



Illinois Department of Transportation

2300 South Dirksen Parkway / Springfield, Illinois / 62764

April 29, 2010

SUBJECT: FAP Route 317 (US 24)
Section 16 W-2, RS-4; 17 W-1, RS-3
Fulton County
Contract No. 88703
Item No. 106, May 14, 2010 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 pages 43 - 49 of 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,

Scott E. Stitt, P.E.
Acting Engineer of Design and Environment

A handwritten signature in cursive script, appearing to read "Ted B. Walschleger P.E.", with a small "P.E." written in block letters at the end.

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

cc: Joseph E. Crowe, Region 3, District 4; Mike Renner; Estimates

TBW:DB:jc

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 personnel who perform the work shall have current American Concrete Institute (ACI) nozzle men certification for vertical wet and overhead wet applications, except one individual may be in training. This individual shall be adequately supervised by a certified ACI nozzle men as determined by the Engineer. A copy of the nozzle men certificate(s) 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 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.

COLD IP (IN-PLACE) RECYCLE OF BITUMINOUS MATERIALS

1. Description

This work shall consist of pulverizing, crushing, and screening the in situ bituminous materials to the depth and width shown on the plans; an emulsified asphalt binder agent, water, and other additives, if required, will then be incorporated into the pulverized material. This material will then be spread and compacted in accordance with the plans and specifications and as directed by the engineer.

2. Materials

2.1 **Asphalt Emulsion** - The type of asphalt emulsion to be used shall be determined by the mixture design. A representative from the asphalt emulsion supplier will be at the job site at the beginning of the project to monitor the characteristics and performance of the asphalt emulsion. Throughout the job, the representative will be available to check on the project and make adjustments to the asphalt emulsion formulation as required.

2.2 **Cold Pulverized Material** -The cold pulverized material shall meet the following gradation requirement prior to the addition of the asphalt emulsion.

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STANDARD		METRIC	
Sieve Size	%Passing	Sieve Size	%Passing
1.25" (or 1.00")	100	31.5mm (or 25.4mm)	100

Note: the 100% passing the 1.00" Sieve Size is optional, and only to be used when a finer gradation of RAP is required.

The compacted product shall be placed at a thickness of a minimum of two (2) times the nominal size of crushed millings or 2.5 inches, whichever is greater, and to a maximum of 5 inches.

- 2.3 **Mixture Design** - A preconstruction mix design shall be submitted by the Cold In-Place Recycling contractor tested in accordance with Appendix 1 using materials obtained directly from the project site. Based on cores taken before the project, more than one mix design may be required. The job mix formula shall meet the criteria of Table 1 and be approved by the Engineer. Refer to Appendix 1 - Mix Design Procedures for COLD IP RECYCLE OF BITUMINOUS MATERIALS.

Table 1		
<i>100 mm specimens shall be prepared in a Superpave Gyrotory compactor. The mixture should meet the following criteria at the selected design asphalt emulsion content:</i>		
Property	Criteria	Purpose
<i>Compaction effort, Superpave Gyrotory Compactor</i>	<i>1.25° angle, 600 kPa stress, 30 gyrations</i>	<i>Density Indicator</i>
<i>Density, ASTM D 2726 or equivalent</i>	<i>Report</i>	<i>Compaction Indicator</i>
<i>Gradation for Design Millings, ASTM C117</i>	<i>Report</i>	
<i>Marshall stability*, ASTM D 1559 Part 5, 40°C</i>	<i>1,250 lb min.</i>	<i>Stability Indicator</i>
<i>Retained stability based on cured stability **</i>	<i>70 % min.</i>	<i>Ability to withstand moisture damage</i>
<i>Indirect Tensile Test, AASHTO T-322, Modified in Appendix 2</i>	<i>See Note in Appendix 2</i>	<i>Cracking (Thermal)</i>
<i>Raveling Test, 4 hour cure @ 10°C and 50% humidity, ASTM D7196 or Appendix 3</i>	<i>2% max.</i>	<i>Raveling Resistance</i>
<i>* Cured stability tested on compacted specimens after 60°C (140°F) curing to constant weight.</i>		
<i>**Vacuum saturation of 55 to 75 percent, water bath 25°C 23 hours, last hour at 40°C water bath</i>		

- 2.4 **Other Additives** – If necessary, additives may be used to meet the requirements in Table 1. In the case that an additive is used, the type and allowable usage percentage must be described in the submitted design recommendation.
- 2.5 **Addition of crushed Reclaimed Asphalt Pavement (RAP) material** - If available, RAP material may be added at the discretion of the Engineer if the RAP material meets the requirements in Table 2.

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The crushed RAP shall be free from vegetation and all other deleterious materials, including silt and clay balls. It shall meet the requirements for Deleterious Materials given in Table 2. The crushed RAP shall not exceed the maximum size requirement in Section 2.2, and when blended with the design millings shall produce a product which meets the specifications given in Table 1.

Table 2. Additional Crushed RAP		
Tests	Method	Limit
Deleterious Materials: Clay Lumps and Friable Particles in Aggregate, % max	ASTM C 142 or AASHTO T112	0.2 recommended
Maximum size, 100% Passing, Sieve Size	ASTM C 136 or AASHTO T 27	Section 2.2

2.6 **Additional aggregate** - Based on the results of the mix design or other requirements, the Contractor shall determine if additional aggregate is required. Any additional aggregate shall meet the requirements in Table 3, and it shall be graded to produce a product which meets the specification given in Table 1.

Table 3. Additional Aggregate		
Tests	Method	Limit
Los Angeles abrasion value, % loss	AASHTO T 96	40 max for Surface mix 50 max for Base mix
Sand Equivalent,%	ASTM D-2419	60 minimum
Maximum size, 100% Passing, Sieve Size	ASTM C 136 or AASHTO T 27	Section 2.2
Water absorption %	AASHTO T 85	5 max.

3. **Equipment**

The cold in-place recycling shall be completed with the following required equipment.

- 3.1 A self-propelled cold milling machine that is capable of pulverizing the existing bituminous material in a single pass to the depth shown on the plans and to a minimum width of not less than 12.5 feet (3.8 m). The machine shall have automatic depth controls to maintain the cutting depth to within $\pm \frac{1}{4}$ in (6 mm) of that shown on the plans, and shall have a positive means for controlling cross slope elevations. The use of a heating device to soften the pavement will not be permitted.
- 3.2 A material sizing unit having screening and crushing capabilities to reduce the pulverized bituminous material to the size required by Section 2.2 prior to mixing with asphalt emulsion. The screening and crushing unit shall have a closed circuit system capable of continuously returning oversized material to the crusher. All of the reclaimed asphalt pavement (100%) shall be processed to the maximum size requirements as specified.
- 3.3 A mixing unit equipped with a belt scale for the continuous weighing of the pulverized and sized bituminous material and a coupled/interlocked computer controlled liquid metering device.

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The mixing unit shall be an on-board completely self-contained pugmill. The liquid metering device shall be capable of automatically adjusting the flow of asphalt emulsion to compensate for any variation in the weight of pulverized material coming into the mixer. The metering device shall deliver the amount of asphalt emulsion to within ± 0.2 percent of the required amount by weight of pulverized bituminous material (for example, if the design requires 3.0 percent, the metering device shall maintain between 2.8 percent to 3.2 percent). The asphalt emulsion pump should be of sufficient capacity to allow emulsion contents up to 3.5% by weight of pulverized bituminous material. Also, automatic digital readings will be displayed for both the flow rate and total amount of pulverized bituminous material and asphalt emulsion in appropriate units of weight and time.

- 3.4 A pick-up machine may be used for transferring the recycled material from the windrow to the receiving hopper of the bituminous paver. The pick-up machine shall be capable of removing the entire windrow down to the remaining underlying material.
- 3.5 A self-propelled conventional bituminous paver having electronic grade and cross slope control for the screed. The equipment shall be of sufficient size and power to spread and lay the mixture in one smooth continuous pass to the specified section and according to the plans.
- 3.6 Alternatively to the equipment listed in Sections 3.3, 3.4, and 3.5, a self-propelled paver with on-board pugmill and emulsion tank can be used. Millings must be added directly to the hopper. The paver shall be equipped with a belt scale for the continuous weighing of the pulverized and sized bituminous material and a coupled/interlocked computer controlled liquid metering device. The mixing unit shall be an on-board completely self-contained pugmill. The liquid metering device shall be capable of automatically adjusting the flow of asphalt emulsion to compensate for any variation in the weight of pulverized material coming into the mixer. The metering device shall deliver the amount of asphalt emulsion to within ± 0.2 percent of the required amount by weight of pulverized bituminous material (for example, if the design requires 3.0 percent, the metering device shall maintain between 2.8 percent to 3.2 percent). Also, automatic digital readings will be displayed for both the flow rate and total amount of pulverized bituminous material and asphalt emulsion in appropriate units of weight and time.
- 3.7 **Alternatively to the equipment listed in Sections 3.1, 3.2, 3.3, and 3.6, a self-propelled cold milling machine/cold recycling machine with a down cutting cutter head shall be capable of pulverizing and recycling the existing hot-mix asphalt pavement to a maximum depth of 5 inches (0.12m), incorporate the asphalt emulsion and water, and mix the materials to produce a homogeneous material. The recommended minimum power of this machine is 900 hp. The machine shall be capable of pulverizing and recycling not less than 11'-6" (3.63 m) wide in each pass. The machine shall have two systems for adding asphalt emulsion and water with each system having a full width spray bar with a positive displacement pump interlocked to the machine's ground speed to insure that the amount of asphalt emulsion and water being added is automatically adjusted with changes to the machine's ground speed. Each additive system shall have its own spray bar equipped with 2 nozzles per foot of spray bar and be capable of incorporating up to 7 gallons per square yard of asphalt emulsion and/or water. Individual valves on the spray bar shall be capable of being turned off as necessary to minimize emulsion and water overlap on subsequent passes.**

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When the Engineer determines the location for a gradation sample, the contractor will be notified to turn off the asphalt emulsion and mark the location continuing to pulverize the hot-mix asphalt pavement until the Engineer is satisfied with the length of material pulverized without the addition of the asphalt emulsion. The maximum length of pulverization without the addition of the asphalt emulsion shall not exceed 100 feet. After the Engineer collects the gradation sample, the machine will be backed up to the location where the asphalt emulsion was turned off then re-pulverize this material adding the required amount of asphalt emulsion to the pulverized material.

- 3.8 Any additives such as water, lime slurry, etc. added by the equipment in sections 3.1-3.7 at the mill head or mixing unit shall be controlled through liquid metering devices capable of automatically adjusting for the variation in the weight of the pulverized material going into the mixing unit. The metering devices shall be capable of delivering the amount of additive to within +/- 0.2 percent of the required amount by weight of the pulverized bituminous material. A capability of adding up to 5% water by weight of the pulverized bituminous material, if necessary based on environmental and material requirements, is mandatory. It will not be required to meter the water added at the milling machine to control dust in the screens, belts, or crusher/material sizing unit.
- 3.9 All rollers shall be self-propelled. The number, weight and types of rollers shall be as necessary to obtain the required compaction. At least one pneumatic roller shall have a minimum gross operating weight of not less than 50,000 lbs. (22,600 kg). Pneumatic rollers must have properly working scrapers and water spraying systems. At least one double drum vibratory roller shall have a gross operating weight of not less than 20,000 lbs. (9,000 kg) and a width of 78 inches (1980 mm). Double drum vibratory rollers must have properly working scrapers and water spraying systems.
- 3.10 A self-propelled power broom for removal of loose particles and other materials from the cold in-place recycled surface. The broom shall have positive control on the downward pressure applied to the surface.

4. Construction Methods

- 4.1 Grass and other vegetation shall be removed from the edge of the existing pavement to prevent contamination of the pulverized bituminous material during the milling operation.
- 4.2 The existing pavement shall be milled to the required depth and width as indicated on the plans. Recycling shall be in a manner that does not disturb the underlying material in the existing roadway. The milling operation shall be conducted so that the amount of fines occurring along the vertical faces of the cut will not prevent bonding of the cold recycled materials. The pulverized bituminous material shall be processed by screening and crushing to the required gradation specified in Section 2.2. When a paving fabric is encountered during the cold in-place recycling operation, the Contractor shall make the necessary adjustments in equipment or operations so that at least ninety percent (90%) of the shredded fabric in the recycled material is no more than 5 in² (3200 mm²). Additionally, no fabric piece shall have any dimension exceeding a length of 4 inches (100 mm). These changes may include, but not be limited to, adjusting the milling rate and adding or removing screens in order to obtain a specification recycled material. The Contractor shall be required to waste material containing over-sized pieces of paving fabric as directed by the Engineer. When the Contractor is aware that paving fabric exists, such as indicated on the plans, the Contractor will not receive additional payment.

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However, if the Contractor is not made aware of the paving fabric, than the Contractor shall receive additional payment for any necessary adjustments in equipment and operations.

- 4.3 The recycled material shall be produced through a mixing unit capable of processing the pulverized material, asphalt emulsion and any additives to a homogeneous mixture. The asphalt emulsion shall be incorporated into the pulverized bituminous material at the initial rate determined by the mix design(s) and approved by the Engineer. Sampling and mix design may determine different levels of asphalt emulsion at various portions of the project.
- 4.4 **The material shall be spread using a self-propelled paver meeting the requirements of Article 1102.03 of the Standard Specifications or either paver in Sections 3.5 or 3.6. Heating of the paver screed will not be permitted. A pick-up machine may be used to transfer the windrowed material into the paver hopper if using a conventional paver as listed in Sections 3.4 and 3.5. The pickup machine must be within 150 feet (45 m) of the mixing unit described in Section 4.4. The recycled material shall be spread in one continuous pass, without segregation and to the lines and grades established by the Engineer.**
- 4.5 **Compacting of the recycled mix shall be completed using rollers meeting the requirements of Section 3.9. Rolling patterns shall be established to achieve a maximum density determined by nuclear density testing. Rolling shall be continued until no displacement is occurring or until the pneumatic roller(s) is (are) walking out of the mixture. Final rolling to eliminate pneumatic tire marks and to achieve density shall be done by double drum steel roller(s), either operating in a static or vibratory mode. Vibratory mode should only be used if it is shown to not damage the pavement. The selected rolling pattern shall be followed unless changes in the recycled mix or placement conditions occur and a new rolling pattern is established at that time. Rolling or roller patterns shall change when major displacement and/or cracking of the recycled material is occurring. Rolling shall start no more than 30 minutes behind the paver. Finish rolling shall be completed no more than one hour after milling is completed. When possible, rolling shall not be started or stopped on uncompacted material but with rolling patterns established so that they begin or end on previously compacted material or the existing pavement.**
- 4.6 After the completion of compaction of the recycled material, no traffic, including that of the contractor, shall be permitted on the completed recycled material for at least two (2) hours. After two hours rolling traffic may be permitted on the recycled material. This time may be adjusted by the Engineer to allow establishment of sufficient cure so traffic will not initiate raveling. After opening to traffic, the surface of the recycled pavement shall be maintained in a condition suitable for the safe movement of traffic. All loose particles that may develop on the pavement surface shall be removed by power brooming.
- 4.7 Any damage to the completed cold in-place recycled bituminous material shall be repaired by the Contractor prior to the placement of the hot mix asphalt binder course as directed by the Engineer. Damage unrelated to Contractor construction procedures or quality of work, such as due to poor base conditions, shall be paid for according to Article 109.04 of the Standard Specifications.

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- 4.8 The completed cold recycled material surface shall not vary more than ¼ in (6 mm) from the lower edge of a 10-foot (3-meter) straight edge placed on the surface parallel and transversely to the centerline.
- 4.9 Before placing the hot mix asphalt binder course, the cold in-place recycled bituminous material shall be allowed to cure until the moisture of the material is reduced to 2.0 percent or less, or approval of the Engineer. Under dry conditions the cold in-place recycling should meet the moisture requirements within 48 hours. The Contractor shall place one lift of hot-mix asphalt binder course on the cold in-place recycled bituminous material within four (4) calendar days of the cold in-place recycled bituminous material meeting the moisture requirement as determined by the Engineer.

5. Quality Assurance/ Quality Control

The Department shall be responsible for quality assurance of the materials and cold recycling process. The Department may choose to test, or to delegate to the Contractor or supplier, prior to bidding, the schedule of testing to be completed on the items listed below:

- 5.1 **Pulverized Bituminous Material Sizing** - A sample shall be obtained each ½ mile (0.8 km) before emulsion addition and screened using a 1.25 in. (31.5mm) sieve (or smaller sieve if required) to determine if meeting the maximum particle size requirement. Additionally, two gradations shall be performed each day on the moist millings using the following sieves: 1.25 inch, 1.0 inch, ¾ inch, ½ inch, 3/8 inch, No.4, No.8, No.16, and No.30. The resulting gradation shall be compared to the mix design gradations to determine any necessary changes to emulsion content. Sampling procedures shall generally be in accordance with ASTM D979 or AASHTO T168. The testing schedule to meet these requirements shall also be at the discretion of the Engineer.
- 5.2 **Asphalt Emulsion** – The asphalt emulsion shall be received on the job site at a temperature no greater than 120°F. The sampling rate shall be determined by the Department. Samples shall be obtained from the shipping trailers prior to unloading into the Contractor's storage units. The testing shall meet the following requirements:

Test		Minimum	Maximum
Residue from distillation, %	ASTM D244 ¹	64.0	66.0
Oil distillate by distillation, %	ASTM D244 ¹		0.5
Sieve Test, %	ASTM D244 ¹		0.1
Penetration (TBD ²), 25°C, dmm	ASTM D5	-25%	+25%

¹ Modified ASTM D244 procedure – distillation temperature of 177°C with a 20 minute hold. The ASTM D244 vacuum distillation procedure may be substituted once the maximum oil distillate is satisfied.

² TBD – to be determined by the cold in-place recycle design prior to emulsion manufacture for project. Penetration range will be determined on the design requirements for the project and will be submitted to the Engineer for approval prior to project start.

- 5.3 **Asphalt Emulsion Content** – Emulsion content shall be checked and recorded for each segment in which the percentage is changed. Emulsion content changes shall be made based upon mix design recommendations, which are based upon different mix designs for road segments of varying construction. Asphalt emulsion content can be checked from the belt scale totalizer and asphalt pump totalizer.

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