**ON PAGE 253, SUBSECTION 430.03.B.5.b – COLD IN-PLACE RECYCLED (CIR) PAVEMENT/COMPACTION**

Delete 405.03.L and replace with 405.03.O.

**ON PAGE 569, SUBSECTION 720.07.1.b – RECYCLED ASPHALT PAVEMENT (RAP)/CATEGORY 2**

Delete this sentence: "Submit test results within 10 calendar days before mix design submittal."

**ON PAGE 570, SUBSECTION 720.07.3 – RECYCLED ASPHALT PAVEMENT (RAP)**

Delete this sentence: "Provide the test results on a spreadsheet with the mix design submittal and update the spreadsheet, if additional RAP is produced before producing HMA."

And replace with this sentence: "Provide the test results on a spreadsheet with the specific gravity of aggregates and RAP submittal as specified in 405.03.A."

**ON PAGES 180-207, SECTION 405 – SUPERPAVE® HOT MIX ASPHALT**

Delete this section, in its entirety, and replace with the following:

**405.01 Description.** Construct 1 or more courses of Superpave hot mix asphalt (HMA) plant mix, including leveling courses if applicable, on a prepared surface. References in this section also apply to warm mix asphalt (WMA).

**405.02 Materials.** Provide materials as specified in:

Aggregate ..... 703

Asphalt ..... 702

Anti-Stripping Additive ..... 702

Hydrated Lime ..... 720.06

Recycled Asphalt Pavement (RAP) ..... 720.07

Test materials in accordance with the following applicable standard methods:

Particle Size Distribution of Aggregate ..... FOP for AASHTO T 27

With Materials Finer than 75um (No. 200) Sieve in Mineral Aggregate by Washing ..... FOP for AASHTO T 11 Method A or B

Mechanical Analysis of Extracted Aggregate ..... FOP for AASHTO T 30

Preparing and Determining the Density of Hot Mix Asphalt (HMA) Specimens by Means of the Superpave Gyratory Compactor. ..... FOP for AASHTO T 312

Superpave Volumetric Design for Hot Mix Asphalt (HMA) ..... AASHTO R 35

Determining the Percentage of Fracture in Coarse Aggregate ..... FOP for AASHTO T 335 Method 1

Percent Air Voids in Compacted Dense and Open Bituminous Paving Mixtures ..... AASHTO T 269

Theoretical Maximum Specific Gravity and Density of Bituminous Paving Mixtures ..... FOP for AASHTO T 209 Bowl Method

Bulk Specific Gravity of Compacted Bituminous Mixtures Using Saturated Surface Dry Specimens ..... FOP for AASHTO T 166 Method A

Pavement Straightedge Procedures ..... Idaho IR 87

In-Place Density of Asphalt Mixtures by Nuclear Methods ..... FOP for AASHTO T 355
Backscatter mode

Sampling Asphalt Mixtures after Compaction (Obtaining Cores) ..... FOP for AASHTO R 67

Determining Volume of Liquids in Horizontal or Vertical Storage Tanks ..... Idaho IT 120

Acceptance Test Strip for Hot Mix Asphalt (HMA) Pavement..... Idaho IR 125

Standard Practice for Operating Inertial Profilers and Evaluating Pavement Profiles ..... AASHTO R 57

Determining the Asphalt Binder Content of Hot Mix Asphalt (HMA) by the Ignition Method ..... FOP for AASHTO T 308

Sampling Asphalt Mixtures ..... AASHTO R 97
(See QA Manual Section 270 for sampling method)

Reducing Samples of Hot Mix Asphalt to Testing Size ..... FOP for AASHTO R 47

Moisture Content of Hot Mix Asphalt (HMA) by Oven Method ..... FOP for AASHTO T 329

Plastic Fines in Graded Aggregate and Soils By Use of the Sand Equivalent Test..... FOP for AASHTO T 176
Alternate Method #2, Mechanical, Pre-wet

Standard Method of Test for Compressive Strength of Hot Mix Asphalt .....AASHTO T 167

Standard Test Method for Effect of Water on Compressive Strength of Compacted Bituminous Mixtures (Immersion-Compression)..... ASTM D1075
(Replace ASTM D1074 and ASTM D2726 with AASHTO T 167 and AASHTO T 166)

Resistance of Compacted Asphalt Mixtures to Moisture-Induced Damage.....AASHTO T 283

Uncompacted Void Content of Fine Aggregate, Method A .....AASHTO T 304

Mixture Conditioning of Hot-Mix Asphalt (HMA) ..... AASHTO R 30

Sampling Asphalt Materials .....FOP for AASHTO R 66

Determining Rutting Susceptibility of Asphalt Pavement Mixture Using the Asphalt Pavement Analyzer (APA) .....AASHTO T 340

Superpave Volumetric Mix Design .....AASHTO M 323

Evaluation of the Superpave Gyratory Compactor (SGC) Internal angle of Gyration Using Simulated Loading ..... AASHTO T 344

Standard Test Method for Flat Particles, Elongated Particles, or Flat and Elongated Particles in Coarse Aggregate ..... Idaho FOP for ASTM D4791 (ratio of length to thickness equal to or greater than 5:1)

Bulk Specific Gravity and Density of Compacted Asphalt Mixtures Using Automatic Vacuum Sealing Method ..... AASHTO T 331

Standard Practice for Rapid Drying of Compacted Asphalt Specimens Using Vacuum Drying Apparatus ..... AASHTO R 79

Standard Test Method for Maximum Specific Gravity and Density of Bituminous Paving Mixtures Using Automatic Vacuum Sealing Method ..... ASTM D6857

Specific Gravity and Absorption of Aggregate Using Automatic Vacuum Sealing Method ..... Idaho IT 144

Quantitative Extraction of Bitumen from Bituminous Paving Mixtures ..... AASHTO T 164

Quantitative Extraction and Recovery of Asphalt Binder from Asphalt Mixtures ..... AASHTO T 319

Lime for Asphalt Mixtures ..... AASHTO T 303

Determination of Recycled Asphalt Pavement (RAP) Aggregate Dry Bulk Specific Gravity ($G_{sb}$) ..... Idaho IT 146

Standard Test Method for Automated Extraction of Asphalt Binder From Asphalt Mixtures (Asphalt Analyzer™) ..... ASTM D8159

Standard Method of Test for Determination of Cracking Tolerance Index of Asphalt Mixture Using the Indirect Tensile Cracking Test at Intermediate Temperature ..... ASTM D8225

Hamburg Wheel-Track Testing of Compacted Hot Mix Asphalt (HMA) ..... AASHTO T 324

Stratified Random Sampling ..... Idaho IR 148

Superpave Mix Design ..... Idaho IR 150

Superpave Mix Design Evaluation ..... Idaho IR 151

HMA Quality Control Plan Development and Implementation ..... Idaho IR 152

Split Sample Comparison ..... Idaho IR 153

Nuclear Density Gauge Correlation ..... Idaho IR 154

Procedures for Checking Asphalt Drum Mix Plant Calibrations ..... Idaho IR 155

Method for Determining Rolling $G_{mm}$ ..... Idaho IR 156

NCAT Correction Factor ..... Idaho IR 157

Evaluation and Approval of HMA Plants ..... Idaho IR 160

Provide Superpave HMA composed of a combination of aggregate, approved additives, mineral filler (if required), RAP (if used), WMA additives or process (if used), and performance graded (PG) asphalt binder material. Provide a job mix formula (JMF) reported on ITD-0774 and a Superpave HMA pavement as specified and meeting the requirements in this section, 703, and 720.

**Table 405.02-1 – Superpave Mixture Requirements**

| Mixture Type | SP 2 (50 gyrations) | SP 3 (75 gyrations) | SP 5 (100 gyrations) |
|---|---|---|---|
| Design ESALs [a] (millions) | < 1 | 1 < 10 | ≥ 10 |
| Gyratory Compaction<br>Gyrations for $N_{ini}$<br>Gyrations for $N_{des}$<br>Gyrations for $N_{max}$ | <br>6<br>50<br>75 | <br>7<br>75<br>115 | <br>8<br>100<br>160 |
| Relative Density, % $G_{mm}$ @ $N_{ini}$ | ≤ 90.5 | ≤ 89.0 | ≤ 89.0 |
| Relative Density, % $G_{mm}$ @ $N_{des}$ | 96.0 | 96.0 | 96.0 |
| Relative Density, % $G_{mm}$ @ $N_{max}$ | ≤ 98.0 | ≤ 98.0 | ≤ 98.0 |
| Air Voids, % $P_a$ | 4.0 | 4.0 | 4.0 |
| Dust Proportion Range [b] | 0.6 – 1.4 | 0.6 – 1.4 | 0.6 – 1.4 |
| Voids Filled with Asphalt (VFA) Range, %<br>1½"<br>1"<br>¾"<br>½"<br>3/8"<br>#4 | <br>64 – 80<br>65 – 78<br>65 – 78<br>65 – 78<br>65 – 78<br>67 – 79 | <br>64 – 75<br>65 – 75<br>65 – 75<br>65 – 75<br>73 – 76<br>67 – 77 | <br>64 – 75<br>65 – 75<br>65 – 75<br>65 – 75<br>73 – 76<br>67 – 77 |
| Rut Depth, mm [c] | ≤ 10.0 mm | ≤ 10.0 mm | ≤ 10.0 mm |
| Stripping, passes [d] | 12,500 | 15,000 | 15,000 |
| Cracking Test, IDEAL-$CT_{Index}$ [e] | 80 (index value) | 80 (index value) | 80 (index value) |

[a] The anticipated project traffic level expected on the design lane over a 20 year period. Regardless of the actual design life of the roadway, determine the design ESALs for 20 years.

[b] For No. 4 nominal maximum size mixtures, the dust proportion is 1.0 to 2.0 for SP 2 mixes and 1.5 to 2.0 for SP 3 and SP 5 mixes. For coarse graded 3/8, ½, and ¾ inch nominal maximum size mixtures, the dust proportion is 0.6 – 1.5. (Fine and coarse graded mixtures are defined in 703.05).

[c] Maximum depth after specified number of stripping passes. The Hamburg must have passing test results in the mix design.

[d] Minimum number of passes with no stripping inflection point. The Hamburg must have passing test results in the mix design.

[e] The Ideal-CT value and the associated data generated will be included in the mix design submittal; the data will only be used for information.

Approved SP 3 mixes may be substituted for SP 2 mixes. Use the binder content corresponding to 3.5 percent air voids. Adjust the SP 3 mix binder content by selecting the binder content that achieves 3.5 percent air voids at 75 gyrations from the binder content versus air voids graph of the approved mix design and target this binder content in the C-JMF. The SP 3 mix will be tested during production and accepted as an SP 2 mix (i.e., measuring binder content and gradation) when a substitution is made and the SP 2 VFA value will be used.

Use a QPL anti-stripping additive, if needed. Determine the amount of liquid anti-stripping additive or lime required by performing AASHTO T 324 during the mix design development.

1. Warm Mix Asphalt (WMA). WMA is defined as HMA that is produced at a target discharge temperature of 275 °F or less using QPL WMA additives or processes. WMA is allowed for use. QPL WMA additives or processes may be used to facilitate mixing and compaction of HMA produced at target discharge temperatures above 275 °F; however, such mixtures will not be defined as WMA.

   Use additives or processes from the QPL. Follow the supplier's or the manufacturer's written instructions for additives and processes when producing WMA mixtures.

   Use equipment and WMA technologies capable of producing an asphalt mixture that meet specifications and is workable at the minimum placement and compaction temperature desired, regardless of storage or haul distance considerations.

   Produce Superpave WMA by 1 or a combination of several QPL-approved technologies including chemical, foaming, and organic processes.

   The Department and the Contractor will prepare Superpave WMA field samples, as recommended by the manufacturer's representative, for WMA mixture testing.

2. Recycled Asphalt Pavement (RAP). The Department will allow RAP in the Superpave HMA. Provide RAP as specified in 720.07. Produce the mixture as specified in 405. Select the mass of RAP, the type of RAP, and the extent of RAP processing necessary to meet specifications. The Department will not change specifications or the contract unit price if RAP is used in the mixture.

   If RAP material is to be used from the project, obtain a representative sample of material for the mix design.

   The mass of RAP used in Superpave HMA is the mass of asphalt binder, in percent that the RAP contributes to the total mass of binder in the mixture.

   RAP Binder Percentages and Binder Grade Selection. Determine the percentage of RAP used and the binder grade required to meet the specified PG binder grade. Select the RAP percentage in the mix by determining the contribution of the RAP binder toward the total binder in the mix, by weight.

   It may be necessary to use a softer virgin PG binder than is specified to account for the age hardened binder in the RAP. Adjust the binder grade specified to account for the stiffening effect of the aged binder in the RAP resulting in a composite binder meeting requirements. The method for determining the binder grade adjustment in Superpave HMA mixtures incorporating RAP is designated as Level 1 or Level 2 as shown in Table 405.02-2. Each level has a range of percentages that represent the contribution of the RAP binder toward the total binder, by weight.

**Table 405.02-2 – Grade Adjustment for RAP Usage**

| Level | RAP binder by weight of the total binder in the mixture, % | Binder Grade Adjustment to account for the stiffness of the asphalt binder in the RAP |
|---|---|---|
| 1 | 0 to 17 | No binder grade adjustment is made. |
| 2 | > 17 to 30 | The selected binder grade adjustment for the binder grade specified on the plans is one grade lower for the high and the low temperatures designated. Or determine the asphalt binder grade adjustment using a blending chart. Note: See AASHTO M 323 for recommended blending chart procedure. |

Table 405.02-3 identifies the typical binder grades used and the recommended binder grade adjustments for each binder grade at the RAP level described in Table 405.02-2. If the binder grade adjustment is not in Table 405.02-3, use Table 405.02-2 to determine the binder grade adjustment needed.

**Table 405.02-3 – Typical Adjusted Binder Grades**

| | Level 2 | Level 1 |
|---|---|---|
| **Binder Grade Specified in Contract** | **Adjusted Binder Grade** | **Adjusted Binder Grade** |
| 58-28 | 58-34 | No adjustment needed |
| 58-34 | No Adjustment Needed | |
| 64-28 | 58-34 | |
| 64-34 | 58-34 | |
| 70-28 | 64-34 | |
| 76-28 | 70-34 | |

Use the following equation to determine the percent of RAP by weight of mix:

X% = c (a/b)

Where:

a = optimum asphalt content, percent in mixture to produce 4.0% air voids.

b = percent asphalt content in the RAP (from chemical extraction and/or FOP for AASHTO T 308 burn with asphalt binder correlation factor).

c = percent of RAP binder by weight of the total binder desired in the mix.

X = desired RAP percent by total weight of mix.

The following is an example of the calculation:

Total RAP binder desired equals 17% of total binder in the mixture. If RAP will contribute 5.1% asphalt content and the optimum asphalt content is 5.8%, then:

X% = 17% * (5.8/5.1) = 19.3% RAP percent by total weight of mix.

3. Recycled Asphalt Shingles (RAS). RAS is not allowed in any Superpave HMA.
4. Re-refined Engine Oil Bottoms (REOB). REOB is not allowed in any Superpave HMA.
5. Crumb Rubber Modifier (CRM). CRM is not allowed in any Superpave HMA.

**405.03 Construction Requirements.**

**A. Specific Gravity of Aggregates and RAP.** The Department will determine the bulk dry specific gravity of aggregate, $G_{sb}$, apparent specific gravity of aggregate, $G_{sa}$, and water absorption (by percent weight of dry aggregate) of the coarse and fine aggregate for each stockpile used in the mixture using AASHTO T 85 and Idaho IT 144. The Department will evaluate the RAP $G_{sb}$, if used, by determining the RAP $G_{se}$ in accordance with Idaho IT 146. The Department will determine the specific gravity of aggregates and RAP at a minimum of once a calendar year for each stockpile.

1. Sampling Requirements. The date, time, and location of sampling will be agreed to by the Engineer and the Contractor. The Contractor will sample the aggregate stockpiles and RAP stockpiles to be used in the mix design in accordance with FOP for AASHTO R 90 and reduce in accordance with FOP for AASHTO R 76. Obtain samples from at least 6 distinct locations within each stockpile. Sample, combine, and reduce the material for each stockpile to the Department's required material submittal size in the Engineer's presence. Immediately give possession of the samples to the Engineer.
2. Submittal Requirements. Provide blend sheets for the mixture proportions and submit the following:
    a. Aggregate Stockpile. For each aggregate stockpile, submit:
        i. 100 pound minimum sample in clean 5-gallon plastic buckets with airtight lids.
            (1) Each bucket must weigh no more than 50 pounds.
        ii. A summary of all QC test data used to develop average stockpile gradation.
        iii. A summary of all QC test data of $G_{sb}$, $G_{sa}$, and water absorption (by percent weight of dry aggregate) of the coarse and fine aggregate produced during stockpile production.
        iv. Source number.
    b. RAP Stockpile. For each RAP stockpile, submit:
        i. 100 pound minimum sample in clean 5-gallon plastic buckets with airtight lids.
            (1) Each bucket must weigh no more than 50 pounds.
        ii. All QC test data used to develop average stockpile gradation.
        iii. Report the asphalt binder/aggregate correlation factor for asphalt binder and gradation for each RAP stockpile as specified in 720.
3. Testing Timeframe. The Department will not begin testing until the complete submittal has been received. The Engineer will provide the Contractor with an aggregate test report (i.e., ITD-802 form) within 10 business days after receiving the complete submittal package. A Contractor's representative may be present during the $G_{sb}$ testing, if requested. Retesting, at the Contractor's request, will require an additional 15 business days for re-evaluation. Additional materials and additional information may be required from the Contractor. The Contractor may request a retest only if the QC data submitted supports retesting.

The Contractor will use the established $G_{sb}$ in the mix design calculation, the mix design report, and for production paving testing.

The Engineer will use the established $G_{sb}$ and $G_{sa}$ during the mix design submittal evaluation, acceptance test strip testing, production acceptance testing, and challenge testing.

If the $G_{sb}$ changes during production more than 0.030, as determined by the Engineer, the Engineer will notify the Contractor. The Engineer will establish a new $G_{sb}$ and re-evaluate the mix design as specified in 405.03.B. All subsequent mix produced after the Contractor has been notified of the new $G_{sb}$ will use the newly established $G_{sb}$. If at any time testing indicates that $G_{sa}$ is greater than or equal to $G_{se}$ and/or $G_{se}$ is greater than or equal to $G_{sb}$ (i.e., $G_{sa} \geq G_{se}$ and/or $G_{se} \geq G_{sb}$) is not true, production will be halted and a new $G_{sb}$ will be established in accordance with this section.

**B. Mix Design.** Develop a Superpave mix design in accordance with Idaho IR 150 to determine the appropriate combination of aggregate, approved additives, mineral filler (if required), RAP (if used), WMA additives or process (if used), and performance graded (PG) asphalt binder material meeting the requirements in 405, 703, and 720.

1. Approved Mix Design. A mix design must be approved before use using the following process:

a. Mix Design Submittal. Submit the mix design and all supporting documentation in accordance with Idaho IR 150 a minimum of 5 business days before paving is scheduled to begin. Email to mixdesigns@ITD.idaho.gov and submit to the Engineer. Only 1 mix design per email notification will be accepted.

b. Mix Design Submittal Evaluation. The Engineer in conjunction with the District Materials Engineer, the Construction and Materials section, and the Central Materials Laboratory will evaluate the mix design in accordance with Idaho IR 151. The Engineer will provide the Contractor with written approval or rejection of the mix design within 5 business days after receiving the full submittal package.

i. Mix Design Submittal Approval. Once the mix design submittal is approved by the Department, the Contractor may proceed with acceptance test strip placement using the JMF from the approved mix design submittal. The mix design will be approved for use for up to 2 calendar years from the date of test strip acceptance.

ii. Mix Design Submittal Rejection. Rejection of the mix design will require:

(1) The mix designer will amend the mix design to address the items noted in the notification of rejection. The Contractor will resubmit the mix design as specified in 405.B.2. The Department will re-evaluate the mix design for approval or rejection as specified in 405.B.3.

(2) Develop and submit a new mix design as specified in 405.B.

2. Approved Mix Design Expiration. An approved mix design, associated JMF, and any associated C-JMF will be considered expired when one of the following situations occur (but not limited to):

a. More than 2 calendar year has elapsed from the time of test strip acceptance for the mix design.

b. Changes in stockpile gradation.

c. Changes in aggregate specific gravity or absorption.

d. Changes in RAP specific gravity.

e. Changes in aggregate, RAP, or binder sources.

f. Aggregate does not meet physical requirements specified in 703.

g. Changes in additives, including a change in the dosage rates.

h. Repeated non-conformance as defined in 405.03.M.1.

3. Asphalt Analyzer Offset Calibration Determination (see Flowchart 405.03-1).

a. The Central Materials Laboratory will prepare 11 hand mixed JMF correction factor samples using aggregates and RAP from $G_{sb}$ determination.

1. Four (4) ITDProdAcceptanceLab (see Flowchart 405.03-1 Box 2.0, for information only).

2. Three (3) ITDHQ Extractor (see Flowchart 405.03-1 Box 3.0 for Payment B).

3. Four (4) Contractor CNCF (see Flowchart 405.03-1 Box 4.0).

b. ITDProdAcceptance lab will determine NCAT Correction Factor (INCF) using AASHTO T 308 (HQ lab produced samples), provide data to the Contractor, for information only.

c. The Department determines an offset between 3 Central Materials Laboratory Asphalt Analyzer samples and known asphalt content from hand batched blend sheets.

The offset will be used to help quantify an asphalt binder quantity to be valued at the asphalt invoice price.

If Asphalt Analyzer Offset is greater than 0.2, adjust bin percentages and target gradations as required to meet specifications and resubmit adjustments as an addendum to the mix design for approval within 1 business day.

The Contractor may challenge upon request. Must use aggregate/RAP from $G_{sb}$ testing. This challenge stands.

d. The Contractor may correlate NCAT ovens with AASHTO T 308 and CNCF to be used during the test strip.

**C. HMA Quality Control Plan.** Develop and submit for approval a HMA quality control plan that complies with the requirements of Idaho IR 152, Idaho IR 155, Idaho IR 160, and 106.03.A.2. The Contractor HMA quality control plan must be approved by the Engineer in accordance with 106.03.A.2, Idaho IR 152, Idaho IR 159, Idaho IR 160, and Idaho IR 155 before the material is incorporated into the work/project.

**D. Weather Limitations for Permanent Paving.** Do not place Superpave HMA on a wet or frozen surface or when weather or surface conditions will otherwise prevent the proper handling or finishing of the Superpave HMA material. Place Superpave HMA as specified in the temperature limitations in Table 405.03-2.

**Table 405.03-2 – Air and Surface Temperature Limitations**

| Compacted Thickness of Individual Courses | Top Course | Leveling and Courses Below the Top Course |
|---|---|---|
| Less than 0.10 foot | 60 °F | 50 °F |
| 0.10 to 0.18 foot | 50 °F | 40 °F |
| Greater than 0.18 foot | 40 °F | 40 °F |

Provide a paved surface for travel if the work extends into the winter. Do not start construction on the pavement surface, unless the progress schedule realistically shows the pavement can be replaced or completed within the temperature limitations listed above.

**E. Mixing Plants.** Use an approved mixing plant that complies with Idaho IR 160 and in accordance with the approved HMA Quality Control Plan. Meet the requirements of Idaho IR 155, with the exception that the Contractor may calibrate the asphalt plant according to current National Asphalt Pavement Association (NAPA) manuals and documented best practices or in accordance to the manufacturer's recommendations. The Contractor will provide the calibration documentation (e.g., manufacturer's recommendation) to the Engineer.

**F. Hauling Equipment.** Provide hauling equipment in accordance with the approved HMA Quality Control Plan.

**G. Paver.** Provide a paver that complies with the approved HMA Quality Control Plan.

**H. Pre-Paving Meeting.** Immediately before paving, the Contractor, the asphalt supplier, the Engineer, and the Department personnel involved in the paving operation will hold a pre-operational paving meeting to discuss how to achieve the highest quality surface. The Engineer will prepare minutes of the pre-operational paving meeting and distribute them to the attendees. Any requests to revise the minutes must be made to the Engineer within 7 business days of receipt. These minutes will constitute the final record of the pre-operational paving meeting.

**I. Acceptance Test Strip.** Construct an acceptance test strip of 200 to 750 tons in accordance with Idaho IR 125 using the approved JMF (including offsite test strips). The Department does not require acceptance test strips on small quantity pavement (e.g., less than 750 tons), nonstructural pavement, or temporary pavement.

The Engineer will base acceptance on the requirements in Table 405.03-4. Do not continue production paving until properties of the acceptance test strip are accepted and a C-JMF has been established as specified in 405.03.K.

1. Test Strip Location. The first day of production paving will be considered the acceptance test strip. The Contractor may elect to perform an offsite mix verification of the JMF. Do not use Department-owned or controlled sources for offsite testing.
2. Testing Timeframe. The Department will require 7 business days from the time of receipt of Superpave HMA mix samples, core samples, and cold feed samples to perform acceptance testing. Time will begin when all the required samples and associated paperwork needed to perform the specified testing are in the Engineer's possession.
3. Acceptance Testing Lab. The Department's Central Materials Laboratory will perform acceptance testing for the acceptance test strip.
4. Test Strip Tolerance. The Engineer will apply the tolerances to the acceptance test strip test properties as specified in Table 405.03-4 to establish the upper specification limit (USL) and lower specification limit (LSL) for quality level analysis.
5. Test Strip Acceptance Criteria. The Engineer will determine acceptance in accordance to Idaho IR 125.
6. The production paving lot following the accepted test strip will be based on Table 405.03-4 except the gradation requirements.

**Table 405.03-4 – Acceptance Test Strip Tolerance**

| Quality Characteristic | Test Strip Mix Tolerance |
|---|---|
| VMA, % | 703.05 minimum value |
| Laboratory Air Voids, % | 4.0 ± 1.5 |
| Asphalt Binder Content, % | If AAO > 0.3, JMF ± 0.40<br>If AAO ≤ 0.30, JMF ± 0.40 + AAO |
| Dust Proportion (DP) | Table 405.02-1 range ± 0.10 |
| VFA, % | Table 405.02-1 range |
| No. 4 and larger sieves, % | JMF value ± 6.0 [a] |
| No. 8 to No. 30 sieves, % | JMF value ± 5.0 [a] |
| No. 50 to No. 100 sieves, % | JMF value ± 4.0 [a] |
| No. 200 and smaller sieves, % | JMF value ± 2.0 [a] |
| $G_{mm}$ | JMF value at $P_b$ ± 0.012 [d] |
| $G_{se}$ | JMF value ± 0.012 [d] |
| Mainline Density, % Compaction | 92.0 – 100.0 |
| Rut Depth, mm [b] | 10.0 mm maximum [d] |
| Stripping, passes [c] | 12,500/15,000 [d] |
| Cracking Test, IDEAL-$CT_{Index}$ | 80 (index value) [d] |

[a] The upper and lower specification limits are never allowed to be outside the control points specified in 703.05.

[b] Maximum depth after 12,500/15,000 passes. For information only.

(c) Minimum number of passes with no stripping inflection point.
(d) For information only.

If the acceptance test strip is considered acceptable based on Idaho IR 125, the Contractor may proceed to production paving once a C-JMF is established as specified in 405.03.K.

If the acceptance test strip is not considered acceptable based on 106.03.B. for any quality characteristic, the Contractor will not be allowed to proceed with production paving. The Engineer will reject an unacceptable test section for SP 3 and SP 5 mixtures and require removal. The Department will not pay for the removal or the applicable contract pay item quantities. An unacceptable test section for an SP 2 mixture will be subject to rejection. If the Engineer determines the failed SP 2 test section may remain in place, the Contractor may leave the test section in place with a 50 percent reduction in price or remove the failed material and replace it with acceptable material and receive full payment. Remove the failed SP 2 test section if rejected. The Department will not pay for removal or for the applicable contract pay item quantities.

If the Contractor is unable to meet the requirements after 3 test strips, the Engineer will require a new mix design to meet specifications. Place a new acceptance test strip at no additional cost to the Department.

If the Contractor's testing determines the test strip fails and the Contractor chooses to proceed with another test strip before receiving the Engineer's results, the Engineer will complete testing of the test strip in question and report the results before accepting material from the next test strip for evaluation.

PWL will be used to evaluate the test strip. The test strip will be paid at a 1.0 pay factor for a PWL greater than 40. If any quality characteristic, except $G_{mm}$ or $G_{se}$, has a PWL less than 40, the asphalt mix will be rejected (i.e., $G_{mm}$ or $G_{se}$ with a PWL less than 40, will not be rejected but the cause will be evaluated by the Engineer). Plant settings may differ from the JMF or C-JMF in an effort to match actual plant output to the JMF or C-JMF.

**J. Production Laboratory Comparison Process.** The Contractor or the Engineer may request split sample comparison testing at any time during the project. The split sample comparison will be performed using Idaho IR 153.

1. The Department recommends that at a minimum the comparison be performed during test strip or before production.

**K. C-JMF.** Once a JMF is confirmed at acceptance test strip, the Contractor will establish an initial C-JMF.

1. Adjusting the C-JMF. C-JMF adjustments are allowed that will result in improved mix quality characteristics. If a lot is currently in progress, the adjustment will go into effect at the beginning of the next lot.
    a. Adjustments within Table 405.03-5. Adjustments listed in Table 405.03-5 can be made to the JMF. Provide a detailed description of how these adjustments will be made and what quality characteristics will be effected. The Engineer will be notified within 24 hours of adjustments and descriptions.

**Table 405.03-5 – C-JMF Adjustment Limit Table**

| Parameter | Adjustment |
|---|---|
| No. 4 (4.75 mm) and greater | ± 3% from JMF |
| No. 8 (2.36 mm) | ± 2% from JMF |
| No. 100 to No. 30 (0.600 mm) | ± 2% from JMF |
| No. 200 (0.075 mm) | ± 0.3% from JMF |
| Asphalt Content | ± 0.2% from JMF |
| $G_{mm}$ | ± 0.010 from C-JMF (c) |

| | |
|---|---|
| $G_{se}$ | ± 0.010 from C-JMF [(c)] |
| Individual Cold Feed Percentage for Aggregate | ± 10.0% from JMF [(a)] |
| Cold Feed Percentage for RAP | - 10.0% from JMF [(b)] |

[(a)] The cold feed percentage of any aggregate may be adjusted up to 10 percentage points from the amount listed on the JMF, however no aggregate listed on the JMF will be eliminated.

[(b)] The cold feed percentage for RAP may be reduced up to 10 percentage points from the amount listed on the JMF and must not exceed the percentage of RAP approved in the JMF or for the specific application under any circumstances.

[(c)] Based on the initial C-JMF.

b. Adjustments outside of Table 405.03-5. Adjustments outside the limits listed in Table 405.03-5 can be requested, but these adjustments are considered significant adjustments and will require the Contractor to document any differences in the asphalt plant settings necessary to achieve the designed asphalt plant output as documented by acceptance test results. Thus, additional supporting documentation and justification must be submitted and how these adjustments will effect on the quality characteristics of the asphalt mix. Adjustments and descriptions must be submitted for the Engineer's prior approval and the Engineer will have 1 business day after the date the request was submitted.

Use the C-JMF to establish target values and control limits when producing control charts during production paving.

**L. Tack Coat.** Apply an asphalt tack coat as specified in 402 to the following surfaces:

1. Existing plant mix surfaces and to the surface of each course constructed, except the final course.
2. Surfaces of curbing, gutters, manholes, portland cement pavement, and other structures. Paint or spray a thin, uniform tack coat of asphalt before placing pavement against the surfaces.
3. Contact surfaces of transverse joints and cold longitudinal joints just before additional mixture is placed against previously laid material.

**M. Production Paving.** The Contractor may request to continue production paving in accordance with the C-JMF after the acceptance test strip is approved. Superpave HMA paving acceptance during production is based on the requirements in Table 405.03-6. The production paving lot following the accepted test strip will be based on Table 405.03-4 except the gradation requirements. The Contractor will produce and place mix in accordance with the approved QCP.

If aggregate or asphalt binder sources change from the approved mix design, develop a new mix design as specified in 405.03.B. at no additional cost to the Department. If the $G_{sb}$ changes during production more than 0.030, the Engineer may establish a new $G_{sb}$ and re-evaluate the mix design.

1. Conformance to the C-JMF. The Contractor will produce mix that meets the requirements of Table 405.03-6. The Contractor may elect to remove defective material and replace it with new material on a lot basis, at no additional cost to the Department to ensure conformance to the C-JMF.
    a. Isolated Non-Conformance. If the Contractor is unable to meet the requirements on a single lot, the Engineer will require the Contractor to stop production and/or delivery until a corrective action plan can be developed and implemented to remedy the non-conformance. Submit the corrective action plan to the Engineer before resuming work.
    b. Repeated Non-Conformance. If the Contractor is unable to meet the requirements on 2 consecutive lots, the C-JMF, mix design, and associated JMF will be considered expired as defined in 405.03.B.2. The Engineer will require a new mix design to meet the specifications in 405.03.B. at no additional cost to the Department.

If aggregate or asphalt binder sources change from the approved mix design, develop a new mix design to meet the specifications in 405.03.B. at no additional cost to the Department.

2. Production Limits**.** The properties listed in Table 405.03-6 will be used for purpose of quality analysis calculations, acceptance, and payment. The Engineer will apply the tolerances to the properties as specified in Table 405.03-6 to establish the upper specification limit (USL) and lower specification limit (LSL) for quality level analysis.

3. Production Acceptance Criteria. The Engineer will perform quality level analysis and determine acceptance as specified in 106.03.B using the quality characteristics specified in Table 405.03-6.

**Table 405.03-6 – Production Paving Quality Limits**

| Mix Quality Characteristic | Limits |
|---|---|
| **SP 2 Mixture** | |
| No. 4 sieve and larger sieves, % | C-JMF value ± 5.0 [a] |
| No. 8 to No. 30 sieves, % | C-JMF value ± 4.0 [a] |
| No. 50 to No. 100 sieves, % | C-JMF value ± 3.0 [a] |
| No. 200 sieve and smaller sieves, % | C-JMF value ± 1.5 [a] |
| Asphalt Binder Content, % | C-JMF value ± 0.3 |
| **SP 3 and SP 5 Mixtures** | |
| Laboratory Air Voids, % $N_{design}$ | SP 3: 2.5 – 5.0%<br>SP 5: 2.8 – 5.0% |
| VMA, % $N_{design}$ | 703.05 minimum value |
| Dust Proportion | Table 405.02-1 Range |
| $G_{se}$ [f] | C-JMF value ± 0.012 [g] |
| $G_{mm}$ [e, f] | C-JMF value @ $P_b$ ± 0.012 [g] |
| Rut Depth, mm | 10.0 maximum [b, c] |
| Stripping, passes | 12,500/15,000 [b, d] |
| Cracking Test, IDEAL-$CT_{Index}$ | 80 (index value) [b] |
| **Roadway Quality Characteristic** | **Limits** |
| Mainline Density, % Compaction | 92.0 – 100.0 |

[a] The upper and lower specification limits are never allowed to be outside the control points specified in 703.05.

[b] Hamburg and Ideal-CT are for information only at this time.

[c] Maximum depth after 15,000 passes.

[d] Minimum number of passes with no stripping inflection point.

[e] $G_{mm}$ tests must be performed only after a 2-hour oven cure time in accordance to the mix design requirements to limit test result variability.

[f] $G_{mm}$ and $G_{se}$ values are indicators of consistency of the asphalt mix and are tracked using PWL. $G_{mm}$ and $G_{se}$ will be monitored for information only and, if the PWL is less than 40, the Engineer and the Contractor will review the data and take appropriate action (e.g., review plant settings, review test results). There will be no deduction for a low PWL based on $G_{mm}$ or $G_{se}$.

[g] Based on the initial C-JMF.

**N. Spreading and Finishing.** Place the mixture on an approved surface. Use pavers to distribute the mixture over the entire width or over a partial width as practical. Do not extend partial width paving beyond one day's

production. Minimum lift thickness will be no less than 3.5 times nominal maximum aggregate size (NMAS) of the mix design.

Use pavement marking tape to temporarily mark roadway centerline on pavements being used by traffic as specified in 626.03.

Unless otherwise specified, equip the paver with a shoe on the outside to provide slopes as follows:

> The Engineer will allow an 18-inch-wide shoe for depths 0.2 foot or less on initial pavement placement. The shoe must be 24 inches wide for depths greater than 0.2 foot. The shoe must be 24 inches wide on pavement overlays.

Meet-lines must be within 1 foot of lane lines or within 1 foot of center of lanes. Meet-lines are not allowed within a wheel path. Ensure transverse and longitudinal joints are smooth and match the adjacent surfaces.

**O. Compaction.** Compact the pavement to a density between 92.0 percent and 100.0 percent of maximum theoretical density for SP 2, SP 3, and SP 5 asphalt mixes. Determine $G_{mm}$ using Idaho IR 156.

Following acceptance test strip approval, pavement density testing for acceptance will be performed by the Department using a nuclear density gauge with the readings corrected by cores in accordance with AASHTO T 355. The $G_{mm}$ for determining the percent compaction will be determined using a rolling, consecutive 2-lot average (i.e., the most recent 2 completed lots) of the Department's acceptance test results. For the first lot of production paving, the test strip's $G_{mm}$ corresponding to the C-JMF is used for determining the percent compaction. The Contractor is responsible for quality control testing.

Density Gauge Correlation. When nuclear density gauges are used for acceptance, the Engineer will correlate the gauges in accordance with Idaho IR 154. A new gauge correlation will be established for each mix design, each paving lift, each paving lift thickness, and each underlying material (e.g., ¾" base, CRABs, 0.25' underlying lift of HMA).

When an acceptance test strip is not required as per 405.03.I, the Department will base acceptance for pavement density on the density of cores taken from the finished pavement. Obtain 5 randomly located core samples in accordance with the FOP for AASHTO R 67 from the compacted Superpave HMA in the Engineer's presence. The Engineer will determine the random core locations. Immediately submit the cores for testing. The Department will determine the density of the cores the FOP for AASHTO T 166 Method A or AASHTO T 331. In addition, obtain 3 randomly located mix samples during HMA placement, in the Engineer's presence, and immediately submit samples for testing. Obtain the samples in accordance with the AASHTO R 97 (see the QASP Table 106.03-1 Note 1.c.). The Engineer will randomly locate the mix samples and the Department will test the mix samples to determine the $G_{mm}$ value in accordance with the FOP for AASHTO T 209 or ASTM D6857. The Department will use the average of the 3 $G_{mm}$ values to compute in-place density of the cores taken for density acceptance. If paving will be performed in different construction seasons (e.g., bridge approaches), obtain 5 additional cores from the compacted Superpave HMA and 3 additional mix samples for density acceptance when paving resumes. The Contractor is responsible for quality control testing.

Repair holes left in the pavement by the coring operation with non-shrink grout at no additional cost to the Department. Do not begin coring until repair methods and materials have been approved.

**P. Joints.** Do not roll over the unprotected end of freshly laid mixture. Form transverse joints by cutting back on the previous run to expose a vertical edge the full depth of the course.

Slope the cold transverse construction joints open to public traffic at 20H:1V. Remove the sloped surface (ramp) without damage to the base just before paving is resumed. Test the new joint for smoothness as specified in 405.03.S.

Construct end transitions between overlays and the adjoining pavement by milling a wedge out of the adjoining pavement, starting at the surface and continuing into the adjoining pavement on a 200H:1V slope or flatter until a vertical edge equal to 0.15 foot or the depth of overlay is reached. Transitions to ramps and crossroads are transverse joints. The milled wedge is a transverse joint when the adjoining pavement is concrete. Mill the wedge from the pavement to be overlaid, with the vertical edge against the concrete, when the adjoining pavement is concrete. Taper transitions between overlays and approaches to form a smooth transition while maintaining drainage.

Provide a positive bond, density, and a finish surface to the new mixture at longitudinal joints that is equal to the mixture against which it is placed. The Engineer may take density tests at longitudinal joints to ensure the integrity of material in the joint area.

Locate the longitudinal joint in the top course at the centerline of the traveled way if the roadway is two lanes wide or at the lane lines if the roadway is more than 2 lanes wide. On the lower courses, stagger the longitudinal joint and offset it 6 inches to 1 foot from the centerline of the traveled way if the roadway is 2 lanes wide or from the lane lines if the roadway is more than 2 lanes wide. Match the pavement surface across a longitudinal joint with the transverse slope shown on typical sections.

Test joints, except crowns, for smoothness in accordance with Idaho IR 87. Use an approved 10-foot straightedge. Complete the test and necessary corrections before the material temperature drops below 175 °F.

Place longitudinal joints straight and true. Use approved methods to bring back to straight and true unacceptable deviations. Make adjustments as needed to achieve the specified results.

Obtain approval for Superpave HMA mix design(s) before the start of milling operations.

**Q. Miscellaneous Pavement**. Place miscellaneous Superpave HMA pavement in irregular areas (e.g., raised or depressed medians, gores, tapers, radii (excluding approach radii), tapered paving for guardrail terminal widening). Include areas that taper from 0 to 8 feet maximum width and gore areas from roadway shoulders to termini in this work. Do not include pavement widening for installation of guardrail in this work.

**R. Leveling Course.** Construct the leveling course of Superpave HMA, with a compacted thickness greater than 0.2 foot, in multiple courses.

Place the leveling course on the existing surface in quantities as approved. Use pavers and/or motor graders and a sufficient number of pneumatic tire rollers to adequately place and compact the leveling course to the required cross-section and grade. Use a steel-wheel roller for final rolling if the leveling course is to be used as a wearing course or if a seal coat is to be applied.

When blade laid leveling course is specified, place Superpave HMA in wheel ruts and other surface irregularities. Blade Superpave HMA into the low areas using a motor grader. Normally, 2 passes are required to fill depressions. Follow each pass of the motor grader with a pneumatic tired roller to provide compaction. Position the blade of the motor grader so light contact with the existing pavement surface is maintained. The Contractor may dispose of excess coarse aggregate resulting from placing the blade laid leveling course along the edge of the roadway.

When machine laid leveling course is specified, place Superpave HMA on the roadway with a paver to restore crown, super elevation, or rideability. Operate the screed close to the existing pavement surface. The Engineer will accept minor surface tears from this operation. Use pneumatic and vibratory rolling for compaction.

**S. Surface Smoothness.** Place pavement complying with Schedule II unless otherwise specified.

For Schedule III only, perform pre-paving, quality control, and acceptance surface smoothness testing, analyze the results of this testing, and submit the results. Submit pre-paving results. Before paving, submit a plan showing how Schedule III smoothness will be achieved.

Perform acceptance testing on the final lift and submit the results before corrective action. Complete acceptance testing within 1 week of paving completion.

Perform quality control testing in international roughness index (IRI). Request to use quality control testing for acceptance before the start of paving.

Submit quality control results by the next business day following placement.

If the quality control testing results show surface smoothness is not within the acceptable specification limits, suspend paving operations until it can be shown the steps taken to modify operations will result in acceptable smoothness.

Acceptance surface smoothness testing must be verified by the Engineer. The profile run must be witnessed by the Engineer and a preliminary copy of the report submitted immediately after the end of the run. The Engineer will not accept the testing, unless witnessed. Submit the profile data in a format suitable for evaluation using ProVAL or other industry standard software. In addition, each week or as requested by the Engineer, submit to the Engineer an electronic, editable Microsoft Excel spread sheet containing the data produced from the acceptance smoothness testing. Do not perform corrective action until approved.

The Engineer may elect to perform additional testing for verification. If the results vary from the Contractor's IRI results by more than 10 percent, the Engineer will use the Department's IRI results for acceptance.

Measure the finished pavement as follows:

1. Test the surface with a 10-foot straightedge at locations determined by the Engineer. Identify the locations that vary more than ¼ inch from the lower edge when the straightedge is laid on finished pavement in a direction parallel with centerline or perpendicular to centerline. Remove the high points that cause the surface to exceed the ¼ inch tolerance by grinding with equipment specified in Corrective Action below.
2. Profile the surface 3 feet from and parallel to each edge of each traffic lane. The Engineer will use the average of the results for each 0.1 mile section to calculate incentive payments and determine sections requiring corrective action.

   Use Class 1 or Class 2 profilers as defined in ASTM E950. Operate profilers in accordance with the manufacturer's instructions and AASHTO R 57. Set the profiler as follows:

   1. High pass or pre-filter: off or at least 200 feet.
   2. Bump detection: on
   3. Dip detection: on
   4. Resolution: 0.01 inch
   5. Low pass filter: off
   6. Other filters: off

   Operate the profiler according to the manufacturer's recommended speed. Calibrate the profiler at the beginning of the work and as needed thereafter.

   The Department requires the pavement to comply with the following surface smoothness schedule requirements:

   a. Where longitudinal grade is 6.5 percent or less, pavement on tangent alignment and pavement on horizontal curves having centerline radius of curve 1,000 feet or more must meet the surface smoothness requirements for the smoothness schedule specified. The Engineer will add consecutive 0.1 mile sections of roadway tested together to obtain the mile section. There will be no overlapping of the 0.1 mile or 1 mile sections to change cumulative test results.

(1) Smoothness Schedule using IRI:

(a) Schedule I Projects: Target IRI values range from 60.0 to 70.0 inches per mile per 0.1 mile. Corrective action required above 95.0 inches per mile per 0.1 mile.

(b) Schedule II Projects: Target IRI values range from 71.0 to 80.0 inches per mile per 0.1 mile. Corrective action required above 95.0 inches per mile per 0.1 mile.

(c) Schedule III Projects: Target IRI value range defined as one of the following:

i. For sections with a pre-paving IRI less than 160.0 inches per mile per 0.1 mile the final index must not exceed 80.0 inches per mile per 0.1 mile.

ii. For sections with a pre-paving IRI of 16.0 inches per mile per 0.1 mile or greater, use the smoother of either:

1. A 50 percent improvement of the pre-paving index.

2. A maximum final index of 100.0 inches per mile per 0.1 mile. Corrective action is required above the target IRI.

b. The Engineer will exclude acceptance test strips, pavement on horizontal curves having a centerline radius of curve of less than 1,000 feet and pavement within the super elevation transition of such curves, or pavement with a longitudinal grade greater than 6.5 percent from incentive/disincentive payments. Meet the corrective action requirements for the smoothness schedule specified.

c. Profile the pavement to provide continuous, uninterrupted profile data. The Department will not apply profile smoothness tolerances and incentive/disincentive payments to the following:

(1) Pavement within 50 feet of a transverse joint that separates the pavement from a structure deck, an approach slab, or an existing pavement not constructed under the contract.

(2) Pavement for approaches and structure decks.

(3) Roadways with a speed limit less than 40 mph.

(4) Interstate ramps.

Smoothness acceptance for these areas will be as specified with straightedge requirements.

Surface Smoothness Corrective Action:

Use power-driven grinding equipment that is specifically designed to smooth portland cement concrete pavement with diamond blades. Use a machine with an effective wheelbase at least 12 feet and a cutting width of at least 3 feet. Restrict the machine forward speed to 5 feet per minute while milling. Provide grinding equipment of a shape and dimension that does not encroach on traffic movement.

Grind parallel to centerline. Extend adjacent grinder passes, within ground area, to produce a neat rectangular area having a uniform surface appearance. Make smoothly feathered transitions at transverse boundaries between ground and unground areas. Apply a fog coat to the ground pavement surface as specified in 408 after grinding has been completed.

Grind individual high points in excess of 0.3 inch within 25 feet or less, as determined by the California Profilograph simulation, until such high points do not exceed 0.3 inch.

After individual high point grinding has been completed, perform additional grinding in sections requiring corrective action to reduce the IRI to a maximum of 80.0 inches per mile per 0.1 mile section along lines parallel with the pavement edge.

Individual low points are areas in excess of 0.3 inch within 25 feet or less, as determined by the California Profilograph simulation. Low points will be subject to rejection and replacement at no cost to the Department. Under these circumstances, the Engineer's decision whether to accept the completed pavement or to require corrections is final.

Check the pavement for smoothness after grinding as specified in this subsection and make additional corrections necessary to achieve smoothness. Submit a report and graph showing compliance of the final surface to the smoothness requirements. The Department will not pay for the cost of grinding, milling or related work (e.g., fog coat), disposal of milled material, traffic control, flagging, profiling, surface repair of ground or milled areas, or temporary striping.

Surface Smoothness Deductions, Incentives, and Disincentives:

1. Straight-Edge Evaluation.

   If correction of the roadway as specified will not produce satisfactory smoothness results or it reduces pavement thicknesses and serviceability, the Engineer may accept the completed pavement and will deduct from monies due or may become due to the Contractor the sum of $500.00 for each individual high point exceeding ¼ inch tolerance or $3,000.00 for each 0.1 mile section. $500.00 per individual low point exceeding ¼ inch tolerance will be deducted from monies due or may become due to the Contractor. Low points exceeding ½ inch will be subject to rejection and replacement at no cost to the Department. Under these circumstances, the Engineer's decision whether to accept the completed pavement or to require corrections is final.

2. Profilograph Evaluation.

   For each evaluation section, the Contractor is entitled to a payment adjustment excluding acceptance test strips and Schedule III surface smoothness work. An evaluation section is defined as a 0.1 mile per traffic lane or fraction as applicable. The Department will not pay an incentive for pavement on the roadway shoulders, center turn lanes, turn bays, crossovers, tapers, or other miscellaneous pavement. The Department will pay incentive as specified in Table 405.03-7.

   The Department will base incentive payments on initial profiles before corrective work on the top course of paving.

**Table 405.05-1 – IRI**
**Initial Index inches per mile per 0.1 mile section**

| Payment $ per 0.1 mi | Schedule I | Schedule II |
|---|---|---|
| $500.00 | 40.4 or less | 45.4 or less |
| $300.00 | 40.5 to 50.4 | 45.5 to 60.4 |
| $100.00 | 50.5 to 60.4 | 60.5 to 70.4 |
| $0.00 | 60.5 to 70.4 | 70.5 to 80.4 |
| -$100.00 | 70.5 to 75.4 | 80.5 to 85.4 |
| -$300.00 | 75.5 to 85.4 | 85.5 to 95.4 |
| -$500.00 | 85.5 to 95.4 | — |
| -$500.00 and corrective action | 95.5 or greater | 95.5 or greater |
| -$500.00 and corrective action | Individual high points [(a)] | Individual high points [(a)] |
| -$500.00 and corrective action | Individual low points [(a)] | Individual low points [(a)] |

[a] In addition to the incentive/disincentive payment applied to the 0.1 mile section, the Engineer will deduct from monies due or may become due to the Contractor the sum of $500.00 for each individual high point or low point up to a maximum of $3,000.00 for each 0.1 mile section.

The Department will make only 1 incentive payment per evaluation section. An evaluation section runs consecutively from the point paving begins to the point paving is interrupted (e.g., at bridges, the end of lane paving areas specifically excluded by the specifications). The Department will prorate partial sections based on their percentage of a full section.

The Department will base incentive payments on initial profiles before corrective work on the top course of paving.

**405.04 Method of Measurement.** The Engineer will measure acceptably completed work as follows:

1. Pavements, leveling courses, and asphalts by the ton. The Engineer will not permit batch weights as a method of measurement. The Superpave HMA quantity will be the weight used in the accepted pavement and will include the weight of the aggregate, asphalt, and additives in the mixture.
2. Anti-stripping additive by the percentage of additive per ton of asphalt.
3. Miscellaneous pavement by the square yard. Final measurement will be based on plan quantities, unless changed by the Engineer. Miscellaneous pavement measurement is in addition to the measurement of asphalt and Superpave HMA material.
4. Approaches per each regardless of width or length. Separate mailbox turnouts will be measured as an approach. Mailbox turnouts adjacent to an approach will be considered as part of the approach and no separate measurement will be made. Approach measurements are in addition to the measurement of asphalt and Superpave HMA material.
5. Wedge milling for the transition section by the square yard.
6. Tack coat will be paid for as specified in 401.

**405.05 Basis of Payment.**

1. Superpave SP3 and SP5.

Composite mix pay factor will be computed for each lot using the following equation:

$$CPF_{405Mix} = (0.4 \times PF_{AIRVOIDS}) + (0.4 \times PF_{VMA}) + (0.2 \times PF_{DP})$$

Where:

$CPF_{405Mix}$ = Composite pay factor for mix quality characteristics.

$PF_{AIRVOIDS}$ = Pay factor for air voids.

$PF_{VMA}$ = Pay factor for VMA.

$PF_{DP}$ = Pay factor for dust proportion.

Calculation of Composite Incentive/Disincentive. The composite incentive/disincentive dollar amount to be paid or deducted for Superpave plant mix pavement accepted by the Department, excluding plant mix pavement for test strips, small quantity, approaches, and miscellaneous paving not placed with mainline paving, will be computed for each lot using the formula:

$$PA_{405} = (CPF_{405Mix} + PF_{MLD} - 2) \times Q_i \times P$$

Where:

$PA_{405}$ = Pay adjustment for material and main line density in dollars for the lot.

$CPF_{405Mix}$ = Composite pay factor for material characteristics for the lot.

$PF_{MLD}$ = Pay factor for main line density for the lot.

$Q_i$ = Quantity represented by individual lot.

P = Contract unit price.

Note: The incentive may be a negative amount (i.e., a deduction from the total amount bid for the item).

A pay factor of 1.00 will be used for all acceptable Superpave plant mix pavement incorporated into the onsite acceptance test strip for volumetrics.

Density pay factor for the Superpave plant mix leveling course will be 1.00.

Pay factors for approaches and miscellaneous paving not placed with mainline paving will be 1.00.

2. Superpave SP2.

Composite pay factors will be computed for each lot using the following equations:

$$CPF_{405} = (0.3 \times PF_{AC}) + (0.3 \times PF_{AGG}) + (0.4 \times PF_{MLD})$$

Where:

$CPF_{405}$ = Composite pay factor for mix quality characteristics.

$PF_{AC}$ = Pay factor for asphalt content.

$PF_{AGG}$ = Pay factor for plant mix aggregate.

$PF_{MLD}$ = Pay factor for main line density.

Calculation of Composite Incentive/Disincentive. The composite incentive/disincentive dollar amount to be paid or deducted for Superpave plant mix pavement accepted by the Department, excluding plant mix pavement for test strips, small quantity, approaches, and miscellaneous paving not placed with mainline paving, will be computed for each lot using the formula:

$$PA_{405} = (CPF_{405} - 1) \times Q_i \times P$$

Where:

$PA_{405}$ = Pay adjustment for material and main line density in dollars for the lot.

$CPF_{405}$ = Composite pay factor for material characteristics for the lot.

$Q_i$ = Quantity represented by individual lot.

P = Contract unit price.

Note: The incentive may be a negative amount (i.e., a deduction from the total amount bid for the item).

Density pay factor for the Superpave plant mix leveling course will be 1.00.

Pay factors for approaches and miscellaneous paving not placed with mainline paving will be 1.00.

A pay factor of 1.00 will be used for calculating a pay factor for all acceptable Superpave plant mix pavement incorporated into an onsite acceptance test strip for volumetrics.

The Department will pay for accepted quantities as follows:

| Pay Item | Pay Unit |
|---|---|
| Superpave HMA Pavement Class SP ___ | Ton |
| Superpave HMA Pavement, including asphalt and additives Class SP | Ton |
| Leveling Course Class SP | Ton |
| Leveling Course, including asphalt and additives, Class SP | Ton |
| ___Asphalt Binder for Superpave HMA Pavement | Ton |
| ___Percent Anti-stripping Additive for Superpave HMA Pavement | TOA |
| Miscellaneous Pavement | SY |
| Approaches | Each |
| Wedge Milling | SY |

The cost to produce the required aggregate in each stockpile to accommodate blends is incidental and included in the contract unit price for the Superpave HMA contract pay item.

When Superpave HMA includes RAP, in any proportion, the Department will not include the asphalt binder contributed by the RAP in the quantity for asphalt and additives when asphalt and additives are paid for separately.

3. Payment B, Additional Binder Content determined from Asphalt Analyzer Offset (AAO).

   The offset between 3 extractor samples and the known AC from hand batched blend sheets will be used to quantify an Asphalt Analyzer Offset binder quantity (offset) to be valued at asphalt invoice prices, Payment B.

   Payment B will be calculated for each accepted lot throughout project including the test strip if plant printouts for that lot indicate additional liquid binder was used from design. For any lot that plant printouts do not indicate equal or additional total binder and liquid binder was used compared to the JMF, no Payment B will be made. The Department may verify plant calibrations at any time.

**ON SHEET 10 OF 15 QASP (10/21/2019) – 109.09 PAY FACTOR EQUATIONS**

Add to the beginning of the second paragraph: "For all pay items, except 405 pay items,"

Following the second paragraph add the following:

For 405 items, with the exception of reject quality level material, if any two quality characteristic used in calculating the pay factor for the lot fall below 60 PWL, all quality characteristics will be paid corresponding to the average two lowest, unrounded PWL.

**Flowchart 405.03-1 – Asphalt Analyzer Flowchart – NCAT Correction Factor Development – Test Strip Material and AASHTO T 308**

1.0 Mix Design

Modify IT 146 to determine asphalt content of RAP using the Asphalt Analyzer.

The Department prepares JMF Correction Factor Samples (CFS) for ITD, Acceptance Lab, and the Contractor (IR-157 not included, material form $G_{sb}$ submittal).

4 ITDProdAcceptanceLab (See Box 2.0, for information only)
3 ITDHQ Extractor (See Box 3.0, for Payment B)
4 Contractor CNCF (See Box 4.0)
11 Total CFS

2.0 Mix Design

ITDProdAcceptance lab will determine NCAT Correction Factor (INCF) using AASHTO T 308 (HQ lab produced samples), provide data to the Contractor, for information only.

3.0 Pre-Test Strip

The Department determines an offset between 3 ITD Extractor samples and known AC from hand batched blend sheets prepared by the Central Materials Laboratory. If the Asphalt Analyzer Offset is greater than or equal to 0.30 percent asphalt binder, the Department correlates NCAT ovens with AASHTO T 308 for all acceptance ovens, and the Asphalt Analyzer will only be used for information purposes during the project.

The offset will quantify an Asphalt Analyzer Offset (AAO) binder quantity to be valued at asphalt invoice prices, **Payment B.**

Payment B will be calculated for each lot throughout the project including the test strip if plant printouts indicate additional liquid binder was used from design.

The Contractor may challenge upon request. Must use aggregate/RAP from $G_{sb}$ testing. This challenge stands.

Payment B = Total HMA * the AAO * Bid Price of Asphalt Binder as adjusted per 109.02 B. 1.

The Engineer will verify Payment B using other project documentation.

4.0 Mix Design

The Contractor correlates NCAT ovens with AASHTO T 308 and CNCF.

5.0 Test Strip

Construct Test Strip.

The Contractor may use the AASHTO T 308 CNCF to guide production.

How will this be evaluated and paid.

6.0 Test Strip

The Department will use the 10/21/2019 QASP, 07/21/2020 405, and any change orders to determine HMA quality and payment

Removal of HMA and other associated costs are born by the contractor.

The Department will return APA data in a 2 business days.

7.0 Production Paving

The Department and the Contractor recalibrate NCAT ovens using IR-157, this is used throughout the rest of the project.

Acceptance requirements for the second lot is the same as the test strip.

The Department uses the 10/21/2019 QASP, 07/21/2020 405, and any change orders to determine HMA quality and payment.

**Payment A**

How The Contractor Gets Paid

10/21/2019 QASP, 7/21/2020 405, and any other change order agreements, **Payment A.**

Value of asphalt binder difference, see 3.0
**Payment B**

**(Payment A + B)**

**Example Calculation for Payment B**

| | |
|---|---|
| Total 405 HMA for the lot | 3,000 Tons |
| Asphalt Analyzer Offset (AAO) | 0.29% |
| Total Additional Asphalt Binder from AAO for the Lot | 8.7 tons |
| Bid Price of Asphalt Binder (as documented on Invoices) | $500.00 per ton |
| Total Payment B for the Lot (3,000 tons x 0.29% x $500/ton) | **$4,350.00** |