Iowa Department of Transportation

MINUTES
OF
IOWA D.O.T. SPECIFICATION COMMITTEE MEETING

November 12, 2009

Members Present:	John Adam	Statewide Operations Bureau
	Eric Johnsen, Secretary	Specifications Section
	Bruce Kuehl	District 6 - Construction
	Deanna Maifield	Office of Design
	Doug McDonald	District 1 - Marshalltown RCE
	Gary Novey	Office of Bridges & Structures
	Dan Redmond	District 4 - Materials
	Tom Reis, Chair	Specifications Section
	John Smythe	Office of Construction
Members Not Present:	Jim Berger	Office of Materials
	Roger Bierbaum	Office of Contracts
	Donna Buchwald	Office of Local Systems
	Troy Jerman	Office of Traffic & Safety
	Mike Kennerly	Office of Design
Advisory Members Present:	James King	Fayette County
Others Present:	Daniel Harness	Office of Design
	Ed Kasper	Office of Contracts
	Kevin Jones	Office of Materials
	Tom Parham	FHWA
	Scott Schram	Office of Materials

Tom Reis, Specifications Engineer, opened the meeting. The following items were discussed in accordance with the revised agenda dated November 6, 2009:

1. Article 1102.01, D, 2, CPA Reviewed Statement.
The Office of Contracts requested changes to update prequalification requirements for prospective bidders.

2. Article 1102.09, A, Preparation of Proposals.
The Office of Contracts requested changes to update electronic proposal limits to match proposed prequalification limits.

3. Article 1102.09, B, Preparation of Proposals.
The Office of Contracts requested changes to align the Standard Specifications with current procedures.

4. Article 2109.05, Basis of Payment.
The Office of Construction requested changes to subgrade preparation basis of payment.

5. Article 2111.05, Basis of Payment.
The Office of Construction requested changes to remove subgrade preparation from granular subbase specifications.

6. Section 2122, Paved Shoulders.
The Office of Design requested changes to remove foreslope finishing from paved shoulder specifications.

7. Section 2303, Hot Mix Asphalt Mixtures.
The Office of Materials requested changes to HMA Specifications.

8. Section 2316, Pavement Smoothness.
The Office of Construction requested changes to clarify and improve the smoothness specifications due to field comments.

9. Section 2317, Primary and Interstate Pavement Smoothness.
The Office of Construction requested changes to clarify and improve the smoothness specifications due to field comments.

10. Section 2416, Rigid Pipe Culverts.
Article 2553.02, A, 2, Carrier Pipe Installed without a Casing Pipe.
The Office of Design requested changes to add trenchless construction for culvert pipe.

11. Section 2428, Smoothness of Bridge Decks and Bridge Deck Overlays.
The Office of Construction requested changes to clarify and improve the smoothness specifications due to field comments.

12. Section 2501, Piles and Pile Driving.
The Office of Construction requested changes to clarify method of measurement and basis of payment for various unused or furnished piling.

13. Article 2505.02, B, 2, High Tension Cable Guardrail.
The Office of Design requested changes to allow TL-3 systems.

14. Article 2506.02, F, Fluidity (Flowable Mortar).
Article 2539.02, B, Fluidity (Concrete Pavement Undersealing by Pressure Grouting).
The Office of Materials requested changes to the method specified for measuring fluidity.

15. Article 2511.03, C, 3, a, Sidewalks.
The Office of Design requested changes to the sidewalk cross slope to match ADA requirements.

16. Article 2414.04, A, Concrete Railings.
Article 2513, Concrete Barrier.
The Office of Design requested changes to the method of measurement and basis of payment for concrete barrier end section and transition sections.

17. Section 2528, Traffic Control.
The Office of Construction requested changes to clarify and simplify how pilot cars are measured for payment.

18. Section 2529, Full Depth Finish Patches.
The Office of Construction requested changes to allow for payment adjustment when the placed patch thickness does not match the plan patch thickness.

19. Section 4137, Asphalt Binder.
The Office of Materials requested changes to test polymer modified asphalt.

20. Section 4184, Reflectorizing Spheres for Traffic Paint.
The Office of Materials requested changes to no longer require uncoated spheres, change the sphere gradation, and prohibit spheres containing heavy metals.

21. DS-090XX, Recycled Asphalt Materials.
The Office of Materials requested approval of a DS for Recycled Asphalt Materials. This DS will allow Recycled Asphalt Shingles.

SPECIFICATION REVISION SUBMITTAL FORM

Submitted by: Roger Bierbaum	**Office:** Contracts	**Item 1**
Submittal Date: October 28, 2009	**Proposed Effective Date:** April 2010	
Article No.: 1102.01, D **Title:** Competency and Qualification of Bidders	**Other:**	

Specification Committee Action: Approved as is.

Deferred:	**Not Approved:**	**Approved Date:** 11/12/2009	**Effective Date:** 4/20/2010

Specification Committee Approved Text: See Specification Section recommended text.

Comments: The Office of Contracts explained that the changes will make it easier for contractors to be prequalified to bid. This specification revision may not go into effect until October 2010, pending rules committee approval.

Specification Section Recommended Text:

Article 1102.01, D, 2, CPA Reviewed Statement.

Replace Item b:

b. When a CPA Reviewed Statement is submitted to the Department, an experience factor (F) ranging from 0.0 to ~~10.0~~ 12.5, depending on the prospective bidder's past performance with projects let by the Department, will be used in the prequalification formula. A prospective bidder, who has been qualified to submit proposals with this type of statement, shall be limited to individual proposal sizes that do not exceed the lesser of ~~$600,000~~ $1 million or the maximum prequalification amount minus the bidder's amount of uncompleted work currently under contract. Any combination of proposals, however, may total more than ~~$600,000~~ $1 million - as long as that total does not exceed the maximum prequalification amount minus the currently uncompleted work.

Article 1102.01, D, 3, CPA Audited Statement.

Replace the first sentence of Item b:

When a CPA Audited Statement is submitted to the Department, an experience factor (F) ranging from 0.0 to ~~10.0~~ 12.5, depending on the prospective bidder's past performance with projects let by the Department, will be used in the prequalification formula.

Comments:

Member's Requested Change: (Do not use **'Track Changes'**, or **'Mark-Up'**. Use ~~**Strikeout**~~ and **Highlight**.)

D. The Contracting Authority will qualify Contractors into three categories:

1. Individually Prepared Statement.
   - **a.** An Individually Prepared Statement is a "Contractor's Financial -Experience - Equipment Statement" that has been completed by the prospective bidder. If the statement has been compiled by a CPA, but does not contain a CPA review or audit of the financial portion of the statement, it is still considered an Individually Prepared Statement.
   - **b.** When an Individually Prepared Statement is submitted to the Department, an experience factor (F) of 1.0 will be used in the prequalification formula. Regardless of the formula calculations, however, the maximum prequalification amount can not exceed $100,000.

2. CPA Reviewed Statement.

- **a.** A CPA Reviewed Statement is a "Contractor's Financial -Experience - Equipment Statement" that includes a current CPA review of the financial portion of the statement. The review must be completed by a CPA who is either registered to practice in Iowa or registered in another state having reciprocal arrangements with Iowa.
- **b.** When a CPA Reviewed Statement is submitted to the Department, an experience factor (F) ranging from 0.0 to ~~10.0~~ 12.5, depending on the prospective bidder's past performance with projects let by the Department, will be used in the prequalification formula. A prospective bidder, who has been qualified to submit proposals with this type of statement, shall be limited to individual proposal sizes that do not exceed the lesser of ~~$600,000~~ $1 million or the maximum

prequalification amount minus the bidder's amount of uncompleted work currently under contract. Any combination of proposals, however, may total more than ~~$600,000~~ $1 million - as long as that total does not exceed the maximum prequalification amount minus the currently uncompleted work.

3. CPA Audited Statement.

a. A CPA Audited Statement is a "Contractor's Financial - Experience - Equipment Statement" that includes a current CPA audit of the financial portion of the statement. The audit must be completed by a CPA who is either registered to practice in Iowa or registered in another state having reciprocal arrangements with Iowa.

b. When a CPA Audited Statement is submitted to the Department, an experience factor (F) ranging from 0.0 to ~~10.0~~ 12.5, depending on the prospective bidder's past performance with projects let by the Department, will be used in the prequalification formula. A prospective bidder, who has been qualified to submit proposals with this type of statement, shall be limited to work that does not exceed the maximum prequalification amount minus the bidder's amount of uncompleted work currently under contract. However, a prospective bidder shall be considered to have an "Unlimited" bidding capacity with the Department if they were awarded over $50 million of work (including that from other Contracting Authorities) during their past fiscal year and have a prequalification limit, by the formula, over $100 million.

Reason for Revision: Update prequalification limits					
County or City Input Needed (X one)			**Yes**	**No** X	
Comments:					
Industry Input Needed (X one)			**Yes** X	**No**	
Industry Notified:	**Yes** X	**No**	**Industry Concurrence:**	**Yes** X	**No**
Comments: Met with AGC representatives on October 27, 2009					

SPECIFICATION REVISION SUBMITTAL FORM

Submitted by: Roger Bierbaum	**Office:** Contracts	**Item 2**
Submittal Date: October 28, 2009	**Proposed Effective Date:** April 2010	
Article No.: 1102.09, A **Title:** Preparation of Proposals	**Other:**	

Specification Committee Action: Approved as is.

Deferred:	**Not Approved:**	**Approved Date:** 11/12/2009	**Effective Date:** 4/20/2010

Specification Committee Approved Text: See Specification Section recommended text.

Comments: This specification revision may not go into effect until October 2010, pending rules committee approval.

Specification Section Recommended Text:

Article 1102.09, Preparation of Proposals.

Replace the second sentence of Item A:

For bids submitted to the Department that exceed ~~$600,000~~ $1 million, the bidder shall use subparagraph 2 or subparagraph 3 below.

Comments:

Member's Requested Change: **(Do not use 'Track Changes', or 'Mark-Up'. Use ~~Strikeout~~ and Highlight.)**

A. Only contractors who have been authorized to bid a proposal may submit a bid for a contract. For bids submitted to the Department that exceed ~~$600,000~~ $1 million, the bidder shall use subparagraph 2 or subparagraph 3 below. The Department may wave this requirement for unique or isolated situations.

Reason for Revision: Update electronic proposal limits to match proposed prequalification limits

County or City Input Needed (X one)	**Yes**	**No** X
Comments:		

Industry Input Needed (X one)			**Yes** X	**No**	
Industry Notified:	**Yes** X	**No**	**Industry Concurrence:**	**Yes** X	**No**
Comments: Met with AGC representatives on October 27, 2009					

SPECIFICATION REVISION SUBMITTAL FORM

Submitted by: Roger Bierbaum	**Office:** Contracts	**Item 3**
Submittal Date: October 12, 2009	**Proposed Effective Date:** April 2010 GS	
Article No.: 1102.09 **Title:** Preparation of Proposals	**Other:**	

Specification Committee Action: Approved as is.

Deferred:	**Not Approved:**	**Approved Date:** 11/12/2009	**Effective Date:** 4/20/2010

Specification Committee Approved Text: See Specification Section recommended text.

Comments:

Specification Section Recommended Text:

Article 1102.09, Preparation of Proposals.

Replace Item B:

B. The bidder shall be familiar with the requirements of the applicable specifications. The bidder shall specify a unit price in figures of dollars and cents for all pay items, ~~the extensions for the respective unit prices and quantities in figures in the column provided for the purpose, and the total amount of the proposal obtained by adding the amounts of the several items~~ except for Lump Sum items where the proposal line item bid amount must be shown. All the unit price figures shall be in ink, typed, or computer printed. The bidder may also specify the extension for each proposal line item and or the total amount of the bid. However, ~~I~~if there is a discrepancy between the unit bid prices, extensions, or total amount of bid, the unit prices shall govern. The bidder shall not alter the quantity, unit price, or the extension which has been provided for items which have been predetermined by the Contracting Authority.

Comments:

Member's Requested Change: (Do not use '**Track Changes**', or '**Mark-Up**'. Use ~~**Strikeout**~~ and **Highlight**.)

1102.09 PREPARATION OF PROPOSALS.

B. The bidder shall be familiar with the requirements of the applicable specifications. The bidder shall specify a unit price in figures of dollars and cents for all pay items, except for Lump Sum items where the proposal line item bid amount must be shown. ~~the extensions for the respective unit prices and quantities in figures in the column provided for the purpose, and the total amount of the proposal obtained by adding the amounts of the several items.~~ All the unit price figures shall be in ink, typed, or computer printed. The bidder may also specify the extension for each proposal line item and or the total amount of the bid. However, if there is a discrepancy between the unit bid prices, extensions, or total amount of bid, the unit prices shall govern. The bidder shall not alter the quantity, unit price, or the extension which has been provided for items which have been predetermined by the Contracting Authority.

Reason for Revision: For at least the past 20 years the DOT has not required the contractor to have an extension of each line item on the proposal or to total their bid. This change will align the Standard Specifications with our long standing procedures.

County or City Input Needed (X one)	**Yes**	**No** X
Comments:		
Industry Input Needed (X one)	**Yes**	**No** X

Industry Notified:	**Yes**	**No** X	**Industry Concurrence:**	**Yes**	**No**
Comments:					

SPECIFICATION REVISION SUBMITTAL FORM

Submitted by: John Smythe / Kevin Merryman	**Office:** Construction	**Item 4**
Submittal Date: October 28, 2009	**Proposed Effective Date:** April 2010	
Article No.: 2109.05 **Title:** Natural Subgrade	**Other:**	

Specification Committee Action: Approved with change.

Deferred:	**Not Approved:**	**Approved Date:** 11/12/2009	**Effective Date:** 4/20/2010

Specification Committee Approved Text:

Article 2109.05, Basis of Payment.

Replace Item C and **Add** Items D and E:

~~**C.** Payment for excavation or filling in excess of 3 inches (75 mm) for either elevation adjustment or subgrade correction at locations other than structures or existing pavement will be:~~
- ~~According to Article 2102.05, or~~
- ~~If no contract unit price is provided, as extra work, except when both grading and paving are the responsibility of the same Contractor.~~

C. Excavation in excess of 3 inches (75 mm) for preparation of subgrade at locations other than structures or existing pavements will be paid for according to Article 2102.05, or, if no contract unit price is provided, Article 1109.03, B.

D. When adjustments to profile grades cannot be made, fill required for preparation of subgrade at locations other than structures or existing pavements will be paid for according to Article 2102.05, or, if no contract price is provided, Article 1109.03, B.

E. When grading of the subgrade is a part of the contract, additional payment will not be made for excavation or fill necessary for preparation of subgrade.

Comments: The Office of Local Systems had concerns about paying for fill on a project that has trimmed material available. The Office of Construction pointed out that there would be a cost associated with hauling the trimmed material to the fill locations, so paying for the fill is appropriate.

Specification Section Recommended Text:

Article 2109.05, Basis of Payment.

Replace Item C and **Add** Items D and E:

~~**C.** Payment for excavation or filling in excess of 3 inches (75 mm) for either elevation adjustment or subgrade correction at locations other than structures or existing pavement will be:~~
- ~~According to Article 2102.05, or~~
- ~~If no contract unit price is provided, as extra work, except when both grading and paving are the responsibility of the same Contractor.~~

C. Excavation in excess of 3 inches (75 mm) for preparation of subgrade at locations other than structures or existing pavements will be paid for according to Article 2102.05, or, if no contract unit price is provided, Article 1109.03, B.

D. When adjustments to profile grades cannot be made, fill required for preparation of subgrade at locations other than structures or existing pavements will be paid for according to Article 2102.14, or, if no contract price is provided, Article 1109.03, B.

E. When grading of the subgrade is a part of the contract, additional payment will not be made for excavation or fill necessary for preparation of subgrade.

Comments:

Member's Requested Change (Redline/Strikeout):

2109.05 BASIS OF PAYMENT.

A. Unless otherwise provided, work connected with construction of natural subgrade for pavement, base course, pavement widening, or subbase will not be paid for directly. It is considered as associated work and incidental to the contract unit price for construction of the pavement, base course, or widening.

B. Special Compaction of Subgrade:

1. Payment will be the contract unit price per station (meter).

2. Payment is full compensation for excavating, manipulating, replacing, and compacting the material, and for furnishing all water required for the work.

~~**C.** Payment for excavation or filling in excess of 3 inches (75 mm) for either elevation adjustment or subgrade correction at locations other than structures or existing pavement will be:~~

~~• According to Article 2102.05, or~~

~~• If no contract unit price is provided, as extra work, except when both grading and paving are the responsibility of the same Contractor.~~

C. Excavation in excess of 3 inches (75 mm) for preparation of subgrade at locations other than structures or existing pavements will be paid for according to Article 2102.05, or, if no contract unit price is provided, Article 1109.03, B.

D. When adjustments to profile grades cannot be made, fill required for preparation of subgrade at locations other than structures or existing pavements will be paid for according to Article 2102.14, or, if no contract price is provided, Article 1109.03, B.

E. When grading of the subgrade is a part of the contract, additional payment will not be made for excavation or fill necessary for preparation of subgrade.

Reason for Revision: It is reasonable to expect a contractor to excavate up to 3 inches of material during subgrade preparation without claim for added compensation since they are already trimming the material and the material can be used for haul road construction and earth shoulder construction. It is not reasonable to expect a contractor to furnish any fill material since this is an unknown at the time of bid and can be a very costly incidental on large projects. The change provides for payment, either by bid item or by extra work for all fill required for preparation of subgrade. The change also clarifies that additional payment for preparation of subgrade will not be made when the grading of the subgrade is included in the contract. This issue has come up on several projects where there were grading bid items but the grading items were not used for construction of the subgrade.

County or City Input Needed (X one)	**Yes**	**No** X
Comments:		

Industry Input Needed (X one)			**Yes**	**No** X	
Industry Notified:	**Yes** X	**No**	**Industry Concurrence:**	**Yes**	**No**
Comments: Industry was notified, but no comments were received.					

SPECIFICATION REVISION SUBMITTAL FORM

Submitted by: John Smythe / Kevin Merryman	**Office:** Construction	**Item 5**
Submittal Date: October 28, 2009	**Proposed Effective Date:** April 2010	
Article No.: 2111.05 **Title:** Basis of Payment (Granular Subbase)	**Other:**	

Specification Committee Action: Approved as is.

Deferred:	**Not Approved:**	**Approved Date:** 11/12/2009	**Effective Date:** 4/20/2010

Specification Committee Approved Text: See Specification Section recommended text.

Comments: No comments.

Specification Section Recommended Text:

Article 2111.05, Basis of Payment.

Delete items D, E, and F:

~~**D.** Excavation in excess of 3 inches (75 mm) for preparation of subgrade at locations other than structures or existing pavements will be paid for according to Article 2102.05, or, if no contract unit price is provided, Article 1109.03, B.~~

~~**E.** When adjustments to profile grades cannot be made, fill required for preparation of subgrade at locations other than structures or existing pavements will be paid for according to Article 2102.14, or, if no contract price is provided, Article 1109.03, B.~~

~~**F.** When grading of the subgrade is a part of the contract, additional payment will not be made for excavation or fill necessary for preparation of subgrade.~~

Comments:

Member's Requested Change (Redline/Strikeout):

2111.05 BASIS OF PAYMENT.

A. Payment will be the contract unit price per square yard (square meter) for each specified design thickness of Granular Subbase as measured above.

B. The contract will have a separate item for Granular Subbase, Place Only, in square yards (square meters), when the Contracting Authority is providing the material or if the material is available from mandatory crushing on the contract. The cost of crushing shall be included in the Contractor's price bid for Granular Subbase if recycling is not required, but the Contractor chooses to crush the pavement removed for granular subbase.

C. Payment is full compensation for furnishing all materials, water, preparation of subgrade, and for doing all work necessary to complete the Granular Subbase in compliance with the contract documents.

~~**D.** Excavation in excess of 3 inches (75 mm) for preparation of subgrade at locations other than structures or existing pavements will be paid for according to Article 2102.05, or, if no contract unit price is provided, Article 1109.03, B.~~

~~**E.** When adjustments to profile grades cannot be made, fill required for preparation of subgrade at locations other than structures or existing pavements will be paid for according to Article 2102.14, or, if no contract price is provided, Article 1109.03, B.~~

~~**F.** When grading of the subgrade is a part of the contract, additional payment will not be made for excavation or fill necessary for preparation of subgrade.~~

Reason for Revision: The deleted language is redundant with language proposed for Section 2109. Section 2109 is the proper location for this language.					
County or City Input Needed (X one)			**Yes**	**No** X	
Comments:					
Industry Input Needed (X one)			**Yes**	**No** X	
Industry Notified:	**Yes**	**No** X	**Industry Concurrence:**	**Yes**	**No**
Comments:					

SPECIFICATION REVISION SUBMITTAL FORM

Submitted by: Deanna Maifield	**Office:** Design	**Item 6**
Submittal Date: 2009.10.28	**Proposed Effective Date:** 4-20-2009	
Article No.: 2122.03, D **Title:** Finishing **Article No.:** 2122.05, A, 2, b **Title:** Portland Cement Concrete Shoulder	**Other:**	

Specification Committee Action: Approved as is.

Deferred:	**Not Approved:**	**Approved Date:** 11/12/2009	**Effective Date:** 4/20/2010

Specification Committee Approved Text: See Specification Section recommended text.

Comments: The Office of Design presented new details for shoulder construction. The Office of Construction wondered if the new design would cause drainage problems. It was suggested to flatten the slope of the subgrade under the granular shoulder to increase drainage to the subdrain. The Office of Design will review the effectiveness of the design after implementation.

Specification Section Recommended Text:

2122.03, D, Finishing.

Replace the second sentence:

Finish the foreslope according to Article 2123.03, ~~D~~C.

2122.05, A, 2, b, Portland Cement Concrete Paved Shoulder.

Replace the first bullet:

- Preparing the area, including the earth fill, furnishing and placing the paved shoulder, and finishing the shoulder edge ~~and foreslope~~.

Comments:

Member's Requested Change: **(Do not use 'Track Changes', or 'Mark-Up'. Use ~~Strikeout~~ and Highlight.)**

2122.03, D, Finishing.

Replace the second sentence:

Finish the foreslope according to Article 2123.03, ~~D~~C.

2122.05, A, 2, b, Portland Cement Concrete Paved Shoulder.

Replace the first bullet:

- Preparing the area, including the earth fill, furnishing and placing the paved shoulder, and finishing the shoulder edge ~~and foreslope~~.

Reason for Revision:

County or City Input Needed (X one)	**Yes**	**No**
Comments:		

Industry Input Needed (X one)			**Yes**	**No**	
Industry Notified:	**Yes**	**No**	**Industry Concurrence:**	**Yes**	**No**
Comments:					

SPECIFICATION REVISION SUBMITTAL FORM

Submitted by: Jim Berger / Scott Schram		**Office:** Materials	**Item 7**
Submittal Date: October 27, 2009		**Proposed Effective Date:** April 2010 GS	
Section No.: 2303 **Title:** Hot Mix Asphalt Mixtures		**Other:**	
Specification Committee Action: Approved with changes.			
Deferred:	**Not Approved:**	**Approved Date:** 11/12/2009	**Effective Date:** 4/20/2010

Specification Committee Approved Text:

Article 2303.02, A, Asphalt Binder.

Add to the end of the article:

Unless otherwise specified in the contract documents, use PG 58-28 for shoulder mixtures.

Article 2303.02, C, Recycled Asphalt Pavement.

Replace the article:

C. Recycled Asphalt Pavement.

1. RAP is salvaged asphalt pavement. Use RAP from a source designated in the contract documents, or furnish Classified RAP, Certified RAP, or Unclassified RAP from the Contractor's stockpile. The designations Classified, Certified, and Unclassified are exclusively for the use of RAP in HMA.

~~**a. Classified RAP.**~~

~~**1)** Classified RAP is from a documented source with the aggregate meeting the appropriate quality requirements in Materials I.M. 510, and properly stockpiled.~~

~~**2)** Classified RAP may be used in the base and intermediate mixtures, and in surface mixtures (unless stated otherwise in the contract documents), for which the RAP aggregate qualifies. The surface course may contain up to 15% Classified RAP. The Contractor may use more than 15% of Classified RAP for the surface course when there is quality control sampling and testing of the RAP meeting the requirements in I.M. 505. Asphalt binder contributed by the RAP is limited to no more than 30% of the total asphalt binder in the surface mix.~~

~~**b. Unclassified RAP.**~~

~~**1)** RAP is designated as Unclassified RAP if it is:~~
~~Stockpiled RAP not meeting the requirements of Classified RAP, or~~
~~RAP from an unknown source.~~

~~**2)** When an Unclassified RAP stockpile is characterized by sampling and testing for mix design, do not add material to the stockpile until the project is completed.~~

~~**3)** For Interstate or Primary projects, HMA base and shoulder mixtures may contain up to 10% Unclassified RAP. For Primary projects, intermediate mixtures for 1,000,000 ESALs or less may contain up to 10% Unclassified RAP. HMA base, intermediate, and shoulder mixtures for all other projects may contain up to 10% Unclassified RAP. There will be no friction aggregate credit or aggregate crushed particles credit for Unclassified RAP.~~

2. ~~Unless otherwise stated in the contract documents, i~~Identify each RAP stockpile and document Classified and Certified RAP stockpiles as directed in Materials I.M. 505. ~~Do not add material to a Classified RAP stockpile without the approval of the District Materials Engineer.~~ Include the following information when documenting Classified RAP material in a stockpile for future use in HMA:

- Identification of the project from which the material was removed,
- Mix data from the original project including mixture type, ~~aggregate classification, location and depth in the pavement structure,~~
- Aggregate classification,
- Location and depth in the pavement structure,
- Extracted gradation information, if available, and
- Description of stockpile location and quantity.

Do not add material to a Classified or Certified RAP stockpile without the approval of the District Materials Engineer.

3. The Engineer may reject a RAP stockpile for non-uniformity based on visual inspection. Work the stockpiles in such a manner that the materials removed are representative of a cross section of the pile.

4. Place stockpiles of RAP on a base sufficient to prevent contamination, as directed in Materials I.M. 505. Do not use RAP stockpiles containing concrete chunks, grass, dirt, wood, metal, coal tar, or other foreign or environmentally restricted materials. RAP stockpiles may include PCC (not to exceed 10% of the stockpile) from patches or composite pavement that was milled as part of the asphalt pavement. Track equipment may operate on the stockpile during its construction.

5. When RAP is taken from a project, or is furnished by the Contracting Authority, the contract documents will indicate quantity of RAP expected to be available and test information, if known. Salvage this material. Unless otherwise specified in the contract documents, RAP not used in HMA becomes the property of the Contractor.

6. For HMA mix design purposes, the Contracting Authority will test samples of the RAP. The aggregate gradation and amount of asphalt binder in the RAP will be based on the Contracting Authority's extraction tests. When the amount of ~~RAP~~ recycled binder exceeds 20% of the total asphalt binder, change the asphalt binder grade as directed in Materials I.M. 510. No adjustments will be made to the contract unit price for required changes to the asphalt binder grade.

a. Classified RAP.

1) Classified RAP is from a documented source with the aggregate meeting the appropriate quality requirements in Materials I.M. 510, and properly stockpiled.

2) Classified RAP may be used in the base, intermediate, and surface mixtures for which the RAP aggregate qualifies. Classified RAP may be used in accordance with Table 2303.02-1.

3) Credit for the +4 proportion of frictional aggregate may be given for virgin aggregates used in the original pavement to be reclaimed. Types 4 and 5 frictional aggregate content in the RAP may be given full credit, while Types 2 and 3 content may be given credit for half the proportion in the original pavement. Credit may be used toward the total frictional aggregate requirement. No frictional credit shall be given beyond one generation of the RAP's service life.

b. Certified RAP.

Any stockpiled RAP not meeting the requirements of Classified RAP or from an unknown source may be given a Certified status when meeting quality control sampling, testing, and reporting requirements in Materials I.M. 505. Certified RAP may be used in accordance with Table 2303.02-1.

c. Unclassified RAP.

1) Any stockpiled RAP not meeting the requirements of Classified RAP or Certified RAP shall be designated as Unclassified RAP. Unclassified RAP may be used in accordance with Table 2303.02-1. No frictional aggregate credit or aggregate crushed particles credit will be given for Unclassified RAP.

2) When an Unclassified RAP stockpile is characterized by sampling and testing for mix design, no material can be added to the stockpile until the project is completed.

Table 2303.02-1: Allowable RAP Usage

Mix Designation	Aggregate Quality Type	Maximum Allowable Usage[2]		
		Unclassified RAP	Certified RAP	Classified RAP
HMA 100K S-I-B	B	0%	10%	15% (min. 70% virgin binder)[1]
HMA 300K S-I	B	0%	10%	15% (min. 70% virgin binder)[1]
HMA 300K B	B	10%	20%	No Limit
HMA 1M S L-4	A	0%	0%	15% (min. 70% virgin binder)[1]
HMA 1M S	A	0%	0%	15% (min. 70% virgin binder)[1]
HMA 1M I	B	10%	20%	No Limit
HMA 1M B	B	10%	20%	No Limit
HMA 1M B (shoulder)	B	10%	20%	No Limit
HMA 3M S L-4	A	0%	0%	15% (min. 70% virgin binder)[1]
HMA 3M S L-3	A	0%	0%	15% (min. 70% virgin binder)[1]
HMA 3M S	A	0%	0%	15% (min. 70% virgin binder)[1]
HMA 3M I	A	0%	0%	No Limit

HMA 3M B	B	10%	20%	No Limit
HMA 10M S L-3	A	0%	0%	15% (min. 70% virgin binder) [1]
HMA 10M I	A	0%	0%	No Limit
HMA 10M B	B	10%	20%	No Limit
HMA 30M S L-3	A	0%	0%	15% (min. 70% virgin binder) [1]
HMA 30M S L-2	A	0%	0%	15% (min. 70% virgin binder) [1]
HMA 30M I	A	0%	0%	No Limit
HMA 30M B	B	10%	20%	No Limit
HMA 100M S L-2	A	0%	0%	15% (min. 70% virgin binder) [1]
HMA 100M I	A	0%	0%	No Limit
HMA 100M B	B	10%	20%	No Limit

Note:
1. More than 15% of Classified RAP may be used for the surface course when there is quality control sampling, testing, and reporting of the RAP meeting the requirements in Materials I.M. 505. At least 70% of the total asphalt binder in the surface mix shall be virgin.
2. Maximum percentages shown are not to be combined.

Article 2303.02, D, Hot Mix Asphalt Mixture.

Renumber Table 2303.02-1, Basic Asphalt Binder Content (%):

Table ~~2303.02-1~~ 2303.02-2: Basic Asphalt Binder Content (%)

Article 2303.02, E, 2, Anti-strip Agent.

Replace the article:

2. Anti-strip Agent.

a. On Interstate and Primary highways designed for ~~over 10,000,000 ESALs and all Interstate highways~~ 30,000,000 ESALs and higher, perform an AASHTO T 283 moisture sensitivity evaluation of the proposed ~~HMA~~ asphalt mixture design.

b. On all other Interstate and Primary highways, perform an AASHTO T 283 moisture sensitivity evaluation of the proposed ~~HMA~~ asphalt mixture design if 25% or more of the plus No. 4 (4.75 mm) (virgin and RAP) aggregates or more than 40% of the total (virgin and RAP) aggregates is:

- Quartzite,
- Granite, or
- Other siliceous aggregate (not a limestone or dolomite) which is obtained by crushing from ledge rock.

c. ~~Anti-strip agent~~ AASHTO T 283 will not be required for base repair, patching, or temporary pavement.

~~**d.** The following apply when an AASHTO T 283 analysis is required:~~

~~**1) The Contractor's results equal or exceed 90% tensile strength ratio (TSR).**~~

~~Submit mix design sample to the Central Materials Laboratory for testing. If the Central Laboratory results verify the Contractor's results, no anti-strip agent will be required and no further testing will be required unless substantial mix proportion changed from the original design are made.~~

~~**2) Either the Contractor's results equal or exceed 80% but are less than 90%, or the Central Laboratory TSR results do not verify the Contractor's results.**~~

~~Obtain additional sample for AASHTO T 283 testing during the initial placement of the plant produced mix. Obtain the additional sample from a test strip, if available, or during the initial approximately 500 tons (500 Mg) of mix. Obtain sample from an area without anti-strip agent. This sample will be used to determine acceptability of the plant produced mixture for moisture sensitivity. For production taking place after this initial 500 tons (500 Mg), add anti-strip agent to the mixture until results are obtained from the Central Laboratory. Payment for the anti-strip agent will be made according to Article 2303.05, D. If Central Laboratory results on mixture without anti-strip confirm acceptability, anti-strip agent will not longer be required from the time of notification.~~

~~**3) The Contractor's results fall below 80%.**~~

~~Anti-strip will be required.~~

d. A minimum tensile strength ratio (TSR) of 80.0% is required on plant produced mixture.

e. When the Contractor's mix design TSR results are greater than or equal 80.0% and less than 90.0%, an anti-strip agent will be required until the Contracting Authority's TSR results on the plant produced mixture are equal to or exceeding 80.0%. Plant produced material without anti-strip shall be tested to confirm the need for an anti-strip agent.

f. When the Contractor's mix design TSR results are below 80.0%, an anti-strip agent will be required. Plant produced material with anti-strip shall be tested to verify the minimum TSR is achieved.

g. When there is a "significant mix change", the Engineer may require a re-evaluation of the AASHTO T 283 test.

~~e~~h. Use one of the following anti-strip agents:

1) Hydrated Lime.
Meet the requirements of AASHTO M 303, Type I. Do not apply Section 4193. Hydrated lime will not be considered part of the aggregate when determining the job mix formula and the filler/bitumen ratio.

2) Liquid Anti-strip Additives.
For each JMF, obtain approval for liquid anti-strip additives blended into the binder. Approval will be based on the following conditions:

a) The asphalt binder supplier provides test results that the additive does not negatively impact the asphalt binder properties, including short term and long term aged properties.

b) The design is to establish the optimum additive rate when comparing the dry strength of specimens prepared with asphalt binder not containing the anti-strip additive to conditioned specimens prepared with asphalt binder containing the anti-strip additive. See Materials I.M. 510 for additional information.

~~**c)** A change in the source of asphalt binder, liquid anti-strip, or aggregates will require a re-evaluation of the AASHTO T 283 test. When there is a significant change in the aggregate proportions, the Engineer may require a re-evaluation of the AASHTO T 283 test.~~

3) Polymer-based Liquid Aggregate Treatments.
For each JMF, obtain approval for polymer-based liquid aggregate treatments. Approval will be based on the ~~following conditions:~~

~~**a)** The~~ design ~~establishes~~ establishing the optimum additive rate when comparing the dry strength of specimens prepared without the anti-strip additive to conditioned specimens prepared with asphalt binder containing the anti-strip additive. See Materials I.M. 510 for additional information.

~~**b)** A change in the source of asphalt binder, liquid additive treatment, or aggregates will require a re-evaluation of the AASHTO T 283 test.~~

Article 2303.03, A, General.

Replace articles 3 and 4:

3. Apply Quality Management - Asphalt (QM-A) to ~~contracts with HMA quantities of 5000 tons (5000 Mg)~~ asphalt mixture bid items greater than 1000 tons (1000 Mg) ~~or greater~~ and all Interstate contracts. Follow the procedures and meet the criteria established in Articles 2303.02 and 2303.03, B; Section 2521; and Materials I.M. 510 and 511.

4. ~~For contracts with less than 5000 tons (5000 Mg), the Engineer will be responsible for quality control. The Contractor is responsible for the mix design. This does not change the mix requirements from gyratory to Marshall, unless specified in the contract documents.~~ Apply Article 2303.03, E, for asphalt mixture bid items of 1000 tons (1000 Mg) or less.

Article 2303.03, C, 3, c, 1, a, Added to a Drum Mixer.

Add to article 1:

(c) Add to the outer drum of a double drum system away from heated gas flow and prior to the addition of the virgin asphalt binder

Replace article 2:

(2) Alternative methods for mixing will be allowed only with the Engineer's approval. Do not introduce hydrated lime directly into a single drum mixer by blowing or auguring.

Article 2303.03, D, 3, a, General.

Replace article 4:

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.~~ All of the following qualify as a "significant mix change":

- A single occurrence of an aggregate interchange of greater than 5%.

- A single occurrence of an asphalt content change greater than 0.2%.
- A deletion or introduction of a new material into the mix.
- A change of additive dosage rate.
- A change of binder, aggregate, or additive source.

Article 2303.03, D, 3, b, Sampling and Testing.

Renumber existing article 9 and **replace** the first sentence:

~~9~~10) When liquid anti-strip additives are ~~used~~ added by the Contractor at the plant, satisfy one of the following methods to regulate the quantity of additive:

Add new article 9:

9) The Engineer may obtain samples for AASHTO T 283 at any time for mixes requiring moisture sensitivity testing under Articles 2303.02, E, 2, a, and 2303.02, E, 2, b, to verify the minimum TSR has been achieved.

Article 2303.03, D, 4, a, Density.

Replace the first sentence of article 2:

A lot is considered ~~to be~~ one layer of one mixture placed during a day's operation.

Article 2303.04, C, Recycled Asphalt Pavement.

Replace articles 2 and 3:

2. The quantity of asphalt binder in ~~classified or unclassified~~ RAP, ~~which is~~ incorporated into the mix, will be calculated in tons (megagrams). ~~of asphalt binder in the RAP,~~ This quantity will be based on the actual asphalt binder content determined for the mix design from the results of the Engineer's extraction test.

3. The quantity of asphalt binder in ~~classified or unclassified~~ RAP, ~~which is~~ incorporated into the mix, will be included in the quantity of asphalt binder used.

Article 2303.05, A, Hot Mix Asphalt Mixture.

Replace article 6:

6. ~~When liquid anti-strip agent is used and production quality control testing for AASHTO T 283 is required,~~ When AASHTO T 283 is performed on plant produced mixture, the payment for ~~HMA~~ asphalt mixture will be adjusted according to Table 2303.05-3:

Table 2303.05-3: ~~HMA~~ Asphalt Mixture Payment Adjustment

Contracting Authority's Results (Percent TSR)	Percent of Full
Greater than 79	100
70 to 79	90
Less than 70	75 maximum

Article 2303.05, B, Asphalt Binder.

Replace the second sentence of article 2:

The quantity of asphalt binder in ~~classified or unclassified~~ RAP, which is incorporated into the mix, will be calculated in tons (megagrams) of asphalt binder in the RAP.

Article 2303.05, D, Anti-strip Agent.

Replace article 1:

When anti-strip agent is required according to Article 2303.02, E, 2, the incorporation of the anti-strip agent into the ~~HMA~~ asphalt mixture will be considered as extra work ordered by the Engineer. Payment will be made at the rate of $2.00 per ton (megagram) of ~~HMA~~ asphalt mixture in which the anti-strip agent is incorporated. For mix designs with a TSR greater than or equal to 80.0%, payment will stop when the Contracting Authority's TSR results of the field produced mixture are greater than or equal to 80.0%.

Comments:

Specification Section Recommended Text: See attached requested changes.

Comments:

Member's Requested Change: (Do not use 'Track Changes', or 'Mark-Up'. Use ~~Strikeout~~ and Highlight.)

Several changes are requested. Please see the attached 2303 document.					
Reason for Revision: All changes have been proposed and approved by the DMEs and industry.					
County or City Input Needed (X one)			**Yes**	**No** X	
Comments:					
Industry Input Needed (X one)			**Yes** X	**No**	
Industry Notified:	**Yes** X	**No**	**Industry Concurrence :**	**Yes** X	**No**
Comments: All changes have been made in close agreement with the APAI					

Section 2303. Hot Mix Asphalt Mixtures

2303.01 DESCRIPTION.

A. Design, produce, place, and compact HMA mixtures. Use proper quality control practices for the construction of surface, intermediate, or base course on a prepared subbase, base, or pavement to the dimensions specified in the contract documents.

B. A surface course is the upper lift for a wearing surface of a designated thickness. An intermediate course is the next lower lift or lifts of a designated thickness. Use intermediate course mixtures for leveling, strengthening, and wedge courses. A base course is the lift or lifts placed on a prepared subgrade or subbase.

2303.02 MATERIALS.

Use materials meeting the following requirements:

A. Asphalt Binder.
The Performance Graded asphalt binder, PG XX -XX, will be specified in the contract documents to meet the climate, traffic, and pavement conditions. Use asphalt binder meeting the requirements of Section 4137. Unless otherwise specified in the contract documents, use a PG 58-28 for shoulder mixtures.

B. Aggregates.

1. Individual Aggregates.
- **a.** Use virgin mineral aggregate as specified in Materials I.M. 510 and meeting the requirements of Section 4127.
- **b.** When frictional classification of the coarse aggregate is required, the contract documents will specify the friction level and location. Furnish friction aggregate from sources identified in Materials I.M. T203.
  - **1) Friction Classification L-2.**
    Use a combined aggregate such that:
    - At least 80% of the combined aggregate retained on the No. 4 (4.75 mm) sieve is Type 4 or better friction aggregate, and
    - At least 25% of the combined aggregate retained on the No. 4 (4.75 mm) sieve is Type 2 or better friction aggregate.
  - **2) Friction Classification L-3.**
    Use a combined aggregate such that:
    - At least 80% of the combined aggregate retained on the No. 4 (4.75 mm) sieve is Type 4 or better friction aggregate, and
    - At least 45% of the combined aggregate retained on the No. 4 (4.75 mm) sieve is Type 3 or better friction aggregate, or if Type 2 is used in place of Type 3, at least 25% of the combined aggregate retained on the No. 4 (4.75 mm) sieve is Type 2.
  - **3) Friction Classification L-4.**
    Use a combined aggregate such that at least 50% of the combined aggregate retained on the No. 4 (4.75 mm) sieve is Type 4 or better friction aggregate.

2. Blended Aggregates.
- **a.** Use a blended aggregate meeting the combined aggregate requirements in Materials I.M. 510.
- **b.** When mixtures include RAP, use a blended mineral aggregate gradation consisting of a mixture of RAP aggregate combined with virgin aggregate.

C. Recycled Asphalt Pavement.

~~**1.** RAP is salvaged asphalt pavement. Use RAP from a source designated in the contract documents, or furnish Classified RAP or Unclassified RAP from the Contractor's stockpile. The designations Classified and Unclassified are exclusively for the use of RAP in HMA.~~
- ~~**a. Classified RAP.**~~
  - ~~**1)** Classified RAP is from a documented source with the aggregate meeting the appropriate quality requirements in Materials I.M. 510, and properly stockpiled.~~
  - ~~**2)** Classified RAP may be used in the base and intermediate mixtures, and in surface mixtures (unless stated otherwise in the contract documents), for which the RAP aggregate qualifies. The surface course may contain up to 15% Classified RAP. The Contractor may use more~~

~~than 15% of Classified RAP for the surface course when there is quality control sampling and testing of the RAP meeting the requirements in I.M. 505. Asphalt binder contributed by the RAP is limited to no more than 30% of the total asphalt binder in the surface mix.~~

~~**b. Unclassified RAP.**~~

~~**1)** RAP is designated as Unclassified RAP if it is:~~
~~Stockpiled RAP not meeting the requirements of Classified RAP, or~~
~~RAP from an unknown source.~~

~~**2)** When an Unclassified RAP stockpile is characterized by sampling and testing for mix design, do not add material to the stockpile until the project is completed.~~

~~**3)** For Interstate or Primary projects, HMA base and shoulder mixtures may contain up to 10% Unclassified RAP. For Primary projects, intermediate mixtures for 1,000,000 ESALs or less may contain up to 10% Unclassified RAP. HMA base, intermediate, and shoulder mixtures for all other projects may contain up to 10% Unclassified RAP. There will be no friction aggregate credit or aggregate crushed particles credit for Unclassified RAP.~~

~~**2.** Unless otherwise stated in the contract documents, identify each RAP stockpile and document Classified RAP stockpiles as directed in Materials I.M. 505. Do not add material to a Classified RAP stockpile without the approval of the District Materials Engineer. Include the following information when documenting Classified RAP material in a stockpile for future use in HMA:~~

- ~~Identification of the project from which the material was removed,~~
- ~~Mix data from the original project including mixture type, aggregate classification, location and depth in the pavement structure,~~
- ~~Extracted gradation information, if available, and~~
- ~~Description of stockpile location and quantity.~~

~~**3.** The Engineer may reject a RAP stockpile for non-uniformity based on visual inspection. Work the stockpiles in such a manner that the materials removed are representative of a cross section of the pile.~~

~~**4.** Place stockpiles of RAP on a base sufficient to prevent contamination, as directed in Materials I.M. 505. Do not use RAP stockpiles containing concrete chunks, grass, dirt, wood, metal, coal tar, or other foreign or environmentally restricted materials. RAP stockpiles may include PCC (not to exceed 10% of the stockpile) from patches or composite pavement that was milled as part of the asphalt pavement.~~

~~**5.** When RAP is taken from a project, or is furnished by the Contracting Authority, the contract documents will indicate quantity of RAP expected to be available and test information, if known. Salvage this material. Unless otherwise specified in the contract documents, RAP not used in HMA becomes the property of the Contractor.~~

~~**6.** For HMA mix design purposes, the Contracting Authority will test samples of the RAP. The aggregate gradation and amount of asphalt binder in the RAP will be based on the Contracting Authority's extraction tests. When the amount of RAP binder exceeds 20% of the total asphalt binder, change the asphalt binder grade as directed in Materials I.M. 510.~~

1. RAP is salvaged asphalt pavement. RAP shall be from a source designated in the contract documents, a Classified RAP stockpile, a Certified RAP stockpile, or Unclassified RAP furnished by the Contractor. The designations Classified, Certified, and Unclassified are exclusively for the use of RAP in HMA.

2. Identify each RAP stockpile and document Classified and Certified RAP stockpiles as directed in Materials I.M. 505. Information required for documentation of Classified RAP material in a stockpile for future use in HMA shall include the following:

a. Identification of the project from which the material was removed
b. Mix data from the original project including mixture type
c. Aggregate classification
d. Location and depth in the pavement structure
e. Extracted gradation information, if available
f. Description of stockpile location and quantity.

Additional material shall not be added to a Classified RAP stockpile without the approval of the District Materials Engineer.

3. The Engineer may reject a RAP stockpile for non-uniformity based on visual inspection. Stockpiles shall be worked in such a manner that the materials removed are representative of a cross section of the pile.

4. Stockpiles of RAP shall be placed on a base sufficient to prevent contamination as directed in Materials I.M. 505. RAP stockpiles containing concrete chunks, grass, dirt, wood, metal, coal tar, or other foreign or environmentally restricted materials shall not be used. RAP stockpiles may include PCC (not to exceed 10% of the stockpile) from patches or composite pavement that was milled as part of the asphalt pavement. Track equipment may operate on the stockpile during its construction.

5. When RAP is taken from a project, or is furnished by the Contracting Authority, the contract documents will indicate quantity of RAP expected to be available and test information, if known. The Contractor is responsible for salvaging this material. Unless otherwise specified in the contract documents, RAP not used in HMA shall become the property of the Contractor.

6. For HMA mix design purposes, the Contracting Authority will test samples of the RAP. The aggregate gradation and amount of asphalt binder in the RAP will be based on the Contract Authority's extraction tests. When the amount of RAP binder exceeds 20% of the total asphalt binder, the asphalt binder grade shall be changed as directed in Materials I.M. 510. No additional compensation will be made for required changes to the asphalt binder grade.

a. Classified RAP.

1) Classified RAP is from a documented source with the aggregate meeting the appropriate quality requirements in Materials I.M. 510, and properly stockpiled.

2) Classified RAP may be used in the base, intermediate, and surface mixtures for which the RAP aggregate qualifies. Classified RAP may be used in accordance with Table 2303.02-1.

3) Credit for the +4 proportion of frictional aggregate may be given for virgin aggregates used in the original pavement to be reclaimed. Types 4 and 5 frictional aggregate content in the RAP may be given full credit, while Types 2 and 3 content may be given credit for half the proportion in the original pavement. Credit may be used toward the total frictional aggregate requirement. No frictional credit shall be given beyond one generation of the RAP's service life.

b. Certified RAP.

Any stockpiled RAP not meeting the requirements of Classified RAP or from an unknown source may be given a Certified status when meeting quality control sampling, testing, and reporting requirements in Materials I.M. 505. Certified RAP may be used in accordance with Table 2303.02-1.

c. Unclassified RAP.

1) Any stockpiled RAP not meeting the requirements of Classified RAP or Certified RAP shall be designated as Unclassified RAP. Unclassified RAP may be used in accordance with Table 2303.02-1. No frictional aggregate credit or aggregate crushed particles credit will be given for Unclassified RAP.

2) When an Unclassified RAP stockpile is characterized by sampling and testing for mix design, no material can be added to the stockpile until the project is completed.

Table 2303.02-1: Allowable RAP Usage

Mix Designation	Aggregate Quality Type	Maximum Allowable Usage[2,3]		
		Unclassified RAP	Certified RAP	Classified RAP
HMA 100K S-I-B	B	0%	10%	15% (min. 70% virgin binder)[1]
HMA 300K S-I	B	0%	10%	15% (min. 70% virgin binder)[1]
HMA 300K B	B	10%	20%	No Limit
HMA 1M S L-4	A	0%	0%	15% (min. 70% virgin binder)[1]
HMA 1M S	A	0%	0%	15% (min. 70% virgin binder)[1]
HMA 1M I	B	10%	20%	No Limit
HMA 1M B	B	10%	20%	No Limit
HMA 1M B (shoulder)	B	10%	20%	No Limit
HMA 3M S L-4	A	0%	0%	15% (min. 70% virgin binder)[1]
HMA 3M S L-3	A	0%	0%	15% (min. 70% virgin binder)[1]
HMA 3M S	A	0%	0%	15% (min. 70% virgin binder)[1]
HMA 3M I	A	0%	0%	No Limit
HMA 3M B	B	10%	20%	No Limit
HMA 10M S L-3	A	0%	0%	15% (min. 70% virgin binder)[1]
HMA 10M I	A	0%	0%	No Limit
HMA 10M B	B	10%	20%	No Limit
HMA 30M S L-3	A	0%	0%	15% (min. 70% virgin binder)[1]
HMA 30M S L-2	A	0%	0%	15% (min. 70% virgin binder)[1]
HMA 30M I	A	0%	0%	No Limit
HMA 30M B	B	10%	20%	No Limit
HMA 100M S L-2	A	0%	0%	15% (min. 70% virgin binder)[1]
HMA 100M I	A	0%	0%	No Limit
HMA 100M B	B	10%	20%	No Limit

Note:
1. More than 15% of Classified RAP may be used for the surface course when there is quality control sampling, testing, and reporting of the RAP meeting the requirements in Materials I.M. 505. At least 70% of the total asphalt binder in the surface mix shall be virgin.
2. RAS shall be considered part of the maximum allowable RAP percentage.
3. Maximum percentages shown are not to be combined.

D. Hot Mix Asphalt 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 basic asphalt binder content is the historical, nominal mixture asphalt binder content, expressed as percent by weight (mass) of the asphalt binder in the total mixture. Apply the values in Table 2303.03-1, based on mixture size and type.

3. If the asphalt binder demand for the combination of aggregates submitted for an acceptable mix design exceeds the basic asphalt binder content (see Table 2302.02-1) by more than 0.75%, include an economic evaluation with the mix design. Base this evaluation on past job mix history, possible

aggregate proportion changes, and aggregate availability and haul costs for any changes or substitutions considered.

Table ~~2303.02-1~~ 2303.02-2: Basic Asphalt Binder Content (%)

Size	Aggregate Type	1 inch (25 mm)	3/4 inch (19 mm)	1/2 inch (12.5 mm)	3/8 inch (9.5 mm)
Intermediate and Surface	Type A	4.75	5.50	6.00	6.00
Intermediate and Surface	Type B	5.25	5.75	6.00	6.25
Base	Type B	5.25	6.00	6.00	6.25

4. Use HMA mixture design meeting gyratory design and mixture criteria corresponding to the design level specified in the contract documents. The Engineer may approve the substitution of any mixture which meets requirements for a higher mixture than specified in the contract documents, at no additional cost to the Contracting Authority.

5. Use 1,000,000 ESAL HMA base mixture for shoulders placed as a separate operation. For outside shoulders on Interstate projects, the Contractor has the option to substitute the mainline intermediate or surface mixture for a specified base mixture, at the Contractor's expense.

6. Prepare gyratory HMA mixture designs for base, intermediate, and surface mixtures. Follow the procedure outlined in Materials I.M. 510. Submit mix design complying with Materials I.M. 510.

7. Use gyratory compacter for design and field control meeting the AASHTO protocol for Superpave gyratory compactors. Compactors for which compliance with this protocol is pending may be used at the discretion of the District Materials Engineer.

E. 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. Anti-strip Agent.

a. On Interstate and Primary highways designed for 30,000,000 ESALs and higher ~~over 10,000,000 ESALs and all Interstate highways~~, perform an AASHTO T 283 moisture sensitivity evaluation of the proposed ~~HMA~~ asphalt mixture design.

b. On all other Interstate and Primary highways, perform an AASHTO T 283 moisture sensitivity evaluation of the proposed ~~HMA~~ asphalt mixture design if 25% or more of the plus No. 4 (4.75 mm) (virgin and RAP) aggregates or more than 40% of the total (virgin and RAP) aggregates is:

- Quartzite.
- Granite.
- Other siliceous aggregate (not a limestone or dolomite) which is obtained by crushing from ledge rock.

c. ~~Anti-strip agent~~ AASHTO T 283 will not be required for base repair, patching, or temporary pavement.

~~**d.** The following apply when an AASHTO T 283 analysis is required:~~

~~**1) The Contractor's results equal or exceed 90% tensile strength ratio (TSR).**~~
~~Submit mix design sample to the Central Materials Laboratory for testing. If the Central Laboratory results verify the Contractor's results, no anti-strip agent will be required and no further testing will be required unless substantial mix proportion changed from the original design are made.~~

~~**2) Either the Contractor's results equal or exceed 80% but are less than 90%, or the Central Laboratory TSR results do not verify the Contractor's results.**~~
~~Obtain additional sample for AASHTO T 283 testing during the initial placement of the plant produced mix. Obtain the additional sample from a test strip, if available, or during the initial approximately 500 tons (500 Mg) of mix. Obtain sample from an area without anti strip agent. This sample will be used to determine acceptability of the plant produced mixture for moisture sensitivity. For production taking place after this initial 500 tons (500 Mg), add anti-strip agent~~

~~to the mixture until results are obtained from the Central Laboratory. Payment for the anti-strip agent will be made according to Article 2303.05, D. If Central Laboratory results on mixture without anti-strip confirm acceptability, anti-strip agent will not longer be required from the time of notification.~~

~~**3) The Contractor's results fall below 80%.**~~
~~Anti-strip will be required.~~

d. A minimum tensile strength ratio (TSR) of 80% is required on plant produced mixture.

e. When the Contractor's mix design TSR results are greater than or equal 80.0% and less than 90.0%, an anti-strip agent will be required until the Contracting Authority's TSR results on the plant produced mixture are equal to or exceeding 80.0%. Plant produced material without anti-strip shall be tested to confirm the need for an anti-strip agent.

f. When the Contractor's mix design TSR results are below 80.0%, an anti-strip agent will be required. Plant produced material with anti-strip shall be tested to verify the minimum TSR is achieved.

g. When there is a "significant mix change", the Engineer may require a re-evaluation of the AASHTO T 283 test.

~~e~~h. Use one of the following anti-strip agents:

1) Hydrated Lime.
Meet the requirements of AASHTO M 303, Type I. Do not apply Section 4193. Hydrated lime will not be considered part of the aggregate when determining the job mix formula and the filler/bitumen ratio.

2) Liquid Anti-strip Additives.
For each JMF, obtain approval for liquid anti-strip additives blended into the binder. Approval will be based on the following conditions:

a) The asphalt binder supplier provides test results that the additive does not negatively impact the asphalt binder properties, including short term and long term aged properties.

b) The design is to establish the optimum additive rate when comparing the dry strength of specimens prepared with asphalt binder not containing the anti-strip additive to conditioned specimens prepared with asphalt binder containing the anti-strip additive. See Materials I.M. 510 for additional information.

~~**c)** A change in the source of asphalt binder, liquid anti-strip, or aggregates will require a re-evaluation of the AASHTO T 283 test. When there is a significant change in the aggregate proportions, the Engineer may require a re-evaluation of the AASHTO T 283 test.~~

3) Polymer-based Liquid Aggregate Treatments.
For each JMF, obtain approval for polymer-based liquid aggregate treatments. Approval will be based on the ~~following conditions:~~

~~**a)** The~~ design establishing~~es~~ the optimum additive rate when comparing the dry strength of specimens prepared without the anti-strip additive to conditioned specimens prepared with asphalt binder containing the anti-strip additive. See Materials I.M. 510 for additional information.

~~**b)** A change in the source of asphalt binder, liquid additive treatment, or aggregates will require a re-evaluation of the AASHTO T 283 test.~~

3. Sand for Tack Coats.
Use sand meeting the requirements of Gradation No. 1 of the Aggregate Gradation Table in Section 4109.02.

4. Fabric Reinforcement.
Use fabric reinforcement meeting the requirements of Article 4196.01, B, 4.

2303.03 CONSTRUCTION.

A. General.

1. The Contractor is responsible for all aspects of the project.

2. Provide quality control management and testing, and maintain the quality characteristics specified.

3. Apply Quality Management - Asphalt (QM-A) to ~~contracts with HMA quantities of 5000 tons (5000 Mg)~~ asphalt mixture bid items greater than 1000 tons (1000 Mg) ~~or greater~~ and all Interstate contracts. Follow the procedures and meet the criteria established in Articles 2303.02 and 2303.03, B; Section 2521; and Materials I.M. 510 and 511.

4. ~~For contracts with less than 5000 tons (5000 Mg), the Engineer will be responsible for quality control. The Contractor is responsible for the mix design. This does not change the mix requirements from gyratory to Marshall, unless specified in the contract documents.~~ Apply Article 2303.03, E for asphalt mixture bid items of 1000 tons (1000 Mg) or less.

B. Equipment.

Provide sufficient equipment of the various types required to produce, place, and compact each layer of HMA mixture as specified. 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. Spreaders described in Article 2001.13, D, may be used to place paved shoulders. Spreaders used to place the final lift of paved shoulders shall meet additional requirements of 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 F. 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. **Maintenance of the Subgrade and Subbase.**
   - **a.** Maintain completed subgrade and subbase to the required density, true cross section, and smooth condition, prior to and during subsequent construction activities.
   - **b.** If rutting or any other damage occurs to the subgrade or subbase as a result of hauling operations, immediately repair the subgrade and subbase. 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 the tack coat at an undiluted rate of 0.02 to 0.05 gallon per square yard (0.1 to 0.2 L/m^2). The tack coat may be diluted with water 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) On highways being constructed under traffic, use procedures that provide safety and convenience to the public (without soiling their vehicles) as controlling factors. Limit tack coat application lengths to minimize inconvenience to the public. Keep applications within the hot mixture placing work area that is controlled by flaggers at each end. Plan applications so they will be covered with hot mixture when the work area is opened to traffic at the end of the day's work.

5) Tack the vertical face of exposed, longitudinal joints as a separate operation at a rate from 0.10 to 0.15 gallon per square yard (0.5 to 0.7 L/m^2). Tack before the adjoining lift is placed. Lightly paint or spray vertical surfaces of all fixtures, curbs, bridges, or cold mixture with which the hot mixture will come in contact to facilitate a tight joint with the fresh mixture.

c. Fabric Reinforcement.

1) When fabric reinforcement is required, the locations will be designated in the contract documents.

2) Do not place fabric on wet or damp surfaces, or when the road surface is less than 50°F (10°C).

3) Apply fiberglass fabric only with an adhesive recommended by the manufacturer.

4) Place fabrics with an adhesive backing according to the manufacturer's recommendations.

5) Place other fabrics with a heavy coat of the same asphalt binder grade used in the HMA and applied at a rate of 0.20 to 0.25 gallons per square yard (0.9 to 1.1 L/m^2). Place at a temperature between 295°F and 315°F (145°C and 160°C).

6) Place fabric reinforcement according to the contract documents (full width or individual crack or joint treatment). Place fabric immediately following the adhesive or asphalt binder placement under the fabric. Placement may be by hand or by a mechanical method designed for this purpose.

7) Take precautions to avoid wrinkles in the fabric and to ensure that air bubbles are removed without breaking the fabric. Cut and lap wrinkles or folds which cannot be removed by brushing in order to provide a smooth surface.

8) Additional adhesive or asphalt binder may be required to produce a tight, bonded surface. When applied full lane width, use a minimum 12 inch (300 mm) transverse and longitudinal lap.

9) Avoid applying tack coat over longitudinally placed fabric.

10) To avoid damage to fabric, do not allow traffic over fabric during placement and during curing of the adhesive material. A light application of HMA mix may be hand sprinkled on the fabric to prevent damage from necessary equipment traffic.

11) When directed by the Engineer, repair damaged or soiled fabric prior to HMA overlay, at no additional cost to the Contracting Authority. The Engineer may also require sanding during this period, at no additional cost to the Contracting Authority.

3. Handling, Production, and Delivery.

Ensure plant operation complies with the following requirements:

a. Handling Mineral Aggregate and RAP.

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 (125°C to 165°C) 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. Handling Anti-strip Agents.

1) Hydrated Lime.

Accurately proportion lime using a method acceptable to the Engineer.

a) Added to a Drum Mixer.

(1) Add hydrated lime at the rate of 0.75% by weight (mass) of the total aggregate (virgin and RAP) for Interstate and Primary projects. Add hydrated lime to a drum mixer using one of the following methods:
- **(a)** Add to virgin aggregate on the primary feed belt, as a lime water slurry.
- **(b)** Thoroughly mix with the total combined aggregate if the aggregate contains at least 3% total moisture.
- **(c)** Add to the outer drum of a double drum system away from heated gas flow and prior to the addition of the virgin asphalt binder

(2) Alternative methods for mixing will be allowed only with the Engineer's approval. Do not introduce hydrated lime directly into a single drum mixer by blowing or auguring.

b) Added to a Batch Plant.
Add hydrated lime at the rate of 0.5% by weight (mass) of the total aggregate (virgin and RAP) for Interstate and Primary projects. Introduce it to a batch plant using one of the methods below. In any case, introduce the lime prior to the start of the dry mix cycle.
- **(1)** Place on the recycle belt which leads directly into the weigh hopper.
- **(2)** Add directly into the pugmill.
- **(3)** Add directly into the hot aggregate elevator into the hot aggregate stream.

c) Added to the Aggregate Stockpile.
Add hydrated lime at a rate established by the AASHTO T 283 test. The instructions for establishing the rate are discussed in Materials I.M. 510. Add it to the source aggregates defined in Article 2303.02, E, 2, thoroughly mixed with sufficient moisture to achieve aggregate coating, and then place in the stockpile.

2) Liquid.
- **a)** When liquid anti-strip additives are used, employ equipment complying with the anti-strip manufacturer's recommended practice to store, measure, and blend the additive with the binder.
- **b)** The additive may be injected into the asphalt binder by the asphalt supplier or the Contractor. If the Contractor elects to add the liquid anti-strip agent, they assume the material certification responsibilities of the asphalt binder supplier. Ensure the shipping ticket reports the type and amount of additive and time of injection.
- **c)** Ensure the asphalt supplier provides the Contactor and Engineer with the shelf life criteria defining when the anti-strip additive maintains its effectiveness. Do not use binder that has exceeded the shelf life criteria.
- **d)** When using polymer-based aggregate treatment, comply with the manufacturer's recommended specifications and guidelines.

d. 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) Coating aids may be added with the Engineer's approval.

3) Operate the mixer so that the mixture is of consistently uniform temperature, and when discharged from the mixer does not vary more than 20ºF (11ºC).

4) Unless the Engineer approves, do not allow the temperature of the mixtures to exceed 330ºF (165ºC).

5) 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.

6) 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.

7) Ensure mixture temperature allows for the specified compaction and density to be attained. Do not discharge HMA into the paver hopper when its temperature is less than:
- 245°F (120°C) for a nominal layer thickness of 1 1/2 inches (40 mm) or less, or
- 225°F (110°C) for a nominal layer thickness of more than 1 1/2 inches (40 mm).

8) 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. Prior to placing the final lift, correct bumps or other significant irregularities that appear or are evident in the intermediate course or other lower course.

c. 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 2303.03-1 and 2303.03-2.

Table 2303.03-1: Base and Intermediate Course Lifts of HMA Mixtures

Nominal Thickness - inches (mm)	Road Surface Temperature, ºF (ºC)
1 1/2 (40)	40 (4)
2 - 3 (50 - 80)	35 (2)
Over 3 (Over 80)	25 (-4)

Table 2303.03-2: Surface Course Lifts of HMA Mixtures

Nominal Thickness - inches (mm)	Road Surface Temperature, ºF (ºC)
1 (30)	50 (10)
1 1/2 (40)	45 (7)
2 and greater (50 and greater)	40 (4)

3) After November 15, except with the Engineer's approval.

d. The Engineer may further limit placement if, in the Engineer's judgment, other conditions are detrimental to quality work.

e. When placing the mixture, maintain a finishing machine forward speed that will provide a continuous uniform operation. Minimize stopping.

f. Use a wire or string line to guide finishing machine and maintain alignment. Correct edge alignment irregularities immediately.

g. 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.

h. Base the minimum layer thickness on Table 2303.03-3.

Table 2303.03-3: Minimum Lift Thickness

Design Mix Size - inches (mm)	Minimum Lift Thickness - inches (mm)
3/8 (9.5)	1 (25)
1/2 (12.5)	1 1/2 (40)
3/4 (19)	2 (50)
1 (25)	3 (75)

i. Ensure the compacted thickness of the top layer does not exceed 3 inches (75 mm). This restriction does not apply to HMA shoulders.

j. The maximum compacted thickness of lower layers may exceed 4 inches (100 mm) if it is demonstrated that the thicker layers have satisfactory density. The riding characteristics of the thicker layers must be within conformance to that expected from a 3 inch (75 mm) layer.

k. Complete each layer to full width before placing succeeding layers.

l. While operating on the road surface, do not use kerosene, distillate, other petroleum fractions, or other solvents, for cleaning hand tools or for spraying the paver hopper. Do not carry containers of cleaning solution on or near the paver. When a solvent is used, do not use the paver for at least 5 hours after cleaning. Collect and remove all cleaning materials and cleaning residue from the project and plant site. The cleaning material and residue becomes the property of the Contractor.

m. 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.

n. After spreading, carefully smooth to remove all segregated coarse aggregate and rake marks. Use rakes and lutes designed for use on HMA mixtures.

o. Unless stated elsewhere in the contract documents, when placing two adjacent lanes, pave no more than 1 day of rated plant production before paving the adjacent lane(s). Place the adjacent lane to match the first lane during the next day of plant production.

p. Do not spread more mixture than can be compacted in the specified working hours of the same working day.

q. At the close of each working day, clear all construction equipment from the roadbed.

r. Prior to opening a lane to traffic, place fillets or full width granular shoulders according to Article 2121.03, C, 4. Place the material adjacent to and equal in thickness to the resurfacing. Fillet removal is incidental to the HMA mixture.

5. Compaction.

a. General.

1) Promptly and thoroughly compact each layer. Use mechanical tampers for areas inaccessible to the rollers.

2) 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.

b. Class I Compaction.

Intended for use on Interstate highways, and most Primary and Secondary highways. For Class I compaction, the roadway density (percent of laboratory density) will be based on the density obtained from the Quality Control Program for that day's mixture.

1) Class IA Compaction.

a) Use Class IA compaction for intermediate and surface courses for the traffic lanes of:

- Interstate highways,
- Interstate-to-Interstate ramps, and
- Primary highways as specified.

b) Compact to a minimum of 96% of laboratory density. Do not exceed 8% average air void level for roadway density specimens.

2) Class IB Compaction.

a) Use Class IB compaction for:

- All Interstate and Primary base courses,
- Primary travel lane intermediate and surface courses when Class IA compaction is not specified, and
- Primary ramps connecting to Interstate and Primary highways when Class IA compaction is not specified.

b) Compact to a minimum of 95% of laboratory density. Do not exceed 8% average air void level for roadway density specimens.

3) Class IC Compaction.

a) Use Class IC compaction for:

- HMA base widening,
- Shoulder resurfacing when specified,
- Traffic lanes of Secondary highways, and
- Any other traffic lanes when Class IA and IB are not specified.

b) Compact to a minimum of 94% of laboratory density. Do not exceed 8% average air void level for roadway density specimens.

4) Test Strip Construction for Class IA and IB Compaction.

a) For the purpose of evaluating properties of the HMA mixtures and for evaluating an effective rolling pattern:

(1) For Class IA compaction, construct a test strip at the start of intermediate course placement.

(2) For Class IA and IB compaction, construct a test strip prior to the start of surface course placement.

b) For multiple lifts using the same mix requiring Class IA compaction, when the thickness of the second lift varies from the first lift by 1 1/2 inches (40 mm) or more, perform a test strip for the second lift.

c) When the contract documents specify both intermediate and surface courses, place a surface course test strip in lieu of intermediate mix in a section of intermediate course prior to actual surface course placement.

d) Apply the test strip to each mixture which has a plan quantity of at least 3000 tons (3000 Mg).

e) The quantity of HMA mixture subject to Class IA compaction, produced and placed for test strip production, will be limited to:

(1) 750 tons (750 Mg) for lift thicknesses of 2 inches (50 mm) or less.

(2) 1000 tons (1000 Mg) for lift thicknesses greater than 2 inches (50 mm).

f) After test strip placement, suspend further mixing and laydown operations until the laboratory test results of the plant produced mixture and core densities are available.

g) Only one test strip will be allowed for each mixture. The Engineer may require additional test strips if a complying HMA mixture or rolling pattern was not established.

h) Use procedures and documentation during test strip construction that allow the Engineer and Contractor to confirm mixture design properties and effectiveness of compaction procedures.

i) Use test strip production control that meets the requirements of Article 2303.03, D, 3, c. The number of density core samples obtained for the test strip will be increased by one. The low core result will not be used in the Quality Index (Q.I.) formula for payment for the test strip quantity.

c. Class II Compaction.

Intended for paved shoulders, temporary crossovers, onsite detours, and other situations where Class I is not specified.

1) For all rollers, make initial contact with the hot mixture using the power driven wheels or drum.

2) Perform initial rolling at a temperature so the mixture will compact without excessive distortion. Except on longitudinal joints and super-elevated curves, begin rolling with the initial roller at the outer edges of the pavement. With each successive pass, progress inward toward the center. For each reverse trip, lap all but 4 to 6 inches (100 to 150 mm) of the previous track. When reversing direction, stop the initial roller at an angle with the longitudinal direction.

3) Following the initial rolling, give the layer an intermediate rolling with a pneumatic tired roller before the temperature falls below 225°F (110°C). Cover the area no less than six times with the intermediate roller.

4) Use a finish, steel tired roller to smooth out all marks and roughness in the surface.

5) For areas inaccessible to rollers, use mechanical tampers or other approved compaction methods.

6. Joints and Runouts.

a. Construct longitudinal joints for courses on resurfacing projects directly above the longitudinal joint in the existing pavement. Limit the offset distance between longitudinal joints in succeeding full depth HMA paving courses to 3 inches (75 mm) or less. Adjust hot mixture spreading along longitudinal joints to secure complete joint closure and full compression of the mixture with a smooth surface and joint after compaction.

b. Separate transverse construction joints in succeeding courses by at least 6 feet (1.6 m). Do not use wood or metal headers to form joint edge during rolling of the fresh mixture. Saw header to a straight line at right angles to the center line to provide a full thickness vertical edge before continuing paving. Provide a 10 foot (3 m) straightedge for checking transverse construction joints for smoothness. Before compaction, use hand methods to correct surface variations at transverse construction joints indicated by the straightedge.

c. When a transverse construction joint is open to traffic, install a temporary runout 10 feet (3 m) long per 1 inch (25 mm) of lift thickness. Use suitable paper or burlap (not sand, dirt, or wood) under the taper to prevent adhesion.

d. When required to end paving for winter shutdown, locate runouts adjacent to each other. Install a winter shutdown runout 25 feet (8 m) long per 1 inch (25 mm) of lift thickness.

e. For temporary runouts open to traffic for periods greater than 4 weeks or winter shutdown runouts, the Contractor may reduce the amount of top size aggregate in the transition taper. Remove temporary runouts and winter shutdown runouts before commencing paving. Runout removal is incidental to the HMA mixture.

7. Miscellaneous Operations.

a. Leveling and Strengthening Courses.

1) The contract documents will show course thickness. Place strengthening and leveling courses as indicated in the contract documents. Use the same mixture specified for the base or intermediate course.

2) When the width of strengthening or leveling course is 8 feet (2.4 m) or more, spread using a finishing machine.

3) Compact leveling courses using Class II compaction, except make all passes with a pneumatic roller.

b. Wedge Courses.

1) Use the base or intermediate mixture to construct wedge courses used to secure desired curve super-elevation. When possible, spread using a finishing machine.

2) Place wedge courses in compacted layers no thicker than 3 inches (75 mm). Avoid crushing the coarse aggregate. Place wedge courses to the full width of the pavement.

3) On super-elevated curves which require wedge course placement, stage the shoulder construction. After completing each day's wedge placement operations and prior to suspending that day's construction activities, construct a full width shoulder on the high side up to the completed wedge course elevation. Shoulder construction staging will be considered incidental to shoulder construction.

c. Fixtures in the Pavement Surface.

1) Adjust utility accesses, intakes, or other fixtures encountered within the area to be covered by HMA to conform to the final adjacent finished surface. Unless specified otherwise in the plans, adjust fixtures:

- Between placing the surface course and the layer preceding the surface course, or
- After placing the surface course using a composite patch or PCC patch.

2) Use PCC and HMA patch material complying with the requirements of Section 2529. Make patches large enough to accommodate the structure being adjusted.

3) Construct patches to be square. Orient them diagonally to the direction of traffic flow. Ensure the elevation of the adjusted fixture and patch does not differ from the elevation of the surrounding pavement surface by more than 1/4 inch (6 mm).

d. Fillets for Intersecting Roads and Driveways.

1) Shape, clean of loose material, and tack coat the surface adjacent to the pavement being surfaced when fillets are designated in the contract documents for driveways to homesteads and commercial establishments and at intersecting roads. On the tack coated surface, place and compact the hot mixture in layers equal to the adjacent layer. Extend from the edge of the pavement as shown on the plans.

2) Place and compact fillets at intersecting roads at the same time as the adjacent layer.

3) Entrance fillets that are 8 feet (2.4 m) or wider may be placed as a separate operation. Pave fillets which are 8 feet (2.4 m) or wider with a self propelled finishing machine described in Article 2001.19.

4) The Engineer may approve other equipment for placement of fillets, based on a demonstration of satisfactory results.

e. Stop Sign Rumble Strips.

If the plans include the bid item Rumble Strip Panel (In Full Depth Patch), apply Section 2529. To meet the requirements of placing Stop Sign Rumble Strips before opening roadway sections to traffic, the Contractor may construct temporary rumble strip panels meeting the final pattern and location of the Stop Sign Rumble Strip indicated in the plans

f. Paved HMA Shoulders.

1) Compact paved HMA shoulders using one of the following methods:

a) Class II compaction (Article 2303.03, C, 5, c),

b) Rolling pattern established during the first day of shoulder placement to achieve Class 1C compaction (Article 2303.03, C, 5, b, 3), or

c) Same rolling pattern established for mainline lanes, as determined by density coring.

2) Shoulder area will not be included in calculations for density price adjustment on mainline. A price adjustment may be applied to shoulder areas that do not adhere to the established roller pattern.

D. Quality Assurance Program.

For each HMA mixture bid item of more than 1000 tons (1000 Mg), apply requirements of this article.

HMA mixture bid items of 1000 tons (1000 Mg) or less and patching bid items are both defined as small quantities. For those bid items, meet the requirements of Article 2303.03, E.

1. General.

Follow the procedures and meet the criteria established in Articles 2303.02 and 2303.03, B, Section 2521, and Materials I.M. 510 and 511.

2. Mix Design - Job Mix Formula.

a. The Contractor is responsible for the JMF for each mixture.

b. Submit a completed JMF, using the computer format of Form 956, 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. Include trial and final proposed aggregate proportions (Form 955) and corresponding gyratory data. In addition, submit sufficient loose mixture and individual material samples for approval of the design.

c. Personnel preparing the JMF shall 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. The Contractor will be charged $1000 for each JMF approval requested and performed which exceeds two per mix size, type, and proposal item on any individual project or group of tied projects.

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 Section 2521 is required.

2) Personnel performing production quality control testing shall be Iowa DOT certified for the duties performed.

3) Provide easy and safe access for Iowa DOT staff to the location in the plant where samples are taken.

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.~~

All of the following qualify as a “significant mix change”:

- A single occurrence of an aggregate interchange of greater than 5%
- A single occurrence of an asphalt content change greater than 0.2%
- Any deletion or introduction of a new material into the mix
- A change of additive dosage rate
- A change of binder, aggregate, or additive source

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 Materials I.M. 204.

2) Use cold feed 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 Materials I.M. 204. The Engineer will secure the samples according to Materials I.M. 511.

3) Sample the hot HMA mixture at random locations as directed and witnessed by the Engineer according to Materials I.M. 322. Secure the samples according to Materials I.M. 511.

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 2000 tons (2000 Mg) or more, divide that day’s production into four sublots, with the first sublot being the first 500 tons (500 Mg) 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 2000 tons (2000 Mg), use the first 500 tons (500 Mg) produced for the first daily sublot. The Engineer will establish 750 ton (750 Mg) daily sublots for mix production exceeding the first 500 tons (500 Mg).

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 (100 Mg) of mix produced each day or the first 100 tons (100 Mg) of mix following a significant mix change.

8) Test the quality control sample of each production paired sample as follows:

a) Prepare and compact two gyratory specimens according to Materials I.M. 325G.

b) Determine the density for each specimen according to 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 Materials I.M. 350 or other test methods recognized by AASHTO or ASTM.

e) Determine laboratory air voids for each sample according to Materials I.M. 501.

9) The Engineer may obtain samples for AASHTO T 283 at any time for all mixes requiring moisture sensitivity testing under Articles 2303.02,E, 2, a, and b to verify the minimum TSR has been achieved.

~~9~~10) When liquid anti-strip additives are ~~used~~ added by the Contractor at the plant, 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.

b) Test the binder to measure the quantity of liquid anti-strip additive in the binder for every 5000 tons (5000Mg) of HMA production. Obtain the Engineer's approval for the supplier's test method prior to use of the test.

c) Run AASHTO T 283 during production. If unable to certify or test for the presence and quality, run AASHTO T 283 each 10,000 tons (10,000 Mg) of production to measure the effectiveness of the additive. Ensure test results satisfy 80% TSR when compared to the dry strength of specimens prepared with asphalt binder containing the additive.

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 2303.03-4.

Table 2303.03-4: Production Tolerances

Measured Characteristic	Target Value (%)	Specification Tolerance (%) [a]
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 [b]
Daily asphalt binder content	by JMF	± 0.3
Field laboratory air voids	4.0 [c]	-0.5/+1.0 [d]
VMA [e]	by JMF	± 1.0 [f]

(a) Based on single test unless noted otherwise.
(b) Maintain the filler/bitumen ratio of the plant produced mixture between 0.6 and 1.4.
(c) Unless otherwise specified.
(d) Based on the moving average of four test values.
(e) Restricted to an asphalt film thickness as specified for the level of HMA mixture.
(f) Based on the daily lot average.

2) Control plant production so that the plant produced HMA mixture will meet mixture design criteria (within the test tolerances given in Table 2303.03-4) for Air Voids and VMA at N_{design} 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) The Contractor determines 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 specification compliance every day of HMA production.

8) Prepare quality control charts according to 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 specification tolerances on control charts.

9) Calculate laboratory voids for individual samples according to 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.

4. Construction.

a. Density.

1) Take density samples from the compacted mixture and test no later than the next working day following placement and compaction.

2) A lot is considered to be one layer of one mixture placed during a day's operation. The Engineer may approve classifying multiple layers of construction placed during a single day as a lot provided only one mixture was used.

3) The Engineer may waive sampling for density in the following situations, provided compaction has been thorough and effective:

- When the day's operation is not more than 2500 square yards (2500 m^2),
- When the day's operation is not more than 500 tons (500 Mg),
- When the mixture is being placed in irregular areas, or
- When placing wedge or strengthening courses.

4) The Engineer will obtain and test density samples for each lot according to Materials I.M. 204. The Engineer will determine the core locations. The minimum number of cores is set forth in Materials I.M. 204, Appendix F. The length laid in each lot will be divided into approximately equal sublots. Obtain one sample at a random location, as directed and witnessed by the Engineer, in each sublot.

5) If a sample is damaged or measures less than 70% or more than 150% of the intended thickness, an alternate sampling location will be determined and used. Take samples from no less than 1 foot (300 mm) from the edge of a given pass of the placing equipment, from run-outs, or from day's work joints or structures.

6) Determine the quality index for density of each lot using the following formula:

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

where $QI_{Density}$ = Quality Index for density
G_{mb} = bulk Specific Gravity of the mixture

7) When the quality index falls below 0.00, the Engineer may declare the lot or parts of the lot defective.

8) If one of the density test values from a lot is an outlier, identified according to the procedure described in Materials I.M. 501, do not use the outlier value to determine the quality index. Use the remaining density test values to determine the quality index.

9) If only one laboratory density value is obtained that day, combine that value with the next day's test results to evaluate both days' production. If two or more laboratory density values are obtained that day, then use the average of those tests alone. If a significant mix change has been made, only the appropriate laboratory density values should be used with the corresponding density cores.

b. Thickness.

1) The Engineer will measure the cores, exclusive of sealcoat, according to Materials I.M. 337. All areas of uniform and similar thickness and width for the project will be divided into lots.

2) Use the frequency specified for taking density samples from the surface lift when measuring for completed thickness. Samples for thickness not tested for density, because they are less than 70% of the intended thickness, are included for thickness. In these particular instances, do not measure the thickness of additional sufficiently thick samples used for density tests. Take thickness samples full depth of the completed course. After measurement, remove the density samples for the top layer from the core.

3) 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:

(English)

$$QI_{Thickness} = \frac{\text{Average Thickness}_{Measured} - (\text{Thickness}_{Plan} - 0.5)}{\text{Maximum Thickness}_{Measured} - \text{Minimum Thickness}_{Measured}}$$

(Metric)

$$QI_{Thickness} = \frac{\text{Average Thickness}_{Measured} - (\text{Thickness}_{Plan} - 12.7)}{\text{Maximum Thickness}_{Measured} - \text{Minimum Thickness}_{Measured}}$$

4) Provided there is reasonable assurance that the pavement complies with the required thickness, the Engineer may waive sampling for thickness for the following situations:

a) When the day's operation is 2500 square yards (2500 m^2) or less.

b) When the mixture is being placed in irregular areas.

c) When the mixture is being placed next to structures.

5) When the quality index falls below 0.00, the Engineer may declare the lot or parts of the lot defective.

c. Smoothness.

Apply Section 2317 to HMA surface mixture bid items of a Primary project if any individual HMA mixture bid item is 1000 tons (1000 Mg) or greater or 5000 square yards (4200 m^2) or greater. Apply Section 2316 to all other Primary projects with a surface course and when specifically required for other projects.

5. Sampling and Testing.

a. General.

1) Maintain and calibrate the quality control testing equipment using prescribed procedures. Sample and test according to the specified procedures as listed in the applicable Materials I.M. and Specifications. When the results from a Contractor's quality control lab are used as part of product acceptance, the Contractor's quality control lab is required to be qualified.

2) Identify, store, and retain all quality control samples and field lab gyratory specimens used for acceptance until the lot is accepted. The Contracting Authority will prescribe the method of securing the identity and integrity of the verification samples according to Materials I.M. 511. Store verification samples for the Contracting Authority until delivery to the Contracting Authority's lab.

3) Identify all samples using a system the Engineer approves.

b. Individual Materials and Loose Mixture.

1) Complete the following as designated by the Engineer:

- Identify samples of asphalt binder, aggregate, and tack coat material, and
- Secure and promptly deliver the samples to the appropriate laboratory.

2) Take paired samples of loose HMA mixture (each box of the pair weighing at least 30 pounds (14 kg)) according to Materials I.M. 322.

3) Conduct quality control tests for mixture properties using representative portions of the mix from the quality control sample of each sublot.

4) Split samples for specimen preparation according to Materials I.M. 357.

5) Paired sampling may also be accomplished by taking a bulk sample and immediately splitting the sample according to Materials I.M. 322 on the grade.

6) Record and document all test results and calculations on data sheets approved by the Contracting Authority. Record specific test results on the Daily Plant Report the Contracting Authority provides. Also include a description of the quality control actions taken (adjustment of cold feet percentages, changes in JMF, and so forth) on the Daily Plant Report.

7) Facsimile, or deliver by other methods the Engineer approves, the Daily Plant Report to the Engineer and the designated laboratory daily. At project completion, provide the Engineer a copy of the electronic file containing project information generated during the progress of the work.

8) When sampling for AASHTO T 283, obtain a 50 pound (25 kg) sample according to Materials I.M. 322. The Engineer will select, at random, the sample location. Split the sample and deliver half to the Central Materials Laboratory.

c. Compacted Pavement Cores.

1) Cut and trim samples under the direction of and witnessed by the Engineer for tests of density, thickness, or composition by using a power driven masonry saw or by drilling a minimum 4 inch (100 mm) nominal diameter core.

2) Restore the surfaces the same day. Dry, fill with the same material, and properly compact core holes.

3) Pavement core samples will be identified, taken possession of by the Engineer, and delivered to the Contractor's quality control field laboratory.

4) The Engineer may either:

- Transport the cores directly to the lab, or
- Secure the cores and allow the Contractor to transport the cores to the lab.

5) The compacted HMA pavement will be tested in a timely manner by the Engineer's personnel who are Iowa DOT Certified to perform the test.

6) Prepare and test the cores according to Materials I.M. 320, 321, and 337.

d. Verification and Independent Assurance Testing.

1) The Contractor's quality control test results from paired samples will be validated by the Engineer's verification test results on a regular basis using guidelines and tolerances set forth in Materials I.M. 216 and 511.

2) If the Engineer's verification test results validate the Contractor's test results, the Contractor's results will be used for material acceptance. Disputes between the Contractor's and Engineer's test results will be resolved according to Materials I.M. 511.

3) The Engineer will randomly select, one or more of the daily hot mix production verification samples. Some or all of the samples selected will be tested in the materials laboratory designated by the Engineer. The Engineer will use the verification test results to determine if the Contractor's test results can be used for acceptance.

4) The Engineer will test each lot of cores. These will be tested at the Contractor's field quality control laboratory. Cores may also be tested by the Contractor, but the Contractor's test results will not be used for material acceptance.

5) Personnel and laboratories performing tests used in the acceptance of material are required to have participated in the statewide Independent Assurance Program according to Materials I.M. 208.

E. 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 2303.02 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 density measurements, except when Class II compaction is specified. Use the field quality control laboratory compaction for field density control, as specified in Article 2303.03, D. 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 compacted mixture density measurements no later than the next working day following placement and compaction.

b. For small quantities, a lot will be the entire quantity of each HMA mixture bid item.

c. The quality index for density will not apply to small quantities.

4. Sampling and Testing.

a. 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. Sample and test according to the Standard Specifications and Materials I.M.s using certified technicians and qualified testing equipment. The Engineer may approve alternative sampling procedures. Take the sample between the first 100 to 200 tons (100 to 200 Mg) of production. No split samples for agency verification testing are required.

b. Asphalt binder will be accepted based on the asphalt supplier's shipment certification. No binder sampling or testing is required.

c. Material sampling or testing is not required for daily HMA production of less than 100 tons (100 Mg) of any mixture on any project.

5. 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 2303.03, E"

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.

2303.04 METHOD OF MEASUREMENT.

A. Hot Mix Asphalt Mixture.

1. General.

a. Removal of fillets is incidental to the contract unit price for the mixture.

b. If the Contractor chooses to place intermediate or surface mixture in lieu of base for the outside shoulders, the quantity will be calculated from the pavement and shoulder template. If placed as a separate operation, the quantity will be calculated from scale tickets. If the substitute mixture placed on the shoulder is for an intermediate course fillet only, include the quantity in the fillet for payment in the quantity placed in the adjacent intermediate course.

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

2. Measurement by Weight (Mass).

a. The quantity of the type specified, expressed in tons (megagrams), will be determined from the weight (mass) of individual loads, including fillets, measured to the nearest 0.01 tons (0.01 Mg).

b. Loads may be weighed in trucks, weigh hoppers, or from the weight (mass) from batch plants computed by count of batches in each truck and batch weight (mass). Article 2001.07 applies. Segregate the weights (mass) of various loads into the quantities for each pay item.

3. Measurement by Area.

a. The quantity of the type specified, expressed in square yards (square meters), will be shown in the contract documents to the nearest 0.1 square yard (0.1 m^2).

b. When constructing shoulders on a basis of payment of square yards (square meters), inspection of the profile and elevation will be based on the completed work relative to the pavement edge. The Contractor is responsible for the profile and elevation of the subgrade and for thickness.

B. Asphalt Binder.

1. Measure the amount of asphalt binder used from batch plants, continuous plants, or drum mixing plants by stick measurement in the Contractor's storage tank or in-line flow meter reading, according to Article 2001.07, B.

2. Compute the asphalt binder quantity added to the storage tank using a supplier certified transport ticket accompanying each load.

3. The quantity of asphalt binder not used in the work will be deducted.

4. When the quantity of asphalt binder in a batch is measured by weight (mass) and is separately identified by automatic or semi-automatic printout, the Engineer may compute the quantity of asphalt binder used from this printout. By mutual agreement, this method may be modified when small quantities or intermittent operations are involved.

5. The Engineer will calculate and exclude the quantity of asphalt binder used in mixtures in excess of the tolerance specified in Article 2303.03, D, 3, c.

6. When payment for HMA is based on area, the quantity of asphalt binder used will not be measured separately for payment.

C. Recycled Asphalt Pavement.

1. A completed Daily HMA Plant Report with the certification statement is required for measurement and payment for Contractor Certified HMA. The quantity of asphalt binder will be based on the approved JMF and any plant production quality control adjustments.

2. The quantity of asphalt binder in ~~classified or unclassified~~ RAP, which is incorporated into the mix, will be calculated in tons (megagrams) ~~of asphalt binder in the RAP, based on the actual asphalt binder content determined for the mix design from the results of the Engineer's extraction test~~. This quantity will be based on the actual asphalt binder content determined for the mix design from the results of the Engineer's extraction tests.

3. The quantity of asphalt binder in ~~classified or unclassified~~ RAP, which is incorporated into the mix, will be included in the quantity of asphalt binder used.

D. Anti-strip Agent.
Will not be measured separately. The quantity will be based on tons (megagrams) of HMA mixture with anti-strip agent added.

E. Tack Coat.
Will not be measured separately.

F. Fabric Reinforcement.
The quantity, in square yards (square meters) to the nearest 0.1 square yard (0.1 m^2), will be shown in the contract documents.

G. Adjustment of Fixtures.
The Engineer will count the number of fixtures adjusted to the finished grade.

H. Hot Mix Asphalt Pavement Samples.
Will not be individually counted for payment if furnished according to Article 2303.03, D, 5, or required elsewhere in the contract documents,

2303.05 BASIS OF PAYMENT.
The costs of designing, producing, placing, and testing bituminous mixtures and the cost of furnishing and equipping the QM-A field laboratory will not be paid for separately, but are included in the contract unit price for the HMA mixes used. 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 installation of temporary Stop Sign Rumble Strips will not be paid for separately, but is incidental to the price bid for the HMA course for which it is applied.

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

A. Hot Mix Asphalt Mixture.

1. Payment will be the contract unit price for Hot Mix Asphalt Mixture of the type specified per ton (megagram) or square yard (square meter).

2. Payment for surface course test strip placement in an intermediate lift will be the contract unit price for Hot Mix Asphalt Mixture, Surface Course, per ton (megagram).

3. Payment will be adjusted by the percentages in Table 2303.05-1 for the quality index for density determined for the lot:

Table 2303.05-1: Payment Adjustment

Quality Index (Density) 7 Samples [(a)]	Percent of Full Payment
Greater than 0.72	100
0.40 to 0.72	95
0.00 to 0.39	85
Less than 0.00	75 maximum
(a) or 6 samples and 1 outlier. Only one outlier will be allowed.	

4. When the basis of payment is by area, payment will be further adjusted by the appropriate percentage in Table 2303.05-2 below according to the quality index for thickness determined for that lot:

Table 2303.05-2: Payment Adjustment (by Area)

Quality Index (Thickness) 7 Samples	Percent of 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

5. Payment for courses for which quality index (thickness) is not determined because of size or shape, and courses which are found to be deficient in average width, will be according to Article 1105.04.

6. ~~When liquid anti-strip agent is used and production quality control testing for AASHTO T 283 is required,~~ When AASHTO T 283 is performed on plant produced mixture, the payment for ~~HMA~~ asphalt mixture will be adjusted according to Table 2303.05-3:

Table 2303.05-3: ~~HMA~~ Asphalt Mixture Payment Adjustment

Contracting Authority's Results (Percent TSR)	Percent of Full
Greater than 79	100
70 to 79	90
Less than 70	75 maximum

B. Asphalt Binder.

1. Payment will be the contract unit price per ton (megagram) for the number of tons (megagrams) of asphalt binder used in the work.

2. Payment for asphalt binder will be for new asphalt binder and the asphalt binder in the RAP which is incorporated in the mixture. The quantity of asphalt binder in ~~classified or unclassified~~ RAP, which is incorporated into the mix, will be calculated in tons (megagrams) of asphalt binder in the RAP. This will be based on the actual asphalt binder content determined for the mix design from the results of the Engineer's extraction test.

3. When the basis of payment for HMA is in square yards (square meters), compensation for asphalt binder will be included in the contract unit price per square yard (square meter).

C. Recycled Asphalt Pavement.

RAP owned by the Contracting Authority will be made available to the Contractor for the recycled mixture at no cost to the Contractor other than loading, hauling, and processing as required for incorporation into the mix.

D. Anti-strip Agent.

1. When anti-strip agent is required according to Article 2303.02, E, 2, the incorporation of the anti-strip agent into the HMA mixture will be considered as extra work ordered by the Engineer. Payment will be made at the rate of $2.00 per ton (megagram) of HMA mixture in which the anti-strip agent is incorporated until the Contracting Authority's TSR results of the field produced mixture is greater than or equal to 80%.

2. Payment will be full compensation for designing, adding, and testing for anti-strip agent.

E. Tack Coat.
Incidental to HMA.

F. Fabric Reinforcement.

1. Payment will be the contract unit price for Fabric Reinforcement per square yard (square meter).

2. Payment is full compensation for furnishing all materials, labor, and equipment necessary for installing the fabric as required, including the adhesive or heavy tack coat of asphalt binder used as the adhesive.

G. Adjustment of Fixtures.

1. Payment will be the contract unit price for each.

2. If the contract contains no price for Adjustment of Fixtures, this work will be paid for as provided in Article 1109.03, B.

H. Hot Mix Asphalt Pavement Samples.

1. Payment will be the lump sum contract price for cutting HMA Pavement Samples to determine density or thickness according to the specifications, when either of these is the responsibility of the Contractor, and elsewhere when required by the contract documents.

2. Payment is full compensation for furnishing all such samples for all courses or items of work, and for delivery of samples as specified in Article 2303.03, D, 5.

SPECIFICATION REVISION SUBMITTAL FORM

Submitted by: John Smythe / Kevin Merryman	**Office:** Construction	**Item 8**
Submittal Date: October 26, 2009	**Proposed Effective Date:** April 2010	
Section No.: 2316 **Title:** Pavement Smoothness	**Other:**	

Specification Committee Action: Approved with changes.

Deferred:	**Not Approved:**	**Approved Date:** 11/12/2009	**Effective Date:** 4/20/2010

Specification Committee Approved Text:

Article 2316.02, A, 7, Exceptions.

Replace the article:

~~**a.** Areas excluded from smoothness testing are detour pavement, crossovers, shoulders, and sections less than 50 feet (15 m) long.~~

~~**b.** The Engineer will check all excluded areas with a surface checker. Excluded areas are not to exceed 1/8 inch in 10 feet (3 mm in 3 m).~~

Paved shoulders will be excluded from smoothness testing unless used as a temporary driving surface. When used as a temporary driving surface, evaluate paved shoulders for bumps and dips only. Evaluate and correct as provided in Article 2316.03, C.

Article 2316.02, B, 1, General.

Replace Item a:

a. Provide and operate an Ames or California type profilograph or an inertial profiler to produce a profilogram (profile trace) of the surface tested, according to Materials I.M. 341. ~~Other types of profilographs or profilers that produce compatible results and meet the requirements of Materials I.M. 341 may be used.~~

Article 2316.02, B, 2, Pavements.

Add to the end of Item c:

Testing will be done at the quarter point of the traffic lanes unless another location is specified in the contract documents.

Article 2316.02, B, 3, Bridge Approach Sections.

Delete the article:

~~**3. Bridge Approach Sections.**~~

~~Bridge approach sections will not be considered a part of a pavement segment, section, or project.~~

Article 2316.02, D, Profile Index.

Add to the end of Item 1:

g. Detour Pavement.
h. Crossovers.
i. Sections less than 50 feet (15 m) long

Evaluate pavement segments excluded from profile index calculation for bumps and dips. Evaluate and correct per Article 2316.03, C.

Article 2316.03, B, 1, Portland Cement Concrete Pavement.

Replace the second sentence of Item b:

Use a cutting head that is a minimum of ~~24~~36 inches (~~6~~900 mm) wide, unless a 24 inch (600 mm) cutting

head is necessary due to space limitations.

Article 2316.03, C, Bumps and Dips.

Delete the last sentence of the first paragraph:

~~For areas excluded from profilograph testing, correct deviations exceeding 1/8 inch in 10 feet (3 mm in 3 m).~~

Article 2316.03, C, 3, Exceptions.

Replace the article:

~~When the Contractor is not responsible for the adjoining surface, the Engineer will evaluate bumps and dips exceeding 0.5 inches (12.7 mm) located within 16 feet (5 m) either side of the end of a section. The Contractor will not receive a price adjustment for bumps and dips in this area. When the Engineer instructs, the Contractor will be paid to repair these bumps and dips according to Article 1109.03, B.~~

When the Contractor is not responsible for the adjoining surface, bumps and dips in the 16 feet (5 m) at the end of a section will be reviewed by the Engineer. Correct all bumps and dips determined to be under the control of the Contractor and resulting from the Contractor's operations. Correction of bumps and dips determined to be beyond the control of the Contractor will be paid according to Article 1109.03, B.

Article 2316.04, A, Pavement Where Schedule A Smoothness is Required.

Replace item 2:

2. For segments with an initial index of 7.1 to 10.0 inches per mile (111 mm/km to 160 mm/km), the Contractor will be assessed a price reduction or grind the surface to a final index of 7.0 inches per mile (110 mm/km) or less.

Article 2316.04, B, Pavement Where Schedule B Smoothness is Required.

Replace item 2:

2. For all segments with an initial index of 22.1 to 30.0 inches per mile (346 mm/km to 475 mm/km), the Contractor will be assessed a price reduction or grind the surface to a final index of 22.0 inches per mile (110 mm/km) or less.

Comments: The Office of Construction indicated that 24 inch (600 mm) cutting heads may be allowed in certain situations. The Office of Construction expressed some concerns about contractors ability to construct smooth crossovers. With the limited number of crossovers constructed and the ability of the contractors to bid in grinding, the profilograph testing of crossovers should not be a problem. The Office of Materials wondered why grinding was being allowed in lieu of a price reduction. County Engineers had been opposed to this. This change was removed from the approved text. The Office of Contracts wondered if some measurable criteria could be applied to correction of bumps and dips in the 16 feet (5 m) at the end of a section, instead of being at the discretion of the Engineer. The Office of Construction did not foresee a big problem with this requirement.

Specification Section Recommended Text:

Article 2316.02, A, 7, Exceptions.

Replace the article:

~~**a.** Areas excluded from smoothness testing are detour pavement, crossovers, shoulders, and sections less than 50 feet (15 m) long.~~

~~**b.** The Engineer will check all excluded areas with a surface checker. Excluded areas are not to exceed 1/8 inch in 10 feet (3 mm in 3 m).~~

Paved shoulders will be excluded from smoothness testing unless used as a temporary driving surface. When used as a temporary driving surface, evaluate paved shoulders for bumps and dips only. Evaluate and correct per Article 2316.03, C.

Article 2316.02, B, 1, General.

Replace Item a:

a. Provide and operate an Ames or California type profilograph or an inertial profiler to produce a profilogram (profile trace) of the surface tested, according to Materials I.M. 341. ~~Other types of profilographs or profilers that produce compatible results and meet the requirements of Materials I.M. 341 may be used.~~

Article 2316.02, B, 2, Pavements.

Add the following to the end of Item c:

Testing will be done at the quarter point of the traffic lanes unless another location is specified in the contract documents.

Article 2316.02, C, Bridge Approach Sections.

Delete the article:

~~**3. Bridge Approach Sections.**~~

~~Bridge approach sections will not be considered a part of a pavement segment, section, or project.~~

Article 2316.02, D, Profile Index.

Add the following to the end of Item 1:

g. Detour Pavement.
h. Crossovers.
i. Sections less than 50 feet (15 m) long

Evaluate pavement segments excluded from profile index calculation for bumps and dips. Evaluate and correct per Article 2316.03, C.

Article 2316.03, B, 1, Portland Cement Concrete Pavement.

Delete the second sentence of Item b:

~~Use a cutting head that is a minimum of 24 36 inches (6900 mm) wide.~~

Article 2316.03, C, Bumps and Dips.

Delete the last sentence of the first paragraph:

~~For areas excluded from profilograph testing, correct deviations exceeding 1/8 inch in 10 feet (3 mm in 3 m).~~

Article 2316.03, C, 3, Exceptions.

Replace the article:

~~When the Contractor is not responsible for the adjoining surface, the Engineer will evaluate bumps and dips exceeding 0.5 inches (12.7 mm) located within 16 feet (5 m) either side of the end of a section. The Contractor will not receive a price adjustment for bumps and dips in this area. When the Engineer instructs, the Contractor will be paid to repair these bumps and dips according to Article 1109.03, B.~~

When the Contractor is not responsible for the adjoining surface, bumps and dips in the 16 feet (5 m) at the end of a section will be reviewed by the Engineer. Correct all bumps and dips determined to be under the control of the Contractor and resulting from the contractor's operations. Correction of bumps and dips determined to be beyond the control of the Contractor will be paid according to Article 1109.03, B.

Article 2316.04, A, Pavement Where Schedule A Smoothness is Required.

Replace item 2:

2. For segments with an initial index of 7.1 to 10.0 inches per mile (111 mm/km to 160 mm/km), the Contractor will be assessed a price reduction or grind the surface to a final index of 7.0 inches per mile (110 mm/km) or less.

Article 2316.04, B, Pavement Where Schedule B Smoothness is Required.

Replace item 2:

2. For all segments with an initial index of 22.1 to 30.0 inches per mile (346 mm/km to 475 mm/km), the Contractor will be assessed a price reduction or grind the surface to a final index of 22.0 inches per mile (110 mm/km) or less.

Article 2316.05, H, 1, Schedule A Smoothness Requirements.

Replace Table 2316.05-2: Price Reduction for Pavement Smoothness

Initial Profile Index	Single Lift Pavements		Multi-Lift Pavements	
Inches Per Mile (mm / km) Per Segment [(a)]	Primary	Non-Primary	Primary	Non-Primary
	Dollars Per Segment	Dollars Per Segment	Dollars Per Segment	Dollars Per Segment
3.1-7.0 (48-110) 7.1-10.0 (111-160) 10.1 & Over[(a)] (161 & Over)[(a)]	Unit Price 200 or Grind Grind Only	Unit Price 100 or Grind Grind Only	Unit Price 100 or Grind Grind Only	Unit Price 50 or Grind Grind Only
[(a)] For segments with an initial index of 10.1 (161) and over, grind the surface to a final index of 7.0 (110) or better. In lieu of grinding the surface to a final index of 7.0 (110) or better, the Contractor may elect to replace part or ~~all of~~ the entire segment.				

Comments:

Member's Requested Change (Redline/Strikeout):

Section 2316. Pavement Smoothness

2316.01 DESCRIPTION.

A. Apply this specification when Section 2317 does not apply.

B. Test and evaluate pavement smoothness. Perform surface correction if required.

2316.02 TESTING AND EVALUATION.

A. General.

1. Evaluate pavement smoothness for all Interstate and Primary main line pavement surfaces, and all other road surfaces included on Primary projects, except when specifically excluded or modified by the contract documents. Main line pavement is defined as all permanent pavement for traffic lanes, including:
Tapers to parallel lanes or through lanes at intersections,
Tapers to climbing lanes, and
Tapers to ramps and loops.

2. Evaluate pavement smoothness for all interchange ramps and loops.

3. For non-Primary projects, do not evaluate pavement smoothness unless specified in the contract documents.

4. If this specification is required by contract documents on non-Primary projects let by the Department, it will be added in its entirety. Selected portions of the specification will not be deleted.

5. Bridge approach sections which are a part of the paving contract will be tested according to Section 2428.

6. Smoothness Requirements:
a. Apply Table 2316.02-1 to all projects when specified. Smoothness requirements in inches per mile (millimeters per kilometer) are listed in Schedules A and B.
b. For through traffic which requires matching the surface of the new pavement to the surface of an existing old pavement, an Average Base Index (ABI) will be calculated as shown in Table 2316.02-1

on lanes wider than 8.5 feet (2.6 m). This will be the smoothness base in inches per mile (millimeters per kilometer) for payment for the new pavement unless specified otherwise. The requirements are shown in Schedule C.

Table 2316.02-1: Schedule for Identification of Pavements

Pavement	Schedule by Posted Speed (mph) (Existing or Proposed)	
	45 or less	over 45
Mainline, curbed (one or both sides of roadway	B	A
Mainline, not curbed	A	A
Ramps and Collector Distributor Roads	A[(c)]	A[(c)]
Loops	B	B
Side Roads	B	A
Grade Separations[(a)]	B	A
Pavement adjacent to existing pavement (added lane)	C[(b)]	C[(b)]

(a) Including municipal or Secondary Roads therein.

(b) $ABI = \frac{PI + X}{2}$

where:
PI = the profile index of the edge line of the abutting lane. If the computed ABI is less than X, use an ABI equal to X

X = 7 inches/mile (110 mm/km) if Schedule A, or 22 inches/mile (345 mm/km) if Schedule B.

(c) When a ramp or collector distributor road terminates at an intersection with a traffic signal or stop sign, the 700 feet (215 m) nearest the intersection will be evaluated under Schedule B.

7. Exclusions:

~~**a.** Areas excluded from smoothness testing are detour pavement, crossovers, shoulders, and sections less than 50 feet (15 m) long.~~

~~**b.** The Engineer will check all excluded areas with a surface checker. Excluded areas are not to exceed 1/8 inch in 10 feet (3 mm in 3 m).~~

Paved shoulders will be excluded from smoothness testing unless used as a temporary driving surface. When used as a temporary driving surface, evaluate paved shoulders for bumps and dips only. Evaluate and correct per Article 2316.03, C.

B. Measurement.

1. General.

a. Provide and operate an Ames or California type profilograph or an inertial profiler to produce a profilogram (profile trace) of the surface tested, according to Materials I.M. 341. ~~Other types of profilographs or profilers that produce compatible results and meet the requirements of Materials I.M. 341 may be used.~~

b. When a pavement for which smoothness is to be tested is adjacent to an existing old pavement, smoothness must also be tested on the old pavement 3 feet (1 m) from the adjacent edge for ABI calculation. Should the surface of the old pavement be specified for correction, perform smoothness testing for ABI calculation after correction.

c. Remove all objects and foreign material on the pavement surface, including protective covers if used, prior to testing. If appropriate, properly replace protective covers after testing.

d. Produce a profilogram for each segment of 50 feet (15 m) or more. Include the 16 feet (5 m) beyond the ends of the section in the profilogram.

2. **Pavements.**
   - **a.** The pavement surface will be divided into sections that represent continuous placement.
   - **b.** A section will terminate at a day's work joint (header), a bridge, similar interruption, or when continuous placement crosses to a section with a different smoothness designation.
   - **c.** Sections longer than 778 feet or 0.147 miles (240 m) placed without interruption will be separated into segments of 0.1 mile (160 m). The terminating segment may be shorter than 0.1 mile (160 m) and greater than 250 feet (80 m) and still be considered a segment. A segment is to be in only one traffic lane. Each traffic lane will be tested and evaluated separately. Gaps for temporary crossings or similar construction sequencing which are placed in otherwise continuous sections will be tested, when placed, and included in the adjacent section evaluation. Testing will be done at the quarter point of the traffic lanes unless another location is specified in the contract documents.

3. ~~**Bridge Approach Sections.**~~
   ~~Bridge approach sections will not be considered a part of a pavement segment, section, or project.~~

C. Profilograph Testing.

Perform testing and provide the Engineer with the profilogram results. Ensure testing and evaluation are done by a trained and certified person. Ensure the evaluation is certified according to Materials I.M. 341.

1. Test each segment within 48 hours following placement. Provide the Engineer the index for each segment of paving by the end of the next day worked following the placement until there has been 3 consecutive days of paving where the index for all segments would result in 100% payment or better.
2. Should any following day be evaluated to receive less than 100% payment, immediately notify the Engineer, and take corrective action to modify paving methods and equipment to achieve 100% payment or better.

3. Submit all final profilograph test reports and profile traces to the Engineer within 14 calendar days following completion of paving on the project. Selected reports and traces may be requested by the Engineer in advance of paving completion for purposes of validating the Contractor's test results. Incentive payments for qualifying segments will be made following receipt of appropriate documentation of certified smoothness results.

4. The Engineer will perform verification testing to validate the contractor's certified quality control testing. If the Engineer's verification test results validate the Contractor's test results, the Contractor's results will be used for acceptance. Disputes between the Contractor's and Engineer's test results will be resolved according to Materials I.M. 341. The Engineer may test the entire project length if it is determined that the Contractor certified test results are inaccurate, and the Contractor will be charged for this work at a rate of $400.00 per mile ($250.00 per kilometer), per profile track, with a minimum charge of $800.00. Furnishing inaccurate tests may result in decertification of the Contractor's certified operator.

D. Profile Index.

1. Calculate a profile index for each segment from the profilogram, according to Materials I.M. 341, except for:
   - **a.** Side road connections less than 600 feet (180 m) in length.
   - **b.** Single lift pavement overlays 2 inches (50 mm) or less in thickness unless the existing surface has been corrected by milling or scarification.
   - **c.** Storage lanes and turn lanes.
   - **d.** Pavement less than 8.5 feet (2.6 m) in width.
   - **e.** The 16 feet (5 m) at the ends of the section when the Contractor is not responsible for the adjoining surface.
   - **f.** Runout tapers on HMA overlays at existing pavement, bridges, or bridge approach sections when the thickness is less than the design thickness.
   - **g.** Detour Pavement.
   - **h.** Crossovers.
   - **i.** Sections less than 50 feet (15 m) long

   Evaluate pavement segments excluded from profile index calculation for bumps and dips. Evaluate and correct per Article 2316.03, C.

2. If there is a segment 250 feet or 0.047 mile (80 m) long or less at the end of a section, include the

profilograph measurements for that segment in the evaluation of the adjacent segment in that section.

3. Identify bumps and dips separately on all profilograms. These appear as high or low points on the profilogram and correspond to high points (bumps) or low points (dips) on the pavement surface. They are identified by locating vertical deviations exceeding 0.5 inches for a 25 foot (12.7 mm for a 7.6 m) span for both bumps and dips as indicated on the profilogram.

2316.03 SURFACE CORRECTION.

A. General.

1. Surface correction for pavement smoothness may be required, which includes bumps or dips. Complete the correction before the determination of pavement thickness.

2. Perform bump, dip, and smoothness correction work for the full lane width of the paved surface.

3. Obtain the Engineer's approval for all correction work. After all required correction work is completed, determine the final profile index.

B. Pavements.

1. Portland Cement Concrete Pavement.

a. Accomplish PCC pavement surface correction by grinding the pavement with a diamond grinder, by PCC resurfacing, or by replacement.

b. Use grinding and texturing equipment that meets the requirements of Section 2532. ~~Use a cutting head that is a minimum of 24 36 inches (6900 mm) wide.~~

c. Perform surface correction parallel to lane lines or edge lines as directed by the Engineer. Make each pass parallel to the previous passes. Ensure the ground surface is of a uniform texture.

d. Do not allow adjacent passes to overlap more than 1 inch (25 mm) or have a vertical difference of more than 1/8 inch (3 mm) as measured from bottom of groove to bottom of groove.

e. Begin and end smoothness correction at lines normal to the pavement lane lines or edge lines within any one corrected area. Proceed from the center line or lane line toward the pavement edge to maintain pavement cross slope.

2. Hot Mix Asphalt Pavements.

a. Accomplish asphalt pavement surface correction by:
Diamond grinding,
Overlaying the area,
Replacing the area, or
Inlaying the area.

b. For diamond grinding, perform the same work and use the same equipment specified for PCC pavement. Cover the surface that has been ground with a seal coat according to Section 2307 with the following modifications:
The binder bitumen may be the same material used for tack coat, applied at a rate of 0.10 gallon per square yard (0.45 L/m^2). Hand methods may be used for spraying.
Apply a cover aggregate consisting of sand at a rate of 10 pounds per square yard (5 kg/m^2). Hand methods may be used for spreading. Apply the sand slightly damp, but with no free moisture, as determined by visual inspection. Embed with at least one complete pneumatic roller coverage.
This seal coat is intended to be placed immediately after the diamond grinding is completed in the travel lane. Complete this work when the road surface temperature is above 60ºF (16ºC).
Labor, equipment, and materials used for this seal coat will not be paid for separately, but are incidental to the items for which correction is required.

c. If the surface is corrected by overlay, replacement, or inlay, begin and end the surface correction with a transverse saw cut normal to the pavement lane lines or edge lines within any one area. Ensure the profile of the surface is smooth with no bumps or dips at the beginning or end of correction. Overlay correction must be for the entire pavement width. Maintain pavement cross slope through the corrected areas.

C. Bumps and Dips.

Evaluate bumps and dips, including those at headers, on all pavements for which pavement smoothness is designated. Correction work will be required according to the criteria in Paragraphs 1, 2, and 3 below. ~~For areas excluded from profilograph testing, correct deviations exceeding 1/8 inch in 10 feet (3 mm in 3 m).~~

1. **Bumps.**
   - **a.** For all pavements evaluated, if the Engineer does not assess a price adjustment, correct all bumps exceeding 0.5 inch (12.7 mm) within a 25 foot (7.6 m) span, as indicated on the profilogram, except as stated in Article 2316.03, C, 3.
   - **b.** Corrected bumps will be considered satisfactory when measurement by the profilograph shows that the bumps are 0.3 inch (8 mm) or less in a 25 foot (7.6 m) span.
   - **c.** When a through traffic lane over 8.5 feet (2.6 m) wide is constructed adjacent to an existing old pavement, bump correction or price adjustment to the Contractor for a bump will not apply if a bump exists at that location in the adjacent existing old pavement.

2. **Dips.**
   - **a.** On all pavements, if the Engineer does not asses a price adjustment, correct dips of 0.5 inch to 1.0 inch (12.7 mm to 25 mm) in a 25 foot (7.6 m) span, as indicated on the profilogram, except as stated in Article 2316.03, C, 3. Replace the pavement in areas with dips over 1.0 inch (25 mm). Corrected dips will be considered satisfactory when the profilogram shows the dips are less than 0.3 inch (8 mm) in a 25 foot (7.6 m) span.
   - **b.** When a lane over 8.5 feet (2.6 m) wide is constructed adjacent to an existing old pavement, correction of a dip or price adjustment to the Contractor for a dip will not be required if a dip exists at that location in the adjacent existing old pavement.

3. **Exceptions.**

~~When the Contractor is not responsible for the adjoining pavement, the Engineer will evaluate bumps and dips exceeding 0.5 inches (12.7 mm) located within 16 feet (5 m) either side of the end of a section. The Contractor will not be price adjusted for bumps and dips in this area. When the Engineer instructs to repair these bumps and dips, the Contractor will be paid according to Article 1109.03, B.~~

When the Contractor is not responsible for the adjoining surface, bumps and dips in the 16 feet (5 m) at the end of a section will be reviewed by the Engineer. Correct all bumps and dips determined to be under the control of the contractor and resulting from the contractor's operations. Correction of bumps and dips determined to be beyond the control of the contractor will be paid according to Article 1109.03, B.

2316.04 SMOOTHNESS.

Pavement smoothness will be compensated by adding to (incentive) or subtracting from (price reduction) the price bid for pavement a determined amount for each segment. These amounts are identified in the appropriate schedule of Article 2316.05.

A. Pavement Where Schedule A Smoothness is Required.

1. For the appropriate categories of highway, as shown in Schedule A, incentives for pavement smoothness will be paid for each segment of pavement with an initial index per mile (kilometer) per segment of 3.0 inches (48 mm) or less.
2. For segments with an initial index of 7.1 to 10.0 inches per mile (111 mm/km to 160 mm/km), the Contractor will be assessed a price reduction or grind the surface to a final index of 7.0 inches per mile (110 mm/km) or less.
3. For segments with an index of 10.1 inches per mile (161 mm/km) and greater, grind the surface to a final index of 7.0 inches per mile (110 mm/km) or less.

B. Pavement Where Schedule B Smoothness is Required.

1. For all highways, incentives for pavement smoothness will be paid for each segment of pavement with an initial index of 12 inches per mile (190 mm/km) per segment or less.
2. For all segments with an initial index of 22.1 to 30.0 inches per mile (346 mm/km to 475 mm/km), the Contractor will be assessed a price reduction or grind the surface to a final index of 22.0 inches per mile (110 mm/km) or less.
3. For segments with an index of 30.1 inches per mile (476 mm/km) and greater, grind the surface to a final index of 22.0 inches per mile (345 mm/km) or less.

C. Pavement Adjacent to Existing Pavement.

1. Smoothness will be evaluated by the Average Base Index (ABI) as defined in Article 2316.02, A, 6 or 7,

for each segment of new pavement 8.5 feet (2.6 m) wide or more, and over 600 feet (180 m) in length, which is to be matched to the surface of an existing pavement.

2. Surface correction is required for smoothness exceeding ABI + 12 (190) when Schedule A is required and exceeding ABI + 30 (470) when Schedule B is required. Payment will be based on results after correction according to Schedule C.

3. Longitudinally check areas not included in the profilograph test with a 10 foot (3 m) straight edge. Ensure the surface does not deviate from a straight line by more than 1/8 inch in 10 feet (3 mm in 3 m). Meet requirements of Article 2316.03 for all corrections needed.

D. Bridge Approach Sections.
Smoothness of bridge approach sections will not be used in the calculations for incentive or price reduction of pavement segments, sections, or the project.

2316.05 SCHEDULE OF PAYMENT.

A. For each traffic lane of main line pavement and each traffic lane of interchange ramps and loops evaluated for smoothness, as defined in Article 2316.02, A, the Engineer will determine the length of each segment in miles (kilometers).

B. For roadways, the Contractor may receive an incentive payment or be assessed a price reduction based on the number of qualifying segments and the initial profile index.

C. Pavement segments excluding repair work that are subject to profilograph testing, as defined in Article 2316.02, D, will be considered for additional payment as a smoothness incentive or price reduction. For a segment to be qualified for incentive, there must be no grinding within that segment.

D. Surface correction (grinding) of bridge approach sections, and as stated in Article 2316.03, C, 3, will not count as surface correction on adjacent pavement segments and will not detract from possible incentive payments on those segments.

E. Single lift pavement resurfacing 2 inches (50 mm) thick or more that has milling or scarification of the original pavement will be rated using the multi-lift schedules.

F. A $900 price adjustment will be assessed for each dip not corrected in each pavement lane under Schedule A and B, except as stated in Article 2316.03, C, 3. In addition, a $900 price adjustment will be assessed for each bump not corrected under Schedule A and B, except as stated in Article 2316.03, C, 3. Bumps and dips not corrected will also be included in the evaluation for the segment smoothness.

G. The cost of certified smoothness and associated traffic control is incidental to the cost of the pavement.

H. These payments or assessments will be based on the following schedules:

1. Schedule A Smoothness Requirements.
Pavement segments which are designated for Schedule A smoothness will be evaluated for incentive or price reduction assessments as follows:

Table 2316.05-1: Incentives for Pavement Smoothness

Initial Profile Index	Single Lift Pavements		Multi-Lift Pavements	
Inches Per Mile (mm / km) Per Segment [(a)]	Primary	Non-Primary	Primary	Non-Primary
	Dollars Per Segment	Dollars Per Segment	Dollars Per Segment	Dollars Per Segment
0-1.0 (0-16) 1.1-2.0 (17-32) 2.1-3.0 (33-48) 3.1-7.0 (49-110)	700 600 450 Unit Price	300 250 200 Unit Price	250 200 150 Unit Price	125 100 50 Unit Price

(a) For each segment of pavement that has an initial index, within the limits listed, with no grinding, the Contractor will receive an incentive payment as shown in the tabulation for the appropriate category.

Table 2316.05-2: Price Reduction for Pavement Smoothness

Initial Profile Index	Single Lift Pavements		Multi-Lift Pavements	
	Primary	Non-Primary	Primary	Non-Primary
Inches Per Mile (mm / km) Per Segment [(a)]	Dollars Per Segment	Dollars Per Segment	Dollars Per Segment	Dollars Per Segment
3.1-7.0 (48-110) 7.1-10.0 (111-160) 10.1 & Over[(a)] (161 & Over)[(a)]	Unit Price 200 or Grind Grind Only	Unit Price 100 or Grind Grind Only	Unit Price 100 or Grind Grind Only	Unit Price 50 or Grind Grind Only

(a) For segments with an initial index of 10.1 (161) and over, grind the surface to a final index of 7.0 (110) or better. In lieu of grinding the surface to a final index of 7.0 (110) or better, the Contractor may elect to replace part or all of the segment.

2. Schedule B Smoothness Requirements.

a. Pavement segments designated for Schedule B smoothness and indexed in segments greater than 50 feet (15 m) will be evaluated for incentive or price reduction as shown in Tables 2316.05-3 and 2316.05-4.

b. No price reduction assessment will be made for individual segments shorter than 50 feet (15 m) properly corrected if required.

Table 2316.05-3: Incentives for Pavement Smoothness

Initial Profile Index	New Pavements	Resurfaced Pavements
Inches Per Mile (mm / km) Per Segment [(a)]	Dollars Per Segment	Dollars Per Segment
0-4.0 (0-65) 4.1-8.0 (66-130) 8.1-12.0 (131-190) 12.1-22 (191-345)	600 500 400 Unit Price	300 250 200 Unit Price

(a) For each segment of pavement that has an initial index, within the limits listed, with no grinding, the Contractor will receive an incentive payment as shown in the tabulation for the appropriate category.

Table 2316.05-4: Price Reduction for Pavement Smoothness

Initial Profile Index	New Pavements	Resurfaced Pavements
Inches Per Mile (mm / km) Per Segment [(a)]	Dollars Per Segment	Dollars Per Segment
12.1-22.0 (191-345) 22.1-30.0 (346-475) 30.1 & Over (476 & Over) [(a)]	Unit Price Grind Grind Only	Unit Price Grind Grind Only

(a) For segments with an initial index of 30.1 (476) and over, grind the surface to a finish index of 22.0 (345) or better. In lieu of accepting a price reduction and grinding the surface to a final index of 22.0 (345) or better the Contractor may elect to replace part or all of the segment.

3. Schedule C Smoothness Requirements (Pavement Adjacent to Existing Pavement).

For new pavement which has been matched to an existing old pavement for which an Average Base Index (ABI) was calculated, the pavement will be evaluated for a price reduction for each segment based on Schedule A or Schedule B payment.

Table 2316.05-5: Initial Profile Index or Profile Index after Correction

Schedule A Inches Per Mile (mm / km) Per Segment	Schedule B Inches Per Mile (mm / km) Per Segment	Dollars Per Segment
0 to ABI	0 to ABI	0
ABI + 0.1 (1) to ABI +4 (65) incl.	ABI + 0.1 (0.1) to ABI + 10 (160) incl.	300
ABI + 4.1 (66) to ABI +8.0 (130) incl.	ABI + 10.1 (161) to ABI + 20 (315) incl.	500
ABI + 8.1 (131) to ABI +12 (190) incl.	ABI + 20.1 (316) to ABI + 30 (475) incl.	800
Greater than AGI + 12 (190)	Greater than ABI + 30 (470)	Grind Only

4. Bridge Approach Sections.
Correct bridge approach sections for smoothness as specified in Section 2428.

Reason for Revision: Several changes requested from field staff to clarify and improve the specification. Changes primarily include expanding contractor evaluation for half inch bumps and dips and contractor responsibility for the 16 feet at the end of a section.

County or City Input Needed (X one)			**Yes**	**No** X	
Comments:					
Industry Input Needed (X one)			**Yes** X	**No**	
Industry Notified:	**Yes** X	**No**	**Industry Concurrence:**	**Yes**	**No**
Comments:					

SPECIFICATION REVISION SUBMITTAL FORM

Submitted by: John Smythe / Kevin Merryman	**Office:** Construction	**Item 9**
Submittal Date: October 26, 2009	**Proposed Effective Date:** April 2010	
Section No.: 2317 **Title:** Primary and Interstate Pavement Smoothness	**Other:**	

Specification Committee Action: Approved as is.

Deferred:	**Not Approved:**	**Approved Date:** 11/12/2009	**Effective Date:** 4/20/2010

Specification Committee Approved Text: See Specification Section recommended text.

Comments: See comments for Item 8.

Specification Section Recommended Text:

Article 2317.01, General.

Replace the article:

~~**A.**~~ Evaluate pavement smoothness for all Interstate and Primary main line pavement surfaces, and all other road surfaces included on Primary projects, except when specifically excluded or modified by the contract documents. Main line pavement is defined as all permanent pavement for through lanes. ~~Exclusions from profilograph testing are detour pavement, shoulders, crossovers, and individual sections of pavement less than 50 feet (15 m) in length.~~

~~**B.** The Engineer may determine the pavement smoothness according to Materials I.M. 341 using a 10 foot (3 m) straightedge or rolling straightedge on surfaces excluded from profilograph testing. The variation of the surface from the testing edge of the straightedge is not to exceed 1/8 inch (3 mm) between any two contacts, longitudinal or transverse. Correct all irregularities exceeding the specified tolerance using equipment and methods approved by the Engineer. After the Contractor has corrected an irregularity, the Engineer may perform monitor testing of the area to verify compliance with the specified tolerance.~~

Article 2317.02, Equipment.

Replace Article A and **Add** Article C:

A. Provide and operate an Ames type or California type profilograph or an inertial profiler to produce a profilogram (profile trace) of the surface tested according to Materials I.M. 341. ~~Other types of profilographs or profilers that produce compatible results and meet the requirements of Materials I.M. 341 may be used.~~ Ensure the operator is trained and certified to operate the profilograph as required by the Contracting Authority.

C. For corrective work by diamond grinding, use grinding and texturing equipment that meets the requirements of Section 2532.

Article 2317.03, B, Testing.

Add Article 4:

4. Paved shoulders will be excluded from smoothness testing. When used as a temporary driving surface, evaluate paved shoulders for bumps and dips. Evaluate for high points and low points with deviations in excess of 0.5 inches (12.7 mm) in a length of 25 feet (7.6 m) or less. Take corrective action.

Article 2317.03, C, Evaluation.

Add to the end of Article 1:

i. Detour pavement.
j. Crossovers.

k. Individual sections of pavement less than 50 feet (15 m) in length.

Evaluate pavement segments excluded from profile index evaluation for high points and low points with deviations in excess of 0.5 inches (12.7 mm) in a length of 25 feet (7.6 m) or less. Take corrective action.

Article 2317.03, C, Evaluation.

Replace the second sentence of Article 2:

If the average profile index exceeds the tolerances listed in Article 2317.03, A, the Contractor may elect to eliminate that area from the profile index for the day's paving operation. ~~and evaluate the area using a 10 foot (3 m) straightedge as outlined in Article 2317.01.~~

Article 2317.03, C, Evaluation.

Add to the end of Article 2:

Evaluate pavement segments eliminated from profile index evaluation for high points and low points with deviations in excess of 0.5 inches (12.7 mm) in a length of 25 feet (7.6 m) or less. Take corrective action.

Article 2317.04, A, General.

Delete the second sentence of Article 2:

~~Evaluate pavement segments excluded from profile index evaluation in Article 2317.03 for high points and low points with deviations in excess of 0.5 inches (12.7 mm) in a length of 25 feet (7.6 m) or less.~~

Article 2317.04, E, Corrective Work.

Replace the first paragraph of the article:

~~Corrective work is at the Contractor's expense except for the 16 feet (5 m) before and the 16 feet (5 m) beyond the end of the section when the Contractor is not responsible for the adjoining surface.~~ When the Contractor is not responsible for the adjoining surface, bumps and dips in the 16 feet (5 m) at the end of a section will be reviewed by the Engineer. Correct bumps and dips determined to be under the control of the Contractor and resulting from the Contractor's operations. Correction of bumps and dips determined to be beyond the control of the Contractor will be paid according to Article 1109.03, B. Complete the corrective work prior to determining pavement thickness. Do not use bush hammers or other impact devices.

Article 2317.05, Pay Adjustments.

Replace articles 1 and 2:

~~1~~B. PCC Pavement.

The payment will be adjusted as shown in Table 2317.05-1 according to the posted or proposed speed.

Table 2317.05-1: Schedule for Adjustment Payment for PCC Pavements (0 inch (0 mm) blanking band)

Profile Index For greater than 45 mph	Profile Index For 45 mph or less and ramps	Dollars per 0.1 mile (161 m) segment per lane	
Inches per mile (mm / km)	Inches per mile (mm / km)	Interstate & Multi-Lane Divided Segments	Other Primary Segments
22.0 or less (345 or less)	25.0 or less (395 or less)	+950.00	+850.00
22.1 to 23.5 (346 to 370)		+800.00	+650.00
23.6 to 26.0 (371 to 410)	25.1 to 30.0 (396 to 475)	+600.00	+450.00
26.1 to 40.0 (411 to 630)	30.1 to 65.0 (476 to 1025)	0.00	0.00
40.1 to 45.0 (631 to 710)	65.1 to 70.0 (1025 to 1105)	-600.00 or grind*	-450.00 or grind*
45.1 or more (711 or more)	70.1 or more (1105 or more)	0.00*	0.00*
* These segments ~~must~~ shall be corrected to the levels shown in Table 2317.04-1.			

~~2~~C. HMA Pavement.

The payment will be adjusted as shown in Table 2317.05-2 according to the posted or proposed speed.

Table 2317.05-2: Schedule for Adjustment Payment for HMA Pavements (0 inch (0 mm) blanking band)

Profile Index For greater than 45 mph	Profile Index For 45 mph or less and ramps	Dollars per 0.1 mile (161 m) segment per lane	
Inches per mile (mm / km)	Inches per mile (mm / km)	Interstate & Multi-Lane Divided Segments	Other Primary Segments
10.0 or less (160 or less)		+850.00	+750.00
10.1 to 11.5 (161 to 180)	15.0 or less (235 or less)	+650.00	+500.00
11.6 to 13.5 (181 to 215)		+500.00	+350.00
13.6 to 15.5 (216 to 245)	15.1 to 20.0 (236 to 315)	+350.00	+200.00
15.6 to 35.0 (246 to 550)	20.1 to 45.0 (316 to 710)	0.00	0.00
35.1 to 40.0 (551 to 630)	45.1 to 50.0 (711 to 790)	-350.00 or grind*	-200.00 or grind*
40.1 or more (631 or more)	50.1 or more (791 or more)	0.00*	0.00*
* These segments ~~must~~ shall be corrected to the levels shown in Table 2317.04-1.			

Comments:

Member's Requested Change (Redline/Strikeout):

Section 2317. Primary and Interstate Pavement Smoothness

2317.01 GENERAL.

~~A.~~ Evaluate pavement smoothness for all Interstate and Primary main line pavement surfaces, and all other road surfaces included on Primary projects, except when specifically excluded or modified by the contract documents. Main line pavement is defined as all permanent pavement for through lanes. ~~Exclusions from profilograph testing are detour pavement, shoulders, crossovers, and individual sections of pavement less than 50 feet (15 m) in length.~~

~~B.~~ ~~The Engineer may determine the pavement smoothness according to Materials I.M. 341 using a 10 foot (3 m) straightedge or rolling straightedge on surfaces excluded from profilograph testing. The variation of the surface from the testing edge of the straightedge is not to exceed 1/8 inch (3 mm) between any two contacts, longitudinal or transverse. Correct all irregularities exceeding the specified tolerance using equipment and methods approved by the Engineer. After the Contractor has corrected an irregularity, the Engineer may perform monitor testing of the area to verify compliance with the specified tolerance.~~

2317.02 EQUIPMENT.

A. Provide and operate an Ames type or California type profilograph or an inertial profiler to produce a profilogram (profile trace) of the surface tested according to Materials I.M. 341. ~~Other types of profilographs or profilers that produce compatible results and meet the requirements of Materials I.M. 341 may be used.~~ Ensure the operator is trained and certified to operate the profilograph as required by the Contracting Authority.

B. If the profilograph has a mechanical recorder, provide automated trace reduction equipment according to Materials I.M. 341. If it has a computerized recorder, the trace produced will be evaluated without further reduction.

C. For corrective work by diamond grinding, use grinding and texturing equipment that meets the requirements of Section 2532.

2317.03 SURFACE TOLERANCES, TESTING, AND EVALUATION.

A pavement segment is defined as a continuous area of finished pavement 0.1 mile (161 m) in length and one lane

(10 to 12 foot (3.0 to 3.7 m) nominal) in width. A partial segment resulting from an interruption of the continuous pavement surface (in other words, bridge approaches, side road tie-ins, the cessation of the daily paving operations, and so forth) is subject to the same evaluation as a whole segment.

A. Tolerances.

Produce pavement with an average profile index per 0.1 mile (161 m) segment as shown in Table 2317.03-1.

Table 2317.03-1: Tolerance for Average Profile Index per 0.1 Mile (161 m) (0 inch (0 mm) blanking band)

Surface Type	Profile Index For greater than 45 mph	Profile Index For 45 mph or less and ramps
	Inches per mile (mm / km)	Inches per mile (mm / km)
PCC Pavement	40.0 or less (630 or less)	65.0 or less (1025 or less)
HMA Pavement	35.0 or less (550 or less)	45.0 or less (710 or less)

B. Testing.

1. Determine the pavement profiles for each lane according to the procedures for one lane, as shown in Materials I.M. 341 except for main line traffic lanes which will be tested in the wheel paths. Round the trace scallops to the nearest 0.01 inch (0.1 mm). The wheel paths are defined as the 3 feet (0.9 m) and 9 feet (2.7 m) from the center line or lane line. Average the two wheel path profile indexes for each segment. Additional profiles may be taken only to define the limits of an out-of-tolerance surface variation.

2. The Engineer may use a 10 foot (3 m) straightedge (or other means) to detect irregularities outside the required trace paths. The Engineer may also use the straightedge to delineate the areas that require corrective action.

3. Test bridge approaches according to Section 2428.

4. Paved shoulders will be excluded from smoothness testing. When used as a temporary driving surface, evaluate paved shoulders for bumps and dips. Evaluate for high points and low points with deviations in excess of 0.5 inches (12.7 mm) in a length of 25 feet (7.6 m) or less. Take corrective action.

C. Evaluation.

1. Determine a profile index based on the 0 inch (0 mm) blanking band following the same procedures shown in Materials I.M. 341 for each segment of finished pavement surface except for:

- **a.** Primary side road connections less than 600 feet (180 m) in length.
- **b.** Non-primary side road connections, which are to be evaluated according to Section 2316.
- **c.** Bridge approaches (evaluated according to Section 2428).
- **d.** Storage lanes, turn lanes, and other auxiliary lanes less than 600 feet (180 m).
- **e.** Pavement less than 8.5 feet (2.6 m) in width.
- **f.** The 16 feet (5 m) before and the 16 feet (5 m) beyond the ends of the section when the Contractor is not responsible for the adjoining surface.
- **g.** Single lift pavement overlays 2 inches (50 mm) thick or less, unless the existing surface has been corrected by milling or scarification.
- **h.** Runout tapers on HMA overlays at existing pavement, bridges, or bridge approach sections where the thickness is less than the design thickness.
- **i.** Detour pavement.
- **j.** Crossovers.
- **k.** Individual sections of pavement less than 50 feet (15 m) in length

Evaluate pavement segments excluded from profile index evaluation for high points and low points with deviations in excess of 0.5 inches (12.7 mm) in a length of 25 feet (7.6 m) or less. Take corrective action

2. For the following situations, the profile index will be evaluated. If the average profile index exceeds the tolerances listed in Article 2317.03, A, the Contractor may elect to eliminate that area from the profile index for the day's paving operation. ~~and evaluate the area using a 10 foot (3 m) straightedge as outlined in Article 2317.01.~~

a. Horizontal curves with a centerline radius of less than 1000 feet (300 m) and the pavement within the superelevation transition of such curves.
b. Crest and sag vertical curves with an L/A < 100 where L is the length of curve in feet and A is the grade change in percent (L/A < 30.5 where L is the length in meters and A is the grade change in percent).

Evaluate pavement segments eliminated from profile index evaluation for high points and low points with deviations in excess of 0.5 inches (12.7 mm) in a length of 25 feet (7.6 m) or less. Take corrective action

3. Determine a daily average profile index for each day's paving operation. A day's paving operation is defined as a minimum of 0.1 mile (161 m) segment of pavement placed in a day. If less than 0.1 mile (161 m) segment is paved, the day's production will be grouped with the next day's production. If the production of the last day of project paving is less than 0.1 mile (161 m) segment, it will be grouped with the previous day's production.

4. Test each segment within 48 hours following placement. Furnish the profile index for each segment of paving to the Engineer by the end of the next day worked following the placement until there has been 3 consecutive days of paving where the index for all segments would result in 100% payment or better. Should any following day be evaluated to receive less than 100% payment, immediately notify the Engineer and take corrective action to modify paving methods and equipment to achieve 100% payment or better.

5. If the day's average profile index exceeds the values in Table 2317.03-1, notify the Engineer and suspend the paving operation until corrective action is taken. When the paving is resumed, the paving operations will be evaluated with the start-up testing procedures in the preceding paragraph.

6. Submit all final profilograph test reports and profile traces to the Engineer within 14 calendar days following completion of paving on the project. The Engineer may request selected reports and traces in advance of paving completion for purposes of validating the Contractor's test results. Incentive payments for qualifying segments will be made following receipt of appropriate documentation of certified smoothness results.

2317.04 CORRECTIVE ACTIONS.

A. General.

1. The pavement will be evaluated in 0.1 mile (161 m) segments using the profilograph, to determine pavement segments where corrective work or pay adjustments will be necessary. Each individual profilograph trace will be evaluated (not the average of multiple traces) to determine the areas where corrective action on 0.5 inch (12.7 mm) bumps and dips is needed.

2. Within each 0.1 mile (161 m) segment, correct all areas representing high points (bumps) or low points (dips) with deviations in excess of 0.5 inches (12.7 mm) in a length of 25 feet (7.6 m) or less regardless of the profile index value. ~~Evaluate pavement segments excluded from profile index evaluation in Article 2317.03 for high points and low points with deviations in excess of 0.5 inches (12.7 mm) in a length of 25 feet (7.6 m) or less.~~ Take corrective action.

3. Separately identify bumps and dips equal to or exceeding 0.5 inches (12.7 mm) in a length of 25 feet (7.6 m) or less.

4. On lanes over 8.5 feet (2.6 m) in width, for through traffic which requires matching the surface of the new pavement to the surface of an existing pavement, an Average Base Index (ABI) will be determined according to Section 2316.

B. Roadways with a posted speed greater than 45 mph.
Correct all 0.1 mile (161 m) segments, including bumps, having an initial average profile index of greater than those tolerances shown in Article 2317.05. Correct these segments to reduce the average profile index to those shown in Table 2317.04-1 below. The Contractor has the option to replace these segments. On segments where corrections are made, test the pavement to verify that corrections have met the average profile index as shown in Table 2317.04-1 below.

C. Roadways with a posted speed of 45 mph, or less, and ramps.
Correct all 0.1 mile (161 m) segments, including bumps, having an initial average profile index of greater than

those tolerances shown in Article 2317.05. Correct these segments to reduce the average profile index to those shown in Table 2317.04-1 below. The Contractor has the option to replace these segments. On segments where corrections are made, test the pavement to verify that corrections have met the average profile index as shown in Table 2317.04-1 below.

Table 2317.04-1: Average Profile Index per 0.1 Mile (161 m) after Corrections (0 inch (0 mm) blanking band)

Surface Type	Profile Index For greater than 45 mph	Profile Index For 45 mph or less and ramps
	Inches per mile (mm / km)	Inches per mile (mm / km)
PCC Pavement	40.0 or less (630 or less)	65.0 or less (1025 or less)
HMA Pavement	40.0 or less (630 or less)	50.0 or less (790 or less)

D. Bridge Approach Sections.
Correct bridge approach sections according to Section 2428.

E. Corrective Work.
~~Corrective work is at the Contractor's expense except for the 16 feet (5 m) before and the 16 feet (5 m) beyond the end of the section when the Contractor is not responsible for the adjoining surface.~~ When the Contractor is not responsible for the adjoining surface, bumps and dips in the 16 feet (5 m) at the end of a section will be reviewed by the Engineer. Correct all bumps and dips determined to be under the control of the contractor and resulting from the contractor's operations. Correction of bumps and dips determined to be beyond the control of the contractor will be paid according to Article 1109.03, B.
Complete the corrective work prior to determining pavement thickness. Do not use bush hammers or other impact devices.

1. PCC Pavement.
On PCC pavement, make corrections using an approved profiling device or by removing and replacing the pavement. Apply corrective methods to the full lane width. Ensure, when completed, the corrected area (full lane width) has uniform texture and appearance, with the beginning and ending of the corrected area squared normal to centerline of the paved surface. Where surface corrections are made, grooving will not be required.

2. HMA Pavement.

a. On HMA pavement, make corrections by diamond grinding, by overlaying the area, by replacing the area, or by inlaying the area. If the surface is corrected by diamond grinding, perform the same work and use the same equipment as specified for PCC pavement, except cover the ground surface with a seal coat according to Section 2307, with the following modifications:

1) The binder bitumen may be the emulsion or cutback asphalt used for tack coat, applied at a rate of 0.10 gallon per square yard (0.7 L/m^2). Hand methods may be used for spraying.

2) Apply a cover aggregate consisting of sand (slightly damp, but with no free moisture as determined by visual inspection) at a rate of 10 pounds per square yard (5 kg/m^2). Hand methods may be used for spreading. Embed cover aggregate with at least one complete pneumatic roller coverage.

3) This seal coat is intended to be placed immediately after the diamond grinding is completed in the travel lane. The Engineer may approve this construction when road surface temperatures are below 60ºF (16ºC).

4) Labor, equipment, and materials used for this seal coat are incidental to other items and will not be paid for separately.

b. If the surface is corrected by overlay, replacement, or inlay, begin and end the surface correction with a transverse saw cut normal to the pavement lane lines or edge lines within any one area. The profile of the surface must be smooth with no bumps or dips at the beginning or end of correction.

c. Overlay correction must be for the entire pavement width. Pavement cross slope must be maintained through the corrected areas.

F. Verification Testing.

1. The Engineer will perform verification testing to validate the Contractor's certified quality control testing. If the Engineer's verification test results validate the Contractor's test results, the Contractor's results will be used for acceptance. Disputes between the Contractor's and Engineer's test results will be resolved

according to Materials I.M. 341.

2. The Engineer may test the entire project length if it is determined that the Contractor certified test results are inaccurate, The Contractor will be charged for this work at a rate of $400.00 per mile ($250.00 per kilometer), per profile track, with a minimum charge of $800.00.

3. Furnishing inaccurate tests may result in decertification of the Contractor's certified operator.

2317.05 PAY ADJUSTMENTS.

A. General.

1. Pay adjustments will be based on the initial average profile index determined for the segments prior to performing any corrective work. Areas excluded from the profilograph testing and bridges approaches will not be subject to price adjustments.

2. If the Contractor elects to remove and replace the segments, the Contractor will be paid the price adjustment that corresponds to the initial average profile index obtained on the pavement segments after replacement.

3. When the plans dictate that an area of pavement is to be hand finished, the area will not be subject to reduced payment. However, the area is to be profiled and corrected as necessary to meet these specifications.

1. PCC Pavement.

The payment will be adjusted as shown in Table 2317.05-1 according to the posted or proposed speed.

Table 2317.05-1: Schedule for Adjustment Payment for PCC Pavements (0 inch (0 mm) blanking band)

Profile Index For greater than 45 mph	Profile Index For 45 mph or less and ramps	Dollars per 0.1 mile (161 m) segment per lane	
Inches per mile (mm / km)	Inches per mile (mm / km)	Interstate & Multi-Lane Divided Segments	Other Primary Segments
22.0 or less (345 or less)	25.0 or less (395 or less)	+950.00	+850.00
22.1 to 23.5 (346 to 370)		+800.00	+650.00
23.6 to 26.0 (371 to 410)	25.1 to 30.0 (396 to 475)	+600.00	+450.00
26.1 to 40.0 (411 to 630)	30.1 to 65.0 (476 to 1025)	0.00	0.00
40.1 to 45.0 (631 to 710)	65.1 to 70.0 (1025 to 1105)	-600.00 or grind*	-450.00 or grind*
45.1 or more (711 or more)	70.1 or more (1105 or more)	0.00*	0.00*
* These segments must be corrected to the levels shown in Table 2317.04-1.			

2. HMA Pavement.

The payment will be adjusted as shown in Table 2317.05-2 according to the posted or proposed speed.

Table 2317.05-2: Schedule for Adjustment Payment for HMA Pavements (0 inch (0 mm) blanking band)

Profile Index For greater than 45 mph	Profile Index For 45 mph or less and ramps	Dollars per 0.1 mile (161 m) segment per lane	
Inches per mile (mm / km)	Inches per mile (mm / km)	Interstate & Multi-Lane Divided Segments	Other Primary Segments
10.0 or less (160 or less)		+850.00	+750.00

10.1 to 11.5 (161 to 180)	15.0 or less (235 or less)	+650.00	+500.00	
11.6 to 13.5 (181 to 215)		+500.00	+350.00	
13.6 to 15.5 (216 to 245)	15.1 to 20.0 (236 to 315)	+350.00	+200.00	
15.6 to 35.0 (246 to 550)	20.1 to 45.0 (316 to 710)	0.00	0.00	
35.1 to 40.0 (551 to 630)	45.1 to 50.0 (711 to 790)	-350.00 or grind*	-200.00 or grind*	
40.1 or more (631 or more)	50.1 or more (791 or more)	0.00*	0.00*	
* These segments must be corrected to the levels shown in Table 2317.04-1.				

Reason for Revision: Several changes requested from field staff to clarify and improve the specification. Changes primarily include expanding contractor evaluation for half inch bumps and dips and contractor responsibility for the 16 feet at the end of a section.

County or City Input Needed (X one)			**Yes**	**No** X	
Comments:					
Industry Input Needed (X one)			**Yes** X	**No**	
Industry Notified:	**Yes** X	**No**	**Industry Concurrence:**	**Yes**	**No**
Comments:					

SPECIFICATION REVISION SUBMITTAL FORM

Submitted by: Deanna Maifield	**Office:** Design	**Item 10**
Submittal Date: 2009.10.28	**Proposed Effective Date:** 1-20-2010	
Section No.: 2416 **Title:** Rigid Pipe Culverts **Article No.:** 2553.02, A, 2 **Title:** Carrier Pipe Installed without a Casing Pipe	**Other:**	

Specification Committee Action: Approved as is.

Deferred:	**Not Approved:**	**Approved Date:** 11/12/2009	**Effective Date:** 1/20/2010

Specification Committee Approved Text: See Specification Section recommended text.

Comments: The Office of Contracts had concerns about replacing SS-09007, requiring that the new SS-090XX be printed and attached to all proposals sent out. It was decided that this was the best and most effective way of getting this specification revision applied.

Specification Section Recommended Text:

Article 2416.03, Construction

Add new article:

E. Trenchless Construction.
Apply Section 2553.

Article 2416.04, Method of Measurement.

Add new article:

H. Trenchless: Measurement for each type and size of pipe installed by trenchless methods will be in linear feet (meters) along the centerline of the pipe.

Article 2416.05, Basis of Payment.

Add new article:

H. Trenchless:

1. Payment will be made at the contract unit price per linear foot (meter) for each type and size of pipe.

2. Payment is full compensation for:

- Furnishing and installing pipe,
- Trenchless installation materials and equipment,
- Pit excavation, dewatering, and placing backfill material, and
- Pipe connections.

Article 2553.02, A, 2, Carrier Pipe Installed without a Casing Pipe

Add new article:

e. Roadway Pipe Culvert.
Reinforced Concrete Pipe: Apply Section 4145.

Comments: This change will be included in SS-090XX, Revisions to the Standard Specifications for Highway and Bridge Construction, Series 2009.

Member's Requested Change: (Do not use **'Track Changes'**, or **'Mark-Up'**. Use ~~**Strikeout**~~ and **Highlight**.)

2553.03, A, 2, e, Concrete Culvert Pipe.

Add a new article:

e. Concrete Culvert Pipe. Apply Section 4145.					
Reason for Revision: Currently, the specifications do not contain bid items for culverts placed by trenchless construction; however the methods are contained in Section 2553.					
County or City Input Needed (X one)			**Yes**	**No**	
Comments:					
Industry Input Needed (X one)			**Yes**	**No**	
Industry Notified:	**Yes**	**No**	**Industry Concurrence:**	**Yes**	**No**
Comments:					

SPECIFICATION REVISION SUBMITTAL FORM

Submitted by: John Smythe/Kevin Merryman	**Office:** Construction	**Item 11**
Submittal Date: October 26, 2009	**Proposed Effective Date:** April 2010	
Section No.: 2428 **Title:** Smoothness of Bridge Decks and Bridge Deck Overlays	**Other:**	

Specification Committee Action: Approved with changes.

Deferred:	**Not Approved:**	**Approved Date:** 11/12/2009	**Effective Date:** 4/20/2010

Specification Committee Approved Text:

Article 2428.02, B, Measurement.

Replace the article:

Provide and operate an Ames ~~type~~ or California type profilograph or an inertial profiler to produce a profilogram (profile trace) of the surface tested according to Materials I.M. 341. ~~Other types of profilographs or profilers that produce compatible results and meet the requirements of Materials I.M. 341 may be used.~~

Article 2428.03, Surface Correction.

Delete the last sentence of Item C:

~~Use a cutting head that is a minimum of 24 inches (600 mm) wide.~~

Article 2428.04, Bumps and Dips.

Delete the last sentence of the first paragraph:

~~For areas excluded from profilograph testing, correct deviations exceeding 1/8 inch in 10 feet (3 mm in 3 m).~~

Article 2428.04, C, Exceptions.

Replace the article:

~~When the Contractor is not responsible for the adjoining surface, the Engineer will evaluate bumps and dips exceeding 0.5 inches (12.7 mm) located within 16 feet (5 m) either side of the end of a section. The Contractor will not receive a price adjustment for bumps and dips in this area. When the Engineer instructs, the Contractor will be paid to repair these bumps and dips according to Article 1109.03, B.~~

When the Contractor is not responsible for the adjoining surface, bumps and dips in the 16 feet (5 m) at the end of a section will be reviewed by the Engineer. Correct bumps and dips determined to be under the control of the Contractor and resulting from the Contractor's operations. Correction of bumps and dips determined to be beyond the control of the Contractor will be paid according to Article 1109.03, B.

Comments: The Office of Materials wondered if the addition to Article 2428.02, D, Profile Index was necessary. It was decided that this change did not add anything that wasn't already in the specification, so this revision was deleted.

Specification Section Recommended Text:

Article 2428.02, B, Measurement.

Replace the article:

Provide and operate an Ames type or California type profilograph or an inertial profiler to produce a profilogram (profile trace) of the surface tested according to Materials I.M. 341. ~~Other types of profilographs or profilers that produce compatible results and meet the requirements of Materials I.M. 341 may be used.~~

Article 2428.02, D, Profile Index.

Add the following to the end of the article:

Evaluate segments excluded from profile index evaluation for high points and low points with deviations in excess of 0.5 inches (12.7 mm) in a length of 25 feet (7.6 m) or less. Take corrective action.

Article 2428.03, Surface Correction.

Delete the last sentence of Item C:

~~Use a cutting head that is a minimum of 24 inches (600 mm) wide.~~

Article 2428.04, Bumps and Dips.

Delete the last sentence of the first paragraph:

~~For areas excluded from profilograph testing, correct deviations exceeding 1/8 inch in 10 feet (3 mm in 3 m).~~

Article 2428.04, C, Exceptions.

Replace the article:

~~When the Contractor is not responsible for the adjoining surface, the Engineer will evaluate bumps and dips exceeding 0.5 inches (12.7 mm) located within 16 feet (5 m) either side of the end of a section. The Contractor will not receive a price adjustment for bumps and dips in this area. When the Engineer instructs, the Contractor will be paid to repair these bumps and dips according to Article 1109.03, B.~~

When the Contractor is not responsible for the adjoining surface, bumps and dips in the 16 feet (5 m) at the end of a section will be reviewed by the Engineer. Correct bumps and dips determined to be under the control of the Contractor and resulting from the Contractor's operations. Correction of bumps and dips determined to be beyond the control of the Contractor will be paid according to Article 1109.03, B.

Comments:

Member's Requested Change (Redline/Strikeout):

Section 2428. Smoothness of Bridge Decks and Bridge Deck Overlays

2428.01 DESCRIPTION.

Test and evaluate smoothness of bridge decks and bridge deck overlays. Perform surface correction if required.

2428.02 TESTING AND EVALUATION.

A. General.

1. Except when specifically excluded in the contract documents, evaluate smoothness for all:
   - **a.** Interstate and Primary bridge decks, new approaches and bridge deck overlays, and overlaid approaches.
   - **b.** Non-Primary bridge decks, new approaches and bridge deck overlays, and overlaid approaches for projects where the Department is the Contracting Authority.

2. If this specification is required by contract documents on non-Primary projects let by the Department, it will be added in its entirety. Selected portions of the specification will not be deleted.

B. Measurement.

Provide and operate an Ames type or California type profilograph or an inertial profiler to produce a profilogram (profile trace) of the surface tested according to Materials I.M. 341. ~~Other types of profilographs or profilers that produce compatible results and meet the requirements of Materials I.M. 341 may be used.~~

C. Profilograph Testing.

1. Remove all objects and foreign material from the deck surface, including protective covers, if used, prior to testing by the Engineer. If appropriate, properly replace protective covers after testing.

2. A profilogram will be made by a test in each wheel path of each traffic lane. The profilogram will include a minimum of 16 feet (5 m) beyond the bridge section when there is adjoining pavement. Bridge decks and bridge deck overlays will be treated as one section. The profilogram will include a minimum of 100 feet (30 m) beyond the approach section when there is adjoining pavement.

3. For bridge lengths of 778 feet (240 m) or less, each traffic lane is a segment. For bridges longer than 778 feet (240 m), a segment shall be 0.1 miles (160 m) of the traffic lane. If the remaining segment is

250 feet (80 m) or less in length, it is included in the adjacent bridge segment. If the remaining segment is more than 250 feet (80 m) in length, it is evaluated on its own. When bridge deck overlay expansion joints are not new or replaced, segments begin and end at the expansion joints.

4. Each bridge approach lane is a separate segment.

5. Perform quality control testing and furnish the profilogram results to the Engineer. Ensure:
- Testing and evaluation are done by a trained and certified person, and
- The evaluation is certified according to Materials I.M. 341.

D. Profile Index.

1. Calculate an average profile index for each segment from the two wheel path profilograms, according to Materials I.M. 341, except for:
a. Bridge decks or bridge deck overlays less than 100 feet (30 m) in length.
b. New bridge approach sections or bridge approach overlays less than 100 feet (30 m) in length.
c. Bridge decks for new concrete slab bridges.
d. The 16 feet (5 m) at the ends of the section.
e. The 16 feet (5 m) on each side of the expansion joints that are not new or replaced.

Evaluate segments excluded from profile index evaluation for high points and low points with deviations in excess of 0.5 inches (12.7 mm) in a length of 25 feet (7.6 m) or less. Take corrective action

2. Limits for average profile index per 0.1 mile (160 m) are as follows:

New Bridge Deck	less than 22.1 inches/mile (351 mm/km)
Bridge Deck Overlay	less than 15.1 inches/mile (241 mm/km)
Bridge Approach (New or Overlaid)	less than 22.1 inches/mile (351 mm/km)

3. The Engineer will perform verification testing to validate the Contractor's certified quality control testing. If the Engineer's verification test results validate the Contractor's test results, The Contractor's results will be used for acceptance. Disputes between the Contractor's and the Engineer's test results will be resolved according to Materials I.M. 341. The Engineer may test the entire project length if it is determined the Contractor's certified test results are inaccurate. The Contractor will be charged for this work at a rate of $500 per bridge deck. In addition, providing inaccurate test results may result in decertification.

4. On deck placements less than 100 feet (30 m), test and evaluate each lane of placements. Provide the Engineer with the final trace and index and the final evaluation within 14 calendar days of deck completion.

5. On deck placements of 100 feet (30 m) or more, provide the Engineer with the initial profile trace and index for each lane by noon of the fifth working day following each of the first row placements. On subsequent placements, provide the Engineer with the trace and index following every third placement until the deck is completed. On single-pour bridges, provide the Engineer with the final profile trace and index and the final evaluation within 2 weeks of deck completion.

2428.03 SURFACE CORRECTION.

A. Perform surface correction for the full segment width of the paved surface.

B. Obtain the Engineer's approval for all correction work. After all required correction work is completed, determine the final profile index.

C. Accomplish surface correction by grinding or by other methods the Engineer approves. Perform the work as identified in Section 2532. ~~Use a cutting head that is a minimum of 24 inches (600 mm) wide.~~

D. Perform surface correction parallel to lane lines or edge lines as directed by the Engineer. Make each pass parallel to the previous passes. Grind the surface to a uniform texture.

E. Do not overlap adjacent passes more than 1 inch (25 mm) or have a vertical difference of more than 1/8 inch (3 mm) as measured from bottom of groove to bottom of groove.

F. Begin and end smoothness correction at lines normal to the lane lines or edge lines within any one corrected area. Proceed from the center line or lane line toward the edge to maintain cross slope.

G. Maintain cross slope throughout the corrected area.

H. Perform corrective grinding prior to longitudinal grooving.

2428.04 BUMPS AND DIPS.
Bumps and dips, including those at headers, on all surfaces for which smoothness is designated will be evaluated. Correction work will be required according to the criteria in Paragraphs B and C below. ~~For areas excluded from profilograph testing, correct deviations exceeding 1/8 inch in 10 feet (3 mm in 3 m).~~

A. Bumps.

1. Correct all bumps exceeding 0.5 inch (12.7 mm) within a 25 foot (7.6 m) span, as indicated on the profilogram, except as stated in Article 2428.04, F.

2. Corrected bumps will be considered satisfactory when profilograph measurement shows that the bumps were 0.3 inch (7.6 mm) or less in a 25 foot (7.6 m) span.

B. Dips.

1. Correct all dips exceeding 0.5 inch (12.7 mm) in a 25 foot (7.6 m) span, as indicated on the profilogram, only when the Engineer requires, except as stated in Article 2428.04, F. The Contractor will be assessed a price adjustment of $900 for each dip exceeding 0.5 inch (12.7 mm) that is not corrected, except as stated in Article 2428.04, C.

2. A dip in both wheel paths at a lane location will be considered a single dip when assessing a price adjustment.

3. Corrected dips will be considered satisfactory when the profilogram shows the dips are less than 0.3 inch (7.6 mm) in a 25 foot (7.6 m) span.

C. Exceptions.
~~When the Contractor is not responsible for the adjoining surface, the Engineer will evaluate bumps and dips exceeding 0.5 inches (12.7 mm) located within 16 feet (5 m) either side of the end of a section. The Contractor will not receive a price adjustment for bumps and dips in this area. When the Engineer instructs, the Contractor will be paid to repair these bumps and dips according to Article 1109.03, B.~~

When the Contractor is not responsible for the adjoining surface, bumps and dips in the 16 feet (5 m) at the end of a section will be reviewed by the Engineer. Correct all bumps and dips determined to be under the control of the Contractor and resulting from the contractor's operations. Correction of bumps and dips determined to be beyond the control of the Contractor will be paid according to Article 1109.03, B.

2428.05 SCHEDULE OF PAYMENT.
The cost of certified profilograph testing and associated traffic control is incidental to the contract unit price for the item for which the testing is required.

A. Incentives.

1. New bridge decks or bridge deck overlays which are designated for smoothness will be evaluated for incentives using the initial profile index and the number of segments on the bridge.

2. For each segment of a bridge to be qualified for an incentive payment, the profilogram for that segment before correction must meet the specification requirement so there is no price reduction.

3. For each segment of the bridge deck or bridge deck overlay, the incentive index is 12.0 inches per mile (190 mm/km) for new bridge decks, and 4.0 inches per mile (65 mm/km) for bridge deck overlays. The incentive payment will be according to Table 2428.05-1:

Table 2428.05-1: Incentives

New Bridge Decks		Bridge Deck Overlays	
Initial Profile Index Inches Per Mile (mm/km) Per Segment	Dollars Per Segment	Initial Profile Index Inches Per Mile (mm/km) Per Segment	Dollars Per Segment
0 - 6.0 (0 - 95)	6000	0 - 2.0 (0 - 32)	2000
6.1 - 12.0 (96 - 190)	3000	2.1 - 4.0 (33 - 65)	1000
12.1 - 22.0 (191 - 350)	Unit Price	4.1 - 15.0 (66 - 240)	Unit Price

B. Price Reduction.

1. New bridge decks or bridge overlays which are designated for smoothness will be evaluated for price reduction assessment using the final profile index and the number of segments.

2. The Contractor may grind the surface of the bridge deck to a final index of 22.0 inches per mile (350 mm/km) or less, or the surface of a bridge deck overlay to a final index of 15.0 inches per mile (240 mm/km) in lieu of a price reduction.

3. Each segment of bridge deck with a final index of 22.1 inches per mile (351 mm/km) or greater or bridge deck overlay with a final index of 15.1 inches per mile (241 mm/km) or greater will be assessed a price reduction according to Table 2428.05-2:

Table 2428.05-2: Price Reduction

New Bridge Decks		Bridge Deck Overlays	
Initial Profile Index Inches Per Mile (mm/km) Per Segment	Dollars Per Segment	Initial Profile Index Inches Per Mile (mm/km) Per Segment	Dollars Per Segment
22.1 - 30.0 (351 - 470)	2000	15.1 - 20.0 (241 - 315)	1000
30.1 - 35.0 (471 - 550)	4000	20.1 - 25.0 (316 - 390)	2000
35.1 - 40.0 (551-630)	6000	25.1 - 30.0 (391 - 470)	3000
over 40.0 (over 630)	[(a)]	over 30.0 (over 470)	[(a)]

[(a)] Correction is required to an index of 15.0 inches per mile (240 mm/km) for overlays and to an index of 22.0 inches per mile (350 mm/km) for new decks.

C. Bridge Approach Sections and Overlay of Bridge Approach Sections.
Correct bridge approach sections and overlays of bridge approach sections for smoothness as specified in Article 2428.03 in lieu of a price reduction.

Reason for Revision: Several changes requested from field staff to clarify and improve the specification. Changes primarily include expanding contractor evaluation for half inch bumps and dips and contractor responsibility for the 16 feet at the end of a section.

County or City Input Needed (X one)			**Yes**	**No** X	
Comments:					
Industry Input Needed (X one)			**Yes** X	**No**	
Industry Notified:	**Yes**	**No**	**Industry Concurrence:**	**Yes**	**No**
Comments:					

SPECIFICATION REVISION SUBMITTAL FORM

Submitted by: John Smythe / Kyle Frame	**Office:** Construction	**Item 12**
Submittal Date: 10/07/09	**Proposed Effective Date:** 04/2010	
Article No.: 2501.04 **Title:** Method of Measurement (Piles) **Article No.:** 2501.05 **Title:** Basis of Payment (Piles)	**Other:**	

Specification Committee Action: Approved as is.

Deferred:	**Not Approved:**	**Approved Date:** 11/12/2009	**Effective Date:** 4/20/2010

Specification Committee Approved Text: See Specification Section recommended text.

Comments: No comments.

Specification Section Recommended Text:

Article 2501.04, Method of Measurement.

Replace the first paragraph of the article:

Measurement for the quantities of Wood Piles, Steel HP-Piles (either encased or not), Steel Pipe Piles, Concrete Piles, and Steel Sheet Piles, will be the plan ~~length~~ quantity. The quantity may be modified by Article 2501.04, D, ~~or~~ F, or G.

Add to the end of the article:

G. Unused Piles.

The quantity of unused piling delivered to the job site without having been placed in the leads or any attempt made to drive it will be subtracted from the plan quantity.

Article 2501.05, Basis of Payment.

Replace Article A, Increased or Decreased Length or Size of Piles:

A. ~~Increased or Decreased Length or Size of Piles~~ Unused Piles.

1. Return unused piling (either ordered as directed by the Engineer, or specified in the contract documents ~~and delivered to the job site without having been placed in the leads~~) to the supplier. Unused piles are piles that have been delivered to the job site without having been placed in the leads or any attempt made to drive them. Payment will be made for freight, restocking, and handling charges.

2. ~~When the plans designate steel HP piles 60 feet (18 m) or shorter and the Engineer subsequently orders steel H-piles longer than 60 feet (18 m), the adjusted price for such piles will, when required, will also include payment for one extension splice for each pile at the rate specified in Paragraph C below.~~ The contracting authority may purchase unused piles for the invoice cost plus handling and transporting costs.

Add to the end of the article:

N. Payment for Driving Only.

If extensions or extra piles are furnished by the Contracting Authority, payment for driving will be paid according to Article 1109.03, B.

Comments:

Member's Requested Change: (Do not use **'Track Changes'**, or **'Mark-Up'**. Use **~~Strikeout~~** and **Highlight**.)

Replace the first paragraph of Article 2501.04 and add Article 2501.04, G.

~~Measurement for the quantities of Wood Piles, Steel HP-Piles (either encased or not), Steel Pipe Piles, Concrete Piles, and Steel Sheet Piles, will be the plan length. The quantity may be modified by Article~~

~~2501.04, D or F.~~
Measurement for the quantities of Wood Piles, Steel HP-Piles (either encased or not), Steel Pipe Piles, Concrete Piles, and Steel Sheet Piles, will be the plan quantity. The quantity may be modified by Article 2501.04; D, F or G.

G. Unused Piles.
The quantity of unused piling delivered to the job site without having been placed in the leads or any attempt made to drive it will be subtracted from the plan quantity.

Replace Article 2501.05 A and add Article 2501.05 N:

~~**A. Increased or Decreased Length or Size of Piles.**~~
~~**1.** Return unused piling (either ordered as directed by the Engineer, or specified in the contract documents and delivered to the job site without having been placed in the leads) to the supplier. Payment will be made for freight, restocking, and handling charges.~~

~~**2.** When the plans designate steel HP-piles 60 feet (18 m) or shorter and the Engineer subsequently orders steel H-piles longer than 60 feet (18 m), the adjusted price for such piles will, when required, will also include payment for one extension splice for each pile at the rate specified in Paragraph C below.~~

A. Unused Piles.
1. Return unused piling (either ordered as directed by the Engineer, or specified in the contract documents) to the supplier. Unused piles are piles that have been delivered to the job site without having been placed in the leads or any attempt made to drive them. Payment will be made for freight, restocking, and handling charges.

2. The contracting authority may purchase unused piles for the invoice cost plus handling and transporting costs.

N. Payment for Driving Only.
If extensions or extra piles are furnished by the Contracting Authority, payment for driving will be paid according to Article 1109.03B.

Reason for Revision: Clarify the method of measurement for unused piles to match the basis of payment.

Rename Article A to address unused piles.

Remove the second paragraph, lack of pile availability may require the contractor to weld piles shorter than 60 feet long to address a plan pile length change after the project letting.

Add a paragraph that was included in this article in the GS-01016 but was not included in the new book. This provides the option for the contracting authority to purchase the unused piles. The amount was changed to cover the contractors costs. The reference to the 10% overhead charge was removed for clarification.

Provide a Basis of Payment for driving piles furnished by the contracting authority.

County or City Input Needed (X one)			**Yes**	**No** X	
Comments:					
Industry Input Needed (X one)			**Yes**	**No** X	
Industry Notified:	**Yes**	**No**	**Industry Concurrence:**	**Yes**	**No**
Comments:					

SPECIFICATION REVISION SUBMITTAL FORM

Submitted by: Deanna Maifield	**Office:** Design	**Item 13**
Submittal Date: 2009.10.28	**Proposed Effective Date:** 4-20-2010	
Article No.: 2505.02, B, 2 **Title:** High Tension Cable Guardrail	**Other:**	

Specification Committee Action: Approved as is.

Deferred:	**Not Approved:**	**Approved Date:** 11/12/2009	**Effective Date:** 4/20/2010

Specification Committee Approved Text: See Specification Section recommended text.

Comments: No comments.

Specification Section Recommended Text:

2505.02, B, 2, High Tension Cable Guardrail.

Replace the first sentence of the first bullet:

An extra supply of ~~TL-4~~ line posts (socketed-type), including post hardware and accessories (caps, reflective sheeting, straps, spacers, and socket covers).

Comments:

Member's Requested Change: **(Do not use 'Track Changes', or 'Mark-Up'. Use ~~Strikeout~~ and Highlight.)**

2505.02, B, 2, High Tension Cable Guardrail.

Replace the first sentence of the first bullet:

An extra supply of ~~TL-4~~ line posts (socketed-type), including post hardware and accessories (caps, reflective sheeting, straps, spacers, and socket covers).

Reason for Revision: Materials I.M. 455.01 allows TL-4 and TL-3 systems, depending on the steepness of the slope on which the system is installed.

County or City Input Needed (X one)	**Yes**	**No** X
Comments:		

Industry Input Needed (X one)			**Yes**	**No** X	
Industry Notified:	**Yes**	**No**	**Industry Concurrence:**	**Yes**	**No**
Comments:					

SPECIFICATION REVISION SUBMITTAL FORM

Submitted by: Jim Berger	**Office:** Materials	**Item 14**
Submittal Date: October 23, 2009	**Proposed Effective Date:** April 2010	
Article No.: 2506.02, F **Title:** Fluidity (Flowable Mortar) **Article No.:** 2539.02, B **Title:** Fluidity (Concrete Pavement Undersealing by Pressure Grouting)	**Other:**	

Specification Committee Action: Approved as is.

Deferred:	**Not Approved:**	**Approved Date:** 11/12/2009	**Effective Date:** 4/20/2010

Specification Committee Approved Text: See Specification Section recommended text.

Comments: No comments.

Specification Section Recommended Text:

Article 2506.02, F, Fluidity.

Replace the first sentence of Item 1:

Measure the fluidity of the flowable mortar using the ~~Corps of Engineers flow cone method CRD-C611-80~~ method described by Materials I.M. 375.

Article 2539.02, B, Fluidity.

Replace the first sentence of the article:

Measure the fluidity of the grout slurry using the ~~Corps of Engineers flow cone method according to their specification CRD-C611-80~~ method described by Materials I.M. 375.

Comments:

Member's Requested Change: (Do not use **'Track Changes'**, or **'Mark-Up'**. Use **~~Strikeout~~** and **Highlight**.)

F. Fluidity.

1. Measure the fluidity of the flowable mortar using ~~the Corps of Engineers flow cone method CRD-C611-80~~ the method described by Materials IM 375. Prior to filling the flow cone with flowable mortar, pass the mixture through a 1/4 inch (6.3 mm) screen.

B. Fluidity.

Measure fluidity of the grout slurry using the method described by Materials IM 375 ~~the Corps of Engineers flow cone method according to their specification CRF-C611-80~~. Time of efflux shall range from 10 seconds to 16 seconds. A more fluid mix having a flow cone time of efflux of 9 seconds to 15 seconds may be used during the initial injection at each hole. These measurements will be made by the Engineer, normally at least once every 4 working hours.

Reason for Revision: The method described in IM 375 is based on ASTM C939 and D6449, and is currently used to measure fluidity.

County or City Input Needed (X one)	**Yes**	**No** X
Comments: The fluidity measurement is performed by the DOT workers.		

Industry Input Needed (X one)			**Yes**	**No** X	
Industry Notified:	**Yes**	**No**	**Industry Concurrence:**	**Yes**	**No**
Comments: The fluidity measurement is performed by the DOT workers.					

SPECIFICATION REVISION SUBMITTAL FORM

Submitted by: Deanna Maifield			**Office:** Design	**Item 15**
Submittal Date: 2009.10.28			**Proposed Effective Date:** 4-20-2010	
Article No.: 2511.03, C, 3, a **Title:** Sidewalks			**Other:**	
Specification Committee Action: Approved as is.				
Deferred:	**Not Approved:**	**Approved Date:** 11/12/2009		**Effective Date:** 4/20/2010
Specification Committee Approved Text: See Specification Section recommended text.				
Comments: No comments.				

Specification Section Recommended Text:

Article 2511.03, C, 3, a, Sidewalks.

Replace the second sentence of Item 1):

Ensure the finished surface has a cross slope ~~of 1/4 inch per foot (20 mm/m)~~ between 1% and 2% for drainage, unless shown otherwise.

Comments:

Member's Requested Change: (Do not use '**Track Changes**', or '**Mark-Up**'. Use ~~**Strikeout**~~ and **Highlight**.)

2511.03, C, 3, a, 1, Sidewalks.

Replace the second sentence:

1) Ensure the finished surface has a cross slope ~~of 1/4 inch per foot (20 mm/m)~~ between 1% and 2% for drainage, unless shown otherwise.

Reason for Revision: ADA requirements allow a maximum cross slope of 2%. 1/4 inch per foot results in a cross slope of 2.08%, which is out of compliance with ADA requirements.

County or City Input Needed (X one)			**Yes**	**No** X	
Comments:					
Industry Input Needed (X one)			**Yes**	**No** X	
Industry Notified:	**Yes**	**No**	**Industry Concurrence:**	**Yes**	**No**
Comments:					

SPECIFICATION REVISION SUBMITTAL FORM

Submitted by: Deanna Maifield	**Office:** Design	**Item 16**
Submittal Date: 2009.10.28	**Proposed Effective Date:** 4-20-2010	
Article No.: 2513.04 **Title:** Method of Measurement (Concrete Barrier) **Article No.:** 2513.05 **Title:** Basis of Payment (Concrete Barrier)	**Other:**	

Specification Committee Action: Approved with changes.

Deferred:	**Not Approved:**	**Approved Date:** 11/12/2009	**Effective Date:** 4/20/2010

Specification Committee Approved Text:

Article 2414.04, A, 1, Concrete Barrier Railing.

Replace the first sentence of the article:

Linear feet (meters) shown in the contract documents, measured from end to end of the barrier, including end sections and transition sections.

Article 2414.04, A, 2, Concrete Open Railing.

Replace the first sentence of the article:

Linear feet (meters) shown in the contract documents, measured from end to end of the barrier, including end sections and transition sections.

Article 2414.04, A, 3, Retrofit Concrete Barrier Railing.

Replace the first sentence of the article:

Linear feet (meters) shown in the contract documents, measured from end to end of the barrier, including end sections and transition sections.

Article 2513.04, Method of Measurement.

Replace the article:

A. Concrete Barrier: linear feet (meters) shown in the contract documents, based on the contract quantity from end to end of the barrier ~~including~~ excluding end sections, width transition sections, and height transitions sections.

B. End sections, width transition sections, and height transition sections: By count for each type of end section, width transition section, or height transition section.

~~B~~C. ~~Reinforcement in~~ For concrete barrier railing for bridge structures: ~~as provided in~~ apply Article 240~~0~~14.04.

~~C~~D. Reinforcement in concrete barrier for other than bridge structures will not be measured separately.

Article 2513.05, Basis of Payment.

Replace the article:

B. End sections, width transition sections, and height transition sections: Each for the type of end section, width transition section, or height transition section specified.

~~B~~C. ~~Reinforcement in~~ For concrete barrier railing for ~~new~~ bridge structures: ~~as provided in~~ apply Article 240~~0~~14.05. ~~The quantities will be included in the quantities for the superstructure or abutments.~~

~~C~~D. Reinforcement in ~~retrofit~~ concrete barrier for other than bridge structures: not paid for separately.

~~D~~E. Payment as described above is considered full compensation for all work involved.

Comments: The Office of Bridges and Structures expressed concern with measuring and paying for concrete barrier railing end sections, width transition sections and height transition sections differently than we do on concrete barrier. References to reinforcement for concrete barrier for bridge structures in Articles 2513.04 and 2513.05 were changed to refer to Articles 2414.04 and 2414.05 for all concrete barrier railing specifications. Also, Articles 2414.04 and 2414.05 were revised to more clearly define that end sections and transition sections are included in the length and not paid for separately.

Specification Section Recommended Text:

Article 2513.04, Method of Measurement.

Replace Article A, **Add** a new Article B, and **Renumber** articles B and C:

A. Concrete Barrier: linear feet (meters) shown in the contract documents, based on the contract quantity from end to end of the barrier ~~including~~ excluding end sections, width transition sections, and height transitions sections.

B. End sections, width transition sections, and height transition sections: By count for each type of end section, width transition section, or height transition section.

~~B~~C. Reinforcement in concrete barrier for bridge structures: as provided in Article 2404.04.

~~C~~D. Reinforcement in concrete barrier for other than bridge structures will not be measured separately.

Article 2513.05, Basis of Payment.

Add a new Article B and **Renumber** articles B, C, and D:

B. End sections, width transition sections, and height transition sections: Each for the type of end section, width transition section, or height transition section specified.

~~B~~C. Reinforcement in concrete barrier for new bridge structures: as provided in Article 2404.05. The quantities will be included in the quantities for the superstructure or abutments.

~~C~~D. Reinforcement in retrofit concrete barrier: not paid for separately.

~~D~~E. Payment as described above is considered full compensation for all work involved.

Comments:

Member's Requested Change: **(Do not use 'Track Changes', or 'Mark-Up'. Use ~~Strikeout~~ and Highlight.)**

2513.04, Method of Measurement.

Replace Article A with:

A. Concrete Barrier: linear feet (meters) shown in the contract documents, based on the contract quantity from end to end of the barrier ~~including~~ excluding end sections, width transition sections, and height transitions sections.

Add a new Article B:

B. End sections, width transition sections, and height transition sections: By count for each type of end section, width transition section, or height transition section.

Renumber Articles B and C as Articles C and D.

2513.05, Basis of Payment.

Add a new Article B:

B. End sections, width transition sections, and height transition sections: Each for the type of end section, width transition section, or height transition section specified.

Renumber Articles B, C, and D as Articles C, D, and E.

Reason for Revision: End sections, width transition sections, and height transition sections will no longer be included in the length of concrete barrier. They will be paid for separately.					
County or City Input Needed (X one)			**Yes**	**No** X	
Comments:					
Industry Input Needed (X one)			**Yes**	**No** X	
Industry Notified:	**Yes**	**No**	**Industry Concurrence:**	**Yes**	**No**
Comments:					

SPECIFICATION REVISION SUBMITTAL FORM

Submitted by: John Smythe	**Office:** Construction	**Item 17**
Submittal Date: September 16, 2009	**Proposed Effective Date:** April 2010	
Article No.: 2528.04 H. and 2528.04 I **Title:** Method of Measurement (Traffic Control) **Article No.:** 2528.05 H. and 2528.05 I **Title:** Basis of Payment (Traffic Control)	**Other:**	

Specification Committee Action: Approved with changes.

Deferred:	**Not Approved:**	**Approved Date:** 11/12/2009	**Effective Date:** 4/20/2010

Specification Committee Approved Text:

2528.04, H, Pilot Cars.

Replace Items 1 and 2:

1. By count for the number of ~~days each~~ pilot cars ~~was~~ used during each work shift. A shift is a scheduled period of work for the Contractor's operations.

2. For a pilot car to be counted:
   a. Use of the pilot car is necessary and it is used as part of preplanned work that is started that ~~day~~ shift and is intended to proceed for a major part of the ~~day~~ shift. If used less than 4 hours ~~in a calendar day~~ during a shift, ~~operation will be counted as a half-day~~ one half pilot car will be counted. ~~If a pilot car is used for more than 16 hours in a calendar day, the pilot car will be counted as 2 days.~~
   b. Use of other pilot cars is necessary and they are used for at least 1 hour during the ~~day~~ shift, perhaps intermittently, and this shall be the primary duty of the employee. If used less than 4 hours in a ~~calendar day~~ shift, ~~the~~ one-half pilot car will be counted ~~as a half-day~~.

2528.04, I, Flaggers.

Replace Items 1 and 2:

1. By count for the number of ~~days each~~ flaggers ~~was~~ used during each work shift. A shift is a scheduled period of work for the Contractor's operations.

2. For flaggers to be counted:
   a. Use of the flaggers is necessary and they are used as part of preplanned work that is started that ~~day~~ shift and is intended to proceed for a major part of the ~~day~~ shift. If used less than 4 hours ~~in a calendar day~~ during a shift, ~~the~~ one-half flagger will be counted ~~as a half-day~~.
   b. Use of other flaggers is necessary and they are used for at least 1 hour during the ~~day~~ shift, perhaps intermittently, and this shall be the primary duty of the employee. If used less than 4 hours in a ~~calendar day~~ shift, ~~the~~ one-half flagger will be counted ~~as a half-day. If a flagger is used for more than 16 hours in a calendar day, the flagger will be counted as 2 days.~~

2528.05, H, Pilot Cars.

Replace the article:

Predetermined contract unit price per ~~day~~ each for the number of ~~days~~ shifts each pilot car was operated.

2528.05, I, Flaggers.

Replace Item 1:

1. Predetermined contract unit price per ~~day~~ each for the number of ~~days~~ shifts each flagger was used.

Comments: It was decided that a definition for "shift" should be included in the specification.

Specification Section Recommended Text:

2528.04, H, Pilot Cars.

Replace Items 1 and 2:

1. By count for the number of ~~days each~~ pilot cars ~~was~~ used during each work shift.

2. For a pilot car to be counted:
   a. Use of the pilot car is necessary and it is used as part of preplanned work that is started that ~~day~~ shift and is intended to proceed for a major part of the ~~day~~ shift. If used less than 4 hours ~~in a calendar day~~ during a shift, ~~operation will be counted as a half-day~~ one half pilot car will be counted. ~~If a pilot car is used for more than 16 hours in a calendar day, the pilot car will be counted as 2 days.~~
   b. Use of other pilot cars is necessary and they are used for at least 1 hour during the ~~day~~ shift, perhaps intermittently, and this shall be the primary duty of the employee. If used less than 4 hours in a ~~calendar day~~ shift, ~~the~~ one-half pilot car will be counted ~~as a half-day~~.

2528.04, I, Flaggers.

Replace Items 1 and 2:

1. By count for the number of ~~days each~~ flaggers ~~was~~ used during each work shift.

2. For flaggers to be counted:
   a. Use of the flaggers is necessary and they are used as part of preplanned work that is started that ~~day~~ shift and is intended to proceed for a major part of the ~~day~~ shift. If used less than 4 hours ~~in a calendar day~~ during a shift, ~~the~~ one-half flagger will be counted ~~as a half-day~~.
   b. Use of other flaggers is necessary and they are used for at least 1 hour during the ~~day~~ shift, perhaps intermittently, and this shall be the primary duty of the employee. If used less than 4 hours in a ~~calendar day~~ shift, ~~the~~ one-half flagger will be counted ~~as a half-day. If a flagger is used for more than 16 hours in a calendar day, the flagger will be counted as 2 days.~~

2528.05, H, Pilot Cars.

Replace the article:

Predetermined contract unit price per ~~day~~ each for the number of ~~days~~ shifts each pilot car was operated.

2528.05, I, Flaggers.

Replace Item 1:

1. Predetermined contract unit price per ~~day~~ each for the number of ~~days~~ shifts each flagger was used.

Comments:

Member's Requested Change: **(Do not use 'Track Changes', or 'Mark-Up'. Use ~~Strikeout~~ and Highlight.)**

2528.04 METHOD OF MEASUREMENT.

Measurement will be as follows:

H. Pilot Cars.

1. By count for the number of ~~days each~~ pilot cars ~~was~~ used during each work shift.

2. For a pilot car to be counted:
- **a.** Use of the pilot car is necessary and it is used as part of preplanned work that is started that ~~day~~ shift and is intended to proceed for a major part of the ~~day~~ shift. If used less than 4 hours ~~in a calendar day~~ during a shift, ~~operation will be counted as a half day,~~ one half pilot car will be counted. ~~If a pilot car is used for more than 16 hours in a calendar day, the pilot car will be counted as 2 days.~~
- **b.** Use of other pilot cars is necessary and they are used for at least 1 hour during the ~~day~~ shift, perhaps intermittently, and this shall be the primary duty of the employee. If used less than 4 hours in a ~~calendar day~~ shift, ~~the~~ one-half pilot car will be counted ~~as a half day~~.

3. Short time, emergency, or relief assignment of employees to pilot car operations will not be counted separately.

I. Flaggers.

1. By count for the number of ~~days each~~ flagger**s** ~~was~~ used during each work shift.

2. For flaggers to be counted:
- **a.** Use of the flaggers is necessary and they are used as part of preplanned work that is started that ~~day~~ shift and is intended to proceed for a major part of the ~~day~~ shift. If used less than 4 hours ~~in a calendar day~~, during a shift, ~~the~~ one-half flagger will be counted ~~as a half day~~.
- **b.** Use of other flaggers is necessary and they are used for at least 1 hour during the ~~day~~ shift, perhaps intermittently, and this shall be the primary duty of the employee. If used less than 4 hours in a ~~calendar day~~ shift, ~~the~~ one-half flagger will be counted ~~as a half day. If a flagger is used for more than 16 hours in a calendar day, the flagger will be counted as 2 days.~~

3. Short time, emergency, or relief assignment of employees to flagging operations will not be counted separately.

2528.05 BASIS OF PAYMENT.

Payment will be at the contract unit price as described below. When the Engineer requires recleaning of reflectorized surfaces of traffic control devices, payment will be made as extra work according to Article 1109.03, B. All traffic control devices furnished by the Contractor remain the Contractor's property at the completion of the work and are to be removed from the site when no longer needed.

H. Pilot Cars.

Predetermined contract unit price per ~~day~~ each for the number of ~~days~~ shifts each pilot car was operated.

I. Flaggers.

1. Predetermined contract unit price per ~~day~~ each for the number of ~~days~~ shifts each flagger was used.

2. Payment is full compensation for providing trained flaggers according to Article 2528.03, K.

Reason for Revision: To clarify and simplify how pilot cars are to be measured for payment. The current Method of Measurement, by calendar day, is not appropriate for projects requiring night work.

County or City Input Needed (X one)			**Yes**	**No** X	
Comments:					
Industry Input Needed (X one)			**Yes** X	**No**	
Industry Notified:	**Yes** X	**No**	**Industry Concurrence:**	**Yes**	**No**
Comments:					

SPECIFICATION REVISION SUBMITTAL FORM

Submitted by: John Smythe / Kevin Merryman	**Office:** Construction	**Item 18**
Submittal Date: October 29, 2009	**Proposed Effective Date:** April 2010	
Article No.: 2529.05, A, 2, c **Title:** Basis of Payment (Full Depth Finish Patches, by Area)	**Other:**	

Specification Committee Action: Approved as is.

Deferred:	**Not Approved:**	**Approved Date:** 11/12/2009	**Effective Date:** 4/20/2010

Specification Committee Approved Text: See Specification Section recommended text.

Comments: No comments.

Specification Section Recommended Text:

Article 2529.05, A, 2, Full Depth Finish Patches, by Area.

Replace Item c

When the average thickness of ~~the existing pavement~~ a patch at any one ~~patch~~ location varies from the patch thickness shown in the plans, the square yard (square meter) patching quantity will be adjusted per Table 2529.05-1.Quantities will be increased when ~~pavement~~ patch thickness is greater than shown in the plans and decreased when less than shown in the plans. Adjustments will not be made for increased thickness due to damaged subgrade, base, or subbase as described in Article 2529.03, D, 2.

Comments:

Member's Requested Change (Redline/Strikeout):

c. When the average thickness of ~~the existing pavement~~ a patch at any one ~~patch~~ location varies from the patch thickness shown in the plans, the square yard (square meter) patching quantity will be adjusted per Table 2529.05-1. Quantities will be increased when ~~pavement~~ patch thickness is greater than shown in the plans and decreased when less than shown in the plans. Adjustments will not be made for increased thickness due to damaged subgrade, base, or subbase as described in Section 2529.03, D, 2.

Reason for Revision: The current specification language does not work as intended when the design patch thickness varies from the existing pavement thickness. The change will allow for adjustment of payment when the placed patch varies from the plan patch thickness.

County or City Input Needed (X one)	**Yes**	**No** X
Comments:		

Industry Input Needed (X one)			**Yes** X	**No**	
Industry Notified:	**Yes** X	**No**	**Industry Concurrence:**	**Yes**	**No**
Comments: Industry had no comments.					

SPECIFICATION REVISION SUBMITTAL FORM

Submitted by: Jim Berger / Scott Schram	**Office:** Materials	**Item 19**
Submittal Date: October 29, 2009	**Proposed Effective Date:** April 2010 GS	
Section No.: 4137 **Title:** Asphalt Binder	**Other:**	

Specification Committee Action: Approved as is.

Deferred:	**Not Approved:**	**Approved Date:** 11/12/2009	**Effective Date:** 4/20/2010

Specification Committee Approved Text: See Specification Section recommended text and **Article 4137.01, General Requirements.**

Replace the second sentence of article B:

Determine performance grade according to AASHTO ~~PP 6~~ R 29.

Comments: No comments.

Specification Section Recommended Text:

Article 4137.01, General Requirements.

Add new article:

D. For asphalt binder grades with a temperature spread of 92° or greater, use binders that meet the PG+ requirements established by the Combined State Binder Group as follows:

Table 4137.01-1: PG+ Requirements

Temperature Spread[1,2]	92	98	104
Elastic Recovery: AASHTO T 301 at 77° F. (RTFO Aged AASHTO T 240)	65% min.	65% min.	65% min.
DSR Phase Angle; degrees (original binder)	77.0 max.	75.0 max.	73.0 max.

[1] Temperature spread is determined by subtracting low temperature from high temperature; for example PG 64-28: 64 - (-28) = 92

[2] When a grade change is required to compensate for binder in recycled materials, the virgin binder provided shall meet the above requirements for the original grade specified in the contract documents.

Comments:

Member's Requested Change: (Do not use '**Track Changes**', or '**Mark-Up**'. Use ~~**Strikeout**~~ and **Highlight**.)

Add the following

D. For asphalt binder grades with a temperature spread of 92 degrees or greater, use binders that meet the PG+ requirements established by the Combined State Binder Group as follows:

Table 4137.01-1: PG+ Requirements

Temperature Spread[1,2]	92	98	104
Elastic Recovery: AASHTO T301 at 77° F. (RTFO Aged AASHTO T240)	65% min.	65% min.	65% min.
DSR Phase Angle; degrees (original binder)	77.0 max.	75.0 max.	73.0 max.

[1] Temperature spread is determined by subtracting low temperature from high temperature; for example PG 64-28: 64 – (-28) = 92

[2] When a grade change is required to compensate for binder in recycled materials, the virgin binder provided must meet the above requirements for the original grade specified in the contract documents.

Reason for Revision: When a polymer modified asphalt (PMA) is specified, this test will confirm the

presence of a polymer.					
County or City Input Needed (X one)			**Yes**	**No** X	
Comments: Local systems has been contacted and concur with the use of Certified RAP.					
Industry Input Needed (X one)			**Yes**	**No** X	
Industry Notified:	**Yes** X	**No**	**Industry Concurrence:**	**Yes**	**No**
Comments:					

SPECIFICATION REVISION SUBMITTAL FORM

Submitted by: Jim Berger	**Office:** Materials	**Item 20**
Submittal Date: 10-25-09	**Proposed Effective Date:** April 2010	
Section No.: 4184. **Title:** Reflectorizing Spheres for Traffic Paint	**Other:**	

Specification Committee Action: Approved as is.

Deferred:	**Not Approved:**	**Approved Date:** 11/12/2009	**Effective Date:** 4/20/2010

Specification Committee Approved Text: See Specification Section recommended text.

Comments: No comments.

Specification Section Recommended Text:

Article 4184.01, Description

Replace Article A:

A. This specification covers two types of glass spheres, dual coated and single ~~un~~coated, for the production of reflectorized pavement markings.

- Waterborne and VOC compliant solvent borne traffic paint: use dual coated beads (silicone and silane).
- Epoxy pavement markings: use silicone only coated beads (no silane).
- ~~VOC compliant, solvent borne paint: use uncoated beads.~~

Add as the first sentence of Article B:

The glass beads must not exhibit a characteristic of toxicity, relative to heavy metals when tested in accordance with EPA 40CFR 261.24.

Article 4184.02, A, Gradation.

Replace Table 4184.02-1: Gradation Requirements (Glass Spheres):

Sieve Size	Percent Passing
16 (1180 µm)	100
20 (850 µm)	~~95-100~~ 90-100
30 (600 µm)	~~75-95~~ 50-75
40 (425 µm)	15-45
50 (300 µm)	~~15-35~~ 0-15
80 (180 µm)	0-5
~~100 (150 µm)~~	~~0-5~~

Article 4184.02, F, Properties of Uncoated Spheres.

Delete the article:

~~**F. Properties of Uncoated Spheres.**~~

~~Passes the free flow test.~~

Comments:

Member's Requested Change: (Do not use 'Track Changes', or 'Mark-Up'.Use ~~Strikeout~~ and Highlight.

4184.01

A. This specification covers two types of glass spheres, dual coated and single ~~un~~coated for the production of reflectorized pavement markings.

. Waterborne and VOC compliant solvent borne traffic paint : use dual coated beads(silicone and silane)

.

. ~~VOC compliant, solvent borne paint : use uncoated beads.~~

B. The glass beads must not exhibit a characteristic of toxicity, relative to heavy metals when tested in accordance with EPA 40CFR 261.24.

Use transparent …….

4184.02

A. Gradation.

Table 4184.02-1: Gradation Requirements (Glass Spheres)

Sieve Size	Percent Passing
16 (1180 mi m)	100
20 (850)	~~95-100~~ 90-100
30 (600)	~~75-95~~ 50-75
40 (425)	15-45
50 (300)	~~15-35~~ 0-15
80 (180)	0-5
100 (150)	~~0-5~~ -----

~~F. Properties of Uncoated Spheres.~~

~~Passes the free flow test.~~

Reason for Revision:

Small amounts of solvent based paint used in low temperatures does not justify warehousing a different class of beads.

The possibility of heavy metal contaminated glass beads was overlooked earlier.

A coarser gradation of beads to get better retroreflectivity has been adopted by AASHTO and the DOT crews have used it for the past 3 years with better results.

County or City Input Needed (X one)			Yes	No	
Comments:					
Industry Input Needed (X one)			Yes	No	
Industry Notified:	Yes	No	Industry Concurrence:	Yes	No
Comments:					

SPECIFICATION REVISION SUBMITTAL FORM

Submitted by: Jim Berger / Scott Schram	**Office:** Materials	**Item 21**
Submittal Date: October 29, 2009	**Proposed Effective Date:** January 2010	
Article No.: New DS for Recycled Asphalt Materials **Title:** Recycled Asphalt Materials	**Other:**	

Specification Committee Action: Approved with changes.			
Deferred:	**Not Approved:**	**Approved Date:** 11/12/2009	**Effective Date:** 1/20/2010

Specification Committee Approved Text: See attached DS-090XX, Recycled Asphalt Shingles and SS-090XX, Recycled Asphalt Pavement.

Comments: The DS will be changed to Recycled Asphalt Shingles and the SS for Recycled Asphalt Pavement will be updated until it can be incorporated into the GS in April. This way, the DS can be applied only when it is desired to use RAS.

Specification Section Recommended Text: See attached DS-090XX, Recycled Asphalt Materials.

Comments: Will this replace SS-09006?

Member's Requested Change: (Do not use **'Track Changes'**, or **'Mark-Up'**. Use ~~**Strikeout**~~ and **Highlight**.)

Please find the attached developmental specification document

Reason for Revision: We have increased the use of unclassified RAP (provide additional uniformity testing), and are adding it as a middle tier termed "Certified". We are also implementing the use of recycles asphalt shingles (RAS) on a developmental basis. The use of these two materials has been combined to a single specification.

County or City Input Needed (X one)	**Yes** X	**No**
Comments: Local systems has been contacted and concur with the use of Certified RAP.		

Industry Input Needed (X one)			**Yes** X	**No**	
Industry Notified:	**Yes** X	**No**	**Industry Concurrence:**	**Yes** X	**No**
Comments: APAI is encouraging the DS to be approved					

DS-090XX
(New)

Iowa Department of Transportation

DEVELOPMENTAL SPECIFICATIONS
FOR
RECYCLED ASPHALT SHINGLES (RAS)

Effective Date
January 20, 2009

THE STANDARD SPECIFICATIONS, SERIES 2009, ARE AMENDED BY THE FOLLOWING MODIFICATIONS AND ADDITIONS. THESE ARE DEVELOPMENTAL SPECIFICATIONS AND THEY SHALL PREVAIL OVER THOSE PUBLISHED IN THE STANDARD SPECIFICATIONS.

Add the following to Article 2303.02, Materials:

F. Recycled Asphalt Shingles (RAS)

1. Pre-consumer or post-consumer shingles that have been processed, sized, and ready for incorporation into an asphalt mixture constitute RAS material. Other than explicitly stated in this subsection and Appendix A, use RAS according to the same requirements as prescribed for RAP material.

2. Use between 2% and 5% RAS by weight of total aggregate. Consider the percentage of RAS used part of the maximum allowable RAP percentage.

3. RAS shall come from an approved supplier designated in Materials I.M. 506 Appendix A.

Add the following to Article 2303.04, Method of Measurement:

I. Recycled Asphalt Shingles (RAS)
Two-thirds (67%) of the asphalt binder from RAS which is incorporated into the mixture will be included in the quantity of asphalt binder used.

Replace item 2 of Article 2303.05, B, Asphalt Binder:

2. Payment for asphalt binder will be for new asphalt binder, ~~and~~ the asphalt binder in the RAP which is incorporated in the mixture, and two-thirds (67%) of the asphalt binder from RAS which is incorporated into the mixture. The quantity of asphalt binder in ~~classified or unclassified RAP~~ RAM, which is incorporated into the mix, will be calculated in tons (megagrams) of asphalt binder in the ~~RAP~~ RAM. This will be based on the actual asphalt binder content determined for the mix design from the results of the Engineer's extraction test.

Appendix A – Instructions for RAS in HMA Mixtures

GENERAL
This Appendix describes requirements for processing, storing, documenting, and sampling & testing of RAS intended for use in asphalt mixtures.

All notifications and documentation shall be submitted to the District Materials Engineer based on the District responsible for the location of the initial RAS stockpile.

PROCESSING
End users of RAS which also receive raw, unprocessed shingles and process the material for incorporation into an asphalt mixture, shall be considered a shingle Supplier and must adhere to Materials I.M. 506.

STORAGE
Stockpiles shall be placed on a base with adequate drainage sufficient to prevent contamination.

Separately stockpile pre-consumer RAS from post-consumer (tear-off) RAS. RAS may be pre-blended with RAP under the direction of the Engineer. Notify the Engineer and District Materials Engineer 48 hours prior to blending RAS materials with other materials or adding to a RAS stockpile. The Engineer may require verification testing for asphalt content, gradation, aggregate specific gravity, aggregate absorption, and fine aggregate angularity before the pile may be used.

All RAS stockpiles shall be identified by maps of stockpile areas and signs placed in or near each stockpile.

STOCKPILE DOCUMENTATION
The following documentation is required for owners of stockpiled RAS:

- Form 82009ras (see Appendix B) is completed by the stockpile owner and a copy is forwarded to the District Materials Engineer within 10 calendar days of completing the stockpile.
- Any special handling, treatment or conditions of the RAS should be described on this form.
- A record of addition and consumption of the RAS stockpile should be documented on this form.
- Maps shall provide details that depict the stockpile site, including adjacent stockpiles of RAP or aggregates, permanent plant equipment, and landmarks.
- Maps and signs shall identify the stockpile by RAP Identification Number.

The District Materials Engineer will review forms for accuracy. Portions of the form including assigning the stockpile identification number, average values for extracted aggregate gradation, aggregate bulk specific gravity, aggregate absorption and asphalt binder content will be completed by the District Materials Engineer.

Notify the District Materials Engineer at least 48 hours before relocating or reprocessing a RAS stockpile for future use (not intended for a specific project). The notification shall include the estimated quantity of RAS being relocated or reprocessed and the new location of the stockpile. Relocation of RAS shall be reported on the appropriate Form (820009ras) and submitted to the District Materials Engineer within 10 calendar days of completing the relocation. Reprocessing a RAS stockpile may require additional sampling, testing, and a new Form (820009ras) with reassignment of a RAS Identification Number.

Before January 1st of each year, the Contractor shall update Form 820009ras on the status of each RAS stockpile. Report the estimated quantity of RAS removed for the construction season completed and the available RAS in each stockpile for future use.

SAMPLING AND TESTING
Mix Design
A certified Level I Aggregate Technician shall obtain the samples. Samples for mix design testing shall be obtained from at least 3 locations. A sampling plan shall be developed by the Contractor and approved by the District Materials Engineer prior to sampling.

Obtain sufficient material for contractor mix design testing and owner agency extraction testing as recommended in Materials I.M. 510. A representative 30 pound (15 kg) sample split from the total sample shall be delivered to the District Materials Laboratory for extraction testing. Results of the extraction test will be provided to the Contractor within 4 weeks of sample delivery.

Include asphalt content, gradation, aggregate specific gravity, fine aggregate angularity and absorption of the RAS material in testing.

In lieu of a sieve analysis, the following gradation may be assumed for the RAS aggregate:

Shingle Aggregate Gradation	
Sieve Size	Percent Passing by Weight
3/8 in. (9.5 mm)	100
No. 4 (4.75 mm)	95
No. 8 (2.36 mm)	85
No. 16 (1.18 mm)	70
No. 30 (600 µm)	50
No. 50 (300 µm)	45
No. 100 (150 µm)	35
No. 200 (75 µm)	25

Appendix B –RAS Stockpile Report (Form 820009ras)

820009ras (January 2010)

RAS Stockpile Report	**RAS Stockpile ID #**
Stockpile Owner:	

SOURCE OF RAS

☐ **Post Consumer Scrap (Tear-offs)** ☐ **Post Manufactured Scrap**

LOCATION OF RAS STOCKPILE:

County	Section	Township	Range

Description of stockpile base:

Processing remarks:

STOCKPILE INVENTORY LOG

RAS Addition			RAS Consumption		
Date	Quantity	Supplier	Date	Quantity	Disposition (Project No. and use)
					Total initial stockpile quantity

Average EXTRACTION TEST RESULTS

Gradation	Lab Report nos.
3 / 4	Moisture % =
1 / 2	
3 / 8	Pb =
No. 4	
No. 8	Gsb =
No. 16	
No. 30	Abs% =
No. 50	
No. 100	FAA =
No. 200	

Shaded boxes to be completed by the District Materials Engineer

Stockpile Owner Representative		Date
District Materials Representative		Date

SS-090XX
(Replaces SS-09006)

Iowa Department of Transportation

SUPPLEMENTAL SPECIFICATIONS
FOR
RECYCLED ASPHALT PAVEMENT (RAP)

Effective Date
January 20, 2010

THE STANDARD SPECIFICATIONS, SERIES 2009, ARE AMENDED BY THE FOLLOWING MODIFICATIONS AND ADDITIONS. THESE ARE SUPPLEMENTAL SPECIFICATIONS AND THEY SHALL PREVAIL OVER THOSE PUBLISHED IN THE STANDARD SPECIFICATIONS.

This specification applies to projects on the Primary Road System only. It may apply to other projects when specifically identified in the contract documents.

Replace all of Article 2303.02, C with the following:

C. Recycled Asphalt Pavement (RAP)

RAP is salvaged asphalt pavement. RAP shall be from a source designated in the contract documents, a Classified RAP stockpile, a Certified RAP stockpile, or Unclassified RAP furnished by the Contractor. The designations Classified, Certified, and Unclassified are exclusively for the use of RAP in HMA.

~~The Contractor shall identify~~ Identify each RAP stockpile and document Classified and Certified RAP stockpiles as directed in Appendix A. Information required for documentation of Classified RAP material in a stockpile for future use in HMA shall include identification of the project from which the material was removed; mix data from the original project including mixture type, aggregate classification, location and depth in the pavement structure; extracted gradation information, if available; and description of stockpile location and quantity. Additional material shall not be added to a Classified or Certified RAP stockpile without the approval of the District Materials Engineer.

The Engineer may reject a RAP stockpile for non-uniformity based on visual inspection. Stockpiles shall be worked in such a manner that the materials removed are representative of a cross section of the pile.

~~Stockpiles of RAP shall be placed~~ Place stockpiles on a base sufficient to prevent contamination as directed in Appendix A. RAP stockpiles containing concrete chunks, grass, dirt, wood, metal, coal tar, or other foreign or environmentally restricted materials shall not be used. RAP stockpiles may include PCC (not to exceed 10% of the stockpile) from patches or composite pavement that was milled as part of the asphalt pavement.

When RAP is taken from a project, or is furnished by the Contracting Authority, the contract documents will indicate quantity of RAP expected to be available and test information, if known. The Contractor is responsible for salvaging this material. Unless otherwise specified in the contract documents, RAP not used in HMA shall become the property of the Contractor.

For HMA mix design purposes, the Contracting Authority will test samples of the RAP. The aggregate gradation and amount of asphalt binder in the RAP will be based on the Contract Authority's extraction tests. When the amount of ~~RAP~~ recycled binder exceeds 20% of the total asphalt binder, change the asphalt binder grade as directed in Materials IM 510.

1. Classified RAP.
Classified RAP is from a documented source with the aggregate meeting the appropriate quality requirements in Materials IM 510, and properly stockpiled.

~~Classified RAP may be used in the base, intermediate, and surface mixtures for which the RAP aggregate qualifies. The surface course may use up to 15% of Classified RAP. The Contractor may use more than 15% of Classified RAP for the surface course when there is quality control sampling and testing of the RAP meeting the requirements in Appendix A. Not more than 30% of the total asphalt binder in the surface mix shall come from the RAP.~~

Classified RAP may be used in the base, intermediate, and surface mixtures for which the RAP aggregate qualifies in accordance with Appendix C.

Credit for the +4 proportion of friction aggregate may be given for virgin aggregates used in the original pavement to be reclaimed. Types 4 and 5 frictional aggregate content in the RAP may be given full credit, while Types 2 and 3 content may be given credit for half the proportion in the original pavement. Credit may be used toward the total frictional aggregate requirement. No frictional credit shall be given beyond one generation of the RAP's service life.

2. Certified RAP.
Any stockpiled RAP not meeting the requirements of Classified RAP or from an unknown source may be given a Certified status when meeting quality control sampling and testing requirements in Appendix A. Certified RAP may be used in accordance with Appendix C.

~~2~~3. Unclassified RAP.
Any stockpiled RAP not meeting the requirements of Classified RAP or Certified RAP shall be designated as Unclassified RAP. ~~For Interstate and Primary projects, up to 10% Unclassified RAP may be used in HMA base and shoulder mixtures. For Primary projects, up to 10% Unclassified RAP may be used for equal to or less than 1,000,000 ESAL intermediate mixtures. For all other projects, up to 10% Unclassified RAP may be used in HMA base, intermediate, and shoulder mixtures.~~ Unclassified RAP may be used in accordance with Appendix C. ~~There will be no~~ No frictional aggregate credit or aggregate crushed particles credit will be given for Unclassified RAP.

When an Unclassified RAP stockpile is characterized by sampling and testing for mix design, no material can be added to the stockpile until the project is completed.

Replace all of Article ~~2303.05~~ 2303.04, C with the following:

C. Recycled Asphalt Pavement.
~~The quantity of asphalt binder in classified or unclassified RAP, which is incorporated into the mix, will be calculated in tons (megagrams) of asphalt binder in the RAP, based on the actual asphalt binder content determined for the mix design from the results of the Engineer's extraction test.~~

~~The quantity of asphalt binder in classified or unclassified RAP, which is incorporated into the mix, will be included in the quantity of asphalt binder used.~~

1. A completed Daily HMA Plant Report with the certification statement is required for measurement and payment for Contractor Certified HMA. The quantity of asphalt binder will be based on the approved JMF and any plant production quality control adjustments.

2. The quantity of asphalt binder in RAP that is incorporated into the mix will be calculated in tons (megagrams) of asphalt binder in the RAP. This quantity shall be based on the actual asphalt binder content determined for the mix design from the results of the Engineer's extraction tests.

3. The quantity of asphalt binder in RAP, which is incorporated into the mix, will be included in the quantity of asphalt binder used.

~~**Replace** the second paragraph of Article 2303.06, B with the following:~~

~~Payment for asphalt binder will be for all new asphalt binder and the asphalt binder in the RAP which is incorporated in the mixture.~~

~~The quantity of asphalt binder in classified or unclassified RAP, which is incorporated into the mix, will be calculated in tons (megagrams) of asphalt binder in the RAP. This will be based on the actual asphalt binder content determined for the mix design from the results of the Engineer's extraction test.~~

Replace item 2 of Article 2303.05, B with the following:

2. Payment for asphalt binder will be for new asphalt binder and the asphalt binder in the RAP which is incorporated in the mixture. The quantity of asphalt binder in RAP, which is incorporated into the mix, will be calculated in tons (megagrams) of asphalt binder in the RAP. This will be based on the actual asphalt binder content determined for the mix design from the results of the Engineer's extraction test.

Appendix A – Instructions for RAP in HMA Mixtures (Supersedes Materials IM 505)

GENERAL
This Appendix describes requirements for processing, storing, documenting, and sampling & testing of RAP intended for use in HMA mixtures.

All notifications and documentation shall be submitted to the District Materials Engineer based on the District responsible for the location of the initial RAP stockpile.

PROCESSING
RAP suitable for HMA shall be processed by milling and/or crushing to a maximum particle size of 1.5 inches (37.5 mm). The Contractor shall notify the Engineer and District Materials Engineer 48 hours before processing begins.

Additional screening or blending may be done to achieve a more uniform stockpile. This processing may be done as the stockpile is built or as part of the HMA plant production. Additional actions that may improve the consistency of the RAP include further crushing to reduce top size, screening into coarse and fine fractions, or blending by proportioning through a two-bin cold feed.

STORAGE
Placed stockpiles on a base with adequate drainage, constructed in layers to minimize RAP segregation and ensure a workable face.

To meet Classified RAP criteria, separate stockpiles shall be constructed for each source of RAP based on the quality of aggregate, type and quantity of asphalt binder, and size of processed material. ~~The Contractor shall notify~~ Notify the Engineer and District Materials Engineer 48 hours prior to blending Classified or Certified RAP materials of the same source, type and quantity of asphalt binder, and size of processed material to retain Classified or Certified status.

All RAP stockpiles shall be identified by maps of stockpile areas and signs placed in or near each stockpile.

DOCUMENTATION of CLASSIFIED RAP STOCKPILES
Stockpiled RAP material will only ~~be considered Classified RAP~~ retain its Classified or Certified status when the following documentation requirements are met. No documentation is required when the RAP is used on the project it came from, or a tied project.

- Form 820009r (see Appendix B) is completed by the RAP owner and a copy is forwarded to the District Materials Engineer within 10 calendar days of completing the stockpile.
- Any special handling, treatment or conditions of the RAP or its use should be described on this form.
- Maps shall provide details that depict the stockpile site, including adjacent stockpiles of RAP or aggregates, permanent plant equipment, and landmarks.
- Maps and signs shall identify the stockpile by RAP Identification Number.

The District Materials Engineer will review ~~Form 82009r~~ forms for accuracy. Portions of the form including assigning the RAP identification number, aggregate quality type, crushed particle and friction type credit, average values for extracted aggregate gradation, aggregate bulk specific gravity, aggregate absorption and asphalt binder content will be completed by the District Materials Engineer.

Notify the District Materials Engineer at least 48 hours before relocating or reprocessing a Classified RAP or Certified RAP stockpile for future use (not intended for a specific project). The notification shall include the estimated quantity of RAP being relocated or reprocessed and the new location of the stockpile. Relocation of RAP shall be reported on the appropriate Form (820009r) and submitted to the District Materials Engineer within 10 calendar days of completing the relocation. Reprocessing a Classified RAP or Certified RAP stockpile may require additional sampling, testing, and a new Form (820009r) with

reassignment of a RAP Identification Number.

Before January 1st of each year, the Contractor shall update Form 820009r on the status of each Classified RAP and Certified RAP stockpile. Report the estimated quantity of RAP removed for the construction season completed and the available RAP in each stockpile for future use.

SAMPLING AND TESTING

Mix Design

A certified Level I Aggregate Technician shall obtain the samples. Samples for mix design testing shall be obtained from at least 3 locations. Significant mixture differences in the pavement to be recycled may require separate stockpiles and samples. A sampling plan shall be developed by the Contractor and approved by the District Materials Engineer prior to sampling.

Samples for mix design obtained from the RAP stockpile are the most representative, but not always possible when the mix designs are performed. When stockpile samples are not available, RAP samples shall be obtained by milling a minimum of 50 feet (15 m) of project length at each sample location. Other methods of sampling for mix design, including coring or air-hammer patch areas, may only be used with the approval of the District Materials Engineer.

Obtain sufficient material for contractor mix design testing and owner agency RAP extraction testing as recommended in Materials I.M. 510. A representative 30 pound (15 kg) sample split from the total sample shall be delivered to the District Materials Laboratory for extraction testing. Results of the extraction test will be provided to the Contractor within 4 weeks of sample delivery.

Classified RAP Quality Control

When RAP quality control is required, use one of the following quality control sampling programs. A certified Level I Aggregate Technician shall obtain the samples.

- Stockpiles – The Contractor shall obtain a representative sample of RAP from the stockpile for each 1000 tons of RAP placed in the stockpile.
- HMA Plant – The Contractor shall obtain a representative sample of RAP from the HMA plant RAP feed belt for each lot of HMA produced.

The Contractor shall use the ignition oven (Materials IM 338) or chemical extraction (AASHTO T 164) to extract the aggregate from the RAP sample. Calibration of the asphalt binder content from the ignition oven extraction is not required for the RAP quality control program. The gradation of the extracted RAP aggregate and the un-calibrated asphalt binder content shall be logged and charted within 24 hours of sampling. Report results to the District Materials Engineer upon completion of testing.

Certified RAP Quality Control

To retain Certified RAP status, the stockpile shall be uniform in gradation and binder content. Perform ignition oven (Materials IM 338) or chemical extraction (AASHTO T164) testing for aggregate gradation and binder content at 1/1000 tons as the stockpile is built or during processing of the stockpile. Regardless of tonnage, a minimum of three tests shall be required. Interior samples from the stockpile cross section shall be included in quality control testing. Use a consistent test procedure for obtaining binder content and gradation. Perform and report aggregate specific gravity and absorption testing at the above frequencies. Retain a split portion of each sample for testing by the Iowa DOT. The Iowa DOT will select a sample to test for verification. Log, chart, and report all test results to the DME.

Gradation and asphalt content uniformity will be based on the following standard deviation requirements:

Property	Maximum Standard Deviation
1 ½ (% Passing)	6.5
1 (% Passing)	6.5
¾ (% Passing)	6.5
⅜ (% Passing)	6.5
#4 (% Passing)	6.5
#8 (% Passing)	6.5
#30 (% Passing)	4.5
#200 (% Passing)	2.2
Asphalt Content (%)	0.70

The DME will provide notification of Certified status when the above requirements are satisfied.

Appendix B -- ~~Classified~~ RAP Stockpile Report (Form 820009r)

820009r (~~December 2005~~ January 2010)

~~Classified~~ RAP Stockpile Report				**RAP Stockpile ID #**	
☐ **Classified** ☐ **Certified**					
Stockpile Owner:					
SOURCE OF RAP (Classified only)	Project No.		Dates of Removal		
Route No.	From Milepost		To Milepost		
Removal Depth	JMF No(s)	Mix Type / Size	Crushed Particle %		

LOCATION OF RAP STOCKPILE:

County	Section	Township	Range

Description of stockpile base:

Processing remarks:

STOCKPILE QUANTITY INVENTORY LOG		
Date	Quantity	Disposition (Project No. and use)
		Total initial stockpile quantity

Average EXTRACTION TEST RESULTS		**Aggregate Characteristics**	
Gradation	Lab Report nos.		
3 / 4	Moisture % =	Aggregate Type	
1 / 2			
3 / 8	Pb =	Crushed Particles	%
No. 4			
No. 8	Gsb =	Aggr Friction Type 2	%
No. 16			
No. 30	Abs% =	Aggr Friction Type 3	%
No. 50			
No. 100	FAA =	Aggr Friction Type 4	%
No. 200			

Shaded boxes to be completed by the District Materials Engineer

Stockpile Owner Representative		Date
District Materials Representative		Date

Appendix C –Allowable RAP Usage

Mix Designation	Aggregate Quality Type	Maximum Allowable Usage[2]		
		Unclassified RAP	Certified RAP	Classified RAP
HMA 100K S-I-B	B	0%	10%	15% (min. 70% virgin binder)[1]
HMA 300K S-I	B	0%	10%	15% (min. 70% virgin binder)[1]
HMA 300K B	B	10%	20%	No Limit
HMA 1M S L-4	A	0%	0%	15% (min. 70% virgin binder)[1]
HMA 1M S	A	0%	0%	15% (min. 70% virgin binder)[1]
HMA 1M I	B	10%	20%	No Limit
HMA 1M B	B	10%	20%	No Limit
HMA 1M B (shoulder)	B	10%	20%	No Limit
HMA 3M S L-4	A	0%	0%	15% (min. 70% virgin binder)[1]
HMA 3M S L-3	A	0%	0%	15% (min. 70% virgin binder)[1]
HMA 3M S	A	0%	0%	15% (min. 70% virgin binder)[1]
HMA 3M I	A	0%	0%	No Limit
HMA 3M B	B	10%	20%	No Limit
HMA 10M S L-3	A	0%	0%	15% (min. 70% virgin binder)[1]
HMA 10M I	A	0%	0%	No Limit
HMA 10M B	B	10%	20%	No Limit
HMA 30M S L-3	A	0%	0%	15% (min. 70% virgin binder)[1]
HMA 30M S L-2	A	0%	0%	15% (min. 70% virgin binder)[1]
HMA 30M I	A	0%	0%	No Limit
HMA 30M B	B	10%	20%	No Limit
HMA 100M S L-2	A	0%	0%	15% (min. 70% virgin binder)[1]
HMA 100M I	A	0%	0%	No Limit
HMA 100M B	B	10%	20%	No Limit

Note:

1. The Contractor may use more than 15% of Classified RAP for the surface course when there is quality control sampling and testing of the RAP meeting the requirements in Appendix A. At least 70% of the total asphalt binder in the surface mix shall be virgin.
2. Maximum percentages shown are not to be combined.