

GS-01007

General Supplemental Specifications for Highway and Bridge Construction

Effective Date
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THE STANDARD SPECIFICATIONS, SERIES OF 2001, ARE AMENDED BY THE FOLLOWING MODIFICATIONS, ADDITIONS, AND DELETIONS. THESE ARE GENERAL SUPPLEMENTAL SPECIFICATIONS AND SHALL PREVAIL OVER THOSE PUBLISHED IN THE STANDARD SPECIFICATIONS.

NOTE: Changes made since the previous GS issue 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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Division 11. General Requirements and Covenants.

Section 1101

1101.02, Definitions of Abbreviations.

Replace "ACT" with "ACI" in the list of abbreviations.

Replace "HMA - Hot Mix Asphlt" with "HMA - Hot Mix Asphalt".

1101.03, Definition of Terms.

Add definitions:

Completion Date.

The date on which all work specified in the contract is completed.

Developmental Specifications.

Additions and revisions to the standard, general supplemental, and supplemental specifications covering the development of new construction items or changes to a process. They only apply to a project when noted in the proposal form.

General Supplemental Specifications.

Specifications adopted by the Department's Specification Committee subsequent to the publication of this book. They involve changes in the Standard Specifications and apply to all contracts. Published in April and October of each year.

Optionally Combined Proposal.

The projects from two or more proposals combined by the Contracting Authority to allow the Contractor to bid all the projects as one contract.

Responsible Bid.

A bid submitted by a Contractor which is determined not to be an irregular proposal as defined by Article 1102.10 and fulfills the good faith effort recruitment requirements in Article 1102.17.

Replace definitions:

Special Provisions.

Additions and revisions to the standard, general supplemental, and supplemental specifications covering conditions peculiar to an individual project. They only apply to a project when noted in the proposal form.

Standard Specifications.

The requirements contained herein applying to the all contracts, and pertaining to the method and manner of performing the work, or to the quantity and quality of the materials to be furnished.

Supplemental Specifications.

Specifications adopted subsequent to the publication of this book. They involve new construction items or changes in the Standard Specifications. They only apply to a project when noted in the proposal form. Generally published in April and October of each year.

Section 1102

1102.01, Competency and Qualification of Bidders.

Replace "16" with "18" in the second sentence of the second paragraph.

1102.01, C, CPA Audit Statement.

Replace the third sentence of the second paragraph:

However, a prospective bidder shall be considered to have an "Unlimited" bidding capacity with the Department if they were awarded over \$50 million of work (including that from other Contracting Authorities) during their past fiscal year and have a prequalification limit, by the formula, over \$100 million.

1102.04, Contents of Proposal Forms.

Replace the second paragraph:

The statement, "By virtue of statutory authority preference will be given to products and provisions grown and coal produced within the State of Iowa where applicable," which is on the bidding document shall not be applicable to contracts involving Federal-aid participation in construction.

1102.09, Preparation of Proposals.

Replace the second sentence of the first paragraph:

For bids submitted to the Department that exceed \$600,000, the Contractor shall use subparagraph B or subparagraph C below. The Department may waive this requirement for unique or isolated situations.

1102.09, B (following the first paragraph)

Delete the word "Expedite".

1102.09, C (following the first paragraph)

Replace the entire paragraph:

Submit an electronic bid with digital signature using the bidding software furnished by the Department using the electronic bid submittal procedures of the Department.

1102.11, Proposal Guaranty.

Replace the first sentence of the first paragraph:

Each proposal shall be supported by a proposal guaranty in the form and amount prescribed in the proposal.

Replace the first sentence of the second paragraph:

The proposal guaranty shall be in the form of a certified check or credit union certified share draft, cashier's check, **money order**, or bank draft drawn on a solvent bank or credit union.

Replace the third sentence of the second paragraph:

Cashier's checks, **money orders**, or bank drafts shall be made payable either to the Contracting Authority or to the bidder and, where made payable to the bidder, shall contain an unqualified endorsement to the Contracting Authority signed by the bidder or the bidder's authorized agent.

Replace the last sentence of the second paragraph:

Certified checks and credit union share drafts shall be certified, or the cashier's check shall be drawn and endorsed, in an amount not less than prescribed in the proposal.

Replace the last sentence and list of the third paragraph:

Bid bonds will be declared invalid and bid proposals will not be considered if any of the following items are omitted **or incorrect**:

Proposal ID Number

County Name

Type of Work

Date of Letting

Bid Order Number

Date of Signature

Name of Contractor

Original Signature of Contractor: In case of joint venture bid, all contractors must sign.

Name of the Surety Company

Original Signature of Surety (if Surety's limitation is less than the amount of the bid bond, a certificate of reinsurance must be attached).

Replace the fourth paragraph:

A Contractor's Annual Bid bond (Form 650043) may also be used for the proposal guaranty in lieu of that specified above. The Annual Bid Bond shall contain the following items:

Name of Contractor
Original signature of the Contractor;
 Date of signature;
Name of the Surety Company
and Original signature of the Surety;

1102.12, Filing of Proposal.**Add** second paragraph:

The Contracting Authority may take bids on the same project as an individual proposal or part of an Optionally Combined Proposal. When an Optionally Combined Proposal is designated, the consideration for award of contracts will be based on which of the following gives the lowest total cost:

1. The sum of the lowest responsible bid on each of the individual proposals.
2. The lowest responsible bid on the Optionally Combined Proposal.

1102.13, Withdrawal of Proposal.**Add** after the first paragraph:

The bidder will be permitted to withdraw their proposal under the following three conditions:

- A.** The bidder may withdraw a proposal unopened if such a request is made in writing and received at the Department prior to the time specified in the advertisement for receiving bids. A proposal so withdrawn may be resubmitted as long as it is resubmitted prior to the deadline for receipt of bids.
- B.** If, after bids are open, the low bidder should claim a serious error in the preparation of the bid, and can support such a claim with evidence satisfactory to the Department, the bidder may be permitted to withdraw the bid and the bid guarantee may be returned. In such an event, action on the remaining bids will be considered as if the withdrawn bid had not been received. Under no circumstances will the bidder be permitted to alter the bid after the bids have been opened.

The Department will keep the bidder's proposal guarantee unless the bidder satisfies all four of the following conditions:

1. The mistake must be a clerical mistake as opposed to a mistake involving poor judgment concerning a construction process. The bidder must be able to produce bid preparation documentation to show how the clerical error occurred.
 2. The bidder must immediately notify the Department as soon as the error is observed.
 3. The scope of the mistake must be significant. The size of the mistake when compared to the overall project must be significant enough to cause major financial difficulties if the bidder is forced to complete the project at the price quoted.
 4. The Department should not be placed in a worse position than if the bid had never been submitted.
- C.** The bidder may withdraw their bid from consideration if a contract has not been offered them within 30 calendar days after the letting and the bidder has not requested approval for award be deferred.

1102.17, D, Contract Award Procedures.**Add** a new third sentence:

The bidder may only use work on the federal aid projects on the proposal to achieve the DBE goal.

Replace the fourth sentence:

The proposal may also designate the items of the federal aid project that are over utilized by DBE firms and cannot be used for DBE commitments.

1102.17, D, 3, c, Contractors with History of Utilizing DBEs.**Replace** the first two paragraphs:

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.

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:

1102.17, D, 3, c, 1**Replace** the first paragraph:

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)

1102.17, E, 1**Replace** the second sentence:

After adequate notice by the Contractor, if any DBE is unable to perform, the Contractor shall inform the Engineer of the reasons why a DBE will be unable to complete the work for which they were committed.

1102.17, E, 2**Delete** the entire Article:

~~2. Each month all certified DBE firms shall submit to the Contracts Engineer a list of projects and the dollar amounts they have been paid on each during the prior month. This information is necessary to compute the volume of Federal-aid contract dollars being paid to DBE firms.~~

1102.17, E, 3 and 4

Re-number Article 1102.17, E, 3 and 4, to Article 1102.17, E, 2 and 3, respectively.

1102.17, E, 2**Replace** the last sentence:

Before offering the assistance, the Contractor shall notify the Engineer and obtain the written approval of the Contracts Engineer.

1102.17, F, Post Construction Requirements.**Replace** the second sentence of the first paragraph:

This certificate shall be submitted on all Federal-aid contracts, where a DBE performed work and shall list the dollar amounts paid to all DBE firms on the contract.

Replace "penalty" with "price adjustment" in the second sentence of the second paragraph.

Replace "penalty" with "price adjustment" in the third sentence of the second paragraph.

Replace the last paragraph:

Failure to meet the specified DBE commitment to each DBE firm will result in a **penalty price adjustment** of an amount equal to the difference between the actual DBE dollars paid and the Contractor's adjusted DBE commitment to that DBE firm.

1102.17, H, Sanctions for Failing to Comply with the Intent of the DBE Regulations.

Add a new article:

H. Sanctions for Failing to Comply with the Intent of the DBE Regulations.**1. DBE Firms.**

The ability to be eligible to receive DBE goal work is a privilege made available to a select group of firms. Firms that abuse this privilege may have their ability to be counted towards the DBE goal restricted if the firm fails to perform their work consistent with common industry practices. Examples of not performing work consistent with common industry practice include, but are not limited to:

- a. Patterns of failing to perform a commercially useful function for work quoted to meet a DBE goal.
- b. Patterns of failing to complete the work with their own organization for work quoted to meet a DBE goal.
- c. Patterns of failing to pay for all labor and materials for the work they have subcontracted to meet a DBE goal.
- d. Patterns of failing to perform the work they have subcontracted.
- e. Patterns of failing to notify the prime contractor in a timely manner when their work schedule makes it impossible for them to begin subcontract work at the requested time.
- f. Patterns of failure to furnish documents (e.g. certified payrolls, material test reports, etc.) within the timeframes allowed by the specifications.

The Department will provide written notice to the DBE firm, informing them of any proposed sanction. The DBE firm will have 14 calendar days, from the receipt of the certified notification, to make a written request for a hearing. The appeal hearing will be held with a three-person committee consisting of representatives from the Office of Contracts, Office of Construction, and a district office. If the Department does not receive a written request for a hearing, or if the DBE firm does not provide sufficient evidence at the hearing to refute the violations, the Department may suspend the DBE firm from the ability to be counted towards the commitment on projects with DBE goals. The duration of the suspension will be determined based on the severity of the violation and the number of prior suspensions of the DBE firm.

2. Prime Contractors.

Contractors who show a pattern of non-compliance with the DBE requirements of the contract may be suspended from bidding on contracts that have DBE goals. Examples that would indicate a lack of good faith effort to comply with the DBE requirements include, but are not limited, to:

- a. Patterns of performing work with their own organization, or having another company perform work, which was committed to a DBE firm to meet a DBE goal.
- b. Patterns of not keeping the DBE firms posted on the status of their projects, and not providing advance notification to the DBE when their subcontract work will be available to the DBE firm.
- c. Patterns of not promptly paying DBE firms for completed work in accord with Article 1109.05.
- d. Not treating DBE firms as they would any other subcontractor on the project.

The Department will provide written notice to the Contractor, informing them of any proposed sanction for failure to comply in good faith with the intent of the DBE regulations. The Contractor will have 14 calendar days, from the receipt of the certified notification, to make a written request for a hearing. The appeal hearing will be held with a three-person committee consisting of representatives from the Office of Contracts, Office of Construction, and a district office. If the Department does not receive a written request for a hearing, or if the contractor does not provide sufficient evidence at the hearing to refute the violations, the Department may suspend the Contractor from bidding on projects that have DBE goals. The duration of the suspension will be determined based on the severity of the violation and the number of prior suspensions of the Contractor for DBE sanctions. The sanctions may be extended beyond contracts with DBE goals if the Contractor's treatment of DBE firms has extended beyond contracts assigned DBE goals.

1102.18, C, Positive TSB Effort Documentation.

Add as the second paragraph:

On proposals where a specific TSB goal has been established, the Contractor will be required to submit the TSB form with their bid. The TSB form will be provided by the Contracting Authority and used to document the TSB participation that shall be attained. The Contracting Authority will determine if the bidder has made adequate Good Faith Effort to meet the established goal. Bidders who fail to make such Good Faith Effort may have their bid rejected on the basis of being non-responsive to meeting the established TSB goal.

1102.19, C, 4, Payment to Trainees.

Replace the title and entire article:

Payment of Trainees.

On contracts with a predetermined wage rate, trainees must be paid at least the journeyman's wage unless the trainee is enrolled in an approved U.S. Department of Labor (DOL) training program. Trainees in approved U.S. DOL training programs shall be paid the appropriate rates approved by the U.S. DOL or Iowa DOT.

1102.19, D, 5, Placement of EEO/AA Notices and Posters.

Replace entire article:

5. Placement of EEO/AA Notices and Posters.

The Contractor shall place the following notices and posters on a bulletin board at the project site in areas readily accessible to employees and potential employees:

- a. Notice provided by the Iowa DOT listing the names, addresses, and phone numbers of the Contractor and all approved subcontractors.
- b. Form EEOC-P/E-1, stating "Equal Employment Opportunity is THE LAW".
- c. Form FHWA-1022, regarding any false statement, false representation, false report, or false claim made in connection with any Federal or Federal-aid highway or related project.
- d. Form FHWA-1495, regarding wage rate information for a Federal-aid highway project, required only if Davis/Bacon predetermined wage rates apply to the project.
- e. Current Iowa Predetermined Wage Rate Decision, identifying Davis/Bacon predetermined wage rates for the State of Iowa. The wage rate decision shall be arranged on a bulletin board so that all wage rate and classification information is visible.
- f. IOSH 30 Safety and Health Protection on the Job.
- g. WH-1420 Your Rights Under the FMLA Act of 1993.
- h. WH-1462 Notice: Employee Polygraph Protection Act.
- i. Form FHWA-1495A (Spanish version of form FHWA-1495), stating "Informacion Sobre Escalas De Salarios Proyecto De Carretera Con Ayuda Federal", required only if Davis/Bacon predetermined wage rates apply to the project.*
- j. Form EEOC-P/S-1 (Spanish version of form EEOC-P/E-1), stating "La Igualdad de Oportunidades De Empleo Es LA LEY".*

* These forms are not required, but it is strongly recommended that these two Spanish notices be posted whenever the company employs and/or anticipates receiving applications from those who speak Spanish.

All required postings shall be in place when work commences on a project and shall remain in place through completion of the project.

Progress payments to the Contractor will not be made until these notices and posters are displayed at the required site.

1102.19, F, 1, c, 3

Replace "Article 1102.19/F, 2, b" with "Article 1102.19, F, 2, b".

Section 1103

1103.05, Requirement of Contract Bond.

Replace the first sentence:

On all contracts amounting to \$25,000 dollars or more, the Contractor shall file an acceptable bond in an amount not less than 100% of the contract sum with the Contracting Authority; however, the amount of the contract bond does not need to include the predetermined costs for incentives or bonuses shown on the contract.

Section 1104

1104.09, Right-of-Way.

Add as last sentence of Article:

Permission of the property owner may be necessary to access some parcels prior to the letting.

Section 1105

1105.04, Conformity with and Coordination of the Contract Documents.

Replace the list:

1. Addendum
2. Proposal Form
3. Special Provision
4. Plans
5. Developmental Specification
6. Supplemental Specifications
7. General Supplemental Specifications
78. Standard Specifications
89. Materials I.M.

1105.06, Construction Stakes.

Add as first sentence of first paragraph:

Minimum standards for Construction Survey provided by the Engineer will meet the requirements of Section 2526.

1105.14, Placement of Fill Material in Streams and Water Bodies.

Replace the fourth paragraph:

For Interstate and Primary projects, the use of stream crossings and causeways will be indicated in the Clean Water Act Section 404 Permit cover letter included in the proposal form. Temporary stream crossings or causeways shall be bridged or culverted to not restrict expected high flows or disrupt the movement of aquatic life native to the stream or water body. They shall not extend over 100 feet (30 m) into any swamp, bog, marsh, or similar area that is adjacent to the stream or water body. Expected high flows are those flows which the Contractor expects to experience during the period of time that the crossing is in place. They shall maintain pre-construction downstream flow conditions. Contractors are encouraged to construct these during low flows. Temporary stream crossings They shall be maintained to prevent unnecessary erosion and other non-point sources of pollution. Temporary crossings When no longer needed, they shall be removed after they are no longer needed and all disturbed areas shall be reshaped and stabilized. The cost for constructing temporary stream crossings or causeways will not be paid for separately and shall be considered incidental to the contract price for Mobilization.

Section 1106**1106.01, Source of Supply and Quality Requirements.**

Replace "Materials I.M.s 209 and 210" with "Materials I.M.s 209 and 213" in the fourth paragraph.

Section 1107**1107.07, Safety, Health, Pollution, and Sanitation.**

Delete the second paragraph:

~~A safety inspection will be required at the beginning of each major phase of the operation. Repeated inspections may be necessary for phases of long duration. All safety inspections shall be made and reported by the Contractor's safety officer, even though that phase of the operation may be subcontracted. The times of these inspections should be identified at the preconstruction conference or before work is started. The Engineer shall be given reasonable notice with an opportunity to witness the inspection, and the Engineer shall receive a copy of a written report.~~

Section 1108**1108.01, Subletting of Contract.**

Replace the second paragraph with a new second and third paragraph:

Except for the furnishing and transportation of materials, no portion of the contract shall be sublet, assigned, or otherwise disposed of except with written consent of the Contracting Authority. Where a subcontract has been approved, the approved subcontractor shall be responsible to complete that portion of the contract with its own organization.

Where a subcontract does not exist, but a DBE firm is manufacturing, supplying, or trucking materials to the job site; terms of the agreement shall be described and documented on the Subcontract Request and Approval form (Form 830231). This will assure the Engineer that a Contractor is meeting commitments previously stated on the Statement of DBE Commitments form (Form 102115). This dollar value will not be used to determine the percent subcontracted as specified previously. Where Davis/Bacon wage requirements apply, the Contractor shall be responsible for collecting and submitting certified payrolls for all drivers. Owner/operators shall be listed on the certified payrolls as owner/operators.

Add as the second sentence of the last paragraph:

For contracts that exceed \$600,000, the Contractor shall submit the Subcontract Request and Approval form electronically using the software furnished by the Department.

1108.02, D, Charging of Working Days.

Replace the first paragraph:

The Contractor will be charged working days as defined in Article 1101.03 and this article. For multiple site contracts, working day charges for each site will be charged independently based on the controlling operation for the site.

Add this indented paragraph after the numbered list in the second paragraph:

However, working days will not be charged prior to 15 calendar days after the contract has been signed by the Contracting Authority, as long as the Contractor furnished the signed contract, performance bond, and proof of insurance within the time allowed by Article 1103.07; and has not begun work on the contract.

Add as first two sentences of fourth paragraph:

The Contractor will be charged 1/2 working day when weather or other conditions beyond the control of the Contractor permit work for at least 1/2 but less than 3/4 of a working day. The Contractor will not be charged a working day when weather or other conditions beyond the control of the Contractor prevent work less than 1/2 of a working day.

Delete the third paragraph:

~~For multiple site contracts, working day charges for each site will be charged independently based on the controlling operation for the site.~~

Section 1109

1109.01, B, 1, b, 1, Section 4151 Steel Reinforcement.

Add after the last paragraph:

All hard converted * metric reinforcing steel (bar size matrix shown on plans) may be substituted with English reinforcing steel or soft converted * metric steel as follows:

*NOTE: Hard Converted metric size reinforcing steel refers to bars referenced in ASTM A 615/A 615 M - 95b using the following sizes: 10, 15, 20, 25, 30, 35, 45, and 55.

Soft Converted metric size reinforcing steel refers to bars referenced in ASTM A 615/A 615 M - 96a using the following sizes: 10, 13, 16, 19, 22, 25, 29, 32, 36, 43, and 57.

Hard Converted* Metric Size	English Size	Soft Converted* Metric Size
10	4	13
15	5	16
20	6	19
25	8	25
30	10	32
35	11	36

The spacing or pattern of bar placement shall be as shown in the contract documents, and no changes in the spacing or the pattern will be allowed with the substitution.

1109.05, A, Progress Payments.

Replace the first two sentences of the first paragraph:

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. For primary and secondary projects in which the Contracting Authority is the Department or a county Board of Supervisors, these progress payments will be bi-weekly if requested by the Contractor.

1109.07, Certified Statement of Sales Tax and Use Tax Paid.

Replace the entire article:

Contractors and approved subcontractors will be provided a Sales Tax Exemption Certification to purchase building materials, supplies, or equipment in the performance of construction contracts let by the Department.

Division 20. Equipment Requirements.

Section 2001

2001.07, B, Special Procedures for Asphalt Mixtures and Aggregates.

Replace the title and entire article:

Special Procedures for Asphalt Mixtures, and Aggregates, and Binders.

Automatic or semi automatic weighing (Procedure 1 or Procedure 2) shall be used in the following cases:

1. P on projects with contract quantities of asphalt mixtures totaling 10,000 tons (10,000 Mg) or more;
2. Projects with contract quantities of ; or aggregates totaling 10,000 tons (10,000 Mg) or more from a single source.

When the item quantity for asphalt mixtures or any aggregate is in tons (megagrams) and measurement is by weight (mass), this paragraph specifies additional requirements and conditions for two measurement procedures.

A. Procedure 1 Automatic Weighing.

The weighing equipment shall be self balancing and shall include an automatic weight (mass) recorder. All tickets shall be printed automatically with net weight (mass) and all weights (mass) needed to determine total net weight (mass).

B. Procedure 2 Semi Automatic Weighing.

The weighing equipment may be self balancing or manually balanced. Equipment shall include an automatic weight (mass) recorder which will not print until the equipment is balanced, and which prints the gross weight (mass) or the batch weights (mass) and number of batches. For weigh hoppers, the printout shall include the empty weight (mass) after each discharge.

For measurement of asphalt binders by tank stick or in-line flow meter, the Contractor shall meet the requirements of Materials I.M. 509 for calibration and measurement.

For asphalt mixtures, the Contractor shall furnish to the Engineer each day, a total quantity of mixture used for the project. The Contractor shall furnish daily totals to the Engineer for all mixture quantities produced and not incorporated into the project. This total shall also identify the quantity of asphalt binder used but not incorporated.

Division 21. Earthwork, Subgrades, and Subbases.

Section 2102

2102.05, Rock Cuts.

Add new paragraph:

The contract documents may require that part or all of the Class 12 Excavation be crushed. When crushing is required, the contract documents will specify the size and/or gradation the rock shall be crushed to, and specify where the crushed material is to be stockpiled or used in the contract.

2102.13, G, Crushing of Class 12 Excavation.

Add entire new article:

G. Crushing of Class 12 Excavation.

The quantity in cubic yards (cubic meters) shown in the contract documents for Crushing of Class 12 Excavation will be the volume paid. Prior to the start of this work, if either the Engineer or the Contractor desires actual measurement the Engineer will determine in cubic yards (cubic meters) the quantity of Class 12 Excavation that will be crushed computed from the cross section measurements by the average end area method based on soil borings.

2102.14, D, Special Backfill Material.

Add a second paragraph:

The contract will have a separate item for Special Backfill, Place Only, in tons (Mg) or cubic yards (m³), when the Contracting Authority is providing the material or if the material is available from mandatory crushing of pavement or pavement scarification on the contract. The cost of crushing or pavement scarification should be included in the Contractor's price for special backfill if recycling is not required but the Contractor chooses to crush the pavement removed or scarify the HMA surfacing for special backfill.

2102.14, G, Crushing of Class 12 Excavation.

Add entire new article:

G. Crushing of Class 12 Excavation.

The Contractor will be paid the contract unit price per cubic yard (cubic meter) for the volume of Class 12 Excavation crushed.

Section 2103

2103.04, A

Replace “5% with “50%” in the second paragraph.

Replace “0.05” with “0.50” in the equation in the second paragraph.

2103.04, B

Replace “5% with “50%” in the second paragraph.

Replace “0.05” with “0.50” in the equation in the second paragraph.

Section 2107

2107.10, Rock Fills.

Replace “ow” with “below” in the third sentence of the second paragraph.

2107.14, Use of Unsuitable Soils.

Replace “RL-1” with “RL-1B” in the first sentence.

2107.16, A, Compaction with Moisture and Density Control.

Replace the entire article:

~~Compaction with moisture and density control will be the volume computed in cubic yards (cubic meters) by the Engineer from dimensions of the roadbed cross section and depth below the completed grade elevation to which this method of compaction is to be extended. The quantity of Compaction with Moisture and Density Control, in cubic yards (cubic meters), will be the quantity shown on the contract documents.~~

2107.16, B, Compaction with Moisture Control.

Replace the entire article:

~~Compaction with moisture control will be the volume computed in cubic yards (cubic meters) by the Engineer from dimensions of the roadbed cross section and the depth below the completed grade elevation to which this method of compaction is to be extended. The quantity of Compaction with Moisture Control, in cubic yards (cubic meters), will be the quantity shown on the contract documents.~~

When moisture control is required adjacent to culverts and stockpasses, Article 2107.15, the volume will be computed using the formula in ~~Paragraph Article 2107.16, D, below~~. When moisture control is required adjacent to pipe culverts, the volume will be computed as provided in Article 2402.12.

2107.16, C, Compacting Trench Bottom.

Replace the entire article:

~~Compacting trench bottom will be measured in stations (meters) on the compacted surface. The quantity of Compacting Trench Bottom, in stations (meters), will be the quantity shown on the contract documents. The quantity of Compacting Trench Bottom will be determined along the centerline of the roadbed.~~

2107.17, Basis of Payment.

Replace the first paragraph:

~~Except as listed herein, the work of building embankments will not be paid for directly, but will be considered as associated work pertaining to the various classes of excavation and included in contract unit prices therefor. The construction of the embankment will be paid for as Embankment-In-Place in accordance with Article 2102.14, with the following additions:~~

2107.17, A, Compaction with Moisture and Density Control.

Replace the first sentence:

For the quantity of embankment placed with moisture and density control, † The Contractor will be paid the contract unit price for Compaction with Moisture and Density Control per cubic yard (cubic meter).

2107.17, B, Compaction with Moisture Control.

Replace the first sentence:

For the quantity of embankment placed with moisture control, † The Contractor will be paid the contract unit price for Compaction with Moisture Control per cubic yard (cubic meter).

2107.17, C, Compacting Trench Bottom.

Replace the entire article:

For the number of stations (meters) of trench bottom scarified and compacted, † The Contractor will be paid the contract unit price for Compacting Trench Bottom per station (meter). This payment shall be full compensation for the work of scarifying, drying material, furnishing and applying water, controlling moisture content of the materials, and compacting the materials, as specified.

Section 2109**2109.06, Method of Measurement.**

Replace the second paragraph:

Special compaction of subgrade will be measured in stations of 100 feet (meters) The quantity of Special Compaction of Subgrade, in stations (meters), will be the quantity shown on the contract documents. The quantity of Special Compaction of Subgrade will be determined along the centerline of the roadbed.

2109.07, Basis of Payment.

Replace the second paragraph:

Special compaction of subgrade The Contractor will be paid for at the contract unit price for Special Compaction of Subgrade per station (meter), which. This payment shall be full payment compensation for excavating, manipulating, replacing, and compacting the material, and for furnishing all water required for the work.

Section 2110**2110.07, A, Construction of Soil Aggregate Subbase.**

Replace the entire article:

The Engineer will determine the number of miles (kilometers) of soil aggregate subbase constructed by measuring or calculating the length on the surface The quantity of Soil Aggregate Subbase, in miles (kilometers), will be the quantity shown on the contract documents. The quantity of Soil Aggregate Subbase will be determined along the centerline of the subbase, including approaches to railroad crossings, bridges, and similar structures. At intersections, the length of subbase measured for payment shall will not include that portion of centerline which overlaps previously constructed or previously measured determined pavement, base course, or subbase.

2110.08, A, Construction of Soil Aggregate Subbase.

Replace the first sentence:

For construction of soil aggregate subbase, measured as provided above, † The Contractor will be paid the contract unit price for Soil Aggregate Subbase per mile (kilometer).

Section 2111

2111.06, Construction of Granular Subbase.

Add as the last two sentences of the last paragraph:

The granular subbase may be placed in areas where the Engineer and the Contractor agree it is reasonable to expect pavement construction can be accomplished prior to winter shutdown. The trimming of the granular subbase shall be restricted to 1 mile (1.6 km) ahead of the paving operation when winter shutdown is eminent.

2111.09, Basis of Payment.

Add as the second and third sentences of the first paragraph:

The contract will have a separate item for Granular Subbase, Place Only, in square yards (m^2), when the Contracting Authority is providing the material or if the material is available from mandatory crushing on the contract. The cost of crushing should be included in the Contractor's price for granular subbase if recycling is not required but the Contractor chooses to crush the pavement removed for granular subbase.

Section 2113

2113.05, Method of Measurement.

Replace the entire article:

The Engineer will measure the quantity of Subgrade Stabilization Material in-place in square yards (to the nearest $0.1 m^2$). The quantity of Subgrade Stabilization Material of the type specified, in square yards (square meters), will be the quantity shown on the contract documents to the nearest square foot ($0.1 m^2$).

2113.06, Basis of Payment.

Replace the first sentence:

For the type of Subgrade Stabilization Material specified, the Contractor will be paid the contract unit price for the type of Subgrade Stabilization Material specified per square yard (square meter) as measured in place.

Section 2115

2115.02, Materials.

Replace the entire article:

Article 4123.01 shall apply.

2115.06, Basis of Payment.

Add as the third and fourth sentences of the first paragraph:

The contract will have a separate item for Modified Subbase, Place Only, in cubic yards (m^3), when the Contracting Authority is providing the material or if the material is available from mandatory crushing on the contract. The cost of crushing should be included in the Contractor's price for modified subbase if recycling is not required but the Contractor chooses to crush the pavement removed for modified subbase.

Section 2121

2121.05, A, Earth Shoulder Fill.

Replace the first sentence:

This work involves construction of a shoulder fill to such elevation below that of the pavement edge as to allow for placement of granular shoulders as shown in the contract documents.

Add as the second and third sentences:

Material shall be select treatment materials of Article 2102.06, A, 1, if available and coordinated with the Engineer, or suitable soils of Article 2102.06, A, 2. Material shall not be unsuitable soils of Article 2102.06, A, 3, or topsoil.

2121.07, B, Type B Granular Shoulders.

Add as new third sentence:

If a fillet is placed, the minimum width of the fillet shall be 1 foot (300 mm) per 1 inch (25 mm) of HMA resurfacing completed.

Replace the sixth sentence:

The Engineer may modify this requirement for ~~unusual narrow shoulders~~ and ~~other~~ justifiable conditions.

2121.07, C, Winter Shutdown.

Add entire new article:

C. Winter Shutdown.

Granular shoulder material shall be brought up to the pavement edge for the full width of the shoulder, at the design cross slope, prior to winter shutdown.

2121.08, Method of Measurement.

Replace the second paragraph:

~~For trenching and reshaping in connection with Type A granular shoulders, the Engineer will measure or compute the number of stations (meters) of trenching and reshaping. The quantity of Trenching and Reshaping, in stations (meters), will be the quantity shown on the contract documents. The quantity of Trenching and Reshaping will be determined for each side of the pavement or base.~~

2121.09, Basis of Payment.

Delete the first paragraph:

~~All work performed and measured as provided above will be paid for as follows:~~

Add as the last paragraph:

The contract will have a separate item for Granular Shoulders, Place Only, of the type specified in tons (Mg), when the Contracting Authority is providing the material or if the material is available from mandatory crushing on the contract. The cost of crushing should be included in the Contractor's price for granular shoulders if recycling is not required but the Contractor chooses to crush the pavement removal for granular shoulder material.

2121.09, A, 2, Trenching and Reshaping.

Replace the entire article:

~~Trenching and Reshaping will be paid for at the contract unit price per station (meter) which shall include the cost of The Contractor will be paid the contract unit price for Trenching and Reshaping per station (meter). This payment shall be full compensation for trenching, reshaping, and removing excess excavated material from the project.~~

Section 2122

2122.02, A, Type B Hot Mix Asphalt Mixture.

Replace the title and sentence:

A. Hot Mix Asphalt Mixtures.

HMA 1,000,000 ESAL base mixture shall be of materials specified in Section 2303.

2122.04, Preparation of Shoulder Area.

Replace the first paragraph:

This work may involve construction of an earth fill and a special backfill to allow placement of paved shoulders. The earth fill shall be spread and compacted in accordance with the requirements of Section 2109. Material shall be select treatment materials of Article 2102.06, A, 1, if available and coordinated with the Engineer, or suitable soils of Article 2102.06, A, 2. Material shall not be unsuitable soils of Article 2102.06, A, 3, or topsoil.

2122.04, Preparation of Shoulders Area.

Replace "Article 2303.03, C" with "Article 2303.03, D" in the second paragraph.

2122.07, Method of Measurement.

Replace the entire article:

A. Paved Shoulders.**1. Hot Mix Asphalt Paved Shoulder.**

The quantity of Hot Mix Asphalt Paved Shoulder, in square yards (square meters), will be the quantity shown in the contract documents.

2. Portland Cement Concrete Paved Shoulder.

The quantity of Portland Cement Concrete Paved Shoulder, in square yards (square meters), will be the quantity shown in the contract documents. Thickness determination will be in accordance with Article 2301.34, A.

B. Special Backfill.

The quantity for payment for special backfill shall be the contract quantity.

C. Resurfacing or Overlay of Existing Paved Shoulders.**1. Hot Mix Asphalt Resurfacing.**

Article 2303.05, A, 1, shall apply.

2. Asphalt Binder.

Article 2303.05, B, shall apply.

2122.08, A, Paved Shoulders.

Delete the first paragraph:

~~For the number of square yards (square meters) of paved shoulders of the type, width, and thickness specified, satisfactorily constructed, the Contractor will be paid the contract unit price per square yard (square meter), as follows:~~

2122.08, C, 1, Hot Mix Asphalt Resurfacing.

Replace "Article 2303.06" with "Article 2303.06, A".

2122.08, C, 2, Asphalt Binder.

Replace "Article 2303.06" with "Article 2303.06, B".

Section 2123

2123.02, Construction.

Replace the second sentence:

Material deposited above an elevation 6 inches (150 mm) below subgrade elevation shall be select treatment materials of Article 2102.06, A, 1, if available and coordinated with the Engineer, or suitable soils of Article 2102.06, A, 2.

Add as the third sentence:

Material shall not be unsuitable soils of Article 2102.06, A, 3, or topsoil.

2123.04, A, Earth Shoulder Finishing.

Replace the first paragraph:

The quantity of Earth Shoulder Finishing, in stations (meters) along each edge of the pavement, will be the quantity shown in the contract documents.

2123.04, B, Earth Shoulder Construction.

Replace the first sentence:

The quantity of Earth Shoulder Construction, in stations (meters) along each edge of the pavement, will be the quantity shown in the contract documents.

2123.05, Basis of Payment.

Delete the first paragraph:

~~For the quantity of earth shoulder finishing or earth shoulder construction, measured as provided above, the Contractor will be paid as follows:~~

2123.05, A, Earth Shoulder Finishing.

Replace the first sentence:

The Contractor will be paid the contract unit price for excavation per cubic yard (cubic meter), as provided in Article 2102.14, A; and for Earth Shoulder Finishing per station (meter).

2123.05, B, Earth Shoulder Construction.

Replace the first sentence:

The Contractor will be paid the contract unit price for Earth Shoulder Construction per station (meter).

Section 2125

2125.03, Method of Measurement.

Replace the entire article:

~~The Engineer will determine the number of stations (meters) of ditch reshaped from longitudinal measurement. The quantity of Reshaping Ditches, in stations (meters), will be the quantity shown on the contract documents. The quantity of Reshaping Ditches will be determined along the bottom of the ditch.~~

2125.04, Basis of Payment.

Replace the entire article:

~~For the number of stations (meters) of reshaping ditches and for removal or placement of the excavated material, † The Contractor will be paid the contract unit price for Reshaping Ditches per station (meter). This payment shall be full compensation for the performance of all work involved reshaping ditches, and for removal or placement of the excavated material.~~

Section 2127

2127.03, Method of Measurement.

Replace the entire article:

The Engineer will determine the quantities involved in the following items from measurement to the nearest foot (meter) or cubic yard (cubic meter), whichever is applicable.

A. Reconstruction of Roadbed.

The Engineer will determine the number of stations (meters) of reconstruction of roadbed from measurement on the surface along the centerline. The work involved in excavating, hauling, compaction, and recovery of excavated material, except reclaimed surfacing material, in the area of reconstruction of roadbed will not be measured separately for payment. This work will be considered incidental to other items of work for which measurement and payment will be made. The quantity of Reconstruction of Roadbed, in stations (meters), will be the quantity shown on the contract documents. The quantity of Reconstruction of Roadbed will be determined along the centerline.

B. Earth Shoulder Construction.

The Engineer will measure, as provided in Article 2123.04, B, the number of stations (meters) of earth shoulder construction shall apply.

C. Reclaiming Present Surfacing Material.

The Engineer will determine the number of cubic yards (cubic meters) of reclaiming present surfacing material as provided in Article 2126.03 shall apply.

2127.04, Basis of Payment.

Replace the entire article:

For the quantity of work involved in reconstruction of roadbed, the Contractor will be paid in accordance with unit prices provided in the contract.

A. Reconstruction of Roadbed.

For the number of stations (meters) of reconstruction of roadbed, as measured above, † The Contractor will be paid the contract unit price for Reconstruction of Roadbed per station (meter). This payment shall be full compensation for furnishing all labor, tools, and equipment, and for performance of all work involved, except earth shoulder construction and reclaiming present surfacing material. excavating, hauling, compaction, and recovery of excavated material. This work will not include the cost of reclaimed surfacing material or earth shoulder construction in the area of Reconstruction of Roadbed.

B. Earth Shoulder Construction.

For the number of stations (meters) of earth shoulder construction, measured as provided above, the Contractor will be paid the contract unit price per station (meter) in accordance with Article 2123.05, B, shall apply.

C. Reclaiming Present Surfacing Material.

For the number of cubic yards (cubic meters) of reclaiming present surfacing material, measured as provided above, the Contractor will be paid the contract unit price per cubic yard (cubic meter) in accordance with Article 2126.04 shall apply.

Division 22. Base Courses.

Section 2201

2201.03, Method of Measurement and Basis of Payment.

Replace “Article 2301.34 and Article 2301.35” with “Article 2301.34, A, and Article 2301.35, A”.

Section 2213

2213.01, Description.

Delete the indented paragraph:

~~The contract documents may designate PCC base widening, HMA base widening, or a Contractor's option of these types. When the option is designated, the thickness of base widening with each material will be shown, and payment will be based on square yards.~~

2213.07, Preparation of Subgrade.

Replace "Article 2303.03, A, 2" with "Article 2303.03, B, 2" in the second indented paragraph.

2213.08, A, HMA Base Widening.

Replace "Article 2303.03, D" with "Article 2303.03, E" in the third paragraph.

Replace the second sentence of the fifth paragraph:

Density samples shall be taken from the compacted material and tested in accordance with Article ~~2303.03, D~~, except that samples will be randomly located transversely from within 1 inch (25 mm) of the base being widened to 6 inches (150 mm) from the outside edge of a given pass of the placing equipment ~~2303.04~~.

2213.09, Limitation of Operations.

Replace "Article 2303.03, C" with "Article 2303.03, D" in the fourth paragraph.

2213.14, Method of Measurement.

Replace the entire article:

A. Removal of Curb.

The quantity of curb removed, in stations (meters), to the nearest foot (meter), will be the quantity shown in the contract documents.

B. Removal of Flumes.

The quantity of flumes removed will be the quantity shown in the contract documents.

C. Excavation, Class 13, for Widening.

The quantity of trench excavation for Base Widening will be the quantity shown in the contract documents as Class 13 excavation.

D. Base Widening.

1. Hot Mix Asphalt Base Widening.

a. Measurement by Weight (Mass).

The quantity of Hot Mix Asphalt Mixture for Base Widening ~~used~~ will be ~~measured~~ **determined** in accordance with Article 2303.05, A, 1.

b. Measurement by Area.

The quantity of Hot Mix Asphalt Mixture for Base Widening, of the depth specified, ~~used~~ will be ~~measured~~ **determined** in accordance with Article 2303.05, A, 2.

2. Portland Cement Concrete Base Widening.

The quantity of Portland Cement Concrete for Base Widening, of the depth specified, ~~used~~ will be ~~measured~~ **determined** in accordance with Article 2301.34, A.

E. Asphalt Binder.

Article 2303.05, B, shall apply.

F. Primer or Tack Coat Bitumen.

Article 2303.05, E, shall apply.

G. Samples.

Article 2303.05, H, shall apply for HMA base widening. Article 2301.34, I, shall apply for PCC base widening.

2213.15, Basis of Payment.

Replace the entire article:

A. Removal of Curb.

The Contractor will be paid the contract unit price for Removal of Curb per station (meter).

B. Removal of Flumes.

The Contractor will be paid the contract unit price for Removal of Flumes per each unit.

C. Excavation, Class 13, for Widening.

For the number of cubic yards (cubic meters) of Class 13 excavation for trench excavation stated in the contract, the Contractor will be paid the contract unit price per cubic yard (cubic meter). This payment shall include removal of bituminous fragments, boulders, and broken concrete in accordance with Article 1104.08.

D. Base Widening.**1. Hot Mix Asphalt Base Widening.****a. Measurement by Weight (Mass).**

The Contractor will be paid the contract unit price for Hot Mix Asphalt Mixture for Base Widening in accordance with Article 2303.06.

b. Measurement by Area.

The Contractor will be paid the contract unit price for Hot Mix Asphalt Mixture for Base Widening, of the depth specified, in accordance with Article 2303.06.

2. Portland Cement Concrete Base Widening.

The Contractor will be paid the contract unit price for Portland Cement Concrete for Base Widening, of the depth specified, per square yard (square meter).

E. Asphalt Binder.

Article 2303.06, B, shall apply.

F. Intentionally left blank.**G. Samples.**

HMA base widening samples will be paid for in accordance with Article 2303.06, F. PCC base widening samples will be paid for in accordance with Article 2301.35, I.

Section 2214**2214.01, Description.**

Replace the second paragraph:

When scarified material is suitable for recycling into HMA, the contract documents will show bid items by weight (mass), except for small quantities which may be shown by area. When the scarified material is not suitable for recycling, the contract documents will show bid items by area and removed from the project as directed in the contract documents.

2214.05, Limitations.

Add as the eighth paragraph:

When resurfacing is part of the contract, all scarified surfaces shall be covered with at least one full lift of HMA prior to winter shutdown. The Contractor shall leave no vertical edges or fillets.

2214.06, Method of Measurement.

Replace the entire article:

A. Pavement Scarification.**1. Measurement by Weight (Mass).**

When measurement is by weight (mass), the quantity of Pavement Scarification will be expressed in tons (megagrams) and determined from the quantity of scale weights (mass) of the material salvaged.

2. Measurement by Area.

When measurement is by area, the quantity of Pavement Scarification, square yards (square meters), will be the quantity shown in the contract documents.

B. Blading and Shaping Shoulder Material.

The quantity of Blading and Shaping Shoulder Material, in stations (meters), along each edge of the pavement, will be the quantity shown in the contract documents.

2214.07, A, Payment for pavement scarification will be as follows:

Replace the title and entire article:

A. Pavement Scarification.**1. Measurement by Weight (Mass).**

The Contractor will be paid the contract unit price for Pavement Scarification per ton (megagram).

2. Measurement by Area.

The Contractor will be paid the contract unit price for Pavement Scarification per square yards (square meters).

2214.07, B, Blading and Shaping Shoulder Material.

Replace the entire article:

The Contractor will be paid the contract unit price for Blading and Shaping Shoulder Material per station (meter).

Section 2217**2217.05, Method of Measurement.**

Replace the entire article:

The quantity of Rubblized Pavement, in square yards (square meters), will be the quantity shown in the contract documents.

2217.06, Basis of Payment.

Replace the first sentence:

The Contractor will be paid the contract unit price for Rubblized Pavement per square yard (square meter).

Division 23. Surface Courses.

Section 2301

2301.04, C, Entrained Air Content.

Replace the entire article:

Air entrainment shall be accomplished by addition of an approved air entraining agent. Air content as determined by Materials I.M. 318, shall be determined on each day of production as early and as frequently as necessary until the air content is consistently acceptable. The intended air content of finished concrete is 6.0% and the target air content shall be determined to account for air loss during consolidation of concrete during slip form paving. The difference between before and after the paver air contents for a given location shall be considered the air loss.

On the first day of paving, the first load shall be tested at the plant. The air content shall be between 8.0% and 12.0%. The next ten loads will be accepted on the basis of this complying air test. Starting with the twelfth load all samples shall be taken at the point of acceptance and the air content before the paver shall be 7.5% plus 1.5% or minus 1.0%. The air loss shall be determined at two locations. The air loss from both locations shall be averaged and added to 6.0% to establish the target air content, rounded to the next higher 0.5%. After the air loss has been established, the air content before the paver shall be the target air content plus 1.5% or minus 1.0%.

After the first day of paving, the air content before the paver shall be the target air content plus 1.5% or minus 1.0%. A new target air content shall be established if the average air loss from two consecutive tests deviates by more than 0.5% from the air loss. The air loss shall be determined at one location per half day. At the option of the Engineer, air loss determination may be reduced if the air loss is consistent.

For projects less than 5000 square yards (4000 m²) the air content before the paver shall be 7.5% plus 1.5% or minus 1.0%. At the option of the Contractor, the target air content may be established using the air loss.

The air content for non-slip form paving shall be 7.0% plus 1.5% or minus 1.0%.

2301.04, E, Use of Fly Ash.

Replace the first and second sentences:

For Interstate, and Primary, and Secondary paving, the maximum allowable fly ash substitution rate shall not exceed 15%. For all other paving, the fly ash substitution rate shall not exceed be 20%. For all other projects, the maximum allowable fly ash substitution rate shall be 20% unless otherwise specified in the contract documents.

2301.04, F, 1.

Add a new third sentence.

The total mineral admixture substitution rate shall not exceed 40%.

2301.04, F, 2.

Replace "50%" with "40%" in the third sentence.

2301.08, Bridge Approach Sections.

Replace the entire article:

Bridge approach sections shall be constructed as shown in the contract documents. All approach pavement reinforcing steel shall be epoxy coated. Clear distance from face of concrete to near reinforcing steel shall be 2 inches (50 mm), unless otherwise noted in the contract documents. The Bridge Approach Section shall be Class C Concrete, with coarse aggregate durability in accordance with Article 4115.04.

2301.12, Placing Reinforcement.

Delete the fourth, fifth, and sixth sentences of the fourth paragraph:

~~Assemblies placed on hardened PCC or Class A subbase shall be attached with nails, pins, etc., in at least eight locations, based on a 12 foot (3.6 m) width. Assemblies placed on granular subbase or natural subgrade shall be attached with hooks in at least eight locations, based on a 12 foot (3.6 m) width. These hooks shall be at least a 0 gauge wire (0.306" dia.) (7.5 mm diameter wire) and at least 12 inches (300 mm) long.~~

Add as the seventh paragraph:

Cutting the tie wires of the load transfer assemblies shall be the option of the Contractor.

2301.13, D, 2, b

Delete entire article:

~~b. Proportioned at a central plant, and only partially mixed in a stationary mixer for transportation and finish mixing in a transit mixer.~~

2301.13, D, 2, c

Re-letter the article:

~~c.~~ b. Proportioned and then mixed in a transit mixer prior to or during transit.

2301.16, C, 2, a, Transverse Grooving.

Replace the second paragraph:

On pavement where transverse tining is to be used, a 4 inch to 6 inch (100 mm to 150 mm) wide strip of pavement surface shall not be tined for the length of each transverse joint, providing an untined surface centered over the transverse joint.

2301.18, End of Run.

Replace entire article:

Whenever 30 minutes or more have elapsed since the last concrete has been deposited on the subgrade or if such a delay is anticipated, an approved header shall be installed.

Header joints shall not be constructed within 5 feet (1.5 m) of an intended or previously placed contraction joint. Header joints shall not be constructed opposite a contraction joint in multiple lane construction.

When a header joint is installed, resumption of paving which abuts the header shall not commence for a minimum of 6 hours.

When the end of the day's run occurs in curb section, sufficient curb shall be omitted to accommodate equipment that must be backed out of the way. Construction of the portion of curb omitted shall be as shown in the contract documents and in accordance with Article 2301.17.

A. Headers Constructed in Plastic Concrete.

The header shall be constructed true to line and grade with the face perpendicular to the surface and at right angles to the centerline of the pavement. The tie bar reinforcement shall be level, true to line and grade, and normal to the header joint.

Concrete collected by a finishing machine during its first passage shall not be used adjacent to the header board. Concrete screeded over the header during finishing shall be promptly removed.

Concrete shall be well consolidated against the header and finished with an edging tool.

The header board and all supports shall be removed before paving is resumed.

B. Headers Constructed in Hardened Concrete.

The Contractor may pave past the location of the header. After the concrete has hardened, the pavement shall be sawed perpendicular to the centerline of the pavement, creating a vertical face. Holes for the tie bar reinforcement shall be drilled and reinforcement grouted into the holes, in accordance with Article 2301.12.

The paving operations may begin adjacent to the header after a minimum of 1 hour after the placement of the reinforcement bars.

2301.19, B, Cold Weather Protection.

Replace the table:

<u>Night Temperature Forecast</u>	<u>Type of Protection⁽¹⁾</u>
35°F to 32°F (2°C to 0°C)	One layer of burlap for concrete.
31°F to 25°F (-1°C to -4°C)	Two layers of burlap or one layer of plastic on one layer of burlap.
Below 25°F (-4°C)	Four layers of burlap between layers of 4 mil (100 µm) plastic or equivalent commercial insulating material approved by the Engineer.

⁽¹⁾ The protection shall remain until one of the following conditions is met:

- a. The pavement is 5 calendar days old.
- b. Opening strength is attained.
- c. Forecasted low temperatures exceed 35°F (2°C) for the next 48 hours.
- d. Forecasted high temperatures exceed 55°F (13°C) for the next 24 hours and subgrade temperatures are above 40°F (4°C).

2301.22, Sawing Joints.

Replace the fifth paragraph:

Should uncontrolled cracking or random transverse cracking occur, the pavement shall be repaired at no additional cost to the Contracting Authority. Repair methods shall be as approved by the Engineer.

Delete the seventh paragraph:

~~When random transverse cracks occur away from a CD joint, the Engineer may require the pavement to be patched and an additional CD joint installed.~~

2301.23, Expansion Joints.

Replace the first three sentences:

Preformed joint material shall be installed perpendicular to the pavement surface. The Contractor shall exercise care throughout the construction of the pavement to ensure that the joint material remains in proper position.

2301.25, Sealing Joints.

Delete the seventh sentence of the eighth paragraph:

~~To ensure that the transverse joint is filled uniformly across the entire width of pavement, the joint opening at the pavement edge shall be sealed with tape to prevent flow of the sealer material from the joint opening during the sealing operation.~~

2301.28, Concrete Header Slabs.

Replace the title and entire article:

2301.28 RESERVED.

2301.31, Time for Opening Pavement for Use.

Replace the table:

Minimum Flexural		
<u>Strength Class of Concrete</u>	<u>Minimum Age</u>⁽⁴⁾	<u>psi (MPa)</u>
A	14 calendar days ⁽¹⁾	500 (3.45)
B	14 calendar days	400 (2.80)
C	7 calendar days ⁽²⁾	500 (3.45)
M	48 hours	500 (3.45)

Notes:

1. 10 calendar days for concrete 8 inches (200 mm) or more in thickness.
2. **5** calendar days **for concrete 9 inches (230) or more in thickness.**

Replace “burnish” with “furnish” in the last sentence of the second paragraph.

Replace “with” with “when” in the first sentence of the third paragraph.

Replace “certified plant inspector” and “certified inspector” with “certified technician” in the fifth paragraph.

2301.34, Method of Measurement.

Delete the first paragraph:

~~The quantity of the various items of work involved in construction of concrete pavements will be measured by the Engineer in accordance with the following provisions:~~

2301.34, A, Portland Cement Concrete Pavement.

Replace the first paragraph:

The quantity of Standard or Slip-Form Portland Cement Concrete Pavement of the type specified, in square yards (square meters), will be the quantity shown in the contract documents and applies to pavement, concrete pavement widening greater than 6 feet (1.8 m), side street connections, crossovers, ramps, acceleration and deceleration lanes or auxiliary lanes, and concrete paved shoulders having the same design thickness. The coring requirements for thickness do not apply to detour pavements, paved drives, and temporary pavements. The thickness of pavement constructed will be determined from core depths as follows:

2301.34, D, Incidental Concrete.

Replace the title and entire article:

D. Intentionally left blank.

2301.34, E, Concrete Median.

Replace the entire article:

The quantity of Concrete Median, in square yards (square meters), will be the quantity shown in the contract documents. This will be calculated to the nearest 0.1 foot (0.1 m) of the length along the surface and the overall width of median when no integral curb is involved, or the width from back to back of curb when integral curb is involved.

2301.34, F, Bridge Approach Sections.

Replace the entire article:

The quantity of Bridge Approach Section, in square yards (square meters), will be the quantity shown in the contract documents.

2301.34, J, Saw Cut.

Replace the title:

J. Saw Cut and Joint Sealing.

Add as last paragraph:

Joint sealing will not be measured for payment.

2301.35, Basis of Payment.

Delete the first paragraph:

~~For construction of concrete pavement and other construction in connection therewith, the Contractor will be paid the contract unit prices for the following items of work:~~

2301.35, A, Portland Cement Concrete Pavement.

Replace the first sentence:

The Contractor will be paid the contract unit price for Standard or Slip-Form Portland Cement Concrete Pavement of the type specified per square yard (square meter) and applies to pavement, concrete pavement widening greater than 6 feet (1.8 m), side street connections, ramps, acceleration and deceleration lanes or auxiliary lanes, and concrete paved shoulders having the same design thickness.

Replace "-26-67" with "-26.67" in Row 10, Column 3 of the Payment Schedule Table.

2301.35, D, Incidental Concrete.

Replace the title and entire article:

D. Intentionally left blank.

2301.35, E, Concrete Median.

Replace the entire article:

The Contractor will be paid the contract unit price for Concrete Median per square yard (square meter).

2301.35, F, Bridge Approach Sections.

Replace the entire article:

The Contractor will be paid the contract unit price for bridge approach pavement per square yard (square meter). This payment shall be full compensation for excavation for modified subbase and subdrain; furnishing and installing subdrain; furnishing and installing subdrain outlet; furnishing and installing polymer grid; furnishing and placing porous backfill; furnishing and backfilling modified subbase; saw cutting; furnishing and installing reinforcing steel, tie bars, and dowel assemblies; placing, finishing, texturing, grooving, curing, all joint construction; and all other materials and labor to construct the Bridge Approach Section as shown in the contract documents.

Section 2302

2302.13, Method of Measurement.

Delete the first paragraph:

~~The various items involved in construction of PCC pavement widening will be measured as follows:~~

2302.13, C, Pavement Widening.

Replace the entire article:

The quantity of PCC Pavement Widening, in square yards (square meters), to the nearest 0.1 foot (0.1 meter) along the exiting pavement edge, will be the quantity shown in the contract documents.

2302.13, D, Shoulders.

Replace the first sentence:

The quantity of Type A, B, and C Shoulders, in stations (meters), to the nearest 0.1 foot (0.1 meter) along each edge of the existing pavement edge, will be the quantity shown in the contract documents.

2302.14, Basis of Payment.

Delete the first paragraph:

~~For the quantity of the various items involved in construction of PCC pavement widening, measured as provided above, the Contractor will be paid as follows:~~

2302.14, C, Pavement Widening.

Replace the entire article:

The Contractor will be paid the contract unit price for PCC Pavement Widening per square yard (square meter) or the adjusted price per square yard (square meter) as provided in Article 2301.35. This payment shall be full compensation for construction of the pavement widening and all other work not paid for under other items.

2302.14, D, Shoulders.

Replace the first sentence:

The Contractor will be paid the contract unit price for Type A, B, and C Shoulders per station (meter).

Section 2303**2303, Hot Mix Asphalt Mixtures.**

Replace the entire Section:

2303.01 DESCRIPTION.

This work shall consist of mixture design, production, placement, and compaction of HMA using proper quality control practices for the construction of surface, intermediate, or base course on a prepared subbase, base, or pavement, to the proper dimensions specified in the contract documents.

The Contractor shall be responsible for all aspects of the project, provide quality control management and testing, and maintain the quality characteristics specified.

Quality Management - Asphalt (QM-A) shall apply to contracts with HMA quantities of 5000 tons (5000 Mg) or greater and all Interstate contracts. The Contractor shall follow the procedures and meet the criteria established in Article 2303.02, Section 2521, and Materials I.M. 510 and 511.

For contracts with less than 5000 tons (5000 Mg) quality control will be the responsibility of the Engineer. The Contractor shall be responsible for the mix design. This does not change the mix requirements from gyratory to Marshall, unless specified in the contract documents.

2303.02 MATERIALS AND EQUIPMENT.

Materials used in these mixtures shall meet 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. The asphalt binder shall meet the requirements of Section 4137.

B. Aggregates.**1. Individual Aggregates.**

Virgin mineral aggregate shall meet the following requirements:

VIRGIN MINERAL AGGREGATES		
Mixture	Aggregate Type	Aggregate Requirements
Base	Type B	Section 4126 ⁽¹⁾ & 4127
Intermediate and Surface	Type B	Section 4126
Intermediate and Surface	Type A	Section 4127

⁽¹⁾When the size of the mixture is not specified, 1/2 inch (12.5 mm) shall be used.

When frictional classification of the coarse aggregate is required, the contract documents will specify the friction level and location. The friction aggregate shall be furnished from a source identified in Materials I.M. T203 as having the specified frictional classification. The aggregate retained on the No. 4 (4.75 mm) sieve shall meet or exceed the following amount for each classification:

FRICTION AGGREGATE CLASSIFICATION			
Friction Level	Type 2	Type 3	Type 4
L-2	25%		80%
L-3		45% ^(†)	80%
L-4			50%

^(†)A minimum of 30% of Type 2 friction aggregate may be substituted for the Type 3 aggregate.

For friction classification L-2, at least 80% of the combined aggregate retained on the No. 4 (4.75 mm) sieve shall be Type 4 or better friction aggregate; and at least 25% of the combined aggregate retained on the No. 4 (4.75 mm) sieve shall be Type 2 or better friction aggregate.

For friction classification L-3, at least 80% of the combined aggregate retained on the No. 4 (4.75 mm) sieve shall be Type 4 or better friction aggregate; and at least 45% of the combined aggregate retained on the No. 4 (4.75 mm) sieve shall be Type 3 or better friction aggregate. If Type 2 is used in place of Type 3, the minimum shall be 30% of the combined aggregate retained on the No. 4 (4.75 mm) sieve.

For friction classification L-4, at least 50% of the combined aggregate retained on the No. 4 (4.75 mm) sieve shall be Type 4 or better friction aggregate.

2. Blended Aggregates.

The blended aggregates shall meet the combined aggregate requirements in Materials I.M. 510.

When mixtures include RAP, the blended mineral aggregate gradation shall be a mixture of extracted RAP aggregate combined with virgin aggregate.

C. Recycled Asphalt Pavement.

RAP shall be from a source designated in the contract documents, a certified stockpile, or unclassified RAP furnished by the Contractor subject to the following limitations:

1. Designated RAP.

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. The Contractor is responsible for salvaging this material unless otherwise specified in the contract documents. The RAP not used shall be incorporated into other parts of the project or placed in active stockpiles as directed in the contract documents.

The Contracting Authority will test samples of this material. For mix design purposes, the amount of asphalt binder in the RAP will be based on extraction tests. The Contractor shall designate the exact proportions of RAP material in the hot mix within the allowable range.

When the work is completed, the Contractor shall return unused material to the stockpile or other designated location, rebuild the stockpile, and restore the area, in accordance with Article 1104.08.

Test information, if known, will be included in the contract documents.

2. Certified RAP.

The RAP shall be from a known source and of the proper quality for the intended use, with no material added from other sources during the time in stockpile. The Contractor shall certify to this before use. RAP from not more than two known sources at a time will be allowed.

Certified RAP may be used in the base and intermediate course of mixes for which the RAP aggregate qualifies. RAP may also be used in surface courses when authorized by the Engineer. Not more than 30% of the asphalt binder in a final surface course mixture shall come from the RAP.

A certified RAP stockpile shall be sealed or protected in accordance with Materials I.M. 505.

3. Unclassified RAP.

Up to 10% of unclassified RAP may be incorporated into intermediate mixes for under 3,000,000 ESALs and all base mixes with the following safeguards:

- a. Unclassified RAP shall not be used in surface courses.
- b. Unclassified RAP shall not be used in intermediate or base mixtures containing designated or certified RAP.
- c. The Engineer will inspect the unclassified RAP stockpile visually for uniformity. Unclassified RAP stockpiles containing concrete chunks, grass, dirt, wood, metal, coal tar, or other foreign or environmentally restricted materials shall not be used, unless approved by the Engineer. If foreign material is discovered in any unclassified stockpile, the Engineer may stop the continued use of the pile.
- d. Representative samples will be taken by the Engineer. These samples are to be tested for gradation and asphalt content.
- e. No credit will be given for crushed particles.
- f. Stockpiles, when used, shall be worked in such a manner that the materials removed are representative of a cross section of the pile as approved by the Engineer.

D. Hot Mix Asphalt Mixture.

The surface course is the upper lift for a wearing surface of a designated thickness. The intermediate course is the next lower lift or lifts of a designated thickness. Leveling, strengthening, and wedge courses shall be of the intermediate course mixture. The base course is the lift or lifts placed on a prepared subgrade or subbase.

The job mix formula (JMF) is the percentage of each material, including the asphalt binder, to be used in the HMA mixture. The JMF gradation shall be within the control points specified for the particular mixture designated and shall establish a single percentage of aggregate passing each required sieve size.

If the asphalt binder demand for the combination of aggregates submitted for an acceptable mix design exceeds the basic asphalt binder content by more than 0.75%, the mix design will include an economic evaluation prepared by the Contractor. This evaluation will be based on past job mix history, possible aggregate proportion changes, and aggregate availability and haul costs for any changes or substitutions considered.

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. The following values, based on mixture size and type, shall apply.

BASIC ASPHALT BINDER CONTENT (%)					
Mixture Size	Aggr. 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

The HMA mixture designed shall meet gyratory design and mixture criteria corresponding to the design level specified in the contract documents. The Engineer may approve the substitution of any mixture which meets requirements for a higher mixture than specified in the contract documents at no additional cost to the Contracting Authority. Shoulders placed as a separate operation shall be HMA 1,000,000 ESAL base mixture. For outside shoulders On Interstate projects, the Contractor has the option to substitute a Type A the mainline intermediate or surface mixture for a specified Type B base mixture for the outside shoulder at the Contractor's expense.

The Contractor shall prepare gyratory HMA mixture designs for all base, intermediate, and surface mixtures. The gyratory design procedure used shall follow the procedure outlined in Materials I.M. 510. The gyratory mixture designs submitted shall comply with Materials I.M. 510.

The gyratory compactor used for design and field control shall meet 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.

The HMA mixture designed shall meet gyratory design and mixture criteria corresponding to the size of the mixture and the 20 year design traffic level (ESALs) for the project or an appropriate design level as specified in the contract documents. Shoulders placed as a separate operation shall be designed for less than 300,000 ESALs.

E. Other Materials.

1. Tack Coat.

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

2. Hydrated Lime.

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

On Interstate highways, if 25% or more of the plus No. 4 (4.75 mm) (virgin and RAP) aggregate is gravel, quartzite, granite, trap rock, steel slag, or other siliceous aggregate (not a limestone or dolomite), hydrated lime will be required in the affected intermediate and surface course mixture.

On Primary highways other than Interstate highways, if 25% or more of the plus No. 4 (4.75 mm) (virgin and RAP) aggregates or more than 40% of the total (virgin and RAP) aggregates is quartzite, granite, or other siliceous aggregates (not limestone or dolomite) which is obtained by crushing from ledge rock, hydrated lime will be required in the affected mixtures requiring Type A aggregate.

Hydrated lime will not be required for base repair, patching, or temporary pavement.

When hydrated lime is required based on aggregate source, the Contractor may arrange for Superpave moisture sensitivity evaluation of the proposed HMA mixture design according to AASHTO T 283, "Resistance of Compacted Bituminous Mixture to Moisture-Induced Damage." When results of this evaluation indicate more than 80% tensile strength retained (TSR), hydrated lime will not be required. Confirmation of AASHTO T 283 test results will be completed by the Central Materials Laboratory during placement of the test strip.

3. Sand for tack Coats.

Sand shall meet requirements of Section 4109, Gradation No. 1.

4. Fabric Reinforcement.

Fabric reinforcement shall meet requirements of Article 4196.01, D.

F. Equipment.

The Contractor shall provide sufficient equipment of the various types required to produce, place, and compact each layer of HMA mixture as specified.

Equipment shall meet requirements of Section 2001 with the following modifications:

1. Plant Calibration.

Each plant scale and metering system shall be calibrated before work on a contract begins. Calibration equipment shall meet the manufacturer's guidelines and Materials I.M. 508. 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. Calibration data shall be available at the plant.

When the plant is completely assembled and before any mixture is produced, each aggregate feed shall be calibrated throughout an operating range wide enough to cover the proportion of that material required in the JMF. A new calibration shall be made each time there is a change in size or source of any aggregate being used.

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

Each plant scale and metering system shall be calibrated before work on a contract begins. 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.

Calibration curves shall be available in the plant laboratory. New calibration curves shall be made each time there is a change in size or source of any aggregate being used. On all plants, aggregate samples shall be taken in accordance with Materials I.M. 204 to determine that materials are being proportioned in accordance with the specifications.

2. Paver.

Article 2001.19 shall apply. When placing paved shoulders, spreaders described in Article 2001.13, D, may be used for all but the top lift. Spreaders, as 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.

For initial and intermediate rolling, self-propelled, steel tired, pneumatic tired, or vibratory rollers meeting requirements of Article 2001.05, B, C, or F, shall be used. Their weight (mass) or tire pressure may be adjusted when justified by conditions.

For finish rolling, self propelled, steel tired rollers or vibratory rollers in the static mode meeting requirements of Article 2001.05, B or F, shall be used.

4. Scales.

Article 2001.07, B, shall apply to all paving operations regardless of the method of measurement.

2303.03 CONSTRUCTION.

4A. Maintenance of the Subgrade and Subbase.

The Contractor is responsible for the maintenance of the completed subgrade and subbase to the required density, true cross section, and smooth condition, prior to and during subsequent construction activities. If rutting or any other damage occurs to the subgrade or subbase as a result of hauling operations, the Contractor shall immediately repair the subgrade and subbase, and such repair will include, if necessary, removal and replacement at the Contractor's expense.

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.

AB. Surface Preparation of Existing Surfaces.**1. Cleaning.**

The existing surface shall be cleaned and prepared in accordance with Section Article 2212.04, A.

1. Maintenance of the Subgrade and Subbase.

The Contractor is responsible for the maintenance of the completed subgrade and subbase to the required density, true cross section, and smooth condition, prior to and during subsequent construction activities. If rutting or any other damage occurs to the subgrade or subbase as a result of hauling operations, the Contractor shall immediately repair the subgrade and subbase, and such repair will include, if necessary, removal and replacement at the Contractor's expense.

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 self imposed limit, the Contracting Authority will pay repair costs set by the Engineer, representing an increase in cost of repair of damage, if any, caused by such traffic.

2. Tack Coats.

Tack coats shall be applied when the entire surface area on which the coat is to be applied is free of moisture. They shall not be applied when the temperature on the surface being covered is less than 25°F (-4°C).

The Contractor shall place a tack coat to form a continuous, uniform film on the area to be covered, and, unless otherwise directed, the tack coat shall be spread at an undiluted rate of 0.02 to 0.05 gallon per square yard (0.1 to 0.2 L/m²). The tack coat emulsion may be diluted with water to improve application.

Tack coat shall be adequately cured prior to placement of the HMA to assure bond to the underlying surface and avoid damage of the HMA being placed. If the tack coat surface becomes dirty from weather or traffic, the surface shall be thoroughly cleaned and, if necessary, retacked. 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.

On highways being constructed under traffic, safety and convenience to the public without soiling their vehicles shall be a controlling factor. Tack coat shall be adequately cured prior to placement of the HMA. Tack coat applications shall be limited in length, to minimize inconvenience to the public. They shall be kept within the hot mixture placing work area that is controlled by flaggers at each end, and shall be planned so that they will be covered with hot mixture when the work area is opened to traffic at the end of the day's work. If the tack coat surface becomes dirty from weather or traffic, the surface shall be thoroughly cleaned and, if necessary, retacked.

The vertical face of exposed, longitudinal joints shall be tacked as a separate operation, before the adjoining lift is placed, at a rate from 0.10 to 0.15 gallon per square yard (0.5 to 0.7 L/m²). The vertical surfaces of all fixtures, curbs, bridges, or cold mixture with which the hot mixture will come in contact shall be lightly painted or sprayed to facilitate a tight joint with the fresh mixture.

3. Fabric Reinforcement.

When fabric reinforcement is required, the locations will be designated in the contract documents. Fabric shall not be placed on a wet or damp surface or when the road surface is less than 50°F (10°C). Fiberglass fabric shall be applied only with an adhesive recommended by the manufacturer. Fabrics with an adhesive backing shall be placed in accordance with the manufacturer's recommendations.

Other fabrics shall be placed with a heavy coat of the asphalt binder grade used in the HMA applied at a rate of 0.20 to 0.25 gallons per square yard (0.9 to 1.1 L/m²) and at a temperature between 295°F and 315°F (145°C and 160°C).

The fabric reinforcement shall be placed in accordance with the contract documents (full width or individual crack or joint treatment). The fabric shall be placed immediately following the adhesive or asphalt binder placement under the fabric. Placement may be by hand or by a mechanical method

specifically designed for this purpose. Precautions shall be taken to avoid wrinkles in the fabric and to insure that air bubbles are removed without breaking the fabric. Wrinkles or folds which cannot be removed by brushing shall be cut and lapped to provide a smooth surface.

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

The Contractor shall avoid application of the tack coat over longitudinally placed fabric. Traffic shall not be allowed over the fabric during placement and during curing of the adhesive material to avoid damage to the fabric. A light application of HMA mix material may be hand sprinkled on the fabric to prevent damage from necessary equipment traffic.

Fabric that is damaged or soiled prior to HMA overlay shall be repaired at no additional cost, when directed by the Engineer. Sanding, at no additional cost, may also be required by the Engineer during this period.

BC. Handling, Production, and Delivery.

1. Hot Mix Asphalt Plant Operation.

The plant operation shall comply with the following requirements:

a. Handling Mineral Aggregate and RAP.

The various aggregate products used shall be kept separate, and adequate provisions shall be made to prevent intermingling. Stockpiling and processing shall be handled in a manner that will ensure uniform incorporation of the aggregate into the mix.

The various aggregates shall be separately fed by feeders to the cold elevator in their proper proportions and at a rate to permit correct and uniform temperature control of heating and drying operations.

b. Handling Asphalt Binder.

The asphalt binder shall be brought 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. Modified asphalt binder should be heated according to the suppliers recommendations.

c. Handling Hydrated Lime.

The lime must be accurately proportioned by a method acceptable to the Engineer.

1) Hydrated Lime Added to a Drum Mixer.

The hydrated lime shall be added at the rate of 0.75% by weight (mass) of the total aggregate (virgin and RAP) for Interstate and Primary projects. The hydrated lime shall be added to a drum mixer by one of the following methods:

- a)** Added to the virgin aggregate on the primary feed belt, as a lime water slurry.
- b)** Thoroughly mixed with the total combined aggregate if the aggregate contains at least 3% total moisture.
- c)** Added to the Type 2 or Type 3 virgin aggregate in a moist condition, and then mixed with the total combined virgin aggregate.

Alternative methods for mixing must be reviewed and approved by the Engineer. Hydrated lime shall not be introduced directly into a drum mixer by blowing or augering.

2) Hydrated Lime Added to a Batch Plant.

Hydrated lime shall be added at the rate of 0.5% by weight (mass) of total aggregate (virgin and RAP) for Interstate and Primary projects. It shall be introduced to a batch plant by one of the following methods:

- a)** Placed on the recycle belt which leads directly into the weigh hopper.

- b) Added directly into the pugmill.
- c) Added directly into the hot aggregate elevator into the hot aggregate stream. In any case, the lime must be introduced prior to the start of the dry mix cycle.

When any of the above methods for a batch plant is used, the hydrated lime will be considered part of the JMF.

d. Production of Hot Mix Asphalt Mixtures.

The exact proportions of the various materials shall be regulated within the limits specified so as to produce a satisfactory bituminous coating and mixture. The aggregates shall first be mixed dry, then the asphalt binder shall be added. In batch plants, the asphalt binder shall be added in an evenly spread sheet over the full length of the mixer box. In continuous plants, the asphalt binder shall be sprayed evenly into the aggregate by a positive pressure spray within the first 30% of the length of the mixer box. In drum mixing plants, the asphalt binder shall be sprayed evenly into the aggregate by a positive pressure spray. Coating aids may be added, subject to approval of the Engineer.

The mixer shall be operated so that the mixture is of consistently uniform temperature and, as discharged from the mixer, will not vary more than 20°F (11°C). The temperature of the mixtures shall not exceed 330°F (165°C) unless approved by the Engineer.

The rate of production shall not exceed the manufacturer's rated capacity of the mixer and shall provide uniform coating. Dry mixing time for batch mixers shall be not less than 5 seconds. Wet mixing time for batch mixers shall be not less than 25 seconds. For continuous mixers, the mixing time shall be at least 30 seconds.

All handling and manipulation of the hot mixture from the mixer to the final spread on the road shall be controlled so that a uniform composition is maintained and segregation of coarser particles is minimized. The segregation shall be minimized to the extent that it cannot be visibly observed in the compacted surface. The Contractor shall only apply approved release agents to trucks and equipment as specified in Article 2001.01.

The mixture temperature shall be sufficient to allow for the specified compaction and density to be attained. HMA shall not be discharged 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 and 225°F (110°C) for a nominal layer thickness of more than 1 1/2 inches (40 mm).

Except for an unavoidable delay or breakdown, delivery of hot HMA to any individual spreading unit shall be continuous and uniform and at a rate sufficient to provide as continuous an operation of the spreading unit as practical. The paver hopper shall, at all times, be kept sufficiently full to prevent non-uniform flow of the mixture to the screed.

CD. Placement.

The existing surface and the surface of each layer shall be clean and, free from foreign matter when each succeeding layer is placed. Any surface which becomes dirty shall be cleaned by the Contractor cleaned in accordance with Article 2212.04, A, and if necessary, retacked to provide bond with the succeeding course. If bumps or other significant irregularities appear or are evident in the intermediate course or other lower course, they are to be corrected before the final lift is placed.

HMA mixtures shall not be placed on a wet or damp surface and shall not be placed when the temperature of the road surface is less than shown in the table below. The Engineer may further limit placement if, in the Engineer's judgment, other conditions are detrimental to quality work. HMA mixtures shall not be placed after November 15, except with approval of the Engineer.

ALL BASE AND INTERMEDIATE COURSE LIFTS OF HMA MIXTURES	
Nominal Thickness - inches (mm)	Road Surface Temperature, °F (°C)
1 1/2 (40)	40 (4)
2 - 3 (60-80)	35 (2)
Over 3 (Over 80)	25 (-4)

ALL SURFACE COURSE LIFTS OF HMA MIXTURES	
Nominal Thickness - inches (mm)	Road Surface Temperature, °F (°C)
1 (30)	50 (10)
1 1/2 (40)	45 (7)
2 and greater (50 and greater)	40 (4)

When placing the mixture, the forward speed of the finishing machine shall be slowed as necessary to provide at a rate to provide a continuous uniform operation with the least amount of stopping.

A wire or string line shall be used to guide the finishing machine and to maintain alignment. Edge alignment irregularities shall be corrected by hand methods immediately after they occur.

The contract documents will show the total thickness to be placed. Spreading of the mixture shall be at such a rate that, when compacted, the layer(s) will be substantially of the thickness and dimensions required to produce the required thickness. The minimum layer thickness is three times the designated mix size shall be based on the following:

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)

The compacted thickness of the top layer shall not be greater than 3 inches (75 mm). This restriction shall not apply to HMA shoulders. The maximum compacted thickness of lower layers may exceed 4 inches (100 mm) if it is demonstrated that the thicker layers have satisfactory density. The riding characteristics of the thicker layers shall be within reasonably close conformance to that expected from a 3 inch (75 mm) layer. Each layer shall be completed to full width before succeeding layers are placed.

When placing two adjacent lanes, not more than one normal day's run shall be made on one side before the adjacent side or pass is completed. At the close of each working day, the roadbed shall be free of any construction equipment. The Contractor shall not spread more mixture than can be compacted and finished in daylight hours of the same working day.

While operating on the road surface, use of kerosene, distillate, other petroleum fractions, or other solvents, for cleaning hand tools or for spraying the paver hopper will not be permitted. Containers of cleaning solution shall not be carried on or near the paver. When a solvent is used, the paver shall not be used for at least 5 hours after this cleaning. The Contractor shall be responsible for collecting and removing all cleaning materials and cleaning residue from the project and plant site. The cleaning material and residue shall become the property of the Contractor.

Whenever practicable, all mixtures shall be spread by a finishing machine. Irregular areas may be spread by hand methods. The hot mixture shall be spread uniformly to the desired depth with hot shovels and rakes. Loads shall not be dumped faster than they can be spread properly. Workers shall not stand on the loose mixture while spreading. After spreading, the hot mixture shall be carefully smoothed to remove all segregated coarse aggregate and rake marks. Rakes and lutes used for hand spreading and smoothing shall be of the type designed for use on HMA mixtures.

When placing two adjacent lanes, not more than 1 1/2 days of rated plant production capacity shall be paved in a lane before the adjacent lane(s) is paved. The Contractor shall not spread more mixture than can be compacted in the specified working hours of the same working day. At the close of each working day, the roadbed shall be free of any construction equipment.

Prior to opening a lane to traffic, fillets or full width granular shoulders shall be placed in accordance with Article 2121.07, B. The material shall be placed adjacent to and equal in thickness to the resurfacing. Fillet removal shall be incidental to the HMA mixture.

DE. Compaction.

Each layer shall be promptly and thoroughly compacted. Mechanical tampers shall be used for areas inaccessible to the rollers.

The overall rolling procedure and compactive effort shall produce a surface free of ridges, marks, or bumps and shall be subject to approval of the Engineer.

There are two classes of compaction, Class I and Class II. Class I compaction is intended for use on Interstate highways, and most Primary and Secondary highways. Class II compaction is intended for resurfacing paved shoulders, temporary crossovers, runarounds onsite detours, and for other situations where Class I is not specified.

For Class I compaction, the roadway density (percent of laboratory density) will be based on the density obtained from the Quality Control Program for that day's mixture.

1. Class I Compaction.

a. Class IA Compaction.

Class IA compaction shall be used for intermediate and surface courses for the traffic lanes of Interstate highways, including Interstate-to-Interstate ramps, and Primary highways as specified. Compaction shall be a minimum of 96% of laboratory density. The average air void level of the roadway density specimens shall not exceed 8.0%.

b. Class IB Compaction.

Class IB compaction shall be used for all Interstate and Primary bases. Class IB will also be required on Primary travel lanes intermediate and surface courses, and ramps connecting to Interstate and Primary highways when Class IA compaction is not specified. Compaction shall be to a minimum of 95% of laboratory density. The average air void level of the roadway density specimens shall not exceed 8.0%.

c. Class IC Compaction.

Class IC compaction shall be used for HMA base widening, shoulder resurfacing when specified, traffic lanes of Secondary highways, and any other HMA course traffic lanes when Class IA and IB are not specified. Compaction shall be a minimum of 94% of laboratory density. The average air void level of the roadway density specimens shall not exceed 8.0%.

d. Rolling Patterns Test Strip Construction for Class IA and IB Compaction.

For Class IA compaction at the start of intermediate course placement and for Class IA and Class IB compaction prior to the start of surface course placement, the Contractor shall construct a test strip for the purpose of evaluating properties of the HMA mixtures and for identifying an effective rolling pattern. For multiple lifts using the same mix requiring Class IA compaction, when the thickness of the second lift varies from the first lift by 1 1/2 inches (40 mm) or more, a test strip for the second lift shall be performed. When the contract documents specify both intermediate and surface courses, a surface course test strip shall be placed in lieu of intermediate mix in a section of intermediate course prior to actual surface course placement. This will be paid for at the contract unit price for the surface mix. The test strip shall be applied to each mixture which has a plan quantity of at least 4500 3000 tons (4500 3000 Mg).

The quantity of HMA mixture subject to Class IA compaction, produced and placed for test strip production, will be limited to 500 750 tons (500 750 Mg) for lift thicknesses of 2 inches (50 mm) or less, and 750 1000 tons (750 1000 Mg) for lift thicknesses greater than 2 inches (50 mm). After test strip placement, further mixing and laydown operations will be suspended until the laboratory test results of the plant produced mixture and core densities are available.

Only one test strip will be allowed for each mixture. At the direction of the Engineer, additional test strips may be required if a **successful complying HMA mixture or** rolling pattern was not established.

Procedures and documentation to be followed during construction of the test strip shall allow the Engineer and the Contractor to verify mixture design and effectiveness of compaction procedures.

The test strip production control shall meet the requirements of Article 2303.04, B, 2. The number of density core samples obtained for the test strip will be increased by one and the low core result will not be used in the Quality Index (QI) density formula for payment for the test strip quantity.

2. Class II Compaction.

For all rollers, the initial contact with the hot mixture shall be made by the power driven wheels or roll.

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

Following the initial rolling, the layer shall be given an intermediate rolling with a pneumatic tired roller **and** before the temperature falls below 225°F (110°C). The intermediate roller shall cover the entire area not less than six times. A finish, steel tired roller shall be used to smooth out all marks and roughness in the surface.

Mechanical tampers **or other approved compaction methods** shall be used for areas inaccessible to the rollers.

3F. Joints and Runouts.

Longitudinal joints for courses on resurfacing projects shall be constructed directly above the longitudinal joint in the existing pavement. The offset distance between longitudinal joints in succeeding courses of full depth HMA paving shall be not more than 3 inches (75 mm). **Transverse construction joints in succeeding courses shall be separated by not less than 6 feet (1.6 m).** The spreading of hot mixtures along longitudinal joints shall be adjusted to secure complete joint closure and full compression of the mixture with a smooth surface and joint after compaction. **At transverse joints, the cold mixture of the layer shall be sawed to a straight line at right angles to the center line so that a full thickness, a true surface, and a vertical edge will be provided.**

Transverse construction joints in succeeding courses shall be separated by not less than 6 feet (1.6 m). The use of wood or metal headers to form the edge of the joint during rolling of the fresh mixture will not be permitted. The header shall be sawed to a straight line at right angles to the center line so that a full thickness vertical edge will be provided before continuing paving. The Contractor shall provide a 10 foot (3 m) straightedge for checking transverse **construction** joints for smoothness. Variations in the surface at transverse **construction** joints, as indicated by the straightedge, shall be corrected by hand methods before compaction.

When a transverse construction joint is open to traffic, a temporary runout of 10 feet (3 m) in length per 1 inch (25 mm) of lift thickness shall be installed. Suitable paper or burlap should be used under the taper **at end-of-day's run transverse joints** to prevent adhesion. Sand, dirt, or wood shall not be used for this purpose. **Use of wood or metal headers to form the edge of the joint during rolling of the fresh mixture will not be permitted.**

When required to end paving for winter shutdown, runouts shall be located adjacent to each other. A winter shutdown runout of 25 feet (8 m) in length per 1 inch (25 mm) of lift thickness shall be installed.

When temporary transverse construction joints will be For temporary runouts open to traffic for periods greater than 4 weeks **and winter shutdown runouts**, the Contractor may reduce the amount of top size aggregate in the transition taper. **The temporary runouts and winter shutdown runouts shall be removed before commencement of paving. Runout removal shall be incidental to the HMA mixture.**

EG. Miscellaneous Operations.**1. Leveling and Strengthening Courses.**

The contract documents will show the thickness of the courses to be placed. Strengthening and leveling courses will be placed as indicated in the contract documents. These courses shall be of the same mixture specified for the base or intermediate course.

When the width of any strengthening or leveling layer is 8 feet (2.4 m) or more, the layer shall be spread by a finishing machine.

Leveling courses shall be compacted using Class II compaction procedures, **except all passes shall be made** with a pneumatic roller.

2. Wedge Courses.

Wedge courses used to secure desired super-elevation of curves shall be constructed of the base or intermediate mixture, and **insofar as when** possible, shall be spread by a finishing machine. In placing wedge course, the maximum thickness of individual layers, when compacted, shall not exceed 3 inches (75 mm), and care shall be used to avoid crushing the coarse aggregate. Wedge courses shall be placed to the full width of pavement.

On curves which require the placement of wedge courses, the Contractor will be required to stage the shoulder construction on the super elevated curves. After completion of each day's wedge placement operations and prior to suspending construction activities for that day, a full width shoulder shall be constructed on the high side up to the elevation of the completed wedge course. All necessary staging of shoulder construction will be considered incidental to shoulder construction.

3. Fixtures in the Pavement Surface.

All utility accesses, **catch basins, valve holes, intakes,** or other fixtures encountered within the area to be covered by HMA shall be adjusted to conform to the final adjacent finished surface. Unless otherwise indicated in the plans, the Contractor shall have the option of adjusting fixtures between placement of the surface course and the layer preceding the surface course, or adjusting the fixture after placement of the surface course using a composite patch or PCC patch.

PCC and HMA patch material shall conform to the requirements of Section 2529. Patches shall be of sufficient size to accommodate the structure being adjusted.

Patches shall be square in shape and oriented diagonally to the direction of traffic flow. Elevation of the adjusted fixture and patch shall not be higher than or more than 1/4 inch (6 mm) below that of the surrounding pavement surface.

4. Fillets for Intersecting Roads and Driveways.

When fillets are designated in the contract documents for driveways to homesteads and commercial establishments and at intersecting roads, the surface adjacent to the pavement being surfaced shall be shaped, cleaned of loose material, and tack coated. On this coated surface, the hot mixture shall be placed and compacted in layers equal to the adjacent layer and extended from the edge of pavement as shown in the plans. Fillets at intersecting roads shall be placed and compacted at the same time as the adjacent layer. Entrance fillets that are 8 feet (2.4 m) or wider may be placed as a separate operation. Paving of fillets 8 feet (2.4 m) or more in width shall be with a self propelled finishing machine described in Article 2001.19. The Engineer may approve other equipment for placement of fillets, based on a demonstration of satisfactory results.

F. Limitations.

Headers, when required to end paving for winter shutdown, shall be located adjacent to each other. A winter shutdown runout of 50 feet (15 m) in length per 1 inch (25 mm) of lift thickness shall be installed. The runout shall be removed before commencement of paving and shall be incidental to HMA.

2303.04 QUALITY CONTROL PROGRAM.**A. Mix Design - Job Mix Formula.**

The JMF for each mixture shall be the responsibility of the Contractor.

The Contractor shall submit completed JMF using the computer format of Form 956 to the materials laboratory designated by the Contracting Authority for approval. The Contractor shall submit supporting documentation demonstrating the design process was followed and how the recommended JMF was determined, including an economic evaluation when required. Documentation shall include trial and final proposed aggregate proportions (Form 955) and corresponding gyratory data. The Contractor shall also submit sufficient loose mixture and individual material samples for approval of the design.

The JMF shall be prepared by personnel who are Iowa DOT certified in bituminous mix design.

If the JMF is not satisfactory, the Contractor shall 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.

B. Plant Production.

The Contractor shall perform the sampling and testing to provide the quality control of the mixture during plant production. Certified Plant Inspection according to Section 2521 will be required. All personnel performing production quality control testing shall be certified by the Department.

Easy and safe access shall be provided to the location in the plant where samples are to be taken.

A "significant mix change" is defined as a single occurrence of an aggregate interchange of greater than 5%, a single occurrence of an asphalt content change greater than 0.2%, or any deletion or introduction of a new aggregate material into the mix.

1. Sampling and Testing.

Aggregate gradation control shall be based on cold feed gradation.

Aggregate samples shall be taken in accordance with Materials I.M. 204 to determine that materials are being proportioned in accordance with the specifications.

The hot HMA mixture shall be sampled, at random, from the roadway, behind the paver, prior to compaction, in accordance with Materials I.M. 322.

Each day's production shall be considered a lot. When the anticipated quantity for the day is 2000 tons (2000 Mg) or more, that day's production shall be divided into four sublots, the first subplot of each day shall be the first 500 tons (500 Mg) produced. The remaining anticipated quantity for the day shall be divided into three sublots of equal size.

When the anticipated quantity for the day is less than 2000 tons (2000 Mg), the first daily subplot shall be the first 500 tons (500 Mg) produced. Additional daily sublots of 750 tons (750 Mg) each will be established for mix production exceeding the first 500 tons (500 Mg).

The maximum number of samples required for a day's production will not exceed four.

Samples shall not be taken 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.

Each production sample shall be tested as follows:

Two gyratory specimens shall be prepared and compacted in accordance with Materials I.M. 325G and the results averaged to determine sample results.

Density shall be determined for each specimen in accordance with Materials I.M. 321.

The Contractor's field quality control laboratory compaction shall be used for field density control. The laboratory density for field control will be the bulk specific gravity of compacted mixture (G_{mb}) at N_{design} . Bulk specific gravity at N_{design} will be determined by compacting specimens to N_{max} and back calculating the bulk specific gravity at N_{design} .

The Theoretical Maximum Specific Gravity of the uncompacted mixture shall be determined in accordance with Materials I.M. 350 or other test methods recognized by AASHTO or ASTM.

The laboratory air voids shall be determined in accordance with Materials I.M. 501.

2. Production Control.

After the JMF is established, the combined aggregate furnished for the project, the quantity of asphalt binder and laboratory air voids should consistently conform to the JMF, as target values, and shall be controlled within the production tolerances given in Table 2. Plant production must be controlled such that the plant produced HMA mixture will meet mixture design criteria for Air Voids and VMA at N_{design} gyrations of the gyratory compactor within the single test tolerances given in the table. The slope of the gyratory compaction curve of plant produced material shall be monitored and variations in excess of ± 0.40 of the mixture design gyratory compaction curve slope may indicate potential problems with uniformity of the mixture.

The gyratory mix design gradation control points for the size mixture designated in the project plans will not apply to plant production control.

Table 2 - Production Tolerances		
MEASURED CHARACTERISTIC	TARGET VALUE (%)	SPECIFICATION TOLERANCE (%) ⁽¹⁾
Cold feed gradation No. 4 (4.75 mm) and larger sieves	by JMF	± 7.0
Cold feed gradation No. 8 (2.36 mm)	by JMF	± 5.0
Cold feed gradation No. 30 (600 μ m)	by JMF	± 4.0
Cold feed gradation No. 200 (75 μ m)	by JMF	± 2.0 ⁽⁴²⁾
Daily asphalt binder content	by JMF	± 0.3
Field laboratory air voids	4.0 ⁽²⁰⁾	-0.5/+1.0 ⁽³⁴⁾
VMA ⁽⁴⁵⁾	by JMF	± 1.0 ⁽⁵⁶⁾
⁽¹⁾ - Based on single test unless otherwise noted.		
⁽⁴²⁾ - The filler/bitumen ratio of the plant produced mixture will be maintained between 0.6 and 1.4.		
⁽²⁰⁾ - Unless otherwise specified.		
⁽³⁴⁾ - Based on the moving average of four test values.		
⁽⁴⁵⁾ - Restricted to an asphalt film thickness as specified for the level of HMA mixture.		
⁽⁵⁶⁾ - Based on the daily lot average.		

The Contractor shall strive for the target value of the percent air void and asphalt binder by adjusting gradation and asphalt binder content.

The Contractor shall produce a mixture of uniform composition conforming to the JMF. If, during production, the Contractor determines from quality control testing that adjustments are necessary to the JMF to achieve the specified properties, adjustments to the JMF target gradation and asphalt binder content values may be made.

Adjustments to the JMF aggregate proportions and asphalt binder content shall be made as a result of the interactive process between the Contractor and the Engineer. The Contractor's adjustment recommendations shall prevail, provided all specifications and established mix design criteria are being met for plant production.

The voids in the mineral aggregate (VMA) and estimated film thickness shall be measured for specification compliance every day of HMA production.

Quality control charts in accordance with Materials I.M. 511 shall be available and kept current showing both individual test results and moving average values. Moving averages shall be based on four consecutive test results. Moving averages may only restart in the event of a mandatory plant shutdown for failure to maintain the average within the production tolerance. Control charts shall include a target value and specification tolerances. As a minimum, the following values shall be plotted on Iowa DOT Materials approved control charts as indicated below:

Laboratory density (each point being an average of two specimens).
 Laboratory air voids (plotted to nearest 0.1%)
 Asphalt binder content (plotted to nearest 0.1%)
 Cold feed gradation (No. 4, No. 8, No. 30, and No. 200 (4.75 mm, 2.36 mm, 600 μ m, and 75 μ m sieves))
 Maximum specific gravity (Rice) (Materials I.M. 350).

Laboratory voids for individual tests shall be calculated according to Materials I.M. 501, using the individual density and individual maximum specific gravity determined for each sample. The moving average of laboratory voids shall be the average of the last four individual laboratory voids.

The Contractor shall monitor the test results and to make mix adjustments, when appropriate, to keep the mixture near the target values. The Contractor shall notify the Engineer whenever the process approaches a specification tolerance limit. One moving average point for laboratory air voids outside the specification tolerance limit shall be cause to cease operations. The Contractor shall assume the responsibility to cease operations, including not incorporating produced material which has not been placed. The process shall not be started again until the Contractor notifies the Engineer of the corrective action proposed.

C. Construction.

1. Density.

Density samples shall be taken from the compacted mixture and tested not later than the next working day following placement and compaction.

A lot shall be considered as 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. When the day's operation is 2500 square yards (2500 m^2) or less, or the day's operation is 500 tons (500 Mg) or less, or when the mixture is being placed in irregular areas, or for wedge, leveling, or strengthening courses, the Engineer may waive sampling for density provided compaction has been thorough and effective.

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

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

Seven density samples will be taken for each lot. The length laid in each lot shall be divided into seven approximately equal sections and one sample will be obtained at a random location in each section.

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. Samples shall not be taken less than 1 foot (300 mm) from the edge of a given pass of the placing equipment, or from run-outs, or areas adjacent to day's work joints or structures.

The quality index for density of each lot shall be determined by the following formula:

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

where QI_{Density} = Quality Index for density

G_{mb} = bulk Specific Gravity of the mixture

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

If one of the density test values from a lot is an outlier, identified in accordance with the procedure described in Materials I.M. 501, the outlier value shall not be used to determine the quality index. The quality index shall be determined using the remaining density test values.

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

2. Thickness.

The thickness of the completed course will be measured to the nearest 1/8 inch (3 mm), exclusive of seal coat, by measurement of cores. All areas of uniform and similar thickness and width for the project will be divided into lots.

The frequency specified for taking density samples from the surface lift will be used when measuring for completed thickness. However, samples that may not be tested for density because they are less than 70% of the intended thickness shall be used for thickness, and in these particular instances, the additional samples of sufficient thickness that are used for density tests shall not be measured for thickness. Thickness samples will be taken full depth of the completed course and after measurement, the density samples for the top layer shall be removed by the Contractor from the core. If any of the measurements for a lot is less than the designated thickness, the quality index for thickness of that lot will be determined by the following formula:

(English)

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

(Metric)

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

When the day's operation is 2500 square yards (2500 m²) or less, or the mixture is being placed in irregular areas or next to structures, the Engineer may waive sampling for thickness provided there is reasonable assurance that the pavement conforms to the required thickness. When the quality index falls below 0.00, the Engineer may declare the lot or parts of the lot defective.

3. Smoothness

Smoothness of the surface course shall be in accordance with Section 2316.

D. Sampling and Testing.

The Contractor shall calibrate and correlate the testing equipment with prescribed procedures. Sampling and testing shall conform with specified testing procedures as listed in the applicable Materials I.M. and applicable Specifications. When the results from a lab are used for product acceptance, the lab shall be qualified.

All samples shall be identified, stored and retained by the Contractor for the Contracting Authority until the lot is accepted. The Contracting Authority may acquire these samples for comparative, verification, or assurance testing.

All samples shall be identified by a system approved by the Engineer.

1. ~~Loose Material Requirements Individual Materials and Loose Mixture.~~

All samples of asphalt binder and tack coat material, shall be identified and promptly delivered to the appropriate laboratory, as designated by the Engineer.

Samples of loose HMA mixture shall be taken in accordance with Materials I.M. 322, weigh at least 60 pounds (28 kg), and shall be transported to the test facility in a way to retain heat to facilitate sample splitting procedures. The tests for mixture properties shall be conducted on representative portions of the mix, split from the larger sample of mix. After splitting of the sample is completed in the Contractor's QM-A laboratory, the remainder of the sample, approximately 30 pounds (15 kg), shall be retained for laboratory testing by the laboratory designated by the Contracting Authority.

Samples shall be split in accordance with Materials I.M. 357.

All test results and calculations shall be recorded and documented on data sheets approved by the Contracting Authority. Specific test results shall be recorded on a daily summary sheet approved by the Contracting Authority. The Daily Quality Control Summary Sheet shall also include a description of quality control actions taken (adjustment of cold feed percentages, changes in JMF, etc.). The Contractor shall FAX, or by other method approved by the Engineer, the daily quality control summary sheet to the ~~appropriate Iowa DOT District Materials Engineer or Engineer and designated laboratory~~ daily. A copy of the electronic file containing project information generated during the progress of the work shall be furnished to the Engineer at project completion.

2. ~~Finished Pavement Requirements Compacted Pavement Cores.~~

The Contractor shall cut samples from any course or finished pavement for tests of density, thickness, or composition, by sawing with a power driven masonry saw or by drilling a minimum 4 inch nominal diameter core. The surfaces shall be restored by the Contractor the same day. The core holes shall be dried, filled with the same type of material, and the material properly compacted. Pavement core samples shall be identified and delivered to the Contractor's quality control field laboratory.

The compacted HMA pavement shall be tested by Contractor's personnel who are Iowa DOT Certified in QM-A bituminous quality control.

The minimum number of cores taken shall be in accordance with ~~the following~~ Materials I.M. 204, Appendix G.

The core locations will be determined by the Engineer.

The cores shall be prepared and tested in accordance with ~~the following~~ Materials I.M. 320, 321, and 337.

3. Acceptance, Correlation, and Quality Assurance Testing.

The Contractor's quality control test results will be compared and correlated to the Engineer's test results on a regular basis using guidelines and tolerances set forth in Materials I.M. 208, Appendix C; 216; and 511.

If satisfactory correlation exists between the Contractor's test results and the Engineer tests, the Contractor's results will be used. Disputes between the Contractor's and Engineer's test results, on one sample or one test of one sample, will be resolved ~~by repeated testing of the same sample or additional testing of another sample. When repeated and/or additional sampling fails to resolve a dispute, a third materials laboratory designated by the Contracting Authority will act as a reference laboratory and perform additional testing as necessary to resolve the dispute. in accordance with Materials I.M. 511.~~

The Engineer will select, at random, a split portion of one or more of the daily hot mix production samples. Some or all of the samples selected will be tested in the materials laboratory designated by the Engineer. The Engineer will test as many of the samples as necessary to establish a correlation.

The Engineer will select one daily set of cores at random each week. These will be tested at the materials laboratory designated by the Engineer. Cores from the initial production will also be tested by the Contractor and the Engineer for correlation and validation of results.

2303.05 METHOD OF MEASUREMENT.

A. Hot Mix Asphalt Mixture.

1. Measurement by Weight (Mass).

When measurement is by weight (mass), the quantity of Hot Mix Asphalt Mixture of the type specified will be expressed in tons (megagrams) and determined from the weight (mass) of individual loads, including fillets, measured to the nearest 0.01 tons (0.01 Mg).

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. The weights (mass) of various loads shall be segregated into the quantities for each pay item.

2. Measurement by Area.

When payment is based on square yards (square meters), the quantity of Hot Mix Asphalt Mixture of the type specified, will be the quantity shown in the contract documents to the nearest 0.1 square yard (0.1 m²).

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 shall be responsible for the profile and elevation of the subgrade and for thickness.

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, or when placed as a separate operation, from scale tickets. If the substitute mixture placed on the shoulder is for an intermediate course fillet only, the quantity in the fillet shall be included for payment in the quantity placed in the adjacent intermediate course.

B. Asphalt Binder.

The amount of asphalt binder used from batch plants, continuous plants, or drum mixing plants, shall be by stick measurement in the Contractor's storage tank or by in-line flow meter reading, in accordance with Article 2001.07, B. The asphalt binder quantity added to the storage tank shall be computed from a supplier certified transport ticket accompanying each load. The quantity of asphalt binder not used in the work will be deducted.

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 from this printout the quantity of asphalt binder used.

By mutual agreement, this method may be modified when small quantities or intermittent operations are involved.

The Engineer will calculate and exclude the quantity of asphalt binder used in mixtures in excess of the tolerance specified in Article 2303.04, B, 2.

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.

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, based on an assumed asphalt binder content of 5% of the dry RAP weight (mass).

The quantity of asphalt binder in RAP, which is incorporated into the mix, will be included in the quantity of asphalt binder used.

The quantity of asphalt binder in unclassified RAP will not be measured for payment.

D. Hydrated Lime.

Hydrated lime incorporated in HMA mixtures shall be considered incidental to HMA and will not be measured separately. The quantity will be based on tons (megagrams) of HMA mixture with hydrated lime added.

E. Tack Coat.

Tack Coat shall be considered incidental to HMA, and will not be measured separately.

F. Fabric Reinforcement.

The quantity of Fabric Reinforcement, in square yards (square meters), to the nearest 0.1 square yard (0.1 m²), will be the quantity 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.

HMA Pavement Samples of any finished pavement furnished according to Article 2303.04 D, or required elsewhere in the contract documents, will not be individually counted for payment.

2303.06 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 shall not be paid for separately, but shall be included in the contract unit price for the HMA mixes used. The application of hydrated lime, tack coat, and sand cover aggregate are incidental and will not be paid for separately. Any pollution control testing shall be at the Contractor's expense.

A. Hot Mix Asphalt Mixture.

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

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

Payment will be adjusted by the following percentages for the quality index for density determined for the lot:

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

When the basis of payment is by area, payment will be further adjusted by the appropriate percentage according to the quality index for thickness determined for that lot and the following table:

Quality Index (Thickness) 7 Samples	Percent of Payment (Previously Adjusted for Density)
Greater than 0.34	100
0.14 to 0.34	95
0.00 to 0.13	85
Less than 0.00	75 maximum

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 paid for according to Article 1105.04.

B. Asphalt Binder.

For the number of tons (megagrams) of asphalt binder used in the work, measured as provided in Article 2303.05, B, the Contractor will be paid the contract unit price per ton (megagram).

Payment for asphalt binder will be for all new asphalt binder and the asphalt binder in RAP salvaged from the project, the Contracting Authority owned stockpile, or certified Contractor owned stockpiles, which is incorporated in the mixture.

When scarification of asphalt material is required and is paid for on the basis of square yards (square meters) and no other use of the RAP is specified, the RAP shall become the property of the Contractor, and the Contractor shall not be charged for the asphalt binder in that material.

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 which is 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. Hydrated Lime.

The Contractor will be paid the predetermined contract unit price for Hydrated Lime per ton (megagram) of HMA mixture in which hydrated lime is incorporated. This payment will be full compensation for designing, adding, and testing of the hydrated lime.

DE. Fabric Reinforcement.

The Contractor will be paid the contract unit price for Fabric Reinforcement per square yard (square meter). This payment shall be 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.

EF. Adjustment of Fixtures.

For the number of fixtures adjusted to the finished grade line, the Contractor will be paid the contract unit price for each. If the contract contains no price for adjustment of fixtures, this work will be paid for as provided in Article 1109.03, B.

FG. Hot Mix Asphalt Pavement Samples.

For cutting HMA pavement samples to determine density or thickness according to the specifications, when either of these is the responsibility of the Contractor, and elsewhere when required by the contract documents, the Contractor will be paid the lump sum contract price. This lump sum payment shall be full compensation for furnishing all such samples for all courses or items of work, and for delivery of samples as specified in Article 2303.04, D.

Section 2304

2304, Detour Pavement.

Add as a new section:

2304.01 DESCRIPTION.

This work shall consist of furnishing and placing a temporary hard surface composed of PCC or HMA to carry traffic during construction of permanent pavement.

2304.02 MATERIALS.

The Contractor has the option of using PCC or HMA for the detour pavement. The option used shall meet the following requirements.

A. PCC.

The PCC option shall meet the requirements of Section 2301 for Class A PCC Pavement.

B. HMA.

For projects with less than 10,000,000 total design year ESALs, the HMA option shall meet the requirements of Article 2303.02 for HMA 1,000,000 ESAL surface or intermediate course, 1/2 inch (12.5 mm) or 3/4 inch (19 mm). For projects with more than 10,000,000 total design year ESALs, the HMA option shall meet the requirements of Article 2303.02 for HMA 10,000,000 ESAL base course, 3/4 inch (19 mm).

The asphalt binder shall be PG 64-22.

2304.03 CONSTRUCTION.

Earthwork quantities are based upon the PCC option and will not be adjusted for additional HMA depth. Additional cut material may be used as earth shoulder construction.

A. PCC.

The PCC option shall meet the requirements of Section 2301. Transverse joints, center tie bars, and sealing of the center longitudinal joint are not required.

Article 2301.16, B, C, and D, shall not apply unless stated otherwise in the contract documents.

Article 2316.01, B, shall apply.

B. HMA.

The HMA option shall meet the requirements of Section 2303.

2304.04 METHOD OF MEASUREMENT.

The quantity of Detour Pavement constructed, in square yards (square meters), will be the quantity shown in the contract documents.

2304.05 BASIS OF PAYMENT.

The Contractor will be paid the contract unit price for Detour Pavement, per square yard (square meter). This payment shall be full compensation for furnishing all material, equipment, and labor to construct the detour pavement in accordance with the contract documents. Removal of detour pavement will be paid for according to Section 2510.

Section 2306**2306.09, Traffic Control.**

Replace the second paragraph:

The Contracting Authority Unless stated otherwise in the contract documents, the Contractor ~~will~~ shall furnish signs and mounting devices including posts.

Replace the third paragraph:

The Contractor shall furnish and install these signs as follows:

2306.11, C, Traffic Control.

Replace the entire article:

Traffic Control shall be lump sum for the contract. Article 2528 shall apply.

2306.12, B, Traffic Control.

Replace the entire article:

For traffic control, the Contractor will be paid the lump sum contract price. This payment shall be full compensation for placing and maintaining all signs. Article 2528.13 shall apply.

Section 2307**2307.04, J, Traffic Control.**

Replace the third paragraph:

The Contracting Authority Unless stated otherwise in the contract documents, the Contractor will shall furnish the signs and mounting devices including posts.

Replace the fourth paragraph:

The Contractor shall furnish and install these signs as follows:

2307.06, E, Traffic Control.

Replace the entire article:

Traffic Control shall be lump sum for the contract. Article 2528.12 shall apply.

2307.07, E, Traffic Control.

Replace the entire article:

For Traffic Control, the contractor will be paid the lump sum contract price. This payment shall be full compensation for placing and maintaining signs as identified in Article 2307.04, J. It shall also include barricades, flaggers, pilot cars and other traffic control devices required for this work. Article 2528.13 shall apply.

Section 2309**2309.02, E, Compaction of Mixture.**

Replace "Article 2303.03, D, 2" with "Article 2303.03, E, 2" in the article.

2309.02, F, Joints.

Replace "Article 2303.03, D, 3" with "Article 2303.03, F" in the article.

2309.03, Limitations.

Replace "Article 2303.03, C" with "Article 2303.03, D" in the article.

Section 2310**2310, Portland Cement Concrete Overlay.**

Replace the entire section:

2310.01 DESCRIPTION.

This work consists of overlaying of an existing pavement with a PCC overlay. The various types of PCC overlay are as follows:

1. Bonded overlay consists of placing a PCC overlay over an existing PCC pavement.
2. Unbonded overlay consists of placing a PCC overlay over an existing pavement where a stress relief layer is placed on top of the existing PCC pavement or an existing PCC pavement that has been overlaid with HMA (composite pavement).
3. Whitetopping consists of placing a PCC overlay over an existing, full depth asphalt pavement.

The requirements of Section 2301 shall apply to this work with the modifications for each type of work identified below.

2310.02 MATERIALS.

A. Bonded Overlays.

1. Aggregate.

Unless otherwise specified, the coarse aggregate shall be the same type of aggregate, crushed limestone, or gravel, as the existing pavement. The coarse aggregate shall have as the largest size particle, no greater than one-third of the overlay thickness.

2. Concrete.

For projects with mainline paving less than 50,000 square yards (40,000 m²), Gradation No. 5, and a C-3WR mixture, with or without fly ash, shall be used. For larger projects, a QM-C design mixture shall be used, as described below:

a. Description.

The Contractor shall develop a concrete mixture design with an optimum combined aggregate gradation. Optimization of the aggregates should produce concrete with low water requirement as well as with improved workability and finishing characteristics. While concrete strength is important and shall be measured, it is not the basis for optimization of the concrete mixture design.

The Concrete Design Mixture (CDM) shall apply to mainline slip form pavement. At the Contractor's option, the CDM may apply to any other slip form paving.

b. Coarse and Fine Aggregate.

The Gradation Table in Article 4109.01 will not apply to coarse or fine aggregate with the following exceptions: fine aggregate sources shall meet the requirements of Gradation No. 1 for the 3/8 inch (9.5 mm) sieve and the No. 4 (4.75 mm) sieve, except for Class 3I gravel sources.

A coarse, uncrushed sand may be produced from an approved Class 2 or Class 3 gravel source meeting the quality requirements of Section 4110 and the following gradation limits:

Sieve	% Passing
1/2 inch (12.5 mm)	100
3/8 inch (9.5 mm)	90-100
No. 4 (4.75 mm)	80-100

c. Intermediate Aggregate.

Any limestone intermediate aggregate material shall meet the durability class required for the coarse a reasonable aggregate. Intermediate aggregate shall be considered coarse aggregate for gradations and correlations.

Uncrushed pea gravel produced from an approved Class 2 or Class 3 gravel source and meeting the quality requirements of Section 4110 shall not exceed 10% of the total aggregate.

d. Laboratory Design Mixture.

The Contractor shall develop a CDM based on a unit volume of 1.000 according to industry standard practice. The CDM shall contain proportions of materials, including admixtures. Proportions shall be based upon saturated surface dry aggregates and shall produce a workable concrete mixture meeting the following constraints:

Nominal Maximum Coarse Aggregate Size	1/3 the pavement design thickness
Gradation	Materials I.M. 532
Cementitious Content	Minimum, 560 lbs./cy * (333 kg/m ³ *)
Fly Ash Substitution Rate	See Article 2301.04, Paragraph E
Water/Cementitious Ratio	Maximum, 0.45
Target Air Content	6% ± 1%
28 Day Flexural Strength, Third Point	Minimum, 640 psi (4.40 MPa)

*The minimum cement content assumes the use of Type I/II cement with a specific gravity of 3.14 for an absolute volume of 0.106. The absolute volume shall be 0.106 and the weight (mass) of cement shall be determined from the specific gravity of the cement, if other than Type I/II cement. Cement content may need to be increased to maintain water to cementitious ratio during hot weather conditions.

Normal production gradations shall be used to determine the relative percentage of each individual aggregate used in the CDM. The relative percentage of each individual aggregate shall be selected to produce the desired combined aggregate gradation using on the following sieves: 1 inch, 3/4 inch, 1/2 inch, 3/8 inch, No. 4, No. 8, No. 16, No. 30, No. 50, No. 100, and No. 200 (25 mm, 19 mm, 12.5 mm, 9.5 mm, 4.75 mm, 2.36 mm, 1.18 mm, 600 µm, 300 µm, 150 µm, and 75 µm). A target combined gradation shall be developed for each CDM based on normal production gradations and the relative percentages of each individual aggregate. Percent passing the No. 200 (75 µm) sieve shall not exceed 1.5% for the combined aggregate gradation. Water reducing admixture, Type A, or water reducing and retarding admixture, Type D, may be used in the CDM.

Laboratory development of the CDM shall be in accordance with AASHTO T 126. Mix designs may be conducted in a ready mix or central mix batch plant provided the following conditions are met:

- 1) all non-mix design materials are emptied,
- 2) mix design materials are used, and
- 3) batch size at least 3 cubic yards (2 m³).

Personnel overseeing the development of the CDM shall be an Iowa DOT PCC Level III Certified Technician. The Engineer shall be allowed to witness the development of the CDM. Notice shall be given 7 calendar days prior to this event. The following tests shall be performed in the development of the CDM:

Specific Gravity of Each Individual Aggregate	Materials I.M. 307
Gradation of Each Individual Aggregate	Materials I.M. 302
Unit Weight of Plastic Concrete	AASHTO T 121
Air Content of Plastic Concrete	Materials I.M. 318
28 Day Flexural Strength	AASHTO T 97
Temperature of Plastic Concrete	ASTM C 1064

e. Mix Design Documentation.

At least 7 calendar days prior to the start of paving the Contractor shall submit a CDM report to the District Materials Engineer for approval. Contract extensions will not be allowed due to inadequate or additional CDMs. The CDM report shall include the following:

Cover Page	Contractor name Project number Date and location of CDM laboratory development Date Submitted Signature of Contractor representative
Material Source Information	Brand Type Source
Material Proportion Information	Specific gravity Relative percentage of each individual aggregate Target combined gradation % passing (Material I.M. 531) Target combined gradation charts (Material I.M. 532) Design batch weight (mass) (SSD) As mixed batch weight (mass) (SSD)
Mix Properties	Unit weight (mass) of plastic concrete Air content of plastic concrete 28 day flexural strength Slump Temperature of plastic concrete

B. Unbonded Overlays.

The HMA stress relief course for unbonded overlays shall consist of a nominal 1 inch (25 mm) course of HMA meeting the requirements of Section 2303. Asphalt binder shall be PG 58-28. Mixture shall meet 300,000 ESAL, 3/8 inch (9.5 mm), HMA mix requirements, target air voids is 3.0%, no maximum film

thickness restriction, and no minimum filler/bitumen ratio restriction. Aggregate shall be Type B with no percent crushed particle requirements and gradation shall fall below the restricted zone.

2310.03 CONSTRUCTION.

A. EQUIPMENT.

Surface preparation equipment used shall be subject to approval of the Engineer and shall comply with the following:

1. Scarifying or Shotblasting Equipment.

Equipment shall be a power operated, capable of uniformly scarifying or removing the existing surface to depths required in a satisfactory manner. 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.

2. Sand Blasting Equipment.

Sand blasting equipment shall be capable of removing rust, oil, and concrete laitance from the existing surface of the pavement.

B. PREPARATION OF SURFACE.

If full depth base repair is included in the project, it shall be completed prior to surface preparation.

Surface preparation shall include the entire surface to be resurfaced. Materials removed in the preparation operation may be placed in the shoulder area unless otherwise specified in the contract documents.

The Contractor shall clean the existing surface of all loose or adhering foreign material prior to placement of the PCC overlay.

1. Bonded Overlays.

The surface shall be prepared by shot blasting, or shall be scarified and followed by shot blasting. Scarification shall be to a nominal depth of 1/4 inch (5 mm). In either case, the preparation shall be of an extent to remove all dirt, oil, and other foreign materials, as well as any laitance or loose material from the surface and edges against which new concrete is to be placed.

2. Unbonded Overlays.

When jointing is specified in which panels are smaller than a normal lane width, the entire surface shall be scarified to create a roughened surface. This will not apply when a new HMA stress relief layer is constructed as a part of this contract.

Any high spots found in the existing HMA pavement shall be trimmed at the direction of the Engineer. This work would be accomplished during the scarification operation, only at isolated locations, and would be considered incidental to the surface preparation.

3. Whitetopping.

When jointing is specified in which panels are smaller than a normal lane width, the entire surface shall be scarified using a cold-milling operation to create a roughened surface.

Any high spots found in the existing HMA pavement shall be trimmed at the direction of the Engineer. This work would be accomplished during the scarification operation, only at isolated locations, and would be considered incidental to the surface preparation.

C. PLACING AND FINISHING OVERLAY.

The Contractor shall construct the pavement in a manner that will provide a smooth riding surface. Section 2316 shall apply to smoothness of the completed overlay for Primary projects and when specifically required for Secondary projects.

The placing equipment shall be controlled to the proper elevation by string line. Cross sections shall be taken and a grade line established. The Engineer will review and approve the new grade lines. Information detailing the pavement design thicknesses at the various survey points and material

quantities will also be provided. During construction, these grades shall not be altered solely to account for concrete overruns. Some overrun is normal and only with approval of the Engineer will they be adjusted.

1. Bonded Overlays.

a. Surface Cleaning.

Prior to placing concrete onto the surface, the entire surface shall be cleaned with an air blast. After cleaning, no traffic will be permitted on the cleaned surface except that necessary for overlay construction.

b. Surface Condition.

The prepared surface shall be dry to allow some absorption of the concrete mortar.

c. Joints.

The exact location of each contraction and expansion joint in the existing pavement and the joint to be sawed at each full depth patch shall be identified on both sides by a reliable method.

Joints shall be sawed in the resurfacing directly over existing transverse joints. Transverse joints shall be sawed to the full depth of new resurfacing concrete, including depressions created in the existing surface, and as specified in the widening areas. Transverse joints shall be sawed as soon as possible without causing excessive raveling. Joints shall not be sawed over existing longitudinal joints.

2. Unbonded Overlays.

a. Hot Mix Asphalt Stress Relief Course.

Compaction shall be in accordance with Article 2303.03, **DE**, Class 1C Compaction except only static steel wheeled rollers shall be used.

b. Surface Cleaning.

The Contractor shall clean the existing surface of all loose or adhering foreign material prior to placement of the PCC over HMA pavement. Normally this will be accomplished with a power broom and shall be available during paving operations to clean loose material that may be tracked onto the surface by the construction equipment.

c. Surface Condition.

The prepared surface shall be dry when concrete is placed on the surface of the HMA pavement to allow some absorption of the concrete mortar. If the surface of the HMA is above 110°F (40°C), the Contractor may apply water to the surface of the HMA ahead of the paving operation in order to cool the surface. The water shall be applied far enough in advance of the paving operation that the surface will dry from evaporation before concrete is placed. No water shall be applied to the surface of the pavement when the HMA surface temperature is below 100°F (38°C).

d. Joints.

When jointing is specified in which panels are smaller than a normal lane width, the joints shall be 1/8 inch (3 mm) wide with no cleaning or sealing required.

3. Whitetopping.

a. Surface Cleaning.

The Contractor shall clean the existing surface of all loose or adhering foreign material prior to placement of the PCC over HMA pavement. Normally this will be accomplished with a power broom and shall be available during paving operations to clean loose material that may be tracked onto the surface by the construction equipment.

b. Surface Condition.

The prepared surface shall be dry when concrete is placed on the surface of the HMA pavement to allow some absorption of the concrete mortar. If the surface of the HMA is above 110°F (40°C), the Contractor may apply water to the surface of the HMA ahead of the paving operation in order

to cool the surface. The water shall be applied far enough in advance of the paving operation that the surface will dry from evaporation before concrete is placed. No water shall be applied to the surface of the pavement when the HMA surface temperature is below 100°F (38°C).

c. Joints.

When jointing is specified in which panels are smaller than a normal lane width, the joints shall be 1/8 inch (3 mm) wide with no cleaning or sealing required.

D. LIMITATION OF OPERATIONS.

At temperatures below 55°F (13°C) the opening time shall be determined using the maturity method. Resurfacing concrete shall not be placed when the air or pavement temperature is below 40°F (4°C).

The Contractor will be permitted to use the shoulders for construction activities. It will be the Contractor's responsibility to repair the shoulders at no additional cost as deemed necessary by the Engineer, to restore the shoulders to a condition acceptable for shoulder work. The Contractor may elect to limit the use and vehicle loadings to minimize this work and its cost.

Bonded concrete overlays shall be placed between June 1 and September 30.

Unbonded overlay and whitetopping materials shall not be placed on any HMA when the pavement surface temperature exceeds 120°F (50°C).

2310.04 METHOD OF MEASUREMENT.

The quantity of the various items of work involved in the construction of PCC overlay will be measured by the Engineer in accordance with the following provisions:

A. Portland Cement Concrete Overlay, Furnish Only.

The quantity of resurfacing concrete furnished will be measured in cubic yards (cubic meters), using a count of batches incorporated. This quantity will include concrete placed in widening sections and partial depth patches.

B. Portland Cement Concrete Overlay, Placement Only.

The quantity of Portland Cement Concrete Overlay, Placement Only, in square yards (square meters), will be the quantity shown in the contract documents. The area of PCC overlay placement will be determined from the longitudinal surface and the nominal pavement width, including widening sections.

C. Surface Preparation.

The quantity of Surface Preparation, in square yards (square meters), will be the quantity shown in the contract documents. The area of surface preparation will be determined from the longitudinal surface and the nominal width of existing pavement.

D. Hot Mix Asphalt Stress Relief Course.

The asphalt binder will be measured in accordance with Article 2303.05, B.

1. Measurement by Weight (Mass).

From all plants, the quantity of mixture measured for payment will be computed from the weights (mass) of individual loads. Loads may be weighed in trucks or in weigh hoppers, or the weights (mass) from batch plants charging trucks by batch may be computed by count of batches in each truck and batch amount. Article 2001.07 shall apply.

2. Measurement by Area.

The quantity of Hot Mix Asphalt Stress Relief Layer, in square yards (square meters), will be the quantity shown in the contract documents. The area of surface preparation will be determined from the longitudinal surface and the nominal width of existing pavement.

2310.05 BASIS OF PAYMENT.

For the performance of acceptable work, measured as provided above, the Contractor will be paid the contract unit price in accordance with the following provisions:

A. Portland Cement Concrete, Furnish Only.

The Contractor will be paid the contract unit price per cubic yards (cubic meters) for Portland Cement Concrete, Furnish Only, as measured above. This payment shall be full compensation for furnishing all raw materials, and for proportioning, mixing, and delivery of concrete to the paving machine.

B. Portland Cement Concrete Overlay, Placement Only.

The Contractor will be paid the contract unit price per square yard (square meter) for Portland Cement Concrete Overlay, Placement Only. This payment shall be full compensation for furnishing all materials, labor, and equipment necessary to place, finish, texture, and cure the concrete, including the placement of tie bars for widening, if required, and sawing, cleaning, and sealing the joints, if required.

C. Surface Preparation.

The Contractor will be paid the contract unit price per square yard (square meter) for Surface Preparation. This payment shall be full compensation for preparation of the existing pavement, sandblasting or shot blasting, and for removal of the existing pavement surface material in accordance with Article 1104.08.

D. Hot Mix Asphalt Stress Relief Course.

The Contractor will be paid for the asphalt binder in accordance with Article 2303.06, B.

1. Measurement by Weight (Mass).

The Contractor will be paid the contract unit price per ton (megagram) for Hot Mix Asphalt Stress Relief Course as measured above. This payment shall be full compensation for furnishing and placing the HMA stress relief course.

2. Measurement by Area.

The Contractor will be paid the contract unit price per square yard (square meter) for Hot Mix Asphalt Stress Relief Course constructed. This payment shall be full compensation for furnishing and placing the HMA stress relief course, including the cost of the asphalt binder.

Section 2316**2316.01, B, Exclusions.****Replace the first paragraph:**

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

2316.02, Measurement.**Replace the first paragraph:**

The Contractor shall provide and operate a California type profilograph to determine the pavement profile in accordance with Materials I.M. 341. Other types of profilographs or profilers that produce compatible results and meet the requirements of Materials I.M. 341 may be used.

Replace the second sentence of the fourth paragraph:

The profilogram shall include the **4516** feet (5 m) **at beyond** the ends of the section.

2316.02, B, Bridge Approach Sections.**Replace the entire article:**

Bridge approach sections shall be tested with the profilograph. Each lane of each approach **will shall** be an individual segment and **will shall** not be considered a part of a pavement segment, section, or project. Testing **will shall** be at the center of each traffic lane of travel.

2316.04, A, Pavement.**Replace the first paragraph:**

A profile index shall be calculated for each segment from the profilogram in accordance with Materials I.M. 341 except for:

1. Side road connections less than 600 feet (180 m) in length.
2. Single lift pavement overlays 2 inches (50 mm) or less in thickness unless the existing surface has been corrected by milling or scarification.
3. Storage lanes and turn lanes.
4. Pavement less than 8.5 feet (2.6 m) in width.
5. The 1516 feet (5 m) at the ends of the section when the Contractor is not responsible for the adjoining surface.
6. Runout tapers on HMS overlays at existing pavement, bridges, or bridge approach sections when the thickness is less than the design thickness.

Replace the first sentence of the third paragraph:

Bumps and dips shall be separately identified on all profilograms.

2316.04, B, Bridge Approach Sections.

Replace the entire article:

A profile index shall be calculated for each bridge approach section in accordance with Materials I.M. 341 except for plan lengths less than 50 feet (15 m) which will be checked for bumps and dips only.

2316.05, A, 2, Hot Mix Asphalt Pavements.

Replace "Article 2303.03, A, 2" with "Article 2303.03, B, 2" in the second paragraph.

2316.06, A, Bumps.

Replace the first paragraph:

For all pavements evaluated under Schedule A, all bumps exceeding 0.5 inch (13 mm) within a 25 foot (7.6 m) span, as indicated on the profilogram, shall be corrected **except as stated in Article 2316.06, C**. On all pavements evaluated under Schedule B the bumps shall be corrected except when otherwise allowed by the Engineer **and as stated in Article 2316.06, C**.

Replace the second sentence of the second paragraph:

For all bumps under Schedule B not corrected, the Contractor will be assessed a **penalty price adjustment** for each bump over 0.5 inch (13 mm) **except when located within 15 feet (5 m) of the end of the section or taper where the Contractor is not responsible for the adjoining pavement as stated in Article 2316.06, C**.

Replace "penalty" with "price adjustment" in the third paragraph.

2316.06, B, Dips.

Replace the second sentence of the first paragraph:

The Contractor will be assessed a **penalty price adjustment** for dips of 0.5 inch (13 mm) to 1.0 inch (25 mm) that are not corrected **except when located within 15 feet (5 m) of the end of the section or taper where the Contractor is not responsible for the adjoining pavement as stated in Article 2316.06, C**.

Replace "penalty" with "price adjustment" in the second paragraph.

2316.06, C, Exceptions.

Add new article:

When the Contractor is not responsible for the adjoining pavement, bumps and dips exceeding 0.5 inches (13 mm) located within 16 feet (5 m) either side of the end of a section will be evaluated by the Engineer. **The Contractor will not be price adjusted for bumps and dips in this area. When instructed by the Engineer to repair these bumps and dips, the Contractor will be paid in accordance with Article 1109.03, B.**

2316.07, C, Pavement Adjacent to Existing Pavement.**Replace** the third paragraph:

Areas not included in the profilograph shall be checked longitudinally with a 10 feet (3 m) straight edge and the surface shall not deviate from a straight line by more than 1/8 inch in 10 feet (3 mm in 3 m). If correction is necessary, it shall meet requirements of Article 2316.05.

2316.08, Schedule of Payment.**Replace** the fourth paragraph:

Surface correction (grinding) of bridge approach sections, and as stated in Article 2316.06, C, will not count as surface correction on adjacent pavement segments and will not detract from possible incentive payments on those segments.

Replace the sixth paragraph:

A \$900 price reduction adjustment shall be assessed for each dip not corrected in each pavement lane under Schedule A and B except as stated in Article 2316.06, C. In addition, a \$900 price reduction adjustment will be assessed for each bump not corrected under Schedule B except as stated in Article 2316.06, C. Bumps and dips not corrected will also be included in the evaluation for the segment smoothness.

Section 2317**2317.01, A, Exclusions.****Replace** the unnumbered paragraph:

All excluded areas will be checked for 1/2 inch (13 mm) bumps on the bridge, and for 1/2 inch (13mm) bumps and dips on the approach pavement, respectively.

2317.04, Profile Index.**Add** a fourth sentence:

These areas will be checked for 1/2 inch (13 mm) bumps on the bridge, and for 1/2 inch (13 mm) bumps and dips on the approach pavement, respectively.

2317.06, Smoothness.**Replace** the first paragraph:

Correction will be required for bumps exceeding 1/2 inch (13 mm) identified on the profilogram and for smoothness, if necessary. Correction will also be required, in lengths excluded from the profilograph index analysis areas. On all bridge decks, new bridge approaches, bridge deck overlays, and overlays of approaches, which are not excluded, a price adjustment of \$900 shall be assessed for each dip of 0.5 inch (13 mm) or greater in each traffic lane. Correction of dips 0.5 inch (13 mm) or greater will not be permitted unless approved by the Engineer and will be included in the evaluation for the segment smoothness. Bumps exceeding 1/2 inch (13 mm) shall be corrected to less than 3/10 inch (8 mm) on the bridge; and bumps and dips exceeding 1/2 inch (13 mm) shall be corrected to less than 3/10 inch (8 mm) on approach pavements.

Delete the third paragraph:

~~If the original surface does not meet this criteria, the surface shall be corrected to the values shown above.~~

Section 2318**2318.04, A, Preparation.****Replace** the title:**A. Surface Preparation.****Delete** the last sentence:

~~Removal of this vegetation and debris shall be in accordance to Article 1104.08.~~

2318.05, Limitation of Operations.

Add as new second paragraph:

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

2318.07, A, Basis of Payment.

Replace the last sentence:

This payment shall be full compensation for all labor, material (including mixing water), and equipment necessary for surface preparation, milling, mixing, spreading, placing, shaping, and compaction of the completed In-Place Recycled Asphalt Pavement.

Section 2319**2319.01, Description.**

Replace the second, third, and fourth paragraphs:

Slurry leveling work involves filling shallow depressions in the pavement at and adjacent to cracks with fine slurry mixtures. Application may be by hand lutes.

Slurry wedge work involves placing a fine or coarse slurry mixture in a narrow wedge-shaped strip to correct the differential elevation between the pavement edge and the shoulder as designated in the contract documents.

Strip slurry treatment work consists of longitudinal applications of fine or coarse slurry mixtures as designated in the contract documents. A spreader box shall be required to place the slurry mixture to pavement centerline, widening unit, pavement edge, wheel paths, and lanes, or at other locations and widths as designated by the contract documents or as directed by the Engineer.

2319.02, B, 3, Gradations.

Replace entire article:

3. Gradation.

The composite aggregate, excluding mineral filler, shall comply with the following gradation limits for the specified slurry mixture required:

a. Fine Slurry Mixture.

The aggregate shall meet the requirements for Gradation No. 22 of the Aggregate Gradation Table in Section 4109.

b. Coarse Slurry Mixture.

The aggregate shall meet the requirements for Gradation No. 23 of the Aggregate Gradation Table in Section 4109.

2319.09, A, General.

Add as new second paragraph:

All applications of Strip Slurry Treatment shall be applied parallel to the center line, edge line, or other reference, using a guide extending at least 3 feet (1 m) ahead of the application equipment.

2319.10, B, 1, Aggregate for Slurry Wedge.

Replace the first sentence:

The quantity of Slurry Wedge Aggregate, of the type specified, in tons (megagrams), measured to the nearest 0.1 ton (0.1 Mg), will be the quantity by weight (mass) of individual loads of aggregate used in accepted portions of the work.

2319.10, C, 1, Aggregate for Strip Slurry Treatment.

Replace the first sentence:

The quantity of Strip Slurry Treatment Aggregate, of the type specified, in tons (megagrams), measured to the nearest 0.1 ton (0.1 Mg), will be the quantity by weight (mass) of individual loads of aggregate used in accepted portions of the work.

2319.11, B, 1, Aggregate for Slurry Wedge.

Replace the first sentence:

The Contractor will be paid the contract unit price for Slurry Wedge Aggregate, of the type specified, per ton (megagram) of aggregate used measured as provided above.

2319.11, C, 1, Aggregate for Strip Slurry Treatment.

Replace the first sentence:

The Contractor will be paid the contract unit price for Strip Slurry Treatment Aggregate, of the type specified, per ton (megagram) of aggregate used measured as provided above.

Division 24. Structures.

Section 2403

2403.01, A, Class D Concrete.

Replace the entire article:

Bridge barrier rails shall be Class BR or Class D concrete.

2403.01, C, Class C Concrete.

Replace the entire article:

Refer to Article 2412.02 for concrete used for one course bridge floors and the first course of two course bridge floors. All other structural concrete, including concrete for bridge curbs, bridge medians, and bridge sidewalks, shall also be Class C concrete.

2403.03, C, Other Admixtures.

Add second and third paragraphs:

Approved retarding admixture complying with Section 4103 may be required by the contract documents or by the Engineer. The retarding admixture shall be used in amounts recommended by the manufacturer for conditions which prevail on the project and as approved by the Engineer. When used, it shall be introduced into the mixer after all other ingredients are in the mixer. Other procedures may be approved by the Engineer.

All retarding admixtures used shall be compatible with the air entraining agent used. Previous experience, satisfactory to the Engineer, will be required to indicate the approximate adjustments in proportions made necessary by the addition of the admixture and compatibility with other materials to be used. The retarding admixture shall be agitated prior to and during its use.

Delete "in proportions made" in the second sentence of the ~~third~~ **fifth** paragraph.

2403.03, D, Use of Fly Ash and GGBFS.

Replace the entire article:

The Contractor may use fly ash or GGBFS as a substitute for a portion of the Portland cement in structural concrete. The fly ash and GGBFS shall meet the requirements of Section 4108. For Interstate, **and Primary, and Secondary** projects, the maximum allowable substitution rates shall be ~~45%~~ **20%** for fly ash and 35% for GGBFS. ~~For all other projects, the maximum allowable substitution rate shall be 20% for fly ash, with a maximum total mineral admixture substitution rate of 50%. For all other projects, the maximum allowable fly ash substitution rate shall be 20% unless otherwise specified in the contract documents.~~

2403.11, Placing and Protection in Cold Weather.

Replace the first indented paragraph:

The concrete shall be maintained at a temperature of not less than 50°F (10°C) for the first 48 hours after placing. The temperature of the concrete shall then be gradually reduced at a rate not exceeding 25°F (15°C) in 24 hours. When heating and housing is used, temperature monitors shall be located in the concrete at the furthest and closest point from the heat source. The maximum temperature of the monitor point closest to the heat source shall not exceed 150°F (65°C).

2403.17, F, Falsework Plans.

Replace the first sentence:

The Contractor shall submit 6 copies of plans for falsework and centering on all concrete slab and cast-in-place concrete girder bridges to the Engineer for checking and review.

Add as the second sentence:

Submittal of forming details for bridge decks on concrete beam and steel beam bridges is not required unless specified in the contract documents.

2403.18, A, Forms Which May be Removed in Less than 5 Calendar Days.

Add as the second sentence:

Forms for concrete open railing shall not be removed in less than 24 hours after concrete placement.

Add as the last sentence:

When Maturity Method, in accordance with I.M. 383, for strength determination is used the above stated flexural strengths will be required, but the days of age will be dependent on the Maturity Curve for the concrete mix used.

2403.18, B, Forms Which Must Remain in Place 5 Calendar Days or Longer.

Add as the second sentence:

When Maturity Method, in accordance with I.M. 383, for strength determination is used the flexural strength of 550 psi (3.8 MPa) will be required, but the days of age will be dependent on the Maturity Curve for the concrete mix used.

2403.19, B, Loads Producing Flexural Stresses.

Add following the third paragraph:

Unless otherwise specified in the contract documents, at the Contractor's option, the time for subjecting to loads may be determined through the use of the maturity method as described in Materials I.M. 383. When the maturity method is used, the time for loading will be based on strength requirements only, as specified above. The Contractor shall furnish all labor, equipment, and materials necessary for the development of the maturity-strength relationship as described in Materials I.M. 383.

Determining that sufficient strength has been achieved for loading a part of a structure shall remain the responsibility of the Engineer when the maturity method is used. The Contractor's maturity testing may be used as the basis for this determination. The Contractor shall provide sufficient documentation of maturity testing before a part of a structure may be loaded or opened to traffic.

The following shall apply when the maturity method is used:

1. Should circumstances arise which are beyond the Contractor's or Engineer's control and strength cannot be determined by maturity method, the minimum age, minimum flexural strength, and fly ash restrictions shall apply. Flexural strength specimens shall be cured under conditions similar to those of the concrete in the structure.
2. Any changes of a material source or proportion in the concrete mixture shall require a new maturity curve.

Personnel performing maturity testing shall be Level I PCC certified technicians, with training for maturity testing. This certified technician may supervise other persons who may then perform the temperature testing of the constructed structure.

2403.23, Basis of Payment.

Replace the seventh paragraph:

When an admixture is required to be added by the contract documents or by the Engineer for the purpose of retarding the set, the cost of the retarding admixture shall be considered incidental to the contract unit price per cubic yard (cubic meter) of structural concrete.

Section 2404

2404.06, Placing and Fastening.

Add as the fourth sentence of the first paragraph:

Welding of reinforcing steel will not be permitted unless specified in the contract documents or approved by the Engineer.

Add a new third sentence to the last paragraph:

Cutting of reinforcing steel in the field shall be by mechanical methods and not by flame cutting.

2404.07, Reinforcing Supports.

Replace the title and entire article:

2404.07 Reinforcing Supports and Spacers.

All horizontal reinforcement shall be supported using support devices or tied to vertical reinforcing steel. All vertical reinforcement shall be positioned using side-form spacers. Support devices and side-form spacers, either plastic or steel, shall meet the requirements of Materials I.M. 451.01. Epoxy coated reinforcing steel shall be held in place with epoxy or plastic coated bar supports, and epoxy or plastic coated tie wires. Concrete block inserts, bricks, stones, wood blocks, wood stakes, and similar materials shall not be used for supporting reinforcement if the manner of their use is such that these materials are likely to become embedded in the concrete.

Support devices shall be spaced in accordance with the manufacturer's recommendations or as recommended by the current Concrete Reinforcing Steel Institute's Manual of Standard Practice. The support system spacing shall not exceed 4 feet (1.2 m) in each direction for bolsters or continuous high chairs and 3 feet (0.9 m) in each direction for individual bar chairs. The base of all chairs and support bolsters shall rest on the supporting false work. Supporting chairs shall have either upturned legs or a horizontal bar spot welded at the base of the leg. If necessary to prevent spreading of upturned legs, the legs shall be cross-tied at their bases or nailed to the forms. For situations where two or more separate mats of reinforcing steel are required, each mat shall be independently supported by an approved support system.

Side-form spacers shall be placed at intervals sufficient to ensure that all reinforcing is at the required clearance.

Section 2405

2405.09, Setting Anchor Bolts for Bridge Bearings.

Replace the title and first paragraph:

Anchor Bolts for Bridge Bearing

Unless otherwise specified in the contract documents, anchor bolts to be embedded in the concrete substructures shall be set in drilled holes. Anchor bolts shall be set prior to the time the concrete is placed, when specified in the contract documents. Anchor bolts shall meet the requirements of ASTM F 1554, Grade 36, and be full-length galvanized. Anchor bolts shall be the Unified Coarse Thread Series and have Class 2A tolerance. The end of each anchor bolt intended to project from the concrete shall be color coded in blue to identify the grade. Washers shall be galvanized and shall meet the requirements of ASTM F 436. Nuts shall

meet the requirements of ASTM A 563, DH, be heavy hex, and be galvanized. Nuts may be over-tapped in accordance with the allowance requirements of ASTM A 563. Galvanizing shall meet the requirements of ASTM A 153, Class C; or ASTM B 695, Class 50.

Section 2407

2407.02, A, Aggregates.

Add a second paragraph:

The coarse aggregate shall be either durability class 3 or 3i as described in Article 4115.04.

2407.02, H, Cement.

Add as the first sentence:

Section 4101 shall apply.

2407.02, I, Fly Ash.

Replace the entire article:

I. Mineral Admixtures.

Section 4108 shall apply.

Fly ash may be substituted for Portland cement. The substitution rate shall not be more than 15% by weight (mass).

GGBFS may be substituted for Portland cement. The substitution rate for GGBFS as a mineral admixture shall not exceed 35% by weight (mass).

2407.03, Concrete.

Replace the first sentence of the second paragraph:

If the units are to form curbs or floors of structures, air entrainment shall be required and be accomplished by addition of an approved air-entraining admixture.

2407.04, C, Stressing Equipment.

Replace the entire article:

Equipment used to tension tendons shall be of a type such that the prestressing force may be accurately known. Load cells, dynamometers, and hydraulic gages of hydraulic pump and jacking systems shall be capable of measuring the force applied to the tendons within 2% of the actual force. This equipment shall be calibrated at least once every 12 months or anytime the tensioning system indicates erratic results. Hydraulic gages, pumps, hoses, and connections shall be calibrated as a system.

All tensioning equipment calibrations shall be performed using load cells calibrated by a testing laboratory or calibration service. Equipment used for calibration purposes shall have current calibration references. The Engineer shall be allowed opportunity to witness calibration of equipment during the Engineer's normal working hours or at a mutually agreeable time.

2407.08, Post Tensioned Prestressed Concrete.

Replace the numbering:

2407.0811, Post Tensioned Prestressed Concrete.

2407.06, Prestressing Steel Stresses and 2407.07, Pretensioned Prestressed Concrete.

Replace all of both articles:

2407.06 PRESTRESSING STEEL STRESSES.

The number, size, and position of individual tendons (7-wire strand) and the prestressing force shall be as shown in the contract documents.

If anchored at other than 70°F (20°C), the initial prestressing force shall be adjusted as follows:

<u>Temperature of Tendons</u>	<u>Initial Prestressing Force</u>
70°F (20°C)	As shown in the contract documents
Below 70°F (20°C)	Increase 1.0% per 10°F (5°C)
Above 70°F (20°C)	Decrease 1.0% per 10°F (5°C)

After the tendons have been positioned, an initial force between 1,000 and 4,500 pounds (4.5 kN and 20 kN) shall be applied to each tendon. The initial force shall be measured within a tolerance of ± 100 pounds (0.5 kN) for initial forces under 3,000 pounds (13 kN) and a tolerance of ± 200 pounds (1 kN) for initial forces of 3,000 pounds (13 kN) or more.

The theoretical elongation of the tendons is calculated from material properties furnished by the manufacturer and allowable losses. Allowable losses may include seating losses, bed shortening, abutment movement, and temperature adjustments.

The pretensioning shall be measured by the net elongation of the tendons. The calculated theoretical net elongation shall be considered the target. A tolerance of $\pm 1/2$ inch (13 mm) from the calculated net elongation, after seating, may be allowed.

The tensioning procedure shall be conducted so the indicated stress, measured by the tensioning system, is within 5% of the calculated stress, based upon the corresponding elongation. The distribution of the stress shall be within 5% of the calculated stress at all points along the tendon or when measured at the end of the bed.

Temporary overstressing of the tendons is allowed, but shall at no time exceed 80% of the specified tensile strength of the tendons. Tendons shall not be seated in this overstress condition.

Tendons shall be tensioned between fixed end anchorages by means of jacks either separately or in a group. Several units may be cast in one continuous line in which case they shall be tensioned simultaneously.

Deflected tendons may be tensioned in place. Alternatively, deflected tendons may be partially tensioned and then raised to the predetermined final position at the beam ends, achieving the required prestressing force. Tendons may be raised simultaneously to the predetermined final position or at any one point, in a single lift, provided the sequence of lifting commences at the point nearest the center of the bed and then progresses alternately at points equidistant from the center to the ends.

Tendons shall be supported at each deflection point on a freely rotating metal pulley not less than 3/4 inch (19 mm) in diameter.

The number of broken strand wires shall not exceed 2% of the total number of strand wires nor one broken wire of any one strand.

2407.08 PRESTRESS TRANSFER.

When accelerated heat curing is used, prestress transfer shall be performed immediately after the curing period is completed and while the concrete is warm and moist.

Deflected tendons, if any, are to be released first, either by lowering holdup devices at beam ends as nearly simultaneously as practical, or if this is not feasible, deflected tendons shall be flame cut in each beam interval in rotation until all deflected tendons are released. The procedure for flame cutting deflected tendons shall be subject to approval by the Engineer.

The hold down devices shall then be released from the bed and the straight line tendons released simultaneously and gradually with the jack. If this is not feasible, heating of the individual tendons shall be employed as follows:

Heating of each individual tendon shall be done simultaneously on the tendon at a minimum of two locations along the casting bed. Heating shall be done along the tendon over a minimum 5 inch (125 mm) distance. The application of heat shall be controlled so that failure of the first wire in the tendon does not occur for at least five seconds after heat is applied, followed by a gradual elongation and failure of the remaining wires. The tendon shall also be heated until failure occurs at each beam interval before proceeding to the next tendon. The sequence of prestress transfer between individual tendons shall be such that there is minimum eccentricity of prestress load. Alternate procedures for releasing deflected or straight-line tendons may be submitted for the Engineer's approval.

The camber due to prestress shall be measured while the beam is on the bed by checking the beam profile within three hours after prestress transfer.

2407.09, Proportioning, Mixing, and Placing Concrete.

Change the article number 2407.0907.

2407.0907, Proportioning, Mixing, and Placing Concrete.

Replace in the first sentence of the second paragraph of the new Article 2407.07:
Concrete shall not be placed when the ambient temperature is below 35°F (2°C) unless the plant has been approved by the Engineer for cold weather concrete placement.

Delete the last sentence of the third paragraph of the new Article 2407.07:
~~All surfaces which will be exposed in the finished structure shall be finished as provided in Article 2403.21, Paragraph B.~~

2407.10, Curing.

Change the article number 2407.4009.

2407.4009, Curing.

Replace "artificial" with "accelerated" the first sentence of the third paragraph of **Article** 2407.4009, Curing.

Replace the first sentence of the fourth paragraph of 2407.09, Curing:
In all cases, the concrete shall be covered and remain covered until curing is completed.

2407.11, Removal of Forms.

Change the article number 2407.4410.

2407.12, B, Precast Prestressed Units.

Replace the 7th item:
Sweep (deviations from straight line parallel to center line of member): L/80 (L in feet, sweep is in inches (L in meters, sweep is in millimeters))

Add as the 14th item in the list:
Deviation from net theoretical
elongation after final seating: ± 1/2 inch (13 mm)

Replace the 25th item in the list:
Elongation (standard gauge length to be a minimum of 20 feet (6 m)):

2407.14, Finish.**Replace** the entire article:

All surfaces, which will be exposed in the finished structure, shall be finished as provided in Article 2403.21, B, and be free of honeycomb or surface defects. Structural Repair procedures shall be submitted to the Engineer for approval.

The outer surface of exterior beams shall be finished as follows:

As soon as practicable after removal of the forms, all fins and other surface projections shall be removed, and a prepared grout shall be brushed or sprayed onto the prewetted surface.

The grout shall consist of one part of silica sand and one part of Portland cement blended with acrylic bonding agent and water to produce a consistency sufficient to fill the cavities. The Engineer may require white Portland cement to be used in amounts necessary to obtain a uniform finish.

Immediately after application of the grout, the surface shall receive a float finish with a cork or other suitable float. This operation shall completely fill all holes and depressions on the surface. When the grout is of such plasticity that it will not be pulled from holes or depressions, a float of sponge rubber shall be used to remove excess grout. When the surface is thoroughly dry, it shall be rubbed vigorously with dry burlap to completely remove excess dried grout. The surface finish shall be cured in a manner satisfactory to the Engineer, and heat curing may be required in cold weather. When finished, the surface shall be free from stain and have a uniform color.

Tendon projections shall be cut and bent as detailed in the contract documents. Where the tendon end will be exposed in the completed structure, it shall be cut off reasonably flush with the concrete. The end of each cut off tendon shall be cleaned to a bright appearance.

Beam ends exposed in the completed structure shall be coated and sealed with an approved gray or clear epoxy listed in Materials I.M. 491.12, Appendix A. The epoxy coating and sealing of beam ends shall be as indicated on the plans and shall be applied at the fabricating plant.

Section 2408**2408.01, Description.****Replace** the second sentence:

Unless modified elsewhere in the contract documents, all fabrication to which this section applies shall be done in the states, territories, and possessions of the United States and in other locations within the geographic limits of North America and only in steel fabrication shops and plants that are approved as per Materials I.M. 557 prior to the letting.

2408.09, Bars and Plates.

Delete "to hold paint" from the second sentence of the second paragraph.

2408.13, Section 1, 1.3, Welding Processes.**Add** as new paragraph 1.3.1.2:

1.3.1.2 The WPS shall be initialed by the welder and posted at the welder's workstation at all times during welding operations.

2408.13, Section 5, Part B, 5.21.**Delete** the last sentence of Paragraph 5.21.2:

~~The WPS shall be posted at the welder's work station at all times during welding operations.~~

2408.13, Section 5, Part B, 5.21.4.**Replace** the first sentence:

Shop welder's, welding operator's, or tack welders qualification herein specified shall be considered as remaining in effect from the end of the month in which the tests were taken, for a period of 1 year.

Delete the third sentence:

~~In all cases, requalification will be required every 5 years.~~

2408.14, Annealing Normalizing, and Stress Relieving.**Replace** the title:

Stress Relief Heat Treatment

Replace the first paragraph:

Structural members which are in the contract documents to be stress relieved, shall have finished machining, boring, and straightening done subsequent to heat treatment. Stress relief heat treatment shall be done in accordance with AWS D1.5 Section 4.4.

Replace the last paragraph:

All members, such as bridge shoes, pedestals, rockers, or other parts, which are built up by welding sections of plate together, shall be stress relieved, unless otherwise stated in the contract documents.

2408.16, Camber of Rolled Beam and Plate Girder Spans.**Delete** the 8th paragraph:

~~Camber of main members of continuous or simple span bridges with lines composed of rolled beams, beams and girders, or girders, shall be fabricated so that when the members are assembled in laydown with bearing points accurately positioned as shown on the erection diagram, points on any member shall not vary in the offset position from that indicated in the erection diagram by more than $\pm 1/2$ inch (13 mm).~~

Delete the last paragraph:

~~The erection diagram on the shop drawings shall show camber offsets at bearing points and splice points, and at midpoints of individually cambered beams or girders.~~

2408.17, Bolt Holes.**Replace** the last sentence of the first paragraph:

Holes in other than a main stress carrying member in metal not thicker than 3/4 inch (19 mm) for carbon steel and 5/8 inch (16 mm) for alloy steel shall be punched or drilled full size.

Add a second and third paragraph:

When reaming is required all holes shall be subpunched or subdrilled. Subdrilling will be required if thickness limitations govern. The subpunching or subdrilling shall be 3/16 inch (5 mm) smaller and, after assembling, reamed 1/16 inch (2 mm) larger or drilled full size to 1/16 (2 mm) larger than the nominal diameter of the bolts.

All steel templates shall have hardened steel bushings in holes accurately dimensioned from the centerline of the connections as inscribed on the template. The centerline shall be used in accurately locating the template from the milled or scribed ends of the members.

2408.17, A, Punched Holes.**Replace** the entire article:

The diameter of the die shall not exceed the diameter of the punch by more than 1/16 inch (2 mm). If any holes must be enlarged to admit the bolts, such holes shall be reamed. Holes must be clean cut without torn or ragged edges. The slightly conical hole that naturally results from punching operations is considered acceptable with the approval of the Engineer.

2408.17, B, Reamed or Drilled Holes.

Replace the title and entire article:

B. Reamed or Drilled Holes.

Reamed or drilled holes shall be cylindrical and perpendicular to the member. Where practical, reamers shall be directed by mechanical means. Reaming and drilling shall be done with twist drills, twist reamers, or rotobroach cutters. Connecting parts requiring reamed or drilled holes shall be assembled and securely held while being reamed or drilled and shall be match marked before disassembling.

2408.17, C, Drilled Holes.

Replace the title and the entire article:

C. Accuracy of Holes.

Holes not more than 1/32 inch (1 mm) larger in diameter than the true decimal equivalent of the nominal diameter that may result from a drill or reamer of the nominal diameter are considered acceptable. The width of slotted holes, which are produced by flame cutting or a combination of drilling or punching and flame cutting, shall generally be not more than 1/32 inch (1 mm) greater than the nominal width. The flame cut surface shall be ground smooth.

2408.17, D and E

Re-letter article 2408.17, ~~DF~~ and 2408 17, ~~EG~~.

2408.17, D, Accuracy Before Reaming.

Add new title and article:

D. Accuracy Before Reaming.

All holes subpunched or subdrilled shall be so accurate that after assembling (before any reaming is done) a cylindrical pin 1/8 inch (3 mm) smaller in diameter than the nominal size of the hole may be entered perpendicular to the face of the member, without drifting, in at least 75% of the contiguous holes in the same plane. If the requirement is not fulfilled, the badly subpunched/subdrilled pieces will be rejected. If any hole does not allow a pin 3/16 inch (5 mm) smaller in diameter than the nominal size of the subpunched/subdrilled hole to pass, it will be cause for rejection.

2408.17, E, Accuracy After Reaming.

Add new title and article:

E. Accuracy After Reaming or Drilling.

When holes are reamed or drilled, 85% of the holes in any contiguous group shall, after reaming or drilling, show no offset greater than 1/32 inch (1 mm) between adjacent thicknesses of metal.

2408.19, Shop Assembly.

Replace the first sentence of the last paragraph:

Members to be welded shall be brought into correct alignment and held in position by bolts, clamps, wedges, guylines, struts, tack welds, or other suitable devices, until welding has been completed.

2408.30, A, Surface Preparation.

Replace the first and second sentences of the first paragraph:

All steel surfaces to be painted shall be given a near white metal blast cleaning in accordance with SSPC-SP10. Bearing assemblies shall be cleaned of any surface contamination using suitable solvents in accordance with SSPC-SP1 and then given a near white metal blast cleaning in accordance with SSPC-SP10.

2408.30, A, 1, Non-weathering Structural Steel Applications.

Replace the last sentence:

All surfaces to be top coated shall be clean in accordance with the specification requirements and dry.

2408.30, A, 2, Weathering Structural Steel Applications.

Replace the second paragraph:

To ensure uniform weathering, all unpainted areas of outside surfaces of the fascia girders shall receive, after blasting, at least three uniform applications of water mist at 24 hour interval between applications. Each application shall be applied on dry surfaces. The water mist application shall be performed within 48 hours after the painted surfaces have been properly cured. All water mist application shall be witnessed by a representative of the Contracting Authority.

2408.30, B, 1, b, Prime Coat.

Replace the 5th sentence:

Steel members with coating areas measuring less than 3 mils (75µm) that have not been corrected within 24 hours shall be completely reblasted and repainted.

2408.30, B, 1, c, Top Coat.

Replace the first sentence of the first paragraph:

When designated by the contract documents, a top coat of waterborne acrylic paint shall be shop applied to all primed surfaces. The galvanized fasteners shall be painted in accordance with Article 2408.30, B, 1, d after bolting.

Add as the fourth sentence of the first paragraph:

To avoid moisture condensation, top coat shall be kept under a roof, protected from dirt, dust, and moisture, in an area where the temperature is maintained above 40°F (5°C) for a minimum of 24 hours after painting is completed.

2408.30, B, 1, e, Cleaning of Paint System.

Replace the title:

e. Cleaning of Paint Surfaces.

2408.30, B, 2, Weathering Structural Steel Applications.

Replace "30045" with 20045" in the sixth sentence of the first paragraph.

Replace the seventh sentence of the first paragraph:

The top coat shall cover all the primed surfaces except faying surfaces of bolted joints with a uniform film of paint.

2408.30, B, 2, d, Weathering Structural Steel Applications.

Replace the entire article:

d. Exterior surfaces of all galvanized components which are indicated in the plans to be painted and all galvanized floor drains shall be prepared according to the written recommendations of the paint manufacturer and painted with the same type of waterborne acrylic paint used for top coat as noted in this specification.

Section 2409**2409.11, Bracing.**

Replace the first sentence:

The ends of bracing shall be bolted through the pile, post, or cap with bolts not less than 5/8 inch (16 mm) in diameter.

Section 2412

2412.02, Materials.

Replace the first sentence of the second paragraph:

Concrete used shall meet the requirements for C-4WR, C-L4WR, and C-V47B concrete mixtures, as specified in Materials I.M. 529.

Replace the fifth and sixth sentence of the second paragraph:

The fly ash and GGBFS shall meet the requirements of Section 4108. For Interstate, Primary, and Secondary projects, the maximum allowable substitution rates shall be 15% for fly ash and 35% for GGBFS. ~~For all other projects, the maximum allowable substitution rate shall be 20% for fly ash,~~ with a maximum total mineral admixture substitution rate of 50%.

Replace the third paragraphs:

Retarding admixture may be required by the contract documents or by the Engineer. A water reducing/retarding admixture meeting the requirements of Materials I.M. 403, Appendix B, shall be used in accordance with Section 2403. When placements require extended working times, the dosage rate shall be increased for the appropriate working time and temperature. For placements requiring normal working times, the dosage rate shall be in accordance with Section 4103. Other admixtures may be approved by the Engineer.

2412.03, Swinging The Span and Support of Forms.

Add as the new third paragraph:

Welding on structural steel in the field will not be permitted, unless specified in the contract documents or approved by the Engineer.

2412.04, Placing Reinforcement.

Add as new second sentence of the first paragraph:

Welding of reinforcing steel will not be permitted unless specified in the contract documents or approved by the Engineer.

2412.06, Surface Finish.

Add as new fifth paragraph:

When the surface being placed is the final surface of a bridge sidewalk, the surface of sidewalk shall be given a transverse coarse broom texture.

2412.07, Curing.

Replace the second sentence of the first indented paragraph:

The first layer of prewetted burlap shall be placed on the floor within 15 minutes after final finishing (texturing) and covering of concrete with white pigmented curing compound. The Engineer may adjust the time for placement of the first layer of prewetted burlap to minimize burlap damage to the transverse grooving.

2412.11, Method of Measurement and Basis of Payment.

Replace the first sentence of the first paragraph:

Structural concrete, reinforcement, and structural steel will be measured and paid for in accordance with Sections 2403, 2404, and 2408, respectively.

Section 2413

2413.09, Sealing.

Replace the first sentence of the first paragraph:

The tops and traffic sides of curbs, retrofit barrier rails, and concrete barrier rails shall be sealed in accordance with Article 2403.21, D.

2413.12, Basis of Payment.

Replace the first sentence of the fourth indented paragraph:

When there is no item for Class B Bridge Floor Repair, but such work is required, payment for each square yard for 5 square yards (square meter for 4 m²) or less will be at three times the contract unit price per square yard (square meter) for Class A Bridge Floor Repair.

Section 2414**2414.07, A, Concrete Railings.**

Add as the last paragraph:

When the contract documents include an item for Electrical Circuits, measurement will be in accordance with Article 2523.22, B. When electrical conduit and junction boxes are installed as part of Article 2525, measurement will be in accordance with Article 2525.10. Otherwise, electrical conduit and junction boxes will not be measured.

2414.08, A, Concrete Railings.

Add as the third paragraph:

When the contract documents include an item for Electrical Circuits, payment will be in accordance with Article 2523.23, B. When electrical conduit and junction boxes are installed as part of Article 2525, payment will be in accordance with Article 2525.10. Otherwise, electrical conduit and junction boxes will be incidental to the concrete railing.

Section 2415**2415.01, Description.**

Replace "ASTM C 850" and "ASTM C 789" with "ASTM C 1433" in the second paragraph.

Replace the sixth sentence of the second paragraph:

Concrete strength ~~tests may will~~ be based on cylinders ~~tests~~.

Section 2416**2416.054, E, Joints for Concrete Pipe.**

Replace "Type C-1" with "Type C" in the first sentence of the third paragraph.

2416.05, Method of Measurement.

Replace the entire article:

The quantity of pipe culvert in feet (meters), will be the quantity shown in the contract documents for each culvert to the nearest foot (0.1 m) with no deductions for elbows, tees, and other fittings, but not including aprons. The quantity of pipe will be determined along the axis. Pipe laterals terminating at a tee will be from the point of inlet to a point 6 inches (150 mm) from the outside of the main, less the length of the apron, if any.

The quantity of aprons will be the quantity shown in the contract documents.

The quantity of appurtenances (elbows, tees, and other fittings) will be shown on the contract documents but will not be measured for payment.

Type C adaptors required by the contract documents or installed to correct faulty work will not be measured for payment. Type C adaptors not shown in the contract documents, but required because of changes in alignment, shall be paid for in accordance with Article 1109.03, B.

Excavation for roadway culverts will be measured for payment as provided in Article 2402.12, B. Excavation for entrance culverts will not be measured for payment. Sand required for Class B bedding will not be measured for payment.

When granular backfill is required and furnished, Article 2402.12, D, shall apply.

When foundation treatment material has been placed at the direction of the Engineer, Article 2402.12, E, shall apply.

2416.06, Basis of Payment.

Replace the entire article:

The Contractor will be paid the contract unit price for pipe culvert of type and size specified per linear foot (meter). The cost of wrapping pipe joints, Type C adapters, and appurtenances shall be included in the contract unit price per linear foot (meter) for the pipe culvert.

The Contractor will be paid the contract unit price for aprons of the size specified per unit.

For the quantity of excavation for roadway culverts and the quantity of extra excavation for embankments, the Contractor will be paid the contract unit price per cubic yard (cubic meter). For entrance culverts, excavation shall be considered as incidental to the contract unit price for rigid pipe culvert. Sand required for Class B bedding shall be incidental to the contract unit price for pipe culvert.

When Granular backfill is required and furnished, it will be paid for in accordance with Article 2402.13, F.

Foundation treatment material furnished and placed will be paid for in accordance with Article 2402.13, E.

Section 2417

2417.06, Method of Measurement.

Replace the entire article:

The quantity of corrugated pipe culvert, in feet (meters), will be the quantity shown in the contract documents, for each culvert to the nearest foot (0.1 m), but not including apron. The quantity of pipe will be determined along the axis. Pipe laterals terminating at a tee will be measured from the point of inlet to a point 6 inches (150 mm) from the outside of the main, less the length of the apron, if any.

The quantity of aprons will be the quantity shown in the contract documents.

The quantity of appurtenances (elbows, tees, and other fittings) will be shown on the contract documents but will not be measured for payment.

Excavation for roadway culverts will be measured in accordance with Article 2402.12, B. Excavation for entrance culverts will not be measured for payment.

When granular backfill is required and furnished, measurement will be in accordance with Article 2402.12, D.

When foundation treatment material has been placed at the written direction of the Engineer, measurement will be in accordance with Article 2402.12, E.

2417.07, Basis of Payment.

Replace the entire article:

The Contractor will be paid the contract unit price for corrugated pipe culvert of the type and size specified per linear foot (meter). Appurtenances shall be included in the contract unit price per linear foot (meter) for the corrugated pipe culvert.

The Contractor will be paid the contract unit price for aprons of the size specified per unit.

For the quantity of excavation for roadway culverts and the quantity of extra excavation for embankments, the Contractor will be paid the contract unit price per cubic yard (cubic meter).

For entrance culverts, excavation shall be considered as incidental to the contract unit price for corrugated pipe culverts.

When Granular backfill is required and furnished, it will be paid for in accordance with Article 2402.13, F.

Foundation treatment material furnished and placed will be paid for in accordance with Article 2402.13, E.

Section 2418

2418.06, Method of Measurement.

Replace the first paragraph:

The quantity of jacked pipe culvert, in feet (meters), will be the quantity shown on the contract documents, for each jacked pipe culvert to the nearest foot (0.1 m), but not including aprons. The quantity of jacked pipe culvert will be determined along the axis.

2418.07, Basis of Payment.

Replace the entire article:

The Contractor will be paid the contract unit price for jacked pipe culvert of the type and size specified per linear foot (meter). This payment shall be full compensation for materials, labor, and equipment necessary to complete the work. Culverts that consist of both jacked pipe culvert and conventionally placed pipe culvert will include separate bid items for each portion.

Section 2420

2420.12, Method of Measurement.

Replace the first paragraph:

The quantity of structural pipe culvert, in feet (meters), will be the quantity shown in the contract documents for each culvert to the nearest foot (0.1 m). The quantity of pipe will be determined as follows:

2420.13, Basis of Payment.

Replace the entire article:

The Contractor will be paid the contract unit price for structural pipe culvert of the type and size specified per linear foot (meter). This payment shall be full compensation for furnishing all materials, labor, and equipment necessary to complete the work.

Excavation for structures, structural concrete, and reinforcement will be paid for separately.

Section 2422

2422.02, Materials for Unclassified Pipe Culvert.

Add as the last table in this article:

UNCLASSIFIED ROADWAY LETDOWN PIPE CULVERT	
Coated Corrugated Iron or Steel	Section 2417
Polyethylene Pipe	Section 2417

2422.04, Method of Measurement.

Replace the first paragraph:

Unclassified pipe culverts will be measured as provided in Articles 2416.05 and 2417.06.

2422.05, Basis of Payment.

Replace the entire article:

Payment for unclassified pipe culverts will be as provided in Articles 2416.06 or 2417.07.

Division 25. Miscellaneous Construction.**Section 2501****2501.05, Steel H-Piles.**

Add as new second paragraph:

The number of permitted welds used to develop plan specified lengths of steel H-piles shall be limited to the following:

Plan Pile Length Feet (m)	Number of Permitted Welds (splices)
0 – 50 (0-15.0)	0
51-100 (15.1-30)	1
101-150 (30.1-45.0)	2

Welds (splices) in excess of the number specified above will not be permitted unless required for a pile extension. When steel H-piles are to be spliced, the shortest pile length shall be the last added length.

2501.13, A, Wave Equation Analysis.

Replace the entire article:

Wave equation analysis will be used on all Interstate and Primary projects, on other projects when specified in the contract documents, or as directed by the Engineer. Piles shall be driven with approved driving equipment to full penetration. Retaps or pile extensions may be necessary to obtain the required pile bearing capacity including potential adjustments for scour or downdrag conditions. Driving shall not continue beyond a depth at which acceptable pile stress is exceeded. Driving may be stopped when the rate of driving exceeds 160 blows per foot (0.3 m) with approval from the Engineer.

2501.13, B, 2

Replace the entire article:

Driving may be stopped when the rate of driving exceeds 160 blows per foot (0.3 m) with approval from the Engineer.

Section 2502**2502.03, Placing Standard Subdrains.**

Add new ninth paragraph:

All subdrain outlets shall be marked with a steel post. The post shall meet the requirements of Article 4154.09. The Contractor shall drive the post 3 feet (1 m) into the ground and install a 4 foot (1.1 m) plastic sleeve over the post. When sleeves are furnished by the Contracting Authority, the Contractor shall install them. Only one post will be required to mark the location of a double outlet.

2502.05, Placing Longitudinal Subdrains.

Replace the last paragraph:

All subdrains outlets shall be covered with a rodent guard described in Article 4143.01, B. The outlet of a All subdrains outlets, except for medians, shall be marked with an orange metal fence steel post meeting the requirements of Article 4154.09. The Contractor shall drive the post 3 feet (1 m) into the ground and install a 4 foot (1.1 m) plastic sleeve over the post. When sleeves are furnished by the Contracting Authority, the Contractor shall install them. Only one metal fence post shall will be required to mark the location of a double outlet.

2502.08, C, Subdrain Outlet.**Replace the entire article:**

For each subdrain outlet installed, the Contractor will be paid the contract unit price. This payment shall be full compensation for furnishing and installing corrugated ~~culverts at outlets metal pipe, double walled PE, or PVC pipe~~; including the outlet coverings, grouted joints and special connections, drilling or forming into an existing drainage facility, and associated excavation, backfill with specified material, ~~furnishing and installing steel post and concrete patio block, installing plastic sleeve~~, and restoration of the site.

Section 2503**2503.02, Materials.**

Replace "Article 4149.02" with "Article 4149.03" in the second paragraph.

2503.03, B, Laying and Placing Pipe.

Replace "Type C-1 connections" with "Type C adapters" in the second sentence of the second paragraph.

2503.04, Method of Measurement.

Replace the first paragraph with a new first, second, and third paragraphs:

The quantity of storm sewer pipe, in feet (meters), will be the quantity shown in the contract documents, for each storm sewer to the nearest foot (0.1 m). Such lengths shall exclude the space across catch basins, intakes, and utility access where pipe is not actually placed.

Type C adapters required by the contract documents or installed to correct faulty work will not be measured for payment. Type C adapters not shown in the contract documents, but required because of change in alignment, shall be paid for in accordance with Article 1109.03, B.

The quantity of aprons will be the quantity shown in the contract documents.

2503.05, Basis of Payment.

Replace the first paragraph:

The Contractor will be paid the contract unit price for storm sewer pipe of the type and size specified as follows:

Replace "as extra work" with "in accordance with Article 1109.03, B" in the last paragraph.

2503.05, A

Replace the last sentence of the first indented paragraph:

For depths of excavation more than 1 foot (0.3 m) below the specified bedding elevation, shown in the contract documents, payment for overdepth excavation will be made in accordance with the following schedule:

2503.05, E

Replace the entire article:

E. Type C adapters shown in the contract documents or installed to correct faulty quality of work will be included in the cost per foot (meter) of pipe. Type C adapters required because of change in alignment will be paid for in accordance with Article 1109.03, B.

The Contractor will be paid the contract unit price for aprons of the type and size specified per unit.

2503.05, F

Replace "as extra work as provided in" with "in accordance with" in the second sentence.

Section 2504

2504.05, Method of Measurement.

Replace the first sentence of first paragraph:

The quantity of sanitary sewer pipe, in feet (meters), to the nearest foot (0.1 m), of each size of sanitary sewer placed will be the quantity shown in the contract documents. The number of utility accesses and lamp holes will be the quantity shown in the contract documents.

Add as new second paragraph:

Aprons and appurtenances of the type specified will be measured in accordance with Articles 2416.05 or 2417.05.

2504.06, Basis of Payment.

Replace the first paragraph:

When the contract documents indicate the depth of sanitary sewer excavation and the pipes have been laid substantially to the elevation of the flow line indicated, the Contractor will be paid the contract unit price per linear foot (meter) of sanitary sewer complete and the contract unit price for each lamp hole and utility access complete. The Contractor will be paid the contract unit price for sanitary sewer pipe of the type and size specified per linear foot (meter).

Add as new second paragraph:

Aprons and appurtenances of the type specified will be paid in accordance with Articles 2416.06 or 2417.06.

Replace "as extra work as provided in" with "in accordance with" in the first sentence of the third paragraph.

Replace the fourth paragraph:

This payment shall be full compensation for furnishing all material, labor, and equipment necessary to complete the work including excavation, backfilling, constructing utility accesses and lamp holes, special shaping through utility accesses and lamp holes, and removal of excess material from the project. It shall include furnishing sections of pipe for inlet and outlet lines through walls of utility accesses and lamp holes.

Section 2505

2505.05, Limitations.

Replace the fifth paragraph:

On a roadway that is open to traffic during guardrail construction, each guardrail installation exceeding the 5 working day completion requirement will be subject to a ~~penalty of~~ \$100 per working day contract price adjustment.

Section 2506

2506.06, Placement of Mortar as Culvert Backfill.

Replace "Section 4133" with "Article 2506.02, G," in the first sentence of the third paragraph.

Section 2507

2507.02, B, 2, Fly Ash.

Replace the second sentence:

Fly ash may be substituted for cement for up to 25% by weight (mass) of cement.

2507.02, C, Filter Blanket.

Add title and article:

C. Filter Blanket.

Article 2107.11 shall apply.

Section 2508**2508.01, B, 3, b, Preconstruction Sampling and Testing.**

Replace the second sentence of the first paragraph:

An accredited laboratory shall test waste material.

Add a new third sentence:

Laboratories accredited by the American Industrial Hygiene Association or National Environmental Laboratory Accreditation Program, or any EPA certified laboratory may perform the paint waste testing.

Delete the fifth paragraph:

~~Acceptable testing laboratories are listed in Materials I.M. 482.07 or any EPA approved participating Federal Contract testing laboratory. If the Contractor chooses to use a laboratory not listed, the Contractor shall include the full contact information for that laboratory in the Site Work Plan described below.~~

2508.01, B, 7, f, Prior to Painting.

Replace "Article 2508.01, B, 6, e" with "2508.02, E, 4" in the first paragraph.

Replace "Article 2508.01, B, 6, e" with "2508.02, B, 2" in the second paragraph.

Replace "Article 2508.01, B, 6, e" with "2508.02, E, 7" in the third paragraph.

2508.02, D, Acceptable Products.

Replace "Materials I.M. 482" with "Materials I.M.s 482.02 through 482.06" in the first paragraph.

2508.04, A, Bridge Cleaning.

Replace the title and first sentence:

A. Bridge Cleaning for Painting.

The Contractor will be paid the lump sum contract price for Bridge Cleaning for Painting.

Section 2510**2510.01, Description.**

Replace the first sentence:

This work involves removal of PCC pavement including reinforcing, pavement widening, HMA pavement, ~~and concrete curb and gutter detour pavement, and "integral and separate curb"~~.

2510.02, Removal of Pavement.

Replace "integral curb" with "integral and separate curb" in the second sentence of the first paragraph.

Delete the last sentence of the second paragraph:

~~If processing is require, the processing will be defined elsewhere in the contract documents.~~

2510.02, C, PCC Pavement with HMA Resurfacing (Composite Pavement Section).

Replace the entire article:

The contract documents may specify that the HMA Resurfacing be removed from the PCC pavement as a separate operation. When not specified, the Contractor may remove the composite pavement as a single operation.

2510.02, D, Removal and Crushing of Pavement.

Add as a new article:

D. Removal and Crushing of Pavement.

The contract documents may require the pavement be removed and crushed. When required, the contract documents will specify the size and/or gradation the pavement shall be crushed to, and specify where the crushed material is to be stockpiled or used in the contract.

2510.02, E, Removal of Intakes and Utility Accesses.

Add as a new article:

The top and sides of the structure shall be removed a minimum of 10 feet (3 meters) below the subgrade or 6 feet (1.8 meters) below the finished grade in other areas. All the pipes in the structure to be removed shall be plugged using Class C concrete. If the structure is more than 10 feet (3 meters) deep, the remaining structure shall be filled using flowable mortar. Place compacted fill over excavation.

2510.04, A, Removal of Pavement.

Replace the entire article:

For the area of pavement removed in accordance with the contract documents, in square yards (square meters), will be considered the area of removal of pavement. Additional measurement or allowance will not be made for curb above or below the pavement slab or for utility accesses, intakes, etc. within the pavement area, and integral or separate curb. The quantity of Removal of Pavement will be measured in square yards (square meters). This quantity will include areas of utility accesses and intakes within the pavement area; and integral and separate curb. Removal of reinforcing steel will be incidental to removal of pavement and will not be measured for payment.

2510.04, D, Pavement Scarification.

Add as a new article:

D. Pavement Scarification.

The quantity of pavement in square yards (square meters) where the HMA Resurfacing has been scarified prior to the removal of the pavement will be considered the area of pavement scarification. HMA Resurfacing removed and crushed with the PCC pavement will be included in the area of pavement scarification if the composite crushed material meets the gradation and composition required by the contract documents.

2510.04, E, Removal and Crushing of Pavement.

Add as a new article:

E. Removal and Crushing of Pavement.

The quantity removed and crushed, of pavement in square yards (square meters) in accordance with the contract documents will be considered the area of removal and crushing of pavement.

2510.04, F, Removal of Intakes and Utility Accesses.

Add as a new article:

The Engineer will count the number of intakes and utility accesses removed.

2510.05, A, Removal of Pavement.

Replace the first sentence of the first paragraph:

For the area of pavement removed in accordance with the contract documents, the area shown in the contract documents, measured in square yards (square meters), the Contractor will be paid for at the contract unit price per square yard (square meter) for Removal of Pavement.

Delete the last sentence of the first paragraph:

The cost of saw cut, removal of utility accesses, intakes, and integral and separate curb shall be included in the contract unit price for the removal and crushing of pavement.

Add as the second and third paragraphs:

When recycling is not mandatory, the cost of recycling pavement removal into granular subbase, granular shoulders, or special backfill shall be included into the cost of the items for which the recycled pavement material will be used.

The cost of saw cut, removal of utility accesses, intakes, and integral and separate curb shall be included in the contract unit price for the Removal of Pavement, Pavement Scarification, or Removal and Crushing of Pavement.

2510.05, D, Pavement Scarification.

Add as article D:

D. Pavement Scarification.

The quantity of pavement where the HMA Resurfacing has been scarified, in square yards (square meters), will be paid for at the contract unit price.

2510.05, E, Removal and Crushing of Pavement.

Add as article E:

E. Removal and Crushing of Pavement.

The quantity of pavement removed and crushed, in square yards (square meters), in accordance with the contract documents will be paid for at the contract unit price.

2510.05, F, Removal of Intakes and Utility Accesses.

Add as a new article:

The Contractor will be paid the contract unit price for Removal of Intakes and Utility Accesses per each unit. This payment shall be full compensation for the work of plugging pipes, filling remaining structures with flowable mortar, and placing compacted fill.

Section 2511**2511, Removal and Construction of Portland Cement Concrete Sidewalks.**

Replace the title and entire section:

Section 2511. Removal and Construction of Sidewalks and Recreational Trails**2511.01 DESCRIPTION.**

This work shall consist of removal of sidewalks and recreational trails or portions of them and/or the construction of new sidewalks and recreational trails according to the contract documents.

2511.02 MATERIALS.**A. Portland Cement Concrete.**

The Portland cement concrete used for sidewalks and recreational trails shall be Class B concrete produced and placed in accordance with Section 2301. For sidewalk and recreational trail construction included in PCC paving projects, the Contractor may use the approved paving mixture for the project. A Class 2 durability or better aggregate, in accordance with Article 4115.04, A, will be required.

When construction of a sidewalk or recreational trail is associated with a bridge project the Contractor may use the concrete approved for the bridge structure with Class C as the minimum.

B. Hot Mix Asphalt.

The HMA used for sidewalks and recreational trails not adjacent to pavement shall be 100,000 ESAL, 3/8 inch (9.5 mm) in accordance with Section 2303. When the recreational trail or sidewalk is adjacent to the pavement and also functions as the pavement shoulder, 1,000,000 ESAL, 1/2 inch (12.5 mm) base mixture shall be used. The Performance Grade binder shall be PG 58-28 or PG 52-34 as specified in the plans.

C. Subbase and Granular Surface.

The subbase and granular surface shall be as specified in the contract documents.

2511.03 CONSTRUCTION.

A. Removal of Sidewalks and Recreational Trails.

The Contractor shall remove the sidewalks and recreational trails as shown in the contract documents. If only portions of the sidewalks or recreational trails are to be removed, the boundaries of removal shall be made by a vertical saw cut not less than 1 inch (25 mm) deep before breaking the removal. Any areas of the sidewalk or recreational trail not designated for removal but which are removed, broken, or damaged by the Contractor's operations shall be removed and replaced by the Contractor with no additional cost to the Contracting Authority. Removal of sidewalks and recreational trails shall be in accordance with Article 2510.02.

B. Preparation of Subgrade.

1. Sidewalks.

The subgrade for sidewalks shall be prepared by excavating or filling with suitable earth to a depth below the finished grade line so that, when tamped or rolled until smooth, firm, and hard, the subgrade will be uniform and at the required depth below the finished grade line.

2. Recreational Trails.

When the recreational trail is to be constructed on natural subgrade special compaction of subgrade for the recreational trail will be required. The Contractor shall disk, scarify, mix, and recompact the top 12 inches (300 mm) of subgrade with moisture and density control. Compact to not less than 95% maximum density as determined by Iowa DOT Materials Laboratory Test Method 103; moisture content not less than optimum or more than 4% above optimum moisture content.

When the recreational trail surface is to be constructed on an existing granular surface, the subbase (existing granular surface) shall be prepared in accordance with the contract documents.

C. Portland Cement Concrete.

1. Placing.

a. Hand Finished Sidewalks and Recreational Trails.

Forms of wood or steel shall be in accordance with Article 2301.07, A, 1, b.

The subgrade shall be thoroughly moistened. Concrete shall be deposited for the full depth of slab in one operation. It shall be consolidated by tamping or vibration, and the excess concrete screeded off flush with the forms. Edges adjacent to all forms, expansion joints, curbs, or fixtures in the surface shall be thoroughly consolidated.

b. Slip Form Sidewalks and Recreational Trails.

Self propelled slip form pavers shall meet the requirements of Section 2301. Other slip form paving machine shall be approved by the Engineer and designed for the specific purpose of placing, consolidating, and finishing concrete sidewalk and recreational trail slabs without use of fixed side forms.

2. Finishing.

After consolidation, the concrete surface shall be finished to a uniform, slip resistant, wet burlap drag or broom finish texture true to the line and grade specified in the contract documents. The broom finish shall be obtained by dragging a suitable broom transversely across the surface of the plastic concrete.

a. Sidewalks.

After the surface has been floated, the edges of the slabs shall be finished with a suitable edging tool. Unless otherwise shown, the finished surface shall have a cross slope of 1/4 inch per foot (20 mm/m) for drainage.

For PCC sidewalks the transverse joint spacing shall be equal to the pavement width. The concrete shall be cut through for not less than 25% of the depth with a pointed trowel or suitable spading tool, and the concrete edged on both sides. In lieu of using a pointed trowel or suitable spading tool, the Contractor may cut these lines within 12 hours after placement of concrete with a 1/8 inch (3 mm) blade saw that is approved by the Engineer. Metal dividers will be considered for approval, in lieu of cutting.

b. Recreational Trails.

For PCC recreational trails the transverse joints spacing shall be equal to the pavement width. All transverse joints shall be saw cut not tooled. The transverse joints shall be cut 1/8 inch (3 mm) wide and not less than 1 inch (25 mm) in depth. No sealant will be required.

Recreational trails 12 feet (2.6 m) wide or less, shall not have a longitudinal joint.

3. Protection and Curing.

After finishing, the concrete shall be cured and protected by one of the methods described in Article 2301.19.

4. Isolation Joints.

Isolation joints shall be constructed at all points where sidewalks or recreational trails meet other walks, curbs, or fixtures in the surface. These joints shall be constructed by installing a 1/2 inch (13 mm), full depth strip of approved premolded joint material.

5. Time for Opening Pavement for Use.

PCC sidewalks and recreational trails shall be opened a minimum of 7 **calendar** days after placement or when flexural strength reaches 400 psi (2.75 MPa) as determined by Materials I.M. 383.

D. Hot Mix Asphalt.

HMA sidewalks and recreational trails shall be constructed in accordance with Article 2303.03 and 2303.04. Compaction shall be Class 1C.

E. Smoothness.

Sidewalk and recreational trail smoothness shall be in accordance with Article 2301.16, D, except for the requirements for pavement and bridge approach sections for Primary projects.

Areas may be checked by the Engineer with a surface checker and shall not exceed 1/4 inch in 10 feet (6 mm in 3 m). For each bump exceeding these requirements, the Contractor will be assessed \$50 or the bump corrected as agreed upon by the Engineer and Contractor.

F. Weight Limits.

Construction equipment on both PCC and HMA sidewalks and recreational trails shall be limited to 5 ton (5 Mg).

G. Pavement Markings.

Pavement markings shall be placed in accordance with Section 2527.

2511.04 METHOD OF MEASUREMENT.**A. Removal of Sidewalks or Recreational Trails.**

The quantity of sidewalk or recreational trail removed, in square yards (square meters), will be the quantity shown in the contract documents.

B. Construction of Sidewalks or Recreational Trails.

The quantity of Sidewalk or Recreational Trail constructed of the material type and depth specified, in square yards (square meters), will be the quantity shown in the contract documents. Deductions will not be made for fixtures having an area of 1 square yard (1 m²) or less.

C. Special Compaction of Subgrade for Recreational Trail.

The quantity of Special Compaction of Subgrade for Recreational Trail, in stations (meters), will be the quantity shown in the contract documents.

2511.05 BASIS OF PAYMENT.**A. Removal of Sidewalks or Recreational Trails.**

The Contractor will be paid the contract unit price for Removal of Sidewalk or Removal of Recreational Trail per square yards (square meters). This payment shall be full compensation for all equipment, labor, and disposal for removal of the sidewalk or recreational trail as specified in the contract documents.

B. Construction of Sidewalks or Recreational Trails.

The Contractor will be paid the contract unit price for construction of Sidewalk or Recreational Trail, of the material type and thickness specified, per square yard (square meter). This payment shall be full compensation for furnishing all material, equipment, and labor to construct the sidewalk or recreational trail in accordance with the contract documents.

C. Special Compaction of Subgrade for Recreational Trail.

The Contractor will be paid the contract unit price for Special Compaction of Subgrade for Recreational Trail, per station (meter). This payment shall be full compensation for furnishing all material, equipment, and labor to construct the special compaction of subgrade for recreational trail in accordance with the contract documents.

Section 2513**2513.01, Description.**

Replace the first sentence of the first paragraph:

The provisions of this section shall apply to production and construction of concrete barrier, both permanent and temporary, as shown in the contract documents.

Add as the second sentence of the last paragraph:

F-shape TBR, Type A, as defined in the Standard Road Plans, shall be used in all situations requiring the railing to be in place during the winter work period as defined in Article 1108.02, paragraph E.

2513.03, A, Precast.

Replace the last paragraph:

The air content of fresh, unvibrated concrete shall be 7.0%, as a target value, with a maximum variation of plus 1.5% or minus 1.0%.

2513.03, B, 3

Replace the entire article:

3. Aggregates. The combination of aggregates shall be uniformly well graded in accordance with Materials I.M. 532, meeting the following gradation limits: The Contractor shall provide a target gradation and the following limits shall apply:

Sieve Size	Percent Passing
1 1/2 inch (37.5 mm)	100
3/4 inch (19.0 mm)	81-93
1/2 inch (12.5 mm)	67-79
3/8 inch (9.5 mm)	57-69
No. 4 (4.75 mm)	41-53
No. 8 (2.36 mm)	29-41
No. 16 (1.18 mm)	21-33
No. 200 (75 µm)	0-1.5

Sieves	Limits
No. 4 (4.75 mm) and larger	± 5%
No. 8 (2.36 mm) to No. 30 (600 µm)	± 4%
No. 50 (300 µm)	± 3%
No. 100 (150 µm)	± 2%
No. 200 (150 µm)	Maximum 1.5% Passing

A new target gradation will require approval by the Engineer.

2513.03, B, 4

Replace the third sentence:

The air content of fresh, unvibrated concrete shall be 7.0%, as a target value, with a maximum variation of plus 1.5% or minus 1.0%.

2513.03, B, 5.

Replace the entire article:

5. Fly Ash and GGBFS. The conditions and allowable rates of fly ash and GGBFS substitution shall be in accordance with Article 2403.03, D. Fly ash and GGBFS substitution will not be permitted in slip form barrier rail placed in the time period from October 16 through March 15.

2513.06, B, Curing.

Add as the second sentence:

Clear curing compound shall be applied to the concrete barrier rail within 15 minutes after final finishing provided that the free water (sheen) has appreciably disappeared from the concrete surface.

2513.09, Tolerances.

Add new third paragraph:

Tolerances for concrete barrier shall be as follows:

Item	Precast Fabrication ⁽¹⁾ (Permanent or Temporary)	Cast-in-Place or Slip Form Installation
Length	± 3/4 inch (± 19 mm)	
Width	± 1/4 inch (± 6 mm)	⁽²⁾
Height	± 1/4 inch (± 6 mm)	⁽²⁾
Horizontal Straightness (Sweep)	1/2 inch maximum in 10 feet (12 mm maximum in 3 m)	3/4 inch maximum in 10 feet (19 mm maximum in 3 m)
Top Straightness (Vertical)	1/4 inch maximum in 10 feet (6 mm maximum in 3 m)	3/4 inch maximum in 10 feet (9 mm maximum in 3 m)
Exposed Ends (Deviation from square)	± 1/4 inch (± 6 mm)	
⁽¹⁾ Installation of permanent precast barrier shall include shimming and grouting such that adjoining sections match within 1/4 inch (6 mm) on the sides and top, and the finished height is not less than required by the contract documents. ⁽²⁾ The width and depth shall not be less than required by the contract documents.		

Section 2515

2515.05, Method of Measurement.

Replace the entire article:

Paved driveways removed and constructed will be computed from measurements to the nearest foot (0.1 m), measured as follows:

A. Removal of Paved Driveway.

For the area of paved driveway removed in accordance with the contract documents, the area shown in the contract documents, in square yards (square meters), will be considered the area of removal of paved driveway. The quantity of Removal of Paved Driveway, in square yards (square meters), will be the quantity shown on the contract documents for each paved driveway removed to the nearest square foot (0.1 m²).

B. Portland Cement Concrete Driveways.

The area of square yards (square meters) of paved driveway constructed, of the thickness specified, will be computed by the Engineer from measurement of the finished surface, including The quantity of PCC Driveway of the thickness specified in square yards (square meters), will be the quantity shown on the contract documents for each paved driveway to the nearest square foot (0.1 m²). This will include areas through sidewalks. No deductions will be made for fixtures having an area of 1 square yard (1 m²) or less.

2515.06, Basis of Payment.

Replace entire article:

Paved driveways removed and constructed will be paid for as follows:

A. Removal of Paved Driveway.

For the area of paved driveway removed in accordance with the contract documents, the area shown in the contract documents, in square yards (square meters). The Contractor will be paid for at the contract unit price for Removal of Paved Driveway per square yard (square meter). This payment shall be full compensation for all equipment, tools, and labor for removal of the driveways as specified in the contract documents.

B. Portland Cement Concrete Driveway.

For the area of PCC driveway, of the thickness specified, measured for payment, The Contractor will be paid the contract unit price for PCC Driveway of the thickness specified per square yard (square meter). This payment shall be full compensation for furnishing all material, equipment, tools, and labor to construct the driveway in accordance with the contract documents.

Section 2517

2517, Concrete Header Slabs.

Replace the title and entire section:

Section 2517. Railroad Approach Sections.

2517.01 DESCRIPTION.

This work shall consist of construction of pavement sections at junctures in accordance with the contract documents.

2517.02 MATERIALS.

Materials for construction of railroad approach sections shall meet requirements of Division 41 for the respective material.

A. PCC Paving Projects.

The PCC shall be of the same class as specified for the pavement.

B. HMA Paving Projects.

The HMA mixture shall be one step above the adjoining surface course. The asphalt binder shall be PG 64-22.

2517.03 CONSTRUCTION.**A. PCC Paving Projects.**

The PCC shall be formed, placed, finished, and cured in accordance with Section 2301.

The Engineer may require the railroad approach section to be placed one lane at a time for the convenience of the traveling public. When the header slab is constructed in two sections, a centerline joint shall be constructed as shown in the contract documents. When the joint is not provided for, 1/2 inch (No. 15) tie bars shall be placed not more than 4 feet (1.2 m) apart and shall extend not less than 18 inches (450 mm) into each section.

B. HMA Paving Projects.

The HMA shall be placed in accordance with Article 2303.03, **GD**, with maximum 2 inch (50 mm) lifts. Compaction shall be in accordance with Article 2303.03, **DE**, Class 2.

2517.04 METHOD OF MEASUREMENT.**A. Railroad Approach Section, PCC.**

The quantity of Railroad Approach Section, PCC, in square yards (square meters), will be the quantity shown in the contract documents.

B. Railroad Approach Section, HMA.

The quantity of Railroad Approach Section, HMA, in square yards (square meters), will be the quantity shown in the contract documents.

2517.05 BASIS OF PAYMENT.**A. Railroad Approach Section, PCC.**

The Contractor will be paid the contract unit price for Railroad Approach Section, PCC, per square yard (square meter). This payment shall be full compensation for excavation for modified subbase and subdrain; furnishing and installing subdrain; furnishing and installing subdrain outlet; furnishing and placing porous backfill; furnishing and backfilling modified subbase; and furnishing and installing reinforcing steel, tie bars, and dowel assemblies.

B. Railroad Approach Section, HMA.

The Contractor will be paid the contract unit price for Railroad Approach Section, HMA, per square yard (square meter). This payment shall be full compensation for excavation for HMA, modified subbase, and subdrain; furnishing and installing subdrain; furnishing and installing subdrain outlet; furnishing and placing porous backfill; furnishing and backfilling modified subbase; and furnishing and installing fiber board barrier.

Section 2521**2521.02, Requirements.**

Replace "Materials I.M. 213 and 214" with "Materials I.M. 213".

Section 2522**2522.04, D**

Replace the entire article:

Each anchor bolt shall be furnished with one leveling nut and two anchoring nuts. Anchor bolts shall meet the requirements of ASTM F 1554, Grade 105 (724 MPa), be full-length galvanized, and be high-strength low alloy steel. Unless otherwise specified, anchor bolts shall be the Unified Coarse Thread Series and have Class 2A tolerance. The end of each anchor bolt intended to project from the concrete shall be color coded in

red to identify the grade. Washers shall be galvanized and shall meet the requirements of ASTM F 436. Nuts shall meet the requirements of ASTM A 563, DH, be heavy hex, and be galvanized. Nuts may be over-tapped in accordance with the allowance requirements of ASTM A 563. Galvanizing shall meet the requirements of ASTM A 153, Class C; or ASTM B 695, Class 50.

Section 2525

2525.03, A, 6, Uninterrupted Timing.

Replace "Article 2525.04, A, 11, and A, 12, a" with "Article 2525.03, A, 2, b, and Article 2525.03, A, 5" in the first sentence.

2525.03, C, 11, i, 1, Connecting Cables.

Delete "correlations shall be made with connecting cable plug and controller jack as described in Article 2525.05, A, 2, 6." in the last sentence.

2525.03, C, 11, j, 1, Incoming AC Line.

Replace "Article 2525.05, A, 12, d, 2, a" with "Article 2525.03, C, 11, i, 2, a".

2525.03, F, 4, d

Replace "Paragraph A, 10, of this Article" with "2525.03, C".

2525.06, B, 2

Replace the entire article:

The anchor bolts shall meet the requirements of ASTM F 1554, Grade 105 (724 MPa), be full-length galvanized, and have a full-body diameter. Anchor bolts shall be the Unified Coarse Thread Series and have Class 2A tolerance. The end of each anchor bolt intended to project from the concrete shall be color coded in red to identify the grade. Washers shall be galvanized and shall meet the requirements of ASTM F 436. Nuts shall meet the requirements of ASTM A 563, DH, be heavy hex, and be galvanized. Nuts may be over-tapped in accordance with the allowance requirements of ASTM A 563. Galvanizing shall meet the requirements of ASTM A 153, Class C; or ASTM B 695, Class 50.

2525.06, C, 3

Replace "115 m" with "115 mm" in the article.

2525.07, Method of Measurement and Basis of Payment.

Replace the second sentence of the first paragraph:

Payment will be made at the lump sum contract unit price for traffic signalization. The Contractor will be paid the contract lump sum price for Traffic Signalization.

Section 2526

2526, Construction Survey.

Replace the entire article:

2526.01 DESCRIPTION.

This work involves survey for construction projects. The Contractor shall furnish all survey necessary for construction of the project before work begins in the area. The provisions of Article 1105.06 do not apply to this work, except that the original stakes set by the Engineer shall be preserved. If, in the opinion of the Engineer, any of the original survey stakes or benchmarks have been destroyed or disturbed by the Contractor, the cost of replacing shall be charged to the Contractor. Design errors discovered shall be brought to the Engineer's attention for review prior to staking. Construction survey shall include qualified personnel, equipment, and supplies required for, but not limited to, the following items:

A. Project Control.**1. Primary Control Monuments.**

A primary control monument is a survey point established by the Department prior to project commencement and shown in the contract documents. The point will be established by placing a monument in the ground.

2. Secondary Control Monuments.

A secondary control monument is a survey point established by the Contractor on grading or other projects specified in the plans, and preserved by the Contractor on all other projects.

The Engineer will provide monuments, similar to those used for Global Positioning System (GPS) control by the Department.

Secondary permanent horizontal control monuments shall be placed, as directed by the Engineer, at locations likely to survive project construction and at intervals not to exceed 2,640 feet (0.8 km). The Contractor shall place the monuments in the ground along the project corridor. Monuments shall be placed at higher elevations along the corridor to provide a view of the immediate project topography and provide for visible clear line of sight to the nearest secondary permanent control monument in either direction. Primary project monuments may be substituted if appropriate.

The monument shall be planted 1 to 4 inches (25 mm to 100 mm) below existing ground. A metal fence post shall be driven within 1 foot (0.3 m) to mark its location.

Project coordinates shall be carefully determined relative to the nearest primary project control monument using project coordinate values provided by the Engineer. The resulting error radius of the secondary monument shall not exceed 0.10 feet (30 mm) ± 2 ppm relative to the primary control. Unedited printed and/or electronic formatted field data of the field survey shall be provided to the Engineer along with an ASCII comma delineated file of the coordinates formatted as (Point Number, Northing, Easting, Elevation, Point Description, Feature).

An independent traverse check between the secondary control monuments shall be performed by observing distance and angular measurements or by use of GPS. An unedited printed and/or electronic file of the field data for the traverse check shall be provided to the Engineer. A diagram shall be provided to the Engineer indicating horizontal ground distances to nearest 0.01 foot (3 mm) and angles to at least the nearest 10 seconds between each secondary control monument. Inverses between the coordinate pairs as determined in the previous paragraph shall not exceed 0.10 feet (30 mm) of the direct measurements.

Secondary control monuments that are disturbed during construction activities will be replaced using procedures outlined above at no additional expense to the Contracting Authority.

3. Durable Physical Objects.

Each control monument shall be referenced to at least three durable physical objects from 20 to 100 feet (6 m to 30 m) away from the monument with measurements to the nearest 0.10 foot (30 mm). Durable physical objects could include trees, poles, fence posts, station marks in new roadway pavement, or metal fence posts. A printed and/or electronic reference image (for example .JPG, TIFF, etc), including each reference and project coordinate, shall be provided to the Engineer.

4. Benchmarks.

Permanent vertical control benchmarks shall be established at all bridges and reinforced concrete box culverts within the project. An I.D.O.T. brass plug on bridge barrier rail or headwall of reinforced concrete box culvert shall be used to indicate the benchmark. The Contractor may use a sawn "X" on bridge barrier rail or headwall of reinforced concrete box culvert if approved by the Engineer.

All benchmark elevations shall be transferred from construction plan benchmarks to the permanent benchmarks using the three-wire method or by trigonometric leveling. Temporary benchmarks of reasonable stability shall be used to preserve the plan benchmarks.

All unedited printed and/or electronic formatted field benchmark elevation data will be furnished to the Engineer. The project x and y coordinates of all benchmarks shall be provided to the Engineer. An ASCII comma delineated file of the coordinates formatted as (Point Number, Northing, Easting, Elevation, Point Description, Feature).

Benchmark level loops shall not exceed an error of 0.05 feet (15 mm) times the square root of the loop's length in miles (kilometers) and the error shall be distributed equally along the loop on all intermediate traverse/benchmark points.

B. Grading.

Right-of-way line between permanent right-of-way corners at 100 foot (20 m) intervals, or less if needed, including borrows, temporary easements, and right of entry. These points shall be marked by placement of a metal pin or wood hub, flat, and lath at the same location as the slope stakes. The flat shall be clearly marked with the station number, distance from centerline, and elevation (cut or fill) to subgrade.

Slope stakes at 100 foot (20 m) intervals, or less if needed, for all embankment and excavation work including roadway, channel changes, and borrow areas. Interpolations may be necessary to match the cross-sections. Slope stakes shall be set at the toe of the foreslope, and/or the top of the backslope. Slope stakes shall be marked with a flat and lath. The flat shall be clearly marked with the station location, distance, slope, and cut/fill information.

Grade check stakes at 100 feet (20 m) intervals for bottoms of subgrade treatments. Grade check stakes shall be set on centerline for two-lane roads and in the median for four-lane roads. Grade check stakes shall be marked with a lath. The lath shall be clearly marked with the station location and cut or fill information.

Finish grade stakes (blue tops) at 100 foot (20 m) intervals, or less if needed. The blue tops shall be set at each shoulder line and at each point where there is a change in cross slope. Blue tops shall be marked with a wood hub and a stake chaser or similar type tassel.

Take original and final elevations of all borrows. Provide original and final graphical cross sections at 100 foot (20 m) intervals, or less if needed, suitable for use by the Engineer to calculate excavation quantities.

Bridge berm slope stakes to establish all transitions including the face of the berm. Finish grade stakes (blue tops) on all roadway shoulder lines and roadway centerlines project down the face of bridge berm at the top, midpoint, and toe.

When Class 12 excavation is an item, cross section elevations shall be taken at 100 foot (20 m) intervals, or less if needed, and cross sections plotted for use by the Engineer to calculate the excavation quantities.

Agricultural drain tile shown in the contract documents shall be located on each side of roadway at the right-of-way line with a lath. The lath shall be clearly marked to show station location, distance from centerline, tile size and type, and flowline elevation.

C. Bridges.

Locations and elevations shall be marked with metal pin or tack in a wood hub, flat, and lath. The flat shall be clearly marked with the pier/abutment station location, design number, and offset distance from the centerline of the approach roadway.

Minimum of three temporary benchmarks.

Location of test pile shall be marked with a wood hub.

Independent check of the above stakes.

Elevations of beams as erected. Provide the elevations to the Engineer for computation of finish elevations for deck construction. Locations for determining beam elevations shall be in accordance with the plans.

A copy of the staking diagram shall be provided to the Engineer before work begins.

D. Reinforced Concrete Box Culverts.

Locations and elevations shall be marked with metal pin or tack in a wood hub, flat, and lath. The flat shall be clearly marked with the station location, design number, cut/fill elevation, and offset distance from the centerline of the culvert and back of parapet.

An independent check of the above stakes.

A copy of the staking diagram shall be provided to the Engineer before work begins.

Questionable flow lines and alignments that do not match existing drainage shall be reported to the Engineer.

E. Pipe Culverts.

Locations and elevations shall be marked with metal pin or a wood hub, flat, and lath. The flat shall be clearly marked with the station location, cut/fill elevation, and offset distance to both ends or centerline of pipe.

Questionable flow lines and alignments that do not match existing drainage shall be reported to the Engineer.

F. Sanitary and Storm Sewers.

Locations and elevations shall be marked with metal pin or tack in a wood hub, flat, and lath. The flat shall be clearly marked with the station location, pipe number, cut/fill elevation, and offset distance to centerline of pipe.

G. Intakes and Utility Accesses.

Locations and elevations shall be marked with metal pin or tack in a wood hub, flat, and lath. The flat shall be clearly marked with the station location; intake or utility access number; cut/fill elevation, including bottom of well and form grade; and offset distance to the Station Location.

H. Pavements (PCC & HMA).

Locations and elevations shall be marked with metal pin or tack in a wood hub (only tack one side), flat, and lath. Elevations on both sides of the pavement at 50 foot (10 m) intervals on straight and level sections and at 25 foot (10 m) intervals on horizontal and vertical curves. The flat shall be clearly marked with the station location, cut/fill information, and offset distance to the edge of pavement. Pavement cross slope information shall be included in superelevated curves.

Elevations of pavement centerline, and both edges at bridges and existing pavement, shall be taken at 10 foot (3 m) intervals for 100 feet (30 m). Final elevations shall be submitted to the Engineer for approval.

When a new profile grade is not included in the contract documents the Contractor shall:

1. Obtain elevations of the existing shoulders and/or pavement as stated in Article 2526.01, H.
2. 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.

I. Pavement Overlays (PCC and HMA)

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

Method used to reference points shall be approved by the Engineer.

Control Points shall be reset after the work is complete.

The method used by the Contractor to preserve project control shall be submitted to the Engineer for approval. Survey work documentation shall be in a format acceptable to the Contracting Authority. Survey work shall be done with a Professional Engineer licensed in the State of Iowa or a Professional Land Surveyor licensed in the State of Iowa in responsible charge, in accordance with provisions of Chapter 542 B, Code of Iowa. The Contractor shall submit to the Engineer a resume identifying the field survey personnel and their capabilities to perform the intended requirements.

The method of determining alignments and elevations and the method of preserving control points shall be subject to review and approval by the Engineer. This approval shall not act to relieve the Contractor of the responsibility for the correctness of the survey work. Plan cross-sections shall not be used for vertical or horizontal control.

The Engineer will provide benchmark elevations, right-of-way corners, and reference control points on the original survey as shown in the contract documents. A GeoPak alignment will be provided if available

Tie-ins with existing roadways shall be checked for correctness of alignment prior to construction staking.

When survey work is done under traffic, detail sheets in the contract documents will establish the required signing.

The Engineer will locate and determine elevations of settlement plates.

The Contractor shall replace land corners and permanent reference markers unless otherwise stated in the contract documents.

All survey work documentation is to become property of the Contracting Authority. The work of this specification will be considered finished when the documentation is furnished to and accepted by the Engineer.

For the purpose of subcontracting, this item will be considered a specialty item.

2526.02 METHOD OF MEASUREMENT AND BASIS OF PAYMENT.

Construction survey will be measured and paid for at the lump sum contract price. This payment shall be full compensation for the survey work required for the project as let, including any interpolations that may be necessary between cross-section and field staking. Revisions after the letting will be paid for as extra work as described in Article 1109.03, B.

Section 2527

2527.02, B, 2, Epoxy.

Replace the title and entire article:

2. Durable Paint Pavement Markings.

Durable paint pavement markings shall meet requirements of Article 4183.04.

The Contractor shall supply the Engineer with a copy of the manufacturer's recommendations for applying the marking material. The marking material shall be installed according to the product manufacturer's recommendations. Binder thickness shall be the same as applied on the National Transportation Product Evaluation Program (NTPEP) deck with a tolerance of 10%. The bead application rate, bead gradation, and bead coating shall be at the discretion of the Contractor. An appropriate bead package shall be used to consistently meet or exceed the minimum retroreflectivity requirements.

The Contractor shall demonstrate to the Engineer at the start of the project the ability to meet the retroreflectivity requirements of these specifications when tested in accordance with Materials I.M. 483.04. The Engineer may also require the Contractor to demonstrate the ability to meet the initial retroreflectivity requirements if there is a change in equipment, materials, or a delay of more than 2 months in completing the project.

Final acceptance will be based on compliance with these specifications. The markings shall meet the following retroreflectivity requirements:

**Specific Luminance
(mcd/sq. ft./ft.-cdl.)
(lux•m²)**

White line, symbols and legends	300
Yellow line	200

2527.03, Construction.

Replace “epoxy” with “durable paint” in the third paragraph.

Delete the last sentence of the fourth paragraph:

~~For tape products, the manufacturer's recommendations shall be followed for surface dryness and other surface preparation requirements.~~

Add a new sixth paragraph with subparagraphs:

For tape products, the manufacturer's recommendations shall be followed for surface dryness, primers, adhesives, and other surface preparation requirements. Unless otherwise specified by the tape manufacturer the following test shall be met for determining surface dryness before applying the tape.

1. In an area of direct sunlight where the tape will be applied, place an 18 inch x 18 inch (450 mm x 450 mm) piece of polyethylene (a green or black garbage bag may be used). There should not be any holes or tears in the polyethylene.
2. Tape down all the edges of the polyethylene sheet to seal all the edges and not allow any air movement to get under the polyethylene.
3. Firmly tamp the tape using the tamper cart or by foot tamping.
4. Allow 20-25 minutes for the polyethylene to be exposed to the direct sunlight.
5. Remove the polyethylene from the road surface. If no moisture is present on the under side of the polyethylene or on the road surface, the tape can be applied.
6. If any moisture is present, allow another hour to pass and repeat the test until no moisture is found.

2527.03, B, Removal of Pavement Markings.

Replace the second sentence of the third paragraph:

Tightly adhering markings may remain in the bottom of the tining and other depressions on the pavement surface but shall not be visible to the motorist during daytime or night time.

2527.03, D, Limitations.

Add a new fourth paragraph:

Before winter shutdown, the Contractor shall place edge lines and symbols.

Replace the eighth paragraph:

When the installation of preformed polymer pavement marking material or profiled pavement marking tape is in conjunction with placement of hot mix asphalt mixtures, the tape shall be inlaid by positioning on the hot mixture prior to the final rolling. The installation of the tape shall be in accordance with the manufacturer's recommendations. If grooving is specified, tape shall not be inlaid into hot asphalt.

2527.03, H, Defective Epoxy Paint Pavement Markings.

Replace the title:

H. Defective Pavement Markings.

Replace the first unnumbered paragraph:

Markings that are low on initial retroreflectivity up to 20%, may at the discretion of the Engineer, be accepted with a price adjustment.

Delete “epoxy paint” from the third paragraph.

2527.03, H, 1, Insufficient Film Thickness, Line Width, or Low Retroreflectivity.

Delete the title and entire article:

~~1. Insufficient Film Thickness, Line Width, or Low Retroreflectivity.~~

~~Repair Method. Prepare the surface of the defective epoxy paint marking using methods found in Article 2527.03 in. Surface preparation shall be performed to the extent that a substantial amount of the retroreflective glass beads are removed and a roughened epoxy marking surface remains. Repair shall be made by restriping over the cleaned surface in accordance with the requirements of these specifications and at the full thickness.~~

2527.03, H, 2, Insufficient Bond.

Delete the title and entire article:

~~2. Insufficient Bond.~~

~~Repair Method. The defective epoxy paint marking shall be completely removed and cleaned to the underlying pavement surface in accordance with the requirements of Article 2527.03. The extent of removal shall be the defective area plus any adjacent epoxy paint pavement marking material extending 1 foot (300 mm) in any direction. After surface preparation work is complete, repair shall be made by reapplying epoxy paint over the cleaned pavement surface in accordance with the requirements of these specifications.~~

2527.03, I, Surface Preparation for Profiled Marking Tapes.

Replace the title:

I. Grooving for Pavement Markings.

Replace the first sentence of the first paragraph:

When specified, pavement markings shall be placed in a groove cut into the pavement surface.

2527.03, I, 2, Groove Depth.

Replace the entire article:

For profiled marking tape the grooved depth shall be 0.080 inches \pm 0.010 inches (2.0 mm \pm 0.03 mm).

For all other markings, the groove depth shall be as recommended by the pavement marking manufacturer.

2527.03, I, 6, Groove Cleaning.

Replace the last sentence:

The surface to receive the tape shall be free from dust, dirt, or other contaminants that may interfere with the tape properly bonding.

2527.03, I, 6, a, Moisture Test of Pavement Surface.

Delete the title and entire article:

~~a. Moisture Test of Pavement Surface.~~

~~1) In an area of direct sunlight where the tape will be applied, place an 18 inch x 18 inch (450 mm x 450 mm) piece of polyethylene (a green or black garbage bag can be used). There should not be any holes or tears in the polyethylene.~~

~~2) Tape down all the edges of the polyethylene sheet using duct tape or pavement marking tape. The tape should seal all the edges and not allow any air movement to get under the polyethylene.~~

~~3) Firmly tamp the tape using the tamper cart or by foot tamping.~~

~~4) Allow 20-25 minutes for the polyethylene to be exposed to the direct sunlight.~~

~~5) Remove the polyethylene from the road surface. If no moisture is present on the back side of the polyethylene or on the road surface, the tape can be applied.~~

~~6) If any moisture is present, allow another hour to pass and repeat the test until no moisture is found.~~

2527.03, I, 7, Adhesive.

Delete the title and entire article:

~~7. Adhesive.~~

~~The Contractor shall apply adhesive according to the manufacturer's instructions.~~

2527.05, A, Painted Pavement Marking.

DISREGARD the following change made in GS-01004:

~~**Delete** "of the type specified" from the first sentence.~~

2527.05, D, Painted Symbols and Legend.

DISREGARD the following change made in GS-01004:

~~**Delete** "of the type specified" from the first sentence.~~

2527.05, K, Grooves Cut for Tape.

Replace the title and entire article:

K. Grooves Cut for Pavement Markings.

The Engineer will measure the number of stations (meters) of Grooves Cut for Pavement Markings. This quantity will be equivalent to the number of stations (meters) measured for the pavement markings. Additional width and transition length will be incidental.

2527.06, A, Painted Pavement Marking.

DISREGARD the following change made in GS-01004:

~~**Delete** "of the type specified," from the first sentence.~~

2527.06, D, Painted Symbols and Legend.

DISREGARD the following change made in GS-01004:

~~**Delete** "of the type specified," from the first sentence.~~

2527.06, K, Grooves Cut for Tape.

Replace the title and entire article:

K. Groves Cut for Pavement Markings.

For the number of stations (meters) of Grooves Cut for Pavement Markings, the Contractor will be paid the unit price per station (meter).

Section 2528

2528.01, Description.

Replace the sixth and seventh paragraphs:

All Category I and Category II traffic control signs and devices used on Interstate and Primary Road projects shall meet National Cooperative Highway Research Program (NCHRP) Report 350. Category I devices are defined as low mass, single-piece traffic cones, tubular markers, single-piece drums, and delineators. No lights or signs may be attached to these devices in order for them to meet the Category I limitations. Category II devices are defined as vertical panels, Type I, II, and III barricades; and moveable skid mounted sign stands.

It shall be the responsibility of the Contractor to provide the vendor's self-certification for Category I devices and the FHWA NCHRP 350 approval memos for Category II signs and devices, to the Engineer to document

crashworthiness of their Category I and II traffic control signs and devices. 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/fourthlevel/hardware/wzd.htm>.

2528.01, B, Traffic Quality Control.

Replace the last paragraph:

The Contractor shall have a technician on staff that has attended and passed the exam in an ATSSA Traffic Control Technician or International Municipal Signal Association (IMSA) Work Zone Traffic Control training class even though the Traffic Control portion of the contract may be subcontracted. This Traffic Control Technician shall be responsible for the overall management of the contractor's quality control program for traffic control.

2528.02, 3

Add as new item 3 in numbered list:

3. 2 1/4 or 2 1/2 inch (60 mm or 65 mm) square 12 gauge perforated steel tubing.

2528.03, Channelizing Devices.

Replace the word "Devises" with "Devices" in the article.

2528.03, A, Barricades.

Replace the entire article:

A. Barricades.

When Type I or Type II Barricades are furnished as one of the options for channelizing devices in lieu of vertical panels, 42 inch (1050 mm) channelizers, cones, or drums, a 2 foot (0.6 m) minimum length barricade may be used.

Type III barricades shall have a minimum length of rail of 6 feet (1.8 m). When traffic is permitted in each direction around a Type III Barricade, the Type III Barricade used shall have fully reflectorized faces on both sides of the rails.

Barricades shall be erected in essentially a horizontal position perpendicular to the direction of approaching traffic. They shall be ballasted so as not to cover any striped rail.

2528.04, Pilot Cars.

Replace the entire article:

Pilot cars shall be pickup trucks or automobiles displaying the Contractor's company insignia, equipped with G20-4 signs reading: PILOT CAR - FOLLOW ME. Two signs shall be mounted on the vehicle so as to be clearly visible from both directions of traffic. The bottom of the signs shall be mounted at least 1 foot (0.3 m) above the top of the vehicle's roof.

Pilot cars shall be operated such that they maintain a uniform speed through the work area, no greater than 40 miles per hour (65m/hr).

2528.08, Temporary Floodlighting.

Delete the first and second sentence of the first paragraph:

~~Floodlighting may be required. Floodlights will be required at the approximate locations shown in the contract documents.~~

Replace the third paragraph:

Temporary floodlighting shall consist of either a pole-mounted luminaire or a luminaire mounted on portable equipment. The mounting height of luminaires shall be not less than 35 feet (11 m) above the roadway, and as shown in the contract documents. The Contractor shall determine pole length by field measurement to

obtain specified mounting height. Poles shall be placed outside the normal shoulder line at the approximate locations shown in the contract documents.

Add as first and second sentence of fourth paragraph:

Above ground lighting circuits shall be aluminum or A.C.S.R. triplex. Underground lighting circuits shall be type U.S.E. or U.F.

2528.13, A, 5, Temporary Floodlighting.

Add as second sentence of the article:

This payment shall be full compensation for furnishing, installing, maintaining and servicing the temporary floodlighting units, all costs for electrical energy, and the cost of removing all lighting materials from the construction site.

Section 2529

2529.02, B, 6, Water Reducer.

Replace the first sentence:

A water reducing admixture may be used at the Contractor's option.

Section 2530

2530.03, B, 4, a, Slump.

Replace "(100 m)" with "(100 mm)" in the last sentence.

2530.03, B, 4, d, Cement.

Replace the first paragraph:

Cement for Class M concrete mixtures shall meet the requirements of Section 4101. Type IP, I(PM), IS, and I(SM) cement shall not be used in patching concrete unless approved in Materials I.M. 401.

2530.03, B, 4, f, Water Reducer.

Replace the first sentence:

A water reducing admixture may be used at the Contractor's option.

Section 2535

2535.06, B, Backfill.

Replace the first paragraph:

Granular backfill furnished will be measured in cubic yards (cubic meters) or in tons (megagrams), as indicated in the contract documents and as provided in Article 2402.12, D.

Section 2544

2544.05, Limitations.

Replace the second sentence of the first paragraph:

Except when this work is in preparation for a seal coat or slurry seal, crack filling will not be allowed on pavements from June 15 to September 15.

Section 2546

2546.04, B, Concrete Grout for Gabions.

Replace "Article 2507.04, B" with "Article 2507.04".

2546.05, B, Concrete Grout for Gabions.

Replace "Article 2507.05, B" with "Article 2507.05".

Division 26. Roadside Development.**Section 2601****2601.01, Description.**

Replace "Section 2525" with "Section 2602" in the sentence.

2601.05, A, Stabilizing Crop Seed Mixtures.

Replace the second line under "Summer -- May 21 to July 20":

Annual Rye 35 lbs. per acre (39 kg/ha)

2601.06, B, Application of Mulch.

Replace the second sentence:

The application rate for reasonably dry material shall be approximately 1 1/2 tons per acre (3.5 Mg/ha) of dry cereal straw, 2 tons per acre (4.5 Mg/ha) of wood excelsior, or 2 tons per acre (4.5 Mg/ha) of prairie hay, or other approved material, depending on the type of material furnished.

2601.22, Basis of Payment.

Delete "Mulching," from the first indented paragraph.

Add a new sixth indented paragraph:

For the quantity of mulch furnished and placed, the Contractor will be paid the predetermined contract unit price per acre (hectare).

Section 2602**2602.01, Description.**

Replace the first sentence of the second paragraph:

Projects that are regulated by the requirements of Iowa DNR National Pollutant Discharge Elimination System (NPDES), General Permit No. 2, for Storm Water Discharge Associated with Industrial Activity for Construction Activities, will be identified in the contract documents.

2602.03, Construction.

Replace the first sentence of the second paragraph:

The Contractor shall provide immediate, permanent, or temporary water pollution control measures to prevent contamination of adjacent watercourses and property.

Delete the third sentence of the second paragraph:

~~Disturbed areas shall be seeded and/or mulched as the excavation proceeds, to the extent considered desirable and practicable.~~

Replace "as directed by the Engineer" with "as determined by the Contractor" in the second sentence of the third paragraph.

Delete "as soon as conditions permit or as directed by the Engineer" in the last sentence of the fourth paragraph.

Replace "directed" with "approved" in the last sentence of the fifth paragraph.

Delete the sixth paragraph:

~~Under no conditions shall the surface area of erodible earth material exposed at one time by clearing and grubbing, excavation, borrow, or fill within the right of way exceed 750,000 square feet (70,000 m²), without approval by the Engineer.~~

Replace the sixth paragraph:

The Contractor shall limit clearing and grubbing, excavation, borrow, and embankment operations in progress to an area commensurate with their capability and progress in keeping the finish grading, mulching, seeding, and other pollution control measures current in accordance with the accepted work schedule. The Engineer may suspend operations if the Contractor fails to provide adequate erosion control measures in a timely manner.

2602.05, Basis of Payment.

Replace the second paragraph:

When it is necessary for the Contractor to clean out, repair, or reconstruct a silt ditch, dike, or basin, the additional payment will be 100% of the contract unit price for construction of that item. When applicable bid items are not in the contract documents, payment for clean out, repair, or reconstruction will be in accordance with Article 1109.03, B.

Section 2610

2610.03, I, Plant Establishment Period and Replacement.

Replace "Article 2610.07" with "Article 2610.03, E" in the fourth and seventh paragraphs.

2610.05, Basis of Payment.

Delete the last sentence:

~~If the substitute is not a contract item, payment will be made as extra work in accordance with Article 1109.03, B.~~

Section 2611

2611.01, Description.

Replace "Article 2610.03, 2610.06, 2610.07, or 2610.08" with "Article 2610.03, A; 2610.03, D; 2610.03, E; or 2610.03, F".

2611.05, A, After Initial Installation is Complete.

Replace "75%" with "65%" in the first sentence.

Division 41. Construction Materials.

Section 4101

4101.01, General Requirements.

Replace the entire article:

A. ASTM C 150 Cements.

Unless otherwise specified, Portland cement shall meet the requirements of ASTM C 150.

The alkali content expressed as total equivalent sodium oxide shall not be more than 0.60% for all cements.

B. ASTM C 595 Cements.

Unless otherwise specified, blended hydraulic cement shall meet requirements of ASTM C 595 and the following requirements:

1. The pozzolan constituent of Type IP cement shall not be more than 25 weight (mass) percent of the Portland-pozzolan cement.
2. The slag constituent of Type IS cement shall not be more than 35 weight (mass) percent of the Portland blast-furnace slag cement.
3. Type IP or I(PM) cement shall not contain Class C fly ash.
4. Blended cements produced with Type I clinker or Type I cement shall contain 20% ground granulated blast furnace slag or at least 20% Class F fly ash. All other blended cements shall be produced with Type II clinker.

C. Cement Type Usage.

Unless otherwise specified, cement type and usage in various pavements, structures, and other elements shall be as follows:

1. Type II cement shall be used in Interstate and Primary pavements, except for quantities less than 3600 square yards (3000 m²) furnished as transit mix concrete.
2. Type I or Type II cement may be used for all other applications. Type III cement may be used in precast and prestressed concrete only.
3. Type IP, Type I(PM), Type IS, or Type I(SM) cement may be furnished at the Contractor's option when Type I or Type II cement is specified. The limitations of Articles 2301.04, 2403.03, or 2412.02 shall apply.
4. The unit volume of Type IP, Type I(PM), Type IS, or Type I(SM) cement in the concrete shall be that specified for Type I or Type II cement, unless otherwise specified.

Cement which contains 5.0% or more of lumps retained on a No. 20 (850 µm) sieve will be rejected. Cement which contains less than 1.0% of lumps may be used without adjustment in the batch. For each 1.0% or fraction thereof from 1.0% to 5.0% of lumps found by test, batch weights (mass) of cement used in either concrete pavement or structural concrete shall be increased by 2.0% of the original value.

Air entrainment of the concrete is to be accomplished by the addition, at the time of mixing, of as approved air entraining admixture specified in Section 4103. Air entraining cement shall not be used.

Section 4109

4109.02, Testing Sieves.

Add gradation to the Aggregate Gradation Tables:

Grad. No.	Section No.	Intended Use	3/8" (9.5 mm)	4 (4.75 mm)	8 (2.36 mm)	30 (600 µm)	50 (300 µm)	100 (150 µm)	200 (75 µm)	Note
22	4125.02B	Fine Slurry Mixture	100	85-100	40-95	20-60	14-35	10-25	5-25	10

Replace "Slurry Tr." with "Coarse Slurry Mixture" in Grad. No. 23 on the Aggregate Gradation Tables.

Replace "75-100" with "75-90" in Grad. No. 31, Sieve Sz. 0.500" (12.5 mm) on the Aggregate Gradation Tables.

Delete Gradation No. 34:

~~34. 4130.05 {6" Cr. St.} Erosion Stone 100% passing the 9" screen - 100% retained on the 3" sieve.~~

~~34. 4130.05 {152.4 mm Cr. St.} Erosion Stone 100% passing the 228.6 mm screen - 100% retained on the 76.2 mm sieve.~~

Replace Note 9 of the Aggregate Gradation Tables:

9. When granular backfill is used under flowable mortar, one of the following alternative materials shall be used: natural sand complying with Section 4110, except the % passing the No. 200 sieve shall not exceed 4.0%. Gravel, crushed stone, or crushed concrete meeting gradation requirement of Section 4121. For floodable applications and use under flowable mortar, natural sand and gravel with 100% passing the 1.5" (37.5 mm) screen; 20-90% passing the No. 8 (2.36 mm) sieve; and 0-4% passing the No 200 (75 µm) sieve is less than 2%, the percent passing the No. 8 (2.36 mm) sieve may be 100%.

Add Note 10 to Aggregate Gradation Tables:

10. Gradation limitations for the 30, 50, and 100 (600 µm, 300 µm, and 150 µm) sieves shall not apply when slurry mixture is applied by hand lutes such as for slurry leveling.

Replace "and 33" with "33, and 34" in the "Notes:" at the end of the table.

Section 4115

4115.03, C, Maximum Permissible Amounts of Objectionable Material.

Replace "Clay lumps" with "Clay lumps and friable particles" as the first item in the chart.

4115.04, C, Requirements for Use.

Replace the fifth and sixth sentences of the first paragraph:

Class 3 durability or better will be required for all prestressed concrete units. Class 2 durability or better will be required for structural concrete and all precast concrete units, in accordance with Section 2403 and Section 2407, respectively.

Replace the second line in the "Use" column in Table 4115.04:

PCC Pavement, Widening, Bonded Overlay, Finish Patches, and Bridge Approaches

Replace the sixth line in Table 4115.04 and **insert** a new seventh line in Table 4115.04:

Specification Number	Minimum Durability Class Required			Use
	3i	3	2	
2407 (See 2407.03)			X	Precast Units
2407 (See 2407.03)		X		Prestressed Units

Delete the 19th entry and the first note in Table 4115.04:

Specification Number	Minimum Durability Class Required			Use
	3i	3	2	
2517 (See 2301)				Concrete Header Slabs
— Interstate System	X**			
— Primary System		X**		
— Other*			X	
Notes: *County, City, Park and Institutional Road Systems.				

4115.05, Gradation.

Replace the table:

Mix Class	Mix Number	Gradation Number
D	57, 57-6	3 or 5
A, B, C	2 to 8, V47B	3, 4, or 5
M	4	3, 4, or 5
A, B, C, M	V	7

Section 4120**4120.03, Class C Gravel.**

Replace “mud balls” with “clay lumps and friable particles” in the second item in the chart.

4120.04, Class A Crushed Stone.

Replace “mud balls” with “clay lumps and friable particles” in the first item in the chart.

4120.06, Class D Crushed Stone.

Replace “mud balls” with “clay lumps and friable particles” in the last sentence.

Section 4121**4121.01, A, Abrasion and Clay Content.**

Replace “45%” with “50%” in the first sentence.

Section 4123**4123.01, Description.**

Replace the second paragraph:

Recycled crushed PCC pavement, crushed composite pavement, and salvaged HMA shall be reclaimed from an Interstate or Primary roadbed under the jurisdiction of the Contracting Authority. Recycled PCC roadway pavement or recycled composite roadway pavement obtained from secondary roads or municipal streets may be used if the source of the aggregate is known and the PCC coarse aggregate durability is class 2 or better. When the source or quality of the material from the secondary or municipal pavement is unknown, the material shall meet the requirements of **Article 4123.01, A**. Certified RAP may be used.

Replace the third sentence of the fourth paragraph:

Crushed content of gravel, for purposes of this specifications, is defined as the percentage of particles, by weight (mass), as visually observed to have a minimum of one fractured face, **as determined by Materials I.M. 305.**

Section 4125**4125.01, B, 3, Gradation.**

Replace the entire article:

The composite aggregate, excluding mineral filler, shall meet requirements for Gradation No. 22 or No. 23 of the Aggregate Gradation Table referenced in Section 4109.

Section 4127**4127.03, Fine Aggregate.**

Replace “lumps, balls of clay” with “clay lumps and friable particles” in the second paragraph.

4127.04, Coarse Aggregate.

Add as the first sentence of the fifth paragraph:

Coarse aggregate abrasion loss shall not exceed 45% as determined in accordance with AASHTO T 96.

Replace “mud and clay balls” with “clay lumps and friable particles” in the last sentence of the fifth paragraph.

Section 4130

4130.01, Description.

Add as the last item in the fourth indented paragraph which starts with "For all projects":
For Erosion Stone: 15%, Method C.

4130.02, Class A Revetment.

Replace the entire article:

Individual stones of Class A revetment shall weigh not less than 50 pounds (25 kg) and not more than 400 pounds (180 kg). At least 75% of the stones shall weigh more than 75 pounds (35 kg). The Engineer shall visually examine selected samples of Class A Revetment. The stones shall have at least one flat face with one dimension at least 15 inches (375 mm).

Revetment shall have a nominal top size of 400 pounds (180 kg) and meet the following size limitations:

<u>Stone Weight, lbs. (Mass, kilograms)</u>	<u>Minimum % Larger Than Stone Weight (Mass)</u>
75(35)	75
50(25)	100

4130.03, Class B Revetment.

Replace the sentence:

The Engineer will visually examine selected samples of Class B revetment. Revetment shall have a nominal top size of 650 pounds (300 kg) and meet the following size limitations:

Delete the first item in the table:

~~650 (300)~~ — 0

4130.05, Erosion Stone or Buttress Stone.

Replace the entire article:

Stone for erosion control or as a buttress shall consist of a nominal 6 inch (150 mm) mixture, by visual examination, with 100% passing the 9 inch (225 mm) screen and 100% retained on the 3 inch (75 mm) screen. The stone shall meet the requirements of Article 4130.01, and not have more than 5% maximum clay lumps and friable particles.

Section 4131

4131.02, Quality.

Replace the first sentence:

Aggregate for this material shall be limestone and/or dolomite or gravel; free of visible clay lumps, friable particles, and objectionable clay coating.

Section 4136

4136.02, A, Poured Joint Sealer.

Replace the first paragraph:

Hot poured joint sealer shall be composed of petropolymers and be supplied in solid form. The sealer shall meet requirements of ASTM D 6690, Type IV.

4136.03, Preformed Expansion Joint Filler and Sealer.

Replace the title and entire article:

4136.03 Expansion Joint filler and Sealer.

Material for filling expansion joints shall be one of the following types. When the type is not specified, resilient filler shall be used.

A. Resilient Filler.

Resilient filler shall meet requirements of AASHTO M 213 and shall be furnished in strips of dimensions shown in the contract documents. When the self expanding type is specifically required, the material shall meet requirements of AASHTO M 153, Type III. Sealer used with these fillers shall meet requirements of Article 4136.02, A. Other resilient fillers may be approved by the Engineer. Approved sources of resilient expansion joint fillers are listed in Materials I.M. 436.03, Appendix A.

B. Flexible Foam Expansion Joint Filler.

Flexible foam expansion joint filler shall be of the size designated in the contract documents and shall be resistant to petroleum derivatives. The joint filler shall comply with the requirements of ASTM D 1752, Sections 5.1 to 5.4; with Section 5.3 modified to 10 psi (0.069 MPa) minimum and 25 psi (0.173 MPa) maximum when tested in accordance with AASHTO T 42. Approved sources for flexible foam expansion joint fillers are listed in Materials I.M. 436.05, Appendix A.

Sealer used with this filler shall **meet** the requirements of Article 4136.02, A.

C. Tire Buffings Expansion Joint Filler.

When designated in the contract documents tire buffings shall be used to fill expansion joints. Tire buffings shall consist of buffings from the tire retreading industry. Approved sources for tire buffings for expansion joints are listed in Materials I.M. 436.06, Appendix A. The tire buffings shall be clean, dry, and without any contamination. Tire buffings shall be placed loose and struck off level. Any compacted material shall be removed and replaced with loose material. Sealer shall meet the requirements of Article 4136.02, A. Approved sources for sealers are listed in Materials I.M. 436.01, Appendix A.

D. Elastomeric Joint Seals.

Elastomeric joint seals shall be of the size designated in the contract documents and of a shape approved by the Engineer. The seal and the lubricant adhesive shall meet requirements of AASHTO M 220.

Seals with splices will be acceptable only when splices are made using factory type methods approved by the Engineer. A splice shall not occur within 1 foot (0.3 m) of a sharp bend, when placed in final position, and no piece shall have more than one splice.

Section 4137**4137.02, Asphalt Binder.**

Replace "AASHTO MP1" with "AASHTO M 320" in the article.

Add as the second paragraph:

Modification of asphalt binders by addition of acids will not be allowed.

Section 4151**4151.02, B, Pavement Dowel Bars.**

Replace "powers" with "powders" in the third sentence of the second paragraph.

Section 4152**4152.02, Structural Steel.**

Replace "(20 at 4" with "(20 at 4)" in the third line of Minimum Average Energy column of Table A.

Section 4153

4153.04, Iron Castings.

Replace the second sentence of the first paragraph:

Unless otherwise specified, gray iron castings, bridge rockers, and shoes shall meet requirements of Class 35B, and ductile iron castings shall meet requirements of Grade 65-45-12.

4153.06, B, High Strength Fasteners.

Replace the first sentence:

High strength bolts, nuts, and washers shall meet the requirements of the appropriate ASTM Specifications as follows: bolts - A 325, nuts - A 563 Grade DH3, and washers - F 436.

4153.06, B, 2, a

Replace entire article:

- a. **Intentionally left blank.**

Section 4155

4155.01, Description.

Add as the second sentence:

Guardrail posts shall be wood or steel as specified in the contract documents.

4155.02, Formed Steel Beam Guardrail.

Delete the fourth sentence:

~~Anchor cable shall meet requirements of AASHTO M 30, Type II, Class A.~~

Replace the 5th, 6th, and 7th sentences:

Anchor bolts used to attach beam rail to bridge barrier rail shall meet requirements of ASTM F 1554, Grade **55 105**, and shall be full-length galvanized. Washers shall meet the requirements of ASTM F 436. Nuts shall meet the requirements of ASTM A 563, DH, and be heavy hex, Class 2B. All other bolts, nuts, and washers shall meet the requirements of ASTM A 307, Grade A; ASTM A 563, Grade A, hex; and ASTM F 844; respectively. Galvanizing shall meet the requirements of ASTM A 153, Class C.

4155.03, Cable.

Replace the entire article:

A. Cable Rail.

Cable shall meet **the** requirements of AASHTO M 30, Type I, Class A.

B. Anchor Cable.

Cable shall meet the requirements of AASHTO M 30, Type II, Class A.

4155.04, Wood Posts.

Replace the entire article:

Wood posts shall be sawed to the dimensions shown in the contract documents and meet requirements of Section 4164.

4155.05, Steel Posts.

Replace the entire article:

Steel posts and ~~plates blocks~~ shall ~~be galvanized~~ meet the requirements of ASTM A 36/A 36 M structural steel of the dimensions shown in the contract documents. ~~Steel posts and blocks shall be galvanized in accordance with the requirements of ASTM A 123.~~ Bolt holes shall be provided ~~and welding shall be done as~~

indicated and in accordance with Section 2408 Article 2408.39, B. Galvanizing shall be done after fabrication and after all bolt holes have been drilled.

4155.06, Miscellaneous Items.

Change the article number 4155.0607.

Add title and new article 4155.06:

4155.06 Spacer Blocks.

Wood spacer blocks shall meet requirements for wood posts. Steel spacers shall meet requirements for steel posts. Spacer blocks manufactured from alternate materials that have received FHWA approval for use on the National Highway System may be substituted for wood or steel spacer blocks. A list of approved spacer blocks is found on the World Wide Web at the following URL:
http://safety.fhwa.dot.gov/fourthlevel/pro_res_road_nchrp350.htm

Section 4161

4161.03, Treatment.

Replace the entire article:

Except as provided herein, preservative treatment shall be in accordance with requirements and recommendations of AWPA Standard C1 and the applicable AWPA Commodity Standards listed in the following table for various materials and usages:

TABLE 1: MINIMUM PRESERVATIVE RETENTION REQUIREMENTS						
(lb./cu.ft. of wood)						
(kilograms per cubic meter of wood)						
Material and Usage	Retention					AWPA Material Standard
	Creosote ⁽²⁾	Pentachlorophenol ⁽²⁾	ACA ⁽²⁾	ACZA ⁽²⁾	CCA ^{(1), (3)}	
Lumber and Timber for Structures	12 (192.2)	0.6 (9.6)	0.6 (9.6)	0.6 (9.6)	0.6 (9.6)	C2, C14
Piles for Foundation:						
Douglas Fir	17 (272)	-	-	-	-	C3, C14
Southern Pine	12 (192.2)	-	-	-	-	
Post, Guardrail, and Spacer Blocks: Sawed Four Sides	12 (192.2)	0.4 (6.4) 0.6 (9.6)	0.6 (9.6)	0.6 (9.6)	0.6 (9.6)	C2, C14
Posts, Fence Guide, and Sign:						
Round	8 (128)	0.3 (4.8) 0.4 (6.4)	0.4 (6.4)	0.4 (6.4)	0.4 (6.4)	C5, C14
Sawed Four Sides	10 (160)	0.4 (6.4) 0.5 (8.0)	0.5 (8.0) 0.4 (6.4)	0.5 (8.0) 0.4 (6.4)	0.5 (8.0) 0.4 (6.4)	C2, C14

Note: ⁽¹⁾ CCA shall not be used for the treatment of Douglas Fir.

⁽²⁾ Oil type preservatives

⁽³⁾ CCA, ACA, and ACZA are waterborne preservatives.

TABLE 2: MINIMUM PRESERVATIVE PENETRATION REQUIREMENTS			
inches (mm) of wood and/or % of sapwood penetration			
Material and Usage	Penetration		
	Southern Pine	Douglas Fir	AWPA Material Standard
Lumber and Timber for Structures	2.5 in. (63 mm) or 85%	Under 5 in. (125 mm) thick: 0.4 in. (10 mm) and 90% 5 in. (125 mm) and thicker: 0.5 in. (13 mm) and 90%	C2, C14
Piles for Foundation	2.5 in. (63 mm) or 85%	0.75 in. (19 mm) and 85% up to 1.6 in. (40 mm) and 85%	C3, C14
Post, guardrail, and Spacer Blocks:			
Sawed Four Sides	2.5 in. (63 mm) or 85%	Under 5 in. (125 mm) thick: 0.4 in. (10 mm) and 90% 5 in. (125 mm) and thicker: 0.5 in. (13 mm) and 90%	C2, C14
Posts, Fence, Guide, and Sign:			
Round	2.0 in. (50 mm) or 85%	3/8 in. (9 mm) and 100% up to 1 in. (25 mm) or 85%	C5, C14
Sawed Four Sides	2.0 in. (50 mm) or 85%	Under 5 in. (125 mm) thick: 0.4 in. (10 mm) and 90% 5 in. (125 mm) and thicker: 0.5 in. (13 mm) and 90%	C2, C14

Other aspects of the treatment shall meet the following requirements:

A. Incising.

Coastal Douglas Fir lumber shall be incised.

B. Seasoning.

When sawed material is treated with ~~chromated copper arsenate (CCA) waterborne preservatives (CCA, ACA, ACZA)~~, the moisture content prior to treatment, as determined by resistance type moisture meter, shall not be more than 20% ~~if kiln dried or not more than 23% if air dried~~. The moisture content shall be measured at a depth equivalent to the required penetration up to a maximum of 1.5 inches (38 mm). Unless otherwise specified, lumber 2 inches (50 mm) or less in nominal thickness that is treated with a waterborne preservative shall be dried after treatment to a moisture content of not more than 20% ~~if kiln dried or not more than 23% if air dried~~. ~~When treated with ammoniacal copper arsenate, sawed material shall be suitably seasoned or conditioned prior to treatment.~~

C. Special Treatment for Guardrail and Sign Posts Treated With Oil Type Preservative.

Before being removed from the treatment cylinder, sign and guardrail posts shall be further subjected to live steam at a maximum pressure of 13 psi (90 kPa), and following that, to an additional period of vacuum to insure that the surface of the wood is free from accumulation of oil type preservative.

D. Method of Treatment.

The preservative used shall be the same for all the product furnished for each contract item or order. Unless otherwise specified, treatment with creosote oil or pentachlorophenol solution shall be made by the empty cell process with initial air pressure. Treatment with waterborne preservative shall be made by the full cell process.

E. Results of Treatment.

Unless otherwise specified, retention ~~and penetration~~ of preservatives shall be in conformance with the above table~~s~~. Preservative retentions shall be determined by assay method. ~~Penetration and o~~Other treatment requirements shall be in accordance with AWPA Standard C1 and the applicable AWPA Commodity Standards listed in the above table~~s~~.

F. Handling Treated Products.

Care and handling of preservative treated wood products shall be in accordance with AWPA Standard M4.

G. Product Marking.

The individual pieces of inspected, treated material shall bear a legible identification mark either hammer or heat branded, die stamped, or metal tagged. For material treated with waterborne preservatives, the identification mark may be ink stamped provided the information is clearly visible and legible. As a minimum, the identification mark shall indicate the treater, the species of wood, the preservative treatment type, and the retention level. Additionally, the individual pieces of inspected, treated material shall be marked by the treating plant with the treatment charge number. Acceptable brands or marks shall be similar to the general guidelines for brands listed in accordance with AWPA M1 and M6, with the addition of the charge number. ~~except that b~~ Branding of piles shall be on the butt end. ~~The charge number shall be included in the markings on all treated piles.~~ When size permits, pieces are 2 inches by 2 inches (50 mm by 50 mm) or larger, each piece of inspected and approved sawed material shall be legibly hammer stamped on one or both ends by the ~~inspector or the immediate supervisor~~ treatment inspection agency. This ~~mark~~ treatment stamp shall identify the treatment inspection agency and the inspector. ~~The individual pieces of inspected, treated materials shall be marked by the treating plant with the treatment charge number.~~

H. Inspection.

White and treatment inspections, certifications, and test reports for each shipment shall be furnished in accordance with Materials I.M. 462.

Section 4162**4162.03, Minimum Acceptable Sizes.****Replace the first sentence of the first paragraph:**

All material furnished shall conform to the dimensions specified for ~~either~~ rough, ~~or~~ surfaced, ~~or surfaced hit or miss~~ stock.

4162.03, A, Manufacture.**Replace the first sentence:**

All pieces shall be ~~well manufactured~~ fully milled and processed, and unless otherwise specified, all ends shall be neatly cut at right angles to the ~~longest dimension, to a length not less than the length designated~~ length specified.

4162.03, B, Dimensions.**Replace the second sentence:**

~~±~~ Unless otherwise specified, the dimensions of all other material shall be in accordance with the industry standards approved by the Board of Review of the American Lumber Standards Committee for rough or surfaced stock, ~~as specified,~~ for the species furnished.

4162.04, Species of Wood.**Replace the second sentence:**

Construction parts less than a nominal thickness of 2 inches (50 mm) ~~and including~~ all boards, strips, and sheathing, may be Douglas Fir (coast region), Southern Pine, West Coast Hemlock, Ponderosa Pine, Idaho White Pine, Sugar Pine, or White Fir.

4162.06, Stress Grade Timber and Lumber.**Replace the entire article:**

Material furnished under this specification shall be either Douglas Fir (coast region) or Southern Pine. The material shall be graded as provided in ASTM D 245, ~~"National Design Specifications for Stress Grade Lumber and its Fastenings"~~, and by rules of associations ~~representing these industries as approved by the~~ American Lumber Standards Committee.

Material shall be of the grade specified for each species. ~~Douglas Fir (Coastal Region) shall be graded according to the grading rules published by the Western Wood Products Association or the West Coast Lumber Inspection Bureau. Southern Pine shall be graded according to the grading rules published by the~~

Southern Pine Inspection Bureau. When a stress grade is identified as structural or common class, Table 4162.06 A shall apply. When a stress grade is identified as common class, Table 4162.06 B shall apply. Unless otherwise specified, the material may be either Douglas Fir or Southern Pine.

Table 4162.06 A	
Structural Class*	Grade
Light Framing: Douglas Fir Southern Pine	Dense No. 2 No. 2 Dense
Joists and Plank: Douglas Fir Southern Pine	Select Structural or Dense No. 1 Dense Structural 72
Beams and Stringers: Douglas Fir Southern Pine	Dense Select Structural Dense Structural 86
Posts and Timbers: Douglas Fir Southern Pine	Dense Select Structural Dense Structural 72
<p>* Structural class is based on a nominal extreme fiber stress in bending of 1,900 psi (13 MPa) (minimum 1,850 psi (12.8 MPa)) for light framing, and joists, and plank in a repetitive member use, and for beams and stringers in a single member use. Structural class for posts and timbers is based on a compression stress parallel to the grain of 1,100 psi (7.6 MPa) when used as a column; when used as a beam in a single member use, the minimum extreme fiber stress in bending is 1,750 psi (12 MPa). Use is assumed in a location where the moisture content will not exceed 19% for an extended period of time. Treatment for durability (Section 4161) is also assumed, where appropriate specified.</p>	

Table 4162.06 B	
Common Class*	Grade
Light Framing: Douglas Fir Southern Pine	No. 2 No. 2 Dense
Joists and Plank: Douglas Fir Southern Pine	No. 1 Dense Structural 65
Posts and Timbers: Douglas Fir Southern Pine	Select Structural Dense Structural 65
<p>* Common class is based on a nominal extreme fiber stress in bending of 1,500 psi (10.3MPa) (minimum 1,450 psi (10 MPa)) for light framing, and joists, and plank in a repetitive member use. Common class for posts and timbers is based on a compression stress parallel to the grain of 1,000 psi (7 MPa) when used as a column; when used as a beam in single member use, the minimum extreme fiber stress in bending is 1,450 psi (10 MPa). Use is assumed in a location where the moisture content will not exceed 19% for an extended period of time. Treatment for durability (Section 4161) is also assumed, where appropriate specified.</p>	

Untreated wood material that requires a grade shall be stamped with the identifying quality grade mark of an accredited grade monitoring and inspection agency approved by the American Lumber Standards Committee (ALSC) under the Untreated Wood Program.

When material is resized to shorter lengths, and the quality grade mark is no longer available, the lumber mill/processor shall certify the grade of the material.

Material less than 3 feet (1 m) in length does not require a grade mark; however, the grade of the material shall be certified by the certification statement from the mill/processor in accordance with Materials I.M. 462. Round wood posts, round wood piles, and round wood poles do not require a grade, since the grading rules apply only to sawn material.

Section 4164

4164.01, General Requirement.

Add new first paragraph:

When dried, either kiln dried or air dried, all posts shall be free from bends in more than one plane and free from short or reverse bends, and a straight line from the centers of the ends of a post shall not deviate from the longitudinal axis of the post at any point more than 0.5% of the length of the post.

4164.02, Round Wood Posts.

Replace the first sentence of the first paragraph:

All round wood posts shall be cut from live, sound, solid trees.

4164.03, Sawed Wood Posts.

Replace the entire article:

Sawed wood posts shall conform to the shape and nominal dimensions for rough stock and shall meet the applicable requirements of Section 4162 and Dense. The minimum grade for treated sawed wood guardrail posts, 5 inches by 5 inches (125 mm by 125 mm) and larger shall be No. 1 4400F for or better Douglas Fir (coast region) or No. 1 Dense SR 1550F for or better Southern Pine in accordance with the minimum strength requirements of AASHTO M 168.

4164.04, Wood Sign Posts.

Delete the last paragraph:

All posts shall be kiln dried or air dried prior to treatment to a moisture content of not more than 20%. When dried, all posts shall be free from bends in more than one plane and free from short or reverse bends, and a straight line from the centers of the ends of a post shall not deviate from the longitudinal axis of the post at any point more than 0.5% of the length of the post.

4164.06, Inspection.

Delete the word "sign" from the second sentence.

Section 4183

4183.03, B, 1, b, Resin Solids.

Replace the second sentence:

Acrylic emulsion polymer shall be Rohm & Haas E 3427, Dow Chemical DT 250, or an approved equal.

4183.03, B, 4, Packaging and Marking.

Replace "(2.5°C)" with "(25°C)" in the last paragraph.

4183.04, Epoxy Traffic Paint.

Replace the title:

Durable Paint Pavement Markings.

Replace the first paragraph:

Durable paint pavement markings shall meet the requirements of Materials I.M. 483.04.

Delete the second paragraph:

~~Final acceptance will be based on compliance with these specifications and also retroreflective readings which will be taken in 1 to 2 weeks after installation of the markings. The retroreflectivity will be measured, by the Engineer, with a 30 m geometry retroreflectometer. This instrument has an 88.76 degree entrance angle, and a 1.05 degree observation angle. The markings shall meet the following retroreflectivity requirements:~~

Specific Luminance
(mcd/sq. ft./ft.-cdl.)
(lux•m²)

White line, symbols and legends	300
Yellow line	200

Section 4185

4185.02, A, Anchor Bolt and Slip-Base Plate Fasteners for Lighting Poles.

Replace the second paragraph:

The anchor bolts shall meet the requirements of ASTM F 1554, Grade 105 (724 MPa), and be full-length galvanized. Anchor bolts shall be the Unified Coarse Thread Series and have Class 2A tolerance. The end of each anchor bolt intended to project from the concrete shall be color coded in red to identify the grade. Slip base plate 1 inch by 4 1/2 inch (25 mm by 112 mm) bolts shall meet the requirements of ASTM A 325, be high-strength bolts, and be fully galvanized. Washers shall be galvanized and shall meet the requirements of ASTM F 436. Nuts shall meet the requirements of ASTM A 563, DH, be heavy hex, and be galvanized. Nuts may be over-tapped in accordance with the allowance requirements of ASTM A 563. Galvanizing shall meet the requirements of ASTM A 153, Class C; or ASTM B 695, Class 50.

Section 4186

4186.03, Reflective Sheeting.

Replace the 4th, 5th, and 6th paragraph:

Type VI (Iowa) and Type VII (Iowa) sheeting shall meet the requirement of Materials I.M. 486.03. following materials requirements:

Fluorescent Orange: The sheeting shall be a fluorescent orange sheeting with a minimum total luminance factor (y) of 29. The fluorescent luminance factor (Y_F) shall be a minimum of 15 as measured with a Labsphere BFC 450 Bispectral Fluorescent Colorimeter. The sheeting shall meet the chromaticity coordinates shown in the following Table.

White: The sheeting shall be a white sheeting with a minimum total luminance factor (Y) of 37. The sheeting shall meet the chromaticity coordinates shown in the following Table.

Type VI (Iowa) and Type VII (Iowa) Chromaticity Coordinates

Color Point	Fluorescent Orange		White	
	X	Y	X	Y
1	0.583	0.416	0.303	0.297
2	0.523	0.397	0.368	0.353
3	0.560	0.360	0.340	0.380
4	0.634	0.369	0.274	0.316

Type VII (Iowa) sheeting shall have an initial Coefficient of Retroreflection according to the following table:

Type VI (Iowa) and Type VII (Iowa) Coefficient of Retroreflection

Observation Angle (Degree)	Entrance Angle (Degree)	Orange (Candela/lux/m²)	White (Candela/lux/m²)
0.2	-4.0	200	430
0.2	+30.0	60	220
0.5	-4.0	80	250
0.5	+30.0	34	130

After 1 Year of weathering on the Iowa Test Deck, per Article 4186.03, B, the Type VI (Iowa) and Type VII (Iowa) sheeting shall maintain a minimum retroreflectivity of 80% of the requirements for new sheeting. After 1 year of weathering, the chromaticity coordinates and luminance values shall meet the requirements for new sheeting.

4186.03, A, Utilization of Reflective Sheeting.**Add a sentence:**

Unless otherwise specified, all signs with white background shall use Type III or IV retroreflective sheeting.

4186.03, A, 1, Permanent Signs and Devices.**Replace the entire article:****1. Permanent Signs and Devices.**

Unless otherwise specified, all signs with white, yellow, green, red, blue, or brown background shall use Type III or IV retroreflective sheeting. The legend on white and yellow signs shall be accomplished with black nonreflective sheeting that is direct applied, or silk screened with black opaque ink. The legend on green signs shall be accomplished with white Type III or IV retroreflective sheeting that is direct applied or with detachable copy. The legend on red signs shall be accomplished using either transparent red ink that is reverse silk screened on white Type III or IV sheeting, or with white type III or IV retroreflective sheeting that is direct applied on a red Type III or IV retroreflective sheeting background. The legend on blue or brown signs shall be accomplished using either transparent ink that is reverse silk screened on white Type III or IV sheeting, with white type III or IV retroreflective sheeting that is direct applied, or with detachable copy.

Type III or IV retroreflective sheeting shall be used for permanent road closure barricades.

2. Work Zone Signs and Devices.**a. Interstate and Primary Highways.**

Unless otherwise specified, all All rigid signs with orange backgrounds shall use Type VII (Iowa) retroreflective sheeting. The legend shall be accomplished with black nonreflective sheeting that is direct applied or silk screened with black opaque ink. Unless otherwise specified, all All flexible roll-up signs with orange backgrounds shall use Type VI (Iowa) retroreflective sheeting. The legend shall be accomplished by silk screening with black opaque ink.

STOP/SLOW and SLOW/SLOW paddles shall use Type VII (Iowa) retroreflective sheeting. The black legend shall be accomplished with black nonreflective sheeting that is direct applied or silk screened with black opaque ink on orange Type VII (Iowa) retroreflective sheeting. The white legend shall be accomplished with transparent red ink that is reverse silk screened on white Type VII (Iowa) retroreflective sheeting.

Until January 1, 2007, Type III or IV retroreflective sheeting shall be used for barricades and vertical panels. Until January 1, 2007, Reboundable drums, tubular markers, and other reboundable markers shall use Type III or IV retroreflective sheeting that is designed for reboundable devices.

After January 1, 2007, Type VII (lowa) non-fluorescent retroreflective sheeting shall be used for barricades, vertical panels, and all other work zone traffic control devices that use premanufactured barricade sheeting. After January 1, 2007, Type VII (lowa) fluorescent orange and Type III or IV white retroreflective sheeting shall be used for drums, 42 inch (1050 mm) channelizers, tubular markers, and all other work zone traffic control devices that use horizontal sheeting. Reboundable traffic control devices shall use Type III or IV or Type VII (lowa) sheeting that is designed for such devices. At the Contractor's option, work zone traffic control devices sheeted with Type III or IV and VII (lowa) retroreflective sheeting may be used prior to January 1, 2007, as long as all work zone traffic control devices of the same type on a project utilize the same sheeting.

b. Other Highways.

Unless otherwise specified, all rigid post mounted signs with orange backgrounds shall use Type III or IV retroreflective sheeting. Unless otherwise specified, all skid mounted signs with orange backgrounds shall use Type I or II retroreflective sheeting. The legend shall be accomplished with black nonreflective sheeting that is direct applied or silk screened with black opaque ink.

STOP/SLOW and SLOW/SLOW paddles shall use Type I or II retroreflective sheeting. The black legend shall be accomplished with black nonreflective sheeting that is direct applied or silk screened with black opaque ink. The white legend shall be accomplished with transparent red ink that is reverse silk screened on white retroreflective sheeting.

Type III or IV retroreflective sheeting shall be used for barricades and vertical panels. Reboundable drums, tubular markers, and other reboundable markers shall use Type III or IV retroreflective sheeting that is designed for reboundable devices.

At the Contractor's option, work zone signs and devices using retroreflective sheeting in accordance with Article 4186.03, A, 2, a above, may be used on all other highways.

4186.09, A, Type A Signs.

Replace entire article:

A. Type A Signs

Type A sign fasteners shall be as follows:

1. Bolts.

Bolts shall be 3/8 inch (9.5 mm) in diameter with a hexagonal head. Thread fit shall conform to ANSI Class 2A. The length required shall be dependent upon the type of post supplied by the Contractor (wood, steel or aluminum). The minor thread diameter shall be used in determining stress area.

2. Nuts.

Nuts shall be finished, finished thick, regular, or heavy, hexagonal, self locking nuts for 3/8 inch (9.6 mm) bolts, but all nuts shall be of the same type. The axial tensile strength at room temperature shall be not less than 4,730 pounds (21 kN).

3. Self Locking Nuts.

Self locking nuts shall be approved by the Engineer. Thread fit shall be as recommended by the manufacturer.

4. Washers.

Washers shall be made of a quality of material approved by the Engineer. The washers shall be 3/8 inch (9.5 mm) I.D. x 1 3/8 inch (35 mm) O.D. x 0.125 inch (\pm 3 mm). A thickness tolerance of \pm 0.006 inch (0.15 mm) will be allowed.

Neoprene washers shall be 3/8 inch (9.5 mm) I.D. x 15/16 inch (24 mm) O.D. x 1/8 inch (3 mm) thickness. (Neoprene washers are required when treated wood posts are used). Durometer hardness shall be 60 to 70 with a tolerance of \pm 5.

5. Other Details.

Other details, including post clips on I-beams posts, etc., are shown in the contract documents.

Hardware may be furnished in stainless steel or galvanized steel as approved by the Engineer. Galvanizing shall meet requirements of ASTM A 153, Class D, or ASTM B 633, Class Fe/Zn 12, Type 1.

4186.10, B, Steel Breakaway Posts for Type B Signs.

Replace the fifth sentence of the first paragraph:

The coating shall be applied by the hot dip process in compliance with ASTM A 123, Grade 85.

Replace the fifth paragraph:

Bolts (including the entire length of the anchor bolts), nuts, and washers, shall be galvanized according to ASTM A 153, Class A coating.

Section 4187

4187.01, Description.

Replace the first paragraph:

Materials for aluminum alloy or galvanized overhead sign support structures shall meet the following requirements:

4187.01, B, Reserved.

Replace the title and paragraph:

B. Materials for Galvanized Steel Superstructures.

Materials for galvanized steel superstructure shall be of the type and quality specified in the contract documents.

4187.01, C, Fasteners for Aluminum Alloy.

Replace the title:

C. Fasteners for Aluminum Alloy and Galvanized Steel Superstructures and Anchor Bolts.

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

Replace all paragraphs of item 2:

The anchor bolts shall meet the requirements of ASTM F 1554, Grade 105 (724 MPa), and be full-length galvanized. Anchor bolts shall be the Unified Coarse Thread Series and have Class 2A tolerance. The end of each anchor bolt intended to project from the concrete shall be color coded in red to identify the grade. Washers shall be galvanized and shall meet the requirements of ASTM F 436. Nuts shall meet the requirements of ASTM A 563, DH, be heavy hex, and be galvanized. Nuts may be over-tapped in accordance with the allowance requirements of ASTM A 563. Galvanizing shall meet the requirements of ASTM A 153, Class C; or ASTM B 695, Class 50.

Section 4195

4195.02, Neoprene Bearing Pads.

Replace the second item of Table B:

D 412	Tensile Strength, minimum psi (MPa)	2500 2250 (17.2 15.5)	2500 2250 (17.2 15.5)	2500 2250 (17.2 15.5)
	Ultimate elongation, minimum %	400	350	300

Replace the note at the bottom of Table B:

Laminates shall be rolled mild steel sheets conforming to ASTM A 570/A 570M A 1011/A 1011M, Grade 33, Grade 36, Type 1 and 2, or Grade 40, unless otherwise specified by the Engineer.