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

February 29, 2019

SUBJECT: FAU Route 3785 (Archer Ave.)
Project STP-4IGF(401)
Section 2018-106-I
Cook County
Contract No. 62H41
Item No. 34, March 8, 2019 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 Schedule of Prices
2. Revised the Table of Contents of the Special Provisions
3. Revised pages 49-54 of the Special Provisons
4. Revised sheets 1-13 of the plans
5. Added sheet 13A to 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

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

MS/al

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ULTRA-THIN BONDED WEARING COURSE (BR)

Effective: July 25, 2006
Revised: February 22, 2019

Description. This work shall consist of constructing an ultra-thin bonded wearing course on existing hot-mix asphalt (HMA) or portland cement concrete pavement. An ultra-thin bonded wearing course consists of an application of a rapid setting polymer modified emulsion followed immediately with an ultra-thin HMA surface course. This work shall be according to Section 406 of the Standard Specifications, except as modified herein.

Materials. Materials shall be according to the following.

Item	Article/Section
(a) Fine Aggregate	1003.03
(b) Coarse Aggregate (Note 1)	1004
(c) Performance Graded Asphalt Binder (Note 2)	1032
(d) Mineral Filler	1011
(e) Rapid Setting Polymer Modified Emulsion (Note 3)	

Note 1. The coarse aggregate material shall be selected from the table in Article 1004.03(a) based upon the friction aggregate mixture specified.

Note 2. The bituminous material shall conform to Article 1032.05 of the Standard Specifications for an SBR or SBS PG 70-22.

Note 3. The supplier shall certify that the rapid setting polymer modified emulsion meets the following requirements, prior to the start of mix production.

Tests on Emulsion	Method	Min.	Max.
Viscosity, Saybolt Furol @ 77 °F (25 °C), SFS	AASHTO T59	20	100
Storage Stability Test, 24 hr, % 1/	AASHTO T59	--	1
Sieve Test, retained on #20 (850 µm) sieve, %	AASHTO T59	--	0.1
Residue by Distillation, % 2/	AASHTO T59	63	
Oil Distillate by Volume, %	AASHTO T59	--	2
Demulsibilty, % 35 ml, 0.02 N $CaCl_2$ or 35 ml, 0.8% dioctyl sodium sulfosuccinate	AASHTO T59	60	--

Tests on Residue From Distillation	Method	Min.	Max.
Penetration @ 77 °F (25 °C), 100 g, 5 sec, dmm	AASHTO T49	60	150
Elastic Recovery @ 39 °F (4 °C), %	AASHTO T301	60	--

1/ After standing undisturbed for 24 hours, the surface shall show no white, milky colored substance, but shall be a smooth homogeneous color throughout. The material may be released prior to completion of the test based on approval of the Department.

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2/ AASHTO T59 with modifications to include a 375 °F ± 10 °F (190 °C ± 5 °C) maximum temperature to be held for a period of 15 minutes.

Equipment. Equipment shall be according to the following.

Item	Article/Section
(a) Tandem Roller (Note 1)	1101.01
(b) Hot-Mix Asphalt Plant	1102.01
(c) Spreading and Finishing Machine (Note 2)	1102.03
(d) Heating Equipment	1102.07

Note 1. A minimum of two tandem rollers (T_B), operating in the static mode, sufficient to match paving production will be required. The rollers shall have a properly operating water spray and scraper system.

Note 2. The spreading and finishing machine shall be capable of spraying the rapid setting polymer modified emulsion, applying the surface course, and providing a smooth surface to the mat in one pass at the rate of 30 ft/min (9 m/min) or greater. The surface course shall be spread over the rapid setting polymer modified emulsion in less than five seconds after the application of the rapid setting polymer modified emulsion during normal paving speeds. No wheel or other part of the paving machine shall come in contact with the rapid setting polymer modified emulsion before the surface course is applied. The self-priming paving machine shall also have the following:

(1) a receiving hopper with a minimum of two heated twin screw feed augers,

(2) an integral storage tank for rapid setting polymer modified emulsion,

(3) integral twin expandable emulsion spray bars located immediately in front of the asphalt spread augers and ironing screed,

(4) variable width vibratory heated ironing type screed. The screed shall have the ability to be crowned at the center both positively and negatively and have vertically adjustable extensions to accommodate the desired pavement profile.

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Mixture. A mix design meeting the following design criteria shall be supplied.

SIEVES	#4 – Type A		3/8 in. - Type B		1/2 in. - Type C	
ASTM	Design General Limits, % Passing	Production Tolerance, %	Design General Limits, % Passing	Production Tolerance, %	Design General Limits, % Passing	Production Tolerance, %
3/4 in.	--	--	--	--	100	--
1/2 in.	--	--	100	--	85 - 100	--
3/8 in.	100	±5	85 - 100	±5	60 - 80	±5
#4	40 - 55	±5	24 - 41	±5	24 - 41	±5
#8	22 - 32	±5	19 - 32	±5	19 - 32	±5
#16	15 - 25	--	12 - 22	--	12 - 22	--
#30	10 - 18	--	9 - 16	--	9 - 16	--
#50	8 - 13	--	7 - 13	--	7 - 13	--
#100	6 - 10	--	5 - 10	--	5 - 10	--
#200	4 - 5.5	±1.5	4 - 5.5	±1.5	4 - 5.5	±1.5
Asphalt Content	4.8 - 6.2	±0.3	4.8 - 6.2	±0.3	4.6 - 6.2	±0.3

SIEVES	4.75 mm - Type A		9.5 mm - Type B		12.5 mm - Type C	
ASTM	Design General Limits, % Passing	Production Tolerance, %	Design General Limits, % Passing	Production Tolerance, %	Design General Limits, % Passing	Production Tolerance, %
19 mm	--	--	--	--	100	--
12.5 mm	--	--	100	--	85 - 100	--
9.5 mm	100	±5	85 - 100	±5	60 - 80	±5
4.75 mm	40 - 55	±5	24 - 41	±5	24 - 41	±5
2.36 mm	22 - 32	±5	19 - 32	±5	19 - 32	±5
1.18 mm	15 - 25	--	12 - 22	--	12 - 22	--
600 µm	10 - 18	--	9 - 16	--	9 - 16	--
300 µm	8 - 13	--	7 - 13	--	7 - 13	--
150 µm	6 - 10	--	5 - 10	--	5 - 10	--
75 µm	4 - 5.5	±1.5	4 - 5.5	±1.5	4 - 5.5	±1.5
Asphalt Content	4.8 - 6.2	±0.3	4.8 - 6.2	±0.3	4.6 - 6.2	±0.3

The film thickness of the asphalt coating on the rock shall be a minimum of 0.35 mils (9 µm) when calculated using the effective asphalt content in conjunction with the surface area for the aggregates in the job mix formula according to the following method.

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Formula: $T_F = \frac{V_{asp}}{\sum[(SA_i)(W_i)]}$

Where: T_F = Average film thickness, in. (microns)
V_{asp} = Effective volume of asphalt cement, cu in. (cu cm)
SA = Surface Area Factor, sq ft/lb of aggregate (sq m/kg of aggregate)
W = Weight of aggregate retained on sieve, lb (kg)
i = Particular sieve

Surface area factors:

Sieve size	Surface Area (SA) Factors, sq ft/lb (sq m/kg)
Percent passing maximum sieve size	2 (0.41)
1/2 in. (12.5 mm)	2 (0.41)
3/8 in. (9.5 mm)	2 (0.41)
No. 4 (4.75 mm)	2 (0.41)
No. 8 (2.36 mm)	4 (0.82)
No. 16 (1.18 mm)	8 (1.64)
No. 30 (600 µm)	14 (2.87)
No. 50 (300 µm)	30 (6.14)
No. 100 (150 µm)	60 (12.29)
No. 200 (75 µm)	160 (32.77)

The mixing and compaction temperatures shall be according to Illinois Modified AASHTO T 312.

Draindown from the loose mixture shall not exceed 0.10 percent when tested according to Illinois Modified AASHTO T 305. The draindown shall be tested at the job mix formula asphalt content plus 0.5 percent. The temperature shall be the mixing temperature plus 59 ºF (15 ºC). The temperature shall not exceed 350 ºF (180 ºC).

The mixture designer shall determine if an additive is needed in the mix to prevent stripping according to Article 1030.04(c).

The mixture shall not contain reclaimed materials.

CONSTRUCTION REQUIREMENTS

General. Article 406.06(b) of the Standard Specifications shall apply, except the mixture shall only be placed when the pavement and ambient air temperature are at least 50 ºF (10 ºC) at the time of placement and the forecast is for rising temperatures.

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Preparation of Existing Surfaces. Prior to placing the ultra-thin bonded wearing course, the surface of the existing pavement shall be cleaned using a mechanical or vacuum sweeper.

Longitudinal and transverse joints and cracks 1/4 in. (6 mm) and wider shall be sealed using an approved polymer modified joint filler material. Overbanding shall be avoided.

Preparation of Mineral Aggregates. The aggregates shall be heated in such a manner as to assure that the mixing temperature is uniformly maintained. The aggregates shall be dried to less than 0.3 percent residual moisture by weight. This may require the aggregate to be processed twice through the drier.

Mix Formula. The proportions of the mix shall be within the following compositions limits by weight:

Aggregate..... 93.8 - 95.4%
Asphalt Binder (Note 1) ..... 4.6 - 6.2%

Note 1. The range of asphalt content is based on the varying physical properties of the coarse aggregate that can be used for the manufacture of ultra-thin bonded wearing course. The amount of anti-stripping agent will not be included in this percentage.

Placement of Emulsion and Surface Course. The rapid setting polymer modified emulsion shall be spray applied immediately prior to the application of the surface course so that no wheel or other part of the paving machine shall come in contact with the rapid setting polymer modified emulsion before the surface course is applied. The process of spreading the rapid setting polymer modified emulsion, spreading the surface course, and screed compacting shall be performed in under five seconds during normal paving speeds resulting in a homogeneous surface course that can be opened to traffic when the surface temperature of the mat is 160 ºF (70 ºC) or less.

(a) The rapid setting polymer modified emulsion shall be sprayed by a metered mechanical pressure spray bar at a temperature of 120 - 180 ºF (50 - 80 ºC). The sprayer shall accurately and continuously monitor the rate of spray and provide a uniform application across the entire width to be overlaid. The rate of application shall be determined by the mix design according to the following method.

(1) Summary of method. The quantity of polymer modified emulsion to be applied shall be calculated based on the volumetrics of laboratory specimens and the nominal maximum aggregate size of the mix. The in-place air voids of the mixture shall be filled to 70 percent of the height of the nominal maximum aggregate size.

(2) Determination of In-Place Air Voids. Two 6-in. (150-mm) specimens shall be prepared according to AASHTO T 312 to 80 gyrations. The percent air voids shall be determined according to AASHTO T 269. The air void determination shall be the average of the two specimens. 2.5 percent air voids shall be added to the lab determined air voids to approximate in-place air voids.

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(3) Calculation. Calculate the volume of 1 sq yd (1 sq m) of mix at a depth of 70 percent of the nominal maximum aggregate size. Multiply the volume of mix at the 70 percent height of the maximum aggregate size times the percent of in-place air voids as determined by the specimen previous section. Convert the volume to gal (L). Express the result in gal/sq yd (L/sq m).

The Engineer will make field adjustments to the calculated application rate no greater than ± 0.05 gal/sq yd (± 0.25 L/sq m) based on the existing surface condition. Once the target application rate is established, the tolerance shall be ± 0.01 gal/sq yd (± 0.05 L/sq m).

(b) The maximum speed of the paver shall not be limited.

Compaction. Compaction shall consist of each area of the mat receiving a minimum of two passes with a tandem roller, before the material temperature has fallen below 180 °F (80 °C).

Quality Control/Quality Assurance. Material testing shall be according to Article 1030.05, except the following tests will not be required.

(a) Bituminous Core Density
(b) Nuclear Density
(c) G_{mm} and G_{mb} testing

Additionally, the Contractor shall have a representative present during construction that is familiar with the lay down of product and its design methods.

Method of Measurement. The rapid setting polymer modified emulsion will be measured for payment as specified in Section 1032.

The ultra-thin HMA surface course will be measured in place and the area computed in square yards (square meters). The measured width shall not exceed that shown on the plans.

Basis of Payment. The rapid setting polymer modified emulsion will be paid for at the contract unit price per pound (kilogram) of residual asphalt for RAPID SETTING POLYMER MODIFIED EMULSION.

The ultra-thin HMA surface course will be paid for at the contract unit price per square yard (square meter) for ULTRA-THIN HMA SURFACE COURSE, of the mixture type and friction aggregate mixture specified.

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