



# Illinois Department of Transportation

2300 South Dirksen Parkway / Springfield, Illinois / 62764

June 5, 2007

SUBJECT: FAI Route 57 (I-57)  
Section (46-1HB, HBK) I  
Kankakee County  
Contract No. 66699  
Item No. 191, June 15, 2007 Letting  
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 1 of the Schedule of Prices.
2. Revised pages 11 – 16 of the Special Provisions.
3. Revised sheets 3 and 6 – 9 of the Plans.

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

Bidders using computer-generated bids are cautioned to reflect any and all Schedule of Prices changes, if involved, into their computer programs.

Very truly yours,

Eric E. Harm  
Interim Bureau Chief  
Bureau of Design and Environment

A handwritten signature in black ink, appearing to read 'Ted B. Walschleger' with a small 'P.E.' to the right.

By: Ted B. Walschleger, P. E.  
Engineer of Project Management

cc: George F. Ryan, Region 2, District 3; Roger Driskell; R. E. Anderson;  
Estimates; Design & Environment File

TBW:RS:jc



The repaired area shall be removed and replaced, as determined by the Engineer, for nonconformance with original dimensions, surface cracks greater than 0.01 in. (0.25 mm) in width, map cracking with a crack spacing in any direction of 18 in. (0.45 m) or less, voids, or delaminations.

If a nonconforming repair is allowed to remain in place, cracks 0.01 in. (0.25 mm) or less shall be repaired with epoxy according to Section 590. For cracks less than 0.007 in. (2 mm), 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.

The shotcrete crew foreman shall have current American Concrete Institute (ACI) nozzle men certification for vertical wet and overhead wet applications. A copy of the certificate shall be given to the Engineer.

**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.

**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 there is no pay item for temporary shoring or cribbing, the work to design, install, and remove the temporary shoring and cribbing will be paid for according to Article 109.04. The furnishing and installation of supplemental reinforcement bars, mechanical bar splicers, hook bolts, and protective coat will be paid according to Article 109.04.

## **FIBER WRAP**

Effective: May 31, 2007

### 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% 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 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.
- 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. 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.
- Documentation showing that the Contractor is experienced in surface preparation techniques required for the 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 job-site arrival. All products shall be delivered to the job-site in their original, unopened 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 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 Reinforcement Requirements*

	Glass Fiber	Carbon Fiber	
<b>Property</b> 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
<b>Laminate Tensile Strength</b>	3240 lbs/layer	4160 lbs/layer	D3039
<b>Laminate Tensile Modulus</b>	3.5 x 10 <sup>6</sup> psi	9.4 x 10 <sup>6</sup> psi	D3039
<b>Laminate Elongation at break</b>	2.23%	0.98%	D3039

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	Glass Fiber	Carbon Fiber	
<b>Dry Fabric Weight</b> , Minimum, per square yard	27 oz./yd <sup>2</sup>	18 oz./yd <sup>2</sup>	
<b>Percent Laminate Tensile Strength</b> Retained after: 7 days, 100% humidity, 100°F 3,000 hrs exposure to alkali 3,000 hrs exposure to salt water 3,000 hrs exposure at 140°F	90% 90% 90% 90%	90% 90% 90% 90%	
<b>Visual Defects</b>	None	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. Dilution of components will not be permitted and mixing of components shall not be divided into smaller units and shall be mixed using full units only. Mixtures shall be used within its pot life.

*Minimum Requirements for Concrete Primer*

Properties	Minimum Requirement	ASTM Test Method
<b>Tensile Strength</b> , 7 day	3,600 psi	D638
<b>Tensile Modulus</b> , 7 day	6.5 x 10 <sup>5</sup> psi	D638
<b>Elongation at Break</b> , 7 day	1.0%	D638
<b>Flexural Strength</b> , 14 day	6,800 psi	D790
<b>Shear Strength</b> , 14 day	3,600 psi	D732
<b>Heat Deflection Temperature</b>	118°F	D648

*Minimum Requirements for Fabric Saturant*

Properties	Minimum Requirement	ASTM Test Method
<b>Tensile Strength</b>	8,000 psi	D638
<b>Tensile Modulus</b>	250,000 psi	D638
<b>Elongation at Break</b>	3.0%	D638
<b>Flexural Strength</b>	11,500 psi	D790
<b>Flexural Modulus</b>	500,000 psi	D790
<b>Heat Deflection Temperature</b>	120°F	D648

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 during installation of FRP wraps. 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:

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- (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.

#### 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 other appropriate mechanical means. All surface irregularities and deteriorated concrete shall be removed and repaired in such a manner as to not damage the existing structure. See special provision for Structural Repair of Concrete for concrete repair at bottom flanges of beams. See special provision for Polymer Modified Portland Cement Mortar for the concrete repair of exposed vertical reinforcement at side faces of beam. When wrapping FRP around corners of rectangular cross sections, the corners should be rounded to a minimum of ½" radius. 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.

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. Any type of putty used for the FRP system shall follow the manufacturer's recommended thicknesses and sequences. Surface depressions/irregularities shall be filled with a system-compatible epoxy filler or ground smooth using appropriate means prior to the application of any other materials. Allow putty and primer to cure as per manufacturer's requirements before applying the saturating resin or adhesive.

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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. 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.

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 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 and the number of FRP layers shown on 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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## **FINAL CLEANUP**

Upon completion of the work, all surplus material, excavated and useless materials, etc. shall be removed from within the limits of the right of way.

## **CEMENT (BDE)**

Effective: January 1, 2007

Revise Section 1001 of the Standard Specifications to read:

### **“SECTION 1001. CEMENT**

**1001.01 Cement Types.** Cement shall be according to the following.

- (a) Portland Cement. Acceptance of portland cement shall be according to the current Bureau of Materials and Physical Research’s Policy Memorandum, “Portland or Blended Cement Acceptance Procedure for Qualified and Non-Qualified Plants”.

Portland cement shall be according to ASTM C 150, and shall meet the standard physical and chemical requirements. Type I or Type II may be used for cast-in-place, precast, and precast prestressed concrete. Type III may be used according to Article 1020.04, or when approved by the Engineer. All other cements referenced in ASTM C 150 may be used when approved by the Engineer.

The total of all organic processing additions shall be a maximum of 1.0 percent by weight (mass) of the cement and the total of all inorganic processing additions shall be a maximum of 4.0 percent by weight (mass) of the cement. Organic processing additions shall be limited to grinding aids that improve the flowability of cement, reduce pack set, and improve grinding efficiency. Inorganic processing additions shall be limited to granulated blast-furnace slag according to the chemical requirements of AASHTO M 302 and Class C fly ash according to the chemical requirements of AASHTO M 295.

- (b) Portland-Pozzolan Cement. Acceptance of portland-pozzolan cement shall be according to the current Bureau of Materials and Physical Research’s Policy Memorandum, “Portland or Blended Cement Acceptance Procedure for Qualified and Non-Qualified Plants”.

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