



Illinois Department of Transportation

2300 South Dirksen Parkway / Springfield, Illinois / 62764

October 28, 2020

SUBJECT: FAI Route 70 (I-55/64)
Project NHPP-ROJ4(100)
Section 82-3HVB-2R-1-I-1
St. Clair County
Contract No. 76B55
Item No. 85, November 6, 2020 Letting
Addendum B

NOTICE TO PROSPECTIVE BIDDERS:

Attached is an addendum to the plans or proposal. This addendum involves revised and/or added material.

1. Revised page iii of the Table of Contents to the Special Provisions.
2. Added pages 221-261 to the Special Provisions.

Prime contractors must utilize the enclosed material when preparing their bid and must include any changes to the Schedule of Prices in their bid.

Very truly yours,

A handwritten signature in black ink, appearing to read 'Jack A. Elston'.

Jack A. Elston, P.E.
Bureau Chief, Design and Environment

IDOT TRAINING PROGRAM GRADUATE ON-THE-JOB TRAINING SPECIAL PROVISION.196

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CONDUIT SUPPORT SYSTEM

Description.

This work shall consist of all labor, materials (rods, clamps, inserts, channels, expansion fitting, etc.) and equipment for the installation and removal of a temporary support system, and the installation of a permanent support system of the conduit ducts in their existing position. The work shall be done in accordance with the Standard Specifications

Care shall be taken not to damage the existing ducts during deck removal operations. Any damage to the ducts must be repaired at the Contractor's expense.

Inserts to permanently support the ducts shall be cast in the proposed deck. No drilling or epoxy grouting will be allowed in the proposed deck slab in order to support the ducts.

Basis for Payment.

This work will be paid for at the contract lump sum price for CONDUIT SUPPORT SYSTEM.

SEISMIC RESTRAINER

Description.

This work shall consist of fabrication and installation of seismic restrainers as detailed on the plans and per the applicable portions of Section 505 of the Standard Specifications.

Method of Measurement.

The seismic restrainer work shall be measured per each restrainer.

Basis of Payment.

This work will be paid for and the contract unit price per each for SEISMIC RESTRAINER.

FIBER WRAP

Description.

This work shall consist of removing existing fiber wraps as needed to complete concrete repairs and furnishing and installing new fiber-reinforced polymer (FRP) wraps at Piers D11, D12, D21, and other locations as may be determined by the Engineer.

The new FRP wraps shall have a minimum total thickness of 0.352. Fiber wraps shall be removed around the entire circumference of the column at heights along the column where they cover delaminated concrete as indicated in the plans. Locations of delaminated concrete marked on the drawing are near the top of the existing fiber wrap, and should be verified by hammer sounding. Mark the area of unsound concrete. Cut the fiberwrap around the circumference of the column 6 inches below the extents of the deterioration. Remove all fiber wrap above that cut to its upper limit. If other locations of delaminated concrete are noted that are not similarly located near the top of a column, wraps shall be removed 6 inches above and below the extents of delamination.

Added October 28, 2020

All concrete repairs and/or modifications shall be completed prior to placing FRP wraps. Concrete placed in areas receiving FRP wraps shall have a maximum moisture content of 4% before wrapping begins. All manufacturer's recommendations for surface preparation and installation of FRP wraps shall be followed.

Submittals.

The following submittals, but not limited to, shall be required of the FRP system manufacturer, installation contractor, and inspection agency. All submittals, except daily installation logs, shall be given to the Engineer for review allowing at least 60 days for approval.

Submittals required of the FRP system manufacturer:

- Product information and data sheets indicating physical, mechanical and chemical properties and limitations of the FRP system and all its components, including the protective coating.
- Procedures for determining moisture content of substrate that will be acceptable to and meet the product manufacturer's requirements for FRP installation.
- Net fiber and gross laminate tensile properties of the FRP system, all test techniques, methods and calculations used for determining properties.
- Durability test data and structural test reports of the FRP system for the proposed application in the expected environmental conditions.
- Installation and maintenance instructions and general recommendations regarding each material used in the FRP system, including the protective coating. Note that surface preparation requirements shall be included in the installation procedures.
- Material Safety Data Sheets of each product used and certification that all materials abide by all local, state, and federal environmental and worker's safety laws and regulations.
- Quality control procedures for tracking FRP materials and material certifications.
- List of projects where similar FRP system has been implemented.

Submittals required of the FRP system installation Contractor:

- Documentation from the FRP system manufacturer stating the Contractor has been trained in the installation of their FRP system.
- List of completed projects by the Contractor where similar FRP system has been implemented. Include location, owner, engineer and contact numbers associated with each project.
- Documentation showing that the Contractor is experienced in surface preparation techniques required for the use of the manufacturers FRP system.
- Quality control procedures, daily installation data logs, and any other inspection forms used by the Contractor.

If an independent inspection agency is used, the following submittals are required of the FRP system inspection agency:

- Qualifications and a list of each inspector used on the project.
- Sample inspection forms to be used during inspection.
- List of prior inspections performed by each inspector used on the project.

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Material Requirements.

The Contractor shall inspect and ensure all materials meet specifications, conform to the plans and are undamaged upon job-site arrival. All products shall be delivered to the job site in their original, un-opened containers with the manufacturer’s name, labels, product identification, and batch numbers. Ensure FRP system materials are protected from chemicals, dirt, extreme temperatures, moisture, and physical damage, by storing, handling, and applying materials according to manufacturer and OSHA recommendations.

FRP shall be high modulus, high strength fiber fabric meeting the following requirements. FRP reinforcement shall meet the requirements as listed below.

Minimum FRP Cured Composite Property Requirements

	Carbon Fiber	
Property Prior to testing, laminate samples shall be cured at least 7 days at 70°F then post-cured at 140°F for 48 hours		ASTM Test Method
Tensile Strength	97 ksi	D3039
Tensile Modulus	8420 ksi	D3039
Elongation at break	0.9%	D3039
Thickness per Layer	0.04 in.	
Visual Defects	None	D2563

Fabric saturant (saturating resin) and concrete primer shall be two-component, 100% solids, tolerant to moisture, high strength and high modulus epoxy. Manufacturer’s recommendations for mixing shall be followed. Components of saturating resin may be proportioned; however, provision shall be made for checking the accuracy of proportions and mixing. Dilution of components shall not be permitted. Mixtures shall be used within its pot life. A vapor permeable, UV resistant polymer or acrylic based protective coating shall be used. The protective coating shall be applied according to the manufacturer’s recommendations.

A vapor permeable, UV resistant polymer or acrylic based protective coating shall be used. The protective coating shall be applied according to the manufacturer’s recommendations.

Construction Requirements.

A technical representative from the manufacturer shall confirm appropriateness of surface preparation before FRP installation and be on-site during installation. All costs associated with providing a technical representative shall be the responsibility of the Contractor.

Damage or spalling of concrete surfaces due to removal operations shall be repaired. Costs for any such repairs are included in this item.

The Contractor shall maintain a Daily Installation Log. The log shall be available for review by the Engineer, and a copy shall be furnished to the Engineer at completion of installation and construction for each day's production. The Log shall provide material traceability and process records for each wrap and shall include all the following information:

- (a) Date, time and specific location of installation.
- (b) Construction and installation requirements, including drawings and references thereto.
- (c) Surface preparation methods.
- (d) Widths and lengths of cracks not injected with epoxy.
- (e) Material information including product description, data of manufacturer, product and fiber batch numbers, mixture ratios, mixing times, appearance description of mixed resins (i.e. primers, putties, saturants, adhesives, and protective coatings used for the day)
- (f) Ambient temperatures, humidity, and general weather observations at the beginning, middle and end of each wrap installation shift.
- (g) Concrete surface temperature, concrete moisture content and surface cleanliness.
- (h) Heat sources used for increase surface temperature or curing.
- (i) Number of FRP layers used, composite thickness measurements, curing progress of resins including full documentation of curing temperature ramping and final curing temperature and thickness measurements of protecting coating used.
- (j) Location and size of FRP debonding or air voids.
- (k) Documentation stating installation procedures were followed.
- (l) Pull off test results including bond strength, failure mode, and location.
- (m) Other general work progress.

Surface Preparation: FRP wraps shall be placed on sound concrete meeting the surface preparation requirements of the FRP manufacturer. All irregularities, unevenness, and sharp protrusions in the surface profile shall be removed by grinding to a smooth surface with less than 1/32-inch deviation. Shallow surface depressions/irregularities shall be filled with a system-compatible epoxy filler prior to the application of any other materials. Allow filler material to cure as per manufacturer's requirements before applying the saturating resin or adhesive.

Larger voids or depressions shall be repaired using the provisions of concrete repair for this project. Concrete repairs shall achieve a moisture content of less than or equal to 4% before FRP installation.

All bond inhibiting and foreign materials, including but not limited to existing FRP remnants, dust, laitance, paint, grease, curing compounds, impregnations and waxes, shall be removed from the concrete surface by blast cleaning or other appropriate mechanical means. All concrete surfaces shall be air blasted and vacuumed clean to be dust free.

All cracks greater than 0.007 inch shall be injected with epoxy according to Section 590 of the Standard Specifications for Road and Bridge Construction and paid for as Epoxy Crack Injection.

After concrete surface preparation has been completed, adhesive strength of the concrete shall be verified by random pull-off testing according to ACI 503R as per the direction of the Engineer.

Added October 28, 2020

Constituent Material Application: All materials shall be applied according to conditions (i.e. surface temperature of the concrete, air temperature, relative humidity, and corresponding dew point) recommended by the FRP manufacturer.

Components of saturating resin may be proportioned and mixed by hand or by automatic equipment. Provision shall be made for checking the accuracy of proportions and mixing. Diluting is not permitted.

The saturating resin shall be applied to a properly prepared substrate as a surface primer. The primer should be applied uniformly on the prepared surface to all areas of concrete receiving the FRP wrap according to the manufacturer's specifications. Primed surfaces shall be protected from all contaminants (e.g. dust, moisture, etc.) prior to the application of the FRP wraps.

The resin-to-fabric ratio shall be verified and documented on the daily installation data log. Saturating resin shall be applied uniformly to prepared surfaces. FRP-ply orientation shall match existing placements, or in unknown be installed perpendicular to the primary axis of the substructure element. Fiber wraps shall be handled in a manner to maintain fiber straightness and prevent fiber damage. Any kinks, folds, or severe waviness should be reported to the Engineer. If multiple fabric layers are being placed, successive layers shall be placed before the complete curing of the previous layer to ensure complete bonding between layers. Entrapped air beneath each layer of fabric shall be rolled out before the saturating resin sets.

Subject to approval by the Engineer, the Contractor may provide suitable enclosures to permit application and curing of the fiber wrap during inclement weather. Provisions shall be made to control atmospheric conditions artificially within the enclosures within the limits specified for application and curing of the fiber wrap.

The FRP system shall be protected from rain, sand, dust, and other foreign particles during and after curing as per the Engineer and manufacturer's recommendations.

The Contractor shall inspect the cured FRP system to ensure saturating resin has completely cured. The Contractor must check for defects such as voids, delaminations, external cracks, chips, cuts, loose fibers, external abrasions, blemishes, foreign inclusions, depressible raised areas, or fabric wrinkles. All defects with a dimension greater than 1½ inch, or an area greater than one square inch, or defects with any dimension greater than 1 inch within one foot from another defect area of similar size, shall be repaired or replaced as determined by the Engineer. Repairs shall be made according to manufacturer's recommendations and as specified by the Engineer. For large defected areas, additional layers of FRP may be required as per the Engineer.

A vapor permeable, UV resistant polymer or acrylic based protective coating shall be used. The protective coating shall be compatible with the FRP system and applied according to the manufacturer's recommendations. Any solvents used to clean the FRP surface prior to the application of the protective coating shall be approved by the FRP manufacturer since solvents can have harmful effects on the polymer fabric. Two layers of protective coating shall be applied to all surfaces of the newly installed fiber wrap, and shall overlay existing fiber wrap materials that may remain by a minimum of 8 inches.

The cost of the protective coating is included in the cost of this work.

Added October 28, 2020

Method of Measurement.

FRP wraps will be computed for payment in place in square feet as determined by the Engineer.

The measured quantity will not be modified for multiple layers of FRP needed.

Basis of Payment.

This work will be paid for at the contract unit price per square foot for FIBER WRAP. Payment shall constitute full compensation for all materials, labor, tools, equipment, and incidentals necessary to complete the work.

Full compensation for any additional testing, materials, enclosures, or work required because of the use of a particular type of fiber wrap, shall be considered as included in the item FIBER WRAP.

POLYURETHANE SEALANT

Description.

This work shall consist of removal of existing sealant and backer rod from parapet joints, and installation of new backer rod and polyurethane sealant. The polyurethane sealant shall be according to Article 1050.04, and color shall be gray.

Construction Requirement.

Remove existing sealant and backer rod. Prepare surface and install sealant in accordance with sealant manufacturer's recommendations.

Method of Measurement.

The polyurethane work shall be measured in feet.

Basis of Payment.

This work will be paid for at the contract unit price per foot for POLYURETHANE SEALANT.

COLUMN TENSIONED STRANDS

Description.

This work shall consist of removal of existing confinement hoops and furnishing and installing tensioned strands at the locations shown on the plans. The column tensioned strands shall be of the size, type, materials, tension, and spacing shown on the plans. The couplers shall be galvanized. The tensioned strands shall include UV stabilized sheathing for the strands, and the couplers and exposed portions of the strands shall be coated and sealed with an approved material that is suitable for long term outdoor exposure.

Added October 28, 2020

Submittals.

The Contractor shall submit drawings of the column tensioned strands, showing materials, components, and installation procedures to the Engineer for approval prior to ordering materials. Contractor shall also submit description of materials for use in providing environmental protection, and procedures for its installation. Submittal for sheathing shall note UV stabilization attribute for product(s) selected. Submittal of coating selected to seal exposed elements of the assembly shall indicate applicability for outdoor exposure.

Following approval, the Contractor shall install an assembled mock-up to illustrate the proposed materials and installation procedure. The assembled mock-up shall include the coupler, strands, wedges, and environmental protection measures.

Materials.

Prestressing strands shall be 0.6 inch diameter, low relaxation prestressing strand. Ultimate tensile strength shall be 270 ksi. Strand shall conform to AASHTO M203.

Coupling devices shall be galvanized according to AASHTO M232.

Installation Procedure.

The column surface shall be clean and free of all loose material prior to beginning installation of tensioned strands. All column repairs and/or other modifications shall be completed prior to installing tensioned strands. Concrete placed in area receiving tensioned strands shall be allowed to cure at least 14 days before strands are installed.

The tensioning procedure shall be according to the procedure submitted and approved and demonstrated in the mock-up.

Method of Measurement and Basis of Payment.

This work will be paid for at the contract unit price each for COLUMN TENSIONED STRANDS. Payment shall constitute full compensation for all materials, labor, tools, equipment, and incidentals necessary to complete the work.

CRACK ARREST HOLES

Description.

This work shall apply to the installation holes of the diameter shown on the plans to remove or intercept various crack tips. In addition to drilling, enlargement of holes with grinding or saw cutting and inspection of the areas of concern is included in this work. This work shall be performed in accordance with the procedure specified on the plans, as well as the provisions outlined herein. The work included under this item shall consist of furnishing all materials, equipment, labor, and inspection services required to accomplish the work.

Added October 28, 2020

Construction Requirements.

The following equipment or outside service shall be utilized to perform this work:

- (a) Drilling Equipment - The Contractor shall use magnetic base drilling equipment to drill holes indicated on the plans. Magnetic base drills shall be used mainly to prevent lateral drift of the drill unit as the drilling progresses.
- (b) Polishing and Trimming Equipment - The Contractor shall use hand-held die grinders equipped with carbide burr cutting bits to enlarge holes or trim adjacent, overlapping holes into a smooth oval shape and sandpaper flapper wheel bits to polish cut surfaces smooth.
- (c) Inspection - The Contractor shall provide or retain the services of an inspection firm that can provide a minimum of an ASNT Level II Inspector trained to perform magnetic particle testing (MT).

The Contractor shall adhere to the following construction requirements as well as the requirements on the plans:

- (d) Inspection of plates and drilling - The ASNT Level II Inspector shall inspect the cracked plate in areas of concern. Any cracks that are found in the plate or welds that do not already terminate in a drilled hole shall be retrofitted by drilling a hole of the diameter indicated on the plans at the end of the crack, totally removing the crack tip. Where this is not possible due to obstructions like bolt heads, drill a hole as close as possible to the crack tip, and enlarge the hole using a die grinder with a carbide burr. All retrofit holes shall be drilled smooth and straight, and wherever possible, at right angles to the plane of the web plate.
- (e) If the newly placed hole intersects existing hole(s), the Contractor shall smooth the transition between the two holes using a die grinder with a carbide burr. The final combined hole profile shall be oval, and subject to approval of the Engineer.
- (f) If saw cutting is necessary, the corner of the saw cut shall also be rounded with a die grinder and a carbide burr.
- (g) Each hole shall then be polished to remove all cutting marks with a sanding flapper. The finished inside surface of all holes shall have a Roughness Average (Ra) of 500 or less.
- (h) The area shall be re-inspected by the ASNT Level II Inspector to verify that the crack tip has been removed. If re-work is required, the Contractor shall return to Step b) and repeat all subsequent steps thereafter.
- (i) The Contractor shall notify the Engineer to inspect each location immediately following the drilling and inspection work.
- (j) Following acceptance of the work, the Contractor shall clean and paint the exposed steel surfaces, and any surfaces marred during the drilling with a zinc rich primer as described in GBSP 21-Cleaning and Painting Existing Steel Structures.

Method of Measurement and Basis of Payment.

This work will be paid for at the contract unit price of each for CRACK ARREST HOLES.

Added October 28, 2020

CABLE PROTECTION

Description.

This work consists of adding protective sleeves on existing seismic cable braces to protect the cables from rubbing and wearing. The work included under this item shall consist of furnishing all materials, equipment, and labor to accomplish the work as shown in the plans.

Method of Measurement and Basis of Payment.

This work will be paid for at the contract unit price of each for CABLE PROTECTION.

BRIDGE DECK CONCRETE SEALER

Description.

This work shall consist of the surface preparation and application of a concrete sealer upon the entire top surface of the deck and the tops and inside vertical faces of the parapets of the structure(s), as outlined in the plans. Work shall be according to Section 587 of the Standard Specifications except as modified herein.

Materials.

Materials shall be according to Article 1026. Concrete sealers shall be penetrating sealers from the Department's approved list of concrete sealers.

Construction Requirements.

General: Surfaces which are to be sealed shall be thoroughly cleaned by brooming and blowing off with high pressure air. Mechanical scraping may also be required to assist in the removal of mud and other foreign material. The use of chemicals and other cleaning compounds to facilitate the removal of foreign materials shall be approved by the manufacturer or its representative before use. Traffic shall not be allowed on the cleaned surface prior to treatment. Cleaning and application equipment shall be fitted with suitable traps, filters, drip pans, and other devices in order to prevent oil and other foreign material from being deposited on the surface.

Deck drains shall be temporarily plugged before the bridge deck concrete sealer is applied to control run off. The material used to plug the drains shall be removed and disposed of upon the completion of the sealing treatment.

Existing pavement markings shall be temporarily covered prior to the application of the bridge deck concrete sealer. The temporary covering material used shall be such that it will not affect the marking's retroreflectivity when removed. After application of the bridge deck concrete sealer and prior to opening to traffic, all temporary coverings shall be removed.

For new concrete, sealing shall be performed after all grinding and/or saw cut grooving is completed and before the deck is marked and open to traffic. Unless otherwise approved by manufacture, concrete must have achieved 80% of the design strength prior to application of sealer.

Added October 28, 2020

The concrete surface moisture condition state shall be dry. Pavement moisture shall be checked by the following procedure. Tape the edges of a square foot of plastic to the pavement surface. Allow the plastic to stand for 15 minutes. After 15 minutes, observe the plastic for drops of moisture. If moisture is present and the drop sizes are larger than a pencil eraser, the pavement moisture is too high and bridge deck concrete sealer shall not be applied. Do not apply when inclement weather is anticipated within 12 hours.

Bridge deck surfaces shall be flooded using a distribution sprayer, roller, brush or broom. Distribution sprayers shall include a skirting system to control overspray. Material shall be brushed or squeegeed for even distribution. When two applications are required, let the surface absorb the sealer and follow-up immediately with a second application before the surface dries; wet on wet method. Redistribute any puddles or free standing material. The bridge deck concrete sealer shall be applied according to the manufacturer's instructions, and information provided on the approved list of concrete sealers. The final total coverage rate shall not exceed 400 sq.ft./gal.

Traffic will be allowed on the deck only after a treated area does not track.

Method of Measurement.

The quantity shall be the actual coverage area in Square Foot of surfaces treated and shall include all surface preparation, material, and application costs.

Basis of Payment.

Payment for completed work shall be made at the contract unit price per Square Foot for BRIDGE DECK CONCRETE SEALER.

SIGN SUPPORT SPECIAL

Description.

This work shall consist of furnishing and installing sign supports attached to parapet as detailed in the plans and specified in this special provision.

Materials.

Structural Steel plates, threaded rods, and angles shall be according to Article 1006.04. High Strength Steel Bolts, Nuts and Washers shall be according to Article 1006.08. Bolts, nuts and washers shall be galvanized.

The drilled-in type anchors shall use a chemical adhesive product in accordance with Section 1027 and shall be on the Department's qualified products list. Setting of anchors shall be in accordance with Article 509.06.

Hollow structural steel tubing shall be according to ASTM A 500 (Grade B) or ASTM A 501.

Construction Requirements.

The sign supports shall be fabricated according to Articles 505.03 through 505.05. All welding shall be continuous and according to Article 505.04.

Added October 28, 2020

After fabrication, the bracket assemblies shall be hot-dip galvanized according to AASHTO M 111. No punching, drilling, or welding shall be permitted after galvanizing.

The drilled-in type adhesive anchors shall be installed according to the manufacturer's printed specifications and instructions.

Basis for Payment.

This work will be measured and paid for at the contract unit price each for SIGN SUPPORT SPECIAL.

JACK AND REMOVE EXISTING BEARING

Effective: April 20, 1994

Revised: April 13, 2018

Description.

This work consists of furnishing all labor, tools and equipment for jacking and supporting the existing beams/slab while removing the bearing assembly. The Contractor is responsible for the complete design of the bridge lifting procedures and the materials used. The Contractor shall furnish and place all bracing, shoring, blocking, cribbing, temporary structural steel, timber, shims, wedges, hydraulic jacks, and any other materials and equipment necessary for safe and proper execution of the work. The Contractor shall remove and dispose of the bearings according to Article 501.05.

Construction Requirements.

The Contractor shall submit details and calculations of his/her proposed jacking systems and temporary support procedures for approval by the Engineer before commencing work. If unforeseen field conditions preclude the execution of the approved jacking plan, the Engineer may require the Contractor to provide additional supports or measures. All changes to the jacking plan shall be approved by the Structural Engineer that sealed the jacking plan. Neither added precautions nor the failure of the Engineer to order additional protection will in any way relieve the Contractor of sole responsibility for the safety of lives, equipment, and structure.

- (a) Jack and Remove Existing Bearings with bridge deck in place. Jacking and cribbing under and against the existing diaphragms, if applicable, will not be allowed. The Contractor's jacking plans and procedures shall be designed and sealed by an Illinois Licensed Structural Engineer.

In all cases, traffic shall be removed from the portion of the structure to be jacked prior to and during the entire time the load is being supported by the hydraulic pressure of the jack(s). The minimum jack capacity per beam shall be as noted in the plans. Whenever possible, traffic shall be kept off that portion of the structure during the entire bearing replacement operation. The shoring or cribbing supporting the beam(s) during bearing replacement shall be designed to support the dead load plus one half of the live load and impact shown in the plans. If traffic cannot be kept off that portion of the structure during the bearing replacement, then the shoring or cribbing supporting the beam(s) shall be designed to support the dead load and full live load and impact shown in the plans.

Added October 28, 2020

No jacking shall be allowed during the period of placement and cure time required for any concrete placed in the span(s) contributing loads to the bearings to be jacked and removed.

Jacking shall be limited to 1/8 inch (4 mm) maximum when jacking one bearing at a time. Simultaneous jacking of all beams at one support may be performed provided the maximum lift is 1/4 inch (7 mm) and the maximum differential displacement between adjacent beams is 1/8 inch (4 mm). Suitable gauges for the measurement of superstructure movement shall be furnished and installed by the Contractor.

- (b) Jack and Remove Existing Bearings when entire bridge deck is removed. Jacking and bearing removal shall be done after the removal of the existing bridge deck is complete. The Contractor's plans and procedures for the proposed jacking and cribbing system shall be designed and sealed by an Illinois Licensed Structural Engineer, unless jacking can be accomplished directly from the bearing seat under the beams or girders.

Jacking shall be limited to 1/4 inch (7 mm) maximum when jacking one beam at a time. Simultaneous jacking of all beams at one support may be performed provided the maximum lift is 3/4 inch (19 mm) and the maximum differential displacement between adjacent beams is 1/4 inch (7 mm). When staged construction is utilized, simultaneous jacking of all beams shall be limited to 1/4 inch (7 mm) unless the diaphragms at the stage line are disconnected, in which case the maximum lift is 3/4 inch (19 mm). Suitable gauges for the measurement of superstructure movement shall be furnished and installed by the Contractor.

The Contractor shall be responsible for restoring to their original condition, prior to jacking, the drainage ditches, pavement, or slopewall disturbed by the cribbing footings.

Additional Requirements for Work at Pier H2.

Shoring systems required for bearing removal and replacement work at Pier H2 must be coordinated with the Union Pacific Railroad. Temporary shoring and cribbing must be detailed so as to be placed outside of the railroad work envelope shown in the plans. Contractor must account for extra time to secure railroad review and approval for shoring and cribbing plans.

Bearing removal and replacement activities at the top of Pier H2 columns shall be limited to Track Windows for the track adjacent to Pier H2. A Track Window is the elapsed time between approaching trains. A Track Window is highly variable, depending on the location. Low speed - low train density tracks have predictable Track Windows. The opposite is true for high density-high speed main tracks. The Railroad can furnish a range of Track Windows that might be expected at a specific location under normal train traffic conditions.

For this project, the naturally occurring track windows assumed to be intermittent, non-concurrent 2-hour durations where no imminent train movements are anticipated.

Plan all work associated with bearing removal and replacement at the top of Pier H2 columns based upon the smallest ESTIMATED Track Window. Do not assume the longest Track Window will be available on any given day. Do not assume the same Track Windows will be available from one day to the next.

Added October 28, 2020

Basis of Payment.

This work will be paid for at the contract unit price each for JACK AND REMOVE EXISTING BEARINGS.

Additional supports or measures resulting from unforeseen field conditions will be paid for according to Article 109.04.

STRUCTURAL STEEL REPAIR

Description.

This work shall consist of furnishing all labor, equipment and materials necessary to furnish, paint, and install new steel repair plates and members as indicated on the plans and according to Section 505 and 506 and these Special Provisions. This work also consists of furnishing all labor, equipment and materials necessary to clean and paint the existing structural steel at repair locations in accordance with the special provision for Cleaning and Painting Contact Surface Areas of Existing Steel Structures (GBSP21).

Construction Requirements.

Where steel repairs are required to align with existing holes, field drilling of holes in new members shall be accomplished using existing holes as a template unless field measurements are used to verify all plan dimensions. Field drilling of new holes in existing members shall be accomplished using the holes in the new material as a template. Burning or reaming of holes or existing members that require modification will not be permitted.

All field drilling, cutting, and grinding necessary to furnish and install new steel plates and members shall be included in this item. Existing surfaces prepared by drilling, cutting, or grinding shall be free of notches and be finished to an ANSI surface roughness not exceeding 250 μ inch (13 μ m). Trimming of existing floor beam stiffeners required to install new steel plate or members shall be executed with extreme care to ensure final surfaces are not damaged and are true and square to the new steel plate or member, with a gap between the end of the stiffener and the new steel plate or member of no more than 1/8 inch (+0 / -1/8 inch). All reentrant corners shall be field drilled prior to executing horizontal and/or vertical cuts, making sure not to leave any gouges or notches. All damage to existing members which are to remain shall be repaired or the member replaced to the satisfaction of the Engineer. Repair or replacement of damaged members shall be at the Contractor's expense.

The removal and disposal of any existing members or fasteners necessary for the installation of the new members as shown in the plans shall be included in this item.

Field preparations for the installation of floor beam, stringer, and girder repairs may proceed under traffic conditions. However, final installation and tightening of fasteners shall occur when the bridge is closed to traffic and prior to the deck removal with the exception of girder repairs in Span D42. These repairs shall be completed with the lanes immediately above the girder closed to traffic. Plates may be left in place prior to final fastener installation and tightening using erection bolts in sufficient number as required to secure the plate under traffic. Erection bolts shall not be used for final installation.

Added October 28, 2020

All structural steel repair work in Spans D1 to D25 must be completed prior to beginning deck removal. Note that dead load deflections presented in the plans account for floor beam repairs being installed prior to deck removal. The Contractor may request alternate sequencing of structural steel repairs in Spans D1 to D25, with approval of the Engineer. If alternate sequencing is permitted the dead load deflection tables shown in the plans will need to be updated. Final tightening of fasteners shall begin near the center of repair plates, moving in a systematic pattern toward the ends of the plate.

Structural steel repair work in Spans D11, D12, and D21 will require methods of access that do not encroach upon the Railroad Construction Clearance Envelope. The Contractor shall propose installation plans for floor beam repairs in accordance with Structural Assessment Reports (SAR) For Contractor's Means and Methods to the railroad having jurisdiction over the right of way below these spans. In this submittal, the Contractor shall indicate the location of equipment, personnel, and materials required for the execution of work shown in the plans. The proposed plan shall clearly demonstrate that the proposed methods will NOT encroach upon the Construction Envelope.

The Contractor will be permitted to operate within Track Windows for obtaining field measurements and to erect any protection measures and work platforms proposed for conducting structural steel repairs. A Track Window is the elapsed time between approaching trains. A Track Window is highly variable, depending on the location. Low speed - low train density tracks have predictable Track Windows. The opposite is true for high density- high speed main tracks. The Railroad can furnish a range of Track Windows that might be expected at a specific location under normal train traffic conditions.

For this project, the naturally occurring track windows assumed to be intermittent, non-concurrent 2-hour durations where no imminent train movements are anticipated.

The Terminal Railroad Association (TRRA) of St. Louis has jurisdiction of areas below Span D11 and N1. The Union Pacific Railroad (UPRR) has jurisdiction of right of way below Spans D12 and D21.

Basis for Payment.

This work will be paid for at the contract unit price per Pound for STRUCTURAL STEEL REPAIR.

APPROACH SLAB REMOVAL

Description.

This work shall consist of the complete removal of the existing approach pavement as required to facilitate construction of the proposed bridge approach slabs in accordance with the applicable portions of Section 440 and 501 of the Standard Specifications.

Added October 28, 2020

Construction Requirements.

The existing approach slabs, including HMA overlays and the approach pile bent which interfere with construction work shall be completely removed to an elevation at least 6" below the bottom of the proposed bridge approach slab as show on the plans or as directed by the Engineer The Contractor shall remove the existing approach pavement in a manner so as not to damage the adjacent structures that are to remain. Materials resulting from the removal of existing approach slab and appurtenances as herein specified shall be disposed of according to Article 202.03 of the Standard Specifications.

Method of Measurement.

Approach slab removal shall be measured for payment in place and the area computed in square yards.

Basis of Payment.

This work will be paid for at the contract unit price per square yard for APPROACH SLAB REMOVAL.

CLEANING DRAINAGE SYSTEM

Description.

This work consists of cleaning the existing drainage scupper and pipe drain systems on bridge structures designated as Roadway D (Spans D26 to D45), Ramp P, Ramp Q, and Roadway H. Based on a recent survey, the number of scuppers/deck pipe drain systems per structure that will require cleaning is as follows:

Structure	Rdwy D Span D26-D45	Ramp P	Ramp Q*	Rdwy H
Number of Drains	45	6	9	6

Note * - All drains in Ramp Q are pipe drains. No scuppers.

Contractor shall be responsible for verifying the actual number of scuppers and pipe drain locations to be included in this pay item. No additional payment or credit will be due to the Contractor for errors in these quantities.

Construction Requirements.

The Contractor shall clean the entire drainage system on these structures. This will include cleaning the bridge scupper and pipe drain as well as the entire downspout to the nearest inlet or catch basin for every scupper located on the bridge. The cleaning method shall not damage the existing drainage system and shall be submitted to the Engineer for approval. Any damage to the drainage system shall be repaired by the Contractor at no additional cost to the Department.

Method of Measurement and Basis of Payment.

This work will be paid for at the contract lump sum price for CLEANING DRAINAGE SYSTEM.

Added October 28, 2020

STRUCTURAL REPAIR OF CONCRETE

Description.

This work shall consist of structurally repairing concrete substructure elements, including columns, tie beams, crash walls, parapets, and abutments. Shotcrete will not be allowed.

Materials.

Materials shall be according to the following.

Item	Section/Article
(a) Portland Cement Concrete (Note 1)	1020
(b) R1, R2, or R3 Concrete (Note 2)	
(c) Normal Weight Concrete (Notes 3 and 4)	
(d) Open	
(e) Reinforcement Bars	1006.10
(f) Anchor Bolts	1006.09
(g) Water	1002
(h) Curing Compound	1022.01
(i) Cotton Mats	1022.02
(j) Protective Coat	1023.01
(k) Epoxy (Note 7)	1025
(l) Mechanical Bar Splicers	508.06(c)

Note 1. The concrete shall be Class SI, except the cement factor shall be a minimum 6.65 cwt/cu yd (395 kg/cu m), the coarse aggregate shall be a CA 16, and the strength shall be a minimum 4000 psi (27,500 kPa) compressive or 675 psi (4650 kPa) flexural at 14 days. A high range water-reducing admixture shall be used to obtain a 5-7 inch (125-175 mm) slump, but a cement factor reduction according to Article 1020.05(b)(8) is prohibited. A self-consolidating concrete mixture is also acceptable per Article 1020.04, except the mix design requirements of this note regarding the cement factor, coarse aggregate, strength, and cement factor reduction shall apply.

Note 2. The R1, R2, or R3 concrete shall be from the Department's qualified product list of Packaged, Dry, Rapid Hardening, Cementitious Materials for Concrete Repairs. The R1, R2, or R3 concrete shall comply with the air content and strength requirements for Class SI concrete as indicated in Note 1. Mixing shall be per the manufacturer's recommendations, except the water/cement ratio shall not exceed the value specified for Class SI concrete as indicated in Note 1. A high range water-reducing admixture shall be used to obtain a 5-7 in. (125-175 mm) slump, and a retarder may be required to allow time to perform the required field tests. The admixtures shall be per the manufacturer's recommendation, and the Department's qualified product list of Concrete Admixtures shall not apply.

Added October 28, 2020

- Note 3. The “high slump” packaged concrete mixture shall be from the Department’s qualified product list of Packaged, Dry, Formed, Concrete Repair Mixtures. The materials and preparation of aggregate shall be according to ASTM C 387. The cement factor shall be 6.65 cwt/cu yd (395 kg/cu m) minimum to 7.05 cwt/cu yd (418 kg/cu m) maximum. Cement replacement with fly ash or ground granulated blast-furnace slag shall be according to Section 1020. The “high slump” packaged concrete mixture shall have a water soluble chloride ion content of less than 0.40 lb/cu yd (0.24 kg/cu m). The test shall be performed according to ASTM C 1218, and the “high slump” packaged concrete mixture shall have an age of 28 to 42 days at the time of test. The ASTM C 1218 test shall be performed by an independent lab a minimum of once every two years, and the test results shall be provided to the Department. The coarse aggregate shall be a maximum size of 1/2 inch (12.5 mm). The packaged concrete mixture shall comply with the air content and strength requirements for Class SI concrete as indicated in Note 1. Mixing shall be per the manufacturer’s recommendations, except the water/cement ratio shall not exceed the value specified for Class SI concrete as indicated in Note 1. A high range water-reducing admixture shall be used to obtain a 5-7 inch (125-175 mm) slump. The admixture shall be per the manufacturer’s recommendation, and the Department’s qualified product list of Concrete Admixtures shall not apply. A maximum slump of 10 inch (250 mm) may be permitted if no segregation is observed by the Engineer in a laboratory or field evaluation.
- Note 4 The “self-consolidating concrete” packaged concrete mixture shall be from the Department’s qualified product list of Packaged, Dry, Formed, Concrete Repair Mixtures. The materials and preparation of aggregate shall be according to ASTM C 387. The cement factor shall be 6.65 cwt/cu yd (395 kg/cu m) minimum to 7.05 cwt/cu yd (418 kg/cu m) maximum. Cement replacement with fly ash or ground granulated blast-furnace slag shall be according to Section 1020. The “self-consolidating concrete” packaged concrete mixture shall have a water soluble chloride ion content of less than 0.40 lb/cu yd (0.24 kg/cu m). The test shall be performed according to ASTM C 1218, and the “self-consolidating concrete” packaged concrete mixture shall have an age of 28 to 42 days at the time of test. The ASTM C 1218 test shall be performed by an independent lab a minimum of once every two years, and the test results shall be provided to the Department. The concrete mixture should be uniformly graded, and the coarse aggregate shall be a maximum size of 1/2 inch (12.5 mm). The fine aggregate proportion shall be a maximum 50 percent by weight (mass) of the total aggregate used. The packaged concrete mixture shall comply with the air content and strength requirements for Class SI concrete as indicated in Note 1. Mixing shall be per the manufacturer’s recommendations, except the water/cement ratio shall not exceed the value specified for Class SI concrete as indicated in Note 1. The admixtures used to produce self-consolidating concrete shall be per the manufacturer’s recommendation, and the Department’s qualified product list of Concrete Admixtures shall not apply. The packaged concrete mixture shall meet the self-consolidating requirements of Article 1020.04.
- Note 7. In addition ASTM C 881, Type IV, Grade 2 or 3, Class A, B, or C may be used.

Added October 28, 2020

Equipment.

Equipment shall be according to Article 503.03 and the following.

Chipping Hammer – The chipping hammer for removing concrete shall be a light-duty pneumatic or electric tool with a 15 lb. (7 kg) maximum class or less.

Blast Cleaning Equipment – Blast cleaning equipment for concrete surface preparation shall be the abrasive type, and the equipment shall have oil traps.

Hydrodemolition Equipment – Hydrodemolition equipment for removing concrete shall be calibrated, and shall use water according to Section 1002.

Construction Requirements

General.

The repair method shall be formed concrete repair.

Temporary Shoring or Cribbing.

When a temporary shoring or cribbing support system is required, the Contractor shall provide details and computations, prepared and sealed by an Illinois licensed Structural Engineer, to the Department for review and approval. Whenever possible the support system shall be installed prior to starting the associated concrete removal. If no system is specified, but during the course of removal the need for temporary shoring or cribbing becomes apparent or is directed by the Engineer due to a structural concern, the Contractor shall not proceed with any further removal work until an appropriate and approved support system is installed.

Concrete Removal.

The Contractor shall provide a Rubble Management Plan that includes a description for how the Contractor will meet railroad protection requirements and protect railroad property from damage throughout the work. See Rubble Management Plan in these Special Provisions for additional details.

The Contractor shall provide ladders or other appropriate equipment for the Engineer to mark the removal areas. Repair configurations will be kept simple, and squared corners will be preferred. The repair perimeter shall be sawed a depth of 3/4 inch (19 mm) or less, as required to avoid cutting the reinforcement. Any cut reinforcement shall be repaired or replaced at the expense of the Contractor. If the concrete is broken or removed beyond the limits of the initial saw cut, the new repair perimeter shall be recut. The areas to be repaired shall have all loose, unsound concrete removed completely by the use of chipping hammers, hydrodemolition equipment, or other methods approved by the Engineer. The concrete removal shall extend along the reinforcement bar until the reinforcement is free of bond inhibiting corrosion. Reinforcement bar with 50 percent or more exposed shall be undercut to a depth of 3/4 inch (19 mm) or the diameter of the reinforcement bar, whichever is greater.

If sound concrete is encountered before existing reinforcement bars are exposed, further removal of concrete shall not be performed unless the minimum repair depth is not met.

Added October 28, 2020

The repair depth shall be a minimum of 1 inch (25 mm). The substrate profile shall be $\pm 1/16$ inch (± 1.5 mm). The perimeter of the repair area shall have a vertical face.

If a repair is located at the ground line, any excavation required below the ground line to complete the repair shall be included in this work.

The Contractor shall have a maximum of 14 calendar days to complete each repair location with concrete, once concrete removal has started for the repair.

The Engineer shall be notified of concrete removal that exceeds 6 inch (150 mm) in depth, one fourth the cross section of a structural member, more than half the vertical column reinforcement is exposed in a cross section, more than 6 consecutive reinforcement bars are exposed in any direction, within 1.5 inch (38 mm) of a bearing area, or other structural concern. Excessive deterioration or removal may require further evaluation of the structure or installation of temporary shoring and cribbing support system.

Surface Preparation.

Prior to placing the concrete, the Contractor shall prepare the repair area and exposed reinforcement by blast cleaning. The blast cleaning shall provide a surface that is free of oil, dirt, and loose material.

The repair area and perimeter vertical face shall have a rough surface. Care shall be taken to ensure the sawcut face is roughened by blast cleaning. Just prior to concrete placement, saturate the repair area with water to a saturated surface-dry condition. Any standing water shall be removed.

Concrete shall be placed within 3 calendar days of the surface preparation or the repair area shall be prepared again.

Reinforcement.

Exposed reinforcement bars shall be cleaned of concrete and corrosion by blast cleaning. After cleaning, all exposed reinforcement shall be carefully evaluated to determine if replacement or additional reinforcement bars are required.

Reinforcing bars that have been cut or have lost 25 percent or more of their original cross-sectional area shall be supplemented by new in-kind reinforcement bars. Section loss shall be reported to the Engineer. New bars shall be lapped a minimum of 32 bar diameters to existing bars. A mechanical bar splicer shall be used when it is not feasible to provide the minimum bar lap. No welding of bars shall be performed. Cost included with Structural Repair of Concrete.

Exposed reinforcement bars shall be cleaned and coated with epoxy in accordance with Cleaning and Painting of Existing Reinforcing Bars as provided in these Special Provisions. Bars shall be free of dirt, detrimental scale, paint, oil, or other foreign substances which may reduce bond with the concrete. Cleaning and coating of existing reinforcement is included in the cost of this work.

Added October 28, 2020

Intersecting reinforcement bars shall be tightly secured to each other using 0.006 inch (1.6 mm) or heavier gauge tie wire (coated) and shall be adequately supported to minimize movement during concrete placement.

For reinforcement bar locations with less than 0.75 inch (19 mm) of cover, protective coat shall be applied to the completed repair. The application of the protective coat shall be according to Article 503.19, 2nd paragraph, except blast cleaning shall be performed to remove curing compound.

The Contractor shall anchor the new concrete to the existing concrete with 3/4 inch (19 mm) diameter hook bolts for all repair areas where the depth of concrete removal is greater than 8 inch (205 mm) and there is no existing reinforcement extending into the repair area. The hook bolts shall be spaced at 15 inch (380 mm) maximum centers both vertically and horizontally and shall be a minimum of 12 inch (305 mm) away from the perimeter of the repair. The hook bolts shall be installed according to Section 584.

Repair Methods.

All repair areas shall be inspected and approved by the Engineer prior to placement of the concrete.

Formed Concrete Repair. Falsework shall be according to Article 503.05. Forms shall be according to Article 503.06. Formwork shall provide a smooth and uniform concrete finish and shall approximately match the existing concrete structure. Formwork shall be mortar tight and closely fitted where they adjoin the existing concrete surface to prevent leakage. Air vents may be provided to reduce voids and improve surface appearance. The Contractor may use exterior mechanical vibration, as approved by the Engineer, to release air pockets that may be entrapped.

Formwork systems proposed for substructure repairs at piers adjacent to railroads shall be described in Structural Assessment Reports (SAR) For Contractor's Means and Methods submitted to the railroad, as specified in these Special Provisions. Contractor shall note that repairs at Pier H2 will encroach on the Railroad Construction Clearance Envelope and will require special approval of the Union Pacific Railroad.

The concrete for formed concrete repair shall be a Class SI Concrete, or a packaged R1, R2, or R3 Concrete, or a packaged Normal Weight Concrete at the Contractor's option. The concrete shall be placed and consolidated according to Article 503.07. The concrete shall not be placed when frost is present on the surface of the repair area, or the surface temperature of the repair area is less than 40 °F (4 °C). All repaired members shall be restored as close as practicable to their original dimensions.

Curing shall be done according to Article 1020.13.

If temperatures below 45°F (7°C) are forecast during the curing period, protection methods shall be used. Protection Method I according to Article 1020.13(d)(1), or Protection Method II according to Article 1020.13(d)(2) shall be used during the curing period.

The surfaces of the completed repair shall be finished according to Article 503.15.

Added October 28, 2020

Inspection of Completed Work.

The Contractor shall provide ladders or other appropriate equipment for the Engineer to inspect the repaired areas. After curing but no sooner than 28 days after placement of concrete, the repair shall be examined for conformance with original dimensions, cracks, voids, and delaminations. Sounding for delaminations will be done with a hammer or by other methods determined by the Engineer.

The acceptable tolerance for conformance of a repaired area shall be within 1/4 inch (6 mm) of the original dimensions. A repaired area not in dimensional conformance or with delaminations shall be removed and replaced.

A repaired area with cracks or voids shall be considered as nonconforming. Exceeding one or more of the following crack and void criteria shall be cause for removal and replacement of a repaired area.

1. The presence of a single surface crack greater than 0.01 inch (0.25 mm) in width and greater than 12 inch (300 mm) in length.
2. The presence of two or more surface cracks greater than 0.01 inch (0.25 mm) in width that total greater than 24 inch (600 mm) in length.
3. The presence of map cracking in one or more regions totaling 15 percent or more of the gross surface area of the repair.
4. The presence of two or more surface voids with least dimension 3/4 inch (19 mm) each.

A repaired area with cracks or voids that do not exceed any of the above criteria may remain in place, as determined by the Engineer.

If a nonconforming repair is allowed to remain in place, cracks greater than 0.007 inch (0.2 mm) in width shall be repaired with epoxy according to Section 590. For cracks less than or equal to 0.007 inch (0.2 mm) in width, the epoxy may be applied to the surface of the crack. Voids shall be repaired according to Article 503.15.

Publications and Personnel Requirements.

The Contractor shall provide a current copy of ACI 506R to the Engineer a minimum of one week prior to start of construction.

Method of Measurement.

This work will be measured for payment in place and the area computed in square feet (square meters). For a repair at a corner, both sides will be measured.

Because the location and extent of repairs having depth of 5 in. or greater is unknown, the following allowances were assumed for STRUCTURAL REPAIR OF CONCRETE (DEPTH GREATER THAN 5 IN. (125 MM)):

Structure No.	Assumed Quantity SqFt (Depth => 5")
082-0005	0
082-0140	0
082-0144	400
082-0203	200
082-0255	0
082-0256	100

Basis of Payment.

This work will be paid for at the contract unit price per square foot (square meter) for STRUCTURAL REPAIR OF CONCRETE (DEPTH GREATER THAN 5 IN. (125 MM), STRUCTURAL REPAIR OF CONCRETE (DEPTH EQUAL TO OR LESS THAN 5 IN. (125 MM)).

When not specified to be paid for elsewhere, the work to design, install, and remove the temporary shoring and cribbing will be paid for according to Article 109.04.

With the exception of reinforcement damaged by the Contractor during removal, the furnishing and installation of supplemental reinforcement bars, mechanical bar splicers, hook bolts, and protective coat will be paid according to Article 109.04.

DECK DRAIN EXTENSIONS

Description.

This work consists of furnishing and installing extensions on the existing bridge deck drains at locations with inadequate extension as noted on the plans and as directed by the Engineer.

Construction Requirements.

The drain extensions shall be fabricated from material as shown on the plans. The Contractor shall verify the required extension length and inner diameter prior to ordering materials. All hardware required to attach the deck drain extension shall be included in the price for DECK DRAIN EXTENSIONS.

Basis of Payment.

This work shall be paid for at the contract unit price each for DECK DRAIN EXTENSIONS.

Added October 28, 2020

DECK SLAB REPAIR

Description.

This work shall consist of the removal and disposal of all loose and deteriorated concrete and/or asphalt patch repairs from bridge deck surfaces and the replacement with new concrete to the original top of deck.

The work shall be done according to the applicable requirements of Sections 501, 503 and 1020.

Deck slab repairs will be classified as follows:

- a) Partial-Depth. Partial-depth repairs shall consist of removing the loose and unsound deck concrete or asphalt patches, disposing of the removed material and replacing with new concrete. The removal may be performed by chipping with power driven hand tools or by hydro-scarification equipment. The depth shall be measured from the top of the concrete deck surface, at least 3/4 inch (20 mm) but not more than 6 inch See notes below regarding the known conditions of the deck slabs.
- b) Full-Depth. Full-depth repairs shall consist of removing concrete full-depth of the deck, disposing of the concrete removed, and replacing with new concrete to the original concrete deck surface. The removal may be performed with power driven hand tools, hydraulic impact equipment, or by hydro-scarification equipment. The depth shall be measured from the top of concrete deck surface and be greater than 6 inch Full-depth repairs shall be classified for payment as Full-Depth, Type I and Full-Depth, Type II according to the following:
 - Type I Full-depth patches less than or equal to 0.6 sq. yd. or 5 sq. ft. (0.5 sq m) in area. The minimum dimensions for a patch shall be 1 ft. x 1 ft. (300 mm x 300 mm).
 - Type II Full-depth patches greater than 0.6 sq. yd. or 5 sq. ft. (0.5 sq. m) in area.

Note- WJE's field investigations of the structures have identified the various conditions summarized below. Cover depth reported below is the clear concrete cover over the upper-most layer of reinforcement. Structure No. 082-0144 has undergone various rehabilitations including addition of a reinforced overlay. Portions of Structure No. 082-0256 and 082-0203 were re-built during the 1989 rehabilitation program. Refer to the plans for more detailed information.

082-0144

- 082-0144 (Roadway D, D26 to D32)
 - Design Deck Thickness: 8-3/4 inches (7-inch original slab plus 2-inch overlay with 1/4-inch scarification)
 - Design Cover Depth: 3-1/4 inches (1.5-inch clear plus 1-3/4-inch nominal overlay)
 - Average Measured Cover: 3.9 inches
 - Maximum Measured Cover Depth: 4.4 inches
- 082-0144 (Roadway D, D33 to D41)
 - Design Deck Thickness: 9 inches (7-inch original slab with 1/2-inch scarification and 2-1/2-inch overlay)
 - Design Cover Depth: 3.5 inches (1.5-inch clear plus 2-inch nominal overlay)
 - Average Measured Cover Depth: 4.1 inches
 - Maximum Measured Cover Depth: 5.6 inches

Added October 28, 2020

- 082-0144 (Roadway D, D42 to D45)
 - Design Deck Thickness: 9 inches (7-inch original slab with 2-inch scarification and 4-inch overlay)
 - Original deck bars, top mat
 - Design Cover Depth: 3.5 inches (1.5-inch clear plus 2-inch nominal overlay)
 - Average Measured Cover: 4.1 inches
 - Maximum Measured Cover Depth: 5.7 inches
 - Overlay reinforcement. A mat of epoxy coated reinforcement was installed in the 4-inch overlay.
 - Design Cover Depth: 2 inches
 - Average Measured Cover: 2.9 inches
 - Maximum Measured Cover: 4.9 inches

082-0201

- 082-0201 (Ramp Q)
 - Design Deck Thickness: 7-1/2 inches
 - Design Cover Depth: 2-1/4 inches (+/- 1/4 inch)
 - Average Measured Cover Depth: 2.4 inches
 - Maximum Measured Cover Depth: 3.9 inches

082-0203

- 082-0203 (Ramp P, Spans P1 to P3)
 - Design Deck Thickness: 9-1/2 inch slab (7-1/2-inch original slab with 2-1/4-inch overlay with 1/4-inch scarification)
 - Design Cover Depth: 4 inches (2-inch clear cover plus nominal 2-inch overlay)
 - Average Measured Cover Depth: 4.0 inches
 - Maximum Measured Cover Depth: 5.2 inches
- 082-0203 (Ramp P, Spans P4 to P14)
 - Design Deck Thickness: 9-inch slab (7-inch original slab plus 2-1/4-inch overlay with 1/4-inch scarification)
 - Design Cover Depth: 3-1/2 inches (1-1/2-inch clear cover plus nominal 2-inch overlay)
 - Average Measured Cover Depth: 3.8 inches
 - Maximum Measured Cover Depth: 5.5 inches
- 082-0203 (Ramp P, Spans P14)
 - Design Deck Thickness: 7-1/2 inches (rebuilt)
 - Design Cover Depth: 2-1/4 inches (+/- 1/4 inch)
 - Average Measured Cover Depth: 2.5 inches
 - Maximum Measured Cover Depth: 3.2 inches

082-0256

- 082-0256 (Roadway H, Spans H2 thru H4)
 - Design Deck Thickness: 8-3/4 inches (including 2-inch overlay)
 - Design Cover Depth: 3-1/4 inches
 - Average Measured Cover: 4.0 inches
 - Maximum Measured Cover Depth: 5.2 inches

Added October 28, 2020

- 082-0256 (Roadway H, Spans P15 and H1)
 - Zone 1 (New slab area along south edge of slab)
 - Design Deck Thickness: 7-1/2 inches
 - Design Cover Depth: 2-1/4 inches (+/- 1/4 inch)
 - Zone 2 (Generally in the area of the merge lane)
 - Design Deck Thickness: 8-3/4 inches (including 2-inch overlay)
 - Design Cover Depth: 3-1/4 inches
 - Zone 3 (Generally in the area of thru lanes)
 - Design Deck Thickness: 9-1/2 inches (7-1/2-inch original slab plus 2-1/4-inch overlay with 1/4-inch scarification)
 - Design Cover Depth: 3-1/2 to 4 inches (1-1/2 to 2-inch clear cover plus nominal 2-inch overlay)

Materials.

Materials shall be according to Article 1020.02 of the Standard Specifications for Road and Bridge Construction.

Portland cement concrete for partial and full-depth repairs shall be according to Section 1020. Class PP-1, PP-2, PP-3, PP-4, PP-5 or BS concrete shall be used at the Contractor's option unless noted otherwise on the contract plans. For Class BS concrete, a CA 13, 14, or 16 shall be used. If the BS concrete mixture is used only for full-depth repairs, a CA-11 may be used.

Equipment.

The equipment used shall be subject to the approval of the Engineer and shall meet the following requirements:

- (a) Surface Preparation Equipment. Surface preparation and concrete removal equipment shall be according to the applicable portions of Section 1100 and the following:
 - a. Sawing Equipment. Sawing equipment shall be a concrete saw capable of sawing concrete to the specified depth.
 - b. Blast Cleaning Equipment. The blast cleaning may be performed by wet sandblasting, high-pressure waterblasting, shotblasting or abrasive blasting. Blast cleaning equipment shall be capable of removing rust and old concrete from exposed reinforcement bars, and shall have oil traps.
 - c. Power-Driven Hand Tools. Power-driven hand tools will be permitted including jackhammers lighter than the nominal 45 lb. (20 kg) class. Chipping hammers heavier than a nominal 15 lb. (6.8 kg) class shall not be used for removing concrete from below any reinforcing bar for partial depth repairs, or for removal within 1 ft (300 mm) of existing beams, girders or other supporting structural members that are to remain in service or within 1 ft (300 mm) of the boundaries of full-depth repairs. Jackhammers or chipping hammers shall not be operated at an angle in excess of 45 degrees measured from the surface of the slab.
 - d. Hydraulic Impact Equipment. Hydraulic impact equipment with a maximum rated striking energy of 360 ft-lbs (270 J) may be permitted only in areas of full-depth removal more than 1 ft (300 mm) away from existing beams, girders or other supporting structural members that are to remain in service or more than 1 ft (300 mm) from the boundaries of full-depth repairs.

Added October 28, 2020

- e. Hydro-Demolition Equipment. The hydro-demolition equipment shall consist of filtering and pumping units operating with a remote-controlled robotic device. The equipment shall use water according to Section 1002. The equipment shall be capable of being controlled to remove only unsound concrete.
- (b) Concrete Equipment: Equipment for proportioning and mixing the concrete shall be according to Article 1020.03 of the Standard Specifications for Road and Bridge Construction.
- (c) Finishing Equipment: Finishing equipment shall be according to Article 1103.17 of the Standard Specifications for Road and Bridge Construction. Adequate hand tools will be permitted for placing and consolidating concrete in the patch areas and for finishing small patches.

Construction Requirements.

Parapets, drains, reinforcement and/or existing transverse and longitudinal joints which are to remain in place shall be protected from damage during removal and cleaning operations.

The Contractor shall control the runoff water generated by the various construction activities in such a manner as to minimize, to the maximum extent practicable, the discharge of untreated effluent into adjacent waters, and shall properly dispose of the solids generated according to Article 202.03. The Contractor shall submit a water management plan to the Engineer specifying the control measures to be used. The control measures shall be in place prior to the start of runoff water generating activities. Runoff water shall not be allowed to constitute a hazard to adjacent or underlying roadways, waterways, drainage areas or railroads nor be allowed to erode existing slopes.

Surface Preparation. All loose, disintegrated and unsound concrete and asphalt patches shall be removed from portions of the deck slab shown on the plans or as designated by the Engineer. The Engineer will determine the limits of removal as the work progresses.

The Contractor shall take care not to damage reinforcement bars or expansion joints which are to remain in place. Any damage to reinforcement bars or expansion joints shall be corrected at the Contractor's expense. All loose reinforcement bars, as determined by the Engineer, shall be retied at the Contractor's expense.

(1) Partial-Depth. Areas to be repaired will be determined and marked by the Engineer. A concrete saw shall be used to provide vertical edges approximately 3/4 inch (20 mm) deep around the perimeter of the area to be patched. Where high steel is present, the depth may be reduced as directed by the Engineer. A saw cut will not be required on those boundaries along the face of the curb, parapet or joint or when sharp vertical edges are provided by hydro-demolition.

The loose and unsound concrete shall be removed by chipping, with power driven hand tools or by hydro-demolition equipment. All exposed reinforcing bars and newly exposed concrete shall be thoroughly blast cleaned. Existing reinforcing shall be cleaned in accordance with Cleaning and Painting of Existing Reinforcing Bars as provided in these Special Provisions.

Added October 28, 2020

Where, in the judgment of the Engineer, the bond between existing concrete and reinforcement steel within the patch area has been destroyed, the concrete adjacent to the bar shall be removed to a depth that will permit new concrete to bond to the entire periphery of the exposed bar. A minimum of 1 inch (25 mm) clearance will be required. The Engineer may require enlarging a designated removal area should inspection indicate deterioration beyond the limits previously designated. In this event, a new saw cut shall be made around the extended area before additional removal is begun. The removal area shall not be enlarged solely to correct debonded reinforcement or deficient lap lengths.

(2) Full-Depth. Concrete shall be removed as determined by the Engineer or in all designated areas of partial depth repair in which unsound concrete is found to extend below half the concrete deck thickness.

Full-depth removal shall be performed according to Article 501.05 except that hydraulic impact equipment may be permitted in areas of full-depth removal more than 1 ft (300 mm) away from the edges of existing beams, girders or other supporting structural members or more than 1 ft (300 mm) from the boundaries of other full-depth repairs. Saw cuts shall be made on the top of the deck, except those boundaries along the face of curbs, parapets and joints or where hydro-demolition provided sharp vertical edges.

Forms for full-depth repair may be supported by hangers with adjustable bolts or by blocking from the beams below. When approved by the Engineer, forms for Type 1 patches may be supported by No. 9 wires or other devices attached to the reinforcement bars.

All form work shall be removed after the curing sequence is complete and prior to opening to traffic.

(3) Reinforcement Treatment. Care shall be exercised during concrete removal to protect the reinforcement bars and structural steel from damage. Any damage to the reinforcement bars or structural steel to remain in place shall be repaired or replaced. All existing reinforcement bars shall remain in place except as herein provided for corroded bars. Tying of loose bars will be required. Reinforcing bars which have been cut or have lost 25 percent or more of their original cross sectional area shall be supplemented by new in kind reinforcement bars. Section loss shall be reported to the Engineer. New bars shall be lapped a minimum of 32 bar diameters to existing bars. An approved mechanical bar splice capable of developing in tension at least 125 percent of the yield strength of the existing bar shall be used when it is not feasible to provide the minimum bar lap. No welding of bars will be permitted. Cost is included with Deck Slab Repair.

(4) Cleaning. Immediately after completion of the concrete removal and reinforcement repairs, the repair areas shall be cleaned of dust and debris. Once the initial cleaning is completed, the repair areas shall be thoroughly blast cleaned to a roughened appearance free from all foreign matter. Particular attention shall be given to removal of concrete fines. Any method of cleaning which does not consistently produce satisfactory results shall be discontinued and replaced by an acceptable method. All debris, including water, resulting from the blast cleaning shall be confined and shall be immediately and thoroughly removed from all areas of accumulation. If concrete placement does not follow immediately after the final cleaning, the area shall be carefully protected with well-anchored polyethylene sheeting.

Added October 28, 2020

Exposed reinforcement bars shall be cleaned and coated with epoxy in accordance with Cleaning and Painting of Existing Reinforcing Bars as provided in these Special Provisions. Bars shall be free of dirt, detrimental scale, paint, oil, or other foreign substances which may reduce bond with the concrete. Cleaning and coating of existing reinforcement is included in the cost of this work.

Placement & Finishing of Concrete Repair.

(1) Bonding Method. The patch area shall be cleaned to the satisfaction of the Engineer and shall be thoroughly wetted and maintained in a dampened condition with water for at least 12 hours before placement of the concrete. Any excess water shall be removed by compressed air or by vacuuming prior to the beginning of concrete placement. Water shall not be applied to the patch surface within one hour before or at any time during placement of the concrete.

(2) Concrete Placement. The concrete shall be placed and consolidated according to Article 503.07 and as herein specified. Article 1020.14 shall apply.

When an overlay system is not specified, the patches shall be finished according to Article 503.16.

Curing and Protection. Concrete patches shall be cured by the Wetted Burlap or Wetted Cotton Mat Method according to Article 1020.13 (a)(3) or Article 1020.13 (a)(5). The curing period shall be 3 days for Class PP-1, PP-2, PP-3, PP-4, and PP-5 concrete. The curing period shall be 7 days for Class BS concrete. In addition to Article 1020.13, when the air temperature is less than 55° F (13° C), the Contractor shall cover the patch according to Article 1020.13 (d)(1) with minimum R12 insulation. Insulation is optional when the air temperature is 55° F. - 90° F (13° C - 32° C). Insulation shall not be placed when the air temperature is greater than 90° F (32° C). A 72-hour minimum drying period shall be required before placing waterproofing or hot-mix asphalt surfacing.

Opening to Traffic. No traffic will be permitted on a patch until after the specified cure period, and the concrete has obtained a minimum compressive strength of 4000 psi (27.6 MPa) or flexural strength of 675 psi (4.65 MPa).

Construction equipment will be permitted on a patch during the cure period if the concrete has obtained the minimum required strength. In this instance, the strength specimens shall be cured with the patch.

Method of Measurement.

When specified, removal of concrete and asphalt patches and full or partial depth repairs will be measured for payment and computed in square yards (square meters).

Basis of Payment.

Areas removed and replaced up to and including a depth of 6 inch will be paid for at the contract unit price per square yard (square meter) for DECK SLAB REPAIR (PARTIAL). Areas requiring removal greater than 6 inch will be removed and replaced full-depth and shall be paid for at the contract unit price per square yard (square meter) for DECK SLAB REPAIR (FULL DEPTH, TYPE I) and/or DECK SLAB REPAIR (FULL DEPTH, TYPE II).

Added October 28, 2020

When corroded reinforcement bars are encountered in the performance of this work and replacement is required, the Contractor will be paid according to Article 109.04 of the Standard Specifications for Road and Bridge Construction.

No payment will be allowed for removal and replacement of reinforcement bars damaged by the Contractor in the performance of his/her work or for any increases in dimensions needed to provide splices for these replacement bars.

TEMPORARY SHORING AND CRIBBING

Description.

This item shall consist of furnishing all material, equipment and labor to support the affected superstructure members during the substructure repairs as shown on the plans, as herein specified, and as directed by the Engineer.

Construction Requirements.

The Contractor shall submit details and calculations, prepared and sealed by an Illinois Licensed Structural Engineer, of the support system he/she proposes to use for approval of the Engineer prior to ordering of material and implementation. Such approval shall in no way relieve the Contractor of responsibility for the safety of the structure. The supports used shall be such that vertical adjustments may be made in order to maintain the existing beam profile. Prior to starting substructure repairs, the temporary supports shall be used to place an upward reaction on the affected superstructures designated in the plans, equal to but not larger than the dead load reactions given in the plans or at repair locations that threaten to undermine bearings as identified by the Field Engineer, thus relieving the superstructure dead load reaction from the substructure unit to be repaired. It is not the intention to raise the affected beams. As the vertical load is incrementally increased to the specified load, if vertical movement is detected the load shall not be increased further.

Additionally, if the work is to be completed under stage construction without traffic directly over the beams being shored then the Temporary Shoring and Cribbing shall be designed to carry the Dead Load plus $\frac{1}{2}$ (Live Load + Imp) as shown in the plans. If work is to be completed with traffic directly over the beams being shored then the Temporary Shoring and Cribbing shall be designed to carry the Dead Load plus full (Live Load + Imp) as shown in the plans.

After the temporary shoring and cribbing is no longer required, it shall be fully removed and become the property of the Contractor.

Temporary shoring and cribbing shall be positioned outside of the railroad construction envelope.

Method of Measurement and Basis of Payment:

The work specified herein, as shown on the plans and as directed by the Engineer, shall be paid for at the contract unit price each for TEMPORARY SHORING AND CRIBBING for each member support location required.

Added October 28, 2020

FURNISHING AND ERECTING STRUCTURAL STEEL (LUMP SUM)

Description.

This work shall consist of removing and replacing seismic retrofit devices used in Spans D1 thru D25 which are attached to the deck. This includes seismic continuity ties and seismic floor beam to deck connection brackets. The work includes furnishing, erecting, and painting steel components that will be embedded into the new deck as indicated on the plans and according to Section 505 and 506.

Construction Requirements.

Prior to deck removal, the Contractor shall obtain measurements of the location of all seismic continuity ties that will be impacted by the deck removal so that they may be reinstalled during deck reconstruction. The continuity ties shall be protected from damage.

Prior to deck removal, the Contractor will remove and dispose of seismic floor beam to deck connection brackets.

During forming of the bridge deck, steel embed plates will be installed at the underside of the slab at a position that will allow for the reinstallation of seismic continuity ties, and installation of new seismic floor beam to deck connection brackets.

Method of Measurement.

The removal and replacement of seismic retrofit devices in Roadway D, Spans D1 to D25 will be measured for payment as a lump sum.

Basis for Payment.

This work will be paid for at the contract unit price of lump sum for FURNISHING AND ERECTING STRUCTURAL STEEL (LUMP SUM).

The cost of labor, materials, and equipment required to install stud shear connectors used in seismic continuity ties and seismic brackets will not be paid separately, but will be included in the cost of the STUD SHEAR CONNECTOR.

FURNISHING AND ERECTING STRUCTURAL STEEL (POUND)

Description.

This work shall consist of furnishing, erecting, and painting steel components used in the Trendley Avenue Bridge as indicated on the plans and according to Section 505 and 506.

Method of Measurement.

Furnishing and Erecting Structural Steel used in Trendley Avenue will be measured for payment and computed in pounds.

Basis for Payment.

This work will be paid for at the contract unit price per pound for FURNISHING AND ERECTING STRUCTURAL STEEL (POUND).

Added October 28, 2020

EPOXY CRACK INJECTION

This work shall consist of injecting cracks in existing substructure elements with an epoxy bonding compound. The work shall be performed according to Section 590, Epoxy Crack Injection and the additional requirements of these Special Provisions.

At locations where cracks requiring repair intersect existing confinement or seismic hoop retrofits, a suitable sealing compound recommended by the supplier of the epoxy bonding compound shall be placed on the surface of the concrete above and below the retrofits and on the retrofit surfaces themselves to create a dam. The sealing compound dam shall be allowed adequate time to cure prior to injection of the crack to prevent blowout.

CLEANING AND PAINTING OF EXISTING REINFORCING BARS

Description.

This work shall consist of the complete blast cleaning and preparation of reinforcing steel surfaces; the furnishing, application and protection of epoxy coatings; and incidental work described herein. The work shall include all labor, materials and equipment necessary to complete the work.

The provisions of this special provision specification shall also apply to newly furnished epoxy coated reinforcement that is damaged during handling, placement, etc.

Quality Assurance.

The Contractor shall submit technical data sheets for each epoxy product and/or formulation to be used showing that the products meet the requirements of the specifications. Technical data shall include:

- Intended use
- Pot life (neat)
- Initial cure time (1000 psi)
- Tack free (thin film)
- Final cure (75% ultimate strength)
- Tensile strengths by ASTM D638 (14 days)
- Tensile elongation by ASTM D638 modified (14 days)
- Flexural strength and modulus per ASTM D790 at 24 hours, 3 days, and 7 days at 77°F
- 24-hr compressive strength by ASTM C109 modified (1 part epoxy to 3-1/4 parts aggregate)

The product shall be delivered and handled according to the manufacturer's recommendations. Material from damaged, open containers shall not be used.

The Contractor shall monitor environmental conditions during the work. The recommendations of the manufacturer shall be followed with regard to use of their materials under various moisture and temperature conditions.

Added October 28, 2020

Materials.

Field epoxy coating for steel reinforcing bars shall be Sika Armatec 110 EpoCem, by Sika, or an approved equal. The epoxy shall be pigmented with a color that contrasts with the bars and surrounding concrete.

Construction Requirements.

Concrete removal shall be accomplished by methods that will not damage the existing reinforcing steel to remain.

Surface Preparation: Exposed reinforcing shall be thoroughly cleaned by sandblasting to remove all rust and adhered concrete. Sandblasting equipment shall be capable of cleaning existing reinforcing steel to a near white metal (SP-10) condition. Abrasive suppliers shall certify that abrasives shall not be oil contaminated and shall have a water extract pH value within the range of 6 to 8. All surfaces prepared with abrasives which are oil contaminated or have a pH outside the specified range shall be cleaned with solvent cleaner or low-pressure water as directed by the Engineer and reblasted by the Contractor at his/her expense. Silica sand shall not be used as an abrasive.

Protect all portions of the structure that could be damaged by blast cleaning operations. Contractor shall use tarpaulins, drop cloths, or other approved methods to collect and properly dispose of abrasives. Abrasives shall not be permitted to enter deck drains.

Field Coating Existing Reinforcing Bars with Epoxy: Field coating shall be applied in accordance with manufacturer's recommendations. Do not applied coating when the ambient temperature is expected to drop below the manufacturer's recommended installation temperature before the coating has cured.

Cleaned reinforcing steel shall receive one coat of epoxy which fully covers the bar. A touch-up coat shall be applied if visible pin holes or holidays remain after the first coat. The dry film thickness of the coating shall be approximately 10 to 12 mils. A second coat of epoxy shall be applied to exposed bars with 1/2 inch or less of cover to the original concrete surface, or if recommended by the epoxy manufacturer. Apply second coat after first coat has cured.

Existing concrete surfaces below the bars shall be protected from epoxy spillage. It is recommended that heavy paper, cardboard, or plastic be installed below the bars during the coating process.

Epoxy spillage on existing concrete surfaces shall be removed by additional chipping or another approved method.

Clean Up: Excess epoxy shall be cleaned up from adjacent work areas. Follow all manufacturer's safety precautions. Avoid skin contact with epoxy materials, solvents and epoxy strippers. Epoxy resins and particularly epoxy hardeners may cause skin sensitization.

Method of Measurement.

This work will be not be measured for payment.

Added October 28, 2020

Basis of Payment.

The cost of labor, materials, and equipment required to complete field coating of existing reinforcing bars with epoxy will not be paid separately, but will be included in the cost of the following pay items: DECK SLAB REPAIR (PARTIAL), DECK SLAB REPAIR (FULL DEPTH, TYPE I), STRUCTURAL REPAIR OF CONCRETE (DEPTH EQUAL TO OR LESS THAN 5 INCHES), STRUCTURAL REPAIR OF CONCRETE (DEPTH GREATER THAN 5 INCHES), and CONCRETE REMOVAL.

PROTECTIVE SHIELD

Description.

Protective Shield shall be provided at locations shown in the plans and in accordance with Article 501.03 and the additional requirements of these Special Provisions.

At-Grade Track Shield shall be considered as Protective Shield. Furnishing, erecting, maintenance, temporary removal and replacement for train passage, and final removal and disposal of At-Grade Track Protection shall be in accordance with Union Pacific Railroad notes included in the plans.

Submittals.

The Contractor shall submit working drawings and calculations prepared and sealed by an Illinois licensed Structural Engineer for Protective Shield per Article 501.03.

The Contractor shall also submit working drawings and calculations prepared and sealed by an Illinois licensed Structural Engineer for At-Grade Track Shield. Include the design load for the shields for both the maximum static load and the maximum anticipated impact loads from falling debris.

All working drawings for Protective Shield and At-Grade Track Shield shall be incorporated into a Rubble Management Plan that includes a description for how the Contractor will meet railroad protection requirements and protect railroad property from damage throughout the work.

No work within 50 feet of a railroad track may take place until the Rubble Management Plan has been approved by the railroad having jurisdiction.

Basis for Payment.

The Projective Shield and At-Grade Track Shield will be paid at the contract unit price per square yard for PROTECTIVE SHIELD. The quantity of Project Shield and At-Grade Track Protection will be measured separately and combined to determine the final quantity for payment.

Added October 28, 2020

RELOCATING NAME PLATES

Description.

This work shall consist of the removal, storage and reinstallation of the existing bridge name plate, located in the southeast parapet wall of Structure No. 082-0005 at the joint at Pier BC1 and the northwest parapet wall of Structure No. 082-0256 at the joint at Abutment H5.

Construction Requirements.

Removal. Removal shall be done with hand held tools preserving the name plate and bolts/lugs in good condition. The Contractor shall be responsible for repairing any damage caused by the removal operations to the name plate at his expense. If the Contractor's operations cause unrepairable damage to the existing name plate, a new name plate with identical markings and in accordance with Section 515 shall be furnished and installed at the Contractors expense. The Contractor shall be responsible for storing the name plates in a secure location until reinstallation.

Reinstallation. On concrete structures, the name plate shall be embedded in the concrete and fastened by means of four brass or bronze bolts with countersunk heads, or four lugs cast integral with the plate. The bolts or lugs shall project at least 3 in. into the concrete beyond the back of the plate. The name plates shall be located a minimum of 12" between the near edge of the plate to the concrete removal line.

Basis of Payment.

This work will be paid for at the contract unit price per each for RELOCATING NAME PLATES which shall be payment in full to complete this work.

HOT DIP GALVANIZING FOR STRUCTURAL STEEL

Description. This work shall consist of surface preparation and hot dip galvanizing all structural steel specified on the plans and painting of galvanized structural steel when specified on the plans.

Materials. Fasteners shall be ASTM F 3125, Grade 325, Type 1, High Strength bolts with matching nuts and washers.

Fabrication Requirements. Hot-dip galvanizing shall be indicated on the shop drawings. The fabricator shall coordinate with the galvanizer to incorporate additional steel details required to facilitate galvanizing of the steel. These additional details shall be indicated on the shop drawings.

To insure identification after galvanizing, piece marks shall be supplemented with metal tags for all items where fit-up requires matching specific pieces.

After fabrication (cutting, welding, drilling, etc.) is complete, all holes shall be deburred and all fins, scabs or other surface/edge anomalies shall be ground or repaired per ASTM A6. The items shall then be cleaned per Steel Structures Painting Council's Surface Preparation Specification SSPC-SP1 (Solvent Cleaning) and SSPC-SP6 (Commercial Blast Cleaning). All surfaces shall be inspected to verify no fins, scabs or other similar defects are present.

Added October 28, 2020

The Contractor shall consult with the galvanizer to insure proper removal of grease, paint and other deleterious materials prior to galvanizing.

Surface Preparation and Hot Dip Galvanizing

General. Surfaces of the structural steel specified on the plans shall be prepared and hot dip galvanized as described herein.

Cleaning Structural Steel. If rust, mill scale, dirt, oil, grease or other foreign substances have accumulated prior to galvanizing, steel surfaces shall be cleaned by a combination of caustic cleaning and cleaning according to SSPC-SP8 (Pickling).

Special attention shall be given to the cleaning of corners and reentrant angles.

Surface Preparation. A flux shall be applied to all steel surfaces to be galvanized. Any surfaces which will receive field-installed stud shear connectors or field welds shall not be galvanized within 2 in. (50 mm) of the stud location. Either the entire area receiving studs or just individual stud locations may be left ungalvanized. The following steel surfaces of bearings shall not be galvanized: stainless steel surfaces, surfaces which will be machined (except for fixed bearing sole plates), and surfaces which will have TFE, elastomer, or stainless steel parts bonded to them.

The cleaned surfaces shall be galvanized within 24 hours after cleaning, unless otherwise authorized by the Engineer.

Application of Hot Dip Galvanized Coating. Steel members, fabrications and assemblies shall be galvanized by the hot dip process in the shop according to AASHTO M 111.

Bolts, nuts, and washers shall be galvanized according to ASTM F 2329.

All steel shall be safeguarded against embrittlement according to ASTM A 143. Water quenching or chromate conversion coating shall not be used on any steel work that is to be painted. All galvanized steel work shall be handled in such a manner as to avoid any mechanical damage and to minimize distortion.

Beams and girders shall be handled, stored and transported with their webs vertical and with proper cushioning to prevent damage to the member and coating. Members shall be supported and externally stiffened during galvanizing to prevent permanent distortion.

Hot Dip Galvanized Coating Requirements. Coating weight, surface finish, appearance and adhesion shall conform to requirements of ASTM A 385, ASTM F2329, AASHTO M 111 or AASHTO M 232, as appropriate.

Added October 28, 2020

Any high spots of zinc coating, such as metal drip lines and rough edges, left by the galvanizing operation in areas that are to be field connected or in areas that are to be painted shall be removed by cleaning per SSPC-SP2 (Hand Tool Cleaning) or SSPC-SP3 (Power Tool Cleaning). The zinc shall be removed until it is level with the surrounding area, leaving at least the minimum required zinc thickness.

Shop assemblies producing field splices shall provide 1/8 in. (3 mm) minimum gaps between ends of members to be galvanized. At field splices of beams or girders, galvanizing exceeding 0.08 in. (2 mm) on the cross-sectional (end) face shall be partially removed until it is 0.04 in. to 0.08 in. (1 to 2 mm) thick.

Testing of Hot Dip Galvanized Coating. Inspection and testing of hot dip galvanized coatings shall follow the guidelines provided in the American Galvanizers Association publication "*Inspection of Products Hot Dip Galvanized After Fabrication*". Sampling, inspection, rejection and retesting for conformance with requirements shall be according to AASHTO M 111 or AASHTO M 232, as applicable. Coating thickness shall be measured according to AASHTO M 111, for magnetic thickness gage measurement or AASHTO M 232, as applicable.

All steel shall be visually inspected for finish and appearance.

Bolts, nuts, washers, and steel components shall be packaged according to ASTM F 2329. Identity of bolts, nuts and washers shall be maintained for lot-testing after galvanizing according to Article 505.04(f)(2) for high strength steel bolts.

A notarized certificate of compliance with the requirements listed herein shall be furnished. The certificate shall include a detailed description of the material processed and a statement that the processes used met or exceeded the requirements for successful galvanizing of the surface, where applicable. The certificate shall be signed by the galvanizer.

Repair of Hot Dip Galvanized Coating. Surfaces with inadequate zinc thickness shall be repaired in the shop according to ASTM A 780 and AASHTO M 111.

Surfaces of galvanized steel that are damaged after the galvanizing operation shall be repaired according to ASTM A 780 whenever damage exceeds 3/16 in. (5 mm) in width and/or 4 in. (100 mm) in length. Damage that occurs in the shop shall be repaired in the shop. Damage that occurs during transport or in the field shall be repaired in the field.

Connection Treatment. After galvanizing and prior to shipping, contact surfaces for any bolted connections shall be roughened by hand wire brushing or according to SSPC-SP7 (Brush-Off Blast Cleaning). Power wire brushing is not allowed.

All bolt holes shall be reamed or drilled to their specified diameters after galvanizing. All bolts shall be installed after galvanizing.

Surface Preparation and Painting

Surface Preparation. Galvanized steel surfaces shall be painted except as noted herein and shall be clean and free of oil, grease, and other foreign substances. Surface preparation necessary to provide adequate adhesion of the coating shall be performed according to ASTM D6386. Surface preparation shall include, but not be limited to the following:

- All galvanized steel surfaces that are to be painted shall be cleaned according to SSPC-SP1 (Solvent Cleaning). After cleaning, all chemicals shall be thoroughly rinsed from the surface with a suitable solvent. The steel shall be allowed to completely dry prior to coating application.
- All galvanized steel surfaces that are to be painted shall be checked for the presence of chromate conversion coating according to ASTM D 6386 Appendix X1. Surfaces where chromate conversion coating is found shall be cleaned according to the same appendix and blown down with clean, compressed air according to ASTM D 6386 Section 6.1.
- All galvanized steel surfaces that are to be painted shall be checked for the presence of wet storage stain. Surfaces where wet storage stain is found shall be cleaned, rinsed and completely dried according to ASTM D 6386 Section 6.2.
- Following galvanizing, thickness readings shall verify the acceptable thickness of the galvanizing according to AASHTO M111/ASTM A123.

Paint Requirements. The paint materials (epoxy intermediate coat and aliphatic urethane finish coat) shall meet the requirements of the Articles 1008.05(d) and (e) of the Standard Specification.

All paint materials for the shop and field shall be supplied by the same manufacturer, and samples of components submitted for approval by the Department, before use.

Paint storage, mixing, and application shall be according to Section 506 of the Standard Specifications and the paint manufacturer's written instructions and product data sheets. In the event of a conflict the Contractor shall advise the Engineer and comply with the Engineer's written resolution. Until a resolution is provided, the most restrictive conditions shall apply.

Shop Application of the Paint System. Where application of shop paint is appropriate, the areas to be painted shall receive one full coat of an epoxy intermediate coat and one full coat of an aliphatic urethane finish coat. The film thickness of each coat shall be according to Article 506.09(f)(2).

Construction Requirements. The contact surfaces of floor beam strengthening plates (mating flange faces and areas under splice bolt heads and nuts) shall be free of paint prior to assembly. If white rust is visible on the mating flange surfaces, the steel shall be prepared by hand wire brushing or brush-off blasting according to SSPC-SP7. Power wire brushing is not allowed.

Added October 28, 2020

After field erection, the following areas shall be prepared by cleaning according to SSPC-SP1 (Solvent Cleaning), tie- or wash-coated if applicable, and then painted or touched up with the paint specified for shop application (the intermediate coat and/or the finish coat):

- exposed unpainted areas at bolted connections and field welds
- areas where the shop paint has been damaged or was purposely not painted
- any other unpainted, exposed areas as directed by the Engineer.

Special Instructions. Painting Date/System Code. At the completion of the work, the Contractor shall stencil in contrasting color paint the date of painting the bridge and the paint type code from the Structure Information and Procedure Manual for the system used according to Article 506.10(i). The code designation for galvanizing is "V". If painting of the structural steel is not specified then the word "PAINTED" may be omitted, the month and year shall then correspond to the date the stencil is applied.

Basis of Payment. The cost of all surface preparation, galvanizing, painting and all other work described herein shall be considered as included in the unit price bid for the applicable pay items to be galvanized and painted, according to the Standard Specifications.

Added October 28, 2020

RUBBLE MANAGEMENT PLAN

Description.

In addition to the requirements of STRUCTURAL REPAIR OF CONCRETE in these Special Provisions, these requirements for RUBBLE MANAGEMENT PLAN shall apply for repair of substructures adjacent to railroads.

The Contractor performing STRUCTURAL REPAIR OF CONCRETE at the following piers shall submit a Rubble Management Plan to the Railroad having jurisdiction of the Right of Way immediately adjacent to the pier for approval prior to starting work at these piers. The Railroad having jurisdiction is identified in parenthesis.

Pier D11 (TRRA)	Pier D21 (UPRR)	Pier H1 (UPRR)
Pier D12 (TRRA & UPRR)	Pier D22 (UPRR)	Pier H2 (UPRR)
	Pier P7 (UPRR)	

In addition to the requirements of Section 501, REMOVAL OF EXISTING STRUCTURES, and PROTECTIVE SHIELD in these Special Provisions, these requirements for RUBBLE MANAGEMENT PLAN shall apply for removal of full depth concrete above or immediately adjacent to railroad right of way.

The Contractor performing complete deck removal in the following spans shall submit a Rubble Management Plan to the Railroad having jurisdiction of the right of way for approval prior to starting work within 50 feet of these spans. The Railroad having jurisdiction is identified in parenthesis.

Span D11 (TRRA)	Span D12 (UPRR)	Span D21 (UPRR)
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The Contractor performing deck removal (3 feet each side of joint) as part of joint replacement in the following locations shall submit a Rubble Management Plan to the Railroad having jurisdiction of the right of way for approval prior to starting work within 50 feet of these locations. The Railroad having jurisdiction is identified in parenthesis.

Pier H1 (UPRR)	Pier H2 (UPRR)
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In addition to the requirements of DECK SLAB REPAIR in these Special Provisions, these requirements for RUBBLE MANAGEMENT PLAN shall apply for repair of concrete bridge decks and parapets in the following spans. The Contractor performing deck slab and parapet repair in these locations shall submit a Rubble Management Plan to the Railroad having jurisdiction of the right of way for approval prior to starting work within 50 feet of these locations. The Railroad having jurisdiction is identified in parenthesis.

Added October 28, 2020

Rubble Management Plan.

For Management of Rubble from substructure repair. In addition to the demolition plan submittal requirements of Article 501.02, the Rubble Management Plan shall include the following:

1. Description of Contractors' means and methods for completion of the work at each pier and joint adjacent to railroads. Plan, elevation, and location of the means and methods at each pier where work will be performed. The plans may be used for the submittal provided the Contractors' notes are clearly marked and legible.
2. Indicate position of all railroad tracks adjacent to the work area(s), and location of equipment, personnel, and materials required for the execution of the work.
3. Clearly delineate the proposed vertical and horizontal clearances from all tracks to accommodate the Contractors' means and methods.
4. Details, limits, and locations of protective measures proposed to shield the tracks from debris. This includes any protective shield, at-grade track shield, protective frames, or other measures that will protect the tracks from falling debris or debris that could come into the area around tracks which could affect train operations. Equipment should be on site capable of removing debris and At-Grade Track Shield from operational tracks.
5. All procedures necessary to complete the work in a safe and controlled manner.
6. Daily and final clean-up procedures. The Contractor shall ensure the area immediately adjacent to operational tracks shall remain free from stumble or like hazards to the ground railroad personnel to prevent injuries. All debris and refuse resulting from the work shall be removed from the right of way by the Contractor and the premises left in a neat and presentable condition.

For Management of Rubble from removal of existing concrete deck and concrete removal for joint replacement: In addition to the demolition plan and other submittal requirements of Article 501.02, the Rubble Management Plan shall include the following:

1. Description of Contractors' means and methods for completion of the work for each span located over railroad right of way. Plan, elevation and location of the means and methods in each span where work will be performed including the type(s) of protective measures to be employed. Types of protective measures that may be acceptable for protecting the tracks and right of way from debris accumulation are 1) Protective Shield, 2) a suspended protective frame structure supported by the bridge and positioned outside of the Minimum Limits of Protection for Frame Protection (shown in the plans), 3) an At-Grade Track Protection cover, or 4) a catcher box or loader bucket under where debris is generated. The plans may be used for the submittal provided the Contractors' notes are clearly marked and legible.
2. Indicate position of all railroad tracks below the work, and location of equipment, personnel, and materials required for the execution of the work.
3. Clearly delineate the proposed vertical and horizontal clearances from all tracks to accommodate the Contractors' means and methods.
4. Deck removal sequence and procedures for the entire project, including specific staging and removal procedures for deck concrete removal in spans or at joints located adjacent to railroads.
5. Proposed vertical and horizontal limits from all tracks to the temporary and permanent supports of any protective measures.

Added October 28, 2020

1. Details, limits, and locations of protective measures proposed to shield the tracks from debris. This includes any protective shield, at-grade track shield, protective frames, or other measures that will protect the tracks from falling debris or debris that could come into the area around tracks which could affect train operations. Equipment should be on site capable of removing debris and At-Grade Track Shield from operational tracks.
2. All procedures necessary to complete the work in a safe and controlled manner.
3. Daily and final clean-up procedures. The Contractor shall ensure the area immediately adjacent to operational tracks shall remain free from stumble or like hazards to the ground railroad personnel to prevent injuries. All debris and refuse resulting from the work shall be removed from the right of way by the Contractor and the premises left in a neat and presentable condition.

For Management of Rubble during deck and parapet repair work: The repair work in Span P7 is not expected to include any full depth repair work. There is a possibility that some full depth deck work will be encountered in Span H1. The exact location and scope of any full depth work will not be known until the work is underway. As such, the Contractor shall assume that full depth, localized deck patching may occur at either location. Thus, in addition to the demolition plan and other submittal requirements of Article 501.02, the Rubble Management Plan shall include the following:

1. Description of Contractors' means and methods for completion of the work for each span located over railroad right of way. Plan, elevation and location of the means and methods in each span where work will be performed including the type(s) of protective measures to be employed. Types of protective measures that may be acceptable for protecting the tracks and right of way from debris accumulation are 1) Protective Shield, 2) a suspended protective frame structure supported by the bridge and positioned outside of the Minimum Limits of Protection for Frame Protection (shown in the plans), 3) an At-Grade Track Protection cover, or 4) a catcher box or loader bucket under where debris is generated. The plans may be used for the submittal provided the Contractors' notes are clearly marked and legible.
2. Indicate position of all railroad tracks below the work, and location of equipment, personnel, and materials required for the execution of the work.
3. Clearly delineate the proposed vertical and horizontal clearances from all tracks to accommodate the Contractors' means and methods.
4. Proposed vertical and horizontal limits from all tracks to the temporary and permanent supports of any protective measures.
5. Details, limits, and locations of protective measures proposed to shield the tracks from debris. This includes any protective shield, at-grade track shield, protective frames, or other measures that will protect the tracks from falling debris or debris that could come into the area around tracks which could affect train operations. Equipment should be on site capable of removing debris and At-Grade Track Shield from operational tracks.
6. All procedures necessary to complete the work in a safe and controlled manner.
7. Daily and final clean-up procedures. The Contractor shall ensure the area immediately adjacent to operational tracks shall remain free from stumble or like hazards to the ground railroad personnel to prevent injuries. All debris and refuse resulting from the work shall be removed from the right of way by the Contractor and the premises left in a neat and presentable condition.

Basis of Payment. This work shall not be paid for separately but shall be included in the applicable pay items according to Article 501.07 and STRUCTURAL REPAIR OF CONCRETE, DECK SLAB REPAIR, CONCRETE REMOVAL, and PROTECTIVE SHIELD of these Special Provisions.

Added October 28, 2020