INDIANA DEPARTMENT OF TRANSPORTATION

STANDARDS COMMITTEE MEETING

Driving Indiana's Economic Growth

FINAL AGENDA

May 8, 2008

MEMORANDUM

TO: Standards Committee

FROM: Mike Milligan, Secretary

RE: Agenda for the May 15, 2008 Standards Committee Meeting

A Standards Committee meeting is scheduled for 9:00 a.m. on May 15, 2008 in the N755 Bay Window Conference Room. Please enter the meeting through the double doors directly in front of the conference room. The following agenda items are listed for consideration.

Page No.

A. GENERAL BUSINESS ITEMS

OLD BUSINESS

(No items on this agenda)

NEW BUSINESS

1. Approval of April 17, 2008 Minutes

B. CONCEPTUAL PROPOSAL ITEMS

OLD BUSINESS

(No items on this agenda)

NEW BUSINESS

1. 703 Epoxy Coated Reinforcing Bars 3

2. Changes to 707 & 711 Fabrication Requirements 4

3. 725 Slip Lining of Existing Pipe 5

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C. RECURRING SPECIAL PROVISIONS PROPOSED ITEMS

(No items on this agenda)

D. STANDARD SPECIFICATIONS AND STANDARD DRAWINGS PROPOSED ITEMS

OLD BUSINESS

(No items on this agenda)

NEW BUSINESS

Item No.	Sponsor	Page No.
Item 08-10-1 ***(NEW)***	Mr. Walker	17
401	QUALITY CONTROL/QUALITY ASSURANCE, QC/QA, HOT MIX ASPHALT, HMA, PAVEMENT	
Item 08-10-2 ***(NEW)***	Mr. Walker	39
402.04	Design Mix Formula	
402.05	Volumetric Mix Design	
402.16	Low Temperature Compaction Requirements	
402.20	Basis of Payment	
410.05	SMA Mix Design	
410.09	Acceptance of Mixture	
410.16	Density	
902.01(a)1	Lots and Sublots	
902.01(a)2	Sampling	
902.01(a)3	PG Binder Testing	
902.01(a)4	Appeals	
904.02(b)	For HMA Mixtures	

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cc: Committee Members (11)
FHWA (1)

Mr. Heustis
Date: 5/15/08

CONCEPTUAL PROPOSAL ITEM

703 - EPOXY COATED REINFORCING BARS

CONCEPTUAL
PROPOSAL TO STANDARDS COMMITTEE

PROBLEM(S) ENCOUNTERED: References to protection of epoxy coated reinforcing bars in the SS are vague. The current SS indicate bars shall be handled and stored to as to prevent damage to the bars and coating. It then specifically mentions protective and padded banding, lifting techniques, and storing above the ground. However exposure to sunlight is not mentioned. Since exposure to sunlight is known to degrade epoxies, and on some jobs, epoxy coated reinforcing is exposed to the elements for long times, the 700 subcommittee proposes to incorporate this additional item into the 703 section.

PROPOSED SOLUTION: Reword the first two paragraphs of 703.04 to make them clearer. Incorporate language into the specification requiring the Contractor to cover epoxy coated reinforcement during shipping, storage, and prior to concrete placement.

APPLICABLE STANDARD SPECIFICATIONS: 703, 910.01(b)9

APPLICABLE STANDARD DRAWINGS: None

APPLICABLE DESIGN MANUAL SECTION: None

APPLICABLE SECTION OF GIFE: new GIFE section 703

APPLICABLE RECURRING SPECIAL PROVISIONS: None

Submitted By: Ron Heustis for Jim Reilman (chair 700 subcommittee)

Title: Manager, Construction Technical Support

Organization: INDOT

Phone Number: 317-234-2777

Date: April 14, 2008

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Mr. Heustis
Date: 5/15/08

CONCEPTUAL PROPOSAL ITEM

CHANGES TO 707 AND 711 FABRICATION REQUIREMENTS

CONCEPTUAL
PROPOSAL TO STANDARDS COMMITTEE

PROBLEM(S) ENCOUNTERED: The Technicians performing inspection at the various fabrication facilities have commented that the current 707 & 711 specifications need updating.
Items for 707 include: certification of the fabrication facilities, the mild reinforcing steel used in the manufacturing of beams is being welded but is not a weldable grade of steel, requirements for the temperature of concrete at the time of placement, and the size of the cylinders are also not addressed.
Items for 711 include: the AISC Certification terminology has changed, there is no requirement or definition for quality control inspection, the mill test report requirements need review, we should consider requiring a prefabrication meeting, requirements are needed to ensure the tracability of materials, computer controlled drilling & cutting machines are available and being used but the SS does not address them, incorporate some additional references to the AWS D1.5 Bridge Welding Code. Also industry has raised concerns regarding anchor plates and that there seems to be no standard detail for these.

PROPOSED SOLUTION: The 700 subcommittee should review the 707 & 711 sections of the SS.
For 707, research the various NPCA & PCI certification programs and see if either of these will be an asset. If reinforcing cages are going to continue to be welded instead of tied, determine if there is a weldable grade of reinforcing steel and incorporate this into the SS. Also address other minor issues such as should there be temperature limits on the concrete at time of placement, similar to that contained in 702.
For 711, perform a thorough review of the section and any other referenced sections. Consider the concerns raised by our Technicians performing inspection in the shops and by Industry and propose necessary changes to the Standards Committee. (Design is already reviewing the anchor plate concern. Any changes to the Standard Drawings or Design Manual will also be incorporated into this proposal and presented as backup information)

APPLICABLE STANDARD SPECIFICATIONS: 707, 711, 910.01(a), 910.01(b)7, 910.02, 910.04, 910.05, 910.06

APPLICABLE STANDARD DRAWINGS: Possibly 711-BSTS-01 & -02

APPLICABLE DESIGN MANUAL SECTION: Chapter 67

APPLICABLE SECTION OF GIFE: new GIFE section 707 and 711

APPLICABLE RECURRING SPECIAL PROVISIONS: None

Submitted By: Ron Heustis for Jim Reilman

Title: Manager, Construction Technical Support

Organization: INDOT

Phone Number: 317-234-2777

Date: April 15, 2008

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Mr. Heustis
Date: 5/15/08

CONCEPTUAL PROPOSAL ITEM

725 Slip Lining of Existing Pipe

CONCEPTUAL
PROPOSAL TO STANDARDS COMMITTEE

PROBLEM(S) ENCOUNTERED: RSP 725-R-541 was recently written to address quality control issues that were reported in the field. The 725 version contained in the 2008 SS does not address having a manufacturer's representative on site to insure the joints are made correctly and the pipe liner is installed correctly. Industry has repeatedly approached INDOT indicating that additional information be added to the RSP that describes handling of the pipe liner sections and requiring bulkheads be constructed at each end of the pipe.
The Department is also seeing numerous instances of failed material committee actions due to the cellular concrete grout. Currently, the grout is placed and 28 days later, after a compression test is performed, we find out if the grout meets spec or not. Industry has approached the Department and requested we consider going to unit weight verification in the field based on information gathered at a trial batch.

PROPOSED SOLUTION: Review & consider the changes proposed/requested by Industry. An ad hoc committee has met to discuss the grout and has recommended some changes. These changes include requiring a trial batch and changing the field verification of the mix from 28 day cylinder test results to unit weight results, which will be known the same day as the grout placement. Revise RSP 725-R-541 accordingly.

APPLICABLE STANDARD SPECIFICATIONS: 725

APPLICABLE STANDARD DRAWINGS: None

APPLICABLE DESIGN MANUAL SECTION: None

APPLICABLE SECTION OF GIFE: new GIFE sections 725

APPLICABLE RECURRING SPECIAL PROVISIONS: this proposal replaces RSP 725-R-541

Submitted By: Ron Heustis for Jim Reilman

Title: Manager, Office of Construction Technical Support

Organization: INDOT, Construction Management

Phone Number: 317-234-2777

Date: April 17, 2008

APPLICABLE SUB-COMMITTEE ENDORSEMENT? The ad hoc committee that considered the cellular concrete grout consisted of: Youlanda Belew, Mike Milligan, Tommy Nantung, Jim Reilman, Nayyar Zia Siddiki, and Tony Zander. Another ad hoc committee consisting of: Mark Miller, Mike Milligan, and Jim Reilman reviewed Industry's concerns.

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725-R-541 SLIP LINING OF EXISTING PIPE

(Revised 01-04-08)

The Standard Specifications are revised as follows:

SECTION 725, DELETE LINES 1 THROUGH 172.

SECTION 725, AFTER LINE 173 INSERT AS FOLLOWS:

SECTION 725 – SLIP LINING OF EXISTING PIPE

725.01 Description

This work shall include installing a thermoplastic liner into an existing pipe and filling the space between the liner and the existing pipe with cellular concrete grout all in accordance with 105.03.

MATERIALS

725.02 Materials

Materials shall be in accordance with the following.

Cement, Type I or Type III	*901.01(b)*
Fine Aggregate	*904*
Flowable Backfill	*213*
Foam Concentrate	*ASTM C869*
Profile Wall HDPE Pipe Liner	*907.25(b)*
Profile Wall PVC Pipe Liner	*907.25(c)*
Solid Wall HDPE Pipe Liner	*907.25(a)*
Water	*913.01*

Individual liner section lengths shall be a minimum of 19 ft (5.8 m), but shall not exceed 55 ft (16.7 m) unless approved. The pipe liner shall either be chosen from those shown on the Department's list of approved Thermoplastic Pipe Liners or shall be covered by a type A certification in accordance with 916. If the pipe liner is not on the Department's list of approved Thermoplastic Pipe Liners, then the type A certification must be furnished and the pipe liner must be approved by the Engineer prior to installation.

Liner joints shall be bell and spigot, screw type, grooved press-on, fused, thermal welded, or other joint as recommended by the pipe liner manufacturer and shall be installed according to the manufacturer's recommended methods. Each liner joint shall be welded, fused, or joined according to the manufacturer's recommended methods. If a liner is welded, it shall be welded with a continuous weld for the circumference of the liner both inside and outside. The ends of pipe liners that are to be welded or fused shall be at the same ambient temperature ± 5°F. Welding, fusing, or joining shall be performed at all times by an installer trained and certified by either the pipe 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. Destructive testing shall be done on a test section of pipe liner of the same size and

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material as the liner being installed. The method and frequency of destructive and non-destructive testing shall be as directed by the Engineer. The results of the destructive testing shall be provided on a type A certification in accordance with 916.

All joints shall have sufficient mechanical strength to withstand the liner installation and grouting operations. Joints shall not reduce the hydraulic capacity of the liner.

The cellular concrete grout shall be designed in accordance with ASTM C 796 except as herein modified.

The admixtures, retarders, and plasticizers used in the grout shall be in accordance with the foam concentrate supplier's specifications.

The grout shall be made using the preformed foam process using foam generating equipment calibrated daily by the foam manufacturer to produce a precise and predictable volume of foam. The foam concentrate shall be certified by the manufacturer to have specific liquid/foam expansion ratio at a constant dilution ratio with water.

The specific job mix shall be submitted to the Engineer by either the foam concentrate supplier or the certified or licensed grouting contractor for approval prior to use on the contract. The mix shall have a minimum 28 day compressive strength of 150 psi (1040 kPa). The mix shall be tested by a laboratory approved by the Department or shall be approved based on prior acceptable performance on Department contracts.

Grout mixed off site shall be delivered to the job site in a truck mixer in accordance with 702.09 filled to half its capacity. The foam concentrate shall then be added to the cement mix in the truck and mixed to a uniform consistency.

Grout mixed on site shall be batched in a deck mate or similar device. Small batches of approximately 1 cu yd (1 m^3) shall be mixed and pumped in a continuous operation.

For each day worked or for each 100 cu yd (100 m^3) placed, four test cylinders measuring 3 in. by 6 in. (75 mm by 150 mm) shall be cast at the point of placement of the grout. Sampling, molding, curing, and compressive strength testing of the cylinders shall be in accordance with ASTM C 495, except as modified herein.

Initial curing shall be at a temperature of 70° ± 10°F (21.1° ± 5.5°C) and shall be from 2 to 5 days. After the initial curing, the test specimens shall be placed in a moist closet or moist room or stored in an enclosed curing tank above the water level. All specimens shall be kept in their molds in the moist storage for the remainder of the curing period. The specimens shall be tested at 28 days. At that time the specimens shall be prepared for testing in accordance with ASTM C 495 except the bearing surface may be ground or cut with a dry saw to meet surface tolerance. The specimens shall not be capped. Specimens shall be tested in compression as rapidly as possible to minimize drying. If more than one specimen is removed from the moist storage at the same time, these specimens shall be covered with a damp cloth until time of testing. The Contractor shall provide a type A certification with the compressive strength results in accordance with 916.

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Existing circular pipe structures shall be lined with solid wall high density polyethylene, HDPE, pipe liner; profile wall HDPE pipe liner; or profile wall polyvinyl chloride, PVC, pipe liner. Existing deformed pipe structures shall be lined with solid wall HDPE pipe liner.

CONSTRUCTION REQUIREMENTS

725.03 Construction Requirements

(a) Right-of-Entry Areas

If the right-of-way does not provide sufficient room for performance of the work, rights-of-entry from all necessary adjacent property owners shall be obtained by the Contractor in accordance with 107.14. A temporary fence shall be installed as required to prevent encroachment of the public or livestock into the work area. Upon completion of the work, disturbed areas on private property shall be restored in accordance with 107.14.

1. Quality Control and Quality Assurance

A signed and dated QCP shall be prepared and submitted to the Engineer for acceptance at least 15 days prior to the start of slip lining the pipe. No work may begin until written notice has been received that the QCP has been accepted by the Engineer. Acceptance of the QCP will in no way relieve the Contractor of responsibility for installation procedures and testing requirements. The QCP shall include, as a minimum, identification of the QC representative by name and documentation verifying the QC representative's experience; the Contractor's method for cleaning and preparation of the existing pipe; method for joining, welding, or fusing the pipe joints; the personnel and certification of the personnel who will be welding or fusing the pipe liners; the method and frequency of destructive and non-destructive testing on the welded or fused joints; the initial testing of the first joining, welding, or fusing at each pipe liner installation location; the corrective action that will be taken if defective or non-passing joints are found; the grouting process including the daily calibration process procedures for the foam generating equipment; the inspection of bulkheads; the specific job mix of the foam concentrate; the grouting procedure and grouting process to ensure complete filling of voids; the corrective action to be taken if the foam compressive strength does not meet specifications; and the plan if the installation of the foam causes damage or deflection to the pipe liner.

2. Quality Control (QC) Representative on Site

The QC representative shall either be a manufacturer's representative or a Professional Engineer with experience inspecting slip lining of pipes. A QC representative shall be present at the jobsite at the following milestones:

a. Cleaning and preparation of the existing pipe,
b. Initial testing of the first welding or fusing at each pipe liner installation location,
c. Joining, welding, or fusing of the pipe liner,
d. Inspection of bulkheads,
e. Grouting procedure and process to ensure 100% filling of voids,
f. Project clean-up.

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The Contractor shall provide a minimum of 24 hours notice to the QC person prior to performing any of the above milestones. The QC person does not supersede the responsibility of the Contractor.

(b) Filling of Cavities Outside the Existing Pipe

All obvious cavities outside the existing pipe shall be filled with flowable backfill in accordance with 213 prior to the liner installation or with grout placed in conjunction with the grouting operation after the liner is installed.

(c) Liner Installation

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

The inside diameter of the liner shall be in accordance with the following:

EXISTING CIRCULAR CMP STRUCTURES	
PAY ITEM DIAMETER in. (mm)	*MINIMUM LINER INSIDE DIAMETER in. (mm)*
12 (300)	*10.0 (250)*
15 (375)	*11.7 (290)*
18 (450)	*14.3 (355)*
21 (525)	*16.8 (420)*
24 (600)	*18.5 (460)*
27 (675)	*20.7 (515)*
30 (750)	*23.5 (585)*
33 (825)	*26.1 (650)*
36 (900)	*29.5 (735)*
42 (1050)	*33.6 (840)*
48 (1200)	*39.2 (980)*
54 (1350)	*42.0 (1050)*
60 (1500)	*48.0 (1200)*
66 (1650)	*51.6 (1350)*
72 (1800)	*59.1 (1475)*
78 (1950)	*60.0 (1500)*
84 (2100)	*66.0 (1650)*
90 (2250)	*72.0 (1800)*
96 (2400)	*78.0 (1950)*
102 (2550)	*78.0 (1950)*
108 (2700)	*84.0 (2100)*
114 (2850)	*90.0 (2250)*
120 (3000)	*96.0 (2400)*
126 (3150)	*96.0 (2400)*
132 (3300)	*108.0 (2700)*
138 (3450)	*108.0 (2700)*
144 (3600)	*120.0 (3000)*

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EXISTING CIRCULAR STRUCTURAL PLATE PIPE STRUCTURES	
PAY ITEM DIAMETER ft – in. (mm)	MINIMUM LINER INSIDE DIAMETER in. (mm)
5 – 0 (1500)	48.0 (1200)
5 – 6 (1655)	51.7 (1290)
6 – 0 (1810)	59.1 (1475)
6 – 6 (1965)	59.1 (1475)
7 – 0 (2120)	59.1 (1475)
7 – 6 (2275)	72.0 (1800)
8 – 0 (2430)	78.0 (1950)
8 – 6 (2585)	84.0 (2100)
9 – 0 (2740)	90.0 (2250)
9 – 6 (2895)	96.0 (2400)
10 – 0 (3050)	96.0 (2400)
10 – 6 (3205)	96.0 (2400)
11 – 0 (3360)	108.0 (2700)
11 – 6 (3515)	108.0 (2700)
12 – 0 (3670)	120.0 (3000)

EXISTING DEFORMED PIPE STRUCTURES	
PAY ITEM END AREA ft^2 (m^2)	MINIMUM LINER INSIDE DIAMETER in. (mm)
CORRUGATED METAL PIPE-ARCH	
2 2/3 in. x 1/2 in. (68 mm x 13 mm) Corrugations	
1.1 (0.10)	12.0 (300)
1.6 (0.15)	14.9 (370)
2.2 (0.20)	16.8 (420)
2.9 (0.27)	18.5 (460)
4.5 (0.42)	24.0 (600)
6.5 (0.60)	29.5 (735)
8.9 (0.83)	33.6 (840)
11.6 (1.08)	39.2 (980)
14.7 (1.37)	42.0 (1050)
18.1 (1.68)	48.0 (1200)
21.9 (2.03)	51.6 (1290)
26.0 (2.42)	59.1 (1475)
3 in. x 1 in. (75 mm x 25 mm) Corrugations	
15.6 (1.45)	42.0 (1050)
19.3 (1.79)	48.0 (1200)
23.2 (2.16)	51.6 (1290)
27.4 (2.55)	59.1 (1475)
32.1 (2.98)	60.0 (1500)
37.0 (3.44)	66.0 (1650)
42.4 (3.94)	72.0 (1800)
48.0 (4.46)	78.0 (1950)
59.2 (5.04)	78.0 (1950)

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60.5 (5.62)	*84.0 (2100)*
67.4 (6.26)	*90.0 (2250)*
74.5 (6.92)	*96.0 (2400)*
STRUCTURAL PLATE STEEL PIPE-ARCH	
22 (2.0)	*48.0 (1200)*
24 (2.2)	*51.7 (1290)*
26 (2.4)	*51.7 (1290)*
28 (2.6)	*59.1 (1475)*
31 (2.9)	*59.1 (1475)*
33 (3.1)	*59.1 (1475)*
35 (3.3)	*59.1 (1475)*
38 (3.5)	*59.1 (1475)*
40 (3.7)	*59.1 (1475)*
43 (4.0)	*59.1 (1475)*
46 (4.3)	*72.0 (1800)*
49 (4.6)	*72.0 (1800)*
52 (4.8)	*78.0 (1950)*
55 (5.1)	*84.0 (2100)*
58 (5.4)	*84.0 (2100)*
61 (5.7)	*90.0 (2250)*
64 (5.9)	*90.0 (2250)*
67 (6.2)	*96.0 (2400)*
71 (6.6)	*96.0 (2400)*
74 (6.9)	*96.0 (2400)*
78 (7.2)	*96.0 (2400)*
81 (7.5)	*96.0 (2400)*
85 (7.9)	*96.0 (2400)*
97 (9.0)	*108.0 (2700)*
102 (9.5)	*108.0 (2700)*
105 (9.8)	*108.0 (2700)*
109 (10.1)	*120.0 (3000)*

Prior to commencing the liner installation operation, steps shall be taken by the Contractor to verify that a liner meeting the minimum inside diameter requirements can be successfully placed inside the existing pipe. If it is discovered prior to installation that a liner with the required inside diameter cannot fit, the inside and outside diameters of a substitute liner shall be submitted to the Engineer for approval. If this discovery is not made until after the liner installation has begun, the partially installed liner shall be removed. Inside and outside diameters for a substitute liner shall then be submitted to the Engineer for approval.

After the liner installation is complete and the liner has cooled to approximately the temperature of the existing pipe, the liner shall be cut so that each end is 8 in. (200 mm) outside the end of the existing pipe.

Grout shall be injected into the space between the existing pipe and the liner. The injection operation shall provide sufficient grout to fill all voids between the existing pipe and the liner over the entire structure length, but shall also be performed in a manner that does not distort the liner. Injection of the grout in lifts, use of spacers, or other safeguards shall be taken in order to keep the liner in position and prevent the liner from

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floating. The pressure developed in the space between the liner and the existing pipe shall not exceed the liner manufacturer's recommended maximum value.

All existing culverts, storm drains, underdrain pipes, drain tile, or other pipes that are directly connected to the lined structure shall be perpetuated. Grout shall not leak through the liner at these connections.

725.04 Method of Measurement

Thermoplastic liner will be measured by the linear foot (meter), complete in place. An allowance of 5 ft (1.5 m) of liner will be made for the perpetuation of an existing pipe through the liner.

No measurement will be made of liner joints or the length of joint welding or fusing, or other incidentals necessary to join sections of liner in accordance with the manufacturer's recommendations. The test section lengths of liner used for destructive testing will not be measured for payment.

No measurement will be made for a liner meeting the minimum inside diameter requirements that does not fit.

725.05 Basis of Payment

The accepted quantities of pipe liner, thermoplastic, will be paid for at the contract unit price per linear foot (meter) for the size of the existing pipe in which the liner is installed, complete in place. Perpetuating the direct connection of an existing pipe through the liner will be paid for by means of an allowance of 5 ft (1.5 m) of liner for each such connection.

Payment will be made under:

Pay Item	***Pay Unit Symbol***
Pipe Liner, Thermoplastic, _____ in. (mm) diameter	*LFT (m)*
Pipe Liner, Thermoplastic, ____ sft (m2) area	*LFT (m)*

The cost of repairing jagged edges or deformities to existing pipe, filling cavities around the existing pipe with cellular concrete grout, acquisition and restoration of required right-of-entry areas, erection, maintenance, and removal of temporary fence, removing foreign material from the existing pipe, grouting the space between the existing pipe and the liner, and other incidentals will not be paid separately, but shall be included in the cost of the pay items in this section.

The cost of liner joints and other incidentals necessary to join sections of liner in accordance with the manufacturer's recommendations shall be included in the cost of the pay items in this section. All costs associated with having the QC representative on site shall be included in the cost of the pay items in this section.

The cost of training and certifying an installer, destructive and non-destructive testing, pipe liner, and incidentals used in destructive testing, and all costs associated

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with the development of an acceptable QCP shall be included in the cost of the pay items in this section.

All welded or fused joints that do not pass the destructive testing will be rejected. The non-compliant joint shall be removed, a new joint fabricated, and retested, all with no additional compensation.

In situations where the condition of the existing pipe requires that a substitute liner be utilized, there will be no reduction in payment for the installation of the substitute liner. There will be no additional payment for the additional grout required to fill the larger void between the existing pipe and the smaller liner.

There will be no payment for the installation or removal of any liner that cannot be successfully installed due to the condition of the existing pipe. There will be no payment for a liner meeting the minimum inside diameter requirements that does not fit.

If the existing pipe or any other object not designated for removal is damaged while performing this work, it shall be considered unauthorized work and repaired or replaced in accordance with 105.11.

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PROPOSAL TO STANDARDS COMMITTEE

PROBLEM(S) ENCOUNTERED: The following issues require revisions to sections 401, 402, 410, 902 & 904:

1. Percent Within Limits (PWL) – PWL is a quality measure that uses the sample mean and the standard deviation to estimate the percentage of the population (lot) that is within the specification limits. There are several revisions throughout 401 that are related to the PWL specifications. The procedure for determining PWL for HMA has been put into an Indiana Test Method (ITM 588).

   Open graded mixtures, original contract pay item quantities less than one lot, and partial lots of four sublots or less when no previous lot is available will be paid for using the current single sublot procedure (401.19 (b)).

2. AASHTO T 331 (Bulk Specific Gravity and Density of Compacted Asphalt Mixtures Using Automatic Vacuum Sealing) -- This test procedure replaces the current test method (ASTM D 6752) for the bulk specific gravity of OG 19.0 and OG 25.0 mixtures. The AASHTO procedure has a check on a possible leak in the bag by requiring the weight of the specimen after weighing-in-water to be within -0.08% and +0.04% of the weight of the initial mass of specimen. This is a more accurate procedure than the current specification requirement of a 5 minute time period for duration of test and requirement that the test is considered invalid if the specimen exceeds 5 g from the initial mass of the specimen.

3. AASHTO T 209 (Theoretical Maximum Specific Gravity and Density of Hot-Mix Asphalt Paving Mixtures) -- The reference to Section 9.5.1 was added to be consistent with the current specification for the appeal maximum specific gravity requirement of 401.20(a) and to emphasize that the maximum specific gravity test is required to be conducted by the weighing-in-water method.

4. Binder Grade Change -- The INDOT laboratory binder study indicated that there is an insignificant change in the volumetric properties when there is a change in the grade of asphalt for the same aggregate structure. Requiring a new mix design for a binder grade change is not needed. Since the volumetric properties are verified from samples taken from the pavement, there is a final check on the HMA.

   Since a higher upper temperature classification of the PG grade will normally result in higher Tensile Strength Ratio (TSR) values, AASHTO T 283 for moisture susceptibility will be required if the original mix design upper temperature classification of the PG grade is higher than the requested PG grade (i.e., original PG 70 mix design and requesting a mix design with PG 64 will require a TSR value to be determined for the PG 64 grade mixture).

   A new DMF is required to be submitted and reference the original mix design for a binder grade change with the same aggregate structure.

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Binder Source Change -- The INDOT laboratory binder study also indicated that there is an insignificant change in volumetric properties when the asphalt grade source is changed. Currently a new mixture design is not required for a change in the source for PG 58-28 or PG 64-22 binders. This revision will not require a new mix design for a change in any grade of binder.

A copy of the load ticket identifying the binder source is required to be submitted with the sublot binder samples to allow improved tracking of the source of the binders.

5. Mixture Adjustment Factor (MAF) -- The MAF value is used to define the planned quantity, lay rate, and pay quantity for HMA. Currently if the MAF value is outside of the 0.980 and 1.020 range, the actual calculated value is used. This procedure has resulted in several instances where Contractors have been forced to ship aggregates long distances rather than use localized material. By making the adjustment more gradual, more localized aggregates will be used and a reduced cost of the HMA should be obtained.

6. Moisture Content -- We have not required moisture tests for HMA and SMA mixtures in 2006 or 2007 through a Special Provision because our experience with moisture tests is that they rarely fail, and when failures do occur no detrimental effects to the pavement have been observed. The Certified HMA Program requires that moisture tests be monitored as part of the plant QCP. Also, Sections 401.10 and 410.10 require removal of HMA or SMA when flushing or bleeding is evident, which is a common occurrence with excessive moisture. This addition to the Special Provision is to reemphasize that no moisture test is required.

7. Certificate of Compliance -- The requirement for a Certificate of Compliance for paving equipment implies that there is a form or format for this document and there is none. The revision to just “written documentation” will require that the Contractor submit any document as long as the document includes the manufacturer’s make, model, serial number, manufactured year, and the manufacturer’s literature with pictures of the paving equipment.

8. AASHTO T 166 (Bulk Specific Gravity of Compacted Hot-Mix Asphalt Using Saturated Surface-Dry Specimens) -- Method A was added to AASHTO T 166 to require the bulk specific gravity to be conducted by weighing the sample in a water bath rather than in a volumeter as required by Method B.

9. The bulk specific gravity and maximum specific gravity samples are dried in accordance with ITM 572. The current specification states that the maximum specific gravity is prepared in accordance with ITM 572 which indicates that the sample is reduced in size by ITM 572.

10. Fine Aggregate Angularity (FAA) -- A statement was added to not require the FAA test for open graded mixtures. A small amount of fine aggregate is normally added to open graded mixtures to have enough aggregate to absorb the heat in the plant dryer to prevent the dryer flame from possibly causing a fire in the plant baghouse. The intent of open graded mixtures is not compromised by adding a small amount of fine aggregate; however, the FAA test is not appropriate for the fine aggregate. The purpose of the open graded mixture is to provide a layer that will drain moisture and the air voids required to provide the drainage are

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measured during production of the mixture. The fine aggregate would not affect the air voids significantly.

11. Smoothness – Clarification was made concerning the use of the straightedge for determining smoothness. Also, the final profile index for each section with a profile index greater than 3.20 that required corrective action will be determined after all corrective action within that section is completed. Regardless of the pay factor, individual sections that require corrective action for high or low points in excess of 0.3 in. will not be greater than 1.00.

12. 402 Mixtures – Currently 402 does not allow the 12.5 mm mixture for intermediate and surface mixtures or the 19.0 mm mixture for base mixtures as alternates for Type A, B, C, or D mixtures. The 12.5mm and 19.0 mm mixtures are needed for projects where there are curb height restrictions, to match adjacent mixtures to prevent a joint and therefore reduce construction costs, and other applications. The additional mixtures would allow designers more flexibility in the pavement design.

PROPOSED SOLUTION: The following revisions are recommended to be authorized and made effective by Recurring Special Provision 400-R-547.

1. Include provisions to incorporate Percent Within Limits for 401
2. Replace ASTM D 6752 with AASHTO T 331.
3. Add "Section 9.5.1" to AASHTO T 209 references.
4. Do not require a new mix design for a binder grade or binder source change
5. Revise MAF adjustments to make adjustments more gradual
6. Remove moisture content requirements
7. Change "Certificate of Compliance" to "written documentation"
8. Add "Method A" to the AASHTO T 166 references
9. Revise specifications to state that the bulk specific gravity and maximum specific gravity samples are dried in accordance with ITM 572.
10. Remove the FAA requirement for open graded mixtures
11. Revise smoothness requirements
12. Add 12.5 mm and 19.0 mm mixtures as allowable mixtures if required by the pavement design for 402 HMA mixtures

APPLICABLE STANDARD SPECIFICATIONS: 401,402,410, 902, 904

APPLICABLE STANDARD DRAWINGS: None

APPLICABLE DESIGN MANUAL SECTION: None

APPLICABLE SECTION OF GIFE: Section 13

APPLICABLE RECURRING SPECIAL PROVISIONS: 400-R-547

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Date: 04-25-08

APPLICABLE SUB-COMMITTEE ENDORSEMENT: These specification revisions are recommended by the INDOT/APAI Technical Committee.

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SECTION 401, BEGIN LINE 1, DELETE AND INSERT AS FOLLOWS:

SECTION 401 – QUALITY CONTROL/QUALITY ASSURANCE, QC/QA, HOT MIX ASPHALT, HMA, PAVEMENT

401.01 Description

This work shall consist of one or more courses of QC/QA HMA base, intermediate, or surface mixtures constructed on prepared foundations in accordance with 105.03.

401.02 Quality Control

The HMA shall be supplied from a certified HMA plant in accordance with ITM 583; Certified ~~Volumetric~~ Hot Mix Asphalt Producer Program. The HMA shall be transported and placed according to a Quality Control Plan, QCP, prepared and submitted by the Contractor in accordance with ITM 803; Contractor Quality Control Plans for Hot Mix Asphalt Pavements. The QCP shall be submitted to the Engineer at least 15 days prior to commencing HMA paving operations.

MATERIALS

401.03 Materials

Materials shall be in accordance with the following:

Asphalt Materials
PG Binder.....902.01(a)
Coarse Aggregates 904
Base Mixtures – Class D or Higher
Intermediate Mixtures – Class C or Higher
*Surface Mixtures – Class B or Higher
Fibers.....AASHTO MP 8
Fine Aggregates 904
*Surface aggregate requirements are listed in 904.03(d).

401.04 Design Mix Formula

A design mix formula, DMF, shall be prepared in accordance with 401.05 and submitted in a format acceptable to the Engineer one week prior to use. The DMF shall state the maximum particle size in the mixture. The DMF shall state the calibration factor, test temperature, and absorption factors to be used for the determination of binder content using the ignition oven in accordance with ITM 586, the binder content by extraction in accordance with ITM 571, and a Mixture Adjustment Factor (MAF). The DMF shall state the source, type, and dosage rate of any stabilizing additives. Approval of the DMF will be based on the ESAL and mixture designation. A mixture number will be assigned by the Engineer. No mixture will be accepted until the DMF has been approved.

The ESAL category identified in the pay item correlates to the following ESAL ranges.

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ESAL CATEGORY	ESAL
1	< 300,000
2	300,000 to < 3,000,000
3	3,000,000 to < 10,000,000
4	10,000,000 to < 30,000,000
5	≥ 30,000,000

401.05 Volumetric Mix Design

The DMF shall be determined for each mixture from a volumetric mix design by a design laboratory selected from the Department's list of approved Mix Design Laboratories. A volumetric mixture shall be designed in accordance with ~~the respective~~ AASHTO *R 35* and ~~ASTM~~ *the respective AASHTO* reference~~s~~ as listed below.

~~Standard Specification for Superpave Volumetric Mix Design ..... AASHTO M 323~~

~~Standard Specification for Designing Stone Matrix Asphalt (SMA) ..... AASHTO MP 8~~

~~Standard Practice for Mixture Conditioning of Hot Mix Asphalt (HMA) ..... AASHTO R 30~~

~~Standard Practice for Superpave Volumetric Design for Hot Mix Asphalt (HMA) ..... AASHTO R 35~~

~~Maximum Specific Gravity and Density of Bituminous Paving Mixtures ..... AASHTO T 209~~

~~Resistance of Compacted Asphalt Mixture to Moisture Induced Damage ..... AASHTO T 283~~

~~Method for Preparing and Determining the Density of Hot Mix Asphalt (HMA) Specimens by Means of the Superpave Gyratory Compactor ..... AASHTO T 312~~

~~Bulk Specific Gravity of Compacted Bituminous Mixtures Using Automatic Vacuum Sealing ..... ASTM D 6752~~

Bulk Specific Gravity and Density of Compacted Asphalt Mixtures Using Automatic Vacuum Sealing ..... AASHTO T 331

The single percentage of aggregate passing each required sieve shall be within the limits of the following gradation tables.

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	Dense Graded, Mixture Designation – Control Point (Percent Passing)				
	25.0 mm	19.0 mm	12.5 mm	9.5 mm	4.75 mm
Sieve Size					
50.0 mm					
37.5 mm	100.0				
25.0 mm	90.0 - 100.0	100.0			
19.0 mm	< 90.0	90.0 - 100.0	100.0		
12.5 mm		< 90.0	90.0 - 100.0	100.0	100.0
9.5 mm			< 90.0	90.0 - 100.0	95.0 -100.0
4.75 mm				< 90.0	90.0 - 100.0
2.36 mm	19.0 - 45.0	23.0 - 49.0	28.0 - 58.0	32.0 - 67.0	
1.18 mm					30.0 - 60.0
600 µm					
300 µm					
75 µm	1.0 - 7.0	2.0 - 8.0	2.0 - 10.0	2.0 - 10.0	6.0 - 12.0

PCS Control Point for Mixture Designation (Percent Passing)					
Mixture Designation	25.0 mm	19.0 mm	12.5 mm	9.5 mm	4.75 mm
Primary Control Sieve	4.75 mm	4.75 mm	2.36 mm	2.36 mm	NA
PCS Control Point	40	47	39	47	NA

Open Graded, Mixture Designation – Control Point (Percent Passing)		
	OG19.0	OG25.0
Sieve Size		
37.5 mm		100.0
25.0 mm	100.0	70.0 – 98.0
19.0 mm	70.0 – 98.0	50.0 – 85.0
12.5 mm	40.0 – 68.0	28.0 – 62.0
9.5 mm	20.0 – 52.0	15.0 – 50.0
4.75 mm	10.0 – 30.0	6.0 – 30.0
2.36 mm	15.0 ± 8.0	15.0 ± 8.0
1.18 mm	2.0 – 18.0	2.0 – 18.0
600 µm	1.0 – 13.0	1.0 – 13.0
300 µm	0.0 – 10.0	0.0 – 10.0
150 µm	0.0 – 9.0	0.0 – 9.0
75 µm	0.0 – 8.0	0.0 – 8.0
Percent of Binder	> 3.0	> 3.0

Dust/Calculated Effective Binder Ratio shall be taken from 0.6 to 1.2, when the aggregate gradation passes above the primary control sieve (PCS) control point and 0.8 to 1.6 when the aggregate gradation is less than or equal to the PCS. The Dust/Calculated Effective Binder Ratio for 4.75 mm mixtures shall be 0.9 to 2.0.

The optimum binder content for dense graded mixtures shall produce 4.0% air voids at N_{des} and for open graded mixtures shall produce 15.0% – 20.0% air voids at N_{des}. The design for dense graded mixtures shall have at least four points, including a minimum of two points above and one point below the optimum. A one point design may be used for open graded mixtures. The maximum specific gravity of the ~~uncompressed~~ *uncompacted* mixture shall be determined in accordance with AASHTO T 209, *Section*

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9.5.1. The bulk specific gravity of the gyratory specimens shall be determined in accordance with AASHTO T 166, Method A for dense graded mixtures and AASHTO T 331 for open graded mixtures.

The percent draindown of open graded mixtures shall not exceed 0.30% in accordance with AASHTO T 305. Open graded mixtures may incorporate fibers.

Dense graded mixture shall be tested for moisture susceptibility in accordance with AASHTO T 283 except that the loose mixture curing shall be replaced by mixture conditioning for 2 h in accordance with AASHTO R 30. The minimum tensile strength ratio, TSR, shall be 80%. The 6 in. (150 mm) mixture specimens shall be compacted in accordance with AASHTO T 312. If anti-stripping additives are added to the mixture to be in accordance with the minimum TSR requirements, the dosage rate shall be submitted with the DMF.

A PG binder grade or source change will not require a new mix design. If the upper temperature classification of the PG binder is lower than the original PG grade, a new TSR value is required. A new DMF shall be submitted for a binder grade change and shall reference the originating DMF/JMF number.

The MAF equals the Gmm from the mixture design divided by the following: 2.465 for 9.5 mm mixtures and 2.500 for 12.5 mm, 19.0 mm, and 25.0 mm mixtures. If the MAF calculation results in a value where 0.980 ≤ MAF ≤ 1.020, then the MAF shall be considered to be 1.000. ~~If the calculated MAF is outside of the above range, then the actual calculated value shall be used.~~ *If the MAF is greater than 1.020, the calculated MAF value shall have 0.020 subtracted from the value. If the MAF is less than 0.980, the calculated MAF value shall have 0.020 added to the value.* The MAF does not apply to OG mixtures.

Changes in the source or types of aggregates shall require a new DMF. A new DMF shall be submitted to the District ~~Materials and Tests~~ *Testing* Engineer for approval one week prior to use.

~~Changes in the source of specified binders, except for PG 58-28 or PG 64-22, shall require a new DMF. Changes in the grade of a specified binder shall require a new DMF.~~

The mixture design compaction temperature for the specimens shall be 300 ± 9°F (150 ± 5°C) for dense graded mixtures and 260°F (125°C) for open graded mixtures.

Design criteria for each mixture shall be based on the ESAL shown in the contract documents and shall be as follows:

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GYRATORY COMPACTION EFFORT					
ESAL	N_{ini}*	N_{des} *	N_{max}*	Max. % Gmm @ N_{ini}	Max. % Gmm @ N_{max}
DENSE GRADED					
< 300,000	6	50	75	91.5	98.0
300,000 to < 3,000,000	7	75	115	90.5	98.0
3,000,000 to < 10,000,000	8	100	160	89.0	98.0
10,000,000 to < 30,000,000	8	100	160	89.0	98.0
≥ 30,000,000	9	125	205	89.0	98.0
OPEN GRADED					
ALL ESAL	NA	20	NA	NA	NA
* N_{ini} , N_{des} , N_{max} , - definitions are included in AASHTO PP 28					

VOIDS IN MINERAL AGGREGATE (VMA) CRITERIA @ N_{des}	
Mixture Designation	Minimum VMA, Percent
4.75 mm	16.0
9.5 mm	15.0
12.5 mm	14.0
19.0 mm	13.0
25.0 mm	12.0
OG19.0 mm	NA
OG25.0 mm	NA

VOIDS FILLED WITH ASPHALT (VFA) CRITERIA @ N_{des}	
ESAL	VFA, Percent
< 300,000	70 – 80
300,000 to < 3,000,000	65 – 78
3,000,000 to < 10,000,000	65 – 75
10,000,000 to < 30,000,000	65 – 75
≥ 30,000,000	65 – 75
Note 1: For 9.5 mm mixtures, the specified VFA range shall be 73% to 76% for design traffic levels ≥ 3 million ESALs. Note 2: For 25.0 mm mixtures, the specified lower limit of the VFA shall be 67% for design traffic levels < 0.3 million ESALs. Note 3: For 4.75 mm mixtures, the specified VFA range shall be 75% to 78% for design traffic levels ≥ 3 million ESALs. Note 4: For OG19.0 mm and OG25.0 mm mixtures, VFA is not applicable.	

401.06 Recycled Materials

Recycled materials may consist of reclaimed asphalt pavement, RAP, or asphalt roofing shingles, ARS, or a blend of both. RAP shall be the product resulting from the cold milling or crushing of an existing HMA pavement. The RAP shall be processed so that 100% will pass the 2 in. (50 mm) sieve when entering the HMA plant. ARS shall consist of waste from a shingle manufacturing facility. No tear-off materials from roofs will be allowed. ARS shall be stockpiled separately from other materials. The coarse aggregate in the recycled materials shall pass the maximum size sieve for the mixture being produced.

Recycled materials may be used as a substitute for a portion of the new materials required to produce HMA mixtures. When only RAP is used in the mixture, the RAP

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shall not exceed 25.0% by weight (mass) of the total mixture. When only ARS is used in the mixture, the ARS shall not exceed 5.0% by weight (mass) of the total mixture. For substitution or use, 1.0% of ARS is considered equal to 5.0% RAP. The percentages of recycled materials shall be as specified on the DMF.

Recycled materials shall not be used in ESAL Category 3, 4, or 5 surface mixtures or open graded mixtures.

The combined aggregate properties of a mixture with recycled materials shall be determined in accordance with ITM 584 and shall be in accordance with 904. Gradations of the combined aggregates shall be in accordance with 401.05.

Mixtures containing 15.0% or less RAP shall use the same grade of binder as specified. The binder for mixtures containing greater than 15.0% and up to 25.0% RAP shall be reduced by one temperature classification, 6°C, for both the upper and lower temperature classifications.

401.07 Lots and Sublots

Lots will be defined as ~~4000~~ *5000* t (~~4000~~ *5000* Mg) of base or intermediate mixtures or ~~2400~~ *3000* t (~~2400~~ *3000* Mg) of surface mixture. Lots will be further sub-divided into sublots not to exceed 1000 t (1000 Mg) of base or intermediate mixtures or 600 t (600 Mg) of surface mixture. Partial sublots ~~or~~ *of* 100 t (100 Mg) or less will be added to the previous sublot. Partial sublots greater than 100 t (100 Mg) constitute a full sublot. *Partial lots of four sublots or less will be added to the previous lot, if available.*

401.08 Job Mix Formula

A job mix formula, JMF, shall be developed by a certified HMA producer. A JMF used in the current or previous calendar year that was developed to N_{des} will be allowed. The mixture compaction temperature shall be 300 ± 9°F (150 ± 5°C) for dense graded mixtures and 260 ± 9°F (125 ± 5°C) for open graded mixtures. The JMF for each mixture shall be submitted to the Engineer and shall use the same MAF as the DMF.

401.09 Acceptance of Mixtures

Acceptance of mixtures for binder content, VMA at N_{des}, and air voids at N_{des} for each lot will be based on tests performed by the Engineer. ~~Acceptance testing for surface mixtures will include tests for moisture content.~~ The Engineer will randomly select the location(s) within each sublot for sampling in accordance with ITM 802. *The first 300 t (300 Mg) of the first sublot of the first lot for each DMF/JMF will not be sampled.* An acceptance sample will consist of two plate samples with the first being at the random location and the second 2 ft (0.6 m) ahead station. A backup sample consisting of two plate samples shall be located 2 ft (0.6 m) towards the center of the mat from the acceptance sample. ~~For surface mixtures, an additional sample shall be located 2 ft (0.6 m) back station from the random sample location.~~

Samples from each location shall be obtained from each sublot from the pavement in accordance with ITM 580. *The Engineer will take immediate possession of the samples.*

The binder content will be determined in accordance with ITM 586 or ITM 571 as directed by the Engineer. The maximum specific gravity will be determined in accordance with AASHTO T 209, *Section 9.5.1*. The air voids will be determined in

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accordance with AASHTO PP 28 based on the average bulk specific gravity from two gyratory specimens and the MSG for the sublot. The VMA will be determined in accordance with AASHTO PP 28 based on the average bulk specific gravity from two gyratory specimens, the percent aggregate in the mixture from the sublot and the BSG of the aggregate blend from the DMF/JMF as applicable. The gyratory pills will be prepared in accordance with AASHTO T 312.

The bulk specific gravity of gyratory specimens for dense graded mixtures will be determined in accordance with AASHTO T 166, *Method A* except samples are not required to be dried overnight. The bulk specific gravity of gyratory specimens for open graded mixtures, OG19.0, OG25.0 will be determined in accordance with ~~ASTM D 6752, except as follows. The duration of the test from initiating the vacuum extraction to weighing the specimen after the water bath will not exceed five minutes. The mass of water absorbed by the specimen while in the water bath will be subtracted from the mass of the specimen obtained in the water bath. Any test in which the mass of water absorbed by the specimen exceeds 5 g is invalid~~ *AASHTO T 331*.

~~The mixture properties for each sublot shall meet the requirements for the tolerances from the JMF as shown in the table as follows.~~

~~ACCEPTANCE TOLERANCES~~	
~~MIXTURE PROPERTIES~~	~~TOLERANCES FROM THE JMF~~
~~DENSE GRADED~~	
~~Air Voids~~	~~JMF ± 1.0%~~
~~Binder Content~~	~~JMF ± 0.5%~~
~~VMA~~	~~JMF ± 1.0%~~
~~OPEN GRADED~~	
~~Air Voids*~~	~~JMF ± 3.0%~~
~~Binder Content~~	~~JMF ± 0.5%~~
~~* Gmb will be determined in accordance with ASTM D 6752~~	

~~The maximum percent of moisture in the mixture shall not exceed 0.10 from plate samples.~~

A binder draindown test in accordance with AASHTO T 305 for open graded mixtures shall be completed once per lot in accordance with 401.07 and shall not exceed 0.50%.

The Engineer's acceptance test results for each sublot will be available after the sublot and testing are complete.

Air voids, binder content and VMA values will be reported to the nearest ~~0.1~~ *0.01*%. ~~Moisture and d~~*D*raindown test results will be rounded to the nearest 0.01%. Rounding will be in accordance with 109.01(a).

~~Pay factors will be determined in accordance with 401.19(a).~~ *Pay factors for dense graded mixtures with original contract pay item quantities greater than or equal to one lot will be determined in accordance with 401.19(a). Partial lots of four sublots or less will have pay factors determined in accordance with 401.19(b) if the previous lot is not available.*

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Pay factors for dense graded mixtures with original contract pay item quantities less than one lot and open graded mixtures will be determined in accordance with 401.19(b).

The Contractor may request an appeal of the Engineer's test results in accordance with 401.20.

Fibers incorporated into the mixture will be accepted on the basis of a type A certification for the specified material properties for each shipment of fibers. Fibers from different manufacturers and different types of fibers shall not be intermixed.

In the event that an acceptance sample is not available to represent a sublot~~(s)~~, all test results of the previous sublot will be used for acceptance. If the previous sublot is not available, the subsequent sublot will be used for acceptance.

CONSTRUCTION REQUIRMENTS

401.10 General

Equipment for HMA operations shall be in accordance with 409. The Contractor shall submit to the Engineer ~~a~~ written ~~Certificate of Compliance~~ *documentation* that includes the manufacturer's make, model, serial number, manufactured year, and the manufacturer's literature with pictures. The ~~Certificate of Compliance~~ *documentation* shall be submitted prior to use and shall certify that the paving equipment proposed for the project is new and includes the modifications or have been modified in accordance with the following.

The paver shall be equipped with means of preventing the segregation of the coarse aggregate particles when moving the mixture from the paver hopper to the paver augers. The means and methods used shall be in accordance with the paver manufacturer's instructions and may consist of chain curtains, deflector plates, or other such devices, or any combination of these.

The following specific requirements shall also apply to identified HMA pavers:

1. Blaw-Knox HMA pavers shall be equipped with the Blaw-Knox Materials Management Kit, MMK.

2. Cedarrapids HMA pavers shall be those that were manufactured in 1989 or later.

3. Barber-Green/Caterpillar HMA pavers shall be equipped with deflector plates as identified in the December, 2000 Service Magazine entitled "New Asphalt Deflector Kit {6630-DFL, 6631-DFL, or 6640-DFL}".

The Contractor is also required to demonstrate to the Engineer prior to use, that the modifications to the paving equipment have been implemented on all pavers to be used on the project.

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Fuel oil, kerosene, or solvents shall not be transported in open containers on equipment. Cleaning of equipment and small tools shall not be accomplished on the pavement or shoulder areas.

Segregation or flushing or bleeding of HMA mixtures will not be permitted. Corrective action shall be taken to prevent continuation of these conditions. Segregated or flushed or bleeding HMA mixtures shall be removed if directed. All areas showing an excess or deficiency of binder shall be removed and replaced.

All mixtures that become loose and broken, mixed with dirt, or is in any way defective shall be removed and replaced.

401.11 Preparation of Surfaces to be Overlaid

The subgrade shall be shaped to the required grade and sections, free from all ruts, corrugations, or other irregularities, and uniformly compacted and approved in accordance with 207. Milling of an existing pavement surface shall be in accordance with 306. Surfaces on which a mixture is placed shall be free from objectionable or foreign materials at the time of placement.

~~Compacted aggregate bases and rubblized~~ *Rubblized concrete* pavements shall be primed in accordance with 405. PCCP, milled asphalt surfaces, and asphalt surfaces shall be tacked in accordance with 406. Contact surfaces of curbing, gutters, manholes, and other structures shall be tacked in accordance with 406.

401.12 Process Control

The Engineer and Contractor will jointly review the operations to ensure compliance with the QCP. Continuous violations of compliance with the QCP will result in suspension of paving operations.

401.13 Weather Limitations

HMA courses of less than 138 lb/syd (75 kg/m^2) shall be placed when the ambient temperature and the temperature of the surface on which it is to be placed is 45°F (7°C) or above. No mixture shall be placed on a frozen subgrade.

401.14 Spreading and Finishing

The mixture shall be placed upon an approved surface by means of laydown equipment in accordance with 409.03(c). Prior to paving, both the planned quantity and lay rate shall be adjusted by multiplying by the MAF. When mixture is produced from more than one DMF or JMF for a given pay item, the MAF will be applied to the applicable portion of the mixture for each. The temperature of each mixture at the time of spreading shall not be more than 18°F (10°C) below the minimum mixing temperature as shown on the JMF for mixtures compacted in accordance with 402.15.

Planned HMA courses greater than 165 lb/syd (90 kg/m^2) placed under traffic, shall be brought up even with each adjacent lane at the end of each work day. Planned HMA courses less than or equal to 165 lb/syd (90 kg/m^2) shall be brought forward concurrently, within practical limits, limiting the work in one lane to not more than one work day of production before moving back to bring forward the adjacent lane. Traffic shall not be allowed on open graded mixtures.

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Hydraulic extensions on the paver will not be permitted for continuous paving operations. Fixed extensions or extendable screeds shall be used on courses greater than the nominal width of the paver except in areas where the paving width ~~vary~~ *varies*. Hydraulic extensions may be used in tapers and added lanes less than 250 ft (75 m) in length.

Automatic slope and grade controls shall be used as outlined in the QCP.

HMA mainline and HMA shoulders which are 8.0 ft (2.4 m) or more in width shall be placed with paving equipment in accordance with 409.03(c)1.

When laying mixtures with density not controlled by cores, the speed of the paver shall not exceed 50 ft (15 m) per min. Rollers shall be operated to avoid shoving of the HMA and at speeds not to exceed 3 mph (4.5 km/h). However, vibratory rollers will be limited to 2.5 mph (4 km/h).

The finished thickness of any course shall be at least two times but not more than four times the maximum particle size as shown on the DMF.

401.15 Joints

Longitudinal joints in the surface shall be at the lanelines of the pavement. Longitudinal joints below the surface shall be offset from previously constructed joints by approximately 6 in. (150 mm), and be located within 12 in. (300 mm) of the lane line.

Transverse joints shall be constructed by exposing a near vertical full depth face of the previous course. For areas inaccessible to rollers, other mechanical devices shall be used to achieve the required density.

If constructed under traffic, temporary transverse joints shall be feathered to provide a smooth transition to the driving surface.

401.16 Density

Acceptance will be based on lots and sublots in accordance with 401.07.

Density of the compacted dense graded mixture will be determined from cores except where:

(a) the total planned lay rate to be placed over a shoulder existing prior to the contract award is less than 385 lb/syd (210 kg/m^2); or

(b) the first lift of material placed at less than 385 lb/syd (210 kg/m^2) over a shoulder existing prior to the contract award.

Density of any random core location(s) in these areas will be assigned a value of 92.0 %MSG and compaction shall be in accordance with 402.15.

Open graded mixtures shall be compacted with six passes of a static tandem roller and will be assigned a value of 84.0% of MSG. Vibratory rollers shall not be used on open graded mixtures.

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Density acceptance by cores will be based on samples obtained from two random locations selected by the Engineer within each sublot in accordance with ITM 802. One core shall be cut at each random location in accordance with ITM 580. The transverse core location will be located so that the edge of the core will be no closer than 3 in. (75 mm) from a confined edge or 6 in. (150 mm) from a non-confined edge of the course being placed. The maximum specific gravity will be determined from the samples obtained in 401.09.

The Contractor shall obtain cores in the presence of the Engineer with a device that shall produce a uniform 6 in. (150 mm) diameter pavement sample. Coring shall be completed prior to the random location being covered by the next course. Surface courses shall be cored within two work days of placement. Damaged core(s) shall be discarded and replaced with a core from a location selected by adding 1.0 ft (0.3 m) to the longitudinal location of the damaged core using the same transverse offset.

The Contractor and the Engineer shall mark the core to define the course to be tested. If the core indicates a course thickness of less than two times the maximum particle size, the core will be discarded and a core from a new random location will be selected for testing.

The Engineer will take immediate possession of the cores. If the Engineer's cores are subsequently damaged, additional coring will be the responsibility of the Department. Subsequent core locations will be determined by subtracting 1.0 ft (0.3 m) from the random location using the same transverse offset.

The density for the mixture will be expressed as the percentage of maximum specific gravity (%MSG) obtained by dividing the average bulk specific gravity by the maximum specific gravity for the sublot, times 100. *Samples for the bulk specific gravity and maximum specific gravity will be dried in accordance with ITM 572.* The Engineer will determine the ~~BSG~~ *bulk specific gravity* of the cores in accordance with AASHTO T 166, *Method A*. The maximum specific gravity will be determined in accordance with AASHTO T 209, *Section 9.5.1* ~~from samples prepared in accordance with ITM 572. The target value for density of dense graded mixtures of each sublot shall be 92.0%~~.

Within one work day of coring operations the Contractor shall clean, dry, and refill the core holes with HMA of similar or smaller size particles.

~~The test results for each sublot shall meet the requirements for the tolerances as shown in the table below.~~

~~DENSE GRADED ACCEPTANCE TOLERANCE~~	
~~Core Density~~	~~94.0 ± 2.0 %MSG~~

~~Pay factors will be determined in accordance with 401.19(b).~~

The Engineer's acceptance test results for each sublot will be available when the sublot testing is complete. Acceptance of the pavement for density (%MSG) will be reported to the nearest ~~0.1~~ *0.01*%. Rounding will be in accordance with 109.01(a).

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401.17 Shoulder Corrugations

Shoulder corrugations shall be in accordance with 606.

401.18 Pavement Smoothness

The pavement smoothness will be accepted by means of a profilograph, a 16 ft (4.9 m) long straightedge, or a 10 ft (3 m) long straightedge.

The profilograph shall be used where all of the following conditions are met:

(a) the design speed is greater than 45 mph (70 km/h),

(b) the pavement lanes are full width and 0.1 mi (0.16 km) or longer, and

(c) the HMA is placed on a milled surface or the total combined planned lay rate of surface, intermediate, and base is 385 lb/syd (210 kg/m2) or greater.

If a pay item, Profilograph, HMA, is included in the contract and the above conditions are met, the Contractor shall furnish, calibrate, and operate an approved profilograph in accordance with ITM 912. The profilogram produced shall become the property of the Department. The profilograph shall remain the property of the Contractor. When a profilograph, HMA, is not included as a pay item, and the above conditions are met, the Department will furnish, calibrate, and operate the profilograph or the Department will develop a change order in accordance with 109.05 to include profilograph, HMA as a pay item.

Within the limits of a smoothness section where the posted speed is ~~40~~ *45* mph (65 km/h) or less, smoothness of that section may be measured by a profilograph or a 16 ft (4.9 m) long straightedge. The Contractor shall notify the Engineer of the selected process prior to placement of the HMA. Smoothness pay adjustments are only applicable when measured by a profilograph.

The 16 ft (4.9 m) long straightedge *is used to check longitudinal profile and* shall be used on *all* overlays where the profilograph is not specified. *For contracts that include a profilograph pay item,* ~~T~~the 16 ft (4.9 m) long straightedge shall be used on all *shoulders, on all* full width pavement lanes shorter than 0.1 mi (0.16 km) *in length*, on tapers, within 50 ft (15 m) of a reinforced concrete bridge approach, and within 50 ft (15 m) of an existing pavement, which is being joined.

The 10 ft (3 m) long straightedge shall be used *to check* ~~for~~ transverse slopes *across travel lanes and shoulders*, approaches, and crossovers.

All wavelike irregularities and abrupt changes in profile caused by paving operations shall be corrected.

Each finished course of base and intermediate shall be subject to approval. The pavement smoothness shall be checked on any new intermediate course located immediately below a surface course and the surface course at the locations as designated in ITM 912.

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If grinding of the intermediate course is used for pavement smoothness corrections, the grinding shall not precede the surface placement by more than 30 calendar days if open to traffic.

When the 16 ft (4.9 m) straightedge is used on a surface course, the pavement variations shall be corrected to 1/4 in. (6 mm) or less. When the 10 ft (3 m) straightedge is used, the pavement variations shall be corrected to 1/8 in. (3 mm) or less.

When the profilograph is being used on a surface course, in addition to the requirements for the profile index, all areas having a high or low point deviation in excess of 0.3 in. (8 mm) shall be corrected. Courses underlying the surface courses that are exposed by corrective actions shall be milled to 1 1/2 in. (38 mm) and replaced with the same type surface materials. The initial profile index shall be determined prior to any corrective action. The final profile index *for each section requiring corrective action* will be determined after all corrective action *within that section* has been completed.

When the profilograph is being used on an intermediate course, all areas having a high or low point deviation in excess of 0.3 in. (8 mm) shall be corrected. *After corrective action is taken on an intermediate course, a 16 ft (4.9 m) straightedge may be used to verify the adequacy of the corrective action.* When the 16 ft (4.9 mm) or 10 ft (3 m) straightedge is being used on an intermediate course, all areas having a high or low point deviation in excess of 1/4 in. (6 mm) shall be corrected.

401.19 Pay Factors

(a) Dense Graded Mixture > One Lot

Pay factors (PF) are calculated for binder content, air voids at N_{des}, VMA at N_{des} and in-place density (%Gmm). The Percent Within Limits (PWL) for each lot will be determined in accordance with ITM 588. The appropriate pay factor for each property is calculated as follows:

Estimated Percent Within Limits (PWL) greater than 90:

$$PF = (105.00-0.50 \times (100.00-PWL))/100$$

Estimated PWL greater than or equal to 50 and equal to or less than 90:

$$PF = (100.00 - 0.000020072 \times (100.00 - PWL)^{3.5877})/100$$

If the Lot PWL for any one of the properties is less than 50 or a sublot has an air void content less than 1.0%, the lot will be referred to the Office of Materials Management for adjudication as a failed material in accordance with normal Department practice as listed in 105.03.

Binder content, air voids, VMA, and in-place density (%Gmm) PF values will be reported to the nearest 0.01. Rounding will be in accordance with 109.01(a).

A composite pay factor for each lot based on test results for mixture properties and density is determined by a weighted formula as follows:

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$$Lot\ PF = 0.20(PF_{BINDER}) + 0.35(PF_{VOIDS}) + 0.10(PF_{VMA}) + 0.35\ (PF_{DENSITY})$$

where:

Lot PF = *Lot Composite Pay Factor for Mixture and Density*
PF_{BINDER} = *Lot Pay Factor for Binder Content*
PF_{VOIDS} = *Lot Pay Factor for Air Voids at* N_{des}
PF_{VMA} = *Lot Pay Factor for VMA at* N_{des}
$PF_{DENSITY}$ = *Lot Pay Factor for In-Place Density (%Gmm)*

The lot quality assurance adjustment for mixture properties and density is calculated as follows.

$$q = L \times U \times (Lot\ PF - 1.00)/MAF$$

where:

q = *quality assurance adjustment for mixture properties and density of the lot*
L = *Lot quantity*
U = *Unit price for the material, $/TON ($/Mg)*
Lot PF = *Lot Pay Factor*

Lot test results for binder content, air voids, VMA, and density will be used to determine the Lot Pay Factors.

The specification limits for binder content, air voids at N_{des}*, VMA at* N_{des}*, and density will be as follows:*

SPECIFICATION LIMITS				
Mixture				
	*LSL**		*USL***	
Binder Content, %	*- 0.40 from JMF*		*+ 0.40 from JMF*	
Air Voids (Va) at Ndes, %	*2.60*		*5.40*	
Voids In Mineral Aggregate at Ndes, %	*Greater Of*		*Lesser Of*	
	Spec-0.50	*JMF-1.20*	*Spec +2.00*	*JMF+ 1.20*
Density				
	LSL		*USL*	
Roadway Core Density (% Gmm), %	*91.00*		*Not Applicable*	

* *LSL, Lower Specification Limit*
** *USL, Upper Specification Limit*

(b) Dense Graded Mixture < One Lot and Open Graded Mixture

A composite pay factor for each sublot based on test results for mixture properties and density is determined in a weighted formula as follows:

$$SCPF = 0.20(PF_{BINDER}) + 0.35(PF_{VOIDS}) + 0.10(PF_{VMA}) + 0.35(PF_{DENSITY})$$

where:

SCPF = Sublot Composite Pay Factor for Mixture and Density
PF_{BINDER} = Sublot Pay Factor for Binder Content
PF_{VOIDS} = Sublot Pay Factor for Air Voids at N_{des}

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PF_{VMA} = Sublot Pay Factor for VMA at N_{des}
$PF_{DENSITY}$ = Sublot Pay Factor for Density

If the SCPF for a sublot is less than 0.85, the ~~Materials and Tests Division~~ *Office of Materials Management* will evaluate the pavement. If the Contractor is not required to remove the mixture, quality assurance adjustments of the lot will be assessed or other corrective actions taken as determined by the ~~Materials and Tests Division~~ *Office of Materials Management*.

The sublot quality assurance adjustment for mixture properties and density is calculated as follows.

$$q = L \times U \times (SCPF - 1.00)/MAF$$

where:

q = quality assurance adjustment for the sublot
L = sublot quantity
U = unit price for the material $/TON ($/Mg)
SCPF =sublot composite pay factor

~~(a) Mixture~~

Sublot test results for mixture properties will be assigned pay factors in accordance with the following.

BINDER CONTENT		
DENSE GRADED	OPEN GRADED	PAY FACTOR
Deviation from JMF (± %)	Deviation from JMF (± %)	Pay Factor
≤ 0.2	≤ 0.2	1.05
0.3	0.3	1.04
0.4	0.4	1.02
0.5	0.5	1.00
0.6	0.6	0.90
0.7	0.7	0.80
0.8	0.8	0.60
0.9	0.9	0.30
1.0	1.0	0.00
> 1.0	> 1.0	Submitted to the ~~Materials and Tests Division~~ *Office of Materials Management**
* Test results will be considered and adjudicated as a failed material in accordance with normal Department practice as listed in 105.03.		

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VMA		
DENSE GRADED	OPEN GRADED	PAY FACTOR
Deviation from JMF (± %)	Deviation from JMF (± %)	Pay Factor
≤ 0.5		1.05
> 0.5 and ≤ 1.0	All	1.00
> 1.0 and ≤ 1.5		0.90
>1.5 and ≤ 2.0		0.70
> 2.0 and ≤ 2.5		0.30
> 2.5		Submitted to the ~~Materials and Tests Division~~ *Office of Materials Management**
* Test results will be considered and adjudicated as a failed material in accordance with normal Department practice as listed in 105.03.		

AIR VOIDS		
DENSE GRADED	OPEN GRADED	PAY FACTOR
Deviation from JMF (± %)	Deviation from JMF (± %)	Pay Factor
≤ 0.5	≤ 1.0	1.05
> 0.5 and ≤ 1.0	> 1.0 and ≤ 3.0	1.00
1.1	3.1	0.98
1.2	3.2	0.96
1.3	3.3	0.94
1.4	3.4	0.92
1.5	3.5	0.90
1.6	3.6	0.84
1.7	3.7	0.78
1.8	3.8	0.72
1.9	3.9	0.66
2.0	4.0	0.60
> 2.0	> 4.0	Submitted to the ~~Materials and Tests Division~~ *Office of Materials Management**
* Test results will be considered and adjudicated as a failed material in accordance with normal Department practice as listed in 105.03.		

For mixtures produced during a plant's adjustment period, pay factors based on the JMF with the above tolerances will be used to compute quality assurance adjustments.

~~(b) Density~~

Sublot test results for density will be assigned pay factors in accordance with the following.

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DENSITY		
Percentages are based on %MSG	Pay Factors – Percent	
Dense Graded	Open Graded	
≥ 97.0		Submitted to the ~~Materials and Tests Division~~ *Office of Materials Management**
95.6 - 96.9		1.05 - 0.01 for each 0.1% above 95.5
94.0 - 95.5		1.05
93.1 - 93.9		1.00 + 0.005 for each 0.1% above 93.0
92.0 - 93.0	84.0	1.00
91.0 - 91.9		1.00 - 0.005 for each 0.1% below 92.0
90.0 - 90.9		0.95 - 0.010 for each 0.1% below 91.0
89.0 - 89.9		0.85 - 0.030 for each 0.1% below 90.0
≤ 88.9		Submitted to the ~~Materials and Tests Division~~ *Office of Materials Management**
* Test results will be considered and adjudicated as a failed material in accordance with normal Department practice as listed in 105.03.		

The pay factors ~~shall~~ *will* be rounded to the nearest 0.01.

(c) Smoothness

When the pavement smoothness is tested with a profilograph, payment will be based on a zero blanking band on the final profile index in accordance with the following table. A Quality Assurance Pay Factor, PFs, for smoothness will apply to the planned typical section including the aggregate base, and the HMA base, intermediate, and surface courses. The quality assurance adjustment for each section will include the total area of each pavement lane excluding shoulders for 0.1 mi (0.16 km) long section represented by the profile index calculated by the following formula.

$$\cancel{q_s = (PF_s - 1.00) \sum_{i-1}^{n} \left(A \times \frac{S}{T} \times U \right)}$$

$$q_s = (PF_s - 1.00) \sum_{i=1}^{n} \left(A \times \frac{S}{T} \times U \right)$$

where:

q_s = quality assurance adjustment for smoothness for one section
PF_s = pay factor for smoothness
n = number of layers
A = area of the section, syd (m^2)
S = planned spread rate for material, lb/syd (kg/m^2)

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T = conversion factor: 2000 lb/ton (1000 kg/Mg)
U = unit price for the material, $/ton ($/Mg)

The quality assurance adjustment for smoothness, Qs, for the contract will be the total of the quality assurance adjustments for smoothness, qs, on each section by the following formula.

$$Q_s = \sum q_s$$

ADJUSTMENT FOR SMOOTHNESS ($PI_{0.0}$) ZERO BLANKING BAND	
Design Speed Greater Than 45 mph (70 km/hr)	
Profile Index in./0.1 mi. (mm per 0.16 km)	Pay Factor
Over 0.00 to 1.20 in. (Over 0 to 30 mm)	1.06
Over 1.20 to 1.40 in. (Over 30 to 35 mm)	1.05
Over 1.40 to 1.60 in. (Over 35 to 40 mm)	1.04
Over 1.60 to 1.80 in. (Over 40 to 45 mm)	1.03
Over 1.80 to 2.00 in. (Over 45 to 50 mm)	1.02
Over 2.00 to 2.40 in. (Over 50 to 60 mm)	1.01
Over 2.40 to 3.20 in. (Over 60 to 80 mm)	1.00
Over 3.20 to 3.40 in. (Over 80 to 85 mm)	0.96
All pavement with a profile index ($PI_{0.0}$) greater than 3.40 in. (85 mm) shall be corrected to 3.40 in. (85 mm).	

Quality assurance pay factors greater than 1.00 will be applicable only to the initial measured profile index, prior to any corrective work. *Regardless of the pay factor tabulated above, quality assurance pay factors for individual sections that require corrective action for high or low points in excess of 0.3 in. (8 mm) will not be greater than 1.00.* Quality assurance pay factors of 1.00 or less will be applied to pavement sections where corrective work has been completed.

The total quality assurance adjustment~~s~~ is ~~to be~~ calculated as follows:

$$Q = Q_s + (\sum q)$$

where

Q = total quality assurance adjustment
Q_s = quality assurance adjustment for smoothness

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q = *lot or* sublot quality assurance adjustment

401.20 Appeals

If the QC test results do not agree with the acceptance test results, a request, along with the QC test results, may be made in writing for additional testing. The appeal sample will be analyzed in a lab different than the lab that analyzed the original sample when requested by the Contractor. Additional testing may be requested for one or more of the following tests: MSG, BSG of the gyratory specimens, binder content, or BSG of the density cores. The request for the appeal for MSG, BSG of gyratory specimens, binder content or BSG of the density cores shall be submitted within seven calendar days of receipt of the Department's written results for that sublot. The sublot and specific test(s) shall be specified at the time of the appeal request. Only one appeal request per sublot is permitted. Upon approval of the appeal, the Engineer will perform additional testing as follows.

The backup or new sample(s) will be tested in accordance with the applicable test method for the test requested.

(a) MSG

The backup MSG sample will be dried in accordance with ITM 572 and tested in accordance with AASHTO T 209, Section 9.5.1.

(b) BSG of the Gyratory Specimen

New gyratory specimens will be prepared and tested in accordance with AASHTO T 312 from the backup sample.

(c) Binder Content

The backup binder content sample will be prepared and tested in accordance with the test method that was used for acceptance *or as directed by the Engineer*.

(d) BSG of the Density Core

Additional cores shall be taken within seven calendar days unless otherwise directed. Additional core locations will be determined by adding 1.0 ft (0.3 m) longitudinally of the cores tested using the same transverse offset. The appeal density cores will be *dried in accordance with ITM 572 and* tested in accordance with AASHTO T 166, *Method A*.

The appeal results will replace all previous test result(s) for acceptance of mixture in accordance with 401.09 and density in accordance with 401.16. The results will be furnished to the Contractor.

401.21 Method of Measurement

HMA mixtures will be measured by the ton (megagram) of the type specified, in accordance with 109.01(b). The measured quantity will be divided by the MAF to determine the pay quantity.

Milled shoulder corrugations will be measured in accordance with 606.02.

401.22 Basis of Payment

The accepted quantities for this work will be paid for at the contract unit price per ton (megagram) for QC/QA-HMA, of the type specified, complete in place.

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Payment for furnishing, calibrating, and operating the profilograph, and furnishing profile information will be made at the contract lump sum price for profilograph, HMA.

Adjustments to the contract payment with respect to mixture, density, and smoothness for mixture produced will be included in a quality assurance adjustment pay item in accordance with 109.05.1.

Milled shoulder corrugations will be paid for in accordance with 606.03.

Payment will be made under:

Pay Item	**Pay Unit Symbol**
Profilograph, HMA	LS
QC/QA-HMA, _____, _____, _____, _____mm (ESAL[1])(PG[2])(Course[3])(Mix[4])	TON (Mg)

(1) ESAL Category as defined in 401.04
(2) Number represents the high temperature binder grade. Low temperature grades are -22.
(3) Surface, Intermediate, or Base
(4) Mixture Designation

Preparation of surfaces to be overlaid shall be included in the cost of other pay items.

Coring and refilling of the core holes shall be included in the cost of other pay items within this section.

No payment will be made for additional anti-stripping additives, appeal coring or traffic control expenditures related to coring operations.

Corrections for pavement smoothness shall be included in the cost of other pay items within this section.

The price for Profilograph, HMA will be full compensation regardless of how often the profilograph is used or how many profilograms are produced.

If QC/QA-HMA intermediate over QC/QA-HMA base mixtures are specified, QC/QA-HMA intermediate mixture may be permitted as a substitute for the QC/QA-HMA intermediate and QC/QA-HMA base mixtures upon a written request by the Contractor. The request for the substitution shall be prepared in advance of the work. A computation will be made in order to obtain a unit price for the QC/QA-HMA intermediate mixture. The quantity and amount for QC/QA-HMA intermediate mixture shall equal the sum of the contract quantities and amounts shown for QC/QA-HMA intermediate and QC/QA-HMA base mixtures. The unit price for QC/QA-HMA intermediate mixture shall be equal to the sum of contract amounts divided by the sum of contract quantities. Payment for the QC/QA-HMA intermediate mixture will be made at the unit price per ton (megagram) for QC/QA-HMA intermediate mixture. No payment will be made for additional work or costs which may result due to this change.

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REVISION TO 2008 STANDARD SPECIFICATIONS

SECTION 401, CONTINUED.

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Other sections containing specific cross references:

SEE NEXT PAGE

Recurring Special Provisions potentially affected:

400-R-547

Motion: M
Second: M
Ayes:
Nays:

General Instructions to Field Employees
Update Required? Y___ N___
By - Addition or Revision
Frequency Manual
Update Required? Y___ N___
By – Addition or Revision

Standard Sheets potentially affected:

None

Action: Passed as submitted; revised

___ RSP Effective: _____ Letting
RSP Sunset Date: _____
___ RPD Effective: _____ Letting
___ 20__ Standard Specifications Book
___ 20__ Standards Edition
___ 20__ Design Manual
___ Technical Advisory

Withdrawn ____

Received FHWA Approval? ____

CROSS REFERENCES TO SECTION 401 – ITEM NO. 08-10-2

109.05(a) Pg 104
304.05 Pg 211
306.04 Pg 217
306.05 Pg 218
306.07 Pg 219
401.04 Pg 222
401.06 Pg 227
401.09 Pg 228
401.16 Pg 232
401.20 Pg 240
401.22 Pg 241
402.05 Pg 243
402.06 Pg 243
402.10 Pg 245
402.18 Pg 250
410.10 Pg 271
410.18 Pg 274
410.19 Pg 275
410.22 Pg 278
501.29(b) Pg 294
610.06 Pg 373
715.12 Pg 553
718.02 Pg 568

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SECTION 402, AFTER LINE 39a, INSERT AS FOLLOWS:

Mixture Type	Type A	Type B	Type C	Type D
Design ESAL	200,000	2,000,000	9,000,000	11,000,000
Surface	9.5 mm	9.5 mm	9.5 mm	9.5 mm
	12.5 mm	*12.5 mm*	*12.5 mm*	*12.5 mm*
Surface – PG Binder	64-22	64-22	70-22	70-22
Intermediate	*12.5 mm*	*12.5 mm*	*12.5 mm*	*12.5 mm*
	19.0 mm	19.0 mm	19.0 mm	19.0 mm
Intermediate – PG Binder	64-22	64-22	64-22	70-22
Base	*19.0 mm*	*19.0 mm*	*19.0 mm*	*19.0 mm*
	25.0 mm	25.0 mm	25.0 mm	25.0 mm
Base – PG Binder	64-22	64-22	64-22	64-22

SECTION 402, LINE 52, DELETE AND INSERT AS FOLLOWS:

The MAF equals the Gmm from the mixture design divided by the following: 2.465 for 9.5 mm mixtures and 2.500 for 12.5 mm, 19.0 mm, and 25.0 mm mixtures. If the MAF calculation results in a value where 0.980 ≤ MAF ≤ 1.020, then the MAF shall be considered to be 1.000. ~~If the calculated MAF is outside of the above range, then the actual calculated value shall be used.~~ *If the MAF is greater than 1.020, the calculated MAF value shall have 0.020 subtracted from the value. If the MAF is less than 0.980, the calculated MAF value shall have 0.020 added to the value.*

SECTION 402, LINE 346, INSERT AS FOLLOWS:

The Engineer will determine the bulk specific gravity of the cores in accordance with AASHTO T 166, *Method A.*. The maximum specific gravity will be determined in accordance with AASHTO T 209, *Section 9.5.1*. Density shall not be less than 92.0%.

SECTION 402, LINE 381, DELETE AND INSERT AS FOLLOWS:

Pay Item **Pay Unit Symbol**

~~HMA Surface, Type ___*___ ..... TON (Mg)~~
~~HMA Intermediate, Type ___*___ ..... TON (Mg)~~
~~HMA Base, Type ___*___ ..... TON (Mg)~~
~~HMA Rumble Strips ..... LFT (m)~~
~~HMA for Temporary Pavement ..... TON (Mg)~~
~~HMA Wedge and Level, Type ___*___ ..... TON (Mg)~~
~~* Mixture type~~

HMA, _____, _____ mm, Type _____ ..... TON (Mg)
(Course[1]) (Mix[2]) (Type[3])

(1) Mixture Course: Surface, Intermediate, Base, Rumble Strips, Temporary Pavement or Wedge and Level
(2) Mixture Designation: 9.5, 12.5, 19.0 or 25.0 mm
(3) Mixture Type: A, B, C or D

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SECTION 410, LINE 84, INSERT AS FOLLOWS:

The optimum binder and aggregate gradation content shall produce 4.0% air voids. The maximum specific gravity of the uncompacted mixture shall be determined in accordance with AASHTO T 209, *Section 9.5.1.*. The percent draindown for SMA surface mixture shall not exceed 0.30% in accordance with AASHTO T 305.

SECTION 410, LINE 89, DELETE AND INSERT AS FOLLOWS

The MAF equals the Gmm from the mixture design divided by the following: 2.465 for 9.5 mm mixtures and 2.500 for 12.5 mm, 19.0 mm, and 25.0 mm mixtures. If the MAF calculation results in a value where 0.980 ≤ MAF ≤ 1.020, then the MAF shall be considered to be 1.000. ~~If the calculated MAF is outside of the above range, then the actual calculated value shall be used.~~ *If the MAF is greater than 1.020, the calculated MAF value shall have 0.020 subtracted from the value. If the MAF is less than 0.980, the calculated MAF value shall have 0.020 added to the value.* The MAF does not apply to OG mixtures.

SECTION 410, BEGIN LINE 136, DELETE AS FOLLOWS:

410.09 Acceptance of Mixtures

Acceptance of mixtures for binder content, ~~moisture,~~ and gradation for each lot will be based on tests performed by the Engineer. The Engineer will randomly select the location(s) within each sublot for sampling in accordance with ITM 802.

Samples from each location shall be obtained from each sublot from the pavement in accordance with ITM 580. ~~The second sample shall be located from the random sample by offsetting 1 ft (0.3 m) transversely towards the center of the mat and will be used for the moisture sample.~~ The test results of the sublots will be averaged and shall meet the requirements for tolerances from the JMF for each sieve and binder content.

~~The maximum percent of moisture in the mixture shall not exceed 0.10 from plate samples.~~

SECTION 410, LINE 170, DELETE AS FOLLOWS:

Single test values and averages will be reported to the nearest 0.1% ~~except moisture will be reported to the nearest 0.01%~~. Rounding will be in accordance with 109.01(a).

SECTION 410, LINE 313, INSERT AS FOLLOWS:

The density of the mixture will be expressed as the percentage of maximum specific gravity (%MSG) obtained by dividing the average bulk specific gravity by the maximum specific gravity for the sublot, times 100. *Samples for the bulk specific gravity and maximum specific gravity will be dried in accordance with ITM 572.* The Engineer will determine the BSG of the cores in accordance with AASHTO T 166, *Method A*. The maximum specific gravity will be determined in accordance with AASHTO T 209, *Section 9.5.1.* ~~from plant produced materials prepared in accordance with ITM 572.~~ The target value for density of SMA mixtures of each sublot shall be 93.0%.

The Engineer will determine the bulk specific gravity of the cores in accordance with AASHTO T 166, *Method A*. The maximum specific gravity will be determined in accordance with AASHTO T 209, *Section 9.5.1*. Density shall not be less than 92.0%.

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SECTION 902, LINE 16, DELETE AND INSERT AS FOLLOWS:

1. Lots and Sublots

A binder lot for each grade of PG binder will be one week of HMA production. Lots will be further subdivided into sublots for each *calendar day* ~~twelve hour period when~~ *that* HMA is produced.~~ within a calendar day. A lot will contain one to fourteen sublots~~.

2. Sampling

~~Each sample~~ *An acceptance sample and backup sample* shall be taken from the asphalt delivery system at the HMA plant. ~~Each sample~~ *The two samples* will represent a sublot. *A copy of a load ticket identifying the binder source shall be submitted with the sublot samples. The Engineer will take immediate possession of the samples.* ~~The Department will randomly select one sublot from each lot in accordance with ITM 802 for either complete or partial testing. If the sublot selected is in compliance, the lot will be accepted. If the sublot is not in compliance, the material will be adjudicated as a failed material in accordance with 105.03.~~

3. PG Binder Testing

The Department will randomly select one sublot from each lot in accordance with ITM 802 for either complete or partial testing in accordance with AASHTO M 320. Complete PG binder testing will consist of RTFO DSR and PAV BBR testing. Partial PG binder testing will consist of RTFO DSR testing. Rotational viscosity and flashpoint tests are not required. If the sublot selected is in accordance with the specifications, the lot will be accepted. If the selected sublot is not in accordance with the specifications, the material will be adjudicated as a failed material in accordance with 105.03.

~~PG binder testing will be performed on completed PG binder lots and will consist of either complete or partial testing. Complete PG binder testing consists of RTFO-DSR and PAV-BBR testing. Complete PG binder testing will be performed on the first sublot of the first lot of production for each grade of material for each supplier, per plant, and then randomly once every ten lots. Partial PG binder testing consists of RTFO-DSR testing on a random sublot of each lot. Lots and/or sublots to be tested will be selected in accordance with Section 3.0 of ITM 802. Random lots designated for complete testing will be selected upon the delivery of the first lot. Rotational viscosity and flashpoint tests are not required for complete or partial testing.~~

~~If the test results from the complete or the partial testing are in accordance with the specifications, the entire lot of PG material is considered to be acceptable.~~

~~If the test results from a complete test are not in accordance with the specifications, the results will be reported to the DMTE and the Department's Asphalt Engineer. The DMTE will prepare a failed materials report in accordance with 105.03, and the next PG binder lot will be selected for complete testing.~~

~~If the test results from the partial test are not in accordance with the specifications, the Department's laboratory will initiate a PAV-BBR test on the same sublot. The test results will be reported to the DMTE and the Department's Asphalt Engineer. The DMTE will prepare a failed material report in accordance with 105.03, and the next PG binder lot will be selected for complete testing.~~

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~~For any PG binder lot having test results not complying with the specifications, the remaining samples for that lot and all the backup samples will be held for 60 days from the date written notification is provided for possible appeal testing. After 60 days, all samples will be discarded. PG binder samples and backups for lots meeting specifications will be discarded promptly.~~

~~The Department's Asphalt Engineer will review the supplier's ASC program and the appropriate DMTE will review the Certified HMA Producer's QCP for compliance for all failing complete test results.~~

4. Appeals

If the Contractor does not agree with the acceptance test results for the lot, a request may be made in writing for additional testing. The appeal shall be submitted within ~~30~~ *15* calendar days of receipt of the Department's written results. The basis of the appeal shall include complete AASHTO M 320 test results for the specific sublot in question plus test values from all other sublots for the parameters being disputed.

~~If an appeal is accepted, the Department will randomly select two additional sublot samples if available from the lot in question. The additional sublot samples if available and the backup sample will be tested in an AASHTO accredited laboratory for the failing test parameters. The backup and additional test results for each test will be averaged. The average value for each test will be considered the final lot value. The Contractor will be notified in writing of the additional test results, the final lot values, and the appeal conclusions.~~

~~If the appeal is not accepted, the Department will respond to the Contractor stating the grounds for the denial.~~

SECTION 904, LINE 127, INSERT AS FOLLOWS:

The fine aggregate angularity value shall not apply to OG mixtures.

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SECTION 904, CONTINUED.

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Other sections containing specific cross references:

SEE NEXT PAGE

Recurring Special Provisions potentially affected:

400-R-547

Motion: M
Second: M
Ayes:
Nays:

General Instructions to Field Employees
Update Required? Y___ N___
By - Addition or Revision
Frequency Manual
Update Required? Y___ N___
By – Addition or Revision

Standard Sheets potentially affected:

None

Action: Passed as submitted; revised

___ RSP Effective: _____ Letting
RSP Sunset Date: _____
___ RPD Effective: _____ Letting
___ 20__ Standard Specifications Book
___ 20__ Standards Edition
___ 20__ Design Manual
___ Technical Advisory

Withdrawn ____

Received FHWA Approval? ____

CROSS REFERENCES – ITEM NO. 08-10-2

402.04
304.07 Pg 211
402.05 Pg 243
402.06 Pg 244
402.07(a) Pg 244
402.07(b) Pg 244
402.07(c) Pg 244
503.03(e) Pg 310
507.05(b) Pg 328
610.03 Pg 372
610.06 Pg 374

402.05
304.04 Pg 210
304.05 Pg 211
402.03 Pg 242
402.04 Pg 243
402.07(a) Pg 244
402.07(c) Pg 244
402.07(d) Pg 244
503.03(e) Pg 310
507.05(b) Pg 328
604.07(c) Pg 356
715.12 Pg 553

402.16
402.12 Pg 246
402.20 Pg 251

402.20
610.06 Pg 373
801.08 Pg 624

410.05
410.04 Pg 267
410.09 Pg 270
410.19(a) Pg 276

410.09
410.16 Pg 274
410.19(a) Pg 276

410.16
None

902.01(a_1
None

902.01(a)2
None

902.01(a)3
None

902.01(a)4
None

904.02(b)_
None

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