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

07/01/24–FP14

FLH Transmittal No. 1 4010010

WFL Specification 07/01/24

Include the following when work is required for this Section.

Coordinate with WFL Materials to determine pavement roughness and asphalt binder grade.

Note: Include SCR 703.07.

Example for stationing sentence: Pavement roughness type for this project is Type III for the following station ranges 10+00 to 22+96, 23+26 to 1022+29, and 1025+07 to 1133+31, according to Subsection 401.16.

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).

Pavement roughness type for this project is [INSERT STATIONING AND ROUGHNESS TYPE (Type I, II or III)] according to Subsection 401.16.

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

Construction Requirements

### 401.03 Composition of Mix (JMF).

Add the following after the second paragraph:

Short-term condition samples according to AASHTO R 30 at the manufacturer’s recommended compaction temperature. Include the material finer than the No. 200 (75 µm) sieve when determining the AASHTO T 84 fine aggregate specific gravity and absorption.

Use 1 percent Type 3 (lime) of the total weight of aggregates including RAP in all mixes. Type 1 (liquid) antistrip additive may be used instead of Type 3 (lime) antistrip additive if the requirements shown in Table 401-1A are met. 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  Antistrip Requirements Using Hamburg Wheel-Track Testing, AASHTO T 324(1), (2) | | | | |
| **PG Binder**  **Grade** | **Testing Temperature** | **Maximum Allowable Rut Depth** | **Number of Passes** | **Stripping Inflection Point** |
| PG 58 & lower | 45 °C | 12.5 mm | 20,000 | None |
| Greater than PG 58 & less than PG 76 | 50 °C |
| PG 76 & higher | 55 °C |
| |  | | --- | | (1) Report the plot of the rut depth versus number of passes for each test for each deformation location. Report the number of passes at maximum rut depth, the maximum rut depth, creep and strip slopes, the stripping inflection point, testing temperature, compaction method (slab or Superpave gyratory compactor cylindrical specimen), and air voids of the specimens.  (2) 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 and Table 401-1A;

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

*(4)* Name of product;

*(5)* Manufacturer; and

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

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

*(1)* 1 pound (0.5 kilograms) of lime additive;

*(2)* Name of product;

*(3)* Manufacturer;

*(4)* Manufacturer’s SDS and product data sheets; and

*(5)* Dosage rate.

### 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 total percent of material passing the No. 200 (75 µm) sieve divided by the effective asphalt content. 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 |
| **Voids-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 07/01/24 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.

### 401.16 Pavement Roughness.

Delete the text of this Subsection and substitute the following:

The CO will measure the profile of the pavement surface according to the designated pavement roughness type. If no roughness type is designated, use Type IV. In addition, construct pavement surfaces to meet the requirements of Subsection 401.16(d).

Provide flaggers, pilot car operations, or other temporary traffic control during profile measurement according to Section 635.

**(a) Profile measurement.** The CO will use profile measurements to determine the Mean Roughness Index (MRI) values for the traveled way according to FLH T 401 and using the current version of Profile Viewer and Analysis (ProVAL) software. The CO will 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.

The CO will identify the starting and ending points of the profile measurements. The CO will identify excluded areas. Cattle guards, bridges not being overlaid, and turning lanes, passing lanes, side roads, and ramps less than 1000 feet (300 meters) in length will be excluded from profile measurement, the calculation of MRI, and the determination of localized roughness. Measure excluded areas with a straightedge according to Subsection 401.16(d).

Areas for which the ProVAL continuous report exceeds the threshold MRI value for the specified roughness type will be considered a defective area requiring correction. If corrections are not allowed, a reduction in payment will be applied according to Subsection 401.19(b). No deduction will be made for areas of localized roughness identified within 12.5 feet (3.81 meters) of the starting 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(d).

**(b) Type I and II 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 start.

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.

**(c) 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.

**(d) Type IV straightedge measurement.** Measure the pavement surface using a 10-foot (3.0 meters) metal straightedge at right angles and parallel to the centerline. Defective areas are deviations between the surface and the bottom of the straightedge more than ¼ inch (6 millimeters) measured between two contacts of the straightedge or deviations more than ¼ inch (6 millimeters) measured at the end of the straightedge.

**(d)** **Type IV straightedge measurement.** Use a 10-foot (3.0 meter) 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(e).

**(e) Defective area correction.** Obtain approval before starting corrective work. Allow 7 days for review and approval of correction method proposal. No defective area corrections are allowed on the final pavement surface unless approved. Defective areas, including localized roughness, can be evaluated and corrected on lower paving lifts according to the following.

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.

### 401.17 Acceptance.

Delete paragraph (b) and (d) 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;

**(d) Pavement roughness.** The evaluation for payment will be made after defective areas are addressed. The pay factor is determined from Table 401-3, Table 401-4, Table 401-5, and Table 401‑6.

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, 401.17(d) and 401.17(e). Payment will be full compensation for the work prescribed in this Section. See Subsection 109.05.

Payment will be adjusted according to the following:

**(a) Asphalt concrete pavement.** Payment for asphalt concrete pavement will be made at a price determined by multiplying the contract price by the material pay factor for each lot. 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.

**(b) Pavement Roughness.** If 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.

LRPR= Localized roughness pay reduction. Each area of localized roughness more than the localized roughness threshold MRI specified for the designated pavement roughness type will receive a reduction in payment according to Table 401-6.

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

For Type I and Type II pavement roughness, the localized roughness threshold computed to the nearest whole number is equal to the following:

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

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

where:

Initial Overall MRI = MRI obtained before construction activities start.

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

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

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

For Type I pavement roughness, Table 401-3 will be used to determine the final pay factor (PFrough) for the traveled way to two decimal places. If 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 from Table 401-5 will be used to determine the final PFrough.

For Type II pavement roughness, Table 401-4 will be used to determine the final PFrough for the traveled way to two decimal places. If 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 from Table 401-5 will be used to determine the final PFrough.

For Type III pavement roughness, 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 localized roughness threshold for Type III pavement roughness is 140 inches per mile (2.210 meters/kilometer). The final PFrough is equal to the sum of the products of the individual pay factors shown 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.

For Type IV pavement roughness, each defective area as determined by a 10-foot (3 meter) metal straightedge will receive a reduction in payment according to Table 401-6.

Delete Table 401-7 and 401-8 and substitute the following:

|  |  |
| --- | --- |
| **Table 401-3**  **Type I Pavement Roughness Pay Factors** | |
| **Percent Improvement (%)** | **Pay Factor (PFrough)** | |
| Greater than 50.0 | PF = 1.05 | |
| 47.6 to 50.0 | PF = 1.04 | |
| 45.1 to 47.5 | PF = 1.03 | |
| 43.6 to 45.0 | PF = 1.02 | |
| 42.1 to 43.5 | PF = 1.01 | |
| 25.0 to 42.0 | PF = 1.00 | |
| 24.0 to 24.9 | PF = 0.99 | |
| 23.0 to 23.9 | PF = 0.98 | |
| 22.0 to 22.9 | PF = 0.97 | |
| 21.0 to 21.9 | PF = 0.96 | |
| 20.0 to 20.9 | PF = 0.95 | |
| 19.0 to 19.9 | PF = 0.94 | |
| 18.0 to 18.9 | PF = 0.93 | |
| 17.0 to 17.9 | PF = 0.92 | |
| 16.0 to 16.9 | PF = 0.91 | |
| 15.0 to 15.9 | PF = 0.90 | |
| 14.0 to 14.9 | PF = 0.89 | |
| 13.0 to 13.9 | PF = 0.88 | |
| 12.0 to 12.9 | PF = 0.87 | |
| 11.0 to 11.9 | PF = 0.86 | |
| 10.0 to 10.9 | PF = 0.85 | |
| 5.0 to 9.9 | PF = 0.80 | |
| 0.0 to 4.9 | PF = 0.70 | |
| Negative % Improvement | Correct & overlay | |

|  |  |  |
| --- | --- | --- |
| **Table 401-4**  **Type II Pavement Roughness Pay Factors** | | |
| **Percent Improvement (%)** | **Pay Factor (PFrough)** |
| Greater than 60.0 | PF = 1.05 |
| 58.6 to 60.0 | PF = 1.04 |
| 57.6 to 58.5 | PF = 1.03 |
| 56.6 to 57.5 | PF = 1.02 |
| 55.1 to 56.5 | PF = 1.01 |
| 49.0 to 55.0 | PF = 1.00 |
| 48.0 to 48.9 | PF = 0.99 |
| 47.0 to 47.9 | PF = 0.98 |
| 46.0 to 46.9 | PF = 0.97 |
| 45.0 to 45.9 | PF = 0.96 |
| 44.0 to 44.9 | PF = 0.95 |
| 43.0 to 43.9 | PF = 0.94 |
| 42.0 to 42.9 | PF = 0.93 |
| 41.0 to 41.9 | PF = 0.92 |
| 40.0 to 40.9 | PF = 0.91 |
| 38.0 to 39.9 | PF = 0.90 |
| 36.0 to 37.9 | PF = 0.89 |
| 35.0 to 35.9 | PF = 0.88 |
| 34.0 to 34.9 | PF = 0.87 |
| 33.0 to 33.9 | PF = 0.86 |
| 31.0 to 32.9 | PF = 0.85 |
| 25.0 to 30.9 | PF = 0.80 |
| 10.0 to 24.9 | PF = 0.70 |
| Less than 10.0 | Correct & overlay |

|  |  |  |
| --- | --- | --- |
| **Table 401-5**  **Type III Pavement Roughness Pay Factors** | | |
| **Mean Roughness Index (MRI)** | **Pay Factor**  **(PFrough)** |
| If MRI of entire roadway is  greater than 125 in/mi | REJECT |
| Greater than 95.0 | 0.700 |
| 95.0 to 90.0 | 0.800 |
| 90.0 to 85.0 | 0.850 |
| 85.0 to 80.0 | 0.900 |
| 80.0 to 75.0 | 0.960 |
| 75.0 to 70.0 | 0.980 |
| 70.0 to 65.0 | 1.000 |
| 65.0 to 60.0 | 1.010 |
| 60.0 to 55.0 | 1.020 |
| 55.0 to 50.0 | 1.025 |
| 50.0 to 45.0 | 1.030 |
| 45.0 to 40.0 | 1.035 |
| 40.0 to 35.0 | 1.040 |
| 35.0 to 30.0 | 1.045 |
| Less than 30.0 | 1.050 |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 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, inch/mile** | **Deduction**  **per**  **Occurrence** |
| $200 | $300 | Computed MRI value  according to Subsection  401.16(b) for Type I  401.16(c) for Type II  401.16(d) for Type III | 140.0 to 169.9 | $300 |
| 170.0 to 179.9 | $450 |
| 180.0 to 189.9 | $600 |
| 190.0 to 199.9 | $750 |
| 200.0 to 209.9 | $900 |
| 210.0 to 219.9 | $1,200 |
| 220.0 to 229.9 | $1,500 |
| 230.0 to 239.9 | $2,000 |
| > 240.0 | $4,000 |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Table 401-7  Asphalt Binder Pay Factor Table | | | | | | | |
| **Tests on**  **Original** | **Specifications(1)** | **Pay Factor =** | | | | | |
| **1.01** | **1.00** | **0.95** | **0.90** | **0.75** | **Reject** |
| Dynamic shear rheometer, kPa | ≥ 1.00 | ≥ 1.17 | 1.16 to 1.00 | 0.99 to 0.89 | 0.88 to 0.77 | 0.76 to 0.50 | < 0.50 |
| **Tests after Rolling Thin Film Oven (RTFO)** | | | | | | | |
| Dynamic shear  rheometer, kPa | ≥ 2.20 | ≥ 2.69 | 2.68 to 2.20 | 2.19 to 1.96 | 1.95 to 1.43 | 1.42 to 1.10 | < 1.10 |
| **Tests on Pressure Aging Vessel (PAV)** | | | | | | | |
| Dynamic shear  rheometer, kPa(2) | < 5000 | ≤4711 | 4712 to 5000 | 5001 to 5289 | 5290 to 5578 | 5579 to 6000 | > 6000 |
| Bending beam  rheometer, s, MPa | ≤ 300 | ≤ 247 | 248 to 300 | 301 to 338 | 339 to 388 | 389 to 449 | ≥ 450 |
| Bending beam  rheometer, m-value | ≥ 0.300 | ≥ 0.320 | 0.319 to 0.300 | 0.299 to 0.294 | 0.293 to 0.278 | 0.277 to 0.261 | < 0.261 |
| (1) Conform to Subsection 702.01.  (2) If dynamic shear rheometer (PAV) value is between 5000 kPa and 6000 kPa, and the phase angle is equal to or greater than 42°, the pay factor is 1.00 | | | | | | | |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| 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) |

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 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 | WFLHD  W 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 | WFLHD  W 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 | | |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| 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) |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 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 &  WFLHD  W 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 | | | | | |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| (Table 401-8 (continued)  Sampling, Testing, and Acceptance requirements | **Remarks** |  | Original surface before construction | − | − | (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. |
| **Reporting Time** |  | Within 21 days before ground disturbing work | Within 21 days after completing paving | 24  hours |
| **Split Sample** |  | No | " | " |
| **Point of Sampling** |  | Left and right wheel paths | " | See  Subsection 401.16(d) |
| **Sampling Frequency** | **Finished Product** | See  Subsection 401.16 | " | Contractor determined |
| **Test Methods Specifications** | FLH T 401 | " | Straightedge measurements Subsection 401.16(d) |
| **Category** | − | − | − |
| **Characteristic** |  | Type I & II roughness, before construction (Initial MRI) | Type I, II & III roughness, after construction (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 | | |