

**5.0 Basis of Payment.** 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 Fiber Reinforced Polymer Wrap.

## H. SHOTCRETE CONCRETE REPAIR

**1.0 Description.** Substructure repair (formed and unformed) shall be in accordance with [Sec 704](#) and as shown on the contract plans. Barrier Repair shall be in accordance with JSP I herein and the contract plans. Shotcrete, in accordance with this Special Provision, shall be used for unformed substructure repair and may be used at the contractor's option for formed substructure and barrier repairs.

**1.1** Shotcrete shall be in accordance with the current requirements of American Concrete Institute (ACI) 506.2-13, "Specification for Shotcrete", except as otherwise specified. Shotcrete shall consist of an application of one or more layers of mortar or concrete conveyed through a hose and pneumatically projected at a high velocity against a prepared surface.

**1.2** Shotcrete shall be produced by a dry-mix process. The dry-mix process shall consist of thoroughly mixing all the ingredients except accelerating admixtures and mixing water and conveying the mixture through the hose pneumatically and the mixing water is introduced at the nozzle. For additional descriptive information, the contractor's attention shall be directed to the ACI 506R-16, "Guide to Shotcrete".

### **2.0 Contractor Experience Requirements.**

**2.1** Workers, including foremen, nozzle men and delivery equipment operators, shall be fully experienced to perform the work.

**2.2** Initial qualification of nozzle men will be based ACI or EFNARC certification for the application process being used. The nozzle men shall submit documented proof they have been certified in accordance with the ACI 506.3R-91 "Certification of Shotcrete Nozzle men" or EFNARC "Nozzle man Certification Scheme". The certification shall have been done by an ACI or EFNARC recognized shotcrete testing lab and/or recognized shotcreting consultant and have covered the type of shotcrete to be used (plain dry-mix).

**2.3** The contractor may supply 1 reference project for the project nozzle man in lieu of completing test panels in accordance with Section 5.1 of this Job Special Provision to demonstrate the experience of the nozzle man in similar shotcrete application work. Owner contact information for the reference project shall be provided to allow for the engineer to confirm satisfactory results.

### **3.0 Shotcrete Materials.**

**3.1** Shotcrete materials shall consist of one of the following premixed and packaged materials:

- a) BASF MasterEmaco S 211SP
- b) Euclid Chemical Eucoshot F
- c) King Shotcrete MS-D1
- d) CTS Cement Low-P

**3.2** No material testing is anticipated. Acceptance will be based on the prequalified materials listed in this Special Provision, approval of the nozzleman prior to material placement, and visual inspection. If questions arise based from visual examination, placement methods, curing methods or other potentially undesirable influences the engineer reserves the right to test any material properties listed on the published product data sheet for the material selected. Testing will be done at the contractor's expense.

**3.3** Material shall be delivered, stored and handled to prevent contamination, segregation, corrosion or damage.

**3.4 Proportioning and Use of Admixtures.** Admixtures will not be permitted unless approved by the engineer.

**3.5 Bonding Agents.** Bonding agents will not be permitted.

**3.6 Air Entrainment.** Additional air entrainment admixtures will not be required.

### **4.0 Construction Submittals.**

**4.1** At least 15 days before the planned start of formed and unformed substructure repair, a copy of the following information shall be submitted in writing to the engineer for review:

- (a) Written documentation of the nozzlemen's qualifications including proof of ACI or EFNARC certification;
- (b) Proposed methods of shotcrete placement and of controlling and maintaining facing alignment including equipment models;
- (c) Shotcrete mix; and
- (d) One reference project including: Nozzleman's name, material used, process used, and whether a blow pipe was utilized. Owner contact information shall be provided to ensure satisfactory results were accomplished on the reference project; or
- (e) A satisfactory test panel shall be provided with the material to be used.

**4.2** The engineer will approve or reject the contractor's submittals within 10 days after the receipt of a complete submission. The contractor will not be permitted to begin formed or unformed substructure repair with Shotcrete until the submittal requirements are satisfied and found acceptable to the engineer. Changes or deviations from the approved submittals shall be re-

submitted for approval. No adjustment in contract time will be allowed due to incomplete submittals.

**4.3** A pre-construction meeting scheduled by the engineer will be held prior to the start of work. Attendance shall be mandatory. The shotcrete contractor shall attend.

## **5.0 Field Quality Control.**

**5.1** Production test panels will not initially be required if a reference project for the nozzleman is provided as outlined in Section 2.3 of this Job Special Provision. The engineer may halt repair work if satisfactory results are not produced by the contractor and require production test panels.

**5.2** If a comparable project demonstrating satisfactory results cannot be provided, the skills of the nozzleman shall be demonstrated and tested with at least one production test panel being furnished prior to performing repairs.

## **5.3 Production Test Panels (If Required).**

**5.3.1** Qualified personnel shall perform shotcreting and coring of the test panels with the engineer present. The contractor shall provide equipment, materials and personnel as necessary to obtain shotcrete cores for testing including construction of test panel boxes, field curing requirements and coring.

**5.3.2** Production test panels shall be made with the minimum full thickness and dimension of 18 x 18 inch and at least 3½ inch thick with 2-#4 bars placed in each direction. The #4 bars shall be centered in the 3½ inch dimension and evenly spaced in each direction with the bars touching at the 4 intersecting locations.

## **5.4 Test Panel Curing, Test Specimen Extraction and Testing.**

**5.4.1** Immediately after shooting, the test panels shall be field moist cured by covering and tightly wrapping with a sheet of material meeting the requirements of ASTM C 171 until delivered to the testing lab or test specimens are extracted. The test panels shall not be immersed in water. The test panels for the first 24 hours after shooting shall not be disturbed.

**5.4.2** At the direction of the engineer at least two 3 inch diameter core samples shall be cut at two of the intersections to ensure consolidation around the bars. If voids are present the material and nozzleman are not approved for use. The contractor may continue with changes to the materials or nozzleman. The same process will be followed until no voids are present.

## **6.0 Shotcrete Facing Requirements.**

**6.1 Shotcrete Alignment Control.** The final surface of the shotcrete shall maintain the existing concrete plane surface.

**6.2 Surface Preparation.** In addition to the manufacturer's recommendations, the surfaces to be shotcreted shall be cleaned of loose materials, mud, rebound, overspray or other foreign matter that could prevent or reduce shotcrete bond. Shotcrete shall not be placed on frozen surfaces.



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**6.3 Delivery and Application.** In addition to the manufacturer's recommendations, a clean, dry, oil free supply of compressed air sufficient for maintaining adequate nozzle velocity shall be maintained at all times. The equipment shall be capable of delivering the premixed material accurately, uniformly and continuously through the delivery hose. Shotcrete application thickness, nozzle technique, air pressure and rate of shotcrete placement shall be controlled to prevent sagging or sloughing of freshly applied shotcrete.

**6.3.1** The shotcrete shall be applied from the lower part of the area upwards to prevent accumulation of rebound. The nozzle shall be oriented at a distance and approximately perpendicular to the working face so that rebound will be minimal and compaction shall be maximized. Special attention shall be paid to encapsulating reinforcement. Care shall be taken while encasing reinforcing steel and mesh to keep the front face of the reinforcement clean during shooting operations, so that the shotcrete builds up from behind, to encase the reinforcement and prevent voids and sand pockets from forming. If a blow pipe was used to qualify, a blow pipe shall be required. The blow pipe is used to remove rebound and overspray immediately ahead of the nozzle. Rebound shall not be worked back into the construction. Rebound that does not fall clear of the working area shall be removed. Hardened rebound and hardened overspray shall be removed prior to the application of additional shotcrete using abrasive blast cleaning, chipping hammers, high pressure water blasting or other suitable techniques.

**6.3.2** When using multiple layer shotcrete construction, the surface of the receiving layer shall be prepared before application of a subsequent layer, by either:

- (a) Brooming the stiffened layer with a stiff bristle broom to remove all loose material, rebound, overspray or glaze, prior to the shotcrete attaining initial set.
- (b) If the shotcrete has set, surface preparation shall be delayed 24 hours, at which time the surface shall be prepared by sandblasting or high pressure water blasting to remove all loose material, rebound, hardened overspray, glaze or other material that may prevent adequate bond.

**6.4 Defective Shotcrete.** The engineer will have authority to accept or reject the shotcrete work. Shotcrete that is not in accordance with the project specifications may be rejected either during the shotcrete application process, or on the basis of tests. Shotcrete surface defects shall be repaired as soon as possible after placement. Shotcrete that exhibits segregation, honeycombing, laminations, voids or sand pockets shall be removed and replaced. In-place shotcrete determined not meeting the published Technical Information for the product used will be subject to remediation as approved by the engineer. Possible remediation options range from required latex over coating for excessive cracking up to removal and replacement at the contractor's expense.

**6.5 Construction Joints.** Construction joints shall be tapered uniformly toward the excavation face over a minimum distance equal to the thickness of the shotcrete layer. Square joints will not be permitted except at the expansion joint. The surface of the joints shall be rough, clean and sound. A minimum reinforcement overlap at reinforcement splice joints shall be provided. The surface of a joint shall be clean and wet before adjacent shotcrete is applied.

**6.6 Final Face Finish.** Shotcrete finish shall be a wood float, rubber float, steel trowel or smooth screeded finish.

**6.7 Additional Construction Requirements.**

**6.7.1** If the work to be performed is in the vicinity of a jurisdictional water of the US, care shall be taken to avoid any rebound from entering the regulated waterway.

**6.7.2** If the work to be performed is in the vicinity of an enclosed drainage system, care shall be taken to avoid any rebound from entering the drainage system.

**6.8 Weather Limitations.**

**6.8.1** The shotcrete shall be protected if placed when the ambient temperature is below 40°F and falling or when likely to be subject to freezing temperatures before gaining sufficient strength. Cold weather protection shall be maintained until the compressive strength of the shotcrete is greater than 725 psi. Cold weather protection includes blankets, heating under tents or other means acceptable to the engineer. The temperature of the shotcrete mix, when deposited, shall be not less than 50°F or more than 85°F. The air in contact with the shotcrete surfaces shall be maintained at temperatures above 32°F for a minimum of 7 days.

**6.8.2** If the prevailing ambient temperature conditions (relative humidity, wind speed, air temperature and direct exposure to sunlight) are such that the shotcrete develops plastic shrinkage and/or early drying shrinkage cracking, shotcrete application shall be suspended. The contractor shall reschedule the work to a time when more favorable ambient conditions prevail or adopt corrective measures, such as installation of sun screens, wind breaks or fogging devices to protect the work. Newly placed shotcrete exposed to rain that washes out cement or otherwise makes the shotcrete unacceptable shall be removed and replaced at the contractor's expense.

**6.9 Curing.** Permanent shotcrete shall be protected from loss of moisture for at least 1 day after placement. Shotcrete shall be cured by methods that keep the shotcrete surfaces adequately wet and protected during the specified curing period. Curing shall commence within one hour of shotcrete application. When the ambient temperature exceeds 80°F, the work shall be planned such that curing can commence immediately after finishing. Curing shall be in accordance with the following requirements.

**(a) Membrane Curing.** Membrane curing is required on overhead surfaces that cannot be adequately wet cured. Curing compounds will not be permitted on any surface against which additional shotcrete or other cementitious finishing materials are to be bonded unless the surface is thoroughly sandblasted in a manner acceptable to the engineer. Membrane curing compounds shall be spray applied as quickly as practical after the initial shotcrete set at rate of coverage of not less than 7.1 square feet per gallon.

**7.0 Safety Requirements.** Nozzlemen and helpers shall be equipped with gloves, eye protection and adequate protective clothing during the application of shotcrete. Whip checks are required on air lines. The contractor shall be responsible for meeting all federal, state and local safety requirements.

**8.0 Method of Measurement.** Measurement of Substructure Repair (Formed) and Substructure Repair (Unformed) shall be in accordance with [Sec 704](#). Measurement of Barrier Repair shall be in accordance with Special Provision for "Barrier Repair."

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**9.0 Basis of Payment.** Payment for Substructure Repair (Formed) and Substructure Repair (Unformed) shall be in accordance with [Sec 704](#). Payment of Barrier Repair shall be in accordance with Special Provision for “Barrier Repair.”

I. BARRIER REPAIR

**1.0 Description.** This work shall consist of repairing the deteriorated concrete on the traffic side face of the existing barriers as shown in the plans. The work includes removing deteriorated concrete, preparing the repair site and application of unformed concrete, or shotcrete at the contractor’s option, to the repair locations.

**2.0 Construction Requirements.** The construction requirements for this work shall be in accordance with Sec 704, and at the contractor’s option the Job Special Provision for Shotcrete Concrete Repair. This work shall be completed prior to the application of Penetrating Concrete Sealer.

**3.0 Method of Measurement.** The extent of the repair may vary from the estimated quantities, but the contract unit price shall prevail regardless of the variation.

**3.1** Barrier Repair will be measured to the nearest linear foot.

**4.0 Basis of Payment.** 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 prices for Barrier Repair per linear foot.

J. CONCRETE DIAPHRAGM REPAIR (FORMED)

**1.0 Description.** This work shall consist of repairing the deteriorated concrete on the concrete diaphragms as shown in the plans. The work includes removing deteriorated concrete, preparing the repair site and applying formed concrete.

**2.0 Construction Requirements.** The construction requirements for this work shall be in accordance with Sec 704 and as noted in the plans. This work shall be completed prior to executing Cleaning and Protective Coating (Epoxy).

**3.0 Method of Measurement.** The extent of the repair may vary from the estimated quantities, but the contract unit price shall prevail regardless of the variation.

**3.1** Concrete Diaphragm Repair (Formed) will be measured to the nearest square foot.

**4.0 Basis of Payment.** 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 prices for Concrete Diaphragm Repair (Formed) per square foot.

**K. CLEANING AND PROTECTIVE COATING (EPOXY)**

**1.0 Description.** In order to protect the bridge superstructure concrete from deicing chemicals and other contaminants, all loose and delaminated concrete shall be removed, and a protective epoxy coating shall be applied to the concrete in the area as shown in the bridge plans and per this job special provision.

**2.0 Construction Requirements.** The areas to be cleaned and coated shall be as follows:

All exposed surfaces of concrete diaphragms and concrete girders 10 feet from the end of the girders as shown on the plans.

**2.1.** Cleaning shall include removal of all loose and delaminated concrete with hand tools to the satisfaction of the engineer. Hand tools may include chipping chisels, wire brushes, dust brushes, etc. After cleaning, a protective coating meeting the requirements of Sec 1059.20 shall be applied in accordance with Sec 711.3.2 and the manufacturer's recommendations.

**3.0 Method of Measurement.** No measurement will be made for cleaning and protective coating except for authorized changes during construction or where appreciable errors are found in the plan quantity. When required, measurement will be made to the nearest square foot.

**4.0 Basis of Payment.** Payment for Cleaning and Protective Coating (Epoxy) includes all material, equipment, labor and any other incidentals necessary to complete this work.

**L. SPECIAL CONSIDERATION OF CHANGE ORDERS AND VALUE ENGINEERING**

**1.0 Description.** Increased Federal Share has been approved by the FHWA for an innovative technology or practice. The Commission will receive an additional five percent Federal Share of the overall contract value due to innovations within the following pay item(s).

Pay Item Number	Pay Item Description	Innovation
7109911	Reinforcing Steel (Galvanized)	Reinforcing Steel (Galvanized)

Due to the increased Federal Share, the project components related to the innovation(s) described above must be constructed with the materials, quantities, methods and innovations as shown on the project plans and specifications. If the contractor requests materials, quantities, methods or innovations other than those included in the plans and specifications, the request must be reviewed and approved by the Commission and FHWA. Approved changes to the innovation items above shall be at no additional cost to the Commission and shall not increase the contract time.

**2.0 Special Consideration of Change Orders and Value Engineering Change Proposals (VECP).** Change ordering and/or value engineering the pay item(s) listed in section 1.0 jeopardize the ability for the Commission to receive an additional Federal Share for the overall contract value. Special consideration should be given to the change order value for removing or modifying such item(s) from the contract ensuring the benefit outweighs the cost.

**3.0 Contacting Financial Services.** If it is determined that the proposed change order and/or VECP outweighs the additional overall five percent Federal Share value, the engineer shall notify the MoDOT project manager.

M. REINFORCING STEEL (GALVANIZED)

**1.0 Description.** This job special provision contains general requirements for furnishing and placing hot-dip galvanized reinforcing steel as shown on the plans and shall be in addition to the requirements of [Sec 706](#).

**2.0 Material.** Reinforcing bars shall be in accordance with ASTM A 123, ASTM A 767 and ASTM A 1094. Repairs to the galvanized coating shall be in accordance with ASTM A 780.

**3.0 Construction Requirements.**

**3.1 Fabrication.** The fabricator shall consult with the hot-dip galvanizer regarding potential problems or potential handling problems during the galvanizing process that may require modifications of design before fabrication proceeds.

**3.1.1** Surface contaminants that are not removable by the normal chemical cleaning process in the galvanizing operation shall be removed by blast cleaning or an alternative method prior to delivery of steel to the galvanizer.

**3.1.2** Shop or field bending of reinforcing bar before or after galvanizing shall pay special attention to the minimum bend diameters required by Table 2 of ASTM A 767.

**3.2 Delivery, Storage and Handling.** Materials shall be delivered in accordance with the manufacturer's written instructions and in accordance with ASTM A 1094/A 1094M. Materials shall be delivered with identification labels intact and product name and manufacturer clearly visible.

**3.2.1 Storage.** Galvanized bars that will be stored in the field in excess of 30 days shall be stored off the ground on dunnage to allow air circulation to prevent the formation of wet storage stain. These corrosion deposits, if present, shall be removed in a manner satisfactory to the engineer prior to incorporation of the material into the work.

**3.3 Accessories.** Reinforcement ties shall be galvanized steel wire in accordance with ASTM A 641/A 641M. Metal bar chairs in contact with galvanized steel shall be galvanized steel. Other materials for bar chairs may be accepted with the approval of the engineer. Mechanical bar splices shall for suitable for use with galvanized reinforcement.

**3.4** Use of metal formwork shall be in accordance with ASTM A 767.

**4.0 Submittals.** The contractor shall submit a copy of the coating applicator's notarized Certificate of Compliance that the hot-dip galvanized coating meets or exceeds the specified requirements of ASTM A 767.

**5.0 Method of Measurement.** Measurement shall be in accordance with [Sec 706.4](#).

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**6.0 Basis of Payment.** 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 Reinforcing Steel (Galvanized).

N. REPAINT RIVER GAUGE MARKINGS

**1.0 Description.** This work shall consist of repainting existing river gauge markings (clearance gauge) on the face of piers as shown on the plans.

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

Item	Section
Water	1070

**2.1** The paint base type shall be a vinyl resin, copolymer type or chlorinated natural rubber that is compatible in all respects with the intended use. The paint shall be suitable for use on concrete masonry under severe exposure or submersion in water as recommended by the manufacturer. Paint applications shall meet the maximum dry mil thickness as recommended by the manufacturer. The white second coat and the black finish coat for the gauge markings shall have a glossy finish. All paint proposed for use shall be as approved by the engineer. The first coat shall be one of the following.

**2.1.1** The first coat shall be adaptable for use as a primer under the succeeding coats with the undercoat tint the same as the second coat.

**2.1.2** The first coat shall be the same as the second coat with the manufacturer certifying the paint to be self-priming.

**2.2** In lieu of painting the gauges, the contractor may use a durable material which shall be of such strength and durability as to provide a clearance gauge resistant to weather, tide and current as approved by the engineer.

**3.0 Construction Requirements.**

**3.1** The area to be painted shall be prepared by removing all dirt, oil or other foreign substances. Use hand tools to remove existing flaking paint and provide a scuff to the entire existing painted surface. The surface shall then be flushed down with clear water and allowed to dry.

**3.2** The first coat shall be worked well into the pores of the concrete. Paint shall not be applied when the air temperature is below 45°F (7°C) or when the air temperature exceeds 90°F (32°C). Painting shall not be started unless it can be reasonably expected that the gauge can be completed with all coats plus 7 days time before any portion of the gauge becomes submerged, unless the material used will permit earlier submersion without detriment to the finished work. The area to be painted shall receive two coats of white paint. The gauge numbers and foot markings shall be painted with two coats of black paint on top of the white paint coats. Each coat shall be thoroughly dry with a minimum of 24 hours between succeeding coats.

**3.3** In lieu of painting the gauges, the contractor may use a durable material that shall be permanently fixed to the bridge pier as recommended by the manufacturer. Cleaning of the pier shall be in accordance with [section 3.1](#) of this provision.

**4.0 Method of Measurement.** No measurement will be made.

**5.0 Basis of Payment.**

**5.1** 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 lump sum price for Repaint River Gauge Markings.

**5.2** In the event the river stage conditions are such that the contractor is unable to perform this work or for any other reason, the State retains the option to eliminate the work or parts thereof from the contract without alteration of the contract unit prices for other work or the option to permit the contractor to delay the performance of the work beyond the end of the contract period.

O. ALTERNATE PAINT SYSTEM

**1.0 Description.** For twin bridges A45576 and A45577, this work shall consist of either applying a System I Finish Coat or a System L Finish Coat. Each paint system alternate includes the same surface preparation and primer.

**2.0 Bidding.** To exercise this option, separate details for each paint system are included in the contract, and separate pay items, descriptions and quantities are included in the itemized proposal for each alternate. The bidder shall bid only one of the alternates and leave blank the contract unit price column for any pay item listed for the other alternate.

**3.0 Method of Measurement.** The quantities of the alternates will be measured in accordance with the plans and the Specifications.

**4.0 Basis of Payment.** The pay items included in the contract for the chosen alternate will be paid for at the contract unit price in accordance with the plans and the Specifications.

P. SYSTEM L PROTECTIVE COATING

**Add the following section 1045.11 in Sec 1045:**

**1045.11 High Solids Inorganic Ethyl Silicate Coating**

**1045.11.1 Description.** The coating shall be a mono-component, high solids inorganic ethyl silicate coating compatible as a topcoat over high solids inorganic zinc primer. The inorganic ethyl silicate coating shall be in accordance with the latest edition of the RCSC *Specification for Structural Joints Using High-Strength Bolts* Class B requirements for slip coefficient and creep resistance on faying surfaces and other requirements specified herein. The VOC content shall not exceed 3.50 pounds per gallon. If thinning is necessary for application, the maximum VOC content after thinning shall not exceed 3.50 pounds per gallon.

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**1045.11.2 Manufacturer and Brand Name Approval.** Prior to approval and use of high solids inorganic ethyl silicate, the manufacturer shall submit to Construction and Materials a certified test report from AASHTO Product Evaluation and Audit Solutions program showing specific test results conforming to all quantitative and resistance test requirements of these specifications. The certified test report must show that the inorganic ethyl silicate when used as a topcoat over a compatible high solids inorganic zinc primer passes ISO 12944-9 CX test twice on each test panel. The certified test report shall also contain the exact ratio, by weight, of each component of the coating used for the tests, the lot tested, the manufacturer's name, brand name of coating and date of manufacture. Upon approval from the engineer of this certified test report, further resistance tests will not be required, except as hereinafter noted, of that manufacturer for that brand name of coating. New certified test results shall be submitted any time the manufacturing process or the coating formulation is changed and may be required by the engineer when sampling and testing of material offered for use indicates nonconformance to any of the requirements herein specified. All resistance testing shall be performed on duplicate sets of test panels, and upon completion of the prescribed exposure testing, the manufacturer shall submit one set of the exposed panels to Construction and Materials.

**Add the following to paragraph 1081.10.2 in Sec 1081:**

**1081.10.2 Systems of Coatings.**

<b>Paint Systems for Structural Steel</b>		
<b>System L (High Solids, Zinc-Inorganic Ethyl Silicate)</b>		
<b>Coating</b>	<b>Section</b>	<b>Dry Film Thickness, mils</b>
Inorganic Zinc Prime Coat	1045.3	3.0 min. to 6.0 max.
Inorganic Ethyl Silicate	1045.11	3.0 min. to 6.0 max.

**Delete paragraph 1081.10.3.4 and substitute the following:**

**1081.10.3.4 Limits of Coating Application.** Unless otherwise indicated on the plans, the application of the intermediate and finish coats for Systems G and H, and the application of the finish coat for System I and L, hereinafter referred to as field coats, shall be applied to the structure within the following limits.

**Add the following paragraph 1081.10.3.4.2.5 in Sec 1081:**

**1081.10.3.4.2.5** When System L is specified on the plans for beam and girder spans, an intermediate coat shall not be applied to the beams and girders. The System L finish coat shall be applied to the surfaces of all structural steel, except that areas of steel to be in contact with concrete shall not receive the finish coat. The finish coat shall also be applied to the bearings, except where bearings will be encased in concrete.

**Delete paragraph 1081.10.3.10.1 and substitute the following:**

**1081.10.3.10.1 Contact Surfaces.** Contact surfaces of high strength bolted field splice and diaphragm connections shall be prime coated to produce a dry film thickness no less than 1.5 mils or more than 2.5 mils. The limits of the coating thickness for these surfaces shall be shown on the shop drawings. The maximum limit of 2.5 mils may be increased provided acceptable test results in accordance with the Testing Method to Determine the Slip Coefficient for Coatings Used



in Bolted Joints (RCSC *Specification for Structural Joints Using High-Strength Bolts*, Appendix A) are submitted and approved by the engineer. Revised shop drawings will not be required upon acceptance of the test results. The tests shall meet the requirements for the slip coefficient and creep resistance for Class B coatings and shall be performed by a nationally recognized independent testing laboratory. Any change in the formulation of the coating will require retesting, except when thinned within the limits of manufacturer's recommendations. At the contractor's option, the contact surfaces of connections for all non-slab bearing diaphragms on non-curved girders may be prime coated with a dry film thickness of no less than 3.0 mils or more than 6.0 mils, unless noted otherwise on the plans.

**Delete the heading for 1081.10.4 and substitute the following:**

**1081.10.4 Recoating of Structural Steel (System G , H, I or L).**

**Q. DRAINAGE MODIFICATIONS**

**1.0 Description.**

**1.1** This work shall consist of furnishing, fabricating and installing the drainage items necessary to complete the drainage system modifications as shown on the contract plans.

**1.2** Detailed shop drawings of the drainage system shall be prepared and submitted to the engineer. Shop drawings shall be in accordance with [Sec 1080](#). Catalog data may be furnished for components that are standard manufactured items in lieu of detailed drawings, provided that governing dimensions are given.

**2.0 Materials.**

**2.1** Steel bent plate drainage system (trough and deflector), tubing, supports and fasteners shall be as shown on the plans. Steel shall be in accordance with the requirements of Sec 712 and 1080.

**2.2** Reinforced fiberglass pipe, collection basins and fittings shall be a Reinforced Thermosetting Resin Pipe (RTRP) system in accordance with the requirements of ASTM D 2996. The RTRP system shall have a minimum short time rupture strength hoop tensile stress of 30,000 psi. The RTRP system shall be pigmented resin throughout the wall. The color of the RTRP system shall be concrete gray, gray (Federal Standard #26373) or as specified on the bridge plans. The RTRP system shall not be coated with paint, gel-coat or any other exterior coating. The resin used shall be ultraviolet (UV) resistant and/or have UV inhibitors mixed throughout. Drains may have an exterior coating for additional UV resistance. The combination of materials used in the manufacture of the drains shall be tested for UV resistance in accordance with ASTM D4329 Cycle A. The representative material shall withstand at least 500 hours of testing with only minor discoloration and without any physical deterioration. The contractor shall furnish the results of the required ultraviolet testing prior to acceptance of the pipe, basins and fittings.

**2.3** The contractor shall furnish a manufacturer's certification to the engineer for each lot furnished, certifying that the materials supplied are in accordance with all requirements specified. The certification shall include results of all required tests. Acceptance of the material will be based

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on the manufacturer's certification and upon results of such tests as may be performed by the engineer. The certification shall show the quantity and lot number that is represented.

**3.0 Construction Requirements.**

**3.1** All connections shown on the plans to facilitate future removal for maintenance cleanout or flushing shall be made with a threaded gasket coupler system, bolted gasket flange system or a female to male threaded PVC plug. Adhesive bonded joints will be permitted for runs of pipe between such connections.

**3.2** Runs of pipe shall be supported at a spacing of not greater than the lesser of those as recommended by the manufacturer of the pipe or as shown on the bridge plans. Supports that have point contact or narrow supporting areas shall be avoided. Standard sling, clamp, clevis hangers and shoe supports designed for use with steel pipe may be used. Minimum hanger thickness shall be 3/16 inch with the minimum strap width for the pipe sizes shown in the table below. Straps shall have 120 degree minimum contact with the pipe. Pipe supported on a surface with less than 120 degrees of contact shall have a split fiberglass pipe protective sleeve bonded in place with adhesive. All new steel, hangers and miscellaneous hardware for drainage system shall be ASTM A 709 Grade 36 steel except as noted on the bridge plans. All new steel, hangers and miscellaneous hardware for drainage system shall be galvanized in accordance with ASTM A 153 except as noted on the bridge plans.

Pipe Size inches (mm)	Minimum Strap Width inches (mm)
3 (76.2)	1.25 (32)
4 (101.6)	1.25 (32)
6 (152.4)	1.50 (38)
8 (203.2)	1.75 (45)
10 (254.0)	1.75 (45)
12 (304.8)	2.00 (51)
14 (355.6)	2.00 (51)

**3.3** The RTRP system shall be handled and installed in accordance with guidelines and procedures as recommended by the manufacturer.

**4.0 Method of Measurement.** No measurement will be made.

**5.0 Basis of Payment.** 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 lump sum price for Drainage Modifications.

R. EXPANSION JOINT BICYCLE PLATE

**1.0 Description.** This work shall consist of removing existing bicycle plates and furnishing and installing new bicycle plates as shown on the plans

**2.0 Construction Requirements.** Steel for plates shall be in accordance with the requirements of Sec 712 and 1080 and as noted in the plans. Furnish fasteners of the size and type as noted in the plans.

**3.0 Method of Measurement.** Measurement will be made per each. The expansion joint bicycle plate, complete in place, shall include the steel plate, fasteners and any incidental material needed to complete the work.

**4.0 Basis of Payment.** Payment for all materials, labor, equipment, and incidentals necessary to complete this item will be considered completely covered under the contract unit price for Expansion Joint Bicycle Plate.

S. GUSSET PLATE L0 RETROFIT

**1.0 Description.** This work shall consist of replacing bolts and furnishing and installing steel cheese plates and gusset plates on inside face and outside face of all four L0 gusset locations per bridge.

**2.0 Construction Requirements.** Structural steel for plates shall be in accordance with the requirements of Sec 712 and 1080 and as noted in the plans.

**2.1 Cheese Plates and Gusset Plates.** Details on the plans for the fabrication and installation of the cheese plates and gusset plates were developed from available plans, shop drawings and limited inspection photographs. All existing configurations and dimensions shall be verified in the field prior to ordering any material.

**2.2** Detailed shop drawings of the cheese plates and gusset plates shall be prepared and submitted to the engineer. Shop drawings shall be in accordance with [Sec 1080](#).

**3.0 Method of Measurement.** Measurement will be made per each. The gusset plate L0 retrofit, complete in place, shall include bolts, nuts, washers, cheese plates, gusset plate, silicone sealant, coating and any incidental material needed to complete the work.

**4.0 Basis of Payment.** Payment for all materials, labor, equipment, and incidentals necessary to complete this item will be considered completely covered under the contract unit price for Gusset Plate L0 Retrofit.

T. MISCELLANEOUS BOLT REPLACEMENT

**1.0 Description.** This work shall consist of furnishing and installing bolts at locations shown on the plans.

**2.0 Construction Requirements.** Install bolts, nuts and washers of the size and grade as noted in the plans.

**3.0 Method of Measurement.** Measurement will be made per each.

**4.0 Basis of Payment.** Payment for all materials, labor, equipment, and incidentals necessary to complete this item will be considered completely covered under the contract unit price for Miscellaneous Bolt Replacement.

U. EXTEND SLAB DRAIN

**1.0 Description.** The work under this item shall consist of all materials, labor, equipment, and incidentals necessary to extend the existing slab drains in Unit 4 truss span as shown on the plans.

**2.0 Materials.** Steel for the bracket assembly shall be in accordance with the requirements of Sec 712 and 1080 and as noted in the plans.

**2.1** Reinforced fiberglass pipe and reducer shall be a Reinforced Thermosetting Resin Pipe (RTRP) system in accordance with sections 2.2 and 2.3 of JSP Q herein.

**3.0 Construction Requirements.**

**3.1** Shop drawings will not be required for the drain extensions and steel bracket assembly.

**3.2** Details on the plans for extending the slab drains were developed from available plans. All existing configurations and dimensions shall be verified in the field prior to ordering any material.

**3.3** Slab drain extensions shall be installed such the bottom of the drain extension shall be nominally flush, and not below, the bottom face of the truss lower chord at all times.

**3.0 Method of Measurement.** Measurement will be made per each. The slab drain extension, complete in place, shall include RTRP pipe, steel bracket assembly and fasteners.

**4.0 Basis of Payment.** Payment for all materials, labor, equipment, and incidentals necessary to complete this item will be considered completely covered under the contract unit price for Extend Slab Drain.

V. TRUSS ACCESS HOLE COVER REPLACEMENT

**1.0 Description.** This work shall consist of furnishing and installing truss access hole covers as shown on the plans.

**2.0 Construction Requirements.** Steel for plates shall be in accordance with the requirements of Sec 712 and 1080 and as noted in the plans.

**3.0 Method of Measurement.** Measurement will be made per each. Truss access hole cover replacement, complete in place, shall include fabricated cover, neoprene gasket and any incidental material needed to complete the work as shown on the plans.

**4.0 Basis of Payment.** Payment for all materials, labor, equipment, and incidentals necessary to complete this item will be considered completely covered under the contract unit price for Truss Access Hole Cover Replacement.

**W. HIGH LOAD MULTI-ROTATIONAL (HLMR) DISC BEARING ASSEMBLY**

**1.0 Description.** This item shall include furnishing and installing complete-in-place factory produced rotational guided expansion disc bearings in accordance with details shown on the plans and this special provision.

**2.0 Materials.** Disc bearing shall consist of a polyether urethane structural element (disc) confined by upper and lower steel bearing plates. The bearing shall be equipped with a shear resisting mechanism, and/or positive location device to prevent lateral movement of the disc. Bearings shall adequately provide for the thermal expansion and contraction, rotation, camber changes, and creep and shrinkage of structural members, where applicable. New disc bearings are intended to replace the existing pot bearings with respect to vertical load and lateral movement capacities. Material requirements, tolerances, finishes and other details for these bearings are prescribed on the plans and in this special provision.

**2.1 Material Substitution.**

**2.1.1** Standard manufactured disc bearings may be substituted for plan bearings provided the bearings meet all contract requirements for materials, movement and loads. In addition the bearing shall be capable of resisting a lateral load as shown on the plans. Masonry plates shall be designed for a maximum load of 1000 psi (6.9 MPa).

**2.1.2** A center bar guide system may be used in lieu of an exterior guide bar system to meet plan requirements, provided the guide and keyway have mating surfaces of stainless steel and Teflon. For either system, provisions shall be made to accommodate the total transverse movements as shown on the plans before the guides are engaged. The transverse movement indicated on the plans is due to thermal effects and no additional movement beyond what is specified on the plans shall be allowed. Provisions shall be made for the transverse guidance mechanism to allow equal movements, one-half of total movement, due to thermal expansion and contraction at 60°F (16°C). The guidance mechanism shall be adjusted appropriately for temperatures different than 60°F (16°C).

**2.1.3** Any modifications required to meet the height of bearings shown on bridge plans will be the responsibility of the contractor. Cost of any modification required shall be borne by the contractor.

**2.2 Polytetrafluoroethylene (PTFE) Requirements.** PTFE sliding surfaces for expansion bearings are designed to translate or rotate by sliding of a self-lubricating PTFE surface across a smooth hard mating surface of stainless steel. The unfilled or filled PTFE sliding surfaces shall have 3/64-inch (1.0 mm) minimum thickness and 3/32-inch (2.0 mm) maximum thickness.

<b>Maximum Coefficient of Friction (PTFE to stainless steel as furnished)</b>	
At 75% of Capacity	0.03
At 25% of Capacity	0.05

**2.2.1** The PTFE sliding surface shall be bonded under factory controlled conditions to a rigid back-up material capable of resisting any bending stresses to which the sliding surfaces may be subjected. Alternatively, PTFE material of twice the thickness specified above may be recessed for half its thickness in the back-up material.

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**2.2.2** The mating stainless steel surface to the PTFE shall be an accurate flat surface as required by the design and shall have a minimum Brinell hardness of 125 and a surface finish of less than 20 micro inches (0.508  $\mu$ m) rms. The mating surfaces shall completely cover PTFE surface in all operating positions of the bearing. Stainless steel used as a mating surface shall be seal welded around its entire perimeter.

**2.3 PTFE Resin.** The virgin PTFE resin, filled or unfilled PTFE sheets, back-up materials and all other parts of the fixed or expansion bearings shall have the friction, mechanical and physical properties prescribed in this specification, or as shown on the bridge plans. PTFE resin shall be virgin material in accordance with ASTM D 4895. Specific gravity shall be 2.13 to 2.19. Melting point shall be  $\pm 623^{\circ}\text{F}$  ( $\pm 327^{\circ}\text{C}$ ).

**2.4 Filler Material.** Filler material when used, shall be milled glass fibers, carbon or other approved inert filler materials.

**2.5 Adhesive Material.** Adhesive material shall be an epoxy resin in accordance with Federal Specification MMA-A-134.

**2.6 Unfilled PTFE Sheet.** Finished unfilled PTFE sheet shall be made from virgin PTFE resin and in accordance with the following requirements.

Properties	Value	Test Method
Tensile Strength, psi (MPa) min.	2800 (19.3)	ASTM D 4895
Elongation, percent, min.	200	ASTM D 4895

**2.7 Filled PTFE Sheet.** Filled PTFE sheet shall be made from virgin PTFE resin uniformly blended with inert filler material. Finished filled PTFE sheets containing glass fiber or carbon shall be in accordance with the following requirements.

Mechanical Requirements			
Properties	15% Glass Fibers	25% Carbon	Test Method
Tensile Strength, psi (MPa) min.	2000 (13.8)	1300 (9.0)	ASTM D 4895
Elongation, percent, min.	150	75	ASTM D 4895

Physical Requirements			
Properties	15% Glass Fibers	25% Carbon	Test Method
Specific Gravity, min.	2.20	2.10	ASTM D 792
Melting Point, $^{\circ}\text{F}$ ( $^{\circ}\text{C}$ )	81 $\pm$ 18 (27 $\pm$ 10)	621 $\pm$ 18 (327 $\pm$ 10)	ASTM D 4895

**2.8 Surface Treatment.** Where PTFE sheets are to be epoxy bonded, one side of the PTFE sheet shall be factory treated by an approved manufacturer by the sodium ammonia or sodium naphthalene process.

**2.9 Stainless Steel Mating Surface.** Stainless steel mating surfaces, when used, shall be 12-gage minimum thickness and in accordance with ASTM A 240 Type 304 with a surface finish of less than 20 micro inches (0.500  $\mu$ m) rms. Stainless steel mating surfaces shall be polished or rolled as necessary to meet the friction requirements of this specification.

**2.10 Structural Carbon Steel.** Base plates, sole plates, guide bars, and other bridge bearing components shall be constructed of structural steel in accordance with ASTM A 709 Grade 50

and galvanized as specified on the bridge plans or shop coated with a prime coat of the coating system as specified on the bridge plans to provide a minimum dry film thickness of 5 mils (125  $\mu\text{m}$ ) in accordance with [Sec 1081](#).

**2.11 Polyether Urethane Disc.** Polyether urethane shall conform to Section 18.3.2.8 and Table 18.3.2.8-1 of the AASHTO LRFD Bridge Construction Specification. The polyether urethane disc shall be designed for a maximum average compressive stress of 5000 psi. If the outer surface of the disc is not vertical, the stress shall be computed using the smallest plan diameter of the disc, excluding the area of any holes. The disc shall be molded as a single piece; separate layers are not allowed.

**2.12 Guiding Arrangements.** Guiding arrangements shall have Teflon to stainless steel sliding surfaces.

**2.13 Fabrication.**

**2.13.1** Shop drawings shall be prepared in accordance with [Sec 1080](#).

**2.13.2** Fabrication of all parts of the bearing shall be in strict accordance with the approved shop drawings. The clearance between guide bar and bearing of all guided bearings shall be maintained in strict compliance with the bridge plans.

**2.13.3** During the welding procedure of the stainless steel plates to the top plate and guide bars the surface of the stainless steel plates shall be protected from weld splatter.

**2.13.4** The bonding of the PTFE sheets shall be performed at the factory of the bearing manufacturer of the expansion bearing under controlled conditions and in accordance with the written instructions of the manufacturer of the approved adhesive system. After completion of the bonding operation, the PTFE surface shall be smooth and free from bubbles. Filled PTFE surfaces shall then be polished.

**2.14 Testing and Acceptance.** Each manufactured lot of bearing assemblies shall be accompanied by a manufacturer's certificate stating that the steel, polyether urethane disc and PTFE material are in accordance with this specification and shall show the actual test results for the materials used in the manufacturing of the bearings. Acceptance of bearing assemblies will be based on satisfactory manufacturer's certification, acceptable test results and inspection at the time of installation.

**2.14.1** The manufacturer shall furnish facilities for the test and inspection of the completed bearings, representative samples at the plant or at an independent test facility.

**2.14.2** A random sample from the production lot of bearings shall be tested. As soon as all bearings have been manufactured for a given project, notification shall be given to the engineer.

**2.14.3** The test method and equipment shall be approved by the engineer and include the following requirements.

- (a) The test shall be arranged so that the coefficient of friction of the first movement of the manufactured bearing can be determined.

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- (b) The bearing surface shall be cleaned prior to testing, upon instructions of the bearing manufacturer.
- (c) The test shall be conducted at maximum working stress for the PTFE working surface with the test load applied continuously for 12 hours prior to measuring friction.
- (d) The first movement static and dynamic coefficient of friction of the test bearing shall be determined at a sliding speed or less than one inch (25 mm) per minute and shall not exceed the coefficient of friction for design.
- (e) The bearing specimen shall then be subjected to 100 movements of at least one inch (25 mm) of relative movement and if the test facility permits, the full design movement at a speed of less than one foot (305 mm) per minute. Following this test, the static and kinetic coefficient of friction shall be determined again and shall not exceed the values measured in requirement (d). The bearing or specimen shall show no sign of bond failure or other defects.
- (f) A proof load test shall be performed on a sample selected at random from the production lot, by applying load equal to 150 percent of the design capacity of the bearing for a period of one hour. The test bearing shall show no sign of failure or other defects while under load or subsequently upon disassembly and inspection.

**2.14.4** Bearings represented by the test specimen passing the above requirements will be approved for use in the structure subject to on-site inspection for visible defects.

**2.15 Packaging.** The bearings shall be packaged and crated in such a manner that they will be protected from dust and moisture, and not become damaged while being handled, transported or stored. The contractor shall replace any bearing damaged during handling, transporting or storing at no expense to the Commission.

**3.0 Construction Requirements.** The bridge bearings are not designed to accept bending stresses and shall be fully supported over the entire area of the bottom and upper surfaces at all times when under load. Where a steel bearing base plate is to be used and laid directly on the pier cap, the area under the plate shall be finished to within 1/8" above plane elevations and shall be dressed to a uniform, level bearing with a Carborundum brick or power grinder after the concrete has set sufficiently to fix the larger particles of sand.

**3.1** The bearing base plate shall be set to line and grade. The contractor shall locate the bearings at the proper elevation and orient them in the proper direction. The engineer will approve the location and orientation of the bearing. The upper part of the bearing shall be located relative to the base of the bearing according to the engineer's recommendations for the temperature at the time of erection.

**3.2** If for any reason the bearings are disassembled, extreme care shall be used to insure that the rubber pads and piston rings are properly seated in the recess with the piston ring gaps 180 degrees apart.

**3.3** It is necessary to exercise care in aligning both the base and upper part of the guided expansion bearing parallel to the axis of the structure, otherwise a wedging action will occur and unsought horizontal forces will result.



**3.4** The contractor shall align all bearings on any one pier exactly to the direction as shown on the plans.

**3.5** The contractor shall avoid scratching, gouging or otherwise marking the PTFE or mating stainless steel surfaces of the bearings during handling or erection. The contractor shall use whatever means are necessary to protect the bearings from dirt, grout or other foreign materials during the construction of other elements of the structure.

**4.0 Method of Measurement.** Measurement will be made per each. The disc bearing, complete in place, shall include the steel sole plate, masonry plate, polyether urethane disc, bearing plates, guide bars, plain neoprene pad, resin anchor bolts, heavy hexagon nuts and washers, coating and any incidental material needed to complete the work.

**5.0 Basis of Payment.** 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 High Load Multi-Rotational (HLMR) Disc Bearing Assembly.

**X. BEARING RETAINER RETROFIT**

**1.0 Description.** This work shall consist of furnishing and installing bearing retainers as shown on the plans.

**2.0 Construction Requirements.** Steel for stopper plate shall be in accordance with the requirements of Sec 712 and 1080 and as noted in the plans. Furnish bolts of the size and grade as noted in the plans.

**3.0 Method of Measurement.** Measurement will be made per each. The bearing retainer retrofit, complete in place, shall include steel stopper plate, resin anchor system, heavy hex nuts, hardened washers and any incidental material needed to complete the work.

**4.0 Basis of Payment.** Payment for all materials, labor, equipment, and incidentals necessary to complete this item will be considered completely covered under the contract unit price for Bearing Retainer Retrofit.

**Y. SEGMENTAL EXPANSION JOINT SYSTEM**

**1.0 Description.** This work shall consist of fabricating, furnishing and installing a bridge deck joint sealing system in accordance with the details shown on the plans and the requirements of the specifications.

**2.0 Product.** Provide a watertight joint sealing system that is capable of accommodating the structures movement. The joint sealing system shall consist of elastomeric molded neoprene panels that are reinforced with structural steel angles and imbedded wear plates. The system is attached to the structure by drilled in place anchors. The elastomeric panels shall be designed to withstand traffic loads. Provide panel size that satisfies project requirements including movement

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and watertightness. Install all components utilizing manufacturer's recommended sealants for complete installation.

**3.0 Component and Materials.** The Contractor shall furnish a manufacturer's certification that the materials proposed have been pre-tested and will meet the requirements as set forth in the specification.

**3.1 Elastomeric Molded Panels.**

**3.1.1** The 6'-0" elastomeric molded panels shall be comprised of a formed steel shape suspended in an elastomeric material. The profile-riding surface shall have imbedded wear plates to ensure skid resistance and shall be capable of accommodating traffic loads. Each elastomeric molded panel shall be supplied with integrated bolt hole cavities and tongue and groove end connections.

**3.1.2** The elastomer used to mold the panels shall be manufactured of a neoprene compound exhibiting the physical properties listed in the table below:

PHYSICAL PROPERTIES	TEST METHOD	REQUIREMENT
Hardness, Type A Durometer	ASTM D2240 modified	45 +/- 5 points
Tensile Elongation	ASTM D412	1800 psi, min.
Elongation at Break	ASTM D412	400%, min.
Compression set, 22 hrs at 158°F	ASTM D395 Method B	20%, max
Low Temperature at -40°F	ASTM D746	Not Brittle
Ozone Resistance, 70 hrs at 100°F, 20% strain, 100 pphm	ASTM D1149 Method B	No Cracks
Oil Deterioration 70 hrs at 212°F, ASTM D471 after Immersion in ASTM Oil #3		120% volume increase max
Requirements shown reflect test results taken immediately following compound mixing. Results may vary and are not indicative of product performance if specimens are skived from finished, molded parts.		

**3.2 Wear Plate.** Wear plate material utilized for skid-resistant surface shall be from alloy 6061-T6 (ASTM B 221-73)

**3.3 Steel Angle.** The steel angles embedded in the molded neoprene panels are formed from ASTM A36 steel.

**3.4 Bolt Cavity Sealant.** Bolt hole cavities shall be filled using a two-part polyurethane sealant that meets Federal Specification TT-S-00227E. Contractors to ensure that the anchor blocks are dry from moisture prior to placement of material.

**3.5 Edge Void Sealant.** Edge voids shall be filled with a one-part polysulfide base synthetic rubber sealant conforming to Federal Specification TT-S-00230C Type II Non-Sag. Contractor shall ensure that the anchor blocks are dry from moisture prior to placement of material.

**3.6 Bedding Compound.** Apply edge void sealant as a bedding material to the blockout base prior to placement of the elastomeric gland. Material shall be a one part polysulfide base synthetic rubber sealant conforming to Federal Specification TT-S-00230C Type II Non-Sag.

#### **4.0 Construction Requirements.**

**4.1** The Contractor shall submit product information and necessary shop drawings in accordance with Sec 1080 after the award of the contract. At the discretion of the engineer, the manufacturer may be required to furnish a representative sample of material to be supplied in accordance with the project specifications.

**4.2** The device shall be accurately set and securely supported at the correct grade and elevation and the correct joint opening as shown on the plans and on the shop drawings.

**4.3** The manufacturer instructions for the proper installation of the joint system shall be entered on the shop drawings. Shop drawings, which lack manufacturer installation instruction, may be returned without approval.

**4.4 Installation and Certification.** The contractor shall obtain the services of a qualified technical representative, approved by the manufacturer of the expansion joint system and acceptable to the engineer, to assist during the installation. The installation shall not occur without the technical representative being present. The technical representative shall provide certification that the joint system delivered and the installation are in conformance with the plans and specifications.

**5.0 Method of Measurement.** Final measurement will not be made except for authorized changes during construction or where significant errors are found in the contract quantity. Where required, the expansion joint will be measured to the nearest linear foot based on measurement from roadway face of curb to roadway face of curb along the centerline of the joint. The revision or correction will be computed and added to or deducted from the contract quantity. No measurement will be made of portions of the joint that extend past or up the roadway face of curbs.

**6.0 Basis of Payment.** The accepted quantity of expansion joint system, including all material, coating, equipment, labor, fabrication, installation, technical assistance, certification, and any other incidental work necessary to complete this work, will be paid for at the contract unit price per linear foot for Segmental Expansion Joint System.

## **Z. NAVIGATION LIGHTING SYSTEM**

**1.0 Description.** This work shall consist of furnishing and installing replacement navigation lighting fixtures, LED flashers and AC to DC power converters and solar powered navigation light fixtures at Piers 12 (1C) and 13 (2C) and at mid-channel in Span (12-13) and furnishing and installing conduit system for the navigation lighting complete in place, including conduit, expansion fittings, wiring, junction boxes, connections to existing power and fixtures as shown on the contract plans and in accordance with Sec 901.

**1.1** The new conduit, junction boxes and wiring shall be connected to the navigation lights as indicated in the plans. The contractor is responsible for making all adjustments necessary to

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provide a fully functional and operational navigation lighting system from the power distribution box at Bent 10 to the navigation lighting and coordinating service to the bridge with the electric company as required.

**1.2** Any portion of the existing navigation system on the structure, including conduits, not incorporated into the new navigation lighting system shall be removed upon satisfactory installation and acceptance of the new navigation lighting system.

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

Item	Section
Conduit System on Structure	<a href="#">707</a>
Highway Lighting	<a href="#">901</a>

**2.1 Working Drawings.** Before any work is started on the navigational light system, working drawings shall be submitted for review by the engineer. Layout on the plans showing the arrangements and locations of all equipment are to be considered as illustrative. The contractor may suggest modifications as necessary for proper construction and operation with approval of the engineer. The location of the wiring cables, conduits and navigation lighting fixtures shown on the plans is diagrammatic only and may be subject to slight shifting as required to meet field conditions as approved by the engineer. Any discrepancies between field conditions, plans and specifications or installation conflicts shall promptly be brought to the attention of the engineer.

**3.0 Construction Requirements.**

**3.1** Navigation lighting as currently exists shall be maintained on both EB and WB Bridges during the duration of the project work. Temporary fixtures may be used at the contractor's option. Power for the navigation lighting system shall be maintained during construction using a temporary power source.

**3.2** If temporary navigation lights are used they shall be of sufficient candlepower to be visible against the background lighting at a minimum distance of 2000 yards on 90% of the nights of the year. The lamp and lens shall be of such size and material to provide this visibility.

**3.3** Upon notice to proceed the contractor shall become responsible to maintain and operate the existing lights on the EB and WB Bridge throughout construction of the project. The contractor shall be responsible for and maintain all circuits, switching, relamping and power service for the existing navigation lighting until the final and formal acceptance of the complete work. Navigational obstructions fixtures shall be operated automatically from sunset to sunrise and at other times when visibility is less than 2000 yards (1.8 km).

**3.4** Testing of the navigation lighting system shall be in accordance with [Sec 901](#).

**3.5** All original surface-mounted conduit and junction boxes shall be completely removed and replaced. Sections of the existing conduit in good condition may remain if in the opinion of the engineer such conduit is still serviceable.

**4.0 Method of Measurement.** No measurement will be made.

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**5.0 Basis of Payment.** 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 lump sum price for Navigation Lighting System.

**AA. MEDIAN SOLAR LIGHT SYSTEM**

**1.0 Description.** This work shall consist of removing existing median solar lights and support brackets and furnishing and installing new median solar lights and support brackets.

**2.0 Material.**

**2.1 Solar Powered LED (Light Emitting Diode) Light.** The median lights shall be solar powered LED as such:

- The unit shall be completely self-contained and sealed.
- The LED light shall be white.
- The light shall be steady burn and capable of producing a minimum of 200 flash patterns.
- The light shall provide up to five years of operation with no maintenance or servicing.
- The light shall charge under nearly all weather conditions.
- The light shall automatically turn on at night and off in the morning.
- Three infrared remote controls shall be provided to remotely program the light.

**2.1.1 Technical.**

Light Output

White light output	approximately 2 Candela
Normal Night Range	approximately 1.5 NM
Vertical Divergence	6.5° at 50% intensity
Horizontal Output	360°

Operation

Minimum Autonomy	150 Hours
Min. Equiv. Peak Sun Hours	3 Hours
To Maintain Min. Autonomy	
Latitude Range	55° S to 55° N
On / Off Level	70 / 100 Lux
Illumination Technology	8 LED's
Lifespan of LED	Up to 100,000 Hours

Solar Panels

Type	Mono-Crystalline Potted with UV-protective Polyurethane and domed for higher efficiency
Maximum Power	1.4 Watts
Efficiency	14%

Battery

Type	Pure-lead thin plate with starved-electrolyte
Nominal voltage	4 Volts
Capacity	5 Amp-hr at 10-hr discharge rate

Construction	
Lens Material	Polycarbonate
Battery Venting	Vent at the bottom of the lantern
Sealing	Self-contained unit, potted with polyurethane
Environmental and Electrical	
Temperature Range	-40° to 176° F
Waterproof	NEMA 6

**2.1.2 Catalog Cuts.** Seven copies of the catalog cuts of the special solar light shall be submitted to the engineer for approval prior to purchasing.

**2.2 Support Bracket.** Steel for support bracket shall be in accordance with the requirements of Sec 712 and 1080 and as noted in the plans. Shop drawings shall be prepared and submitted to the engineer. Shop drawings shall be in accordance with [Sec 1080](#).

**3.0 Method of Measurement.** No measurement will be made.

**4.0 Basis of Payment.** Payment for all materials, labor, equipment, and incidentals necessary to complete this item will be considered completely covered under the contract lump sum price for Median Solar Light System.

#### BB. NAVIGATION PLACARD REPLACEMENT

**1.0 Description.** This work shall consist of furnishing and installing navigation placards as shown on the plans.

**2.0 Construction Requirements.** Remove existing placards as noted in the plans. Fabricate and install placards of the size and location as noted in the plans. Placards shall be installed after Protective Coating (Urethane) application is complete.

**3.0 Method of Measurement.** Measurement will be made per each. The navigation placard replacement, complete in place, shall include fabricated placard, mounting hardware and any incidental material needed to complete the work as shown on the plans.

**4.0 Basis of Payment.** Payment for all materials, labor, equipment, and incidentals necessary to complete this item will be considered completely covered under the contract unit price for Navigation Placard Replacement.

#### CC. RAPID SET CONCRETE PATCHING MATERIAL – HORIZONTAL REPAIRS

**1.0 Description.** This specification covers cementitious concrete, polymer-modified concrete and polymer concrete that are suitable for repairing concrete surfaces on bridges or roadways, particularly under fast setting or special conditions. The repairs would involve horizontal applications. The work shall consist of removing, furnishing, preparing, and placing materials at locations as shown on the plans or as directed by the engineer.

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**2.0 Material.** All materials shall be in accordance with MoDOT specifications and as noted herein.

**2.1 Aggregate For Extending Commercial Mixture.** Coarse and fine aggregates shall be in accordance with [Sec 1005](#), except the requirements for gradation and percent passing the No. 200 sieve shall not apply. Coarse aggregate meeting Gradation E requirements shall be used for repairs greater than one inch (25 mm) in depth. Fine aggregate will be allowed for repairs less than one inch (25 mm). Aggregate specified, bagged, labeled and furnished by the rapid set concrete patching material manufacturer may also be used for mortar extension.

**2.2 Material Applications.** The contractor shall select and use the product most suitable for the work and field conditions in accordance with these specifications.

**2.3 Curing.** Rapid set concrete patching material shall be cured until the minimum compressive strength 3200 psi is attained using standard curing specifications, unless otherwise specified by the manufacturer.

**2.4 Qualification and Project Acceptance.**

**2.4.1 Inspection.** All materials shall be subject to inspection and sampling by MoDOT at the source of manufacture, intermediate shipping terminal or destination. MoDOT will be allowed free access to all facilities and records as required to conduct inspection and sampling.

**2.4.2 Qualification.** Prior to use, rapid set concrete patching material shall be qualified. In order to become qualified, a material shall have completed testing through AASHTO's National Transportation Product Evaluation Program (NTPEP). The manufacturer shall contact the AASHTO/NTPEP coordinator to obtain the testing location for the rapid setting concrete patching material.

**2.4.2.1 Requested Information.** The manufacturer shall submit with samples of the materials, a written request to Construction and Materials with the following information:

- (a) Brand name of the product.
- (b) Certification that the material meets this specification.
- (c) NTPEP test results showing compliance with this special provision.
- (d) Specific mixing, handling and curing instructions.
- (e) Application type (i.e., bridge or roadway).

**2.4.2.2 Qualified List.** Upon approval by the engineer, the brand name and manufacturer will be placed on a qualified list of rapid set concrete patching materials. The listing of qualified materials is available from Construction and Materials or on MoDOT's web site. New certified test results and samples shall be submitted any time the manufacturing process or the material formulation is changed. The material will be subject to removal from the qualified list if there is evidence of unsatisfactory performance or a change in manufacturing process or formulation, or when random sampling and testing of material offered for use indicates nonconformity with any of the requirements herein specified.

**2.4.3 Provisional Approval.** Provisional approval may be granted provided the following requirements have been met:

- (a) New Products Evaluation Form
- (b) Certified test results from an independent laboratory showing compliance with this special provision.
- (c) Documentation prepared by MoDOT covering two years of field performance on MoDOT's system. MoDOT will need to approve the location of the test site. Documentation will contain the placement date, field observations (semi annual), description of field performance and photographs of in-place material.
- (d) During placement the manufacturer's representative shall be present on the project to provide technical expertise.

**2.4.3.1 Disqualification.** If during the two year observation period the repair area(s) fails provisional approval will not be granted. Repair area(s) experiencing any cracking, debonding or spalling will be considered a failure.

**2.4.3.2 Length of Provisional Approval.** Provisional approval will be granted for three years or until NTPEP testing is completed.

**2.5 Certification.** The contractor shall supply a manufacturer's certification to the engineer for each lot of material furnished. The certification shall include the name of the manufacturer, a manufacturer certification statement that the material supplied is the same as that qualified and listing the date of qualification.

**2.6 Acceptance.** Acceptance of the material will be based on the use of a qualified or provisionally approved material, the manufacturer's certification that the material supplied is the same as that approved and upon the results of such tests as may be performed by the engineer.

**3.0 Mixture.** Unless otherwise specified, rapid set concrete patching material shall be approved commercial mixtures meeting [Sections 3.1 – 3.1.3](#) or deck repair cementitious mortar meeting [Section 3.2](#). Rapid set concrete patching materials shall be specifically designed for the application needed.

**3.1 Commercial Mixtures.** Rapid set concrete patching material in its sacked form and mixtures when properly prepared in accordance with the manufacturer's specifications, shall meet the minimum test requirements given in Table 1. Mixtures may be supplied, as required, as a patching mortar or as a patching mortar with aggregate extension. If the material is to be supplied with extender aggregate, this shall also pass the required tests in Table 1 using the maximum allowed amount of extender aggregate.

**3.1.1. Mixture Requirements.** Rapid set concrete patching material shall be single packaged dry mix requiring the addition of water or other liquid component just prior to mixing. The material shall be capable of ½ inch (13 mm) to full depth repair and require no bonding agent. The material shall not contain soluble chlorides as an ingredient of manufacture. The material shall be placed in accordance to the manufacturer's recommendations.



<b>Table 1 (English Unit)</b>				
<b>Physical Test Property</b>	<b>Specification</b>	<b>Requirement for cementitious concrete</b>	<b>Requirement for polymer-modified concrete</b>	<b>Requirement for polymer concrete</b>
Bond Strength by Slant Shear <sup>1</sup>	ASTM C882/C928 <sup>3</sup>	min. 1000 psi @ 24hrs. & min. 1500 psi @ 7 days	n/a	min. 1000 psi @ 24hrs. & min. 1500 psi @ 7 days
Linear Coefficient of Thermal Expansion <sup>1, 2</sup> (for bagged mortar only, without extension aggregate)	ASTM C531	n/a	n/a	4 – 8 X 10 <sup>-6</sup> in/in/deg F
Resistance to Rapid Freezing & Thawing <sup>1</sup>	AASHTO T161 or ASTM C666	80% min. using Procedure B <sup>5</sup> (300 Cycles)	80% min. using Procedure B <sup>5</sup> (300 Cycles)	n/a
Compressive Strength <sup>1</sup>	AASHTO T22 or ASTM C39	3200 psi @ 3 hr & 4000 psi @ 7 days	3200 psi @ 3 hr & 4000 psi @ 7 days	n/a
Rapid Chloride Permeability <sup>1</sup>	AASHTO T277 or ASTM C1202	<u>Bridge Decks</u> 1000 coulombs @ 28 days <u>Roadway</u> 2000 coulombs @ 28 days	<u>Bridge Deck</u> 1000 coulombs @ 28 days <u>Roadway</u> 2000 coulombs @ 28 days	<u>Bridge Deck</u> 1000 coulombs @ 28 days <u>Roadway</u> 2000 coulombs @ 28 days
Length Change <sup>1, 4</sup>	AASHTO T 160 or ASTM C157	In water Storage (+0.15) In air storage (-0.15)	In water storage (+0.15) In air storage (-0.15)	n/a
Color		gray	gray	gray

<sup>1</sup>The commercial mix test values can be located in the AASHTO's National Transportation Product Evaluation Program (NTPEP) reports for Laboratory Evaluations of Rapid Set Concrete Patching Materials. Data for provisionally approved materials is located at the Construction and Materials Division.

<sup>2</sup>Not required for extended mixtures if the mortar passes this requirement.

<sup>3</sup> ASTM C882 shall be performed on non-water based materials. ASTM C928 shall be performed on water-based materials.

<sup>4</sup> As modified by ASTM C928.

<sup>5</sup> Procedure A may be used in lieu of Procedure B

**3.1.2 Construction Requirements.** The manufacturer shall provide with the bagged mixture, specifications for the mixing procedure, amount and kind of liquid to be added, and the amount of aggregate extension allowed, if any. All mixing, handling and curing practices recommended by the manufacturer shall be followed and will be considered a part of these specifications.

JOB SPECIAL PROVISIONS (BRIDGE)

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**3.1.3 Removal from Qualified List.** All mixtures shall be approved before use. Reoccurring failures of any mixture for any reason will be cause for removal from the qualified list.

**3.2 Deck Repair Concrete.** A qualified rapid set concrete patching material indicated for horizontal use and intended for patching concrete bridge decks may be used when specified on the plans and as approved by the engineer. If this option is selected, the contractor shall provide a trial mix to determine the total cure time needed to achieve a compressive strength of 3200 psi (22 MPa). Compressive specimens shall be prepared in accordance with current MoDOT test methods and cured to simulate actual field conditions. Testing of compressive specimens shall be performed by methods and at facilities acceptable to the engineer. The repaired deck shall not be opened to traffic until at least 4 hours after the last placement of deck repair concrete, the established cure time has elapsed and until such concrete has achieved a compressive strength of 3200 psi (22 MPa). A new trial mix may be required if the engineer determines the field conditions vary substantially from trial mix conditions. The engineer will make field cylinders to verify the 3200 psi (22 MPa) minimum strength.

**4.0 Construction Requirements.**

**4.1 Mixing.** Rapid set concrete patching material shall be mixed and finished according to the manufacturer's recommendation.

**4.2 Preparation of Repair Area.** Deteriorated, damaged or defective concrete as shown on the plans, required by the specifications or as directed by the engineer, shall be removed. All exposed reinforcement shall be thoroughly cleaned as shown on the plans, required by the specifications or as directed by the engineer. Unless otherwise specified by the commercial mixture manufacturer, the existing surface shall be damp and all free water shall be removed prior to placement of the required material.

**4.3 Bonding Agent.** A bonding agent may be used if recommended by the rapid set concrete patching material manufacturer.

**5.0 Method of Measurement.** No measurement will be made for rapid set concrete patching material.

**6.0 Basis of Payment.** Rapid set concrete patching material will be paid for at the contract unit price for other items and will be considered full compensation for all labor, equipment and material to complete the described work.

**DD. RAPID SET CONCRETE PATCHING MATERIAL – VERTICAL AND OVERHEAD REPAIRS**

**1.0 Description.** This specification covers cementitious concrete, polymer-modified concrete and polymer concrete that are suitable for repairing concrete surfaces on bridges or concrete structures, particularly under fast setting or special conditions. The repairs would involve vertical or overhead applications. The work shall consist of removing, furnishing, preparing, and placing materials at locations as shown on the plans or as directed by the engineer.

**2.0 Material.** All materials shall be in accordance with MoDOT specifications and as noted herein.

**2.1 Aggregate. For Extending Commercial Mixture.** Coarse and fine aggregates shall be in accordance with [Sec 1005](#), except the requirements for gradation and percent passing the No. 200 sieve shall not apply. Coarse aggregate meeting Gradation E requirements shall be used for repairs greater than one inch (25 mm) in depth. Fine aggregate will be allowed for repairs less than one inch (25 mm). Aggregate specified, bagged, labeled and furnished by the rapid set concrete patching material manufacturer may also be used for mortar extension.

**2.2 Material Applications.** The contractor shall select and use the product most suitable for the work and field conditions in accordance with these specifications.

**2.3 Curing.** Rapid set concrete patching material shall be cured until the minimum compressive strength 1500 psi is attained using standard curing specifications, unless otherwise specified by the manufacturer.

**2.4 Qualification and Project Acceptance.**

**2.4.1 Inspection.** All materials shall be subject to inspection and sampling by MoDOT at the source of manufacture, intermediate shipping terminal or destination. MoDOT will be allowed free access to all facilities and records as required to conduct inspection and sampling.

**2.4.2 Qualification.** Prior to use, rapid set concrete patching materials need to be qualified.

**2.4.2.1 Requested Information.** The manufacturer shall submit with samples of the materials, a written request to Construction and Materials with the following information:

- (a) New Products Evaluation Form
- (b) Brand name of the product.
- (c) Certification that the material meets this specification.
- (d) Certified test results from an independent laboratory showing compliance with this specification.
- (e) Specific preparation instructions of repair area.
- (f) Specific mixing, handling and curing instructions.
- (g) Application type (i.e., vertical or overhead).

**2.4.2.2 Field Evaluation.** Final approval will be granted when the following requirements are met:

- (e) MoDOT report documenting two years of field performance on MoDOT system. The report will contain the placement date, field observations (semi annual), description of field performance and photographs of in-place material.
- (f) A manufacturer's representative shall be present during placement of the material to provide technical expertise.

**2.4.2.2.3 Disqualification.** If during the two year observation period the repair area(s) fails the product will not be added to the qualified list.

**2.5 Qualified List.** The listing of qualified products are available from Construction and Materials or on MoDOT's web site. New certified test results and samples shall be submitted any time the manufacturing process or the material formulation is changed. The material will be subject to removal from the qualified list if there is evidence of unsatisfactory performance or a change in manufacturing process or formulation, or when random sampling and testing of material offered for use indicates nonconformity with any of the requirements herein specified.

**2.6 Certification.** The contractor shall supply a manufacturer's certification to the engineer for each lot of material furnished. The certification shall include the name of the manufacturer, a manufacturer certification statement that the material supplied is the same as that qualified and listing the date of qualification.

**2.7 Acceptance.** Acceptance of the material will be based on the use of a qualified product, the manufacturer's certification that the material supplied is the same as that approved and upon the results of such tests as may be performed by the engineer.

**3.0 Mixture.** Unless otherwise specified, rapid set concrete patching material shall be approved commercial mixtures meeting [Sections 3.1 – 3.1.3.](#) Rapid set concrete patching materials shall be specifically designed for the application needed.

**3.1 Commercial Mixtures.** Rapid set concrete patching material in its sacked form and mixtures when properly prepared in accordance with the manufacturer's specifications, shall meet the minimum test requirements given in Table 1. Mixtures may be supplied, as required, as a patching mortar or as a patching mortar with aggregate extension. If the material is to be supplied with extender aggregate, this shall also pass the required tests in Table 1 using the maximum allowed amount of extender aggregate.

**3.1.1 Mixture Requirements.** Rapid set concrete patching material shall be single packaged dry mix requiring the addition of water or other liquid component just prior to mixing. The material shall not contain soluble chlorides as an ingredient of manufacture. The material shall be placed in accordance to the manufacturer's recommendations.

JOB SPECIAL PROVISIONS (BRIDGE)

<b>Table 1 (English Unit)</b>				
<b>Physical Test Property</b>	<b>Specification</b>	<b>Requirement for cementitious concrete</b>	<b>Requirement for polymer-modified concrete</b>	<b>Requirement for polymer concrete</b>
Bond Strength by Slant Shear	ASTM C882/C928 <sup>2</sup>	min. 1000 psi @ 24hrs. & min. 1500 psi @ 7 days	n/a	min. 1000 psi @ 24hrs. & min. 1500 psi @ 7 days
Linear Coefficient of Thermal Expansion <sup>1</sup> (for bagged mortar only, without extension aggregate)	ASTM C531	n/a	n/a	4 – 8 X 10 <sup>-6</sup> in/in/deg F
Resistance to Rapid Freezing & Thawing	AASHTO T161 or ASTM C666	80% min. using Procedure B <sup>3</sup> (300 Cycles)	80% min. using Procedure B <sup>3</sup> (300 Cycles)	n/a
Compressive Strength	AASHTO T22 or ASTM C39	1500 psi @ 3 hr & 3000 psi @ 24 hr	1500 psi @ 3 hr & 3000 psi @ 24 hr	n/a
Rapid Chloride Permeability	AASHTO T277 or ASTM C1202	1000 coulombs @ 28 days	1000 coulombs @ 28 days	1000 coulombs @ 28 days
Length Change	AASHTO T 160 or ASTM C157	In water Storage (+0.15) In air storage (-0.15)	In water storage (+0.15) In air storage (-0.15)	n/a
Color		gray	gray	gray

<sup>1</sup> Not required for extended mixtures if the mortar passes this requirement.

<sup>2</sup> ASTM C882 shall be performed on non-water based materials. ASTM C928 shall be performed on water-based materials.

<sup>3</sup> Procedure A may be used in lieu of Procedure B

**3.1.2 Construction Requirements.** The manufacturer shall provide with the bagged mixture, specifications for the mixing procedure, amount and kind of liquid to be added, and the amount of aggregate extension allowed, if any. All mixing, handling and curing practices recommended by the manufacturer shall be followed and will be considered a part of these specifications.

**3.1.3 Removal from Qualified List.** All mixtures shall be approved before use. Reoccurring failures of any mixture for any reason will be cause for removal from the qualified list.

**3.2 Vertical Repair.** A qualified rapid set concrete patching material approved for vertical use may be used when specified on the plans and as approved by the engineer. The engineer will make field cylinders to verify the 1500 psi (10 MPa) minimum strength. The material shall adhere to the concrete surface without sagging.

**3.3 Overhead Repair.** A qualified rapid set concrete patching material approved for overhead use may be used when specified on the plans and as approved by the engineer. The material shall be placeable in layers of at least 1 inch on overhead applications without the use of formwork or anchoring devices. The material shall adhere to the concrete surface without sagging. The engineer will make field cylinders to verify the 1500 psi (10 MPa) minimum strength.

#### **4.0 Construction Requirements.**

**4.1 Mixing.** Rapid set concrete patching material shall be mixed and finished according to the manufacturer's recommendation.

**4.2 Preparation of Repair Area.** Deteriorated, damaged or defective concrete as shown on the plans, required by the specifications or as directed by the engineer, shall be removed. All exposed reinforcement shall be thoroughly cleaned as shown on the plans, required by the specifications or as directed by the engineer. Unless otherwise specified by the commercial mixture manufacturer, the existing surface shall be damp and all free water shall be removed prior to placement of the required material.

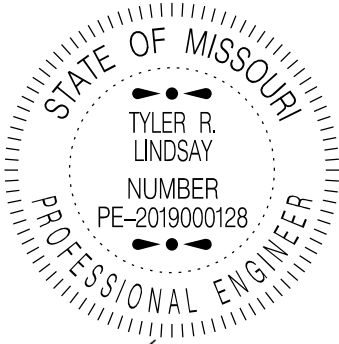
**4.3 Bonding Agent.** A bonding agent may be used if recommended by the rapid set concrete patching material manufacturer.

**5.0 Method of Measurement.** No measurement will be made for rapid set concrete patching material.

**6.0 Basis of Payment.** Rapid set concrete patching material will be paid for at the contract unit price for other items and will be considered full compensation for all labor, equipment and material to complete the described work.

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 <p>06/03/2025 11:14:15 AM TYLER R. LINDSAY - CIVIL MO-PE-2019000128</p>	<p><b>MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION</b> 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. JSL0248 St. Charles County, MO Date Prepared: 6/3/2025</p>
<p>Only the following items of the Job Special Provisions (Bridge) are authenticated by this seal: All</p>	

**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(s) 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** Qualified special mortar shall be a qualified rapid set concrete patching material in accordance with [Sec 704](#). A qualified rapid set concrete patching material will not be permitted for half-sole repair, deck repair with void tube replacement, full depth repair, modified deck repair and substructure repair (formed) unless a note on the bridge plans specifies that a qualified special mortar may be used.

**2.4** 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.

**2.5** 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.

**2.6** 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.

**3.0 Coating Information.**

**3.1 Straps Removal.** Exposed portions of straps for stay-in-place forms shall be removed prior to surface preparation. Straps need not be removed in areas that are not being painted. Flame cutting will not be permitted. The contractor shall exercise care not to damage the existing structure during removal. 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.

**3.2 Slab Drains and Stay-In-Place Forms.** The stay-in-place forms, slab drains and slab drain brackets shall not be recoated, overcoated or damaged during the painting operation. Any portion of the slab drain bracket that is blast cleaned shall be recoated with System G. Any damage



sustained 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.

**3.3 Existing Bridge Information.** The informational plans may be used by bidders in determining the amount of steel to be cleaned and recoated or overcoated with the full understanding that the State accepts no responsibility for accuracy of the estimated tons of existing steel shown in the table below. The bidder's acceptance and use of the estimate shown below shall be no cause for claim for any final adjustment in the contract unit price for the work involved in repainting. Each bidder is expected to carefully examine the structure(s), investigate the condition of existing paint and prepare an estimate of quantities involved before submitting a bid. Surface preparation and application of field coatings to the structural steel shall be based on the contract plan quantities. No final measurements will be made.

Bridge No.	Estimated Tons			Existing Paint System	Lead Based?
	Coating System		Total		
	System G Recoat	System G Overcoat			
A4999	0	170	170	C	No
A5109	0	462	462	C	No

**3.4 Environmental Contact.** Environmental Section may be contacted at the below address or phone number. The Missouri Department of Health may be contacted at (573) 751-6102.

MoDOT - Design Division - Environmental Section  
P.O. Box 270  
105 W. Capitol Ave., Jefferson City, MO 65102  
Telephone: (573) 526-4778

**3.5 Approved Smelter and Hazardous Waste Treatment, Storage and Disposal Facility.** The following is the approved smelter and hazardous waste treatment, storage and disposal facility:

Doe Run Company - Resource Recycling Division - Buick Facility  
Highway KK  
Boss, MO 65440  
Telephone: (573) 626-4813

**4.0 Method of Measurement.** No measurement will be made.

**5.0 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. CONCRETE CRACK FILLER

**1.0 Description.** This work shall consist of preparing and treating the concrete bridge deck cracks with a high molecular weight methacrylate (HMWM) or methyl methacrylate (MMA) crack filler material. This type of surface treatment shall be in accordance with this job special provision, the standard specifications and the manufacturer's recommendations. The objective of this treatment is to seal all concrete deck cracks in order to preserve and extend the life span of the deck.

**2.0 Materials.** The low viscosity concrete bridge deck crack filler shall be a high molecular weight methacrylate (HMWM) or methyl methacrylate (MMA) system in accordance with [Sec 1053](#) and shall be on MoDOT's qualified product list.

### **3.0 Construction Requirements.**

**3.1 Equipment.** Application equipment shall be as recommended by the manufacturer. The spray equipment, tanks, hoses, brooms, rollers, coaters, squeegees, etc. shall be thoroughly clean, dry, and free of foreign matter, oil residue and water prior to application of the treatment.

**3.2 Cleaning, Surface Preparation and Sealing.** Surfaces which are to be treated shall meet the approved product's requirements for surface condition. The contractor shall furnish the engineer with written instructions for the surface preparation requirements, and a representative of the manufacturer shall be present to ensure that the surface conditions meet the manufacturer's requirements.

**3.2.1** At a minimum, the surface shall be thoroughly cleaned to remove dust, dirt, oil, wax, curing components, efflorescence, laitance, coatings and other foreign materials. The manufacturer or manufacturer's representative shall approve the use of chemicals and other cleaning compounds to facilitate the removal of these foreign materials before use. The treatment shall be applied within 48 hours following surface preparation.

**3.2.2** Cleaning equipment shall be fitted with suitable traps, filters, drip pans and other devices to prevent oil and other foreign material from being deposited on the surface.

**3.2.3** The deck shall be shot blasted or water blasted to clean out cracks and allowed to dry prior to sealing.

**3.2.4** Before starting sealing operations, all cracks shall be blown out with dry high-pressure air.

**3.2.5** The contractor shall prevent sealer material from leaking through the deck at any cracks, construction joints or at precast panel joints on the bottom side of the deck that reflect through the slab. The contractor shall take measures to treat these areas to prevent loss of material intended to seal the deck.

**3.2.6** The contractor shall follow the manufacturer's recommendations for a method and material resistant to effects of the deck sealer to prevent leakage of deck sealer through the bridge deck.

**3.3 Application.** After leakage prevention measures are completed, a flood application shall be performed on the entire deck surface to fill all cracks. Flood application and broadcast aggregate shall be placed in accordance with the manufacturer's application rates. The crack filler material shall not be permitted to run into drains.

**3.4 Opening to Traffic.** Traffic shall be allowed on the deck only after the treated area is visibly dry. Dried coating shall not leave residue on glass, painted metal or automobiles.

**4.0 Method of Measurement.** Measurement will be made to the nearest square yard measured longitudinally from end of bridge approach slab to end of bridge approach slab and transversely

from roadway face of curb to roadway face of curb. Additional areas to be sealed will be identified on the plans. No deduction will be made for gaps to avoid raised pavement markers, manholes or other obstructions. Final measurement will not be made except for authorized changes during construction or where appreciable errors are found in the contract quantity. The revision or correction will be computed and added to or deducted from the contract quantity.

**5.0 Basis of Payment.** 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 Concrete Crack Filler.