## Section 401. — ASPHALT CONCRETE PAVEMENT BY GYRATORY MIX DESIGN METHOD

03/25/19–FP14

FLH Transmittal No. 1 4010010

WFL Specification 03/25/19

Include the following when work is required for this Section.

Coordinate with WFL Materials to determine asphalt binder grade.

Note: Include SCR 703.07.

Description

### 401.01

Delete the text of this Subsection and substitute the following:

This work consists of constructing one or more courses of asphalt concrete pavement using hot or warm mix asphalt (HMA or WMA).

Asphalt concrete pavement nominal maximum size aggregate size is designated according to Tables 401-1 and 703-4. Equivalent single axle loads (ESAL) or number of gyrations at design (NDesign) is designated according to Table 401-1.

Pavement roughness type is designated according to Subsection 401.16. When no roughness type is designated use Type IV.

Asphalt binder is designated according to AASHTO M 320.

Asphalt binder grade for this project is [INSERT GRADE].

Antistrip additive type is designated according to Subsection 702.05.

Use 1 percent type 3 (lime) in all mixes. Type 1 (liquid) antistrip may be used in lieu of type 3 (lime) antistrip, if additive is allowed for use by the state department of transportation and meets the requirements in Subsection 401.03.

Construction Requirements

### 401.03 Composition of Mix (JMF).

Add the following:

Provide documentation that demonstrates that the proposed type 1 (liquid) antistrip is allowed for use by the state department of transportation within the past 12 months. If type 1 (liquid) antistrip additive is included in the JMF, the minimum liquid antistrip additive is the minimum amount required to meet the design parameters in Table 401-1A.

Table 401-1A

Type 1 (liquid) Antistrip Requirements

|  |  |
| --- | --- |
| Parameters | Value |
| Hamburg Wheel-Track Testing, AASHTO T 324 (1)  Rut Depth at 15,000 passes, max., mm  Stripping Inflection Point | 10  None |
| (1)Test all specimens at 45°C. Test all specimens to 20,000 passes. Perform two tests at each additive rate and perform one set of control specimens with no additive. | |

### 401.03(c)(1) Aggregate and mineral filler.

Delete paragraph *(a)(2)* and substitute the following:

(a)(2) Designate target values within the gradation band specified for the nominal maximum size aggregate grading shown in Table 703-4. Allowable deviations are shown in Table 703-5;

### 401.03(c)(3) Antistrip Additive.

Delete the text of this Subsection and substitute the following:

**(a)**Type 1 (liquid) antistrip additive if part of the JMF:

**(1)** Target liquid antistrip additive dosage rate by weight of total binder;

**(2)** Test results according to AASHTO T 324, including:

*(a)* Mixing temperature for the specimens

*(b)* Compaction temperature for the specimens

*(c)* Air Void content for each specimen

*(d)* Hamburg curve plotting rut depth versus number of passes for each test

**(3)** 1 pint (0.5 liter) of liquid antistrip additive;

**(4)** Name of product;

**(5)** Manufacturer; and

**(6)** Manufacturer’s MSDS and product data sheets.

**(b)**Type 3 (lime) antistrip additive if part of the JMF:

**(1)** 2 pounds (0.9 kilograms) of lime antistrip additive;

**(2)**Name of product;

**(3)**Manufacturer; and

**(4)**Manufacturer’s MSDS and product data sheets.

### 401.03(d)(4)

Delete this Subsection, including Table 401-1, and substitute the following:

**(4) Voids in mineral aggregate (VMA).** The Contractor's VMA result is verified if the CO's result is within the specification limit in Table 401-1.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Table 401-1  Gyratory Asphalt Concrete Mix Design requirements, AASHTO R35 | **Minimum Tensile Strength Ratio, AASHTO**  **T 283** | | |  |  | 0.80 |  | (1) When mineral filler or hydrated lime is used, include in the calculation for compliance with the VMA.  (2) The nominal maximum size aggregate is one size greater than the first sieve to retain more than 10 percent of the combined aggregate.  (3) Dust to binder ratio is the effective asphalt content divided by the total percent of material passing the No. 200(75-µm) sieve. Dust includes lime, bag house fines, and other mineral matter.  other mineral matter. |
| **Dust-to-Binder Ratio** (3) | | |  | 0.8-1.6 |  | 0.6-2.0 |
| **Voids Filled with Asphalt (VFA), %** | | | 70.0 -80.0 | 65.0-78.0 | 65.0-78.0 | 76.0-80.0 |
| **Void-in-the Mineral Aggregate**  **(VMA), %** (1) | N**ominal Maximum Size Aggregate** (2) | **#4 Sieve**  **(4.75 mm)** |  | **−** |  | 16.0-19.0 |
| **⅜ inch**  **(9.5 mm)** |  | 15.0-18.0 |  | **−** |
| **½ inch**  **(12.5 mm)** |  | 14.0-17.0 |  | **−** |
| **¾ inch**  **(19 mm)** |  | 13.0-16.0 |  | **−** |
| **1 inch**  **(25 mm)** |  | 12.0-15.0 |  | **−** |
| **Gyrator Compaction Level (% Theoretical Maximum Specific Gravity Gmm) AASHTO T 312** | | Nmax | 75  (≤98.0%) | 115  (≤98.0%) | 160  (≤98.0%) | 75  ≤98.0%) |
| Ndesign | 50  (96.0%) | 75  (96.0%) | 100  (96.0%) | 50  (96.0%) |
| Ninitial | 6  (≤91.5%) | 7  (≤90.5%) | 8  (≤89.0%) | 6  (≤91.5%) |
| **Design ESAL**  **(Million)** | | | <0.3 | 0.3 to <3 | 3 to 30 | **−** |

WFL Specification 07/07/14 4010020

Include the following when a safety edge is NOT needed.

Coordinate with WFL Materials to determine safety edge need.

### 401.05(a) Pavers.

Delete paragraph (9).

WFL Specification 11/05/15 4010030

Include the following when work is required under this Section.

### 401.14 Compacting.

Add the following to the third paragraph:

Obtain cores as soon as the pavement has cooled sufficiently to allow coring, but not later than 12 hours after final rolling.

WFL Specification 03/01/19 4010040

Include the following on all projects when:

1) Type I, Type II, or Type III Pavement Roughness is required, and

2) Roughness is evaluated by the government.

Coordinate with WFL Materials for Pavement Roughness Designation.

### 401.16 Pavement Roughness.

Delete the text of this Subsection and substitute the following:

Measure the profile of the pavement surface according to the designated pavement roughness type. In addition, construct pavement surfaces to meet the requirements of Subsection 401.16(e).

**(a) Profile measurement.** The CO will use profile measurements to determine the Mean Roughness Index (MRI) values for the traveled way using the current version of Profile Viewer and Analysis (ProVAL) software. The CO will also determine areas of localized roughness. The MRI and areas of localized roughness will be used to determine payment for the designated pavement roughness type and pavement areas requiring surface corrections.

**(1) Equipment.** The CO will provide and operate an ASTM E950, Class 1 inertial profiling system conforming to AASHTO M 328 and certified according to AASHTO R 56.

**(2) Personnel.** Furnish flaggers, pilot car operations, or other temporary traffic control according to Section 635 as required.

**(3) Measuring.** The CO will identify the beginning and ending points of the profile measurements. The pavement profile will be measured in both wheel paths using a sensor path spacing of 65 - 71 inches (1650 ‑ 1800 millimeters) and centered in the traveled way of the lane. The inertial profiler will be operated according to AASHTO R 57 and the manufacturer’s recommendations. Filters will not be applied when collecting profile data. Filtering will be applied during profile analysis in ProVAL. Profile data (elevation and distance) will be collected at a maximum interval of 2 inches (50 millimeters). A lead-in distance of at least 150 feet (45 meters) after reaching the testing speed will be provided and the profiler’s automatic start/stop activation will be used when collecting data.

The CO will identify excluded areas. Cattle guards, bridges not being overlaid, and turning lanes, passing lanes, side roads, and ramps less than 1,000 feet (300 meters) in length will be excluded from profile measurement, the calculation of MRI, and the determination of localized roughness. Event markers will be used to mark areas to be excluded from profile measurement.

The CO will not measure excluded areas. Measure excluded areas with a straightedge according to Subsection 401.16(e).

**(4) Evaluation.** The CO will review and analyze profile measurements. The MRI will be calculated from profile measurements using ProVAL.

Using ProVAL, a high pass filter length of 300 feet (90 meters) and a low pass filter of 10 inches (250 millimeters) will be applied to the profiles. Individual MRI values are determined by averaging the IRI value from each wheel path. Fixed interval MRI values are reported as an average of the individual MRI values over the fixed interval length. An overall MRI value will be determined by averaging the individual MRI values, excluding segments less than 25 feet (7.62 meters) for Type I and Type II pavement roughness or 528 feet (161 meters) for Type III pavement roughness.

Areas of localized roughness will be identified by using ProVAL’s continuous MRI function with a segment length of 25 feet (7.62 meters). This will yield an average MRI value and a length for each area of localized roughness which exceeds the localized roughness threshold value of every possible 25-foot (7.62-meter) segment. Areas for which the continuous report exceeds the threshold MRI value for the specified roughness type will be considered a defective area requiring correction. When corrections are not allowed, a reduction in payment will be applied according to Subsection 401.16(f). No deduction will be made for areas of localized roughness identified within 12.5 feet (3.81 meters) of the beginning or end of a profile section or within 12.5 feet (3.81 meters) of excluded areas. Measure these areas with a straightedge according to Subsection 401.16(e).

Correct areas of localized roughness according to Subsection 401.16(g).

**(b)** **Type I pavement roughness.** The CO will measure the profile of the initial pavement surface before construction activities disturb the existing pavement surface. The initial pavement surface is defined as the existing pavement surface before construction activities begin. The localized roughness threshold computed to the nearest whole number for Type I pavement roughness is equal to the following:

Localized Roughness Threshold = Initial Overall MRI + 1.881(S25)

where:

Initial Overall MRI = MRI obtained before construction activities begin.

S25 = sample standard deviation of the 25 foot (7.62 meters) fixed interval MRI values.

Do not proceed with work that will disturb the initial pavement surface until the CO’s analysis is complete.

The CO will measure the profile of the final pavement surface before placing a surface treatment and within 21 days of completing roadway paving. The original overall surface MRI will be used in conjunction with the final overall MRI to determine an overall percent improvement for the entire traveled way.

The overall percent improvement in MRI will be determined to one decimal place for the traveled way according to the following formula:

% Improvement = [(Initial Overall MRI – Final Overall MRI) / Initial Overall MRI] × 100

Table 401-3 will be used to determine the final pay factor (PFrough) for the traveled way to two decimal places. When the percent improvement is less than 25.0 percent and the final overall MRI value is less than or equal to 70.0 inches per mile (1.105 meters per kilometer), Type III-A from Table 401-5 will be used to determine the final PFrough.

Correct areas of localized roughness according to Subsection 401.16(g). If a pavement has an overall negative percent improvement, place a minimum 1-inch (25-millimeter) overlay over the entire paved surface.

|  |
| --- |
| Table 401-3  Type I Pavement Roughness Pay Factors |

| Type I-A |  |
| --- | --- |
| Percent Improvement  (%) | Pay Factor  (PFrough) |
| Greater than 50.0 | PF = 1.05 |
| 47.6 – 50.0 | PF = 1.04 |
| 45.1 – 47.5 | PF = 1.03 |
| 43.6 – 45.0 | PF = 1.02 |
| 42.1 – 43.5 | PF = 1.01 |
| 25.0 – 42.0 | PF = 1.00 |
| 24.0 – 24.9 | PF = 0.99 |
| 23.0 – 23.9 | PF = 0.98 |
| 22.0 – 22.9 | PF = 0.97 |
| 21.0 – 21.9 | PF = 0.96 |
| 20.0 – 20.9 | PF = 0.95 |
| 19.0 – 19.9 | PF = 0.94 |
| 18.0 – 18.9 | PF = 0.93 |
| 17.0 – 17.9 | PF = 0.92 |
| 16.0 – 16.9 | PF = 0.91 |
| 15.0 – 15.9 | PF = 0.90 |
| 14.0 – 14.9 | PF = 0.89 |
| 13.0 – 13.9 | PF = 0.88 |
| 12.0 – 12.9 | PF = 0.87 |
| 11.0 – 11.9 | PF = 0.86 |
| 10.0 – 10.9 | PF = 0.85 |
| 5.0 – 9.9 | PF = 0.80 |
| 0.0 – 4.9 | PF = 0.70 |
| Negative % Improvement | Correct & overlay |

**(c) Type II pavement roughness.** The CO will measure the profile of the initial pavement surface before construction activities disturb the pavement surface. The initial pavement surface is defined as the original existing pavement surface before construction activities begin. The localized roughness threshold computed to the nearest whole number for Type II pavement roughness is equal to the following:

Localized Roughness Threshold = Initial Overall MRI + 1.282(S25)

where:

Initial Overall MRI = MRI obtained before construction activities begin.

(S25) = sample standard deviation of the 25-foot (7.62-meter) fixed interval MRI values.

Do not proceed with work that will disturb the initial pavement surface until the CO’s analysis is complete.

The CO will measure the profile of the final pavement surface before placing a surface treatment and within 21 days of completing roadway paving. The original overall surface MRI will be used in conjunction with the final overall MRI to determine an overall percent improvement for the entire traveled way.

The overall percent improvement in MRI will be determined to one decimal place for the traveled way according to the following formula:

% Improvement = [(Initial Overall MRI – Final Overall MRI) / Initial Overall MRI] × 100

Table 401-4 will be used to determine the final PFrough for the traveled way to two decimal places. When the percent improvement is less than 49.0 percent and the final overall MRI value is less than or equal to 70.0 inches per mile (1.105 meters per kilometer), Type III-A from Table 401-5 will be used to determine the final PFrough.

Correct areas of localized roughness according to Subsection 401.16(g). If a pavement has less than a 10.0 percent improvement, place a minimum 1-inch (25-millimeter) overlay over the entire paved surface

|  |
| --- |
| Table 401-4  Type II Pavement Roughness Pay Factors |

| Type II-A |  |
| --- | --- |
| Percent Improvement  (%) | Pay Factor  (PFrough) |
| Greater than 60.0 | PF = 1.05 |
| 58.6 – 60.0 | PF = 1.04 |
| 57.6 – 58.5 | PF = 1.03 |
| 56.6 – 57.5 | PF = 1.02 |
| 55.1 – 56.5 | PF = 1.01 |
| 49.0 – 55.0 | PF = 1.00 |
| 48.0 – 48.9 | PF = 0.99 |
| 47.0 – 47.9 | PF = 0.98 |
| 46.0 – 46.9 | PF = 0.97 |
| 45.0 – 45.9 | PF = 0.96 |
| 44.0 – 44.9 | PF = 0.95 |
| 43.0 – 43.9 | PF = 0.94 |
| 42.0 – 42.9 | PF = 0.93 |
| 41.0 – 41.9 | PF = 0.92 |
| 40.0 – 40.9 | PF = 0.91 |
| 38.0 – 39.9 | PF = 0.90 |
| 36.0 – 37.9 | PF = 0.89 |
| 35.0 – 35.9 | PF = 0.88 |
| 34.0 – 34.9 | PF = 0.87 |
| 33.0 – 33.9 | PF = 0.86 |
| 31.0 – 32.9 | PF = 0.85 |
| 25.0 – 30.9 | PF = 0.80 |
| 10.0 – 24.9 | PF = 0.70 |
| Less than 10.0 | Correct & overlay |

**(d) Type III pavement roughness.** The CO will measure the profile of the final pavement surface before placing a surface treatment and within 21 days of completing roadway paving. Pay factors from Table 401-5 will be used in conjunction with the long continuous histogram printout from ProVAL’s Smoothness Assurance Analysis function and by utilizing a long continuous 528-foot (161-meter) segment length for analysis. The final PFrough is equal to the sum of the products of the individual pay factors indicated in Table 401-5 multiplied by the ratio of individual lane miles (lane kilometers) to the overall project lane miles (lane kilometers) and by ProVAL’s corresponding histogram percentages, divided by 100. The final PFrough will be determined to three decimal places.

If the final overall MRI for the entire traveled way is greater than the values shown in Table 401-5, correct the traveled way according to Subsection 401.16(g).

|  |  |
| --- | --- |
| Table 401-5  Type III Pavement Roughness Pay Factors | |
| Mean Roughness Index  (MRI)  Type III-A  in/mi (m/km) | Pay Factor  (PFrough) |
| Localized roughness threshold  140 in/mi (2.210 m/km) |  |
| If MRI of entire roadway  is greater than  125 in/mi (1.973 m/km) | REJECT |
| Greater than 95.0 (1.50) | 0.700 |
| 95.0 – 90.0 (1.50 – 1.42) | 0.800 |
| 90.0 – 85.0 (1.42 – 1.34) | 0.850 |
| 85.0 – 80.0 (1.34 – 1.26) | 0.900 |
| 80.0 – 75.0 (1.26 – 1.18) | 0.960 |
| 75.0 – 70.0 (1.18 – 1.10) | 0.980 |
| 70.0 – 65.0 (1.10 – 1.02) | 1.000 |
| 65.0 – 60.0 (1.02 – 0.94) | 1.010 |
| 60.0 – 55.0 (0.94 – 0.86) | 1.020 |
| 55.0 – 50.0 (0.86 – 0.78) | 1.025 |
| 50.0 – 45.0 (0.78 – 0.70) | 1.030 |
| 45.0 – 40.0 (0.70 – 0.62) | 1.035 |
| 40.0 – 35.0 (0.62 – 0.54) | 1.040 |
| 35.0 – 30.0 (0.54 – 0.46) | 1.045 |
| Less than 30.0 (0.46) | 1.050 |

**(e)** **Type IV straightedge measurement.** Use a 10-foot (3.0 meters) metal straightedge to measure at right angles and parallel to the centerline. Defective areas are deviations between the surface and the bottom of the straightedge exceeding ¼ inches (6 millimeters) measured between two contacts of the straightedge or deviations exceeding ¼ inches (6 millimeters) measured at the end of the straightedge. Correct defective areas according to Subsection 401.16(g).

**(f) Localized roughness and straightedge measurement pay reduction.** Each area of localized roughness exceeding the threshold MRI specified for the designated pavement roughness type will receive a reduction in payment according to Table 401-6.

Each defective area as determined by a 10-foot (3.0-meter) metal straightedge will receive a reduction in payment according to Table 401-6.

|  |
| --- |
| Table 401-6  Localized Roughness and Straightedge Measurement Pay Reductions |

| Type I | Type II & IV | Localized  Roughness Limit  MRI | Type III | |
| --- | --- | --- | --- | --- |
| Deduction  per  Occurrence | Deduction  per  Occurrence | Localized  Roughness  Limit  MRI, in/mi  (m/km) | Deduction  per  Occurrence |
| $200 | $300 | Computed MRI value  per Subsection  401.16(b) for Type I  401.16(c) for Type II  401.16(d) for Type III | 140.0 – 169.9  (2.208 – 2.680) | $300 |
| 170.0 – 179.9  (2.681 – 2.838) | $450 |
| 180.0 – 189.9  (2.839 – 2.995) | $600 |
| 190.0 – 199.9  (2.996 – 3.154) | $750 |
| 200.0 – 209.9  (3.155 – 3.311) | $900 |
| 210.0 – 219.9  (3.312 – 3.469) | $1,200 |
| 220.0 – 229.9  (3.470 – 3.626) | $1,500 |
| 230.0 – 239.9  (3.627 – 3.784) | $2,000 |
| > 240.0 (3.785) | $4,000 |

**(g) Defective area correction.** Obtain approval before starting corrective work. Allow 7 days for review and approval of correction method proposal.

Correct defective areas by one of the following methods:

**(1) Milling.** Replace the defective area by milling at least one-half the pavement depth and repaving with the approved asphalt concrete mix. Mill the defective area according to Section 413.

**(2) Saw cutting.** Replace the defective area by saw cutting and removing the defective area and repaving with the approved asphalt concrete mix. Saw cut and remove the defective area according to Section 203.

**(3) Grinding.** Use a diamond blade machine to grind off the defective surface area. Provide the manufacturer and model of the equipment to be used. Identify the beginning and ending station of each grind location, the grinding depth, and lateral extent of grinding. Optimize the endpoints of the areas where a grinder is to be applied using ProVAL’s Smoothness Assurance function in conjunction with the grinding simulation function. Submit the type of seal to be placed after grinding is completed for approval. Place seals according to Section 409 or 410. Limit the grinding depth to 12.5 percent of the design pavement thickness. If grinding exceeds this depth, provide a minimum 1-inch (25‑millimeter) overlay.

**(4) Other.** Submit a proposal for approval for other correction methods not listed above.

After corrections are made, the CO will re-measure the pavement profile according to Subsection 401.16(a). Data from the re-measurement will be analyzed to determine the MRI or percent improvement, areas of localized roughness, and the final PFrough. If correction and re-measurement of the surface is required, the maximum allowable pay factor under Subsection 401.19 is 1.00.

If corrections are not allowed, no adjustment will be made to the final PFrough or localized roughness pay deductions.

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WFL Specification 03/01/19

Include the following when work is required under this Section.

### 401.17 Acceptance.

Delete paragraph (b) and substitute the following:

**(b) VMA**. The upper and lower specification limits are the values shown in Table 401-1. After the JMF has been verified according to Subsection 401.03 and 401.12, use the Contractor's combined coarse and fine bulk specific gravity of aggregate Gsb values to calculate VMA on field produced asphalt concrete mix samples;

Measurement

### 401.18

Add the following:

Do not measure type 1 (liquid) antistrip additive that is used in lieu of type 3 (lime) antistrip additive.

Payment

### 401.19

Delete the text of this Subsection and substitute the following:

The accepted quantities will be paid at the contract price per unit of measurement for the Section 401 pay items listed in the bid schedule, except the asphalt concrete pavement contract price will be adjusted according to Subsections 106.05, 401.16, and Table 401-7. Payment will be full compensation for the work prescribed in this Section. See Subsection 109.05.

Payment for asphalt concrete pavement will be made at a price determined by multiplying the contract price by the material pay factor. The material pay factor is calculated as follows:

PFmaterial = 1 + [(PFVolumetric – 1) + (PFPG – 1)]

where:

PFmaterial = Material pay factor.

PFVolumetric = Pay factor for asphalt concrete pavement. PFVolumetric is the lowest single pay factor determined for asphalt binder content, VMA, and core density.

PFPG = Pay factor for asphalt binder. The PFPG formula is as follows:

PFPG = (PF1 + PF2 + PF3 + ….PFn) / n

where:

PF# = For each sample, the lowest pay factor determined from any test in Table 401-7. If the lowest pay factor for a sample is in reject, the sample’s pay factor is zero.

n = Number of samples tested.

If either the pay factor for the asphalt binder (PFPG) or the pay factor for asphalt concrete pavement (PFVolumetric) is below 0.75, the lot for asphalt concrete pavement is in reject.

When the contract specifies a pavement roughness Type I, Type II, or Type III, a separate pay adjustment will be made for pavement roughness calculated as follows:

Type I, Type II, or Type III Pay Adjustment = (RF)(PFrough – 1.00)(L) – (LRPR)

where:

PFrough = Pay factor from Tables 401-3, 401-4, or 401-5.

L = Total project length in lane miles (lane kilometers).

LRPR = Localized roughness pay reduction from table 401-6.

RF = Roughness factor: 100,000 U.S. Customary (62,200 Metric).

WFL Specification 03/25/19 4010060

Include in all projects that require work in this Section. When Type I or Type II Pavement Roughness is required, coordinate with WFL Materials to adjust the reporting time in Table 401-8

Delete Table 401-8 and substitute the following:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Table 401-8  Sampling, Testing and Acceptance Requirements | **Remarks** | **Source** | Not required when using Government- provided sources | − | Not required when using  a pre-crushed  commercial  source |
| **Reporting**  **Time** | Before production | " | 24  hours |
| **Split**  **Sample** | Yes | " | No |
| **Point of**  **Sampling** | Source of material | Asphalt  Supplier  or  mixing plant | Crusher belt  (during production) |
| **Sampling**  **Frequency** | 1 per type & not less than 5 per source of material(5) | " | 2 per day  Per stockpile |
| **Test Methods Specifications** | Subsection  703.07 | AASHTO  M 320 | AASHTO  T 27 & T 11 |
| **Category** | − | − | − |
| **Characteristic** | Aggregate quality | Quality | Gradation |
| **Type of Acceptance (Subsection)** | Measured and tested for conformance (106.04 & 105) | " | Process  control  (153.03) |
| **Material or**  **Product**  **(Subsection)** | Asphalt  concrete  aggregate  (703.07) | Asphalt binder  (702.01) | Asphalt  concrete  (703.07) |

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Table 401-8 (continued)  Sampling, Testing and Acceptance Requirements | **Remarks** | **Mix Design** | − | − | − | − | − | − | − |
| **Reporting**  **Time** | 30 days  before  producing | " | " | " |  | " | " |
| **Split**  **Sample** | Yes | " | " | " | " | " | " |
| **Point of**  **Sampling** | Stockpiles | " | " | − | − | − | − |
| **Sampling**  **Frequency** | 1 per  Submitted  mix design | " | " | " | " | " | " |
| **Test Methods Specifications** | AASHTO  T 27 & T 11 | AASHTO  T 308 | AASHTO  T 84 & T 85 | AASHTO  R 35 | " | " | AASHTO  T 283 |
| **Category** | − | − | − | − | − | − | − |
| **Characteristic** | Gradation | RAP asphalt  binder content | Bulk specific  gravity of  aggregate  (coarse and fine) | VMA | VFA | Air voids | Tensile strength  ratio |
| **Type of Acceptance (Subsection)** | Measured and tested for  conformance  (106.04) | | | | | | |
| **Material or**  **Product**  **(Subsection)** | Asphalt  concrete  mixture | | | | | | |

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Table 401-8 (continued)  Sampling, Testing, and Acceptance Requirements | **Remarks** | **Production Start-up (control strip)** | − | | | | | − | − | Deliver cores to CO after determining specific gravity and compaction |
| **Reporting Time** | 6  hours | | | | | " | " | 24  hours |
| **Split Sample** | Yes | | | | | " | " | " |
| **Point of Sampling** | Behind the paver before compaction | | | | | " | " | In-place  after  compaction |
| **Sampling Frequency** | 3  minimum | | | | | " | " | 5  minimum |
| **Test Methods Specifications** | AASHTO  T 30 | | | | | AASHTO  T 308 | AASHTO  R 35 | AASHTO  T 166 |
| **Category** |  | I | I | I | II | I | I | I |
| **Characteristic** | Gradation | No. 4 (4.75 mm) | No. 30 (600 µm) | No. 200 (75 µm) | Other specified  sieves | Asphalt  Content(1) | VMA | Density(2) |
| **Type of Acceptance (Subsection)** | Statistical  (106.05) | | | | | | | |
| **Material or Product (Subsection)** | Asphalt  concrete  pavement | | | | | | | |

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Table 401-8 (continued)  Sampling, Testing, and Acceptance Requirements | **Remarks** | **Production Start-up (control strip) (continued)** | − | − | See Subsection 401.12 | **Production** | − | − | Deliver cores to CO after testing is completed |
| **Reporting Time** | Immediately upon completion of test | 24  hours | 24  hours | 6  hours | " | 24  hours |
| **Split Sample** | No | Yes | No | Yes | " | " |
| **Point of Sampling** | Hauling vehicle before dumping or windrow before pickup | Behind the paver before compaction | At core location before coring | Behind the paver before compaction | " | In-place after compacting |
| **Sampling Frequency** | First load  and as determined  by CO  thereafter | 3  minimum | 5  minimum | 1 per  700 tons  (650  metric tons) | " | " |
| **Test Methods Specifications** | − | AASHTO  T 209 | ASTM  D2950 | AASHTO  T 308 | AASHTO  R 35 | AASHTO  T 166 |
| **Category** | − | − | − | I | I | I |
| **Characteristic** | Mix  temperature | Maximum specific gravity(4) | Density | Asphalt  Content(1) | VMA | Density(2) |
| **Type of Acceptance (Subsection)** | Measured and tested for conformance (106.04) | | Process control (153.03) | Statistical (106.05) | |
| **Material or Product (Subsection)** | Asphalt concrete pavement | | | Asphalt concrete pavement | | |

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| Table 401-8 (continued)  Sampling, Testing, and Acceptance Requirements | **Remarks** | **Production (continued)** | − | − | Test by Government |
| **Reporting Time** | Immediately upon completion of measurement | 24  hours | − |
| **Split Sample** | No | Yes | Yes  2 1-quart  (1-liter) samples |
| **Point of Sampling** | Hauling vehicle before dumping, or windrow before pickup | Behind the paver before compaction | In line between  tank and  mixing plant |
| **Sampling Frequency** | First load  and as  determined by CO thereafter | Minimum  1 per day | 1per  2000 tons  (1800  metric tons)  of mix |
| **Test Methods Specifications** | − | AASHTO  T209 | AASHTO  M 320 |
| **Category** | − | − | See Table  401-7 |
| **Characteristic** | Placement temperature | Maximum specific  Gravity(3)(4) | Quality |
| **Type of Acceptance (Subsection)** | Measured  and tested  for conformance (106.04) | | Measured  and tested  for conformance  (106.04) |
| **Material or Product (Subsection)** | Asphalt  concrete  pavement | | Asphalt  binder  (702.01) |

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| Table 401-8 (continued)  Sampling, Testing, and Acceptance requirements | **Remarks** | **Production (continued)** | − | − | − | − | − | − |
| **Reporting Time** | 24  hours | " | " | " | 24  hours | " |
| **Split Sample** | No | " | " | " | No | " |
| **Point of Sampling** | Cold feed or hot bins as applicable | Behind  the paver  before  compaction | Stockpile | In-place after compacting | Behind  the paver  before  compaction | " |
| **Sampling Frequency** | Contractor determined | 1 per  700 tons  (650  metric tons) of mix | Contractor determined | 1 per  500 feet  (150 meters) | 1 per  700 tons  (650  metric tons) of mix | " |
| **Test Methods Specifications** | AASHTO  T 27 & T 11 | AASHTO  T 30 | AASHTO  T 255 | ASTM  D2950 | AASHTO  T 312 &  T 166 | AASHTO  R 35 |
| **Category** | − | − | − | − | − | − |
| **Characteristic** | Gradation  at plant | Gradation  at paver | Moisture content of aggregates | Density | Air voids | VFA |
| **Type of Acceptance (Subsection)** | Process  control  (153.03) | | | | | |
| **Material or Product (Subsection)** | Asphalt  concrete  pavement | | | | | |

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| (Table 401-8 (continued)  Sampling, Testing, and Acceptance requirements | **Remarks** |  | Original surface before construction | − | Original surface before construction | − | − | − |
| **Reporting Time** |  | Within 14 days of Notice to Proceed | Within 21 days after completing paving | Within 14 days of Notice to Proceed | Within 21 days after completing paving | " | 24  hours |
| **Split Sample** |  | No | " | " | " | " | " |
| **Point of Sampling** |  | Left and right wheel paths | " | " | " | " | See  Subsection 401.16(e) |
| **Sampling Frequency** | **Finished Product** | See  Subsection 401.16 | " | " | " | " | Contractor determined |
| **Test Methods Specifications** | AASHTO  R 56 & R 57 | " | " | " | " | Straightedge measurements Subsection 401.16(e) |
| **Category** | − | − | − | − | − | − |
| **Characteristic** |  | Type 1 roughness, before construction (Initial MRI) | Type 1 roughness, after construction (Final MRI) | Type II roughness, before construction (Initial MRI) | Type II roughness, after construction (Final MRI) | Type III roughness, (Final MRI) | Surface tolerance |
| **Type of Acceptance (Subsection)** |  | Measured and tested for conformance (106.04) | |  |  |  | Process control (153.03) |
| **Material or Product (Subsection)** |  | Asphalt concrete pavement | |  |  |  |  |

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| **Table 401-8 (continued)**  **Sampling, Testing, and Acceptance Requirements** |
| (1) Use AASHTO T 308, Method A. Calculate the asphalt binder content by weighing the sample before and after the burn using a calibrated external balance.  (2) Cut 6-inch (150-millimeter) diameter cores from the compacted pavement. Remove them with a core retriever and fill and compact the core holes with asphalt concrete mixture. Label the cores and protect them from damage due to handling and temperature. Dry the core to constant mass at 125±5 °F (52±3 °C) or vacuum dry it according to ASTM D7227 before performing the core density and measuring the thickness. Use 62.245 pounds per cubic foot (997.1 kilograms per cubic meter) to convert specific gravity to density. Submit cores to the CO after testing is completed.  (3) After production paving has begun, use the average maximum specific gravity value (AASHTO T 209) for each day to adjust the percent compaction for the cores that represent that day’s paving.  (4) Do not use the supplemental procedure for mixtures containing porous aggregate (dry back method of AASHTO T 209).  (5) Furnish a minimum of five reports, but not less than one report per rock type for each source. Reports must be dated within 1 year of intended use. Obtain samples representative of aggregates being furnished. Include rock type and sample location on test reports. |