



Iowa Department of Transportation

SPECIAL PROVISIONS FOR HMA UNDERLAYMENT

Pottawattamie County
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THE STANDARD SPECIFICATIONS, SERIES 2012, ARE AMENDED BY THE FOLLOWING MODIFICATIONS AND ADDITIONS. THESE ARE SPECIAL PROVISIONS AND THEY SHALL PREVAIL OVER THOSE PUBLISHED IN THE STANDARD SPECIFICATIONS.

120160.01 DESCRIPTION.

Design, produce, place, and compact flexible paving (HMA) mixture including subgrade preparation. Use proper quality control practices for the construction of dense graded HMA on a prepared subgrade to the dimensions specified in the contract documents.

120160.02 MATERIALS.

A. Asphalt Binder.

The Performance Graded asphalt binder, PG 64-22, will be specified in the contract documents to meet the climate, traffic, and pavement conditions. Use asphalt binder meeting the requirements of [Section 4137](#).

B. Individual Aggregates.

Use virgin mineral aggregate as specified in [Materials I.M. 510](#) and meeting the requirements of [Section 4127](#).

C. Flexible Paving Mixture.

1. The job mix formula (JMF) is the percentage of each material, including the asphalt binder, to be used in the HMA mixture. Ensure the JMF gradation is within the control points specified for the particular mixture designated. Use the JMF to establish a single percentage of aggregate passing each required sieve size.
2. The composition of the dense graded mixture shall be as specified in Table I.

Table I

Sieve Size (In.)	Percent Passing (Weight %)
1.5	100

3/4	70-98
3/8	44 - 76
No. 4	30 - 58
No. 8	21 - 45
No. 16	14 - 35
No. 30	8 - 25
No. 50	5 - 20
No. 200	2 - 6
Asphalt	3.5 - 6.5

- Use a dense graded mixture design meeting the criteria specified in Table II.

Table II

Property	Required Range
Compaction	50 Blows
Stability (lbs)	750 Minimum
Flow (in.)	0.15 - 0.25
Air Voids (%)	1 - 3%
Voids Filled With Asphalt	80 - 90%
In-Place Density	95% (Per ASTM D6925)

D. Other Materials.

1. Tack Coat.

Tack coat may be SS-1, SS-1H, CSS-1, or CSS-1H. Do not mix CSS and SS grades. RC-70 and MC-70 may also be used after October 1, at the Contractor's option.

2. Sand for Tack Coats.

Use sand meeting the requirements of Gradation No. 1 of the Aggregate Gradation Table in [Article 4109.02](#).

120160.03 CONSTRUCTION.

A. General.

- The Contractor is responsible for all aspects of the project.
- Provide quality control management and testing, and maintain the quality characteristics specified.
- Apply Article 120160.03, D.

B. Equipment.

Provide sufficient equipment of the various types required to produce, place, and compact each layer of mixture as specified, such that the mixture is workable at the minimum placement and compaction temperature desired, regardless of storage or haul distance considerations.

Use equipment meeting the requirements of [Section 2001](#) with the following modifications:

1. Plant Calibration.

- a. Calibrate each plant scale and metering system before work on a contract begins. Use calibration equipment meeting the manufacturer's guidelines and Materials I.M. 508.
- b. The Engineer may waive calibration of permanent plant scales when a satisfactory operational history is available. The Engineer may require any scale or metering system to be recalibrated if operations indicate it is necessary.
- c. Make calibration data available at the plant.
- d. Calibrate each aggregate feed throughout an operating range wide enough to cover the proportion of that material required in the JMF. Make a new calibration each time there is a change in size or source of any aggregate being used.
- e. For continuous and drum mixing plants, calibrate the asphalt metering pump at the operating temperature and with the outlet under pressure equal to that occurring in normal operations.

2. Paver.

Apply [Article 2001.19](#).

3. Rollers.

- a. For initial and intermediate rolling, use self-propelled, steel tired, pneumatic tired, or vibratory rollers meeting the requirements of [Article 2001.05, B, C, or E](#). Their weight (mass) or tire pressure may be adjusted when justified by conditions.
- b. For finish rolling, use self-propelled, steel tired rollers or vibratory rollers in the static mode that meet the requirements of [Article 2001.05, B, or F](#).

4. Scales.

Apply [Article 2001.07, B](#), to paving operations regardless of the method of measurement.

C. HMA Construction.

1. Subgrade.

- a. Compact subgrade to 95% per ASTM D698 prior to placing asphalt. It may be necessary to place an initial layer of asphalt mix or granular material to serve as a working platform on which to compact the required thickness of asphalt underlayment.
- b. Maintain completed subgrade to the required density, true cross section, and smooth condition, prior to and during subsequent construction activities. If rutting or any other damage occurs to the subgrade as a result of hauling operations, immediately repair the subgrade. Such repair will include, if necessary, removal and replacement, at no additional cost to the Contracting Authority.
- c. Should traffic by others authorized to do work on the project be specifically permitted by the Engineer to use loads which exceed the Contractor's established limit, the Contracting Authority will pay repair costs for repairs directed by the Engineer.

2. Preparation of Existing Surfaces.

a. Cleaning.

Clean and prepare existing surface according to [Article 2212.03, B, 1](#).

b. Tack Coats.

- 1) Apply tack coats when the entire surface area on which the coat is to be applied is free of moisture. Do not apply them when the temperature on the surface being covered is less than 25°F (-4°C).
- 2) Place a tack coat to form a continuous, uniform film on the area to be covered. Unless directed otherwise, spread tack coat at the following undiluted rates: 0.03 to 0.05 gallon per square yard. Tack coat may be diluted with water up to 1:1 to improve application.

- 3) Allow tack coat to adequately cure prior to placement of HMA to assure bond to the underlying surface and avoid damage of the HMA being placed. If tack coat surface becomes dirty from weather or traffic, thoroughly clean and, if necessary, retack. A light application of sand cover may also be required, but this is anticipated only for excessive application rates, breakdowns, and short sections remaining at the end of a day's run.
- 4) Tack before the adjoining lift is placed. Lightly paint or spray vertical surfaces of all fixtures with which the hot mixture will come in contact to facilitate a tight joint with the fresh mixture.

3. Handling, Production, and Delivery.

Ensure plant operation complies with the following requirements:

a. Handling Mineral Aggregate.

- 1) Keep various aggregate products used separate from one another. Make adequate provisions to prevent intermingling.
- 2) Handle stockpiling and processing in a manner to ensure uniform incorporation of the aggregate into the mix.
- 3) Feed various aggregates separately in their proper proportions using feeders to the cold elevator. Feed them at a rate to permit correct and uniform temperature control of heating and drying operations.

b. Handling Asphalt Binder.

Bring asphalt binder to a temperature of 260°F to 330°F before being measured for mixing with the aggregates. The temperature between these limits may be further regulated according to the characteristics of the mixture, method of proportioning, and viscosity of the asphalt binder. Heat modified asphalt binder according to the supplier's recommendations

c. Production of Hot Mix Asphalt Mixtures.

- 1) Regulate the exact proportions of the various materials to be within the limits specified to produce a satisfactory bituminous coating and mixture. First dry mix the aggregates, then add the asphalt binder.
 - (a) In batch plants, add the asphalt binder in an evenly spread sheet over the full length of the mixer box.
 - (b) In continuous plants, spray the asphalt binder evenly into the aggregate within the first 30% of the length of the mixer box using a positive pressure spray.
 - (c) In drum mixing plants, spray the asphalt binder evenly into the aggregate using a positive pressure spray.
- 2) Operate the mixer so that the mixture is of consistently uniform temperature, and when discharged from the mixer does not vary more than 20°F (11°C).
- 3) Do not allow the temperature of the mixtures to fall outside the following parameters:
 - (a) Keep the production temperature of HMA mixtures between 225°F and 330°F until placed on the grade. Do not discharge HMA into the hopper when its temperature is less than: 245°F for a nominal layer thickness of 1 1/2 inches or less, or 225°F for a nominal layer thickness of more than 1 1/2 inches.
 - (b) Flexible paving mixtures not meeting these requirements will be rejected.
 - (c) Production temperature limits apply starting at point of discharge from mixer.
- 4) Use a rate of production that will not exceed the manufacturer's rated capacity for the mixer and will provide uniform coating. For batch mixers, use a dry mixing time of no less than 5 seconds and a wet mixing time of no less than 25 seconds. For continuous mixers, use a mixing time of no less than 30 seconds.
- 5) Control handling and manipulation of the hot mixture from the mixer to the final spread on the road in order to maintain uniform composition and minimize segregation of coarser particles. Minimize segregation to the extent that it cannot be visibly observed in the compacted surface. Apply only approved release agents to trucks and equipment, as specified in [Article 2001.01](#).
- 6) Except for an unavoidable delay or breakdown, provide continuous and uniform delivery of hot HMA to any individual spreading unit. Deliver at a rate sufficient to

provide as continuous an operation of the spreading unit as practical. Keep the paver hopper sufficiently full at all times to prevent non-uniform mixture flow to the screed.

4. Placement.

- a. Clean the surface of each layer according to Article 2212.03, B, 1. If necessary, retack to provide bond with the succeeding course.
- b. Do not place HMA mixtures under the following circumstances:
 - 1) On a wet or damp surface.
 - 2) When road surface temperature is less than that shown in Tables III and IV.

Table III: Base and Intermediate Course Lifts of Asphalt Mixtures

Nominal Thickness - inches	Road Surface Temperature, °F
1 1/2	40
2	35

Table IV: Surface Course Lifts of Asphalt Mixtures

Nominal Thickness - inches	Road Surface Temperature, °F
1	HMA: 50 / WMA: 40
1 1/2	HMA: 45 / WMA: 40
2	40

- 3) After November 15, except with the Engineer's approval.
- c. The Engineer may further limit placement if, in the Engineer's judgment, other conditions are detrimental to quality work.
- d. When placing the mixture, maintain a finishing machine forward speed that will provide a continuous uniform operation. Minimize stopping.
- e. Use a wire or string line to guide finishing machine and maintain alignment. Correct edge alignment irregularities immediately.
- f. The contract documents will show the total thickness to be placed. Spread the mixture at a rate such that, when compacted, the layer(s) will be the required thickness.
- g. Lift thickness shall in no case be more than 2 inches.
- h. Complete each layer to full width before placing succeeding layers.
- i. Whenever practical, spread mixtures using a finishing machine. Irregular areas may be spread by hand. Spread the hot mixture uniformly to the desired depth with hot shovels and rakes. Do not dump loads faster than they can be spread properly. Do not allow workers to stand on the loose mixture while spreading.
- j. After spreading, carefully smooth to remove all segregated coarse aggregate and rake marks. Use rakes and lutes designed for use on HMA mixtures.
- k. Do not spread more mixture than can be compacted in the specified working hours of the same working day.

5. Compaction.

- a. Promptly and thoroughly compact each layer. Use mechanical tampers for areas inaccessible to the rollers.
- b. Use a rolling procedure and compactive effort that will produce a surface free of ridges, marks, or bumps. Obtain the Engineer's approval for the rolling procedure and compactive effort.

D. Quality Control for Small HMA Paving Quantities.

- 1. Mix Design. Prepare the JMF. Prior to HMA production, obtain the Engineer's approval for the JMF. Comply with Article 120160.02 and Materials I.M. 510.

2. Plant Production.

- a. Ensure HMA production plant calibration for the JMF is current and no more than 12 months old.
- b. Use certified asphalt binder and approved aggregate sources meeting the JMF. Ensure the plant maintains an asphalt binder log to track the date and time of binder delivery. Ensure HMA delivery tickets identify the JMF.
- c. Monitor the quality control test results and make adjustments to keep the mixture near the target JMF values.

3. Construction.

- a. Take compacted mixture Gmb measurements, no later than the next working day following placement and compaction. Use the field quality control laboratory compaction for field Gmb control. The Engineer may accept the void content of the compacted layer based on cores or calculations from density gauge measurements. The Engineer may waive field void sampling provided the compaction has been thorough and effective.
- b. For small quantities, a lot will be the entire quantity of each HMA mixture bid item.
- c. The PWL for field voids will not apply to small quantities.

4. Certification.

- a. Provide a certification for the production of any mixture in which the requirements in this article are applied. Place the test results and the following certification statement on the Daily HMA Plant Report (Form 800241). "The HMA mixture contains certified asphalt binder and approved aggregate as specified in the approved mix design and was produced in compliance with the provisions of Article 120160.03, D."
- b. The Daily HMA 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.

120160.04 METHOD OF MEASUREMENT.

A. HMA Underlayment.

1. General.

Payment for the quality control requirements will not be measured separately.

2. Measurement by Area.

The quantity of the type specified, expressed in square yards, will be shown in the contract documents to the nearest 0.1 square yard.

B. Asphalt Binder.

Asphalt binder used will not be measured separately for payment.

C. Tack Coat.

Will not be measured separately.

120160.05 BASIS OF PAYMENT.

The costs of designing, producing, placing, and testing bituminous mixtures will not be paid for separately, but are included in the contract unit price for the HMA mixes used. Subgrade preparation is incidental and will not be paid for separately. The application of tack coat and sand cover aggregate are incidental and will not be paid for separately. Pollution testing is at the Contractor's expense.

The quality control requirements are incidental to the items of HMA mixtures in the contract.

A. HMA Underlayment.

Payment will be the contract unit price for HMA Underlayment of the type specified per square yard.

B. Asphalt Binder.

Compensation for asphalt binder will be included in the contract unit price per square yard for HMA Underlayment.

C. Tack Coat.

Incidental to HMA.