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

February 21, 2013

SUBJECT: FAI Route 74/280 (I-74/ I-280)
Project ACNHF-000S(917)
Section (37-2-1)M
Henry County
Contract No. 64G80
Item No. 81, March 8, 2013 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 the Table of Contents to the Special Provisions.
2. Revised pages 4-6 of the Special Provisions.
3. Added pages 112-117 to the Special Provisions.

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,

John D. Baranzelli, P. E.
Acting Engineer of Design and Environment

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

cc: Paul Loete, Region 2, District 2; Mike Renner; D.Carl Puzey; Estimates

MS/ks

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INSERTION CULVERT LINER (SPECIAL)

Description. This work shall consist of the furnishing and installing of reline pipe segments for the partial insertion linings of the existing pipe culverts as shown on the plans, described herein and as directed by the Engineer. The work shall adhere to the BDE Special Provision *Insertion Lining of Culverts (BDE)* and as modified herein.

General. The project consists of two (2) approximately 510-foot long, 168-inch ID combination CMP pipe culverts (SN 037-2008), with an interior section of repaired liner plate pipe, which conveys Mud Creek under FAI 74/280 in Henry County, IL. The maximum depth of fill over the pipes is approximately 50 feet. The interior repaired sections of the culverts have deteriorated and will be relined. The proposed reline pipe shall be capable of being pushed or pulled through the host pipe without damage to the host pipe or the new reline pipe segments. The proposed reline pipes shall also be structurally adequate to carry the existing depth of fill over the pipes and other applied external forces or loads.

Hydraulic Requirements. The reline pipes shall meet the following requirements:

1. The minimum inside diameter of the reline pipes shall be 144 inches.
2. The Manning coefficient value, *n*, of the reline pipe shall not exceed 0.012.
3. The change in flowline elevation from existing to proposed shall be minimized.

Material. The reline pipe shall be galvanized with a smooth polymer coating on the interior wall per AASHTO M 246. Mechanical joint connections need not be an integral part of the liner.

Minimum thickness of the lining shall be based on AASHTO 2012 LRFD Bridge Design Specification Section 12 criteria.

For double walled pipe, the exterior corrugation shall be fabricated from steel coils, which have been hot-dip galvanized per AASHTO M218 specifications. For the interior lining of the pipe, after the metallic coating is applied to the steel coil, the coil shall be polymer coated on both sides of the steel coil per AASHTO M246 specifications.

Submittals. The reline pipe supplier shall submit shop drawings to the Engineer according to Article 105.04 of the Standard Specifications no later than 90 days prior to beginning construction of the insertion lining. No work or ordering of materials for the project shall be done by the Contractor until the submittal has been approved in writing by the Engineer. In addition to shop drawings, calculations for the structural adequacy of the reline pipes for the depth of fill over the pipe and any external applied forces or loads, such as thrust loads or lateral pressure according to AASHTO LRFD Design Standards, shall be also be submitted. All shop drawing and calculation submittals shall be sealed by an Illinois licensed Structural Engineer and shall include all details, dimensions, quantities and cross sections necessary to construct the insertion lining of the two (2) pipe culverts.

The Contractor shall also submit a Work Plan to the Engineer for review and approval that outlines fabrication specifications and fabrication details including pipe insertion methods, joint coupling and bracing details if required. The Work Plan shall also include dewatering and water diversion, necessary construction platforms, haul roads, construction staging areas and restoration of the site upon completion of the insertion lining.

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Construction Requirements. The Contractor shall obtain technical assistance from the supplier prior to and during culvert insertion lining to demonstrate proper construction procedures and shall include any costs related to this technical assistance in the unit price bid for this item.

Any dewatering or water diversion, construction platforms, haul roads or staging areas necessary to assemble and install the culvert liner shall be considered included in this work.

The Contractor shall handle and assemble all elements of the structure in accordance with the manufacturer's instructions, shop drawings or as directed by the Engineer.

Prior to insertion lining, the Contractor shall dewater, inspect, and clean the existing culverts.

The Contractor may push or pull pipe sections into place. It may be necessary to utilize skids or construct a concrete bed in the existing culvert, to facilitate placement of the pipe sections.

Grouting: After the liners have been completely inserted and have been inspected in place by the Engineer, the annular space between the liners and the host pipes shall be grouted according to the BDE Special Provision for *Insertion Lining of Culverts*.

Method of Measurement: This work shall be measured for payment in place in linear feet along the invert centerline of the relined pipe.

Basis of Payment: The work required to install the pipe liners as specified will be paid for at the contract unit price per Foot for INSERTION CULVERT LINER (SPECIAL).

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CONSTRUCTION PLATFORM/CHANNEL EXCAVATION

Channel Excavation work shall be completed and paid for in accordance with Section 203 of the Standard Specifications. The limits of Channel Excavation will be based on the final grading required to reshape the Mud Creek channel shown in the grading plan and channel cross sections included in the plans. Over excavation required by the Contractor's operations to create a construction platform for installation of the pipe liner beyond the limits of the channel excavation shown on the plans will not be measured for payment but shall be considered included in the cost for Insertion Culvert Liner (Special).

DRAINAGE STRUCTURES TO BE CLEANED

Description: This item shall consist of removal of debris from the entire length of each cell of the existing 168" twin culverts to reestablish their full drainage function.

Construction Methods: The entire length of each culvert pipes shall be cleaned to remove all debris, garbage, rock, silt and mud to reestablish its hydraulic characteristics. The culverts shall be cleaned by means of a high-pressure washer (sprayer) or other methods approved by the Resident Engineer. Excess material removed from the pipe shall not be allowed to reenter the creek from the pipes shall be "vacuumed" or removed from the site.

Disposal of Surplus Material: Any excavated material removed from the existing pipe or materials removed as result of the cleaning operations shall be disposed of according to Article 202.03 of the Standard Specifications.

Method of Measurement: The culverts to be cleaned for its entire length and shall be measured per each culvert cleaned, regardless of the length, size or material of the culvert. For multiple cell culverts, each cell will be paid for separately.

Basis of Payment: This work shall be paid for at the contract unit price per Each DRAINAGE STRUCTURE TO BE CLEANED, regardless of the length, size or material. These prices shall include all material, labor, tools, equipment, disposal of surplus material, and incidentals necessary to complete this item of work.

Revised 2-20-13

INSERTION LINING OF CULVERTS (BDE)

Effective: January 1, 2013

"**SECTION 543. INSERTION LINING OF CULVERTS**

543.01 Description. This work shall consist of insertion lining of existing pipe culverts and grouting of the annular space between the existing culvert and the liner.

543.02 Materials. Materials shall be according to the following.

Item	Article/Section
(a) Polyethylene (PE) Solid Wall Pipe with a Smooth Interior (Note 1)	1040.04
(b) Polyethylene (PE) Profile Wall Pipe (Note 1)	1040.04
(c) Reinforced Plastic Mortar (RPM) Pipe (Note 1)	1040.05
(d) Corrugated PVC with a Smooth Interior (Note 1)	1040.03
(e) Corrugated Steel Pipe (Note 1)(Note 3)	1006.01
(f) Steel Casing (Note 1)(Note 4)	1006.05(d)
(g) Grout Mixture (Note 2)	1024.01
(h) Portland Cement Concrete	1020
(i) Controlled Low-Strength Material	1019
(j) Cellular Concrete	1029

Note 1. Insertion linings are specified according to the existing pipe's inside diameter to be lined. Unless the Contractor can demonstrate by calculation that a small cross sectional area is hydraulically equivalent or better, the insertion lining shall provide a minimum of 72 percent of the cross sectional opening of the existing culvert for diameters under 5 ft (1.5 m), 82 percent for culverts between 5 and 10 ft (1.5 and 3 m) in diameter, and 90 percent for culverts greater than 10 ft (3 m) in diameter.

Any of the listed liner materials are permitted if the cross sectional area requirement is met and the liner is structurally adequate to handle the dead and live loads per current AASHTO LRFD Design Standards without the existing culvert taken into consideration.

Note 2. The grout mixture shall be 6.50 hundredweight/cu yd (385 kg/cu m) of portland cement plus fine aggregate and water. Fly ash may replace a maximum of 5.25 hundredweight/cu yd (310 kg/cu m) of the portland cement. The water/cement ratio, according to Article 1020.06, shall not exceed 0.60. An air-entraining admixture shall be used to produce an air content, according to Article 1020.08, of not less than 6.0 percent nor more than 9.0 percent of the volume of the grout. The Contractor shall have the option to use a water-reducing or high range water-reducing admixture.

Note 3. Corrugated metal pipe shall be spiral ribbed or double walled with a smooth interior and shall be polymer coated or Aluminized Steel Type 2.

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Note 4. For pipe diameter 24 in. (600 mm) and less, use 3/8 in. (9.5 mm) minimum wall thickness, and for pipe 36 in. (900 mm) and above use 1/2 in. (13 mm) minimum wall thickness.

CONSTRUCTION REQUIREMENTS

543.03 General. The Contractor shall submit a work plan at least 15 days prior to the start of work, detailing the methods for cleaning and preparing the existing culvert, the method(s) for joining the liner segments, the method for advancing the liner into the existing culvert, the process to fill the annular space and the proposed grout or cellular concrete mix design, and a list of potential corrective actions to address common installation issues that may arise. When applicable the method(s) for reconnecting or perpetuating existing lateral connections shall also be submitted. The Contractor shall verify that the specified liner can be installed and enough room remains to adequately fill the annular space remaining prior to ordering any materials. If a problem is discovered it shall be brought to the attention of the Engineer for resolution before ordering any materials.

Individual liner section lengths shall be planned to have no more than three joints per 50 ft (15 m) of pipe length unless approved by the Engineer.

Existing deformed culvert structures that require ovalled liners shall be lined with initial round solid wall PE pipe modified to an oval shape or elongated corrugated metal pipe.

All obvious cavities outside the existing culvert shall be filled with controlled low-strength material prior to the liner installation or with material placed in conjunction with filling the annular space between the liner and existing culvert.

Prior to commencing the liner installation, all jagged existing culvert edges or other deformities shall be repaired. All foreign material shall be removed from the existing culvert.

Joints shall be watertight and meet a 10.8 psi (74 kPa) laboratory test per ASTM D 3212. A mechanical coupler or male and female joint design shall use a gasket meeting ASTM F 477.

Joints shall have sufficient longitudinal or axial compression strength to withstand a maximum compressive force of 100 lbs/in. (17.5 N/mm) of outside diameter circumference in compression while maintaining joint integrity when tested.

Joints shall have sufficient pull-apart strength to withstand maximum tensile force of 100 lbs/in. (17.5 N/mm) of outside diameter circumference in tension without joint disassembly when tested.

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Joints shall provide sufficient longitudinal or axial strength to preserve liner alignment, prevent separation at the joints, and maintain integrity while pushing or pulling pipe lengths into existing culverts. Joints shall be mechanical, fusion welded, or male and female joint connections. Mechanical or male and female joint connections shall be an integral part of the liner. Alternatively, the mechanical joint, male and female joints, or pipe ends may be heat fused provided that the fusion process meets the requirements of ASTM F 2620 and that the fused connection is water tight, and shall not reduce the inside diameter or enlarge the outside diameter of the liner being joined by 1/4 in. (6 mm).

If a liner is fusion welded, it shall be welded with a continuous weld for the circumference of the liner both inside and outside. The ends of liners that are to be welded or fused shall be at the same ambient temperature ± 5 °F (2.8 °C) and alignment bands shall be utilized. Welding, fusing, or joining shall be performed at all times by an installer trained and certified by either the liner's manufacturer or the welding, fusing, or joining equipment manufacturer. A copy of the welder's, fuser's, or joiner's certificate shall be provided to the Engineer prior to the start of work.

RPM liners or corrugated PVC liners with a smooth interior shall be joined according to the manufacturer's recommendations using joint lubricant. The joining may be accomplished in a jacking pit or other convenient location where the assembled liner can be brought into alignment with the existing culvert bore without damage. The Engineer will approve each joint before each section of liner is inserted.

The insertion may be made by pushing or pulling the assembled liner from either end of the culvert or if the size permits assembling inside the existing culvert. The Engineer may require the liner to have a temporary nose cone or plug to guide the liner past minor obstructions. The insertion operation shall not cause joints to separate nor damage the liner.

After the liner has been completely inserted and has been inspected in place by the Engineer, it shall be cut off 8 in. (200 mm) past the ends of the existing culvert or as otherwise directed by the Engineer. The liner shall be allowed to cool to the temperature of the existing culvert before it is cut off. The entire length of the annular space between the existing culvert and the liner shall be filled with a grout or cellular concrete.

Prior to filling the annular space, the upstream and downstream ends of the annular space shall have concrete bulkheads constructed to contain the grout mixture. The bulkheads shall be constructed with Class SI concrete. Alternative materials for the bulkhead as recommend by the pipe lining manufacturer may be used if approved by the Engineer. The bulkheads shall extend inward a minimum depth of 18 in. (450 mm) from the ends of the culvert. A method of venting through the bulkheads or grouting ports at the crown shall be utilized to allow air to escape when pumping material and to allow verification that the annular space has been filled.

When the grout or cellular concrete is pumped into the annular space, the Contractor shall prevent the floating of the liner. This shall be accomplished by any of the following methods.

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(a) Intermittent Pumping Method. Small amounts of material shall be pumped into the annular space and allowed to harden. This shall continue until the bond between the liner and material is sufficient to resist floating. The remainder of the annular space shall then be filled.

(b) Bracing Method. Braces shall be installed in the annular space to prevent floating of the liner. Only braces which do not damage the liner shall be used. Bracing shall run parallel to the culvert.

(c) Water Fill Method. The liner shall be temporarily filled with water before filling the annular space with grout.

The pumping operation shall completely fill the annular space along the entire length, but shall be performed in a manner that does not distort the liner. The pressure developed in the annular space shall not exceed the liner manufacturer's recommended value. The air temperature at time of placement and for 24 hours thereafter shall be a minimum of 35 °F (2 °C). The temperature of the cellular concrete at point of discharge shall be a minimum of 45 °F (7 °C) and a maximum of 95 °F (35 °C).

The grout or cellular concrete mixture shall have a minimum 28 day compressive strength of 150 psi (1035 kPa). The Engineer will sample the grout or cellular concrete a minimum of once each day for compression strength during production. Mold the grout specimens according to ASTM C 1107, and the cellular concrete according to ASTM C 495. For each test, three 2 in. x 2 in. (50 mm x 50 mm) specimens will be molded for the grout and four 3 in. x 6 in. (75 mm x 150 mm) specimens will be molded for the cellular concrete. The specimens shall be stored in a temperature range of 60 to 80 °F (16 to 27 °C) for the first 24-72 hours, and the Contractor shall provide a field curing box. After this time, the Engineer will transport the specimens to the laboratory for curing and testing. The grout will be tested for compressive strength according to ASTM C 109, and the cellular concrete will be tested for compressive strength according to ASTM C 495.

Upon completion of the pumping operation, all remaining unfilled vent holes including those at both the upstream and downstream ends shall be filled with a nonshrink grout. Only enough water to make a stiff but workable nonshrink grout shall be used. The air temperature at time of placement and for 24 hours thereafter shall be a minimum of 35 °F (2 °C).

543.04 Method of Measurement. This work will be measured for payment in place in feet (meters).

Excavation in rock will be measured for payment according to Article 502.12.

543.05 Basis of Payment. This work will be paid for at the contract unit price per foot (meter) for INSERTION CULVERT LINER for the existing size specified.

Excavation in rock will be paid for according to Article 502.13."

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Revise Section 1040.04(d) of the Standard Specifications to read as follows.

"(d) PE Solid Wall Pipe with a Smooth Interior. The pipe shall be according to ASTM F 714 (DR 32.5) or ASTM F 2720 (SIDR 35), with a minimum cell classification of PE 335434 as defined in ASTM D 3350.

(1) Pipe Culverts. The section properties shall be according to AASHTO's Section 17. The manufacturer shall submit written certification that the material meets AASHTO's Section 17 properties and the resin used to manufacture the pipe meets or exceeds the minimum cell classification requirements.

(2) Insertion Lining. When used for insertion lining of culverts, the pipe liner for pipe diameters up to 63 in. (1600 mm) shall be according to AASHTO M 326.

(3) Oval shaped pipe liners. Standard round size pipe may be ovalled by compression so as to allow liner installation in deformed existing structures to maximize hydraulic capacity. Compression ovalling shall be performed by the pipe supplier at their facility. Compression ovalling will not be permitted in the field or on the construction site. An ovalled liner may not be compressed to a rise/span ratio less than 0.7 unless approved by the Engineer. Ovalled liners shall be strutted in both the horizontal and vertical axis so as to maintain the oval shape when the compressive source is removed. Struts and bracing shall result in a uniform shaped culvert. Struts shall not be removed until the liner has been completely installed and the grout or cellular concrete has fully cured to its minimum compressive strength."

Add the following Section to the Standard Specifications.

"SECTION 1029. CELLULAR CONCRETE

1029.01 Description. This item shall consist of the materials and equipment to manufacture cellular concrete.

1029.02 Materials. Materials shall be according to the following.

Item	Article/Section
(a) Portland Cement	1001
(b) Fly Ash	1010
(c) Water	1002
(d) Fine Aggregate	1003
(e) Concrete Admixtures	1021
(f) Foaming Agent (Note 1)	

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Note 1. The foaming agent shall be according to ASTM C 869. For the foaming agent submittal, a report prepared by the manufacturer showing the product meets ASTM C 869 test requirements shall be provided. The submittal shall also include an infrared spectrophotometer trace no more than five years old. When the infrared spectrophotometer trace is more than seven years old, a new one shall be provided. The Department will maintain an "Approved List of Foaming Agents for Cellular Concrete".

1029.03 Equipment. Equipment shall be according to the following.

Item	Article/Section
(a) Concrete Mixers and Trucks	1103.01
(b) Batching and Weighing Equipment	1103.02
(c) Automatic and Semi-Automatic Batching Equipment	1103.03
(d) Water Supply Equipment	1103.11
(e) Mobile Portland Cement Concrete Plants	1103.04
(f) Foam Generator (Note 1)	
(g) Mobile Site Batch Plants (Note 2)	

Note 1. Foam generating equipment shall be calibrated daily to produce an accurate volume of foam.

Note 2. Mobile site batch plants shall be capable of mixing and pumping cellular concrete, and shall have a minimum 1 cu yd (0.76 cu m) capacity. Mobile site plants shall be calibrated before the start of a project and during the project as necessary."

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