

HOT MIX ASPHALT PAVEMENT**PART 1 - GENERAL****1.01 SECTION INCLUDES**

- A. Hot Mix Asphalt (HMA) Pavement
- B. Base Widening

1.02 DESCRIPTION OF WORK

- A. Includes the requirements for the construction of HMA surface, intermediate, and base courses placed upon a prepared subgrade, subbase, base, or pavement and HMA base widening.
- B. Comply with Iowa DOT Section 2303 for construction of HMA pavement and base widening, except as modified herein.
 - 1. Provide Quality Management - Asphalt (QM-A) for bid items with HMA quantities exceeding 1,000 tons. Provide quality control for bid items with HMA quantities of 1,000 tons or less according to Section 7020, 3.06.
 - 2. Refer to Table 7020.01 for gyratory mixture design criteria. Note - this table was copied from the SUDAS Design Manual, Section 5D-1.

1.03 SUBMITTALS

Comply with Division 1 - General Provisions and Covenants, as well as the following:

- A. Prepare and submit the job mix formula to the Engineer for approval prior to HMA production.
- B. Provide quality control test results.
- C. Submit all pavement smoothness testing and certifications according to Section 7020, 3.05.
- D. Upon request, provide material certifications to the Engineer.
- E. Submit HMA certifications for all bid items with HMA quantities of 1,000 tons or less, according to Section 7020, 3.06.
- F. Weight receipts should include mix size and type and/or correlate to the bid item.

1.04 SUBSTITUTIONS

Comply with Division 1 - General Provisions and Covenants, as well as the following:

Table 7020.01: Mixture Design Criteria
(derived from Iowa DOT Materials I.M. 510)

Mix	Layer Designation	Gyratory Density		Film Thickness	Aggregate ²			
		N _{des}	Design % G _{mm} (target)		Quality Type	Crush (min)	FAA (min)	Sand Equivalent (min)
LT	0.3 M S	50	96.0	8.0 - 15.0	A ¹	60 ¹	---	40
	0.3 M I		97.0		A ¹	45		
	0.3 M B							
ST	1M S	50	96.0	8.0 - 15.0	A	75 ¹	40	40
	1M I		97.0		A ¹	60 ¹		
	1M B					---		
HT	10M S	75	96.0	8.0 - 15.0	A	75	43	45
	10M I		96.5		A ¹	60		
	10M B							

For mix design levels exceeding 10M ESALs, see Iowa DOT Materials I.M. 510.

¹ Requirements differing from Iowa DOT Materials I.M. 510; for base mixes, aggregate quality improved from B to A and percent crushed aggregate increased by 15%.

² Flat & Elongated 10% maximum at a 5:1 ratio

1.05 DELIVERY, STORAGE, HANDLING, AND SALVAGING

Comply with Division 1 - General Provisions and Covenants, as well as the following:

- A. Aggregate Storage:** Prevent contamination and intermingling per Iowa DOT Section 2303.
- B. Salvaged or Reclaimed Materials:** Classification of RAP will be as determined by the Iowa DOT. If RAP stockpile classification has not been determined by the Iowa DOT, the Contractor is responsible for obtaining the classification from an outside testing firm using the same tests as the Iowa DOT.
- C. Disposal:** Dispose of excess HMA according to applicable local, state, and federal regulations in a manner that does not cause damage or harm to adjacent properties or public facilities.

1.06 SCHEDULING AND CONFLICTS

Comply with Division 1 - General Provisions and Covenants, as well as the following:

Complete elements of the work that can affect line and grade in advance of other open cut construction unless noted on plans.

1.07 SPECIAL REQUIREMENTS

None.

1.08 MEASUREMENT AND PAYMENT**A. HMA Pavement by Ton:**

1. **Measurement:** Measurement will be in tons of HMA pavement.
2. **Payment:** Payment will be at the unit price per ton of HMA pavement.
3. **Includes:** Unit price includes, but is not limited to, asphalt mix with asphalt binder, tack coats between layers, construction zone protection, and quality control.

B. HMA Pavement by Square Yards:

1. **Measurement:** Measurement will be in square yards for each different thickness of HMA pavement. The area of manholes, intakes, or other fixtures in the pavement will not be deducted from the measured pavement area.
2. **Payment:** Payment will be at the unit price per square yard for each thickness of HMA pavement.
3. **Includes:** Unit price includes, but is not limited to, asphalt mix with asphalt binder, tack coats between layers, construction zone protection, and quality control.

C. HMA Base Widening by Ton:

1. **Measurement:** Measurement will be in tons of HMA base widening.
2. **Payment:** Payment will be at the unit price per ton of HMA base widening.
3. **Includes:** Unit price includes, but is not limited to, asphalt mix with asphalt binder, tack coat between layers, construction zone protection, and quality control.

D. HMA Base Widening by Square Yard:

1. **Measurement:** Measurement will be in square yards for each different thickness of HMA base widening. The area of manholes, intakes, or other fixtures in the pavement will not be deducted from the measured base widening area.
2. **Payment:** Payment will be at the unit price per square yard for each thickness of HMA base widening.
3. **Includes:** Unit price includes, but is not limited to, asphalt mix with asphalt binder, tack coat between layers, construction zone protection, and quality control.

E. HMA Railroad Crossing Approach:

1. **Measurement:** Measurement will be in square yards of railroad crossing approach.
2. **Payment:** Payment will be at the unit price per square yard of railroad crossing approach.
3. **Includes:** Unit price includes but is not limited to excavation for modified subbase and subdrain, furnishing and installing subdrain, furnishing and installing subdrain outlet, furnishing and installing porous backfill material, furnishing and installing fiber board barrier, furnishing and placing modified subbase material, furnishing and applying tack coat, furnishing, placing, and compacting HMA.

1.08 MEASUREMENT AND PAYMENT (Continued)**F. Density Deficiency:**

1. **Measurement:** Measurement will be in square yards for each different density of HMA pavement subject to a unit price reduction for density deficiency according to Section 7020, 3.04.
2. **Payment:** Payment will be at the reduced unit price according to Table 7020.02 for each density of HMA pavement. If there is a density deficiency on a privately contracted roadway project, the Jurisdiction ultimately accepting ownership of the roadway will receive the penalty payment prior to acceptance of the work.

G. HMA Pavement Thickness Deficiency:

1. **Measurement:** Measurement will be in square yards for each different thickness of HMA pavement that has deficient pavement thickness as determined in Section 7020, 3.04.
2. **Payment:** Payment will be at the percentage of the unit price indicated in Table 7020.03 for each different thickness of HMA pavement. If there is a pavement thickness deficiency on a privately contracted roadway project, the Jurisdiction ultimately accepting ownership of the roadway will receive the penalty payment prior to acceptance of the work.

H. HMA Pavement Smoothness Deficiency:

1. **Measurement:** Measurement will be in square yards for each different segment of HMA pavement subject to a unit price reduction for pavement smoothness according to Section 7020, 3.05.
2. **Payment:** Payment will be at the reduced unit price according to Table 7020.04 for each segment of HMA pavement. If there is a pavement smoothness deficiency on a privately contracted roadway project, the Jurisdiction ultimately accepting ownership of the roadway will receive the penalty payment prior to acceptance of the work.

I. HMA Pavement Samples and Testing:

1. **Measurement:** Lump sum item; no measurement will be made.
2. **Payment:** Payment will be at the lump sum price for HMA pavement samples and testing.
3. **Includes:** Lump sum price includes, but is not limited to, certified plant inspection, pavement thickness cores, density analysis, profilograph pavement smoothness measurement (when required by the contract documents), and air void testing.

J. Fixture Adjustment: Comply with Section 6010 for adjustment of manholes and intakes and Section 5020 for adjustment of water valves and fire hydrants.**K. Pavement Removal:** Comply with Section 7040.**L. Subgrade and Subbase:** For excavation and construction of subgrade and subbase, comply with Section 2010.

PART 2 - PRODUCTS**2.01 HMA MATERIALS**

Comply with Iowa DOT Section 2303, with the following exception:

Follow the procedure outlined in Iowa DOT Materials I.M. 510 for HMA mixture designs, except replace Table 1 in Appendix A, HMA Mixture Design Criteria with the SUDAS HMA Mixture Design Criteria (Table 7020.01) (Tables 2 through 4 in Appendix A still apply).

2.02 WARM MIX ASPHALT MATERIALS

If use of warm mix asphalt (WMA) is approved by the Jurisdiction, comply with Iowa DOT Section 2303.

2.03 RECYCLED ASPHALT MATERIALS

A. Recycled Asphalt Pavement: If use of recycled asphalt pavement (RAP) is approved by the Jurisdiction, comply with Iowa DOT Section 2303.

B. Recycled Asphalt Shingles: If use of recycled asphalt shingles (RAS) is approved by the Jurisdiction, comply with Iowa DOT Section 2303.

2.04 SUBGRADE AND SUBBASE

Comply with Section 2010.

PART 3 - EXECUTION**3.01 HMA PAVEMENT**

Construct according to Iowa DOT Section 2303 and the following:

- A. Preparation of Pavement Foundation:** Construct subgrade and subbase according to Section 2010.
- B. Compaction:** Compact to a minimum of 94% of laboratory density. Do not exceed 8% average air void level for roadway density specimens.
- C. Tack Coats:** Apply tack coats according to Iowa DOT Section 2303. In addition, if the emulsion is diluted, the dilution must be done by the manufacturer and certified. Provide the Engineer with the new application rate required to achieve the specified undiluted application rate.
- D. Fillets and Runouts:** Rake out coarse aggregate prior to shaping and compaction of fillets and runouts.
- E. HMA Railroad Crossing Approach:** Construct according to Section 7020 and Figure 7020.902.
- F. Fixtures in the Pavement Surface:**
 - 1. Adjust manhole frames and other fixtures within area to be paved to conform to finished surface. Comply with Section 6010, 3.04 for manhole adjustments and Section 5020, 3.04 for water fixture adjustments.
 - 2. Clean outside of fixture to depth of pavement before asphalt placement.
 - 3. Construct boxouts where allowed for later adjustment of fixtures. See Figure 7020.201 for the size and shape of the boxout.
- G. Samples and Testing:** Take samples from the compacted material and test according to Section 7020, 3.04. Randomly locate samples in the pavement area. Notify the Jurisdiction the day prior to coring and testing to give the Jurisdiction the opportunity to witness coring and testing.

3.02 BASE WIDENING

- A. Equipment:** Use equipment complying with Iowa DOT Section 2213.
- B. Conditions:**
 - 1. Resurfacing over Concrete Base Widening:** When the existing pavement is HMA material over concrete pavement, saw or mill the old asphalt to the full depth of the proposed resurfacing or to depth of sound material producing a reasonable vertical line at the edge of the underlying concrete.
 - 2. HMA Base Widening:** Apply a tack coat to the vertical edge of the old pavement at a rate of 0.10 to 0.15 gallon per square yard according to Section 7020, 3.01. No waiting period will be required before placing the widening.

3.02 BASE WIDENING (Continued)**C. Preparation of Subgrade:**

1. Cut the width of the trench for the widening at least 6 inches greater than the base width of the widening according to the contract documents. If widening roadways with open ditches, provide ditches or drains from the widening trench at frequent intervals to allow subgrade drainage to side ditches.
2. Construct subgrade and subbase according to Section 2010.
3. Bring the subgrade to an elevation and cross-section such that, after being compacted to a minimum of 95% of maximum Standard Proctor Density, the surface will be at the required elevation.
4. Remove material, other than sand, that will not readily compact. Replace with material that will readily compact and roll that portion of the subgrade again. Use an appropriate roller complying with Iowa DOT Article 2001.05.
5. While constructing the subgrade, maintain the soil in a condition sufficiently moist to facilitate compaction.
6. Check the finished subgrade with a template supported on the surface of the adjacent pavement. Clean the edge of the old pavement.

D. Construction:

1. Place the HMA mixture in the number of lifts required to produce the required thickness. Do not allow the compacted thickness of the top lift to exceed 2 1/2 inches.
2. The maximum compacted thickness of lower lifts may exceed 3 inches if the thicker lifts demonstrate satisfactory compaction. Maximum lift thickness shall be 4 1/2 inches.
3. Do not place HMA on the surface of the existing pavement, and immediately remove any spilled base material.
4. Ensure that, after compaction, the constructed width conforms to the required width.
5. Promptly and thoroughly compact each lift. Comply with Section 7020, 3.01.
6. Place succeeding lifts of HMA material as soon as the previous lift has been compacted.
7. Obtain the lab density for that day's HMA paving from an Iowa DOT-approved testing lab and based on the job mix formula design criteria.
8. Take density samples from the compacted material and test according to Section 7020, 3.04. Randomly locate samples in the area 6 inches from the base being widened to 6 inches from the outside edge of a given pass of the placing equipment. Notify the Jurisdiction the day prior to coring and testing to give the Jurisdiction the opportunity to witness coring and testing.
9. When the contract for base widening does not include resurfacing, construct the final surface of widening flush with, or no more than 1/8 inch below, the surface of the old pavement.
10. Do not open the widening to traffic until it has cooled sufficiently to support the traffic without displacement or movement.

3.03 PROTECTION FROM TRAFFIC**A. General:**

1. Protect the new pavement and its appurtenances damages caused by traffic, both public and that of the Contractor's own employees and agents, at no additional cost to the Contracting Authority. This includes the erection and maintenance of warning signs, lights, fence, and barricades; flaggers to direct traffic; and pavement bridges or crossovers as appropriate.
2. Do not operate equipment with metal tracks, metal bucket blades, or metal motor patrol blades directly on new paving. Do not unload soil or granular materials, including base rock for storage and future reloading directly onto new paving.

B. End of Day's Run:

1. At the end of each day's run and at all side streets, erect and maintain safety barriers and fencing as necessary to protect the pavement from damage.
2. Install construction zone protection upon completion of paving operations. Leave protection in place and maintained until the pavement has cooled sufficiently to withstand traffic without damage.
3. Intermediate construction zone protection may be required for the purpose of opening the pavement for access to a side road, side street, or entrances.

C. Repair of Damages: At the discretion of the Engineer, and at no additional cost to the Contracting Authority, repair or replace any part of the pavement damaged by traffic or other causes occurring prior to final acceptance of the pavement.

3.04 DEFECTS OR DEFICIENCIES**A. Repairs Required:**

1. Remove and replace or repair pavement containing excessive cracks, deformities, deficiencies, or other defects at no additional cost to the Contracting Authority. The method of replacement or repair will be determined by the Engineer. Extended warranty may be approved by the Engineer.
2. Areas to be replaced will be determined by the Engineer. Complete all repairs according to Section 7040.

B. Density Deficiencies:

1. The Engineer will obtain and test 7 samples for each lot according to Iowa DOT Materials I.M. 204 Appendix F. The quality index for density of each lot will be determined by the following formula:

$$\text{Density (Q.I.)} = \frac{(\text{Average } G_{mb})_{\text{Field Lot}} - ((\% \text{ Density})_{\text{Specified}} \times (\text{Average } G_{mb})_{\text{Lab Lot}})}{(\text{Standard Deviation } G_{mb})_{\text{Field Lot}}}$$

where G_{mb} = bulk Specific Gravity of the mixture

3.04 DEFECTS OR DEFICIENCIES (Continued)

- Payment will be adjusted according to the density requirements of Table 7020.02 for the quality index for density determined for the lot:

Table 7020.02: Pay Factor for HMA Pavement Density

Density Index 7 Samples ¹	Percent Payment
greater than 0.72	100
0.40 to 0.72	95
0.00 to 0.39	85
less than 0.00	75 Maximum

¹Or 6 samples and 1 outlier. Only one outlier will be allowed.

No incentive payment for pavement density will be made.

C. Thickness Deficiencies:

- The Engineer will measure the cores according to Iowa DOT Materials I.M. 337. All areas of uniform and similar thickness and width for the project will be divided into lots.
- The thickness of the completed course will be measured to the nearest 1/8 inch, exclusive of seal coat. All areas of uniform and similar thickness and width for the project will be divided into lots. The frequency specified for taking density samples from the surface lift will be used when measuring for completed thickness. However, samples that may not be tested for density because they are less than 70% of the intended thickness will be used for thickness, and in these particular instances, the additional samples of sufficient thickness that are used for density tests will not be measured for thickness. Thickness samples will be taken full depth of the completed course and after measurement; remove the density samples for the top layer from the core. If any of the measurements for a lot is less than the designated thickness, the quality index for thickness of that lot will be determined by the following formula:

$$\text{Thickness (Q.I.)} = \frac{\text{Avg. Thickness} - (\text{Design Thickness} - 0.50)}{\text{Max Thickness} - \text{Minimum Thickness}}$$

- Payment will be further adjusted by the appropriate percentage according to the quality index for thickness determined for that lot and the following table:

Table 7020.03: Pay Factor for HMA Pavement Thickness

Thickness Index 7 Samples	Percent Payment (Previously Adjusted for Density)
greater than 0.34	100
0.14 to 0.34	95
0.00 to 0.13	85
less than 0.00	75 Maximum

No incentive payment for pavement thickness will be made.

3.05 PAVEMENT SMOOTHNESS

- Straightedge:** The Engineer will check HMA pavement surfaces with a 10 foot straightedge placed parallel to the centerline. Areas showing high spots of more than 1/4 of an inch in 10 feet will be marked. Complete surface corrections according to the procedures in Iowa DOT Section 2316 to an elevation where the area or spot will not show surface deviations in excess of 1/8 inch when tested with a 10 foot straightedge. Surface corrections will be completed at the direction of the Engineer with no additional cost to the Contracting Authority.

3.05 PAVEMENT SMOOTHNESS (Continued)**B. Profilograph:**

1. If specified in the contract documents, comply with Iowa DOT Section 2316 to measure pavement smoothness with a profilograph. Ensure the evaluation is certified according to Iowa DOT Materials I.M. 341. Position the center wheel of the profilometer 6 feet from the centerline or the lane line.
2. Evaluate according to the smoothness requirements of Table 7020.04 and make surface corrections and/or price reductions. Surface corrections will be completed with no additional cost to the Contracting Authority. No incentive for pavement smoothness will be made.

Table 7020.04: Price Reduction for Pavement Smoothness

Initial Profile Index (inch/mile/segment)	New Pavements (\$/segment)	Resurfaced Pavements (\$/segment)
12.1 - 22.0	Unit price	Unit price
22.1 - 30.0	\$500	\$250
30.1 and over ¹	Grind only	Grind only

¹ For segments with an initial index of 30.1 and over, grind the surface to a finish index of 22.0 or better. In lieu of accepting a price reduction and grinding the surface to a final index of 22.0 or better, the Contractor may elect to replace part or the entire segment.

3.06 QUALITY CONTROL

- A. Provide Quality Management - Asphalt (QM-A) for bid items with HMA quantities exceeding 1,000 tons. On locally let projects, all testing normally conducted by the Iowa DOT may be performed by the Jurisdiction or an independent testing laboratory hired by the Jurisdiction.
 1. General: Follow the procedures and meet the criteria established in Iowa DOT Article 2303.03, B; Section 2521; and Materials I.M. 510 and 511. Percent within Limits (PWL) stipulations in these documents is not required.
 2. Mix Design - Job Mix Formula (JMF):
 - a. The Contractor is responsible for the JMF for each mixture.
 - b. Submit a completed JMF for approval to the materials lab designated by the Contracting Authority. Submit supporting documentation demonstrating the design process was followed and how the recommended JMF was determined. Include an economic evaluation when required according to Iowa DOT Section 2303. Include trial and final proposed aggregate proportions and corresponding gyratory data. In addition, submit sufficient loose mixture and individual material samples for approval of the design if requested by the Engineer.
 - c. The person preparing the JMF must be Iowa DOT certified in bituminous mix design.
 - d. If the JMF is not satisfactory, submit another JMF for review. An approved JMF will be required prior to beginning plant production.
 3. Plant Production:
 - a. General:
 - 1) Perform sampling and testing to provide the quality control of the mixture during plant production. Certified Plant Inspection according to Iowa DOT Section 2521 is required.
 - 2) Ensure personnel performing production quality control testing is Iowa DOT certified for the duties performed.
 - 3) Provide easy and safe access to the location in the plant where samples are taken.

3.06 QUALITY CONTROL (Continued)

- 4) A "significant mix change" is defined as a single occurrence of an aggregate interchange of greater than 5%, a single occurrence of an asphalt content change greater than 0.2%, or any deletion or introduction of a new material into the mix.
- b. Sampling and Testing:
 - 1) Sample and test asphalt binder to verify the quality of the binder grade. Take asphalt binder samples at random times as directed and witnessed by the Engineer according to Iowa DOT Materials I.M. 204.
 - 2) Use cold feed or ignition oven gradation for aggregate gradation control to assure materials are being proportioned according to the specifications. Take aggregate samples at random times as directed and witnessed by the Engineer according to Iowa DOT Materials I.M. 204. The Engineer will secure the samples according to Iowa DOT Materials I.M. 205, Appendix A.
 - 3) Sample the hot HMA mixture at random locations as directed and witnessed by the Engineer according to Iowa DOT Materials I.M. 322. Secure the samples according to Iowa DOT Materials I.M. 205, Appendix A.
 - 4) Assist the Engineer with material sampling for verification testing. When the Engineer provides notification that a sample is to be taken, obtain sample within 15 minutes.
 - 5) Each day's production of a mix design will be considered a lot.
 - a) When the anticipated quantity for the day is 2,000 tons or more, divide that day's production into four sublots, with the first subplot being the first 500 tons produced. The Engineer will divide the remaining anticipated quantity for the day into three equally sized sublots.
 - b) When the anticipated quantity for the day is less than 2,000 tons, use the first 500 tons produced for the first daily subplot. The Engineer will establish 750 ton daily sublots for mix production exceeding the first 500 tons.
 - 6) No more than four paired hot HMA mixture samples will be required for acceptance of a lot.
 - 7) Do not take paired samples from the first 100 tons of mix produced each day or the first 100 tons of mix following a significant mix change. When paving operations are staged so each day of placement is less than 100 tons for the entire production of a bid item, establish a sampling plan with the Engineer that includes a minimum of one sample per 2,500 tons.
 - 8) Test the quality control sample of each production paired sample as follows:
 - a) Prepare and compact two gyratory specimens according to Iowa DOT Materials I.M. 325G.
 - b) Determine the density for each specimen according to Iowa DOT Materials I.M. 321. Average the results to determine sample density.
 - c) Use the field quality control laboratory compaction for field density control. The laboratory density for field control will be the bulk specific gravity of compacted mixture (G_{mb}) at N_{design} . Bulk specific gravity at N_{design} will be determined by compacting specimens to N_{max} and back calculating the bulk specific gravity at N_{design} .
 - d) Determine the Theoretical Maximum Specific Gravity of the uncompacted mixture according to Iowa DOT Materials I.M. 350 or other test methods recognized by AASHTO or ASTM.
 - e) Determine laboratory air voids for each sample according to Iowa DOT Materials I.M. 501.
 - 9) When liquid anti-strip additives are used, satisfy one of the following methods to regulate the quantity of additive:
 - a) Present certification that the equipment used to measure and blend the liquid anti-strip additive:
 - Meets the anti-strip supplier's recommended practice,
 - Is directly tied to the asphalt binder supply system, and
 - Has been calibrated to the equipment manufacturer's guidelines.

3.06 QUALITY CONTROL (Continued)

- b) Test the binder to measure the quantity of liquid anti-strip additive in the binder for every 5,000 tons of HMA production. Obtain the Engineer's approval for the supplier's test method prior to use of the test.
- c) Run the test method in Iowa DOT Materials I.M. 319 during production. If unable to certify or test for the presence and quality, run the test method in Iowa DOT Materials I.M. 319 each 10,000 tons of production to measure the effectiveness of the additive. Ensure test results satisfy the minimum requirements of Iowa DOT Article 2303.02, E.
- c. Production Control:
 - 1) After the JMF is established, the combined aggregate furnished for the project, the quantity of asphalt binder, and the laboratory air voids should consistently comply with the JMF, as target values. Control them within the production tolerance given in Table 7020.05.

Table 7020.05 Production Tolerances

Measured Characteristic	Target Value (%)	Specifications Tolerance (%) ¹
Cold feed gradation No. 4 (4.75 mm) and larger sieves	by JMF	± 7.0
Cold feed gradation No. 8 (2.36 mm)	by JMF	± 5.0
Cold feed gradation No. 30 (600 µm)	by JMF	± 4.0
Cold feed gradation No. 200 (75 µm)	by JMF	± 2.0 ²
Daily asphalt binder content	by JMF	± 0.3
Field laboratory air voids - absolute deviation from target	0.0 ³	<1.0 ⁴

¹ Based on single test unless otherwise specified.

² Maintain the filler/bitumen ratio of the plant produced mixture between 0.6 and 1.4.

³ Unless otherwise specified.

⁴ Based on the moving average of four test values.

- 2) Control plant production so that the plant produced HMA mixture will meet mixture design criteria (within the test tolerances given in Table 7020.05) for Air Voids at Ndesign gyrations of the gyratory compactor. Monitor the slope of the gyratory compaction curve of plant produced material. Slope variations in excess of ±0.40 of the mixture design gyratory compaction curve slope may indicate potential problems with uniformity of the mixture.
- 3) The gyratory mix design gradation control points for the size mixture designated in the project plans will not apply to plant production control.
- 4) Strive for the target value of the percent air void and asphalt binder by adjusting gradation and asphalt binder content.
- 5) Produce a uniform composition mixture complying with the JMF.
- 6) Adjustments to the JMF target gradation and asphalt binder content values may be made.
 - a) Determine from quality control testing that adjustments are necessary to achieve the specified properties.
 - b) Consult with the Engineer regarding adjustments to the JMF.
 - c) The Contractor's adjustment recommendations prevail, provided all specifications and established mix criteria are being met for plant production.
- 7) Measure estimated film thickness and voids in the mineral aggregate (VMA) for specifications compliance every day of HMA production.

3.06 QUALITY CONTROL (Continued)

- 8) Prepare quality control charts according to Iowa DOT Materials I.M. 511. Keep the charts current and available showing both individual sample results and moving average values. Base moving average values on four consecutive sample results. Moving averages may restart only in the event of a mandatory plant shutdown for failure to maintain the average within the production tolerance. Include the target value and specifications tolerances on control charts.
 - 9) Calculate laboratory voids for individual samples according to Iowa DOT Materials I.M. 501. Use the individual density and individual maximum specific gravity determined for each sample. To determine the moving average of laboratory voids, use the average of the last four individual sample laboratory voids.
 - 10) Monitor the test results and make mix adjustments, when appropriate, to keep the mixture near the target values. Notify the Engineer whenever the process approaches a specification tolerance limit. Cease operations when the moving average point for laboratory air voids is outside the specification tolerance limit. Assume responsibility to cease operations, including not incorporating material which has not been placed. Do not start the process again until notifying the Engineer of the corrective action proposed.
- B. Provide quality control for bid items with HMA quantities of 1,000 tons or less as follows:
1. Mix Design: Prepare the job mix formula. Prior to HMA production, obtain the Engineer's approval for the job mix formula. Comply with Iowa DOT Article 2303.02 and Iowa DOT Materials I.M. 510. Submit for approval.
 2. Plant Production: Use a current calibration of the HMA production plant for the job mix formula no more than 12 months old. Maintain an asphalt binder log to track when the binder was delivered. Identify the job mix formula on the HMA delivery ticket. Use certified asphalt binder and approved aggregate sources meeting the job mix formula. Monitor the quality control test results and make adjustments to keep the mixture near the target job mix formula values.
 3. Construction: Take density measurements of the compacted mixture. Use the field quality control laboratory compaction for field density control as specified in Section 7020, 3.04. The Engineer may accept the density of the compacted layer based on cores or density gauge. The Engineer may waive density measurement provided the compaction has been thorough and effective. Take density measurements of the compacted mixture no later than the next working day following placement and compaction. For small quantities, a lot is the entire quantity of each HMA mixture bid item. The quality index for density will not apply to small quantities.
 4. Sampling and Testing: Material sampling and testing is for production quality control only. Acceptance of mixture is based on Contractor certification. Perform a minimum of one aggregate cold-feed and one loose HMA test per lot. Sampling and testing of loose HMA is only required for mechanically placed mixture. All sampling and testing procedures will follow the Iowa DOT Specifications and Materials I.M.s using certified technicians and qualified testing equipment. The Engineer may approve alternative sampling procedures, or may approve sampling of uncompacted mix and gradation if Contractor can provide plant reports for other recent projects(s) demonstrating the job mix formula has been produced according to the specifications. Take the sample between the first 100 to 200 tons of production. No split samples for agency correlation testing are required. Asphalt binder will be accepted based on the asphalt supplier's shipment certification. No binder sampling or testing is required. No material sampling or testing is required for daily HMA production of less than 100 tons on any project.

3.06 QUALITY CONTROL (Continued)

5. Certification: Provide a certification for the production of any mixture in which the requirements in this section for small quantities or are applied. Place the test results and certification statement on the Iowa DOT Daily Plant Report. The Daily Plant Report for certified HMA may be submitted at the end of the project for all certified HMA quantities, or submitted at intervals for portions of the certified quantity. Use the following certification statement:

“The certified HMA was produced in compliance with the provisions of Section 7020, of the SUDAS Standard Specifications. The certified HMA was produced with certified asphalt binder and approved aggregates as specified in the approved mix design.”

3.07 REMOVAL OF PAVEMENT

Comply with Section 7040.

END OF SECTION