

STATE**OF****TENNESSEE**

(Rev. 12-15-21)

(Rev. 12-19-22)

(Rev. 10-17-23)

(Rev. 12-27-23)

(Rev. 8-28-24)

(Rev. 12-26-24)

January 1, 2021

Supplemental Specifications – 400SS**of the****Standard Specifications for Road and Bridge Construction****January 1, 2021**

Subsection 403.04, (pg. 285), 12-15-21; **Preparing Surface**; Revise Paragraph:

Prepare the designated surface as specified in **405.05**. Ensure that the surface is dry when applying tack coat.

Subsection 403.04, (pg. 285), 12-27-23; **Preparing the Surface**; Revise Paragraph:

Prepare the designated surface as specified in **405.05**. Ensure that the surface is swept clean and dry when applying tack coat.

Subsection 403.05.C, (pg. 286), 12-15-21; **Fog Sealing**; Revise 1st Paragraph:

When the Contract requires bituminous material for fog sealing of shoulders, provide emulsified asphalt meeting **403.02** or an item from QPL 40A. Apply diluted emulsified asphalt at a rate of 0.10 to 0.15 gallons per square yard based on a dilution rate of one-part emulsified asphalt to one part water. This application may require two equal increments if run-off occurs. Apply fog seal when the ambient air temperature or the surface temperature is a minimum of 50°F.

Subsection 405.06.A, (pg. 290), 12-27-23; **Applying Bituminous Material**; Revise 3rd Paragraph:

At least 7 working days before the scheduled start of construction of any bituminous seal coat, submit a starting aggregate spread rate and emulsion shot rate as determined by AASHTO R 102 or an equivalent design method. Apply emulsified asphalt by pressure distributor at a uniform rate in accordance with Table 405.06-1 below. The exact rate will be established by the Engineer.

Subsection 407.03.E.1, (pg. 310), 10-17-23; **Tensile Strength Ratio**; Revise Table 407.03-4:

Table 407.03-4: Criteria for Stripping and Moisture Susceptibility

Asphalt Cement	Minimum Tensile Strength	Minimum TSR
Polymer Modified	100 psi	80%
Non-Polymer Modified	80 psi	80%
411 OGFC	50 psi	70%

Subsection 407.06.B, (pg. 324), 12-19-22; **Material Transfer Devices (MTDs)**; Revise 2nd Paragraph:

The MTD shall have a minimum storage capacity of 15 tons and shall be equipped with mixing augers in the bottom of the storage hopper that are capable of remixing or re-blending the material as the material is removed from the storage hopper. The mixing augers shall be operational and used at all times during placement of the asphalt mixes. The MTD shall have a rear discharge conveyor that swivels to allow feeding the paving machine from the front, side or rear.

Subsection 407.09, (pg. 326-327), 12-15-21; **Weather Limitations**; Revise No. 2 & 3:

- The bituminous plant mix is placed according to the temperature limitations specified in Table 407.09-1 and when weather conditions otherwise allow the pavement to be properly placed, compacted, and finished. Placement may proceed if either the air or surface temperature is met except for 411-TL, 411-TLD, 411-TLE, and 411-OGFC mixtures.

Measurement of the surface temperature shall be done on pavement that is shaded from direct sunlight unless no shaded location exists. If paving based on the air temperature, stop work once the air temperature falls below the minimum threshold. Do not start paving if the surface temperature does not meet the requirements and the air temperature is forecast to fall below the minimum temperature within 4 hours of starting work.

Table 407.09-1: Temperature Limitations

Compacted Thickness	Minimum Air or Surface Temperature (°F)	
	Unmodified mixes (PG 64, 67)	Modified mixes (PG 70, 76, 82)
≤ 1.5 inches	45	55
> 1.5 inches to < 3.0 inches	40	50
≥ 3.0 inches	35	45

3. For 411-TL, 411-TLD, 411-TLE, and 411-OGFC mixtures, placement shall proceed only when the pavement surface temperature and the air temperature are a minimum of 55° F and rising. Stop paving if the air temperature falls below 55°F immediately. Placement of these mixtures is restricted to the period between April 1 and October 31.

For all other mixtures, do not place bituminous plant mix, with a compacted thickness of 1.5 inches or less, between November 30 and April 1. Do not place bituminous plant mix, with a compacted thickness greater than 1.5 inches, between December 15 and March 16. If the temperature meets the above requirements, outside of normal paving season, a request for a seasonal limitation waiver may be submitted for Departmental consideration. Requests shall be submitted in writing at least one week before the anticipated need.

Subsection 407.09, (pg. 326-327), 12-27-23; **Weather Limitations**; Revise Table 407.09-1, No. 3, and Remove No. 4:

Table 407.09-1: Temperature Limitations

Compacted Thickness	Minimum Air or Surface Temperature (°F)	
	Unmodified mixes (PG 64, 67)	Modified mixes (PG 70, 76, 82)
	< 2.0 inches	45
≥ 2.0 inches	35	35 ¹

¹If compacted thickness < 3 inches and Temperature is < 55 degrees, an approved Warm Mix Additive is required in the mix.

3. For 411-TL, 411-TLD, 411-TLE, and 411-OGFC mixtures, placement shall proceed only when the pavement surface temperature and the air temperature are a minimum of 55°F and rising. Stop paving if the air temperature falls below 55°F immediately. Placement of these mixtures is restricted to the period between April 1 and October 31.

~~4. If determined necessary by the Department, the Contractor....~~

Subsection 407.13, (pg. 331), 8-28-24; **Mixing**; Revise 5th Paragraph No. 5:

5. The Contractor may store bituminous mixtures of Gradings A, AS, ACRL, and B for up to 48 hours, and Gradings BM, BM2, C, CS, CM, CW, D, E, and F for up to 96 hours, in a storage silo by complying with the following:
 - (a) Add an approved silicone additive to the asphalt cement for mixes to be stored beyond the day of mixing.
 - (b) Keep the stored bituminous mixture sealed at all times during storage.

(c) Fill the storage silo to at least 90% of capacity.

Subsection 407.15.A, (pg. 334), 12-19-22; **Compaction, General**; Revise Table 407.15:

Table 407.15 – Roller Requirements by Mix Type

Mix Type	Roller Requirements
307-A, 307-B, 307-BM-2, 307-C, 307-CW (except surface)	3 Rollers (Intermediate roller shall be Pneumatic)
307-AS, 307-ACRL, 411-D, 411-E, 307-CW (surface), 313-Asphalt Treated Permeable Base	3 Rollers (unspecified)
411-TL, 411-TLD, 411-TLE (when lift thickness > 1 inch)	3 Rollers (unspecified)
411-TL, 411-TLD, 411-TLE, 307-CS (when paved as a continuous layer)	2 Rollers (unspecified)
411-OGFC	2 Rollers (both rollers shall be static steel double drum, 10 Ton minimum)
Any mix used for scratch paving	2 Rollers (breakdown shall be pneumatic)

Subsection 407.15.A, (pg. 334), 8-28-24; **Compaction, General**; Revise Table 407.15:

Table 407.15 – Roller Requirements by Mix Type

Mix Type	Roller Requirements
307-A, 307-B, 307-BM-2, 307-C, 307-CM, 307-CW (except surface)	3 Rollers (Intermediate roller shall be Pneumatic)
307-AS, 307-ACRL, 411-D, 411-E, 307-CW (surface), 313-Asphalt Treated Permeable Base	3 Rollers (unspecified)
411-TL, 411-TLD, 411-TLE (when lift thickness > 1 inch)	3 Rollers (unspecified)
411-TL, 411-TLD, 411-TLE, 307-CS (when paved as a continuous layer)	2 Rollers (unspecified)
411-OGFC	2 Rollers (both rollers shall be static steel double drum, 10 Ton minimum)
Any mix used for scratch paving	2 Rollers (breakdown shall be pneumatic)

Subsection 407.15.B, (pg. 336), 12-27-23; **Density Requirements**; Revise Table 407.15-1:

Table 407.15-1: Density Requirements for Bituminous Pavement

Mix Type	% of Maximum Theoretical Density (Lot Average)	No Single Test Less Than, % (Sub Lot)
Travel Lanes ADT <1,000 A, B, BM, BM-2, C, CW, D, E TL, TLD, TLE (lift thickness > 1 inch)	90.0	87.0
Travel Lanes 1,000 <ADT <3,000 A, B, BM, BM-2, C, CW, D, E TL, TLD, TLE (lift thickness > 1 inch)	91.0	89.0
Travel Lanes ADT >3,000 A, B, BM, BM-2, C, CW, D, E TL, TLD, TLE (lift thickness > 1 inch)	92.0	90.0
Travel Lanes and Shoulders Any ADT CS,, OGFC TL, TLD, TLE (lift thickness <= 1 inch)	NA	NA
Shoulders B, BM, BM-2, D, E TL, TLD, TLE (lift thickness > 1 inch)	88.0	85.0

Subsection 407.15.B, (pg. 336), 8-28-24; **Compaction, Density Requirements**; Revise Table 407.15-1:

Table 407.15-1: Density Requirements for Bituminous Pavement

Mix Type	% of Maximum Theoretical Density (Lot Average)	No Single Test Less Than, % (Sub Lot)
Travel Lanes ADT <1,000 A, B, BM, BM-2, C, CM, CW, D, E TL, TLD, TLE (lift thickness > 1 inch)	90.0	87.0
Travel Lanes 1,000 <ADT <3,000 A, B, BM, BM-2, C, CM, CW, D, E TL, TLD, TLE (lift thickness > 1 inch)	91.0	89.0
Travel Lanes ADT >3,000 A, B, BM, BM-2, C, CM, CW, D, E TL, TLD, TLE (lift thickness > 1 inch)	92.0	90.0
Travel Lanes and Shoulders Any ADT CS, OGFC TL, TLD, TLE (lift thickness <= 1 inch)	NA	NA
Shoulders B, BM, BM-2, D, E TL, TLD, TLE (lift thickness > 1 inch)	88.0	85.0

Subsection 407.15.C, (pg. 336-337), 12-15-21; **Test Strips**; Revise 1st Paragraph:

Construct test strips for all mixtures that require density testing to establish rolling patterns, to accommodate the Department to calibrate nuclear gauges, to verify that the base course or surface course mixture meets the density requirements of the specifications, and for mix design and production verification as required. Adjustments to the roller pattern may be made at the direction of the Engineer for mixtures that do not require density testing.

Subsection 407.20.B.2.a, (pg. 342), 12-27-23; **Defective Materials, Acceptance or Rejection**; Revise 3rd Paragraph:

All acceptance samples will be split, and half of the sample will be retained by the Inspector. If the results of an acceptance test are questioned, the Central Laboratory will test the remaining half of the acceptance sample. The Department will use the results obtained by the Central Laboratory to evaluate the quality of the lot. The Contractor may submit a written request to have the split sample tested at a Regional Laboratory.

Subsection 407.20.C.3, (pg. 346-347), 12-15-21; **Loss on Ignition (LOI)**; Revise 2nd & Remove 4th Paragraph:

If the percent of LOI in the aggregate differs by plus or minus 2% from the LOI indicated in the JMF, the Department will make a payment deduction in the price bid for the mix applied to the entire days production, not as a penalty but as liquidated damages. The percent of total payment to be deducted will be 5 times the percent that the LOI exceeds the JMF tolerance of plus or minus 2%.

~~To determine the deduction, the Department will use lots of approximately 5,000 square yards. The Department inspector will perform sampling and testing to establish the LOI according to the Department's sampling and testing procedures. If the initial tests indicate a variation in the LOI of plus or minus 2% than the value shown on the mix design, the Contractor shall perform the additional sampling necessary to establish the LOI of the aggregate in each lot, with the cost of the sampling being included in the contract unit prices bid for the paving items.~~

Subsection 410.06, (pg. 349), 12-26-24; **Preparing Designated Surface**; Revise Sentence:

Prepare the designated surface upon which the material is to be placed as specified in **4054.05**.

Subsection 410.11, (pg. 350), 12-26-24; **Maintenance**; Revise Sentence:

Perform maintenance as specified in **4054.09**.

Subsection 411.06, (pg. 361), 12-26-24; **Preparing the Designated Surface**; Revise 1st Sentence:

Prepare the designated surface upon which the material is to be placed as specified in **4054.05**.

Subsection 411.03.B, (pg. 353), 12-15-21; **Proportioning**; Revise Table 411.03-01:

Table 411.03-1: Proportions of Total Mixture, Percent by Weight

Surface Course	Effective Combined Mineral Aggregate	Asphalt Cement
Grading D	93.0 – 94.3	5.7 – 7.0 ⁽¹⁾
Grading E ⁽²⁾	93.0 – 94.3	5.7 – 7.0 ⁽¹⁾
Grading E (shoulders)	93.5 – 94.0	6.0 – 6.5 ⁽¹⁾
Grading TL	92.5 – 94.3	5.7 – 7.5 ⁽¹⁾
Grading TLD	93.0 – 94.3	5.7 – 7.0 ⁽¹⁾
Grading TLE	93.0 – 94.3	5.7 – 7.0 ⁽¹⁾
Grading TLE (shoulders)	93.5 – 94.0	6.0 – 6.5 ⁽¹⁾
Grading OGFC	92.0 – 94.0	6.0 – 8.0 ⁽¹⁾

⁽¹⁾ If the effective combined specific gravity of the aggregate exceeds 2.80, the above proportions may be adjusted as directed by the Engineer. The upper limit for flow values shall not apply to mixes with modified asphalt liquids.

⁽²⁾ The minimum allowable asphalt cement content for 411E low volume mixtures is 5.3%.

Subsection 411.03.B.4, (pg. 356), 10-17-23; **Grading OGFC**; Revise Table 411.03-5:

Table 411.03-5: Mixture Properties (Grading OGFC)

Mix	Minimum Void Content % ⁽¹⁾	Voids in Coarse Aggregate % ⁽²⁾	Max. Cantabro Abrasion Loss % ^{(2) (3)}	Drain Down Loss % ⁽⁴⁾
411OGFC	17	VCA _{DRC} > VCA _{MIX}	20	<0.3%

⁽¹⁾ Determined using the “Volume Method” described in Section 6.2.2. of AASHTO T 269.

⁽²⁾ As described in National Asphalt Pavement Association (NAPA) Publication IS-115, “Design, Construction and Maintenance of Open-Graded Friction Courses.”

⁽³⁾ Cantabro Abrasion Loss specimens shall be aged as loose mix for 4 hours at lab compaction temperature.

⁽⁴⁾ Tested in accordance with AASHTO T 305.

Subsection 411.03.C.1, (pg. 357), 12-27-23; **Recycled Asphalt Pavement**; Revise Table 411.03-6:

Table 411.03-6: Use of Recycled Asphalt Pavement

Mix Type	% RAP (Non-processed) ⁽¹⁾	Maximum % RAP (Processed) ⁽²⁾	Maximum % RAP Processed and Fractionated ⁽³⁾	Maximum Particle Size (inch)
411-D (PG64-22, PG67-22)	0	15	20	½
411-D (PG70-22, PG76-22, PG82-22)	0	10	15	½
411-E & 411-TLE (Roadway)	0	15	20	½
411-E & 411-TLE (Shoulder)	15	30	35	½
411-TL (PG64-22, PG67-22)	0	15	15	5/16
411-TL (PG70-22, PG76-22, PG82-22)	0	10	10	5/16
411-TLD (PG64-22, PG67-22)	0	15	15	5/16
411-TLD (PG70-22, PG76-22, PG82-22)	0	10	10	5/16

⁽¹⁾ “Non-processed” refers to RAP that has not been crushed and screened or otherwise sized such that the maximum recycled material particle size is less than that listed above prior to entering the dryer drum.

⁽²⁾ “Processed” refers to RAP that has been crushed and screened or otherwise sized such that the maximum recycled material particle size is less than that above prior to entering the dryer drum.

⁽³⁾ “Fractionated” refers to RAP that has been processed over more than one screen, producing sources of various maximum particle sizes (e.g., ¾ to ½ inch, ½ inch to #4, etc.). The Contractor may use the larger percentages of fractionated RAP specified only if the stockpile meets the consistency requirements set forth in Departmental procedures for approval of asphalt mix designs.

Subsection 411.03.C.1, (pg. 358), 12-15-21; **Recycled Asphalt Pavement**; Revise 2nd Paragraph:

All mixes shall contain at least 80% virgin asphalt, except for 411E Shoulder and 411TLE Shoulder Mixtures, which shall have at least 65% virgin asphalt.

Subsection 414.03.B, (pg. 367), 12-19-22; **Micro-Surfacing**; Revise Table 14.03-3:

Table 414.03-3: Micro-Surfacing

Test	Requirement
Mixing Time Test, seconds at 77 °F (T-102)	120 min
Mix Time, at 50 and 100 °F	(informational)
Set Time Tests: 30 minutes (T-139)	12 kg-cm min
Early Rolling Traffic Time: 60 minutes (T-139)	20 kg-cm min
Wet Stripping Test, % coating (T-114)	90% min
Wet Track Abrasion Test, loss in g/ft ² (T-100)	75 max 6 days 50 max 1 hour
Measurement of Excess Asphalt (T-109)	50 grams/ft ² max Sand Adhesion, 1,000 Cycles at 125 lbs
Classification Compatibility (T-144)	11 pt. min

Subsection 414.06.B, (pg. 377), 12-19-22; **Quality Control**; Add Subsection 5:

- 5. Aggregate Gradation.** Prior to the start of production and at a minimum of once per day of production, perform a washed gradation (AASHTO T 27 with AASHTO T 11) of the stockpiled aggregate to ensure the gradation meets the mixture control tolerances of Table 903.12-2.

Subsection 415.03, (pg. 382), 12-19-22; **General Requirements**; Revise 1st Paragraph:

Coordinate operations so that vertical longitudinal faces do not exceed height requirements indicated by plans in areas to be used by public traffic. Taper transverse faces in a manner approved by the Engineer to avoid creating a traffic hazard. Perform cold planing in the direction of traffic.