10/02/2019

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|  |
| --- |
| Use on all projects when a job-mix-formula will be developed for the specific project, and statistical acceptance will be used. Be mindful of the project duration. It takes 1 month to do a mix design. Use this for **more** than 7000 tons of asphalt concrete pavement.  The CFL Incentives and Adjustments spreadsheet that matches the roughness calculations shown in this SCR has a revised date of 02-08-19 |

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

**Description**

|  |
| --- |
| Enter the pavement roughness type and asphalt binder grade in the highlighted areas below. Materials will provide to the designer the following:  1) **Roughness type**: Use the following guidelines:   1. **Type I** is for 3R mill and fill **ONE lift**. This requires before and after IRI measurement.  * Type I-A is for higher speeds **greater than 35 mph** * .Type I-B is for slower winding roads **less than 35 mph**.  1. **Type II** is for 3R mill and fill **TWO** lifts. This requires before and after IRI measurement.  * Type I-A is for higher speeds **greater than 35 mph** * .Type I-B is for slower winding roads **less than 35 mph**.  1. **Type III** is for 4R and 3R work with pulverization, base, or other typical section work prior to placing the asphalt.  * Type III-A is for higher speeds **greater than 35 mph**. * Type III-B is for slower winding roads **less than 35 mph**.   2) **Asphalt binder grade**: Binder grade is project specific.  3) **Pressure Aging Vessel Temperature**: The default temperature should be110°C (212°F). If the project is in a desert environment the temperature could change to 110°C (230°F) in the **highlighted area below.** |

**401.01** Delete the second paragraph and substitute the following:

Asphalt concrete pavement nominal maximum size aggregate 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.

Delete the fifth paragraph and substitute the following:

Antistrip additive type is designated according to Subsection 702.05. A minimum of one percent Type 3 (lime) is required in the asphalt concrete mixture.

Add the following:

Pavement roughness is type I-A, I-B, II-A, II-B, III-A, or III-B, and IV as shown in Subsection 401.16.

Asphalt binder grade is PG xx-xx. The Pressure Aging Vessel test temperature shall be 212°F (100°C).

**Construction Requirements**

**401.03 Composition of Mix (Job-Mix Formula).** Add the following after the first paragraph:

Compact specimens with the gyratory effort corresponding to the design ESAL level of 0.3 to <3 million. Use a gyratory compactor which meets the internal angle requirement according to AASHTO T 312.

If more than 1.0 percent hydrated lime is proposed in the JMF, provide AASHTO T 283 test results showing the additional lime is necessary to meet the minimum tensile strength ratio requirements in Table 401-1.

**(c) Submission**

**(1) Aggregate and mineral filler.**

*(a)* Target values: Delete line *(2)* and substitute the following:

*(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:

**(2) Asphalt binder.** Add the following:

*(e)* Laboratory mixing and compaction temperatures and maximum plant mixing temperature

**(3) Antistrip additives.** Add the following:

*(e)* Dosage rate.

**(4) RAP.** Add the following:

*(f)* Optional sheet for RAP on Form FHWA 1641.

**(d) Verification.** Delete the first paragraph and substitute the following:

The verification process starts when all required job mix formula documentation and materials are received.The CO will review the job mix formula and may perform job mix formula verification testing. If verification testing is performed, the information supplied in the Contractor’s job mix formula must agree with the verification test results within the tolerances shown below. Do not begin asphalt concrete mix production for the control strip until the JMF has been approved.

Delete lines (3) and (4) and substitute the following:

**(3) Bulk specific gravity of aggregate (Gsb).** The Contractor’s coarse and fine Gsb is verified if the CO’s results are within 0.038 for AASHTO T 85 and 0.066 for AASHTO T 84.

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

Add the following:

**(8) Hveem stabilometer value**. The Contractor’s Hveem stabilometer value is verified if the CO’s result is above the minimum specification of 30.

**Table 401-1 Gyratory Asphalt Concrete Mix Design Requirements, AASHTO R 35.** Add the following note:

(4) For AASHTO T 283, use 4-inch (100-millimeter) diameter specimens. Note that AASHTO T 283 requires a freeze-thaw cycle.

**401.05 Equipment.**

|  |
| --- |
| Do not include the pay item for a “Material Transfer Vehicle” in that it is considered incidental to construction. If haul distance is anticipated to be short (e.g. less than 30 minutes), Subsection 401.05(b) may be deleted. Verify with pavement & materials group. |

**(b) Materials Transfer Vehicle (MTV).** Delete this Subsection and substitute the following:

**(b) Materials Transfer Vehicle (MTV).** Furnish an MTV with the following:

1. Independently operated with its own driver/operator;
2. Independent from the paver;
3. A loading system with the ability to receive mixtures from hauling equipment;
4. A minimum storage capacity of 15 tons (13.6 metric tons) with a remixing system in the material storage bin;
5. Remixing capability within the storage bin;
6. A discharge conveyor to deliver the mixture to the paver hopper; and
7. A mass not exceeding the maximum legal loadings on structures.

Pick-up machines, hopper inserts, and material transfer devices are not considered MTVs.

In the event the MTV malfunctions during paving operations, the Contractor must suspend paving, however mix in transit and stored in the silo at the time of breakdown may be placed without the use of an MTV. Do not resume mix placement until the MTV is operational.

**401.14 Compacting.** Add the following:

Do not cause cracking, shoving, or undue displacement. Continue rolling until all roller marks are eliminated, all cracks are sealed, and the required density is obtained. For HMA, do not roll the mix after the surface cools below 175 °F (80°C).

**401.15 Joints, Trimming Edges, and Cleanup.** Add the following:

Make the longitudinal joint in the top layer at the centerline of the pavement on two-lane roadways or at the lane lines of roadways with more than two lanes. Establish the centerline of the pavement from recorded data defined in Subsection 152.05(b) or construction staking data if provided by the government. Offset the longitudinal joint in the layer immediately below at least 6-inches (150-millimeters) from the joint.

For curve widening see the plans for locations and details. For two-lane roadways make the longitudinal joint at the centerline of the pavement. Do not vary the shoulder width where curve widening exists.

At connections to existing pavements and previously placed lifts, make the transverse joints vertical to the depth of the new pavement. Form transverse joints by cutting back the previous run to expose the full-depth of the course.

Delete Subsection 401.16 and substitute the following:

**401.16 Pavement Roughness.** 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.

Conform to the following:

**(1) Equipment.** Provide an ASTM E950, Class 1 inertial profiling system conforming to AASHTO M 328 and certified according to AASHTO R 56. Provide copies of the system certifications at least 21 days before profiling begins. Display a current decal on the equipment indicating the expiration date of the certifications.

The CO may perform verification testing, equipment validation, or both as follows:

*(a) Verification testing*. Verification testing will consist of the CO profiling a section of pavement and comparing the results against the Contractor’s results for the same section of pavement. Comparison runs will be made within 21 days of each other. The Contractor’s results will be considered verified if the CO’s International Ride Index (IRI) for each wheel path differs from the Contractor’s IRI for the same wheel path by no more than 10 percent of their mean. Do not use equipment that fails verification.

*(b) Equipment validation*. Equipment validation will consist of determining a cross correlation value on at least one section of pavement having a minimum length of 528 feet (161 meters). The Contractor’s profiler and the CO’s profiler will be cross correlated on the same day. Coordinate and schedule the equipment validation date at least 14 days before the validation date. The CO will determine the location of the cross correlation segments. The Contractor’s equipment will be considered validated if the cross correlation value is greater than or equal to 0.90. Do not use equipment that fails validation.

**(2) Personnel.** Provide the following:

*(a)* A profile system operator certified according to AASHTO R 56. Submit copies of the operator’s certifications at least 21 days before profiling begins.

*(b)* 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. Measure the pavement profile 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. Operate the inertial profiler according to AASHTO R 57 and the manufacturer’s recommendations. Do not apply filters when collecting profile data. Filtering will be applied during profile analysis in ProVAL. Collect profile data (elevation and distance) at a maximum interval of 2 inches (50 millimeters). Provide a lead-in distance of at least 150 feet (45 meters) after reaching the testing speed. Use the profiler’s automatic start/stop activation when collecting data.

The CO will identify excluded areas. Cattle guards, bridges not being overlaid, and turning lanes, passing lanes, side roads less than 500 feet (150 meters), 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. Use event markers to mark the beginning and ending location of areas to be excluded from profile measurement. Measure excluded areas with a straightedge according to Subsection 401.16(e).

Coordinate profiling operations with the CO. Export each profile (elevation, distance data, header, and marker information) in pavement profile format (ppf) and format specific to the profiler manufacturer to a CD or DVD and submit after profiling. Do not submit non-continuous data files.

Use the following naming convention for electronic file submissions:

*(a)* For Type I and Type II pavement roughness:

[Project Name (or abbreviation)] \_ [beginning station\_to\_ending station] \_ [Initial or Final],

Beaver\_Cr\_Rd\_25+50\_to\_387+35\_Initial.ppf.

*(b)* For Type III pavement roughness:

[Project Name (or abbreviation)] \_ [beginning station\_to\_ending station],

Beaver\_Cr\_Rd\_25+50\_to\_387+35.ppf.

**(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 area defective areas. 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).

**(b) Type I pavement roughness.** 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 actives 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.

Measure the profile of the final pavement surface before placing a surface treatment and within 14 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.

No defective area corrections are allowed on the final pavement surface except at locations that do not meet Subsection 401.16(e). Correct locations that do not meet Subsection 401.16(e) according to Subsection 401.16(g).

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.

If a pavement has less than 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** | **Type I-B** |  |
| **Percent Improvement**  **(%)** | **Percent Improvement**  **(%)** | **Pay Factor**  **(PFrough)** |
| Greater than 50.0 | Greater than 45.0 | PF = 1.05 |
| 47.6 – 50.0 | 44.0 – 45.0 | PF = 1.04 |
| 45.1 – 47.5 | 43.0 – 43.9 | PF = 1.03 |
| 43.6 – 45.0 | 41.6 – 42.9 | PF = 1.02 |
| 42.1 – 43.5 | 40.1 – 41.5 | PF = 1.01 |
| 25.0 – 42.0 | 20.0 – 40.0 | PF = 1.00 |
| 24.0 – 24.9 | 19.0 – 19.9 | PF = 0.99 |
| 23.0 – 23.9 | 18.0 – 18.9 | PF = 0.98 |
| 22.0 – 22.9 | 17.0 – 17.9 | PF = 0.97 |
| 21.0 – 21.9 | 16.0 – 16.9 | PF = 0.96 |
| 20.0 – 20.9 | 15.0 – 15.9 | PF = 0.95 |
| 19.0 – 19.9 | 14.0 – 14.9 | PF = 0.94 |
| 18.0 – 18.9 | 13.0 – 13.9 | PF = 0.93 |
| 17.0 – 17.9 | 12.0 – 12.9 | PF = 0.92 |
| 16.0 – 16.9 | 11.0 – 11.9 | PF = 0.91 |
| 15.0 – 15.9 | 10.0 – 10.9 | PF = 0.90 |
| 14.0 – 14.9 | 9.0 – 9.9 | PF = 0.89 |
| 13.0 – 13.9 | 8.0 – 8.9 | PF = 0.88 |
| 12.0 – 12.9 | 7.0 – 7.9 | PF = 0.87 |
| 11.0 – 11.9 | 6.0 – 6.9 | PF = 0.86 |
| 10.0 – 10.9 | 5.0 – 5.9 | PF = 0.85 |
| 5.0 – 9.9 | 4.0 – 4.9 | PF = 0.80 |
| 0.0 – 4.9 | 0.0 – 3.9 | PF = 0.70 |
| Negative % Improvement | Negative % Improvement | Correct & overlay |

**(c) Type II pavement roughness.** 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 actives 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.

Measure the profile of the final pavement surface before placing a surface treatment and within 14 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.

No defective area corrections are allowed on the final pavement surface except at locations that do not meet Subsection 401.16(e). Correct locations that do not meet Subsection 401.16(e) according to Subsection 401.16(g).

Lower paving lifts can be profiled to locate areas of localized roughness and estimate the final profile pay factor. Defective areas can be corrected on lower paving lifts according to 401.16(g).

If a pavement has less than a 20.0 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** | **Type II-B** |  |
| **Percent Improvement**  **(%)** | **Percent Improvement**  **(%)** | **Pay Factor**  **(PFrough)** |
| Greater than 65.0 | Greater than 55.0 | PF = 1.05 |
| 64.0 – 64.9 | 54.0 – 54.9 | PF = 1.04 |
| 63.0 – 63.9 | 53.0 – 53.9 | PF = 1.03 |
| 62.0 – 62.9 | 52.0 – 52.9 | PF = 1.02 |
| 61.0 – 61.9 | 51.0 – 51.9 | PF = 1.01 |
| 60.0 – 60.9 | 50.0 – 50.9 | PF = 1.00 |
| 59.0 – 59.9 | 49.0 – 49.9 | PF = 0.99 |
| 58.0 – 58.9 | 48.0 – 48.9 | PF = 0.98 |
| 57.0 – 57.9 | 47.0 – 47.9 | PF = 0.97 |
| 56.0 – 56.9 | 48.0 – 46.9 | PF = 0.96 |
| 55.0 – 55.9 | 45.0 – 45.9 | PF = 0.95 |
| 54.0 – 54.9 | 44.0 – 44.9 | PF = 0.94 |
| 53.0 – 53.9 | 43.0 – 43.9 | PF = 0.93 |
| 52.0 – 52.9 | 42.0 – 42.9 | PF = 0.92 |
| 51.0 – 51.9 | 41.0 – 41.9 | PF = 0.91 |
| 50.0 – 50.9 | 40.0 – 40.9 | PF = 0.90 |
| 48.0 – 49.9 | 38.0 – 39.9 | PF = 0.89 |
| 46.0 – 47.9 | 36.0 – 37.9 | PF = 0.88 |
| 44.0 – 45.9 | 34.0 – 35.9 | PF = 0.87 |
| 42.0 – 43.9 | 32.0 – 33.9 | PF = 0.86 |
| 40.0 – 41.9 | 30.0 – 31.9 | PF = 0.85 |
| 35.0 – 39.9 | 25.0 – 29.9 | PF = 0.80 |
| 30.0 – 34.9 | 20.0 – 24.9 | PF = 0.70 |
| Less than 30.0 | Less than 20.0 | Correct & overlay |

**(d) Type III pavement roughness.** Measure the profile of the final pavement surface for payment. Measure the profile before placing a surface treatment and within 14 days of completing roadway paving. No defective area corrections are allowed on the final pavement surface except at locations that do not meet Subsection 401.16(e). Submit electronic files and the analysis to the CO for analysis. Correct locations that do not meet Subsection 401.16(e) according to Subsection 401.16(g).

Pay factors from Table 401-5 will be used in conjunction with the long continuous histogram printout from ProVAL’s Smoothness Assurance Analysis function 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.

Lower paving lifts can be profiled to locate areas of localized roughness and estimate the final profile pay factor. Defective areas can be corrected on lower paving lifts according to 401.16(g).

If the final roadway MRI for the entire traveled way is greater than the value shown in Table 401-5, place a minimum 1-inch (25-millimeter) overlay over the entire paved surface.

|  |  |  |
| --- | --- | --- |
| Table 401-5  **Type III Pavement Roughness Pay Factors** | | |
| **Mean Roughness Index**  **(MRI)**  **Type III-A**  **in/mi (m/km)** | **Mean Roughness Index**  **(MRI)**  **Type III-B**  **in/mi (m/km)** | **Pay Factor**  **(PFrough)** |
| Localized roughness threshold  170 in/mi (2.681 m/km) | Localized roughness threshold  190 in/mi (2.996 m/km) |  |
| If MRI of entire roadway  is greater than  125 in/mi (1.973 m/km) | If MRI of entire roadway  is greater than  140 in/mi (2.210 m/km) | Correct with Overlay |
| Greater than 95.0 (1.50) | Greater than 110.0 (1.74) | 0.700 |
| 95.0 – 90.0 (1.50 – 1.42) | 110.0 – 105.0 (1.74 – 1.66) | 0.750 |
| 90.0 – 85.0 (1.42 – 1.34) | 105.0 – 100.0 (1.66 – 1.58) | 0.800 |
| 85.0 – 80.0 (1.34 – 1.26) | 100.0 – 95.0 (1.58 – 1.50) | 0.850 |
| 80.0 – 75.0 (1.26 – 1.18) | 95.0 – 90.0 (1.50 – 1.42) | 0.900 |
| 75.0 – 70.0 (1.18 – 1.10) | 90.0 – 85.0 (1.42 – 1.34) | 0.950 |
| 70.0 – 65.0 (1.10 – 1.02) | 85.0 – 80.0 (1.34 – 1.26) | 0.970 |
| 65.0 – 60.0 (1.02 – 0.94) | 80.0 – 75.0 (1.26 – 1.18) | 1.000 |
| 60.0 – 55.0 (0.94 – 0.86) | 75.0 – 70.0 (1.18 – 1.10) | 1.010 |
| 55.0 – 50.0 (0.86 – 0.78) | 70.0 – 65.0 (1.10 – 1.02) | 1.020 |
| 50.0 – 45.0 (0.78 – 0.70) | 65.0 – 60.0 (1.02 – 0.94) | 1.030 |
| 45.0 – 40.0 (0.70 – 0.62) | 60.0 – 55.0 (0.94 – 0.86) | 1.040 |
| 40.0 – 35.0 (0.62 – 0.54) | 55.0 – 50.0 (0.86 – 0.78) | 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 in excess of ¼ inches (6 millimeters) measured between two contacts of the straightedge or deviations in excess of ¼ inches (6 millimeters) measured at the end of the straightedge. Correct defective areas according to Subsection 401.16(g).

**(f) Localized roughness area 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.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Table 401-6**  **Localized Roughness Area Pay Reductions** | | | | |  |
| **Type I** | **Type II** | **Localized**  **Roughness Limit**  **MRI** | **Localized**  **Roughness**  **Limit**  **MRI, in/mi**  **(m/km)** | **Type III-A** | **Type III-B** |
| **Deduction**  **per**  **Occurrence** | **Deduction**  **per**  **Occurrence** | **Deduction**  **per**  **Occurrence** | **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 | 170.0 – 179.9  (2.681 – 2.838) | $200 | - |
| 180.0 – 189.9  (2.839 – 2.995) | $400 | - |
| 190.0 – 199.9  (2.996 – 3.154) | $600 | $300 |
| 200.0 – 209.9  (3.155 – 3.311) | $800 | $400 |
| 210.0 – 219.9  (3.312 – 3.469) | $1,000 | $500 |
| 220.0 – 229.9  (3.470 – 3.626) | $1,500 | $750 |
| 230.0 – 239.9  (3.627 – 3.784) | $2,000 | $1,000 |
| > 240.0 (3.785) | $4,000 | $1,500 |

**(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) 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. Seal the surface after grinding. Submit the type of seal to be applied after grinding is completed to the CO for approval. Place seal according to Section 409 or 410. Limit the grinding depth to 12.5 percent of the design pavement thickness. If grinding in excess of this depth, provide a minimum 1-inch (25‑millimeter) overlay.

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

After corrections are made, 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.

**401.17 Acceptance.** Delete (b) and substitute the following:

**(b) VMA.** The specification limit 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;

**Payment**

**401.19** Delete the equation for Roughness Factor (RF) and substitute the following:

RF = Roughness factor: 80,000 U.S. Customary (49,600 Metric).

Delete the last row of Table 401-8 and substitute the following:

**Table 401-8 (continued)**

**Sampling, Testing, and Acceptance Requirements**

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