400-R-553 HMA PROVISIONS

(Revised 02-16-12)

The Standard Specifications are revised as follows:

SECTION 401, BEGIN LINE 9, INSERT AS FOLLOWS:

401.02 Quality Control

The HMA shall be supplied from a certified HMA plant in accordance with ITM 583; Certified 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.

When a safety edge is required for a project, the QCP shall identify the device or devices in accordance with 409.03(c) to be used for constructing the safety edge.

SECTION 401, BEGIN LINE 48, DELETE AND INSERT AS FOLLOWS:

The plant discharge temperature for any mixture shall not be more than 315°F whenever PG 58-28, PG 64-22, PG 64-28 or PG 70-22 binders are used or 325°F whenever PG 70-28 or PG 76-22 binders are used. QC/QA HMA may be produced ~~as warm mix asphalt, WMA, by~~ using a water-injection foaming device. ~~for ESAL category 1, 2 and 3 mixtures.~~ The DMF shall list the minimum *and maximum* plant discharge temperatures ~~for HMA and WMA~~ as applicable to the mixture.

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 AASHTO R 35 and the respective AASHTO reference as listed below.

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:

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
* The mix design gradation shall be less than or equal to the PCS control point for 9.5 mm category *3,* 4 and 5 surface mixtures.					
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

SECTION 401, BEGIN LINE 79, INSERT AS FOLLOWS:

determined in water in accordance with AASHTO T 209. The bulk specific gravity of the gyratory specimens shall be determined in accordance with AASHTO T 166, Method A *or AASHTO T 275, if required,* 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 *recycled materials and* fibers. *The recycled materials shall be in accordance with 401.06, and the fiber type and minimum dosage rate shall be in accordance with AASHTO M 325.* The binder for open graded mixtures ~~containing fibers~~ may ~~be reduced by 1 temperature classification, 6°C, for the upper temperature classification. The fiber type and minimum dosage rate shall be in accordance with AASHTO M 325~~*have the upper temperature classification reduced by 6°C from the specified binder grade if fibers are incorporated into the mixture or if a minimum of 3.0% reclaimed asphalt shingles by weight of the total mixture are used.*

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.~~

SECTION 401, BEGIN LINE 157, DELETE AND INSERT AS FOLLOWS:

The recycled material percentages shall be as specified on the DMF. HMA mixtures utilizing recycled materials shall be limited to the binder replacement percentages in the following table:

HMA mixtures utilizing RAP or RAS or a blend of RAP and RAS

MAXIMUM BINDER REPLACEMENT, %			
Mixture Category	Base and Intermediate		Surface
	Dense Graded	Open Graded	Dense Graded

	25.0 mm	19.0 mm	12.5 mm	9.5 mm	25.0 mm	19.0 mm	12.5 mm	9.5 mm	4.75 mm
1	40.0*				25.0		40.0*		
2	40.0*				25.0		40.0*		
3	40.0*				25.0		~~15.0~~*25.0*		
4	40.0*				25.0		~~15.0~~*25.0*		
5	40.0*				25.0		~~15.0~~*25.0*		

*RAS materials shall not contribute more than 25% by weight (mass) of the total binder content for any HMA mixture.

SECTION 401, BEGIN LINE 189, DELETE AND INSERT AS FOLLOWS:

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 shall list the minimum *and maximum* plant discharge temperatures ~~for HMA and WMA~~ as applicable to the mixture. The JMF for each mixture shall be submitted to the Engineer and shall use the same MAF as the DMF.

SECTION 401, BEGIN LINE 222, INSERT AS FOLLOWS:

The bulk specific gravity of gyratory specimens for dense graded mixtures will be determined in accordance with AASHTO T 166, Method A *or AASHTO T 275, if required*, 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 AASHTO T 331.

SECTION 401, BEGIN LINE 304, INSERT AS FOLLOWS:

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.

Prior to placing an open graded mixture, the underlying HMA course shall have a full width base seal applied in accordance with 415. The base seal materials shall be applied within 3 calendar days after all density cores in accordance with 401.16 have been obtained.

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.

All partially completed sections of roadway that are 8 in. or less in thickness shall be proofrolled prior to the placement of additional materials unless otherwise directed by the Engineer. Proofrolling shall be accomplished in accordance with 203.26. The contact pressure shall be 70 to 80 psi. Soft yielding areas shall be removed and replaced.

SECTION 401, AFTER LINE 361, INSERT AS FOLLOWS:

A safety edge shall be constructed at locations where a dense graded intermediate mixture or a surface mixture is constructed adjacent to an aggregate or earth shoulder.

SECTION 401, BEGIN LINE 423, INSERT AS FOLLOWS:

The Engineer will determine the bulk specific gravity of the cores in accordance with AASHTO T 166, Method A *or AASHTO T 275, if required*. The maximum specific gravity will be mass determined in water in accordance with AASHTO T 209.

SECTION 401, BEGIN LINE 728, INSERT AS FOLLOWS:

(d) BSG of the Density Core

Additional cores shall be taken within 7 calendar days unless otherwise directed. Additional core locations will be determined by adding 1 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 *or AASHTO T 275, if required*.

SECTION 401, AFTER LINE 779, INSERT AS FOLLOWS:

The cost of removing and replacing soft and yielding areas shall be included in the cost of other pay items in this section.

SECTION 402, BEGIN LINE 8, INSERT AS FOLLOWS:

402.02 Quality Control

The HMA shall be supplied from a certified HMA plant in accordance with ITM 583; Certified 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.

When a safety edge is required for a project, the QCP shall identify the device or devices in accordance with 409.03(c) to be used for constructing the safety edge.

SECTION 402, BEGIN LINE 30, DELETE AND INSERT AS FOLLOWS:

402.04 Design Mix Formula

A DMF shall be prepared in accordance with 402.05 and submitted in a format acceptable to the Engineer 1 week prior to use. The DMF shall state the maximum particle size in the mixture, the calibration factor and test temperature to be used for the determination of binder content using ITM 586 or ITM 571, and a MAF. Approval of the DMF will be based on the ESAL and mixture designation 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	4.75 mm	4.75 mm	4.75 mm	4.75 mm
	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	9.5 mm	9.5 mm	9.5 mm	9.5 mm
	12.5 mm	12.5 mm	12.5 mm	12.5 mm

	19.0 mm	19.0 mm	19.0 mm	19.0 mm
	25.0 mm	25.0 mm	25.0 mm	25.0 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

Surface 4.75 mm mixtures shall not be used when the required lay rate shown on the plans is greater than 100 lb/sq yd. Surface 12.5 mm mixtures shall not be used when the required lay rate shown on the plans is less than 195 lb/sq yd.

The plant discharge temperature for any mixture shall not be more than 315°F whenever PG 58-28, PG 64-22, PG 64-28 or PG 70-22 binders are used or 325°F whenever PG 70-28 or PG 76-22 binders are used. HMA may be produced ~~as warm-mix asphalt, WMA, by~~ using a water-injection foaming device. ~~for temporary HMA mixtures and type A, B and C mixtures.~~ The DMF shall list the minimum *and maximum* plant discharge temperatures ~~for HMA and WMA~~ as applicable to the mixture.

The Engineer will assign a mixture number. No mixture will be accepted until the DMF has been approved.

SECTION 402, BEGIN LINE 74, DELETE AS FOLLOWS:

~~For mixtures containing 0.0% to 15.0% RAP, changes in the source and grade of specified binders will be permitted; however, the high temperature grade shall meet the minimum requirements of 402.04.~~

SECTION 402, BEGIN LINE 204, INSERT AS FOLLOWS:

Prior to placing an open graded mixture, the underlying HMA course shall have a full width base seal applied in accordance with 415. The base seal materials shall be applied within 3 calendar days upon completion of paving the underlying HMA course.

SECTION 402, BEGIN LINE 220, DELETE AND INSERT AS FOLLOWS:

All partially completed sections of roadway that are 8 in. ~~(200 mm)~~ or less in thickness shall be proofrolled prior to the placement of additional materials ~~the following *spring*~~*unless otherwise directed by the Engineer*. Proofrolling shall be accomplished in accordance with 203.26. The contact pressure shall be 70 to 80 psi ~~(480 to 550 kPa)~~. Soft yielding areas shall be removed and replaced.

SECTION 402, AFTER LINE 275, INSERT AS FOLLOWS:

A safety edge shall be constructed at locations where an intermediate mixture or a surface mixture is constructed adjacent to an aggregate or earth shoulder.

SECTION 402, BEGIN LINE 296, DELETE AND INSERT AS FOLLOWS:

NUMBER OF ROLLER APPLICATIONS							
Rollers	Courses ≤ 440 lb/sq yd ~~(240 kg/m^2)~~					Courses > 440 lb/sq yd ~~(240 kg/m^2)~~	
	Option 1	Option 2	Option 3	Option 4	*Option 5*	Option 1	Option 2
Three Wheel	2		4			4	

Pneumatic Tire	2	4				4	
Tandem	2	2	2			4	
Vibratory ~~Roller~~				6			8
Oscillatory					*6*	-	-

SECTION 402, BEGIN LINE 380, INSERT AS FOLLOWS:

The Engineer will determine the bulk specific gravity of the cores in accordance with AASHTO T 166, Method A *or AASHTO T 275, if required*. The maximum specific gravity will be mass determined in water in accordance with AASHTO T 209. Density shall not be less than 92.0%.

SECTION 402, BEGIN LINE 431, DELETE AS FOLLOWS:

The cost of removing and replacing soft yielding areas ~~discovered by proofrolling~~ shall be included in the cost of other pay items in this section.

SECTION 403, BEGIN LINE 52, INSERT AS FOLLOWS:

403.07 Spreading Mixture

The CMA mixture shall be spread in accordance with 402.13.

A safety edge shall be constructed at locations where an intermediate mixture or a surface mixture is constructed adjacent to an aggregate or earth shoulder.

SECTION 409, AFTER LINE 67, INSERT AS FOLLOWS:

When a dense graded intermediate or a surface mixture is placed adjacent to an aggregate or earth shoulder, the side of the paver adjacent to the aggregate or earth shoulder shall be equipped with a device capable of constructing a safety edge. The following devices are approved for this application:

(a) Advent-Edge™, Advent-Edge Paving Equipment LLC
(b) Safety Edge End Gate, Carlson Paving Products, Inc.
(c) TransTech Shoulder Wedge Maker™, TransTech Systems, Inc.
(d) SafeTSlope Edge Smoother™, Troxler Electronic Laboratories, Inc.

SECTION 409, BEGIN LINE 104, DELETE AND INSERT AS FOLLOWS:

4. Vibratory Roller

A vibratory roller ~~shall be equipped with~~*is a roller that has both drums equipped for vertical impact forces,* a variable amplitude system, a speed control device, and have a minimum vibration frequency of 2,000 vibrations per min. A reed tachometer shall be provided for verifying the frequency of vibrations.

5. Oscillatory Roller

An oscillatory roller is a roller that has both drums equipped for horizontal and vertical shear forces or 1 drum equipped for horizontal and vertical shear force and the other drum equipped for a vertical impact force.

~~5.~~6. Trench Roller

A trench roller shall have a compaction wheel bearing of no less than 300 lb/in. ~~(5.3 kg/mm)~~.

~~6.~~*7.* Specialty Roller/Compactor

Inaccessible or short sections of HMA may be compacted with specialty equipment approved by the Engineer.

SECTION 410, BEGIN LINE 8, INSERT AS FOLLOWS:

410.02 Quality Control

The SMA mixture shall be supplied from a certified HMA plant in accordance with ITM 583; Certified Hot Mix Asphalt Producer Program. The QCP shall be modified to include the requirements for the SMA mixtures. The SMA 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 SMA paving operations.

When a safety edge is required for a project, the QCP shall identify the device or devices in accordance with 409.03(c) to be used for constructing the safety edge.

SECTION 410, BEGIN LINE 123, DELETE AND INSERT AS FOLLOWS:

The recycled material percentages shall be as specified on the DMF. SMA mixtures utilizing recycled materials shall be limited to the binder replacement percentages in the following table:

SMA mixtures utilizing RAP or RAS or a blend of RAP and RAS

MAXIMUM BINDER REPLACEMENT, %		
SMA Surface		
Mixture Category	12.5 mm	9.5 mm
1	40.0*	40.0*
2	40.0*	40.0*
3	~~15.0~~*25.0*	~~15.0~~*25.0*
4	~~15.0~~*25.0*	~~15.0~~*25.0*
5	~~15.0~~*25.0*	~~15.0~~*25.0*

* RAS materials shall not contribute more than 25% by weight (mass) of the total binder content for any HMA mixture.

SECTION 410, BEGIN LINE 153, INSERT AS FOLLOWS:

410.08 Job Mix Formula

A job mix formula, JMF, shall be developed by a certified HMA producer in accordance with ITM 583. A JMF used for SMA mixture the current or previous calendar year will be allowed. The mixture compaction temperature shall be 300 ± 9°F ~~(150 ± 5°C)~~. *The JMF shall list the minimum and maximum plant discharge temperatures as applicable to the mixture.* The JMF for each mixture shall be submitted to the Engineer.

SECTION 410, AFTER LINE 294, INSERT AS FOLLOWS:

A safety edge shall be constructed at locations where the surface mixture is constructed adjacent to an aggregate or earth shoulder.

SECTION 410, BEGIN LINE 344, DELETE AND INSERT AS FOLLOWS:

The Engineer will determine the ~~BSG~~ *bulk specific gravity* of the cores in accordance with AASHTO T 166, Method A *or AASHTO T 275, if required*. The maximum specific gravity will be mass determined in water in accordance with AASHTO T 209. 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 mass determined in water in accordance with AASHTO T 209. Density shall not be less than 92.0%.~~

SECTION 410, BEGIN LINE 465, INSERT AS FOLLOWS:

(c) BSG of the Density Core

Cores shall be taken within 7 calendar days unless otherwise directed. Additional core locations will be determined by adding 1 ft ~~(0.3m)~~ longitudinally of the cores tested using the same transverse offset. The cores will be dried in accordance with ITM 572 and tested in accordance with AASHTO T 166, Method A *or AASHTO T 275, if required*. The Contractor shall clean, dry, and refill the core holes with SMA or HMA surface materials within 1 work day of the coring operations.

SECTION 410, AFTER LINE 521, INSERT AS FOLLOWS:

SECTION 415 – BASE SEAL

415.01 Description

This work shall consist of applying asphalt emulsion to the pavement surface in accordance with 105.03.

MATERIALS

415.02 Materials

Base seal materials shall be in accordance with the following:

Asphalt Emulsion, SS-1h, AE-NT.....902.01(b)

CONSTRUCTION REQUIREMENTS

415.03 Equipment

A distributor in accordance with 409.03(a) shall be used.

415.04 Weather Limitations

Base sealing operations shall not be conducted on a wet pavement or when the ambient air or pavement temperature is below 32°F.

415.05 Preparation of Surface

Surfaces shall be clean and free of any foreign or loose material.

415.06 Application of Asphalt Material

The base seal materials shall be applied to the pavement surface uniformly with a distributor at an application rate of 0.22 ± 0.02 gal./sq yd.

415.07 Protection of Surface

The base seal materials shall cure a minimum of 2 hours after application before resuming paving operations.

415.08 Method of Measurement

The base seal will be measured by the ton complete in place.

415.09 Basis of Payment

The base seal will be paid for at the contract unit price per ton.

Payment will be made under:

Pay Item	***Pay Unit Symbol***
Base Seal	*TON*

The costs of all asphalt materials, surface preparation and all other necessary incidentals shall be included in the cost of the pay item.