Iowa Department of Transportation

GS-09003

(Replaces GS-09002 and DS-09049)

General Supplemental Specifications for Highway and Bridge Construction

Effective Date
April 19, 2011

THE STANDARD SPECIFICATIONS, SERIES OF 2009, ARE AMENDED BY THE FOLLOWING MODIFICATIONS, ADDITIONS, AND DELETIONS. THESE ARE GENERAL SUPPLEMENTAL SPECIFICATIONS AND SHALL PREVAIL OVER THOSE PUBLISHED IN THE STANDARD SPECIFICATIONS.

NOTES: Changes made since the previous GS-09002 are indicated by shading in the Table of Contents in the instruction line and in the text. Previous changes have been incorporated and are no longer called out by shading or strikeout.

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Table of Contents.

Division 11. General Requirements and Covenants.

Section 1102

1102.01, D, 2, b.

Replace the Article:
When a CPA Reviewed Statement is submitted to the Department, an experience factor (F) ranging from 0.0 to 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 $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 $1 million - as long as that total does not exceed the maximum prequalification amount minus the currently uncompleted work.

1102.01, D, 3, b.

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

1102.04, C.

Add as the second paragraph of the Article:
Do not use composite crews for bridge and culvert work. Pay applicable prevailing wage rate for the classification which the employee is performing work.

1102.08, Examination of Plans, Proposal Form, Specifications, and Site of Work.

Replace the last sentence of the Article:
The Contracting Authority does not warrant, implicitly or explicitly, the nature of the work, the conditions that will be encountered by the bidder, or the adequacy of the contract documents for the Contractor to perform the work.

1102.09, A.

Replace the second sentence of the Article:

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

1102.09, B.

Replace the Article:

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. 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.

1102.17, D, 2, h.

Rename and **Replace** the Article:

Commercially Useful Function

- A DBE performs a commercially useful function when it is responsible for execution of the work of the contract and is carrying out its responsibilities by actually performing, managing, and supervising the work involved. To perform a commercially useful function, the DBE must also be responsible, with respect to materials and supplies used on the contract, for negotiating price, determining quality and quantity, ordering the material, and installing (where applicable) and paying for the material itself. The DBE must perform a commercially useful function consistent with common Iowa highway construction industry practices and the amount the firm is to be paid under the contract must be commensurate with the work it is actually performing by the DBE.
- DBE participation will not be counted if the DBE firm does not perform a commercially useful function (e.g. its role is limited to that of an extra participant in a transaction, contract, or project through which funds are passed in order to obtain the appearance of DBE participation).

  Interpretations by the Department regarding Commercially Useful Function participation by a DBE firm will be in accordance with 49 CFR, Part 26 Public Law 105-178, 112 Stat.107.

1102.17, E, 4.

Renumber the Article:

3) Contractors with History of Utilizing DBEs.

a) A bidder who has demonstrated their ability to utilize DBE firms on both Federal-aid and non-Federal-aid projects let by the Department in the 24 months prior to the letting will be assumed to have made a Good Faith Effort to achieve the project goal.

b) The Department's objective evaluation of prior usage of DBE firms will include all contracts let by the Department that were awarded to the Contractor during the 24 months prior to the letting. The calculation will include the sum of the following:

(1) One point for each percentage of average DBE subcontracted dollars for the 24 months prior to the letting (e.g. an average 7.5% dollars subcontracted to DBE equals 7.5 points)

(2) An additional point for each percentage of usage of DBE firms who meet the emerging small business requirements during the reviewed period (e.g. 1.5 points if 1.5% of the work is subcontracted to DBE firms meeting the small business requirements)

A contractor under consideration for having a history of utilizing DBE firms must have been awarded at least two contracts during the period being reviewed.

A contractor under consideration for having a history of utilizing DBE firms must have been awarded a dollar amount of contracts that exceed at least twice the dollar amount of the contract under consideration. For example, to be awarded a $1,000,000 contract, the contractor under review would have to have been awarded $2,000,000 in the Annual Good Faith Effort calculation.

The Annual Good Faith Effort points used for a letting would be based on the signed contractors and Request for Subcontract forms submitted by 5 calendar days before the letting. The number of points a contractor will need to be considered to demonstrate a history of utilizing DBE firms must exceed 67% of the Department's Annual DBE Goal (e.g. if the Department's annual DBE Goal is 7.8%, the contractor must have over 5.2 points). It is assumed that 67% of the DBE usage will be subcontract work and 33% of the dollars paid to DBE firms will be to DBE firms who have been awarded prime contracts.

1102.17, E, 5.

Renumber the Article:

4) Administrative Reconsideration of Project Specific Good Faith Effort.

a) Contractors who have not met the specified DBE goal or have not been determined to have demonstrated Good Faith Effort by the above methods can request administrative reconsideration of their Good Faith Effort.

b) Within 2 business days after the deadline for bid submittal, the Department will use the three Good Faith Effort methods to determine which bidders have made a Good Faith Effort to meet the DBE goal on each proposal for which bids were received. The Department will contact all otherwise lowest responsive bidders who have not met any of the Good Faith Effort criteria and offer that bidder an opportunity for an Administrative Reconsideration meeting with the Department's Administrative Reconsideration Committee. This committee consists of the Department's Contracts Engineer, Assistant Contracts Engineer, and EEO/AA Administrator. The bidder shall request the Administrative Reconsideration meeting within 1 business day of the Department's offer of an Administrative Reconsideration meeting.

c) Any bidder who has requested Administrative Reconsideration shall not adjust their DBE Commitment or provide any additional documentation of DBE firms contacted that were not listed on Form 102115. However, the bidder will be allowed to provide documentation on other Good Faith Efforts they did to utilize DBE firms that are listed on Form 102115. These efforts may include:

(1) Efforts to provide interested DBEs with adequate information about the plans, specifications, and requirements of the contract in a timely manner to assist them in responding to a solicitation.

(2) Written documentation of negotiation with certified DBE firms including the names, addresses, and telephone numbers of DBEs that were considered; a description of the information provided regarding the plans and specifications for the work selected for subcontracting; and evidence as to why additional agreements could not be reached for DBEs to perform the work.

(3) Written documentation of follow-ups made after the initial solicitations to encourage DBE firms to quote.

(4) Written documentation that the DBE firm's quote was not reasonable or that the DBE firm was not capable of performing the work for which they quoted. The fact that there may be some additional costs involved in finding and using DBE firms is not in itself sufficient reason for a bidder's failure to meet the contract DBE goal, as long as such costs are reasonable. Also, the ability or desire of a bidder to perform the work of a contract with its own organization does not relieve the bidder of the responsibility to make Good Faith Efforts.

(5) Written documentation of efforts to assist interested DBE firms in obtaining bonding, lines of credit, or insurance as required by the specifications.

(6) Written documentation of efforts to assist interested DBE firms in obtaining necessary equipment, supplies, materials, or related assistance or services needed for the project.

d) The determination made by the Administrative Reconsideration Committee shall be considered final.

1102.17, G, 1.

Replace the second sentence of the first paragraph:

Prior to receiving final payment, the Contractor shall provide to the Engineer certification of the dollars paid to each DBE firm, using Form 102116, Certification Of DBE Accomplishment. This certificate shall be submitted on all Federal-aid contracts and shall list the dollar amounts paid to all DBE firms on the contract.

1102.19, C, 3, a.

Replace the first sentence of the Article:

At a minimum, the Contractor/subcontractor shall utilize one or more Iowa Workforce Development Centers or the AGC of Iowa Career Center website.

Section 1107

1107.01, E.

Replace the Article.

E. ~~Except for contracts that are for materials only, all out of state contractors shall file a surety bond for contracts involving non-Federal-aid projects in excess of $5,000 in value prior to commencing a contract. This surety bond shall be filed in accordance with the Code of Iowa, Section 91C.7. It shall be filed with the Division of Labor Services of the Department of Workforce Development. The value of this surety bond shall be $1,000 or 5% of the total contract amount, whichever is greater.~~ On non-Federal aid contracts, out-of-state contractors shall either file a surety bond, as provided in section 91C.7 of the Code of Iowa, with the Division of Labor Services in the amount of $25,000 for a one-year period or shall provide a statement to the Division of Labor Services that they are prequalified to bid on contracts with the Department.

1107.09, A, 2, i, Contractor's Work Plan.

Delete the Article.

~~**i. Contractor's Work Plan.**When traffic is to be maintained through construction areas, the Contractor shall submit to the Engineer the work plan or statement for traffic control at the preconstruction conference or at least before work commences.~~

1107.09, A, 2, k, Traffic Control in Place.

Replace the Article:

At any time signs, barricades, or other traffic control devices are in place, for which the Contractor is responsible, the Contractor shall provide the Engineer the following information at the preconstruction conference or before work commences:

1) The name and telephone number of a 24 hour emergency response person for traffic control (answering services are not acceptable); so that repair or maintenance of these devices can occur promptly, within 2 hours and
2) The name and telephone number of the traffic control technician in responsible charge of the traffic control for the project per Article 2528.01, C.

Section 1108

1108.02, Prosecution of Work.

Add the Article:

M. Notification of Traffic Impacts.

The Contractor shall provide the Engineer with 10 calendar days notice before commencing or resuming work on a Primary or Interstate road or bridge open to traffic. This notification is needed to suspend the issuance of permits for oversized loads when width or vertical clearance restrictions occur during construction.

1108.02, B, Completion Date Contracts.

Replace the third sentence of the Article:

Articles 1108.02, E, Charging of Working Days and 1108.02, F, Winter Work will not apply.

1108.02, C, 3, a.

Replace the second sentence of the Article:

Except as noted in Article 1108.02, F, working days will begin to be charged whenever the Contractor starts work.

1108.02, D, Contract Periods.

Replace the second sentence of the Article:

The intermediate contract period may be the same type as listed in Articles 1108.02, B and 1108.02, C.

1108.02, K, Accelerated Work Schedule.

Replace Article 2 and Add Article 3:

2. A work plan shall be submitted to the Engineer for review prior to commencement of work. Work will be permitted on a 24 hour day basis and on Sundays and holidays, though work may be restricted as identified in the contract documents. Credit will not be allowed for delayed or slow delivery of materials.

3. The proposal form may specify a completion bonus. An accelerated work schedule, as provided in this article, is allowed for work necessary to earn the bonus.

1108.03, D, 2, Fourth of July.

Replace the Article:

Independence Day – When Independence Day is observed as a State Holiday on Monday, no work will be allowed beginning the preceding Friday through the holiday. When Independence Day is observed as a State Holiday on Friday, no work will be allowed the preceding Thursday through the following Saturday.

Section 1109

1109.05, A, 1.

Replace the first sentence of the Article:

For work extending over a period of more than one month, the Contractor will receive monthly progress estimate payments based on the amount of work completed ~~in an acceptable manner~~.

1109.05, B.

Renumber Article 2 and **Add** new Articles:

2. The Contractor may withhold up to 5% of each progress estimate on work performed by subcontractors.

3. Retained funds due a subcontractor shall be payable by the Contractor within 30 calendar days after satisfactory completion of the work by the subcontractor. Subcontractor's work is satisfactorily completed when all requirements called for in the subcontract have been accomplished and required documentation provided by subcontractor. Non-bonded subcontractors may be required to submit proof of payment for all material bills and wages to the Contractor before the Contractor is required to pay the retainage.

~~2~~4. The use of joint checks for payment to subcontractors for their materials is acceptable under the following conditions:

a. The request for a joint check from the prime contractor is made by the materials supplier.

b. The joint check issued by the prime contractor is for an amount not to exceed the cost of unpaid invoice(s) from the materials supplier to a subcontractor on that contract.

c. The joint check is given to the subcontractor and the subcontractor must release the joint check to the material supplier.

d. The use of a joint check by the prime contractor is applicable to all their subcontractors.

1109.05, C, 1.

Add to the end of the Article:

This retainage is held exclusively for claims filed in accordance with Chapter 573 of the Code of Iowa, and shall not be considered as an encumbrance on work performed by a subcontractor.

1109.05, C, 2.

Delete the Article:

~~**2.** The Contractor may withhold up to 5% of each progress estimate on work performed by subcontractors. All retained funds due a subcontractor shall be payable by the Contractor within 30 calendar days after completion of the work completed by the subcontractor. Non-bonded subcontractors may be required to submit proof of payment for all material bills and wages to the Contractor before the Contractor is required to pay the retainage.~~

1109.05, E.

Replace the Article:

The Contractor shall retain records that document the date of field completion, date of satisfactory completion of the ~~field~~ work ~~of each subcontractor~~ and the date of final payment (including ~~retained~~ funds retained in accordance with Article 1109.05, B, 2) to each subcontractor. Copies of the records to verify compliance with Article 1109.05, B shall be provided to the Contracting Authority, if requested.

Prior to receiving final payment, the Contractor shall provide to the Engineer the "Certification of Subcontractor Payments" (Form 518002). This form shall include the names of each approved subcontractor, the date of field completion, the date of satisfactory completion of the work, the date of final payment, the number of days between satisfactory completion and final payment, and the date of payment by the Contracting Authority. ~~e~~Explanations for any final payments made after the 30 calendar day period following field completion shall be included with Form 518002.

Failure to comply with Article 1109.05, B may result in price adjustment credits, loss of Annual Good Faith Effort points, or suspension of bidding qualification in accord with Article 1102.03, A, 2.

Division 20. Equipment Requirements.

Section 2001

2001.21, C, 1.

Replace the Article:

The equipment shall have a metal plate or plates attached with the following information:

- Gross volume of the drum
- Mixed concrete capacity
- Maximum and minimum mixing speed

The plate may be issued by the Truck Mixer Manufacturers Bureau, if not, have an independent laboratory meeting the requirements of ASTM C 1077 perform the proof tests described in Annex A1 of ASTM C 94. The test report of the proof test results may be required.

2001.22, K, 1, g.

Add new Article:

6) For each job mix formula within a project, provide daily printouts identifying weight of RAP separately from total batch as recorded by a totalizer.

Division 21. Earthwork, Subgrades, and Subbases.

Section 2102

2102.03, D, 3, c, 1).

Replace the Article:

Place special or selected backfill material in areas shown in the contract documents or as directed by the Engineer. Place and compact as provided in Section 2107 with the following modifications:

a) Where compaction with moisture and density control or with moisture control is required, ensure the moisture content of special backfill material is within the limits specified.

b) When select backfill material is placed for subgrade treatment purposes, compact using moisture control.

Section 2106

2106.01, Description.

Replace the Article:

~~**A.**~~ Furnish and install settlement plates consisting of a base plate, steel bar, steel riser pipe sections, PVC casing, inspection cover, and additional hardware and couplers which may be required as shown in the contract documents. The number of settlement plates will be shown in the contract documents.

~~**B.** Monitor settlement plate installations and report settlement results.~~

2106.02, B, PVC Casting.

Replace the Article:

Apply Section 4149.

2106.03, A, 2.

Delete the Article:

~~**2.** Establish benchmarks in the adjacent area before installing settlement plates.~~

~~**a.** Obtain the Engineer's approval for the method of determining alignments and elevations and the method of preserving control points. This approval does not act to relieve the Contractor of the responsibility for the correctness of the survey work.~~

~~**b.** Do not use plan cross-sections for vertical or horizontal control.~~

2106.03, E, Monitoring.

Replace the Article:

~~**1.** Monitoring consists of:~~

~~Inspecting the riser pipe,~~

~~Accurately measuring the elevation of top of the riser pipe, and~~

~~Recording, to the nearest 0.01 foot (0.3 mm), the elevation readings on a form supplied by the Engineer.~~

~~**2.** Record elevation readings daily during normal construction and weekly during delays and following the completion of embankment construction. During the course of embankment construction, submit completed forms to the Engineer weekly. Following the completion of embankment construction, submit forms weekly unless the Engineer instructs otherwise.~~

~~**3.** During periods of work suspension, the Engineer will record elevation readings.~~

The Engineer will determine elevations of settlement plates in accordance with Article 2526.03, G.

2106.05, Basis of Payment.

Replace the Article:

Furnishing, installing, and extending~~, and monitoring~~ settlement plates is incidental to embankment or excavation.

Section 2107

2107.04, B, 1, Compaction with Moisture and Density Control.

Replace the Article:

Cubic yards (cubic meters) shown on the contract documents as determined by the template fill volume. Shrinkage will not be included in moisture and density control quantity.

2107.04, B, 2, a.

Replace the Article.

Cubic yards (cubic meters) shown on the contract documents as determined by the template fill volume. Shrinkage will not be included in moisture control quantity.

Section 2109

2109.05.

Add Articles:

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.

2109.05, C.

Replace the Article:

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.

Section 2111

2111.03, A, 2.

Replace the Article:

Apply Article 2001.05, Paragraphs B, C, D, and F, to compaction equipment, except that other types of equipment may be used provided it is demonstrated they will consistently produce the required compaction.

2111.05, D.

Delete the Article:

~~**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.~~

2111.05, E.

Delete the Article:

~~**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 2102.05, or, if no contract price is provided, Article 1109.03, B.~~

2111.05, F.

Delete the Article:

~~**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.~~

Section 2115

2115.03, B, 4, Placing and Compacting Modified Subbase.

Add new Article:

d. Profile and cross section tolerances for modified subbase are +0 to -0.05 feet (+0 mm to -15 mm).

Section 2120

2120, Fuel Adjustment.

Replace the Section:

2120.01 DESCRIPTION.

Fuel Adjustment (FA) is an adjustment to monthly progress payments for cost changes in diesel fuel used on specific items of work identified.

2120.02 PRICE INDEX DEFINITION.

A. A Current Price Index (CPI) in dollars per gallon (liter) will be established by the Department of Transportation for each month. The CPI will be the price of No. 2 High Sulfur Diesel, as reported by the Oil Price Information Service, using the first weekday of the month and the average of all prices reported for Des Moines. This information will be ~~printed in the Weekly Letting Report published by the Department~~ available on the Departments' website.

B. The Base Price Index (BPI) for each contract will be the CPI in effect during the month previous to the month of letting of that contract.

2120.03 APPLICATION.

A. Applied as the work is done, according to this specification when indicated in the contract documents.

B. Fuel adjustment using a fuel adjustment factor (FUF) of 0.20 gallon per cubic yard (1.0 L/m^3) will be applied to:

1. Selected Backfill (including Stockpile)

2. Class 10 (Roadway & Borrow, Unsuitable, Waste, Stockpile, and Channel)

3. Class 12 (Roadway & Borrow, Channel, and Waste)

4. Class 13 (Roadway & Borrow, Channel, and Waste)

5. Topsoil, Furnish and Spread

6. Topsoil, Spread

7. Topsoil, Strip, Salvage, and Spread

8. Topsoil, Strip and Stockpile

C. Fuel adjustment using a FUF factor of 0.27 gallon per cubic yard (1.3 L/m^3) will be applied to Embankment-in-Place (non-dredge material).

D. Fuel adjustment will also be applied to Embankment-In-Place (dredge material). The fuel usage will be based on billed gallons (liters) of fuel used.

2120.04 METHOD OF MEASUREMENT.

A. Provide the Engineer with a monthly spreadsheet (the Engineer will provide the format) with quantities, and the fuel adjustment for the month (even if there will be no adjustment).

B. If the contract quantity for an item is in tons (megagrams), convert the quantity to cubic yards (cubic meters) using an appropriate conversion factor the Engineer approves. The total quantity of cubic yards (cubic meters) for each month (Y) is the sum of these quantities.

C. If the work is not completed within the contract period or authorized extensions thereof, the CPI to be used for work done after the contract period is to be the CPI that applied during the last working day within the contract period, including authorized extensions.

D. A fuel adjustment factor that accounts for the estimated amount of fuel used per cubic yard (cubic meter) of work covered by this specification will be applied to items of work covered in Article 2120.03, B or 2120.03, C.

E. A fuel adjustment will be made for items of work covered in this specification when the CPI for the month the work is performed is more than $0.15 per gallon ($0.04 per liter) different than the BPI established at the beginning of the project.

1. For items of work covered in Article 2120.03, B or 2120.03, C:

a. If the CPI is greater than the BPI plus $0.15, then the fuel adjustment will be positive which warrants additional payment to the Contractor. The following formula will be used to calculate the additional payment:

(English) FA = FUF(CPI - (BPI + 0.15))Y

(Metric) FA = FUF(CPI - (BPI + 0.04))Y

b. If the CPI is less than the BPI minus $0.15, then the fuel adjustment will be negative and a credit will be due to the contracting authority. The following formula will be used to calculate the credit:

(English) FA = FUF(CPI - (BPI - 0.15))Y

(Metric) FA = FUF(CPI - (BPI - 0.04))Y

2. For the item of work covered in Article 2120.03, D:

a. If the CPI is greater than the BPI plus $0.15, then the fuel adjustment will be positive which warrants additional payment to the Contractor. The following formula will be used to calculate the additional payment:

(English) FA = (CPI - (BPI + 0.15)) x (billed gallons of fuel used per month)

(Metric) FA = (CPI - (BPI + 0.04)) x (billed liters of fuel used per month)

b. If the CPI is less than the BPI minus $0.15, then the fuel adjustment will be negative and a credit will be due to the contracting authority. The following formula will be used to calculate the credit:

(English) FA = (CPI - (BPI - 0.15)) x (billed gallons of fuel used per month)

(Metric) FA = (CPI - (BPI - 0.04)) x (billed liters of fuel used per month)

2120.05 BASIS OF PAYMENT.

A. Payment will be the Fuel Adjustment (FA) for each month, subject to the deduction for partial payments described in Article 1109.05. Should the Fuel Adjustment (FA) be negative, an equal amount will be deducted on payments made to the Contractor from sums otherwise due. This payment or deduction will be made by change order.

B. On completion of the work of the contract:

1. For all items covered in Article 2120.03, B or 2120.03, C, the sum of the total quantities (Y) for each monthly period will be adjusted, if necessary, to agree with the final quantities to be paid.

2. For the item covered in Article 2120.03, D, the sum of the total quantities for billed gallons (liters) of fuel used for each monthly period will be adjusted, if necessary, to agree with the final quantities to be paid. This adjustment will be made by either:

- Subtracting the proper quantity from the last adjustment made, or
- Adding the proper quantity and computing the adjustment on the basis of the CPI in effect on the last working day any of this work was done.

C. On completion of the work of the contract, the monthly fuel adjustment will be revised by pro-rating any variance from the plan quantity.

D. Payment or deduction is full compensation for all fluctuations in fuel prices during the time the contract work is being done.

Section 2121

2121.02, A, 3.

Replace the Article:

Crushed PCC, RAP, or crushed composite HMA and PCC. Apply Article 4120.02. Either salvaged or unclassified sources of material may be allowed. Other quality requirements of Section 4120 will not apply.

2121.02, D.

Delete the Article:

~~**D.** RAP inspected according to Article 2303.02, C, may be used for Type A and B Granular Shoulders. When RAP is used for granular shoulders, process it so that 100% of the material passes the 1 1/2 inch (37.5 mm) sieve. When so processed, other gradation and quality requirements of Section 4120 will not apply.~~

2121.02, E.

Replace the first sentence of the Article:

Recycled crushed PCC, RAP, or crushed composite HMA and PCC shall be uniformly blended with crushed stone.

Section 2122

2122.03, D, Finishing.

Replace the Article:

After completion of the paved shoulder, place the granular fillet as shown in the contract documents and according to Section 2121. Finish the foreslope according to Article 2123.03, C.

2122.04, A, 1, Hot Mix Asphalt Paved Shoulder.

Replace the Article:

Article 2303.04, A, 3 applies.

2122.05, A, 2, b.

Renumber the Article:

3. Payment for paved shoulders constructed is full compensation for:

Replace the first bulleted item:

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

2122.05, A, 2, c.

Renumber Article c as 4:

4. Separate payment will not be made for:

Replace the fourth bullet:

- Finishing of the shoulder edge and furnishing granular material.

2122.05, A, 3.

Renumber Article 3 as 5:

5. Furnish samples as specified in Section 2303 or 2301, with payment to be made as specified.

Division 22. Base Courses.

Section 2212

2212.04, C, Partial Depth Repair Patches.

Replace the Article:

1. PCC: The Engineer will calculate the area of each patch in square feet (square meters) from surface measurements. The area of each patch less than 1 square foot (0.1 m^2) will be counted as 1 square foot (0.1 m^2).

2. HMA: The Engineer will calculate the area of each patch in square yards (square meters) from surface measurements to the nearest 0.1 square yards (0.1 m^2).

3. If the patch area is increased by the Contractor to accommodate milling equipment, only the area designated by the Engineer will be measured for payment.

2212.05, C.

Replace the Article:

1. PCC: Per square foot (square meter).

Renumber Article 2 as Article 3:

Add the Article:

2. HMA: Per square yard (square meter).

Section 2214

2214.03, C, 3.

Delete the Article:

~~**3.** Place barricades, as described in Article 1107.09, B, 5, along the windrowed material.~~

2214.05.

Add as the third sentence of the Article:

If the scarified pavement materials will become the property of the Contracting Authority, delivery and stockpiling of the material shall be according to Section 2555.

Division 23. Surface Courses.

Section 2301

2301.03, E, 2, a.

Replace the Article:

Load transfer devices may be required in the contract documents. Accurately place these assemblies as shown. To prevent their movement during subsequent concrete paving operations, securely stake or fasten to the base to line and grade. Do not use mechanical dowel bar inserters.

2301.03, F, Placing Concrete.

Renumber Articles 5, 6, and 7 as 6, 7, and 8 respectively.

Add Article:

5. Concrete shall be placed and consolidated in a manner that prevents material retained in the grout box of the finishing machine from being incorporated into the pavement. At headers, concrete screeded over the header during finishing shall be removed.

2301.03, P, 7.

Replace the Article:

The Engineer may limit the wheel loads and axle loads of equipment operating on the pavement during preparation, cleaning, and sealing operations, if prior to the age and strength specified in Article 2301.03, U. Additional tests to determine the modulus of rupture may be required.

2301.03, D, 1.

Replace the first sentence of the article:

Adjust manholes, intakes, valve boxes, or other fixtures encountered within the area to be paved to conform to the finished surface of the pavement to be built. Payment for adjustment of manholes and intakes will be per Section 2435. Payment for adjustment of valve boxes and other fixtures will be per Section 2554.

2301.03, U, 4.

Delete the Article.

~~Personnel performing maturity testing shall be Level I PCC certified technician with training for maturity testing.~~

2301.04.

Add the Article:

J. Rumble Strip Panel (PCC Surface)

By count for Rumble Strip Panels properly installed at locations designated in the contract documents.

2301.04, A, 1.

Replace the Article:

Square yards (square meters), of the type specified, shown in the contract documents.

2301.05, J. General.

Renumber Article J and Add Article:

J. Rumble Strip Panel (PCC Surface)

Each. Payment is full compensation for construction of the panels as detailed in the contract documents.

K. General.

2301.05, K, 1.

Replace the Article:

Deduction will not be made from the area of pavement for fixtures with an area less than 9 square feet (1 m^2).

Section 2303

2303, Hot Mix Asphalt Mixtures.

Replace the Section:

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. Limestone aggregate sources defined as containing less than 15% magnesium oxide (MgO) are identified in Materials I.M. T203.
1) Friction Classification L-2.
a) If 40% or more of the total aggregate is a limestone, use a combined aggregate such that:
(1) At least 80% of the combined aggregate retained on the No. 4 (4.75 mm) sieve is Type 4 or better friction aggregate,
(2) At least 30% of the combined aggregate retained on the No. 4 (4.75 mm) sieve is Type 2 or better friction aggregate,
(3) At least 25% of the combined aggregate passing the No. 4 (4.75 mm) sieve is Type 2 or better friction aggregate, and
(4) The fineness modulus of the combined Type 2 aggregate is at least 1.0. Calculations for fineness modulus are shown in Materials I.M. 501.
b) If less than 40% of the total aggregate is a limestone, use a combined aggregate such that:
(1) At least 80% of the combined aggregate retained on the No. 4 (4.75 mm) sieve is Type 4 or better friction aggregate, and
(2) At least 25% of the combined aggregate retained on the No. 4 (4.75 mm) sieve is Type 2 or better friction aggregate, and
(3) The fineness modulus of the combined Type 2 aggregate is at least 1.0. Calculations for fineness modulus are shown in Materials I.M. 501.
2) Friction Classification L-3.
Use a combined aggregate such that:
a) At least 80% of the combined aggregate retained on the No. 4 (4.75 mm) sieve is Type 4 or better friction aggregate, and
b) 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, 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.

2. Identify each RAP stockpile and document Classified and Certified RAP stockpiles as directed in Materials I.M. 505. 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.

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 mixture 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 recycled binder exceeds 20% of the total asphalt binder, change the asphalt binder grade as directed in Materials I.M. 510. No adjustments to the contract 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.

4) Credit may be given for crushed particles in the original pavement to be reclaimed as determined in the paving history (or mix design when paving history is unavailable).

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	B	0%	10%	15% (min. 70% virgin binder)[1]
HMA 100K I	B	10%	20%	No Limit
HMA 100K B	B	10%	20%	No Limit
HMA 300K S	B	0%	10%	15% (min. 70% virgin binder)[1]
HMA 300K I	B	10%	20%	No Limit
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 in 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.

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 2303.02-2 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 2303.02-2) 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 2303.02-2: 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 an 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 design level than specified in the contract documents, at no additional cost to the Contracting Authority.

5. Use a 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 a mixture design complying with Materials I.M. 510.

7. Use a 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, perform a moisture sensitivity evaluation of the proposed asphalt mixture design in accordance with Materials I.M. 507.

b. On all other Interstate and Primary highways, perform a moisture sensitivity evaluation in accordance with Materials I.M. 507 of the proposed 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. Moisture susceptibility testing of plant produced mixture will not be required for base repair, patching, ~~or~~ temporary pavement, or mixture bid items of 1000 tons (1000 Mg) or less.

d. A minimum tensile strength ratio (TSR) of 80% is required on plant produced mixture. When notified of non-compliant results, the Engineer may suspend paving operations until an approved “significant mix change” is implemented.

e. For mixture bid items of more than 1000 tons (1000 Mg), ~~W~~when the Contractor’s mix design TSR results are greater than or equal to 80% and less than 90%, 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%. Plant produced material without anti-strip shall be tested without penalty to confirm the need for an anti-strip agent. See Materials I.M. 510 Appendix C for additional information.

f. When the Contractor’s mix design TSR results are below 80%, an anti-strip agent will be required. Plant produced material with anti-strip shall be tested to verify the minimum TSR is achieved. See Materials I.M. 510 Appendix C for additional information.

g. When there is a “significant mix change”, the Engineer may require a re-evaluation of the test method in Materials I.M. 507.

h. The following anti-strip agents may be used:

1) Hydrated Lime.

Meet the requirements of AASHTO M 303, Type I or ASTM C 1097, Type S. 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 Appendix C for additional information.

3) Polymer-based Liquid Aggregate Treatments.
For each JMF, obtain approval for polymer-based liquid aggregate treatments. Approval will be based on the design 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 Appendix C for additional information.

3. Sand for Tack Coats.
Use sand meeting the requirements of Gradation No. 1 of the Aggregate Gradation Table in Article 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 asphalt mixture bid items greater than 1000 tons (1000 Mg) 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. 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, such that the mixture is workable at the minimum placement and compaction temperature desired, regardless of storage or haul distance considerations.
Use equipment meeting the requirements of Section 2001 with the following modifications:

1. Plant Calibration.

a. Calibrate each plant scale and metering system before work on a contract begins. Use calibration equipment meeting the manufacturer's guidelines and Materials I.M. 508.

b. The Engineer may waive calibration of permanent plant scales when a satisfactory operational history is available. The Engineer may require any scale or metering system to be recalibrated if operations indicate it is necessary.

c. Make calibration data available at the plant.

d. Calibrate each aggregate feed throughout an operating range wide enough to cover the proportion of that material required in the JMF. Make a new calibration each time there is a change in size or source of any aggregate being used.

e. For continuous and drum mixing plants, calibrate the asphalt metering pump at the operating temperature and with the outlet under pressure equal to that occurring in normal operations.

2. Paver.
Apply Article 2001.19. 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 the 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, re-tack. 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 asphalt binder at a rate of 0.20 to 0.25 gallons per square yard (0.9 to 1.1 L/m^2). Use the same binder grade used in the HMA mixture. 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 by auger.

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 moisture susceptibility testing. 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 air void content to be attained. Do not discharge the 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 field voids. 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.

1) Applications.

a) Use Class I Compaction for base, intermediate, and surface courses for traffic lanes, ramps, and loops on Interstate, Primary, and Secondary highways.

b) For Class I compaction, the quality characteristic is in-place air void content and will be based on the theoretical maximum specific gravity (G_{mm}) obtained from the Quality Control Program for that day's mixture.

2) Test Strip Construction for Class I Compaction.

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

(1) Construct a test strip of the surface mixture prior to its placement on the surface course for Interstate highways, Primary highways, and ramps connecting Interstate and Primary highways.

(2) Construct a test strip of the intermediate mixture at the start of its placement on the intermediate course for Interstate highways, interstate-to-interstate ramps.

(3) Test strips for base mixtures may be constructed, but are not required.

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

c) Test strips are not required when the entire production of the mixture bid item is placed in a single day.

d) The quantity of HMA mixture subject to the test strip production~~,~~ will be pre-established with the Engineer and limited to a half day's production~~:~~

e) 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.

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

g) Use test strip production control that meets the requirements of Article 2303.03, D, 3, c. The test strip will be an independent lot. Determine sublots in accordance with Table 2303.03-4.

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 manholes, intakes, valve boxes, or other fixtures encountered within the area to be covered by HMA to conform to the final adjacent finished surface. Payment for adjustment of manholes or intakes will be per Section 2435. Payment for adjustment of valve boxes and other fixtures will be per Section 2554. 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 1 compaction (Article 2303.03, C, 5, b), or

c) Same rolling pattern established for adjoining mainline or ramp driving lane, as determined by density coring.

2) Shoulder area will not be included in PWL calculations for field voids on adjoining mainline or ramp driving lane. 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) 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 complete removal of a material from the mixture
- Any introduction of a new material into the mixture
- A change of additive dosage rate
- A change of binder, aggregate, or additive source

b. Sampling and Testing.

Submit a testing plan meeting the requirements of Materials I.M. 511, Appendix D prior to the preconstruction meeting.

1) Asphalt Binder

Sample and test the 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) Aggregate Gradation

i) Use cold feed gradation for aggregate gradation control to assure materials are being proportioned according to the specifications. Take aggregate quality control samples at random times in accordance with Materials I.M. 204.

ii) Take a minimum of one aggregate gradation for each day’s production that exceeds 100 tons (Mg). Higher testing frequencies may be used when defined by a pre-determined quality control plan approved by the Engineer. When more than one sample in a day’s production is tested, use the average gradation to determine compliance of the daily lot.

iii) Split a cold feed sample with the Engineer on the first day's production of each mixture. The Engineer will determine the need for a correction factor for the cold feed gradation based on the Engineer's cold feed gradation and ignition oven results. The Engineer may require additional cold feed split samples to evaluate the need or value of a correction factor for the cold feed and ignition oven gradation.

iv) Secure aggregate gradation samples transported to the lab for determination of the ignition oven correction factor in accordance with Materials I.M. 511.

3) Uncompacted Asphalt Mixture

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

ii) Sampling frequency will be determined by the estimated daily production of each mixture placed. The number of sublots is defined in Table 2303.03-4:

Table 2303.03-4: Uncompacted Mixture Sublot Size

Estimated Daily Production, Tons (Mg)	Number of Sublots
101-500	1
501-1250	2
1251-2000	3
2001-4500	4
Over 4500	5

iii) The Contractor may request to have a quality control plan that indicates a higher testing frequency if pre-approved by the Engineer at the preconstruction meeting.

iv) Assist the Engineer with material sampling for verification testing. When the Engineer provides notification that a sample is to be taken, initiate sampling within 15 minutes. Sampling should normally be completed within 30 minutes of notification.

v) 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.

vi) For PWL analysis of laboratory voids, lot size is defined as follows:

a) No less than 8 and no more than 20 sequential tests will constitute a lot (exceptions stated below).

b) After the 8th test, all subsequent samples collected over the remainder of that week will also be included in the lot up to a maximum of 20.

c) Once a lot has been established with at least 8 tests, a new lot will begin at the start of the following week or the day following the 20th sample, whichever occurs first. Lots shall not contain partial days. When the 20th sample is reached, include all samples taken that day in the lot.

d) When determining PWL lot size for lab voids, Sunday through Saturday defines a week.

e) If the bid item's production has ended and fewer than 8 tests are available, those tests may be combined with the previous lot provided the maximum lot size has not already been reached. When combining results, if the day to be combined contains the 20th sample, include all samples for that day. Do not combine partial day's results.

f) If samples cannot be combined with the previous lot due to maximum lot size restrictions or if fewer than 8 tests are available for the entire production of a bid item, combine those tests into a single lot and use the AAD analysis in Materials I.M. 501.

g) Test strips will be considered a separate lot.

vii) 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 bulk specific gravity of compacted mixture (G_{mb}) at N_{design} for each specimen according to Materials I.M. 321. G_{mb} will be determined by compacting specimens to N_{design}. Average the results.

d) Determine the Theoretical Maximum Specific Gravity of the uncompacted mixture according to Materials I.M. 350.

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

viii) Use the target laboratory voids listed in Materials I.M. 510 Appendix A unless otherwise specified in the contract documents.

ix) Determine PWL for each lot as defined in Material I.M. 501. Use 1.0% below the target air voids as the lower specification limit and 1.0% above the target air voids as the upper specification limit.

x) Determine the pay factor using the absolute average deviation (AAD) procedure described in Materials I.M. 501 for proportions of a mixture bid item which are produced in irregular

intervals and placed in irregular areas. The following items qualify as such and shall be combined into weekly lots:

- Asphalt mixture produced and placed on gores, detours, temporary pavements, turning lanes, and fillets,
- Asphalt mixture produced and placed on ramps that are not high-speed ramps,
- Asphalt mixture produced and placed on non-interstate shoulders.

To be considered irregular, the production rate for mixture bid items described above is not to exceed 1000 tons (1000 mg) or 10,000 square yards (8400 m^2) for items bid in square yards in a single day.

4) Moisture Susceptibility

i) The Engineer may obtain samples for moisture susceptibility testing in accordance with Materials I.M. 507 at any time for mixtures requiring moisture sensitivity testing to verify the minimum TSR has been achieved.

ii) When liquid anti-strip additives are 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 the test method in Materials I.M. 507 during production. If unable to certify or test for the presence and quality, run the test method in Materials I.M. 507 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 2303.03-5.

Table 2303.03-5: 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
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.
(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 2303.03-5) 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)** Notify the Engineer if the average daily gradation for a mixture bid item is outside the production tolerances. If other production tolerances and mixture requirements of Materials I.M. 510 Appendix A are acceptable, a change in gradation target can be requested.
- **d)** If filler/bitumen ratio exceeds the limits listed in Table 2303.03-5, change the JMF at the start of the next day's production for that mixture.
- **e)** 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. 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.

4. Construction.

a. Field Voids for Class I Compaction.

1) Take samples to determine field voids 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 field voids 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 samples for each lot according to Materials I.M. 204 Appendix F. The Contractor may request to have a quality control plan that indicates a higher testing frequency at no additional cost to the Contracting Authority if pre-approved by the Engineer at the preconstruction meeting. The Engineer will determine the core locations. 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 PWL, as defined in Materials I.M. 501, for each lot using a lower specification limit (LSL) of 3.5% voids and an upper specification limit (USL) of 8.5% voids.
7) When the PWL falls below 80.0, use the procedure outlined in Materials I.M. 501 to identify outliers with 1.80 as the quality index criterion. Only one core may be considered an outlier in a single lot. If an outlier is identified, recalculate the PWL with the results of the remaining cores and determine whether the PWL is improved. Use the larger of the original and recalculated PWL to determine the pay factor.
8) When the PWL falls below 50.0, the Engineer may declare the lot or parts of the lot deficient or unacceptable

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 G_{mb} samples from the surface lift when measuring for completed thickness. Samples for thickness not tested for G_{mb}, 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 to determine field voids. Take thickness samples full depth of the completed course. After measurement, remove the G_{mb} 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 Uncompacted Mixture.

1) Complete the following as designated by the Engineer:

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

2) Take paired samples of uncompacted 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 moisture susceptibility testing, obtain a 70 pound (35 kg) sample according to Materials I.M. 322. If the Contractor's TSR results from the mixture design are less than 90%, sample at a minimum frequency of 1/10,000 tons (1/10,000 Mg) of plant production until a complying test result is achieved, after which the minimum frequency may be reduced to 1/50,000 tons (1/50,000 Mg). A single sample shall represent no more than 10,000 tons (10,000 Mg) of mixture. 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 G_{mb}, 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 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 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 at the Contractor's field quality control laboratory. Cores may also be tested by the Contractor; however, 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.

For mixtures meeting the criteria in Articles 2303.02, E, 2, a or b:

a) An anti-stripping agent is required.

b) Use Materials I.M. 507 to optimize the design dosage rate.

c) When prior-approved designs have demonstrated acceptable field TSR values, the anti-stripping agent and dosage from the JMF may be used in lieu of optimization testing.

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 G_{mb} measurements, except when Class II compaction is specified, no later than the next working day following placement and compaction. Use the field quality control laboratory compaction for field G_{mb} control, as specified in Article 2303.03, D. The Engineer may accept the void content of the compacted layer based on cores or calculations from density gauge measurements. The Engineer may waive field void sampling provided the compaction has been thorough and effective.
   - **b.** For small quantities, a lot will be the entire quantity of each HMA mixture bid item.
   - **c.** The PWL for field voids will not apply to small quantities.

4. **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 uncompacted HMA test per lot. Sampling and testing of uncompacted HMA mixture 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.
   - **d.** Moisture susceptibility testing on plant produced mixture is not required.

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 RAP incorporated into the mixture, will be calculated in tons (megagrams). 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.

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. Asphalt Concrete 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 following Pay Factor for field voids and laboratory voids determined for the lot.

Multiply the unit price for the HMA bid item by the Pay Factor rounded to 3 decimal places.

a) Laboratory Voids

1) Payment when PWL is used for acceptance:

PWL	Pay Factor
95.1 – 100.0	PF = 0.006000*PWL + 0.430
80.0 – 95.0	1.000
50.0 – 79.9	PF = 0.008333*PWL + 0.3333
Less than 50.0	0.750

When PWL is less than 50.0, the Engineer may declare the lot or parts of the lot deficient or unacceptable.

2) Payment when AAD is used for acceptance:

AAD from Target Air Void	Pay Factor
0.0 to 1.0	1.000
1.1 to 1.5	0.900
1.6 to 2.0	0.750
Over 2.0	0.500 maximum

When the AAD is more than 2.0, the Engineer may declare the lot or parts of the lot deficient or unacceptable.

3) Use the following payment schedule when a test strip is constructed:

AAD from Target Air Void	Pay Factor
0.0 to 1.5	1.000
1.6 to 2.0	PF = 2.5 - AAD
Over 2.0	0.500 maximum

When the AAD is more than 2.0, the Engineer may declare the lot or parts of the lot deficient or unacceptable.

b) Field Voids

1) Payment when PWL is used for acceptance:

PWL	Pay Factor
95.1 – 100.0	PF = 0.008000*PWL + 0.240
80.0 – 95.0	1.000
50.0 – 79.9	PF = 0.008333*PWL + 0.3333
Less than 50.0	0.750

When PWL is less than 50.0, the Engineer may declare the lot or parts of the lot deficient or unacceptable.

2) Payment when a test strip is constructed:

Average Field Voids (Pa), %	Pay Factor
0.0 to 9.0	1.000
9.1 to 9.5	PF = 10 - Pa
Over 9.5	0.500 maximum

When the average air void content from a test strip exceeds 9.5%, the Engineer may declare the lot or parts of the lot deficient or unacceptable.

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) for Thickness

Quality Index (Thickness) 8 Samples	Percent of Payment (Previously Adjusted for Field Voids)
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 moisture susceptibility testing in accordance with Materials I.M. 507 is performed on plant produced mixture, the payment for asphalt mixture will be adjusted according to Table 2303.05-3:

Table 2303.05-3: Asphalt Mixture Payment Adjustment for Moisture Susceptibility

Contracting Authority's Results (Percent TSR)	Pay Factor
TSR ≥ 80	1.00
70 < TSR < 80	PF = 0.025*TSR - 1
TSR ≤ 70	0.75 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 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, the incorporation of the anti-strip agent into the asphalt mixture will be considered as extra work ordered by the Engineer if the Contracting Authority's TSR results from the field produced mixture meet or exceed the minimum requirement. Payment will be made at the rate of $2.00 per ton (megagram) of asphalt mixture in which the anti-strip agent is incorporated. For HMA mix designs (small quantities excluded) with a TSR greater than or equal to 80%, payment will stop when the Contracting Authority's TSR results of the field produced mixture without the agent are 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 field voids 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.

Section 2305

2305, Safety Edge.

Add Section:

Section 2305. Safety Edge

2305.01 DESCRIPTION.
Incorporate a Safety Edge to the dimensions shown and at locations designated on the contract documents.

2305.02 MATERIALS.
Safety Edge material shall match the adjoining pavement or paved shoulder material.

2305.03 CONSTRUCTION.

A. Asphalt Pavement.
Attach a device to the paver screed to confine material at the end gate and extrude the asphalt material in a wedge shape meeting the requirements of the plan details. Maintain contact between the device and road shoulder surface; and allow automatic transition to cross roads, driveways, and obstructions. Use the device to constrain the asphalt head, reducing the area and increasing the density of the extruded profile. Approved devices meeting this specification are listed in Materials I.M. 502. Use of a single plate strike off will not be allowed.

Alternative devices not listed in Materials I.M. 502 may be approved by the Engineer. The Engineer may require proof that the device has been used on previous projects with acceptable results or may require a test section constructed prior to the beginning of work to demonstrate wedge compaction to the satisfaction of the Engineer.

The Engineer may allow short sections of handwork when necessary for transitions at driveways, intersections, interchanges, and bridges.

Placement of a granular fillet, per Article 2121.03, C, 4, b, is not necessary when a Safety Edge is installed.

B. PCC Pavement.
Modify paver screed to ensure the Safety Edge meets the final cross-section as detailed on the plans.

2305.04 METHOD OF MEASUREMENT.
Safety Edge will not be measured for payment.

2305.05 BASIS OF PAYMENT.
Safety Edge will not be paid for separately and shall be included in the contract unit price for the item for which it is required.

Section 2310

2310.03, A, Equipment.

Rename and **Replace** the Article:

Scarifying or Shotblasting Equipment.
Use power operated equipment capable of uniformly scarifying or removing the existing surface in a satisfactory manner and to depths required. Other types of removal devices may be used if their operation is suitable and if they can be demonstrated to the satisfaction of the Engineer. The contract documents will include a pay item for such work.

2310.03, B, Preparation of Surface.

Replace the Article:

1. **General.**
   - **a.** If full depth base repair is included in the project, complete it prior to preparation of the existing pavement surface.
   - **b**. When required, include the entire area to be resurfaced in preparation of the existing pavement surface. Materials removed in the preparation operation may be placed in the shoulder area unless specified otherwise in the contract documents.

2. **Bonded Overlays.**
   - **a.** Prepare the surface by shot blasting~~,~~ or scarifying. Scarify to a nominal depth of 1/4 inch (5 mm).
   - **b.** Ensure preparation removes all dirt, oil, foreign materials, laitance, or loose material from the surface and edges against which new concrete will be placed.
   - **c**. Work covered by Article 2310.03, B, 2 will be paid for according to Article 2310.05, C, Surface Preparation.

3. **Unbonded Overlays and Whitetopping.**
   - **a.** Prepare surface by scarifying per Section 2214.
   - **b.** When placement of HMA stress relief layer is included as part of the contract for unbonded overlays, pavement scarification will not be required.
   - **c.** At the direction of the Engineer, trim high spots found in the existing HMA pavement. This work will be accomplished during the scarification operation, only at isolated locations, and will be considered incidental to the pavement scarification.
   - **d**. Work covered by Article 2310.03, B, 3, will be paid for according to Article 2310.05, D, Pavement Scarification.

2310.03, C, 2, c, 2).

Replace the Article:

Saw joints in the resurfacing directly over existing joints. Saw joints to the full depth of new resurfacing concrete, including depressions created in the existing surface and as specified in the widening areas. Saw joints as soon as possible without causing excessive raveling.

2310.03, C, 3, a, Hot Mix Asphalt Stress Relief Course.

Replace the Article:
Construct in accordance with Article 2303.03. Use Class II Compaction, except use only static steel wheeled rollers. Article 2303.04 shall also apply.

2310.04, D, Hot Mix Asphalt Stress Relief Course.

Renumber the Article:
~~D~~E. Hot Mix Asphalt Stress Relief Course.

Add Article:
D. Pavement Scarification
1. Measurement by Weight (Mass).
The quantity of Pavement Scarification will be determined in accordance with Article 2214.06, A, 1.

2. Measurement by Area.
The quantity of Pavement Scarification will be determined in accordance with Article 2214.06, A, 2.

2310.05, C, 2.

Replace the Article:
Payment is full compensation for preparation of the existing pavement, scarifying or shot blasting, and for removal of the existing pavement surface material according to Article 1104.08.

2310.05, D, Hot Mix Asphalt Stress Relief Course.

Renumber the Article:
~~D.~~E. Hot Mix Ashphalt Stress Relief Course.

Add Article:
D. Pavement Scarification
1. Measurement by Weight (Mass).
The Contractor will be paid the contract unit price for Pavement Scarification in accordance with Article 2214.07, A, 1.

2. Measurement by Area.
The Contractor will be paid the contract unit price for Pavement Scarification in accordance with Article 2214.07, A, 2.

Section 2316

2316.02, A, 7, Exclusions**.**

Replace the Article:
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.

2316.02, B, 1, a.

Replace the Article:
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.

2316.02, B, 2, c.

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

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.~~

2316.02, D, 1.

Add to the end of the Article:

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.

2316.03, B, 1, b.

Replace the second sentence of the Article:

Use a cutting head that is a minimum of ~~2~~436 inches (~~6~~900 mm) wide~~.~~, unless a 24 inch (600 mm) cutting head is necessary due to space limitations.

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).~~

2316.03, C, 3, Exceptions.

Replace the Article:

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.

2316.05, H, 2, Schedule B Smoothness Requirements.

Replace Table 2316.05-4:

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~~500 Grind Only	Unit Price ~~Grind~~250 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.		

2316.05, H, 3, Schedule C Smoothness Requirements (Pavement Adjacent to Existing Pavement).

Replace Table 2316.05-5:

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 ~~A~~GBI + 12 (190)	Greater than ABI + 30 (470)	Grind Only

Section 2317

2317.01, General.

Replace the Article:

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.

2317.02, Equipment.

Add the Article**:**

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

2317.02, A.

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. Ensure the operator is trained and certified to operate the profilograph as required by the Contracting Authority.

2317.03, SURFACE TOLERANCES, TESTING, AND EVALUATION.

Replace the first paragraph of the Article:

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 may result 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). If the partial segment is 250 feet (80m) or less in length, include its length and roughness with the previous adjacent segment. If the partial segment length is greater than 250 feet (80 m), evaluate it as a single segment. Gaps for temporary crossings or similar construction sequencing which are placed in otherwise continuous sections will be tested, when placed, and included in one of the adjacent sections for evaluation following the procedure for partial segments above.

2317.03, B, Testing.

Add the Article:

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.

2317.03, C, 1.

Add to the end of the Article:

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.

2317.03, C, 2.

Replace the second sentence of the Article:

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.

Add to the end of the Article:

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.

2317.04, A, 2.

Delete the second sentence of the Article:

~~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.~~

2317.04, E, Corrective Work.

Replace the first paragraph of the Article:

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.

2317.05, 1, PCC Pavement.

Renumber and **Replace** the Article:

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 shall be corrected to the levels shown in Table 2317.04-1.			

2317.05, 2, HMA Pavement.

Renumber and **Replace** the Article:

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.			

Section 2318

2318.03, Construction.

Add Article:

J. Limitations.

When HMA resurfacing is part of the contract, cover cold in-place recycled surfaces with at least one full lift of HMA prior to winter shutdown.

Division 24. Structures.

Section 2401

2401.05, B.

Replace the first bullet and add new bullet:

- Furnishing all material, equipment, and labor and for performance of all work necessary for removal of the old structure from the project, and

- If the existing structure will become the property of the Contracting Authority, payment for proper storage, salvage, and delivery of the structure shall be according to Section 2555.

Section 2402

2402.04, F, 1.

Replace the Article:

The Engineer will compute the quantity of excavation for foundation treatment material measured for payment in cubic yards (cubic meters).

2402.04, F, 3.

Delete the Article:

~~When weighing is accepted as the method of measurement and the material is weighed prior to delivery, the cubic yards (cubic meters) will be determined by the method outlined in Article 2312.04, A.~~

2402.05, F, Foundation Treatment Material.

Replace the Article:

Payment for foundation treatment material furnished according to Article 2402.03, C, will be at the Contractor's unit delivered invoiced cost per ton (Mg) plus the applicable contract unit price per cubic yard (Mg) for the class of excavation performed.

Section 2403

2403.03, E, 1.

Replace the Article:

Protect concrete which has been placed from external stress between the time it ceases to be plastic and the time it may be stressed, as provided in Article 2403.03, N.

2403.03, H, 1.

Replace the Article:

When concrete placement in any section of a structure must be interrupted, locate the construction joint as specified in Article 2403.03, O. Leave the surface of the concrete in horizontal joints rough (except in the area near the form) to increase the bond with concrete that is to be placed later. Finish the top surface of the concrete adjacent to the forms to a horizontal 3/4 inch (20 mm) bevel strip.

2403.03, M, 2, a.

Replace the Article:

Except when form removal is permitted in less than 5 calendar days, forms may be removed as soon after 5 calendar days as the concrete has attained the strength required in Article 2403.03, N, 2. When Maturity Method (according to Materials I.M. 383) for strength determination is used, the flexural strength of 550 psi (3.8 MPa) will be required. The days of age will depend on the Maturity Curve for the concrete mix used.

2403.03, N, 2, g.

Delete the Article:

~~g. Perform maturity testing using a Level 1 PCC Certified Technician with training for maturity testing. This technician may supervise other persons who may then perform the temperature testing.~~

2403.05, A, 3.

Replace the first sentence of the Article:

Payment for heating will be made when materials which are proportioned and mixed at the site are heated to meet requirements of Article 2403.03, F, or when heating is charged by the supplier of ready mixed concrete.

Section 2407

2407.02, H, Cement.

Replace the Article:

Apply Section 4101, unless otherwise specified. If the use of Type III Portland cement has been authorized, use it in the same proportions as specified for Type I Portland cement. Cement with total equivalent sodium oxide between 0.61% and 0.75% may be used, provided it is non-reactive with the proposed aggregate when tested according to ASTM C 1260, C 1567, or C 1293.

2407.02, I, Supplementary Cementitious Materials.

Replace the Article:

2. Fly ash may be substituted for Portland cement. Use a substitution rate of no more than 25% by weight (mass).

Add the Article:

4. The maximum total supplementary cementitious materials substitution shall not exceed 50%.

2407.03, B, 4.

Replace the Article:

If using HPC for prestressed concrete beams, use a mix design that has been evaluated according to ASTM C 1202 and approved by the Engineer. To obtain mix design approval either:

a. Submit to the Engineer ASTM C 1202 results from mix samples taken and tested by an independent laboratory. The results shall be 1500 coulombs or less when cured using accelerated moist curing.

b. Contact the Engineer and arrange for a trial batch. The producer certified technician shall cast 4 inch by 8 inch cylinders for testing by the Materials Laboratory. The ASTM C 1202 results shall be 1500 coulombs or less when cured using accelerated moist curing.

c. When silica fume, class F fly ash, or GGBFS is used in the mix, the Engineer may waive ASTM C 1202 testing.

2407.03, L, 4.

Replace the first sentence of the Article:

Coat and seal beam ends exposed in the complete structure with an approved gray or clear epoxy listed in Materials I.M. 491.19, Appendix B.

Section 2408

2408.02, Q, 2, c, 1).

Replace the second sentence of the Article:

Approved paints are shown in Materials I.M. 482.02, Appendix A and Appendix C.

2408.02, Q, 2, c, 2).

Replace the first sentence of the Article.

Apply a top coat of waterborne acrylic paint from the approved lists shown in Materials I.M.s 482.05, Appendix A; or 482.07, Appendix A, to the primed surfaces after the primer has cured to a resistance rating of 4 as verified by 50 MEK rubs as per ASTM D 4752 for inorganic zinc rich primers.

2408.03, B, 6.7, Nondestructive Testing.

Replace subparagraph 6.71.2(2):

50% of each joint subject to compression or shear in each main member including longitudinal butt weld splices in beam or girder webs. If unacceptable discontinuities are found in the first 50% of joint, the entire length shall be tested.

Section 2412

2412.03, A, 2.

Replace the Article:

~~Unless the Engineer approves, d~~Do not use temporary welds to attach hangers to prestressed or steel beams to support deck form joists. ~~according to Article 2408.03, B. Galvanized hangers may remain exposed in the finished structure.~~ Coat deck hangers that are embedded in prestressed beams and deck hangers that drape across steel girder or prestressed beams using one of the following methods:

a. Electroplating in accordance with ASTM B 633, Service Condition SC4, minimum coating thickness of 1.0 mil (25 µm). Classification and Coating Suffix: Fe/Zn 25.

b. Mechanical galvanizing in accordance with ASTM B 695, Type I, Class 50. Minimum coating thickness of 2.0 mils (50 µm).

2412.03, D, 4, a, 7, a.

Replace the second sentence of the Article:

If the Contractor elects to delay cutting of the longitudinal grooves until completion of all stages, apply an interim co~~u~~arse broom finish on the concrete deck and bridge approach during placement for all stages opened to traffic.

Section 2413

2413.02, D, 2, a.

Replace the first sentence of the Article:

A slump of 1 inch (25 mm) to 4 inches (100 mm), measured according to Materials I.M. 317, with a maximum of 5 inches (125 mm).

2413.02, D, 2, b.

Replace the first sentence of the Article:

Use a mid-range water reducing admixture meeting the requirements of Materials I.M. 403, Appendix C and a retarder listed in Materials I.M. 403 Appendix G. When the expected haul time is less than 30 minutes or the maximum air temperature expected is less than 75°F (24°C), addition of a retarder is not required.

2413.02, D, 2, Class HPC-O High Performance Concrete.

Renumber Articles c, d, and e, and **Add** new Articles:

c. Increase moisture testing of coarse and fine aggregate to ensure batch-to-batch consistency and reduce water addition at job site. Perform moisture testing of coarse and fine aggregate prior to batching when batch weights are determined and then again half-way through the placement.

~~c~~d. Air content is to be the same as required for Class O PCC.

~~d~~e. Use Type IS or Type IP cement. If Type I/II is used, 25% replacement with GGBFS is required.

~~e~~f. Limit fly ash substitution to 20% replacement by weight.

g. For projects with deck overlay quantities greater than 1800 square yards (1500 m^2), make a trial batch of the mix (minimum 3 cubic yards (1 m^3)) at the anticipated concrete temperature during delivery. Initially test the slump and air content. Let the mixer run for the time anticipated, including batching, delivery to the project, estimated waiting time for discharge of the load, and the time to discharge the load. Test the slump and air content again. If the slump at the discharge time is 2 inches (50 mm) or less, the proposed mix is not suitable and an additional trial batch will be required. The intent is to ensure the admixture or combination of admixtures will maintain the desired slump without additional water at the discharge site. If unacceptable slump loss occurs during the project placement so that the slump is 2 inches (50 mm) or less, one or all of the following steps will be required:

1. Change the dosage rate of admixture(s).

2. Change the brand of admixture(s).

3. Change the location of mixing admixture(s). For example: incorporate admixture(s) in the ready mix truck on the project site instead of at the ready mix plant.

4. Reduce the concrete temperature. For example: use ice or chilled water.

2413.02, D, 2, e.

Replace the Article:

Limit fly ash substitution to 20% replacement by weight.

2413.03, A, 4, c, 1.

Add new Article:

h) Have internal vibration equipment for consolidation at the edges of the placement.

2413.03, A, 4, c, 2.

Add new Article:

c) Be equipped to provide vibration at the finishing drum.

2413.03, A, 4, d.

Replace the Article:

~~For Class O PCC, internal vibration equipment is required for consolidation at the edges of the placement.~~ Provide supplemental vibration for the concrete between the curb and the end of the drum finisher and along the construction joint adjacent to the current or future placement. Vibration with a standard stinger, whether point vibrating or dragging through the concrete, is not an acceptable method of supplemental vibration.

2413.03, C, 3, c.

Add to the end of the Article:

Provide a method of removal at the bottom of the bridge deck that will prevent feather edging of the concrete.

2413.03, E, 1, b.

Renumber Article 8 to Article 10:

Add Articles:

8) Deck repair concrete, described in Article 2413.02, or Class C structural concrete, meeting requirements of Sections 2403 and 2412, may be used when individual placements are placed to the lower boundary for the superimposed overlay.

9) Allow the partial placement to cure for 72 hours.

2413.03, E, 1, b, 9.

Replace the Article:

~~Allow the partial placement to cure for 72 hours.~~ Wet cure the partial placement for 96 hours.

2413.03, E, 1, c.

Replace the Article:

For Class A repair areas, use Class O or Class HPC-O concrete when repair concrete is placed monolithically with the overlay.

2413.03, E, 2, i.

Add to the end of the Article:

For Class HPC-O PCC, use supplemental surface vibration for consolidation at the curb side, and along the longitudinal joint adjacent to the current or future placement.

2413.03, F, 2, a.

Replace Articles 1 and 2:

1) Allow the surface to cure for at least 72 hours. When Class HPC-O is used on projects with a deck overlay quantity greater than 1800 square yards (1500 m^2), allow the surface to cure for 168 hours.

2) ~~For the first 24 hours, k~~Keep the burlap continuously wet by means of an automatic sprinkling or wetting system. ~~After 24 hours, the Contractor may cover the wet burlap with a layer of 4 mil (100 µm) polyethylene film for a minimum of 48 hours in lieu of using the sprinkling or wetting system.~~

2413.03, F, 2, c.

Delete the Article:

~~c. At the Contractor's option, partial depth concrete for Class B repair may be cured with white pigmented curing compound only. When this curing is completed, sandblast the surface and allow to dry. Sandblast the existing concrete in vicinity of Class B repair prior to placement of the overlay course.~~

2413.03, H, 9.

Replace the third sentence of the Article:

If this work is started before the end of the 72 hour curing period or 168 hour curing period for Class HPC-O projects with greater than 1800 square yards (1500 m^2), the work will be restricted as follows:

2413.03, H, 10.

Replace the first sentence of the Article:

Do not allow traffic on a finished surface course until 72 hours after placement or 168 hours for Class HPC-O projects with greater than 1800 square yards (1500 m^2).

Section 2414

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.

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.

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.

Section 2416

2416.03, Construction.

Add Article:

E. Trenchless Construction.

Apply Section 2553.

2416.04, Method of Measurement.

Add Articles:

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.

I. Removal and Reinstallation:

1. Aprons: Each apron removed and reinstalled will be counted for each size class.

2. Pipe culvert: Measurement of pipe removed and reinstalled for each size class specified will be in linear feet (meters) from end to end.

2416.05, Basis of Payment.

Add Articles:

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.

I. Removal and Reinstallation:

1. Aprons: Per unit for each size class of apron removed and reinstalled. Payment is full compensation for removal and reinstallation of apron.

2. Pipe culvert: Per linear foot (meter) for each size class of pipe removed and reinstalled. Payment is full compensation for removal and reinstallation of pipe.

Section 2417

2417.03, C, Installation.

Delete the first sentence and Replace Article:

1. Class B Bedding.
When installing corrugated metal pipe or polyethylene pipe for roadway culverts, use Class B Bedding described in Article 2416.03, D, 2.

2417.04, Method of Measurement.

Add Articles:

G. Beveled Pipe and Guard: Quantity shown in the contract documents.

H. Removal and Reinstallation:

1. Aprons: Each apron removed and reinstalled will be counted for each size class.

2. Pipe culvert: Measurement of pipe removed for each size class specified will be in linear feet (meters) from end to end.

2417.05, Basis of Payment.

Add Articles:

H. Beveled Pipe and Guard: Per unit for the size specified.

I. Removal and Reinstallation:

1. Aprons: Per unit for each size class of apron removed and reinstalled. Payment is full compensation for removal and reinstallation of apron.

2. Pipe culvert: Per linear foot (meter) for each size class of pipe removed and reinstalled. Payment is full compensation for removal and reinstallation of pipe.

Section 2428

2428.02, B, Measurement.

Replace the Article:
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.

2428.03, C.

Delete the last sentence of the Article**:**
~~Use a cutting head that is a minimum of 24 inches (600 mm) wide.~~

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).~~

2428.04, A, 1.

Replace the Article:
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, C.

2428.04, B, 1.

Replace the Article:
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, C. 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.

2428.04, C, Exceptions.

Replace the Article:
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.

Section 2429

2429.03, B, 1, Welding.

Replace the first bulleted item:
- Comply with Article 2408.03, B.

Section 2431

2431.02, B, 1, b.

Replace the Article:
Ensure block sampling and testing comply with ASTM C 140.

2431.02, B, 1, c.

Replace the Article:
Freeze-thaw durability testing will be required as described in ASTM C 1372 Sections 5.2, 5.2.1, and 8.3. Ensure testing is done according to ASTM C 1262.

2431.02, B, 1, d.

Replace the Article:

Ensure specimens meet weight (mass) loss limits for testing in water as required in ASTM C 1372 Section 5.2.1.

Section 2432

2432.02, B, Materials.

Replace ~~"I.M. 445, Appendix A~~" with "I.M. 445.03, Appendix A" in the first paragraph.

2432.02, B, 3, a, Horizontal and Vertical Joints.

Replace the Article:

Cover horizontal and vertical joints between panels with a polyester fabric that meets requirements of Article 4196.01, B, 3, and is acceptable to the MSE wall company. Obtain the Engineer's approval for adhesives used to temporarily attach the fabric to the back of the facing panels.

Section 2433

2433.01, A.

Replace the Article:

A concrete drilled shaft foundation consists of reinforced concrete placed in a drilled shaft seated in bedrock or soil and may encompass a rock socket as shown in the contract documents. References to "rock" and "rock socket" throughout this section are only applicable to shafts seated in bedrock with rock sockets as specified in the contract documents.

2433.03, K, 2.

Replace the first sentence of the Article:

Construct the demonstration shaft in soil as shown in the contract documents or a minimum of 3 feet (1 m) into bedrock. A reinforcing steel cage, designed by the Contractor, to adequately support the CSL tubes will be required.

2433.05, A, 2.

Replace the first bulleted item:

Drilling and excavation of shaft and possible rock socket,

Section 2434

2434.02, G, 2, Disc Bearing Assemblies.

Renumber the Article:

3. Disc Bearing Assemblies.

2434.04, Method of Measurement.

Replace the Article:

The quantity of Disc Bearing Assemblies (each) will be shown in the contract documents.

Section 2435

2435.03, F, 4, c, 8).

Replace the Article:

Determine the allowable drop in water level by using the equation given in Article 2504.03, L, 4, b, 3, c. After 1 hour, measure the drop in water level.

Division 25. Miscellaneous Construction.

Section 2501

2501.03, A, 10, b, 1, d).

Replace the Article:

Equipment meeting the values in Tables 2501.03-1 and 2501.03-2 in the Appendix will be acceptable for wave equation analysis.

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 quantity. The quantity may be modified by Article 2501.04, D, F, or G.

Add 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.

2501.05, Basis of Payment.

Rename and **Replace** the Article:

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.

Add 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.

Section 2502

2502.03, C, 2.

Replace the Article:

Install outlets as shown in the contract documents at approximately 500 foot (150 m) intervals. Provide additional outlets at the low points of vertical sag curves. The Engineer may adjust outlet location. Cover the outlet end of each subdrain with the specific outlet covering. Cap the blind end with a fitting recommended by the manufacturer.

2502.03, C, 18.

Replace the third and fourth sentences of the Article:

Drive the posts 3 feet (1 m) into the ground. If plastic sleeves are furnished by the Contracting Authority, install over posts.

2502.05, A, 4.

Replace the Article:

When the contract documents do not indicate the depth of excavation, the first 6 feet (1.8 m) of excavation will be included in the contract unit price. Payment will be made for overdepth excavation ~~according to Article 2503.05.~~ as follows:

A deduction of 125% of the delivered cost of pipe per foot (meter) shall be subtracted from the original contract unit price per foot (meter) of pipe. The remainder will be considered the contract unit price for excavation and laying of pipe for subdrain of 6 feet (1.8 m) in depth. The contract unit price for excavation and laying of pipe, determined as provided above, will be divided by 6 and this quotient considered the basic excavation and laying price per foot (meter) of pipe, per foot (0.3 m) of depth.

For overdepth excavation required for the placement of subdrain to elevations greater than 6 feet (1.8 m), measured to the nearest foot (0.3 m) below the original ground profile over the trench, the rate of payment will be as shown in the following table:

Overdepth Excavation*	Percentage of Basic Excavation and Laying Price
1st foot (0.3 m)	100%
2nd foot (0.3 m)	120%
3rd foot (0.3 m)	140%
4th foot (0.3 m)	160%
5th foot (0.3 m)	180%
6th foot (0.3 m)	200%
*For depths of excavation greater than 12 feet (3.6 m) below original ground profile, payment will be made as extra work, as provided in Article 1109.03, B.	

Section 2505

2505, Guardrail Construction and Removal.

Replace the Section:

Section 2505. Guardrail Construction and Removal

2505.01 DESCRIPTION.
Construct guardrail. Remove existing guardrail.

2505.02 MATERIALS.
Provide guardrail materials meeting the requirements for the type of guardrail specified. Provide guardrail posts of wood or steel as specified in the contract documents.

A. Formed Steel Beam Guardrail and Low Tension Cable Guardrail.
Apply Section 4155.

B. High Tension Cable Guardrail.

1. Meet the manufacturer's materials requirements. For line post and end anchor foundations, use Class C mix according to Section 2403.

2. Supply spare parts kits for high tension cable guardrail. Deliver them to the Contracting Authority's nearest maintenance office. Spare parts kits consist of the following items, but do not include a tension meter:

- An extra supply of line posts (socketed-type), including post hardware and accessories (caps, reflective sheeting, straps, spacers, and socket covers). This supply is to include enough materials to complete a 300 foot (90 m) installation.

- An extra supply of anchor posts (socketed-type), including post hardware and accessories (caps, reflective sheeting, straps, fittings, spacers, and socket covers). This supply is to include enough materials to complete one end anchor installation.
- Specialized tools necessary to maintain the guardrail, such as a spreader tool.

2505.03 CONSTRUCTION AND REMOVAL OF GUARDRAIL.
Furnish and install posts, beams or cables, end anchors, and special connections and fittings required in the contract documents. Install to the specified line and mounting height. Changes in the installed length require the Engineer's approval.

A. Steel Beam Guardrail and Low Tension Cable Guardrail.

1. Steel Beam Guardrail.

a. Install w-beam or thrie beam as designated in the contract documents. When not designated, install w-beam.

b. Use steel beam guardrail ready for assembly when delivered to the project. Do not punch, drill, cut, or weld beam in the field.

c. Steel beam guardrail elements may be furnished in either 25 foot (7.62 m) or 12.5 foot (3.81 m) nominal length sections.

d. Straight rail sections may be used to construct radii of 150 feet (45 m) or greater. Shop curve rail sections for radii less than 150 feet (45 m).

e. Install posts for steel beam guardrail at spacing identified in the contract documents. If not defined, use 6.25 foot (1.91 m) spacing.

f. Where necessary, adjust horizontal and vertical alignment of the guardrail to account for road curvature. Use minor adjustments with no abrupt changes.

g. Fully connect beam to all posts as shown in the contract documents. For W-beam guardrail installations with wood blockouts, nail the blockout to the post to prevent blockout rotation. Other methods of preventing rotation may be approved by the Engineer.

2. Low Tension Cable Guardrail.

a. Attach the cables to the posts and end anchors according to the contract documents. Attach compensation devices and turnbuckles so as not to interfere with the function of any part of the installation.

b. Individual cables may be spliced by use of an approved device installed where no interference with any other function will occur. One splice per cable is allowed. Cable may not be spliced within 250 feet (75 m) of another splice in one of the other cables.

c. Tighten individual cables using mechanical means. Stretch cables tight so that no sags occur between posts and so that, in the opinion of the Engineer, the finished installation presents a satisfactory appearance.

3. Posts.

a. Drive posts in a manner that does not damage the post. Place backfill material (consisting of material removed or other suitable soil) around posts required to be set in prebored holes. Place the backfill material in lifts not exceeding 4 inches (100 mm). Thoroughly compact each lift before the next lift is placed.

b. Install the posts to be firm, plumb, and at the location, spacing, and elevation designated.

4. End Anchors and Terminals.

a. Install end anchors and terminals of the type shown in the contract documents. Cast end anchors in place using Class C concrete according to Section 2403, except air content may vary from 4% to 7%. Finish exposed concrete as directed by the Engineer.

b. When bolt holes in concrete bridge end posts or concrete barrier do not align correctly for the steel beam guardrail terminal connection, drill new bolt holes in the locations required for the terminal connection. Use a core bit to ensure correct bolt hole location and alignment.

5. Guardrail Markers.
When indicated in the contract documents, install guardrail markers of the required type meeting the requirements of Article 4186.12.

6. Delineators and Object Markers.
When indicated in the contract documents, install delineators and object markers of the required type meeting the requirements of Articles 4186.11 and 4186.12.

B. High Tension Cable Guardrail.
Furnish high tension cable guardrail from the approved products listed in Materials I.M. 455.01.

1. Installation of High Tension Cable Guardrail.

a. Install high tension cable guardrail according to the manufacturer's recommendations. Prior to construction, provide the Engineer with three copies of the manufacturer's most current product manuals covering installation and maintenance of the installation. Include signed certification statements that all materials to be incorporated into the installation comply with Materials I.M. 455.01.

b. Tension the cables according to the manufacturer's recommendations at the time of installation, then check and adjust the tension approximately three weeks after installation.

2. Posts.

a. Ensure posts are plumb and at the manufacturer's recommended location, spacing, and elevation. Spacing is not to exceed 20 feet (6 m).

b. Furnish "socketed" type posts and install in reinforced concrete foundations. Cast the foundations in place according to Article 2505.03, A, 4. Use the dimensions and reinforcement recommended by the manufacturer, except with a foundation depth of at least 42 inches (1.1 m).

3. End Anchors.

a. Incorporate one of the approved end anchors listed in Materials I.M. 455.01. Furnish end anchors produced by the same manufacturer of the high tension cable guardrail.

b. Construct end anchors according to the manufacturer's recommendations for the site specific soil conditions. Soils testing required is incidental to the cable installation.

4. Delineating High Tension Cable Guardrail.

a. Delineate high tension cable guardrail installations using retroreflective sheeting. Apply the sheeting to the last five posts at each end of an installation and throughout the remainder of the installation at a maximum spacing of 50 feet (15 m). Apply Type III or IV retroreflective sheeting that:

- Meets the requirements of Article 4186.03,
- Provides at least 7 square inches (4500 mm^2) of surface area when viewed from a line parallel to the roadway centerline, and
- Is yellow or white and of the same color as the adjacent edge line.

b. Attach sheeting near the top of the post: 1) in a manner recommended by the manufacturer; and 2) to that side of the post from which vehicle impacts are most likely. For installations where impacts are likely to occur from either side, apply the sheeting to both sides of the post.

C. Guardrail Removal.

1. Remove guardrail, delineators, and object markers as shown in the contract documents. Guardrail materials become the property of the Contactor unless stated otherwise in the contract documents. Deliver salvaged materials to the location stated in the contract documents. Salvaged materials become the property of the Contracting Authority. Remove non-salvaged materials from project site.

2. Carefully remove, disassemble, and clean the salvaged guardrail without damaging the parts. Replace material damaged during removal, disassembly, or cleaning with new material of the same kind (at no cost to the Contracting Authority). Stockpile salvaged

materials as indicated in the contract documents. Restore areas disturbed by the removal operation to an acceptable condition.

3. Place backfill material consisting of suitable soil in post holes. Sand or other granular materials are not acceptable for use as backfill material. Place backfill material in lifts not exceeding 4 inches (100 mm). Thoroughly compact each lift before the next lift is placed. Fill and tamp holes within the same working day.

D. Limitations.

1. General.

a. Do not stress attachments to new concrete or to bolts set in epoxy resin until the new concrete or epoxy resin has attained an age of 3 calendar days. Concrete foundations for posts and end anchors may be subjected to cable tensioning after 3 calendar days. These time requirements may be lengthened by the Engineer during cool weather.

b. Complete grading work, if required, prior to removal of existing guardrail or installation of new guardrail.

c. When a roadway is open to traffic during construction, complete guardrail installations within 5 working days from the day the structure, barrier rail, pavement, or shoulder (whichever is the controlling item of work) is sufficiently completed to allow guardrail installation. Each installation exceeding the 5 working day completion requirement will be subject to a contract price adjustment of $100 per working day. For high tension cable guardrail, this price adjustment will be waived when the installation serves as crossover protection only and no guardrail or concrete barrier has been removed.

d. When a roadway is closed to public traffic for construction, complete all guardrail installations before opening the road to traffic.

2. Steel Beam Guardrail and Low Tension Cable Guardrail.

a. In areas where guardrail construction is not restricted by other construction, remove existing guardrail (if any) and construct new guardrail, except for end anchors requiring concrete, on the same working day. Place concrete for the final end anchor no later than the next working day.

b. For steel beam guardrail installations requiring end anchors, use a Type E Terminal Section, a Type II Barricade, and a Type A Warning Light to end the installations until the final anchor is finished.

3. High Tension Cable Guardrail.

a. In case of a discrepancy between these Specifications and the manufacturer's recommendations, these Specifications will govern.

b. At locations where the proposed guardrail installation does not interfere with the functioning of the existing guardrail, do not remove the existing guardrail until the high tension cable guardrail system is fully functional. Once the installation is fully functional, remove existing guardrail within 5 working days.

2505.04 METHOD OF MEASUREMENT.

Measurement will be as follows:

A. Steel Beam Guardrail Installation.

1. Steel Beam Guardrail.

Linear feet (meters) shown in the contract documents.

2. Steel Beam Guardrail Barrier Transition Section.

By count.

3. Steel Beam Guardrail End Anchors.

By count for each type of end anchor constructed. Installations continued across a bridge will not be counted as end anchors.

4. End Terminals.
By count for each type of end terminal constructed.

B. Low Tension Cable Guardrail Installation.

1. Low Tension Cable Guardrail.
a. Linear feet (meters) shown in the contract documents.
b. Length will be calculated using one of the cables of cable guardrail, with no deductions for turnbuckles or compensating devices.

2. Low Tension Cable Guardrail, End Anchor.
By count.

C. High Tension Cable Guardrail Installation.

1. High Tension Cable Guardrail.
a. Linear feet (meters) shown in the contract documents.
b. Length will be calculated as the protection length, not including lengths of end anchors.

2. High Tension Cable Guardrail, End Anchor.
By count.

3. High Tension Cable Guardrail, Spare Parts Kit.
By count for the number of spare parts kits delivered.

D. Removal of Guardrail.

1. Steel beam guardrail: linear feet (meters) to the nearest 0.5 foot (0.1 m) by measuring along the front of the rail from bolt hole to bolt hole.

2. Cable guardrail: in linear feet (meters) to the nearest 1 foot (0.1 m) by measuring along the front of one of the cables with no deductions for turnbuckles or compensating devices.

2505.05 BASIS OF PAYMENT.
Payment for guardrail items will be the contract unit price as described below. Payment includes furnishing all materials, equipment, tools, and labor necessary to complete the removal and installation of the guardrail, including excavation and placing backfill. However, excavation in unexpected rock will be paid for as extra work according to Article 1109.03. Unexpected rock will be considered as rock encountered during excavation that was not visible from the roadway and was not indicated in the contract documents.

A. Steel Beam Guardrail Installation.

1. Steel Beam Guardrail.
a. Per linear foot (meter).
b. Payment for nested steel beam guardrail will be included in the contract unit price.
c. Posts, spacer blocks, object markers, delineators, guardrail markers, barrier markers, offset brackets, and remaining hardware are incidental.

2. Steel Beam Guardrail Barrier Transition Section.
a. Each.
b. Payment for nested steel beam guardrail will be included in the contract unit price.
c. Posts, spacer blocks, object markers, delineators, guardrail markers, barrier markers, offset brackets, and remaining hardware are incidental.

3. Steel Beam Guardrail End Anchors.
a. Each for the type of end anchor constructed.
b. Payment for nested steel beam guardrail will be included in the contract unit price.
c. Drilling new bolt holes for guardrail connection is incidental.

4. **End Terminals.**
   a. Each for the type of end terminal constructed.
   b. Payment for nested steel beam guardrail will be included in the contract unit price.
   c. Posts, spacer blocks, object markers, delineators, guardrail markers, offset brackets, and remaining hardware are incidental.

B. Low Tension Cable Guardrail Installation.

1. **Low Tension Cable Guardrail.**
   a. Per linear foot (meter).
   b. Posts, spacer blocks, object markers, delineators, guardrail markers, barrier markers, offset brackets, hook bolts, turnbuckles, compensating devices, concrete, and remaining hardware are incidental.

2. **Low Tension Cable Guardrail, End Anchor.**
   Each.

C. High Tension Cable Guardrail Installation.

1. **High Tension Cable Guardrail.**
   a. Per linear foot (meter).
   b. Posts and accessories required by the manufacturer, additional hardware and concrete, and grading required to meet cable height tolerance are incidental.

2. **High Tension Cable Guardrail, End Anchor.**
   Each. Grading required to meet the manufacturer's recommendations is incidental.

3. **High Tension Cable Guardrail, Spare Parts Kit.**
   Each. Payment is full compensation for delivering spare parts kit to the location identified in the contract documents.

D. Removal of Guardrail.

1. Per linear foot (meter) for removal of guardrail, including steel beam guardrail, cable guardrail, foundations for socketed posts for cable guardrail, end anchors, and terminal devices.

2. If the guardrail materials are salvaged, payment for hauling and stockpiling the materials shall be according to Section 2555. Placing backfill material around posts and in end anchor footing holes is incidental.

3. Payment for nested steel beam guardrail will be included in the contract unit price.

4. Posts, spacer blocks, object markers, delineators, guardrail markers, offset brackets, end anchors, terminal devices, and remaining hardware are incidental.

5. For low tension cable guardrail, the following additional items are incidental: hook bolts, turnbuckles, compensating devices, and remaining hardware.

Section 2506

2506.02, F, 1.

Replace the first sentence of the Article:

Measure the fluidity of the flowable mortar using the method described by Materials I.M. 375.

Section 2507

2507.02, Materials.

Add Article:

D. Engineering Fabric.

Meet requirements of Section 4196 and listed on Materials I.M. 496.01, Appendix G.

Section 2508

2508.01, B, 1, a.

Replace the Article:

Apply Article 2508.01, B, only to structures previously painted with lead based paints and for structures with Scratch Tests indicating a hazardous waste is expected to be generated during the project. Scratch tests are provided elsewhere in the contract documents for information per Iowa Code Section 89B.8, Subsection 1.

Section 2510

2510.05, C, Removal of Anchor Lugs.

Replace the Article:

Each. If removal of anchor lugs is not a bid item in the contract documents, payment will be $600 per lane for each anchor lug removed.

Section 2511

2511.03, C, 3, a, 1).

Replace the second sentence of the Article:

Ensure the finished surface has a cross slope between 1% and 2% for drainage, unless shown otherwise.

2511.04, D, Detectable Warnings for Curb Ramps.

Replace the Article:

The Engineer will measure in square feet, to the nearest square foot (square meters to the nearest 0.1 square meter), the surface area of Detectable Warnings for Curb Ramps.

Section 2513

2513.03, A, 1, a.

Replace the first sentence of the Article:

Use concrete specified in Section 2407.

2513.04, A.

Replace the Article:

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

2513.04, B.

Renumber and Replace the Article:

~~B.~~C. For concrete barrier railing for bridge structures: apply Article 2414.04.

Add the Article:

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.

2513.04, C.

Renumber the Article:
~~**C.**~~**D.** Reinforcement in concrete barrier for other than bridge structures will not be measured separately.

2513.05, B.

Renumber and **Replace** the Article:
~~**B.**~~**C.** For concrete barrier railing for bridge structures: apply Article 2414.05.

Add 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.

2513.05, C.

Renumber and **Replace** the Article:
~~**C.**~~**D.** Reinforcement in concrete barrier for other than bridge structures: not paid for separately.

2513.05, D.

Renumber and **Replace** the Article:
~~**D.**~~**E.** Payment as described above is considered full compensation for all work involved.

Section 2514

2514.05, C, Shoulders.

Replace the Article:
According to Article 2302.05, D.

Section 2518

2518.03, A, 1, b

Replace the Article:
Place a Type III barricade, described in Part 6 of the MUTCD, immediately in front of the fence at the approximate roadway centerline. Mount a ROAD CLOSED (RII-2) sign on the Type III barricade.

Section 2519

2519.03, A, 1.

Add Article:
d. When removing and reinstalling field fence, make arrangements with adjacent property occupants for restraining livestock from entering the right-of-way.

2519.04, Method of Measurement.

Add Articles:
G. Removal and reinstallation of fence: Linear feet (meters) for each type of fence, including gates, as shown in the contract documents.

H. Removal of fence: Linear feet (meters) for each type of fence, including gates, as shown in the contract documents.

2519.05, Basis of Payment.

Add Article:
D. Where a new terminus is required at an intersection with new fencing, work and materials to install an “End Post Assembly” for existing field fence will not be paid for separately.

2519.05, A.

Add Articles:

4. Removal and reinstallation of fence: Per linear foot (meter) for each type. Payment will be full compensation for removing and reinstalling fence, including removing and reinstalling gates (if required) and replacement of any fence parts that are not able to be salvaged and reinstalled.

5. Removal of fence: Per linear foot (meter) for each type. Payment will be full compensation for removing fence fabric, gates, posts, and footings and for filling and consolidating resulting holes to finish grade to prevent future settlement.

Section 2522

2522.03, E, 4, Anchor Bolts, Washers, and Nuts.

Replace the first sentence of the Article:

Ensure galvanizing for anchor bolts, washers, and nuts meets the requirements of ASTM F 2329; or ASTM B 695, Class 50, Type I coating.

Section 2525

2525.02, H, 1, General.

Replace the Article:

Meet the requirements of Article 2523.03, N and Article 4185.10.

2525.03, H, 3, Hardware.

Replace the third sentence of the Article:

All hardware shall be steel, hot-dipped galvanized according to F 2329, or ASTM B 695, Class 50, Type I coating, or shall have an electro deposited coating of the same coating thickness, and so designed for this purpose.

2525.03, H, 3, b.

Delete the second bullet of the Article:

- ~~Galvanizing according to ASTM A 153, Class C, or ASTM B 695, Class 50.~~

Section 2526

2526.03, A.

Rename Article 10:

10. HMA Overlays

Renumber Article 11 to Article 12:

Add Article:

11. PCC Overlays

a. Mark locations and elevations with metal pin or tack in a wood hub (only tack one side), flat, and lath. Mark elevations on both sides of pavement at 50 foot (10 m) intervals on straight and level sections and at 25 foot (10 m) intervals on horizontal and vertical curves. Clearly mark flat with the station location, cut/fill information, and offset distance to edge of pavement. Include pavement cross slope information in superelevated curves.

b. Take elevations of pavement centerline and both edges at bridges and existing pavement at 10 foot (3 m) intervals for 100 feet (30 m). Submit final elevations to the Engineer for approval.

c. When a new profile grade is not included in the contract documents:

1) Obtain elevations of existing pavement at centerline and both pavement edges for bonded overlays and projects including mainline stress relief course and/or pavement scarification.

2) Obtain elevations of existing pavement at centerline, quarter points, and both pavement edges for unbonded overlays and whitetopping projects when a stress relief course and/or pavement scarification are not included.

3) Obtain elevations at 100 foot (30 m) intervals on straight and level sections and at 50 foot (10 m) intervals on horizontal and vertical curves.

4) Design a smooth profile grade line based on these elevations to provide the required pavement or shoulder thickness as detailed in the contract documents. This grade line shall tie into existing bridges, adjacent pavement and ramps, and provide the required pavement crown. This proposed grade line shall be submitted to the Engineer for approval.

d. Reference and preserve existing control points located at each Point of Intersection (P.I.).

e. Obtain Engineer's approval for method used to reference points.

f. Reset Control Points after work is complete.

2526.03, G.

Replace the Article:

Establish benchmarks in the adjacent area before installing settlement plates in accordance with Article 2526.03, A, 1, d.

1. Obtain Engineer's approval for method of determining alignments and elevations and the method of preserving control points. This approval does not relieve Contractor of the responsibility for correctness of survey work.

2. Do not use plan cross-sections for vertical or horizontal control.

The Engineer will locate and determine elevations of settlement plates.

Section 2527

2527.02, D, 2, b, 2.

Delete the first rows of the Tables 2527.02-1 and 2527.02-2.

~~4 1/2" (115 mm)~~	~~14 mils (0.35 mm)~~	~~305.5 ft. of solid line per gallon of paint. (24.60 m of solid line per liter of paint.)~~	~~9.0 lb./gal. (1.08 kg/L)~~

~~4 1/2" (115 mm)~~	~~16 mils (0.41 mm)~~	~~267.4 ft. of solid line per gallon of paint. (21.53 m of solid line per liter of paint.)~~	~~9.0 lb./gal. (1.08 kg/L)~~

2527.03, A, 5.

Replace the Article:

Ensure the following for all painted and taped pavement markings:

- Uniform thickness,
- Uniform distribution of glass beads throughout the line width,
- Line widths as specified, with a tolerance of ± 1/4 inch for 4 inch (± 6 mm for 100 mm) lines and ± 1/2 inch (13 mm) for wider lines, ~~and~~
- Symbols and Legends are visually proportional to contract documents with an out-to-out tolerance of ± 6 inches (150 mm), and
- Markings have sharp edges and cutoffs at the ends.

2527.03, C, 5.

Replace the second sentence of the Article:

When symbols or legends are removed, remove the entire area of the existing symbol or legend; in a rectangular shape so no directionality may be observed from the removed symbol or legend.

2527.03, D, Pavement Marking Requirements.

Delete the Article:

~~**D. Pavement Marking Requirements.**~~

~~Apply the following marking material placement requirements for permanent and temporary standard pavement markings:~~

~~**1. Edge Lines.**~~

~~Solid white lines (solid yellow line for the inside edge line for a multi-lane divided highway, including ramps and crossovers). Place approximately 3 inches (75 mm) from the edge of the pavement.~~

~~**2. Center Lines for Two Lane, Two Way Highways.**~~

~~Single, dashed yellow lines 10 feet (3 m) long with 30 foot (9 m) gaps between dashes.~~

~~**3. Center Lines for Multi-lane, Undivided Highways.**~~

~~Solid yellow lines spaced 10 1/2 inches (270 mm) apart between the inside edges of the lines.~~

~~**4. Lane Lines for Multi-lane Highways (Divided and Undivided).**~~

~~Single, dashed white lines 10 feet (3 m) long with 30 foot (9 m) gaps between dashes.~~

~~**5. No Passing Zone Lines.**~~

~~**a.** Solid yellow lines. For PCC surfaces, place 3 inches (75 mm) outside a 4 1/2 inch (115 mm) center line or 3 1/4 inches (85 mm) outside a 4 inch (100 m) center line. For asphalt surfaces, place 10 1/2 inches (270 mm) from the adjacent center line or no passing zone line.~~

~~**b.** Where there are two no passing zone lines, the center line is to be omitted, and the no passing zone lines are spaced 10 1/2 inches (270 mm) apart between the inside edges of the lines.~~

~~**c.** It is intended that only the two outside paint nozzles be used for painting center lines and no passing zone lines on asphalt surfaces. Painting equipment should be equipped to change from solid line to a dashed line on the two outside paint nozzles.~~

~~**6. Dotted Lines.**~~

~~Dotted lines are usually single, white dotted lines 2 feet (0.6 m) long with 4 foot (1.2 m) gaps between dots.~~

~~**7. Transverse Marking.**~~

~~Transverse marking will be shown in the contract documents.~~

~~**8. Symbols and Legends.**~~

~~Symbols and legends will be shown in the contract documents. Each of the following is a complete unit:~~

~~**a.** Each RxR marking for railroad and highway grade crossing.~~

~~**b.** Each SCHOOL legend (one lane or two lane).~~

~~**c.** Each STOP, X-ING, ONLY, BUS, LANE.~~

~~**d.** Each arrow (straight, left, right, combination, or ramp).~~

~~**9. Solid White Barrier Lines.**~~

~~Solid white barrier lines may also be required in the contract documents.~~

2527.03, F, 4.

Delete the second sentence of the Article:

~~If not shown, space them at intervals described in Section 3D-5 of the MUTCD.~~

2527.04, B.

Replace the first sentence of the Article:

The Engineer will measure the number of stations (meters), based on a single 4-inch (100 mm) width, of painted, taped, and/or removed line.

Replace the last sentence of the Article:

Measurement of lines wider than 4 ~~1/2~~ inches (~~115~~ 100 mm) will be adjusted by the quantity factor to a 4 inch (100 mm) line.

Section 2528

2528.01, A.

Replace the Articles:

5. Ensure all traffic control complies with the current edition of the MUTCD, Part 6 as adopted by the Department.

6. On Interstate and Primary Road projects, use crashworthy Category I and Category II traffic control signs and devices that meet NCHRP Report 350 requirements.

7. Upon request, provide the following to the Engineer for the purpose of documenting the crashworthiness of Category I and Category II signs and traffic control devices:

a. The vendor's self-certification for Category I traffic control devices.

b. FHWA NCHRP Report 350 approval memos for Category II signs and traffic control devices.

8. A list of approved Category II traffic control devices is found on the World Wide Web at the following URL: http://safety.fhwa.dot.gov/roadway_dept/policy_guide/road_hardware/wzd

Add Article:

10. Provide ten calendar days advance notification of a pedestrian path closure to the following:

- Iowa Department of the Blind: ~~Curtis.chong@blind.state.ia.us~~ Program Administrator of Field Operations and Access Technology, telephone: 515.281.1361, website: www.blind.state.ia.us.
- National Federation of the Blind of Iowa: ~~m.barber@mchsi.com~~ President, telephone: 515.771.8348, website: www.nfbi.org.
- Engineer

2528.01, C, 1.

Replace the second sentence of the Article:

The Traffic Control Technician is required to have attended and passed the exam in an ATSSA Traffic Control Technician, IMSA Work Zone Traffic Control, or Minnesota DOT Traffic Control Supervisor training class.

2528.03, C, Channelizing Devices.

Add Article:

5. For pedestrian path closures, use Type II Barricades meeting the requirements of the MUTCD for channelizing devices used to channelize pedestrians.

2528.03, C, 1, b, Cones, Vertical Panels, 42 inch (1050 mm) Channelizers, Drums, and Tubular Markers.

Add Article:

5) 42-inch (1050 mm) channelizers may be used in place of drums in work areas remaining in place for up to three days. Spacing of channelizers shall be half the spacing required for drums or double the number of drums required.

2528.04, H, 1.

Replace the Article:

By count for the number of pilot cars used during each work shift. A shift is a scheduled period of work for the Contractor's operations.

2528.04, H, 2.

Replace the Article:

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 shift and is intended to proceed for a major part of the shift. If used less than 4 hours during a shift, one half pilot car will be counted.

b. Use of other pilot cars is necessary and they are used for at least 1 hour during the shift, perhaps intermittently, and this shall be the primary duty of the employee. If used less than 4 hours in a shift, one-half pilot car will be counted.

2528.04, I, 1.

Replace the Article:

By count for the number of flaggers used during each work shift. A shift is a scheduled period of work for the Contractor's operations.

2528.04, I, 2.

Replace the Article:

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 shift and is intended to proceed for a major part of the shift. If used less than 4 hours during a shift, one-half flagger will be counted.

b. Use of other flaggers is necessary and they are used for at least 1 hour during the shift, perhaps intermittently, and this shall be the primary duty of the employee. If used less than 4 hours in a shift, one-half flagger will be counted.

2528.05, E, Temporary Crash Cushions.

Replace the Article:

Article 2551.05, A, applies.

2528.05, H, Pilot Cars.

Replace the Article:

Predetermined contract unit price per each for the number of shifts each pilot car was operated.

2528.05, I, 1.

Replace the Article:

Predetermined contract unit price per each for the number of shifts each flagger was used.

Section 2529

2529.02, Materials.

Add new Article:

F. Patch Subdrain.

Meet the requirements of Article 2502.02.

2529.02, B, 5.

Replace the Table 2529.02-2: Proportions for 32% Calcium Chloride Solutions:

Type of Solid Calcium Chloride	Pounds (Grams) of Solid per Gallon (Liter) of Water	Solution Produced per Gallon (Liter) of Water
Type 1 – Regular Flake (77% material)	6 (720)	1.3
Type 2 – Concrete Flake or Pellets (94% material)	4.5 (540)	1.2

Replace Article b:

b. The Engineer will check the solution concentration using a hydrometer according to Materials I.M. 373. Add the solution at the rate of 3.0 gallons per cubic yard (14.8 L/m^3) of concrete. The Engineer may approve alternate calcium chloride solutions of different concentrations provided appropriate adjustments in the total concrete composition are made.

2529.02, E, Subase.

Rename and **Replace** the Article:

E. Subbase Patch Material.

Meet the requirements of Section 4123.

2529.03, A, 1.

Delete the last sentence of the Article:

~~A detail, typical of each type of patch, will be shown.~~

2529.03, C, 1, a.

Replace the second sentence of the Article:

Excavation will be required for the patch thickness and, if required, for the subbase patch material.

2529.03, C, 1, b.

Replace the third bulleted item of the Article:

- Replace the concrete with subbase patch material, compacted as required, to the elevation of the bottom of the patch.

2529.03, D, 2.

Replace the second and third sentences of the Article:

Overdepth removal may be replaced with subbase patch material or the patching mixture. When the subbase patch material cannot be properly drained, replace the overdepth removal with the patching mixture.

2529.03, F, Subdrains.

Replace the Article:

1. When subbase material and longitudinal subdrains are required by the contract documents or the Engineer, place the subbase as backfill material to drain to the longitudinal subdrain.

2. If longitudinal subdrain will not be placed, or is not present, on the side of the roadway to be patched, place patch subdrain according to Article 2502.03, C and the contract documents.

2529.03, H, 6.

Replace the Article:

~~Saw C and CD joints. Timing is critical for this operation. Perform sawing as soon as possible without excessive raveling of the saw cut edges.~~ When required, saw and seal joints in accordance with Article 2301.25. Sawing shall be done as soon as possible without excessive raveling of the saw cut edges.

2529.03, H, 7.

Delete the Article:

~~**7.** For patches finished flush with the adjacent pavement, and not to be covered with HMA, seal C and CD joints and the edged reservoir formed by edging or sawing according to Article 2301.03, P, except sand cleaning will not be required.~~

2529.04, Method of Measurement.

Rename and **Replace** the Article:

B. CD Joint Assembly, EF Joint Assembly, and CT Joint.
By count for joints properly installed of each type respectively, when CD Joint Assemblies, EF Joint Assemblies, or CT Joints are required within the patch area. Each joint is for one lane width. Partial lane width joints will be counted as one lane width for payment purposes.

Renumber Article E and **Add** new Article:

E. Patch Subdrain.
By count.

~~E~~ F. Removal of Anchor Lugs.

Add new Article:

G. Rumble Strip Panel (In Full Depth Patch)
By count for Rumble Strip Panels properly installed at locations designated on the contract documents.

2529.05, Basis of Payment.

Renumber Article E and **Add** new Article:

E. Patch Subdrain.

1. Each.

2. Payment is full compensation for the following:
- Excavation of the trench and removal of excess trench material from the project, and
- Furnishing and placing 4 inch (100 mm) perforated corrugated polyethylene pipe, porous backfill, impervious fill, shoulder material, and rodent guard.

~~E~~ F. Removal of Anchor Lugs.

Add new Article:

G. Rumble Strip Panel (In Full Depth Patch)
Each. Payment is full compensation for construction of the panels as detailed on the contract documents.

2529.05, A, 2, c.

Replace the Article:

When the average thickness of a patch at any one 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 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.

2529.05, B, CD Joint Assembly and CT Joint.

Rename and **Replace** the Article:

B. CD Joint Assembly, EF Joint Assembly, and CT Joint.
Each, for the type of joint. Payment for Joint Assembly, EF is full compensation for excavation and removal of existing subgrade or subbase material and furnishing and placing Modified Subbase.

2529.05, D, 2.

Delete the third bulleted item:

- ~~Construction of transverse subdrains, and~~

Section 2530

2530.02, B, 2, a.

Replace the last line of the Article:
Aggregate Gradation Table, Appendix.

2530.02, B, 4, e.

Renumber Table 2529.02-2:
Table 2530.02-2: Proportions for 32% Calcium Chloride Solutions

2530.05, B, 2.

Replace the Article:
When parts of ~~HMA~~ regular or irregular partial depth HMA finish patches are constructed to full depth at the direction of the Engineer, payment will be for the areas of those parts at 2.0 times the contract price per square ~~foot~~ yard (square meter) for regular or irregular partial depth HMA finish patches.

Section 2532

2532.03, B, 3, a.

Replace the Article:
Grind and longitudinally groove the entire surface of the bridge deck according to Article 2412.03, D, 4, a.

Section 2533

2533.05, A, 1.

Replace the Article:
Partial payment of mobilization will be made for each project within 30 calendar days after receipt of a signed contract. This partial payment will be either 10% of the contract price for this item or 1% of the original project sum, whichever is less. If the partial payment for a project is less than $1000, the Engineer will delay this partial payment until 5% of the ~~original~~ awarded project ~~sum~~ total is earned.

Section 2536

2536.02, A, Bidding.

Replace the Article:
Bids will be received for this project from bidders who hold a valid permit for this type of work issued by the Iowa Workforce Development, Labor Services Division, and from bidders who can provide documentation the work will be subcontracted to a contractor holding a valid permit.

Section 2538

2538.03, D, 7, a, 2).

Replace the Article:
Remove septic tanks and place backfill in the excavation according to Article 2538.03, D, 9. Removed septic tanks become property of the Contractor. Transport off the project.

2538.03, D, 7, b, Cisterns

Replace the Article:
Remove all cisterns and place backfill in the excavation according to Article 2538.03, D, 9. Cisterns will be considered demolition debris. Remove from the site.

Section 2539

2539.02, B, Fluidity.

Replace the first sentence of the Article:
Measure the fluidity of the grout slurry using the method described by Materials I.M. 375.

Section 2546

2546.02, Materials and Fabrication.

Replace the third sentence of the Article and **Add** new sentence:
At the Contractor's option, for lid fastening of twisted mesh baskets at edges and diaphragms, either "Lacing Wire" or "Steel Ring Fastener System" may be used. For welded wire mesh baskets, use “Lacing Wire” for lid fastening at edges and diaphragms. Baskets shall be fabricated by twisting or welding a mesh from steel wire.

2546.02, A.

Renumber Articles 4, 5, 6, and 7 to 5, 6, 7, and 8 respectively.

Replace Articles 1, 2, and 3 with Articles 1, 2, 3, and 4:

1. **DoubleTwisted Wire Baskets.**
   - **a.** Twisted wire mesh for gabion baskets and revet mattresses shall be formed in a uniform hexagonal pattern with double twists so bound as to prevent unraveling.
   - **b.** Twisted wire mesh baskets shall meet the requirements of ASTM A 975 and fabricated from soft temper galvanized wire with a Class III Coating in accordance with ASTM A 641 (Style 1) and, if specified, subsequently coated with PVC (Style 3).
   - **c.** For gabions, the mesh opening shall not exceed 4.5 inches (115 mm), and area shall not exceed 10 square inches (6450 mm^2).
   - **d.** For mattresses, the maximum linear dimension of mesh opening shall not exceed 3.25 inches (80 mm).
   - **e.** Wire for twisted wire mesh gabion baskets, revet mattresses, edges and selvage shall have a tensile strength of 60,000 to 70,000 psi (413.7 to 485 MPa).
   - **f.** Wire for lacings and connections of twisted wire mesh gabions and mattresses shall have a tensile strength of 60,000 to 75,000 psi (413.7 to 515 MPa).

2. **Welded Wire Baskets.**
   - **a.** Welded wire baskets shall meet the requirements of ASTM A 974, Style 2, manufactured from uncoated hard drawn steel wire conforming to ASTM A 853 and the fabric subsequently coated with zinc using the hot dip process; if specified, the galvanized fabric may have an additional coating of PVC (Style 5).
   - **b.** Weight of the zinc coating on the fabric shall conform to the requirements of ASTM A 641 Class 3.
   - **c.** Welded wire mesh for gabion baskets shall have each connection welded to obtain a minimum average shear strength of 584 pounds (2600 N), with a minimum shear strength of 450 pounds (2000 N).
   - **d.** For revet mattresses, the minimum average shear strength of welded connections shall be 292 pounds (1300 N), with a minimum shear strength of 225 pounds (1000 N).
   - **e.** Wire shall have a minimum tensile strength of 80,000 psi (550.0 MPa) for welded wire baskets and mattresses.
   - **f.** For gabions, the mesh opening shall not exceed 3 inches (76.2 mm), and area shall not exceed 9 square inches (5806 mm^2).
   - **g.** For mattresses, the mesh opening shall not exceed 3 by 1.5 inches (76 by 38 mm).

3. **Wire.**
   Ensure wire complies with the following:
   - **a.** Mesh, edge, and selvage wire are the same material.
   - **b.** Minimum sizes shown in Table 2546.02-1:

Table 2546.02-1: Minimum Wire Sizes

	Gabions	Mattresses
Mesh	11 gage (3.06 mm)	13 1/2 gage (2.18 mm)
Edges and selvage	9 gage (3.76 mm)	11 gage (3.06 mm)
Lacing and connecting	13 1/2 gage (2.18 mm)	13 1/2 gage (2.18 mm)

4. Steel Ring Fastener System.

Steel Ring Fastener System may be used only with twisted mesh wire baskets. Ensure one of the following is used:

- Galvanized 11 gage (3.05 mm) wire with a tensile strength meeting the requirements of ASTM A 764, Class I Tensile, and with a Class 3, Type B or C coating of a minimum of 0.80 ounce (244 g) of zinc per square foot (square meter).
- Stainless steel 11 gage (3.05 mm) wire (use only with PVC coated gabion baskets and mattresses) with a tensile strength meeting the requirements of ASTM A 313, Type 302, Class I.

Section 2548

Section 2548, Milled Shoulder Rumble Strips – HMA or PCC Surface.

Replace the Section:

Section 2548. Milled ~~Shoulder~~ Rumble Strips – HMA or PCC Surface.

2548.01 GENERAL.

Provide equipment, furnish all necessary labor and materials, and perform all operations necessary for milling ~~shoulder~~ rumble strips in HMA or PCC ~~surfaced shoulders~~ surfaces. Mill ~~shoulder~~ rumble strips to the dimensions and spacing shown in the contract documents. Apply diluted asphalt emulsion to the milled shoulder rumble strips on HMA ~~surfaced shoulders~~ surfaces by means of a bituminous distributor.

2548.02 MATERIALS.

A. Milling.

Equip milling equipment with a cutting head having cutting tips arranged in a pattern as to provide a smooth cut, approximately 1/16 inches (2 mm) between peaks and valleys.

B. Asphalt Emulsion Fog Seal.

1. Use asphalt emulsion Grade CSS-1h, meeting requirements of Section 4140.

2. Dilute the asphalt emulsion with water prior to application to the milled shoulder rumble strip. The dilution rate is one part of asphalt emulsion to one part of water.

2548.03 CONSTRUCTION.

Notify the Engineer if degraded ~~shoulders~~ areas are encountered that will not accommodate milled rumble strips. Skip those sections.

A. Test Strip.

Demonstrate to the Engineer on an initial 500 foot (150 m) test section that the equipment and method will provide the desired milled ~~shoulder~~ rumble strip and surface inside each depression without damaging the adjacent pavement. If the desired results are not being provided, as determined by the Engineer, provide different equipment or methods, or make necessary adjustments to provide the desired results. If the initial 500 foot (150 m) section results are unsatisfactory, repair or replace the section as determined by the Engineer, at no additional cost to the Contracting Authority.

B. Milling.

1. Mill shoulder rumble strips in a straight line, offset from the painted edge line as shown in the contract documents. Do not deviate from that offset more than ± 2 inches (50 mm). ~~The offset may be decreased to 6 inches (150 mm) on shoulders with a top width less than 30 inches (750 mm).~~ Ensure the depth of the rumble strips is as shown in the contract documents. The Engineer will randomly check the alignment and depth.

2. Mill centerline rumble strips in a straight line, on the centerline joint as shown in the contract documents. Do not deviate from that location more than ± 1 inch (25 mm). Ensure the depth of the rumble strips is as shown in the contract documents. The Engineer will randomly check the alignment and depth.

~~2~~3. Remove waste material (millings) resulting from the operation on a daily basis. The waste material may be used as fillet material adjacent to the paved shoulder or it may become property of the Contractor and disposed of off the project. Disposal of material may be at an approved landfill or approved stockpile, or by other methods that will allow the material to be recycled. Remove waste material prior to opening adjacent lane to traffic.

C. Asphalt Emulsion Fog Seal.

1. Ensure the equipment meets the requirements of Section 2001.

2. Ensure the application width covers the entire milled shoulder rumble strip.

3. Place the diluted asphalt emulsion fog seal according to Article 2308.03, D, at a rate of 0.13 gallon per square yard (0.6 L/m^2).

4. Do not place asphalt emulsion on a damp or wet surface.

5. Apply asphalt emulsion during weather conditions under which satisfactory application can be obtained. Do not apply asphalt emulsion when the air temperature is below 50°F (10°C). Do not place asphalt emulsion after October 15 without the Engineer's permission.

D. Limitations.
Do not disturb desirable grass areas and desirable trees outside the construction limits. Do not park or service vehicles and equipment or use these areas for storage of materials. Obtain the Engineer's approval for storage, parking, and service areas.

2548.04 METHOD OF MEASUREMENT.
Measurement will be as follows:

A. Milled Shoulder Rumble Strips.
Stations (meters) shown in the contract documents, measured along each edge of mainline pavement ~~abutting a paved shoulder~~. Unless stated otherwise in the contract documents, no deduction will be made for gapped areas. The quantity will be adjusted for the length of degraded shoulders skipped, as defined in Article 2548.03 of this specification. The quantity will be adjusted for test sections that were deemed unsatisfactory.

B. Milled Centerline Rumble Strips.
Stations (meters) shown in the contract documents, measured along the centerline of mainline pavement. Unless stated otherwise in the contract documents, no deduction will be made for gapped areas. The quantity will be adjusted for the length of degraded pavement skipped, as defined in Article 2548.03 of this specification. The quantity will be adjusted for test sections that were deemed unsatisfactory.

~~B~~C. Asphalt Emulsion for Fog Seal (Shoulder Rumble Strips).
Gallons (liters) ~~as provided in Article 2307.04, B~~ computed from field measurements of distributors or from tank cars or transport trucks as provided in Article 4100.03. When quantities computed from field measurements check within 1.0% of the billed gallons (liters), payment will be based on billed gallons (liters). When quantities computed from field measurements differ from billed gallons (liters) by more than 1.0%, payment will be based on the quantity from field measurements. From these quantities, any amount used by the Contractor as fuel, left in cars, or otherwise not delivered to the road surface will be deducted. The Engineer will advise the Contractor promptly, in writing, of quantities deducted.

2548.05 BASIS OF PAYMENT.
Payment will be the contract unit price as follows:

A. Milled Shoulder Rumble Strips.
Per station (meter) for the type specified.

B. Milled Centerline Rumble Strips.
Per station (meter) for the type specified.

~~B~~C. Asphalt Emulsion for Fog Seal (Shoulder Rumble Strips).

1. Per gallon (liter) for undiluted Asphalt Emulsion for Fog Seal (Shoulder Rumble Strips) that is mixed and used on the project. Diluted asphalt emulsion that is delivered to the project site, but not applied to the roadway surface will not be considered for payment.

2. Payment is full compensation for cleaning the shoulder surface, furnishing and applying diluted asphalt emulsion, mixing water, and protecting the adjacent pavement and edge lines.

Section 2550

2550.04, A.

Replace the first sentence of the Article:
Ensure all vehicles, except ready mix trucks, hauling material to or from the work area during night work as described in Article 2550.01 display a minimum 16 inch by 48 inch (400 mm by 1200 mm) sign with the legend “DO NOT FOLLOW - INTO WORK AREA” as shown in the contract documents.

2550.05, Method of Measurement and Basis of Payment.

Replace the Article:
All costs associated with furnishing, installing, operating, maintaining, moving, and removing night work lighting and other traffic control requirements required by this specification, are incidental to the lump sum bid price for Mobilization.

Section 2551

2551.03, B, 3.

Replace the Article:
When a temporary crash cushion is no longer required, remove it. The crash cushion becomes the property of the Contractor. Remove anchor bolts, if used, and fill the bolt holes with one of the non-shrink grouts listed in Materials I.M. 491.13, Appendix A.

Section 2553

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

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

2553.02, D, Backfill Material for Abandoned Tunnels.

Add Article:
3. Option 3: CLSM according to Article 2552.02, E, 3.

2553.02, D, 2, Option 2.

Replace the Article:
Option 2: Flowable mortar according to Article 2506.02.

2553.02, E, 2, c, Controlled Low Strength Material (CLSM).

Replace the Article:
Controlled Low Strength Material (CLSM): Apply Article 2552.02, E, 3.

Section 2554

2554.04, B, 9.

Add new Article:
9. Other Fixture Adjustment.
Adjustment of other fixtures by raising or lowering them will not be measured.

2554.05, B, 5. Valve Box Adjustment, Minor.

Replace the Article:
Valve Box Adjustment.
When shown in the contract documents, minor adjustment of an existing valve box by raising or lowering the adjustable valve box is incidental. When not shown or tabulated, adjustment will be paid for according to Article 1109.03, B.

2554.05, B, 9.

Add Article:
9. Other Fixture Adjustment.
When shown in the contract documents, adjustment of other fixtures by raising or lowering them is incidental. When not shown or tabulated, adjustment will be paid for according to Article 1109.03, B.

Section 2555

2555, Deliver and Stockpile Salvaged Materials.

Add Section:

Section 2555. Deliver and Stockpile Salvaged Materials

2555.01 DESCRIPTION.
Deliver and stockpile salvaged materials as tabulated on the plans.

2555.02 MATERIALS.
None.

2555.03 CONSTRUCTION.

A. Materials to be salvaged, delivered, and stockpiled will be tabulated on the plans. Plans will identify the quantity of each item to be salvaged, delivery location, and stockpiling requirements.

B. Salvage without damage, disassemble, clean, match mark (if required) items to be stockpiled, and bundle in lots normal to the product being salvaged. Replace items damaged from Contractor's operations with new materials (at no additional cost to the Contracting Authority).

C. Deliver salvaged materials, to the location indentified on the contract documents, during normal business hours. Contact the Engineer to schedule delivery and stockpiling of materials at stockpile site.

D. Stockpile salvaged materials to ensure items are not in contact with soil in an orderly fashion. Provide blocking as necessary.

2555.04 METHOD OF MEASUREMENT.
None. Lump sum item.

2555.05 BASIS OF PAYMENT.
The lump sum price for Deliver and Stockpile Salvaged Materials will be full payment for salvaging, disassembly, cleaning, match marking, bundling, delivery, blocking, and stockpiling.

Division 26. Roadside Development.

Section 2601

2601.02, B.

Replace the second sentence and **Delete** the third sentence of the Article:
Apply seed for native grass, wildflower and wetland grass seeding on a PLS basis, as computed by the Engineer.

2601.03, A.

Renumber Articles 12 through 17 as Articles 13 through 18.

Add Article:
12. Pneumatic Seeder.
Use a pneumatic (air blower) system with enough power and hose to reach 300 feet (100 m).

2601.03, B, 4.

Add as the third sentence of the Article:
If an area is disturbed, but not seeded by September 30th, scarify the area to a 3 inch (75 mm) depth and mulch.

2601.03, B, 4, c, 1).

Replace the Table 2601.03-1:

Table 2601.03-1: Permanent Seed Mixture, Rural Areas

Fescue, Fawn	55 lbs. per acre (62 kg/ha)
Ryegrass, Perennial	45 lbs. per acre (51 kg/ha)
Birdsfoot Trefoil	5 lbs. per acre (6 kg/ha)

2601.03, B, 4, e, 1).

Replace the second sentence of the Article:
Ensure the Engineer witnesses all seed mixing for Native Grass, Wildflower and Wetland Grass seeding mixtures.

2601.03, B, 4, i, 3).

Replace the Article:
Seeding after August 31 consists of stabilizing crop seed, hairy vetch (legume seed), and grass seed except native grass. Sow other legume seed and native grass seed the following spring as soon as possible after March 1, and before April 1, when the ground is friable from frost action, as directed by the Engineer and according to Article 2601.03, B, 4, f.

2601.03, B, 4, j, 2).

Replace the Article:
A rotary tiller will be required for the preparation of seedbed according to Article 2601.03, B, 4, a. Prior to the application of seed, ensure the seedbed is firm, smooth, and free of any material 1 1/2 inches (40 mm) in diameter or greater including clods, rocks, and other debris. Roll the seedbed both before and after the application of seed. For rolling, use either open grid type equipment or cultipacker type equipment modified by covering with expanded metal mesh.

2601.03, B, 4, l, 1).

Replace the Article:

Seedbed preparation will not be required, provided the overseeding is applied when the ground is friable from frost action after February 1 and before April 1 or as directed by the Engineer.

2601.03, C, 1.

Add new Article:

e. If an area is disturbed, but not seeded with stabilizing crop by September 30th, scarify to a 3 inch (75 mm) depth and mulch.

2601.03, C, 1, a.

Replace Table 2601.03-5:

Table 2601.03-5: Seeding Rates and Schedule

Spring -- March 1 to May 20	
Oat Grain rye Red clover Timothy	2 bu. per acre (72 kg/ha) 25 lbs. per acre (28 kg/ha) 5 lbs. per acre (6 kg/ha) 5 lbs. per acre (6 kg/ha)
Summer -- May 21 to July 20	
Oat Grain rye Red clover Timothy	3 bu. per acre (108 kg/ha) 35 lbs. per acre (39 kg/ha) 5 lbs. per acre (6 kg/ha) 5 lbs. per acre (6 kg/ha)
Fall – July 21 to September 30	
Oat Grain rye Red clover Timothy	2 bu. per acre (72 kg/ha) 35 lbs. per acre (39 kg/ha) 5 lbs. per acre (6 kg/ha) 5 lbs. per acre (6 kg/ha)

2601.03, E, 1, Time of Mulching.

Add as the second sentence of the Article:

If an area is disturbed, but not seeded by September 30th, scarify the area to a 3 inch (75 mm) depth and mulch.

2601.03, G, 3, b, 3).

Replace the Article:

For both of the above applications, if the type of fertilizer is not specified, apply 13-13-13 (or equivalent) commercial fertilizer. Spread the fertilizer with a mechanical spreader which will secure a uniform rate of application. Manipulation or mixing with the soil, other than that incidental to Article 2601.03, G, 3, d, will not be required.

2601.03, G, 3, c, 1).

Replace the Article:

Do not place sod between May 31 and September 1, or on frozen ground unless otherwise directed by the Engineer.

2601.03, G, 3, d, 4).

Replace the Article:

After sodding and seeding, water the sod, sodbed, and disturbed areas according to Article 2601.03, G, 3, e.

2601.03, J, 1.

Replace the Article:
Shape the ditch channel in the same manner as preparing a ditch for sod as provided in Article 2601.03, G, 3, a.

2601.03, M, Application of Special Ditch Control and Turf Reinforcement Mat Materials on Seeded Areas.

Replace the second sentence of the Article:
Shape the ditch channel as provided in Article 2601.03, G, 3, a.

2601.03, M, 1, e.

Replace the Article:
Use staples meeting the requirements of Article 4169.10, A. Space staples as shown in the contract documents.

2601.03, Q, Watering of Special Ditch Control, Turn Reinforcement, and Slope Protection.

Rename the Article:
Q, Watering of Special Ditch Control, Turf Reinforcement Mat, and Slope Protection

2601.04, A.

Delete the third bulleted item of the Article:
- ~~Pneumatic Seeding~~

2601.04, D.

Replace the first sentence of the Article:
Special Ditch Control, Turf Reinforcement Mat, and Slope Protection: squares of 100 square feet (square meters) calculated from measurements to the nearest foot (0.1 m).

2601.05, A, 1.

Replace the Article:
Contract unit price per acre to the nearest 0.1 acres (hectare to the nearest 0.1 hectares) for the following. Payment is full compensation for preparing the area and furnishing and applying each material.
- Overseeding and Fertilizing,
- Seeding and Fertilizing,
- Compost,
- Native Grass Seeding,
- Wetland Grass Seeding,
- Wildflower Seeding,
- Stabilizing Crop Seeding and Fertilizing, and
- Crownvetch Seeding.

2601.05, A, 8, b.

Replace the second sentence of the Article:
This includes seedbed preparation, seed and fertilizer, special ditch control (wood excelsior mat), stapling and installation of materials.

2601.05, A, 11.

Replace the Article:
When a large area is to be watered, the contract documents will include an item for watering. For the quantity of water applied to sod, Article 2601.03, G, 3, e, and to special ditch control and slope protection, Article 2601.03, Q, payment will be the predetermined contract unit price per 1000 gallons (kiloliter). When an item for watering is not included, the cost of watering is included in the amount paid for the item to be watered.

Section 2602

2602.03, C.

Replace the first bullet and **Add** new second bullet:

- Constructing or installing silt fence, silt fence for ditch checks, silt ditches, silt dikes, silt basins, and slope drains, ~~and~~
- Constructing or installing perimeter and slope sediment control devices (straw wattles, wood excelsior logs, or filter socks filled with compost filter material), and

2602.04, Method of Measurement.

Add new Article:

L. Perimeter and Slope Sediment Control Device.
Linear feet (meters) to the nearest foot (meter) of each size.

2602.05, A.

Add new Article:

12. Perimeter and Slope Sediment Control Device.
Per linear foot (meter) for length of device of each size properly installed.

Section 2610

2610.03, E, 1, a.

Add to the end of the Article:

Ensure existing vegetation and its root system is obliterated to a minimum depth of 4 inches (100 mm). Several passes may be required based on equipment and soil conditions. Obtain Engineer's approval for tilling prior to excavating planting wells.

2610.04, Method of Measurement.

Add Article:

E. Tillage
Lump sum.

2610.05, A.

Add Article:

E. Tillage
Lump sum.

Section 2611

2611.01, Description

Delete Article:

~~**B.** The Contractor has the option to use the provisions of Articles 2610.03, A; 2610.03, D; 2610.03, E; or 2610.03, F as a guideline for planting techniques to enhance survivability of plant materials, at no additional cost to the Contracting Authority.~~

2611.03, Construction

Delete the first paragraph of the Article:

~~Plant trees and shrubs and first year replacements between March 1 and May 15. Plant second year replacements between September 1 and September 30 for evergreens and between October 1 and November 30 for deciduous plants.~~

Renumber Articles A and B as F and G:

Add new Articles:

A. Location of Plantings.

1. Notify the Engineer when utility locates are complete. After utility locates have been completed, the Contracting Authority will stake plant locations with coded flags. Location adjustments may be necessary.

2. Preserve coded flags adjacent to proposed plants until after final fall inspection. Remove material used for flagging, including tags and flagging tape, from the right of way according to Article 1104.08 immediately after final fall inspection is completed.

B. Planting.

1. Plant trees and shrubs and first year replacements between March 1 and May 15. Plant second year replacements between September 1 and September 30 for evergreens and between October 1 and November 30 for deciduous plants.
2. Contractor may use Articles 2610.03, A; 2610.03, D; or 2610.03, E as guidance for planting techniques to enhance survivability of plant materials, at no additional cost to the Contracting Authority.

3. Dig planting wells for single plants 3 feet (1 meter) toward the mainline highway from the flag location unless otherwise directed by the Engineer.

4. Excavate to a minimum diameter of 24 inches (600 mm) for trees and 18 inches (450 mm) for shrubs. Remove plants from containers (plantable and nonplantable) in a manner that does not disturb the roots. Remove twine, wire, and burlap around the stem of the plant. Remove containers, twine, wire and burlap from the project.

5. Install plants in a straight, upright manner. Ensure plants remain plumb throughout the contract period.

6. Install plants such that the root collar is at soil grade upon completion of installation of backfill, and the root collar remains at soil grade.

C. Staking and Guying.

1. The Contractor may use Article 2610.03, F as guidance for staking and guying to enhance survivability of plant materials. However, deciduous trees 6 feet (1.8 meters) or taller in height require staking and guying according to Article 2610.03, F.

2. Repair stakes and guys broken or damaged during the contract period. Remove stakes and guys according to Article 1104.08 in the fall of the second year.

3. Installation, repair, and removal of stakes and guys are incidental to planting and will not be paid for separately.

D. Mulching.

1. Furnish and apply mulch to all of the proposed trees and shrubs. Place mulch as shown in the contract documents to a depth of 3 inches (75 mm). Maintain an air space at the base of tree trunks and shrub canes.

2. Furnish and apply 2 inches (50 mm) of mulch in the fall of the second year to replenish the mulched areas of proposed plants after final plant replacement is complete. Ensure mulch bed is weed free prior to application of additional mulch.

3. Furnishing and applying mulch, as well as replacing mulch displaced or disturbed by the Contractor during the contract period, are incidental to planting and will not be paid for separately.

E. Filter Fabric.

1. Install filter fabric as follows:
- **a.** In areas to be mulched for proposed plants:
  - **1)** Rototill and hand rake the area to a loose condition that:
    - Is friable and free of debris, clods and rock, and
    - Has a smooth surface with a uniform appearance.
  - **2)** Place filter fabric flush with the ground.
- **b.** Secure fabric using staples complying with Article 4169.10, A.

2. Furnishing and installing filter fabric is incidental to planting and will not be paid for separately.

Division 41. Construction Materials.

Table of Contents

Add Section 4130 to Division Table of Contents:

4127. Aggregate for Hot Mix Asphalt.
4130. Revetment Stone, Erosion Stone, and Gabion Stone
4131. Porous Backfill Material.

Section 4100

4100.03, Measurement of Liquid Bituminous Materials.

Replace the first paragraph of the Article:

Liquid bituminous materials will be measured in U.S. standard gallons (liters) at a base temperature of 60°F (~~16~~15°C). Volumes measured at other temperatures will be corrected to a base 60°F (~~16~~15°C), using the appropriate Volume Correction Factor in Table 2 (Table 1 for metric units) of ASTM D 4311. ~~Petroleum Measurement Tables, ASTM D 1250, Table 25, as follows:~~

- ~~Group 0 for asphalt products having specific gravities of 0.9654 and higher.~~
- ~~Group 1 for asphalt products having specific gravities from 0.8495 to 0.9653.~~
- ~~Group 0 for tars of grades RT-1, RT-2, RT-3, and RT-4 or emulsions.~~

4100.07, C, Drive Screws and Bolts (over 3/8 inch (8.5 mm) inch diameter), Washers 3/16 inch (4.8 mm) and 1/4 inch (6.4 mm) Thick, and Similar Articles.

Replace the Article:

Apply ASTM F 2329.

4100.07, D, Screws, Stove Bolts and Bolts (3/8 inch (9.5 mm) and under in diameter), Washers Under 3/16 inch (4.8 mm) Thick, Rivets, Nails, and Similar Articles.

Replace the Article:

Apply ASTM F 2329.

Section 4103

4103, Liquid Admixtures for Portland Cement Concrete.

Replace the Section:

4103.01, General Requirements.

A. Comply with AASHTO M 154 for air entraining admixtures and AASHTO M 194 for other liquid admixtures.

B. Unless the Engineer approves, do not use admixtures containing more than 1.0% chloride ions.

C. Inspection and acceptance of liquid admixtures for PCC will be according to Materials I.M. 403.

D. Air Entraining Admixtures.
Stir, agitate, or circulate air entraining admixtures prior to use to ensure a uniform and homogeneous mixture.

E. Retarding and Water Reducing Admixtures.

1. Use retarding and water reducing admixtures compatible with the air entraining agent used.

2. As approved by the Engineer, use admixtures either:
- In amounts recommended by the manufacturer for conditions which prevail on the project, or
- According to Materials I.M. 403.

3. When used, introduce admixtures into the mixer after all other ingredients are in the mixer. The Engineer may approve other procedures.

4. Agitate retarding and water reducing admixtures prior to and during their use according to Materials I.M. 403.

5. When supplementary cementitious materials are used in the concrete, apply the liquid admixture dosage rate to both the cement and supplementary cementitious materials weight (mass) combined.

F. Other Admixtures.
Other admixtures may be used with the Engineer's approval and according to the manufacturer's recommendations.

Section 4105

4105.03, Moisture Retention.

Replace the Article:
White pigmented liquid curing compounds, when tested in accordance with ASTM C 156 using an application rate of 200 square feet per gallon (5 m^2/L) shall restrict the loss of water to not more than 0.20 kg/m^2 in 24 hours or 0.40 kg/m^2 in 72 hours.

Section 4112

4112.02, A, Intermediate Aggregate.

Replace the first line of the Gradation:

1/2 inch (12.5 mm)	95-100

Section 4115

4115.04, A.

Replace Table 4115.04-1:

Table 4115.04-1: Aggregate Use Durability Requirements

Specification Section Number	Minimum Durability Class Required			Use
	3i	3	2	
2122, 2201 2212, 2213, 2301, 2302, 2310, 2529, 2530 Interstate System Primary System Other	 X* 	 X* 	 X	PCC Paved Shoulders, Base, Base Repair, Base Widening PCC Pavement, Widening, PCC Overlay, Finish Patches, and Bridge Approaches
2403			X	Structural Concrete
2406 (See 2403)			X	Concrete Structures
2407			X	Precast Units
2407, 2501		X		Prestressed Units, Concrete Piles
2412 (See 2403)			X	Concrete Bridge Decks
2413 (See 2413.02, D, 1)		X	~~X~~	Bridge Deck Surfacing, Repair, & Overlay
2414 (See 2403)			X	Concrete Railings
2415 (See 2403)			X	Concrete Box, Arch, & Circular Culverts
2416 (See 4145)			X	Rigid Pipe Culverts
2424			X	Shotcrete
2503 (See 2403)			X	Storm Sewers (Catch Basins, Intakes, & Utility Access)
2505 (See 2403)			X	Guardrails (Concrete End Anchorage)
2511, 2515 (See 2403)			X	PCC Sidewalks, Paved Driveways
2512 (See 2403)			X	PCC Curb & Gutter
2513 (See 2403)			X	Concrete Barrier
2516 (See 2403)			X	Concrete Walls and Steps
2517 Primary System Other		 X 	 X	Railroad Approach Sections
2522 (See 2403)			X	Tower Lighting (Concrete Footings & Foundations)
2523 (See 2403)			X	Highway Lighting (Concrete Footings & Foundations)
2524 (See 2403)			X	Highway Signing (Concrete Footings & Foundations)
2525 (See 2403)			X	Traffic Signals (Concrete Footings & Foundations)

* For patches and PCC base repair, Class 2 durability or better aggregate will be required if the existing pavement was constructed of Class 2 or lower durability aggregate. If the existing pavement was constructed of Class 3 or Class 3i durability aggregate, use Class 3 aggregate or better and Class 3i aggregate, respectively, in the repair.

4115.05, Coarse Aggregate for Bridge Deck Surfacing and Repair and Overlay.

Replace Article title and first sentence:

4115.05, COARSE AGGREGATE FOR BRIDGE DECK SURFACING, REPAIR, AND OVERLAY.
Acquire from a Class 3 durability or better source meeting the following requirements:

4115.05, A, Quality.

Replace Table 4115.05-1:

Table 4115.05-1: Aggregate Quality

Aggregate Quality	Maximum Percent Allowed	Test Method
Abrasion	40	AASHTO T 96
Alumina(a)	0.5	Office of Materials Test Method No. Iowa 222
A Freeze	6	Office of Materials Test Method No. Iowa 211, Method A
Absorption	2.5	Office of Materials Test Method No. Iowa 201

(a) If the Alumina value fails, determined the A Freeze value for specification compliance. Office of Materials Test Method No. Iowa 222 does not apply to gravels.

Section 4117

4117.03, Quality.

Replace the Article:

A. For the portion retained on the No. 4 (4.75 mm) sieve, meet the requirements of Table 4117.03-1 for coarse aggregate for concrete.

Section 4120

4120.03, Class C Gravel.

Replace “course” with “coarse” in the title and the first column heading for Table 4120.03-1.

4120.04, Class A Crushed Stone.

Replace “course” with “coarse” in the title for Table 4120.04-1.

4120.05, Class B Crushed Stone.

Replace “course” with “coarse” in the title for Table 4120.05-1.

Section 4121

4121.03, Quality.

Replace “course” with “coarse” in the title for Table 4121.03-1.

Section 4127

4127.02, Coarse Aggregate.

Replace “course” with “coarse” in the title and the first column heading for Table 4127.02-1.

Section 4133

4133.04, Backfill Material Under Flowable Mortar.

Replace Articles B and C and **Add** new Article:

B. Porous Backfill Material complying with the requirements for Gradation No. 29 of the Aggregate Gradation Table, Article 4109.02 Section 4131.

C. Floodable Backfill Material complying with Section 4134.

D. Granular Subbase Material complying with Section 4121.

Section 4134

4134.03. Quality.

Delete the Article:

~~For crushed stone, meet the requirements of Table 4134.03-1:~~

~~**Table 4134.03-1: Aggregate Quality (Floodable Backfill Material)**~~

~~**Coarse Aggregate Quality**~~	~~**Maximum Percent Allowed**~~	~~**Test Method**~~
~~Abrasion~~	~~55~~	~~AASHTO T 96~~
~~C Freeze~~	~~20~~	~~Office of Materials Test Method No. Iowa 211, Method C~~
~~Total of Abrasion & C Freeze~~	~~65~~	~~---~~
~~Clay Lumps and Friable Particles~~	~~4~~	~~Materials I.M. 368~~

Section 4137

4137.01, General Requirements.

Replace Article B:

Determine performance grade according to AASHTO R 29.

Add 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.	75.0max.	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.

Section 4138

4138.01, D.

Replace the first sentence of the Article:

In Table 1 of AASHTO M 81, the distillation test requirements are as follows:

Section 4143

4143.01, General Requirements.

Add new Article:

D. Patch Subdrains.

Follow requirements for Article 4143.01, B, except that subdrain outlets will not be required.

Section 4145

4145.06, I, Tongue and Groove.

Replace the Article:

Ensure the tongue and groove are compatible so that when the pipe is laid, it will be possible for the contractors to comply with Article 2416.03, D, 5.

Section 4147

4147.01, A, 1, Pipe.

Replace the Article:

a. ~~Comply with ASTM D 1248, Type III, Class C, Category 5, Grade P 34 or equivalent ASTM D 3350 Cell Classification PE 335434C.~~ Comply with ASTM D 3035, minimum pipe stiffness of 46 psi (320 kPa).

b. Polyethylene complying with ASTM D 1248, Type III, Class C, Category 5, Grade P 34 or ASTM D 3350 Cell Classification PE 335434C.

~~b~~c. Maximum outside diameter and SDR as specified in the contract documents.

Section 4149

4149.02, A, Sanitary Sewer (Gravity Mains).

Replace Articles 1 through 5:

1. Solid Wall Polyvinyl Chloride Pipe 8 inch to 15 inch (200 mm to 375 mm).

a. Comply with ASTM D 3034, ~~pipe stiffness per ASTM D 2412, minimum thickness solid wall pipe SDR 23.5 (153 psi (1055 kPa)), 26 (115 psi (795 kPa)), 35 (46 psi (320 kPa))~~ SDR 26, unless SDR 35 is specified.

b. Pipe stiffness per ASTM D 2412.

1) SDR 26: Minimum pipe stiffness of 115 psi (795 kPa).

2) SDR 35: Minimum pipe stiffness of 46 psi (320 kPa).

~~b~~c. PVC plastic meeting ASTM D 1784, Cell Classification 12454 or 12364. Do not exceed 10 parts by weight (mass) per 100 of PVC resin in the compound for additives and fillers, including but not limited to stabilizers, antioxidants, lubricants, and colorants.

~~c~~d. Integral bell and spigot type with elastomeric seals complying with ASTM D 3212 and ASTM F 477.

2. Solid Wall Polyvinyl Chloride Pipe 18 inch to 27 inch (450 mm to 675 mm).

a. Comply with ASTM F 679. ~~Minimum pipe stiffness of 46 psi (320 kPa) as per ASTM D 2412.~~

b. Minimum pipe stiffness of 46 psi (320 kPa) as per ASTM D 2412.

~~b~~c. PVC plastic meeting ASTM D 1784, Cell Classification 12454 or 12364. Do not exceed 10 parts by weight (mass) per 100 of PVC resin in the compound for additives and fillers, including but not limited to stabilizers, antioxidants, lubricants, and colorants.

~~c~~d. Integral bell and spigot type with elastomeric seals complying with ASTM D 3212 and ASTM F 477.

3. Corrugated Polyvinyl Chloride Pipe 8 inch to 36 inch (200 mm to 900 mm).

a. Comply with ASTM F 949, ~~46 psi (320 kPa) stiffness,~~ smooth interior, corrugated exterior.

b. Pipe stiffness per ASTM D 2412.

1) 8 inch to 10 inch (200 mm to 250 mm): Minimum pipe stiffness of 115 psi (795 kPa), unless 46 psi (320 kPa) is specified.

2) 12 inch to 36 inch (300 mm to 900 mm): Minimum pipe stiffness of 46 psi (320 kPa).

~~b~~c. PVC resin meeting ASTM D 1784, Cell Classification 12454. Do not exceed 10 parts by weight (mass) per 100 of PVC resin in the compound for additives and fillers, including but not limited to stabilizers, antioxidants, lubricants, and colorants.

~~c~~d. Integral bell and spigot joints with elastomeric seals complying with ASTM D 3212 and ASTM F 477.

4. **Closed Profile Polyvinyl Chloride Pipe 21 inch to 36 inch (525 mm to 960 mm).**
   a. Comply with ASTM F 1803 ~~(Closed Profile), minimum pipe stiffness 46 psi (320 kPa)~~.
   b. Pipe stiffness per ASTM D 2412, 46 psi (320 kPa).
   ~~b~~c. PVC plastic meeting ASTM D 1784, Cell Classification 12364. Do not exceed 10 parts by weight (mass) per 100 of PVC resin in the compound for additives and fillers, including but not limited to stabilizers, antioxidants, lubricants, and colorants.
   ~~c~~d. Integral bell and spigot joints with elastomeric seals complying with ASTM D 3212 and ASTM F 477.

5. **Polyvinyl Chloride Composite Pipe (truss type) 8 inch to 15 inch (200 mm to 375 mm).**
   a. Comply with ASTM D 2680 ~~(composite pipe), minimum pipe stiffness 200 psi (1380 kPa)~~. Pipe constructed with truss type structure between inner and outer PVC walls with voids filled with lightweight concrete.
   b. Pipe stiffness per ASTM D 2412, 200 psi (1380 kPa).
   ~~b~~c. PVC plastic meeting ASTM D 1784, Cell Classification 12454. Do not exceed 10 parts by weight (mass) per 100 of PVC resin in the compound for additives and fillers, including but not limited to stabilizers, antioxidants, lubricants, and colorants.
   ~~c~~d. Integral bell and spigot joints with elastomeric seals complying with ASTM D 3212 and F 477.

Section 4151

4151.02, C, Reinforcement For Bridge Approach Sections, Reinforced Paved Shoulders, and Full-Width Reinforcement of Pavements.

Replace the first bulleted item:

- Deformed bars meeting the requirements of ASTM A 615/A 615M, Grade 40 or 60 (300 or 400); or ASTM A 706/A 706M, Grade 60,

4151.03, A, 1.

Replace the first sentence of the Article:

Unless otherwise specified, use deformed bars meeting the requirements of ASTM A 615/A 615M, ASTM A 706/A 706M, or ASTM A 996/A 996M.

Section 4153

4153.06, A, 3.

Replace the first sentence of the Article:

Where galvanized fasteners are specified, zinc is applied by hot dipped galvanizing to meet the requirements of ASTM F 2329.

4153.07, C, Galvanizing.

Replace the Article:

Ensure all bolts, nuts, and washers are zinc coated to meet the requirements of ASTM F 2329.

4153.07, D, 4.

Replace the Article:

Ensure the galvanized coating meets the requirements of F 2329.

4153.07, E, Lag Bolts.

Replace the Article:

Use lag bolts meeting the requirements of ANSI B18.2.1, galvanized according to F 2329.

Section 4155

4155, Guardrail.

Replace the Section:

Section 4155. Guardrail

4155.01 GENERAL REQUIREMENTS.
Provide guardrail materials meeting the requirements for the type of guardrail specified. Provide guardrail posts of wood or steel as specified in the contract documents.

4155.02 STEEL BEAM GUARDRAIL.
Comply with the following:

A. Rail elements and terminal sections: meet the requirements of AASHTO M 180, Class A, 12 gauge (2.67 mm thickness), Type I, unless a greater thickness is required.

B. Bolts used to attach steel beam guardrail to concrete barrier or bridge rail: full-length galvanized and meet the requirements of ASTM A 325 or A 449, Type 1.

C. All other bolts: meet the requirements of ASTM A 307, Grade A.

D. Washers used to attach steel beam guardrail to concrete barrier or bridge rail: meet the requirements of ASTM F 436.

E. All other washers: meet the requirements of ASTM F 844.

F. Nuts used to attach steel beam guardrail to concrete barrier or bridge rail: heavy hex, Class 2B meeting the requirements of ASTM A 563, DH.

G. All other nuts: meet the requirements for ASTM A 563, Grade A, hex.

H. Galvanizing: meet the requirements of ASTM A 153, Class C F 2329 or B 695 Class 50, Type I coating.

4155.03 CABLES.

A. Cable Guardrail.

1. Meet the requirements of AASHTO M 30, Type I, Class A.

2. For high tension cable guardrail, meet the manufacturer's requirements.

B. Anchor Cable.
Meet the requirements of AASHTO M 30, Type II, Class A.

4155.04 POSTS.

A. Wood Posts.
Use posts sawed to the dimensions shown in the contract documents and meeting the requirements of Section 4164.

B. Steel Posts.

1. Use steel posts of the dimensions shown in the contract documents and that meet the requirements of ASTM A 36/A 36M structural steel.

2. Ensure bolt holes comply with Article 2408.03, S, 2.

3. Ensure steel posts and blocks are galvanized according to the requirements of ASTM A 123. Ensure galvanizing is done after fabrication and after all bolt holes have been drilled.

4155.05 BLOCKOUTS.

A. For wood blockouts, meet the requirements for wood posts.

B. Blockouts manufactured from alternate materials that have received FHWA acceptance for use on the National Highway System may be substituted for wood blockouts.

4155.06 MISCELLANEOUS ITEMS.

A. Ensure the following:

1. All miscellaneous items and materials are of the type, size, and dimension shown in the contract documents.

2. All metal parts are galvanized. However, any items or parts of items to be covered with 2 inches (50 mm) or more of concrete need not be galvanized.

3. All cable fittings required for cable guardrail installation are designed and fabricated so as to develop the full strength of a single cable or the multiple cable assembly, as applicable.

B. Internal threads of fasteners may be oversize, tapped after galvanizing.

C. When specific requirements are not stated in the contract documents, obtain the Engineer's approval for anchor angles, anchor cable, turnbuckles, hook bolts, compensating devices, and any other fittings or special hardware which may be required.

Section 4161

4161.03, Treatment.

Change all references from 'APWA' to 'AWPA' in Tables 4161.03-1 and 4161.03-2.

Section 4163

4163.02, A.

Replace the Article:

Unless specified otherwise, ~~T~~treat only Douglas Fir (coast region), Northern Pine, and Southern Pine.

Section 4165

4165.01, A.

Add the following to the end of the Article:

Unless otherwise specified, timber piles shall meet the requirements of ASTM D 25.

4165.03, B, 2.

Replace the Article:

Sound knots permitted provided the diameter of any single knot is no larger than 4 inches (100 mm) or one sixth the circumference of the pile at the point where it occurs, whichever is smaller. Cluster knots will be considered a single knot, and the sum of all knots in the cluster shall not be greater than the permitted size for a single knot.

4165.03, C, 1.

Replace the Article:

When measured at the tip, over the outer 50% of a radial line from the pith, no less than the number of annual rings and percentage of summerwood specified in Table 4165.03-1 for the respective species:

Table 4165.03-1: Summerwood

Species	Rings per Inch (25 mm)	Minimum
Douglas Fir	6 or More	33%
Douglas Fir	less than 6	50%
Southern Pine	6 or More	33%
Southern Pine	less than 6	50%
Other species	6	33%

4165.03, D, Holes.

Rename and **Replace** the Article:

Holes and Scars.

Permitted if:

- Less than 1/2 inch (13 mm) in average diameter,
- They do not penetrate more than 20% the diameter at the point where they occur, and
- The sum of the average diameters of all holes in any square foot (0.1 m^2) of pile surface does not exceed 1 1/2 inches (38 mm).
- Turpentine scars undamaged by decay or insect attack will be permitted provided the depth of the scar is not more than one fifth the diameter of the pile at the location of the scar.

4165.04, D, Preservative Treatment.

Replace the first sentence of the Article:

Creosote, pentachlorophenol, or copper naphthenate treatment complying with Section 4161.

Section 4167

4167.01, B, 1.

Replace the Article:

When pipe piles are allowed in the contract documents as an option to steel H-piles, furnish pipe piles of the dimensions shown, manufactured within the physical and chemical requirements of ASTM A 252, Grade 2 or 3. Furnish test results from at least one random sample taken from pieces furnished to the project. Ensure the chemical analysis indicates no more than 0.05% phosphorous.

4167.01, B, 2.

Replace the Article:

Only field welds will be permitted, and only at air temperatures above 0°F (-18°C). Ensure all welding is done by welders certified by the Department. When welding, the surfaces of the pipe being welded, within 3 inches (75 mm) laterally and in advance of welding, must be preheated to a minimum of 50°F (10°C). Maintain this temperature during welding. Weld the joint with a prequalified AWS Joint B-U2a. For manual shielded metal arc welding, use an E701.8 electrode and for semi-automatic Flux Core Arc welding, use an E71T-X electrode. Use a backup ring of the same steel as that of the pipe.

Section 4169

4169, Erosion Control Materials.

Add new Article:

4169.12, Perimeter and Slope Sediment Control Device.

A. Wattles and Sediment Logs.
Wood excelsior or straw contained in a tube of photodegradable open weave fabric (synthetic netting). Install according to manufacturer's recommendations.

B. Filter Socks.
Continuous, tubular, knitted mesh netting with 3/8 inch (10 mm) opening fabricated using 5 mil (0.125 mm) thickness photodegradable HDPE and filled with a filter material consisting of compost from an approved source meeting Article 4169.08. Fill sock by blowing filter material into tube with a pneumatic blower truck or similar device. Hand filling will not be allowed. Install according to manufacturer's recommendations.

C. Approved perimeter and slope sediment control devices are listed in Materials I.M. 469.10, Appendix E.

4169.02, A.

Replace Table 4169.02-2:

Table 4169.02-2: Seeds (Common Names, Scientific Names, and PLS)

Common Names	Scientific Names	PLS (%)
*Furnish seed certified as Source Identified Class (Yellow Tag) Source G0-Iowa.		
NATIVE GRASSES		
Big Bluestem*	Andropogon gerardii	30
Little Bluestem*	Andropogon scoparius	30
Switchgrass*	Panicum virgatum	63
Indiangrass*	Sorghastrum nutans	30
Sideoats Grama*	Bouteloua curtipendula	30
Western Wheatgrass*	Agropyron smithii	56
Buffalograss*	Buchloe dactyloides	60
Sand Bluestem*	Andropogon gerardii, var. paucipilus	30
Blue Grama	Bouteloua gracilis	30
Intermediate Wheatgrass	Agropyron intermedium	70
Slender Wheatgrass	Agropyron trachycaulum, var. unilaterale	70
Prairie Dropseed	Sporobolus heterolepis	65
Sand Dropseed	Sporobolus cryptandrus	65
Sand Lovegrass	Eragrostis trichodes	65
Weeping Lovegrass	Eragrostis curvula	65
Hairy Wood Chess	Bromus purgans	60
Blue-joint grass	Calamagrostis Canadensis	47
Bottlebrush sedge	Carex comosa	62
Tussock sedge	Carex stricta	78
Fox sedge	Carex vulpinoidea	64
Virginia wild-rye	Elymus virginicus	60
Reed manna grass	Glyceria grandis	50
Fowl manna grass	Glyceria striata	72
Common rush	Juncus effuses	80
Rice Cut Grass	Leesia oryzoides	62
Rye grass, annual	Lolium italicum	89
Fowl bluegrass	Poa palustris	72
Green bulrush	Scirpus atrovirens	45
Wool grass	Scirpus cyperinus	78
Soft-stem bulrush	Scirpus vallidus	78
Indian grass	Sorghastrum nutans	60
Spike Rush	Eleocharis palustris	71
FORBS		
Canada anemone	Anemone Canadensis	72
Marsh milkweed	Asclepias incarnate	25
New England aster	Aster novae-angliae	25
Swamp aster	Aster puniceus	25
Showy tic-trefoil	Desmodium canadense	25
Joe-pye weed	Eupatorium maculatum	66
Boneset	Eupatorium perfoliatum	41

Ox Eye sunflower	Heliopsis helianthoides	38
Blue-flag iris	Iris virginica-shrevii	19
Meadow blazingstar	Liatris ligulistylis	24
Tall blazingstar	Liatris pycnostachya	24
Great blue lobelia	Lobelia siphilitica	13
Reed manna grass	Glyceria grandis	50
Fowl manna grass	Glyceria striata	72
Common Rush	Juncus effuses	80
Rice Cut Grass	Leesia oryzoides	62

4169.02, D.

Delete the Article:

D. If the purity and/or germination of native grasses exceeds the minimum required, the application rate may be adjusted, based on PLS.

4169.07, A, Straw Mulch.

Replace the second sentence of the Article:

Use Certified Noxious Weed Seed Free Mulch certified by the Iowa Crop Improvement Association or other state's Crop Improvement Associations.

4169.11, Filter Fabric.

Add new Article:

Furnish nonwoven polypropylene, UV stabilized filter fabric complying with Table 4169.11-1.

Table 4169.11-1: Filter Fabric Properties

Property	Typical	Minimum
Tensile Strength, lbs (metric)	130 (metric)	115 (metric)
Grab Elongation, %	70	50
Trapezoidal Tear Strength, lbs (metric)	60 (metric)	50 (metric)

Section 4184

4184.01, A.

Replace the Article:

This specification covers two types of glass spheres, dual coated and uncoated, 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).

4184.01, B.

Add as the first sentence of the Article:

The glass beads shall not exhibit a characteristic of toxicity, relative to heavy metals when tested in accordance with EPA 40CFR 261.24.

4184.02, A.

Replace Table 4184.02-1:

Sieve Size	Percent Passing
16 (1180 µm)	100
20 (850 µm)	90-100
30 (600 µm)	50-75
40 (425 µm)	15-45

50 (300 µm)	0-15
80 (180 µm)	0-5

4184.02, F, Properties of Uncoated Spheres.

Delete the Article:

~~**F. Properties of Uncoated Spheres.**~~
~~Passes the free flow test.~~

Section 4185

4185.02, B, 2.

Replace the second bulleted item of the Article:

- Are full-length galvanized according to ASTM F 2329, and

4185.05, D.

Delete the Article:

~~**D.** Use an application rate of no less than 0.067 gallon per square yard (0.3 L/m^2) (15 square yards per gallon (3.3 m^2/L)).~~

4185.15, A.

Replace the Article:

Rated for 240 volts and 480 volts, with minimum interrupting ratings of 25,000 amperes, symmetrical, at 240 volts, and 18,000 amperes, symmetrical, at 480 volts.

Section 4186

4186.09, A, 5, b.

Replace the second sentence of the Article.

Ensure galvanizing meets requirements of ASTM F 2329, or ASTM B 633, Class Fe/Zn 25, Type II or Type IV.

4186.09, B, Type B Signs.

Replace the third sentence of the Article.

Galvanizing is to meet the requirements of ASTM F 2329, or ASTM B 633, Class Fe/Zn 25.

4186.10, B, 5.

Replace the Article:

Furnish bolts (including the entire length of the anchor bolts), nuts, and washers,that are galvanized according to ASTM F 2329 or B 695 Class 50, Type I coating.

Section 4187

4187.01, C, 2, Anchor Bolts, Nuts, and Washers.

Replace the first sentence of the Article:

Use bolts, nuts, and washers galvanized according to the requirements of ASTM F 2329 or ASTM B 695, Class 50, Type I coating.

Section 4196

4196.01, B.

Rename Table 4196.01-5:

Fabric for use as Subgrade Stabilization

Add Article:

6. **Concrete and Stone Revetment and Bridge Abutment Backfill Fabric.**
   Use engineering fabric having properties listed in Table 4196.01-6.

Table 4196.01-6: Fabric for use under conc./stone revetment & abutment backfill

Property	Value	Test Method
Tensile Strength (at 5% Strain)	1356 lbs/ft (19.8 kN/m)	ASTM D 4595
Apparent opening size (AOS)	US Sieve #40 (0.43 mm)	ASTM D 4751
UV resistance (at 500 hours)	70% retained strength	ASTM D 4355
Flow Rate	18 gal./min./ft2 (733 L/min./m2)	ASTM D 4491

Appendix.

Replace the Table of Contents:

Renumber Table 2553.02-1: Class II Material:
Table 2552.02-1: Class II Material

Renumber Table 2553.02-2: Class III Material:
Table 2552.02-2: Class III Material

Renumber Table 2553.02-3: Class IVA Material:
Table 2552.02-3: Class IVA Material

Renumber Table 2553.02-4: Class IVB Material:
Table 2552.02-41: Class IVB Material

Renumber Table 2553.02-5: Class V Material:
Table 2552.02-5: Class V Material

Replace the Aggregate Gradation Table (English) and Notes:

AGGREGATE GRADATION TABLE - ENGLISH														
Grad. No.	**Section No.**	**Std. Sieve Sz.**	**1 1/2"**	**1.00"**	**3/4"**	**1/2"**	**3/8"**	**4**	**8**	**30**	**50**	**100**	**200**	
		Intended Use	**Percent Passing**											**Notes**
1	4110, 4125, 4133	PCC FA, Cover Agg.					100	90-100	70-100	10-60			0-1.5	1
3	4115 (57, 2-8)	PCC CA	100	95-100		25-60		0-10	0-5				0-1.5	2, 11
4	4115 (2-8)	PCC CA	100	50-100	30-100	20-75	5-55	0-10	0-5				0-1.5	11
5	4115 (67, 2-8)	PCC CA		100	90-100		20-55	0-10	0-5				0-1.5	11
6	4115.06 (Repair & Overlay)	PCC CA			100	97-100	40-90	0-30					0-1.5	11
7	4117 (Class V)	PCC FA & CA	100					80-92	60-75	20-40				
8	4117.03 (Class V)	Fine Limestone					100	90-100					0-30	
10	4120.02, 4120.03 (C gravel)	Granular Surface			100			50-80	25-60					3, 12
11	4120.02, 4120.04, 4120.05, 4120.07, (A, B Cr. St.)	Granular Surface & Shoulder		100	95-100	70-90		30-55	15-40				6-16	4, 5, 12
12a	4121 (Cr. St.)	Granular Subbase	100			40-80			5-25				0-6	6, 12
12b	4121 (Cr. Gravel)	Granular Subbase	100			50-80			10-30		5-15		3-7	7, 12
13	4122.02 (Cr. St.)	Macadam St. Base	3" nominal maximum size screened over 3/4" or 1.00" screen.											
14	4123	Modified Subbase	100		70-90				10-40				3-10	5, 7, 12
19	4125 (1/2") Cr. Gr. or Cr. St.)	Cover Aggregate			100	97-100	40-90	0-30	0-15				0-2	12
20	4125 (1/2" Scr. Gr.)	Cover Aggregate			100	95-100	40-80	0-15	0-7				0-1.5	12
21	4125 (3/8")	Cover Aggregate				100	90-100	10-55	0-20	0-7			0-1.5	12
22	4124	Fine Slurry Mixture					100	85-100	40-95	20-60	14-35	10-25	5-25	10, 12
23	4124 (Cr. St.)	Coarse Slurry Mixture					100	70-90	40-70	19-42			5-15	12
29	4131	Porous Backfill			100	95-100	50-100	0-50	0-8					12
30	4132.02 (Cr. St.)	Special Backfill	100						10-40				0-10	5, 12
31	4132.03 (Gravel)	Special Backfill		100	90-100	75-100			30-55				3-7	12
32	4133 (Sand/Gr./Cr. St.)	Granular Backfill	100% passing the 3" screen						10-100				0-10	8, 9, 12
35	4134 (Natural Sand/Gr.)	Floodable Backfill	100						20-90				0-4	12
36	4134 (Natural Sand)	Floodable Backfill							100				0-2	12

8. Crushed stone shall have 100% passing the 1½" sieve.

12. When Producer gradation test results are used for acceptance, test results representing at least 90% of the material being produced shall be within the gradation limits and the average of all gradation results shall be within the gradations limits. Stockpiled material not meeting the criteria may, at the

District Materials Engineer's discretion, be resampled using Materials I.M. 301 procedures. One hundred percent of the stockpile quality control and verification test results shall be within the gradation limits.

Delete Note 9 from Aggregate Gradation Tables (English and Metric) :

~~**9.** When granular backfill material is used in floodable applications, use gradation 35 or 36. When granular backfill material is used under flowable mortar, one of the following alternative materials shall be used: natural sand compliant with Section 4110 (except the % passing the No. 200 sieve shall not exceed 4%) or gravel, crushed stone, or crushed concrete meeting the gradation requirements of Section 4121.~~

~~**9.** When granular backfill material is used in floodable applications, use gradation 35 or 36. When granular backfill material is used under flowable mortar, one of the following alternative materials shall be used: natural sand compliant with Section 4110 (except the % passing the 75 µm sieve shall not exceed 4%) gravel, crushed stone, or crushed concrete meeting the gradation requirements of Section 4121.~~

Index.

Delete entry:

~~Class A subbase…….2114~~

Replace entry:

Concrete
Portland cement, pavement..2301.02B

Replace entry:

Coarse Aggregate for PCC……4115

Replace entry:

Flaggers……..2528.03, K

Replace entry:

Grout, concrete and stone
revetment……..2507.03, E

Replace entry:

Patches--finish
full depth finish……2529
partial depth finish……..2530

Replace entry:

Quantities, increased or decreased……1104.03

Replace entry:

Trenchless Construction……2553