Illinois Department of Transportation
2300 South Dirksen Parkway / Springfield, Illinois / 62764

January 4, 2024

SUBJECT Various Routes
Section D6 BRIDGE REPAIR 2024
Various Counties
Contract No. 72728

Item No. 33, January 1st, 2024Letting
Addendum A

NOTICE TO PROSPECTIVE BIDDERS:

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

1. Revised page i of the Table of Contents of the Special Provisions.
2. Revised pages 7-11 of the Special Provisions.
3. Added pages 15A-15E of the Special Provisions.
4. Revised sheets 5, 10, 16, 21, 25, 29, and 33 of the Plans.

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,

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

MTS

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Each container shall have a label which shall clearly show the manufacturer and brand name of paint, the lot number, the date of manufacturer, and shelf life. The label on the vehicle container shall also include complete instructions for the use of this paint. The container shall be coated, if necessary, to prevent attack by the paint components.

(7) Qualification Samples and Tests-The manufacturer shall supply to an independent test laboratory and to the Department duplicate samples of the aluminum epoxy mastic paint for evaluation. Prior to approval and use, the manufacturer shall submit a notarized certification of the independent laboratory, together with the results of all tests, stating that the materials meet the requirements as set forth herein. The certified test report shall state lot tested, manufacturer's name, product name, and date of manufacture. New certified test results and samples for testing by the department shall be submitted any time the manufacturing process or paint formulation changes. All costs of testing (other that tests conducted by the Department) shall be borne by the manufacturer.

(8) Acceptance Samples and Certification-One quart component samples of each lot of paint produced for use on state or local agency projects shall be submitted to the Department for testing, together with a manufacturers certification. Their certification shall state that the formulation for the lot represented is essentially identical to that used for qualification testing. All acceptance samples shall be taken by a representative of the Illinois Department of Transportation. The aluminum epoxy mastic paint shall not be used until all tests are completed and have met the requirements as set forth herein.

Method of Measurement: Limits of the area to be painted are determined by the exposed reinforcement after the loose concrete has been removed. The limits of the area to be painted and measured for payment shall be 3 inches beyond the exposed reinforcement in all directions.

Basis of Payment: This work shall be paid for at the contract unit price per SQUARE FOOT for CLEANING AND PAINTING EXPOSED REBAR. This shall include all equipment and labor necessary to remove loose concrete.

~~FRP STRENGTHENING~~

~~Effective: May 31, 2007 Revised: February 19, 2021~~

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~~Description: This work shall consist of furnishing and installing fiber-reinforced polymer (FRP) wraps at the locations shown in the plans. The FRP wraps shall be of the size, type, layer, materials, tension, and spacing shown in the plans. The Contractor shall submit drawings of the FRP wrap system showing materials, components, and installation procedures to the Engineer for approval prior to ordering materials and commencing work.~~

~~All other concrete repairs and/or modifications shall be completed prior to performing this work. Concrete placed in areas receiving FRP wraps shall have a maximum moisture content of 4% using a digital moisture meter before wrapping begins unless bond testing shows no detrimental effect for installing prior to obtaining the required moisture content. 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, Contractor, and inspection agency. All submittals, except daily installation data logs, shall be given to the Engineer for review allowing at least 60 days for approval.~~

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~~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.~~
- ~~Tensile properties for the FRP system shall be reported in accordance with ASTM D7565 in units of kips/inch/ply for strength and modulus (stiffness). FRP systems not reporting their design properties in accordance with ASTM D7565 are not allowed.~~
- ~~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. 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.~~

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~~Submittals required of the FRP *system installation Contractor:*~~

- ~~Documentation from the FRP system manufacturer stating the Contractor has been trained to install the FRP system show on the design plans.~~
- ~~List of completed projects by the Contractor where similar FRP system has been implemented, including location, owner, Engineer, and contact numbers associated with each project.~~
- ~~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.~~

~~Material Requirements: The Contractor shall inspect and ensure all materials meet specifications, conform to design plans, and are undamaged upon jobsite arrival. All products shall be delivered to the jobsite 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, unidirectional fiber fabric of the type, size, layer, materials, tension, spacing, and location as specified on the design plans. FRP reinforcement shall meet the requirements as listed below.~~

Minimum FRP Cured Composite Property Requirements

Property	E-Glass Fiber	Carbon Fiber	ASTM Test Method
Prior to testing, laminate samples shall be cured at least 7 days at 70°F then post-cured at 140°F for 48 hours			
Tensile Strength	56 ksi	97 ksi	D3039
Tensile Modulus	3300 ksi	8200 ksi	D3039
Elongation at break	1.7%	1.0%	D3039
Thickness per Layer	0.04 in.	0.02 in.	
Unit Tensile Strength	2.24 k/in/layer	1.94 k/in/layer	D7565
Unit Tensile Modulus	132 k/in/layer	164 k/in/layer	D7565

* Individual layer thickness may not exceed 0.05 in.

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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 will 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.

Construction Requirements: A technical representative from the manufacturer shall be onsite at the start of the installation and for as long as needed to ensure the Contractor is installing the material in accordance with the installation manual. All costs associated with providing a technical representative shall be the responsibility of the Contractor.

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 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 plans, drawings, and references.
(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,
(j) Curing progress of resins including full documentation of curing temperature ramping, final curing temperature, and thickness measurements of protective coating used.
(k) Location and size of FRP debonding or air voids.
(l) Documentation stating installation procedures were followed.

(m) Pull off test results including bond strength, failure mode, and location.
(n) Other general work progress.

Surface Preparation: FRP wraps shall be placed on sound concrete having a maximum moisture content of 4% using a digital moisture meter unless bond testing shows no detrimental effect for installing prior to obtaining the required moisture content. All bond inhibiting and foreign materials, including but not limited to dust, laitance, paint, grease, curing compounds, impregnations, and waxes, shall be removed from the concrete surface by blast cleaning or equivalent mechanical means. All concrete surfaces shall be air blasted and vacuumed clean to a dust-free condition.

All concrete surface irregularities less than 1 inch shall be ground smooth and/or filled with an approved repair mortar. Surface irregularities greater than 1 inch and removed deteriorated concrete shall be repaired using an approved cementitious repair mortar. See Structural Repair of Concrete special provision. All sharp edges shall be ground smooth and flush. All repairs shall be completed in such a manner as to not damage the existing structure.

When wrapping FRP around exterior corners of rectangular cross sections, the corners should be rounded to a minimum of ½" radius. Interior corners shall be smoothed by troweling epoxy mortar into the corners. 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.

All cracks greater than 0.007 in. 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.

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.

Unless otherwise recommended by the manufacturer, 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.

Saturating resin shall be applied uniformly to prepared surfaces. FRP-ply orientation shall not deviate from the orientation shown on the design plans. 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,

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~~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, an area greater than 1 square inch, or defects with any dimension greater than 1 inch within 1 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.~~ 1

~~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 fiber wrap. The cost of the protective coating shall be paid for as acrylic coating.~~

~~Method of Measurement: FRP wraps will be measured for payment in place, and the area computed in square feet based on the surface area measurements of the FRP in each orientational direction. The measured quantity will not be modified for multiple layers of FRP needed as shown in the design plans.~~

~~The areas upon which the protective coat is applied will 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 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 fiber wrap.~~

~~Protective coat will be paid for at the contract unit price per SQUARE YARD for ACRYLIC COATING.~~

APPROACH SLAB REPAIR

Description. This work shall consist of the removal and disposal of all loose and deteriorated concrete and the replacement with new concrete to the original top of approach slab. The work shall be done according to the applicable requirements of Sections 501, 503, and 1020 of the Standard Specifications and this special provision.

All work shall conform to the Deck Slab Repair special provision.

Basis of Payment. Areas removed and replaced up to and including a depth of half the concrete approach thickness will be paid for at the contract unit price per SQUARE YARD for APPROACH SLAB REPAIR (FULL DEPTH).

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FRP STRENGTHENING FOR PPC I-BEAM REPAIRS

Effective: March 14, 2018
Revised: October 30, 2018

Description

This work shall consist of furnishing and installing fiber-reinforced polymer (FRP) wraps at the locations shown in the plans. The FRP strengthening shall be of the size, type, layer, materials, tension, and spacing shown in the plans. The Contractor shall submit drawings of the FRP strengthening system, showing materials, components, and installation procedures to the Engineer for approval prior to ordering materials and commencing work. 1

All other concrete repairs and/or modifications shall be completed prior to performing this work. Concrete placed in areas receiving FRP wraps shall have a maximum moisture content of 4% using a digital moisture meter before wrapping begins unless bond testing shows no detrimental effect for installing prior to obtaining the required moisture content. 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 data 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.
- Tensile properties for the FRP system shall be reported in accordance with ASTM D7565 in units of kips/inch/ply for strength and modulus (stiffness). FRP systems not reporting their design properties in accordance with ASTM D7565 are not allowed.
- 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. 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 to install the FRP system show on the design plans.
- 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.
- 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.

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- List of prior inspections performed by each inspector used on the project.

Material Requirements

The Contractor shall inspect and ensure all materials meet specifications, conform to design 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. 1

FRP shall be high modulus, high strength fiber fabric of the type, size, layer, materials, tension, spacing and location as specified on the design plans. FRP Reinforcement shall meet the requirements as listed below.

Minimum FRP Cured Composite Property Requirements

Property	Carbon Fiber	ASTM Test Method
Prior to testing, laminate samples shall be cured at least 7 days at 70°F then post-cured at 140°F for 48 hours		
Tensile Strength	140 ksi	D3039
Tensile Modulus	11000 ksi	D3039
Elongation at break	1.0%	D3039
Thickness per Layer*	0.035 in.	
Unit Tensile Strength	5.6 k/in/layer	D7565
Unit Tensile Modulus	440 k/in/layer	D7565

* Individual layer thickness may not exceed 0.05 in.

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 will 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.

Construction Requirements

A technical representative from the manufacturer shall be on site at the start of the installation and for as long as needed to insure the contractor is installing the material in accordance with the Installation manual. All costs associated with providing a technical representative shall be the responsibility of the Contractor.

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 plans and 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.

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Surface Preparation:

FRP wraps shall be placed on sound concrete having a maximum moisture content of 4%. All bond inhibiting and foreign materials, including but not limited to dust, laitance, paint, grease, curing compounds, impregnations and waxes, shall be removed from the concrete surface by blast cleaning or equivalent mechanical means. All concrete surfaces shall be air blasted and vacuumed clean to a dust-free condition.

All concrete surface irregularities shall be ground smooth and/or filled with an approved repair technique. See special provision for Precast Prestressed Concrete I-Beam Repair for concrete repair at bottom flanges of beams and for the concrete repair of exposed vertical reinforcement at side faces of beam. All sharp edges shall be ground smooth and flush. All repairs shall be completed in such a manner as to not damage the existing structure.
When wrapping FRP around exterior corners of rectangular cross sections, the corners should be rounded to a minimum of ½" radius. Interior corners shall be smoothed by troweling epoxy mortar into the corners. 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.

All cracks greater than 0.007 in. 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.

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 not deviate from the orientation shown on the design plans. 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. 1

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 maybe 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 fiber wrap. In addition, one layer of protective coating shall also be applied to the exterior vertical surface and bottom surface of the fascia beams in areas where the fiber wrap is not applied. The cost of the protective coating shall be paid for as Acrylic Coating.

Method of Measurement

FRP wraps will be computed for payment in place in square feet based on the surface area measurements of the substrate to be repaired. The measured quantity will not be modified for multiple layers of FRP needed as shown in the design plans.

The areas upon which the protective coat is applied will 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 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.

Protective coat will be paid for at the contract unit price per square yard for ACRYLIC COATING.

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