



GS-23002

(Replaces SS-23006)

General Supplemental Specifications for Highway and Bridge Construction

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THE STANDARD SPECIFICATIONS, SERIES 2023, ARE AMENDED BY THE FOLLOWING MODIFICATIONS, ADDITIONS, AND DELETIONS. THESE ARE GENERAL SUPPLEMENTAL SPECIFICATIONS AND SHALL PREVAIL OVER THOSE PUBLISHED IN THE STANDARD SPECIFICATIONS. REVISIONS INCLUDED IN PREVIOUS SERIES 2023 GENERAL SUPPLEMENTAL SPECIFICATIONS ARE NOT INCLUDED IN THIS EDITION.

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Appendix. 16

Aggregate Gradation Table. 16

Division 11. General Requirements and Covenants.

Section 1103

1103.06, Execution of Contract.

Replace the Article:

The bidder to whom a contract is being awarded shall execute and file ~~two copies of~~ such contract with the Contracting Authority.

Section 1107

1107.06, B, 2.

Replace the bulleted items:

- non-ferrous metals;
- plastic and polymer-based products (including polyvinylchloride, composite building materials, and polymers used in fiber optic cables);
- glass (including optic glass);
- fiber-optic cable (including drop cable);
- optical fiber;
- lumber; ~~or~~
- engineered wood; or
- drywall.

Division 21. Earthwork, Subgrades, and Subbases.

Section 2120

2120.03, A.

Replace the Article:

For contracts where the Department is the Contracting Authority, applied to eligible items as the work is done. For contracts where the Department is not the Contracting Authority, Applied to eligible items as the work is done, when the contract quantity of that eligible item is 50,000 cubic yards or more.

2120.03, C.

Replace the Article:

Fuel adjustment using a FUF of 0.27 gallon per cubic yard will be applied to Embankment-in-Place, Contractor Furnished, and Embankment-in-Place ~~(non-dredge material)~~.

2120.03, D.

Delete the Article:

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

2120.04, A.

Replace the Article:

For contracts where the Department is not the Contracting Authority, Provide the Engineer with a monthly spreadsheet (the Engineer will provide the format) with quantities, and the fuel adjustment for the month (even if there will be no adjustment).

2120.04, B.**Replace the Article:**

For contracts where the Department is not the Contracting Authority, if the contract quantity for an item is in tons, convert the quantity to cubic yards using an appropriate conversion factor the Engineer approves. The total quantity of cubic yards for each month (Y) is the sum of these quantities.

2120.04, E.**Replace the Article:**

A fuel adjustment will be made for items of work covered in this specification when the CPI for the month the work is performed is more than ~~\$0.15 per gallon~~ 5% different than the BPI established at the beginning of the project.

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

- a.** If the CPI is greater than the BPI plus ~~\$0.15~~ 5%, then the fuel adjustment will be positive which warrants additional payment to the Contractor. The following formula will be used to calculate the additional payment:

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

$$FA = FUF(CPI - (BPI \times 1.05))Y$$

- b.** If the CPI is less than the BPI minus ~~\$0.15~~ 5%, then the fuel adjustment will be negative and a credit will be due to the contracting authority. The following formula will be used to calculate the credit:

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

$$FA = FUF(CPI - (BPI \times 0.95))Y$$

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

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

$$FA = (CPI - (BPI + 0.15)) \times (\text{billed gallons of fuel used per month})$$

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

$$FA = (CPI - (BPI - 0.15)) \times (\text{billed gallons of fuel used per month})$$

2120.05 Basis of Payment.**Replace the Article:**

- A.** Payment will be the Fuel Adjustment (FA) for each month, subject to the deduction for partial payments described in Article 1109.05. Should the Fuel Adjustment (FA) be negative, an equal amount will be deducted on payments made to the Contractor from sums otherwise due. This payment or deduction will be made by change order for contracts where the Department is not the Contracting Authority or automatically in each pay estimate for contracts where the Department is the Contracting Authority.

- B.** On completion of the work of the contract:

- 1.** For all items covered in Article 2120.03, B or 2120.03, C, the sum of the total quantities (Y) for each monthly period will be adjusted by pro-rating, if necessary, to agree with the final quantities to be paid.
- 2.** For the item covered in Article 2120.03, D, the sum of the total quantities for billed gallons of fuel used for each monthly period will be adjusted, if necessary, to agree with the final quantities to be paid. This adjustment will be made by either:

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

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

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

Division 23. Surface Courses.

Section 2301

2301.03, A, 3, a, 6, a, Vibrators.

Replace Articles 7 through 9:

- (7) Use a vibrator monitoring device that meets all of the following:
- (a) Has a readout display near the operator's controls visible to the paver operator and the Engineer.
 - (b) Operates continuously while paving.
 - (c) Displays all vibrator frequencies with manual or automatic sequencing among all individual vibrators.
 - (d) Records, at a minimum, the clock time, station location, paver track speed, and operating frequency of individual vibrators. Make recordings after each 25 feet of paving or after each 5 minutes of time. ~~In lieu of recording device, a non-recording, electronic monitor may be mounted on side of paver to display vibration frequency.~~
- (8) Provide the Engineer with an electronic record daily for the first 3 days of paving and weekly thereafter. The Engineer may determine that more frequent submission is necessary, particularly if equipment malfunctions occur. ~~When using a non-recording, electronic monitor to display vibration frequency, manually record vibrators once per day.~~
- (9) If the electronic monitoring ~~device~~ sensor in the vibrator fails to operate properly, manually check vibrators immediately. If vibrators are functioning properly, paving may continue, ~~but correct the problem as soon as possible with~~ with manual checking every 4 hours of operation. Increase frequency of manual checks if changes in concrete mix or paving operation occur. Engineer will witness and document readings. If recording device or vibrator display fails to operate, paving may continue with manual checking, but correct the malfunction ~~within 3 paving days~~ prior to use on next project. ~~The Engineer may allow additional time if circumstances are beyond the Contractor's control.~~

2301.03, U, 5.

Replace the Article:

At the Contractor's option, when Type I/II or Type IL cements are used, fly ash may be substituted for up to 10%, by weight, of the cement in Class M concrete mixtures. Type IP, ~~and~~ Type IS, and Type IT cements may be used in Class M concrete mixtures without fly ash substitution.

2301.05, A, 3.

Replace the first equation in the Article:

Use the following formula to determine the thickness index for a section of pavement greater than 3500 square yards:

$$\text{Where: } TI = (\bar{X} - S) - T$$

TI = thickness index for the section.

\bar{X} = mean core length for the section.

T = design thickness. Include subbase adjustment from IM 346.

S = core length standard deviation (of the sample) for the section.

Section 2303

2303.05, H, 2, c.

Delete the Article:

~~c. On days when liquidated damages have been assessed.~~

Section 2310

2310.03, Construction

Add the Article:

E. Time for Opening Pavement for Use.

1. The time for opening pavement for use shall be in accordance with [Article 2301.03, U.](#)
2. When the maturity method for opening is utilized, the Engineer may allow an opening strength requirement of 350 psi, for overlays 6 inches or greater.

Section 2316

2316.02, A, 7, Exclusions.

Add to the beginning of the Article:

Roundabouts will be excluded from smoothness testing. The surface of a roundabout shall not deviate from a straight line by more than 1/8 inch in 10 feet when measured longitudinally with a 10 foot straightedge.

2316.02, D, 1.

Add to the end of the Article:

j. Roundabouts.

Section 2317

2317.03, B, 1.

Replace the first sentence:

Determine an MRI using the latest version of the ProVAL "Ride Quality" or "Smoothness Assurance" analysis and following the procedures shown in [Materials I.M. 341, Appendix A](#) for each segment of finished pavement surface with a posted speed or advisory speed over 45 mph except for:

2317.04, F, Corrective Work.

Replace the first paragraph of the Article:

When the Contractor is not responsible for the adjoining surface, ALR in the 20 45 feet at the beginning or end of a section will be reviewed by the Engineer. Correction of ALR determined to be beyond the control of the Contractor will be paid according to [Article 1109.03, B.](#) Correct ALR determined to be under the control of the Contractor and resulting from the Contractor's operations. ~~Correction of ALR determined to be beyond the control of the Contractor will be paid according to Article 1109.03, B.~~ Complete the corrective work prior to determining pavement thickness. Do not use bush hammers or other impact devices.

2317.04, F, 2, a.

Replace the Article:

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

- 1) The binder bitumen may be the emulsion or cutback asphalt used for tack coat, applied at a rate of 0.10 gallon per square yard. Hand methods may be used for spraying.

- 2) Apply a cover aggregate consisting of sand (slightly damp, but with no free moisture as determined by visual inspection) at a rate of 10 pounds per square yard. Hand methods may be used for spreading. Embed cover aggregate with at least one complete pneumatic roller coverage.
- 3) This seal coat is intended to be placed immediately after the diamond grinding is completed in the travel lane. Do not place when road surface temperatures are below 60°F, unless approved by the Engineer.
- 4) Labor, equipment, and materials used for this seal coat are incidental to other items and will not be paid for separately.

2317.05, Basis of Payment.

Replace Table 2317.05-3:

Table 2317.05-3: Schedule for Adjustment Payment for PCC Pavements for Primary and Interstate Projects

MRI (inches per mile)	Dollars per 0.1 mile segment per lane	
	Design Thickness	
	Full Depth (>6")	Overlay (<=6")
Less than 47.5	1,500.00	1,250.00
47.5 to 57.5	8,625.00-(150*MRI)	5,226.596-(133.2623*MRI)
57.5 to 75	Unit Price	Unit Price
75 to 90	7,500.00-(100*MRI) (or grind ¹)	6,250.00-(83.333*MRI) (or grind ¹)
Greater than 90	Grind ¹	Grind ¹
1. Correct these areas below 75.0 inches per mile		

Replace Table 2317.05-4:

Table 2317.05-4: Schedule for Adjustment Payment for PCC Pavements for Non-Primary Projects

MRI (Inches per mile)	Dollars per 0.1 mile segment per lane
Less than 60.0	300.00
60.0 to 70.0	2,100.00-(30*MRI)
70.0 to 80.0	0.00
80.0 to 95.0	1,600.00-(20*MRI) or grind ¹
Greater than 95.0	Grind ¹
1. Correct these areas to below 80.0 inches per mile	

Replace Table 2317.05-5:

Table 2317.05-5: Schedule for Adjustment Payment for HMA Pavements for Primary and Interstate Projects

MRI (inches per mile)	Dollars per 0.1 mile segment per lane	
	Design Thickness	
	Full Depth (>4")	Overlay (<=4")
Less than 29.84	1,500.00	1,250.00
29.84 to 39.22	6,271.915-(159.915*MRI)	5,226.596-(133.2623*MRI)
39.22 to 75	Unit Price	Unit Price
75 to 90	7,500.00-(100*MRI) or grind ¹	6,250.00-(83.333*MRI) or grind ¹
Greater than 90	Grind ¹	Grind ¹
1. Correct these areas below 75.0 inches per mile		

Replace Table 2317.05-6:

Table 2317.05-6: Schedule for Adjustment Payment for HMA Pavements for Non-Primary Projects

MRI (Inches per mile)	Dollars per 0.1 mile segment per lane
Less than 35.0	300.00
35.0 to 45.0	1,350.00-(30*MRI)
45.0 to 80.0	0.00
80.0 to 95.0	1,600.00-(20*MRI) or grind ¹
Greater than 95.0	Grind ¹
1. Correct these areas to below 80.0 inches per mile	

Division 24. Structures.

Section 2433

2433.03, D, 1, General.

Add the Article:

h. The Contractor shall bear full responsibility for the stability of the shaft during construction.

2433.03, D, 4, c.

Add to the end of the Article:

Excavate the shaft using a continuous operation until the permanent casing is placed.

Division 25. Miscellaneous Construction.

Section 2520

2520.03, A, 1, d.

Replace the Article:

Desk with drawers, ~~three~~ five chairs, a closet, and a suitable worktable space.

2520.03, A, 1, n.

Replace the Article:

Provide a device ~~to allow~~ capable of providing wireless internet connectivity for multiple inspectors ~~to access the internet wirelessly~~, such as a mobile hotspot. ~~Provide a minimum of 10 GB of data usage monthly.~~ Ensure consistent average data speeds of no less than 25 Mbps for downloads and 5 Mbps for uploads with an unlimited data plan. Any data throttling or speed reduction policies after reaching a certain threshold should not affect the stated speed requirements. In the event the job trailer cannot be placed in an area with the stated average speeds, placement must be approved by the Engineer. This device will be considered a part of the field laboratory and shall stay with the field laboratory. If the field laboratory and field office are located adjacent to each other, one device may be adequate to cover both, so long as the signal is strong and can be accessed from both trailers. ~~The Contracting Authority will pay data charges for usage above the monthly minimum.~~

2520.03, B, 1, h.

Replace the Article:

A plan table, ~~a plan storage rack~~, a two office desks, ~~three~~ five straight chairs, ~~a drafting stool~~, a water cooler dispenser, a floor broom, and a 10 pound rated capacity carbon dioxide fire extinguisher.

2520.03, B, 1, l.

Replace the Article:

Wireless connectivity. Provide a device ~~to allow~~ capable of providing wireless internet connectivity for multiple inspectors ~~to access the internet wirelessly~~, such as a mobile hotspot. ~~Provide a minimum of 3 GB of data usage per month.~~ Ensure consistent average data speeds of no less than 25 Mbps for downloads and 5 Mbps for uploads with an unlimited data plan. Any data throttling or speed reduction policies after reaching a certain threshold should not affect the stated speed requirements. In the event the job trailer cannot be placed in an area with the stated average speeds, placement must be approved by the Engineer. This device will be considered a part of the field office and shall stay with the field office. If the field laboratory and field office are located adjacent to each other, one device may be adequate to cover both, so long as the signal is strong and can be accessed from both trailers.

Section 2527

2527.02, D, 2, Traffic Paint.

Replace Articles b through d:

b. Waterborne and Solvent-based Paint.

- 1) Meet the requirements of [Section 4183](#) for fast dry paint.
- 2) Use the nominal application paint and glass bead rates shown in Tables 2527.02-1 and 2527.02-2:

Table 2527.02-1: Waterborne Paint

Line Width	Wet-Film Thickness	Paint	Spheres
4"	14 mils	343.7 ft. of solid line per gallon of paint.	9.0 lb./gal.
6"	18 mils	178.2 ft. of solid line per gallon of paint.	11.0 lb./gal.

Table 2527.02-2: Solvent-based Paint

Line Width	Wet-Film Thickness	Paint	Spheres
4"	16 mils	300.8 ft. of solid line per gallon of paint.	9.0 lb./gal.
6"	18 mils	178.2 ft. of solid line per gallon of paint.	11.0 lb./gal.

c. Durable Paint Pavement Markings.

- 1) Meet requirements of [Article 4183.04](#).
- 2) Provide the Engineer with a copy of the manufacturer's recommendations for applying the marking material upon request. Install the marking material according to the product manufacturer's recommendations. Use the same Provide a minimum binder thickness as applied on the National Transportation Product Evaluation Program (NTPEP) AASHTO Product Evaluations and Audit Solutions deck with a tolerance of 10% of 25 mils. The minimum bead application rate shall be 15 pounds per gallon, bead gradation is AASHTO M 247 Type 3 or as approved by the Engineer, and bead coating is at the discretion of the Contractor as recommended by the manufacturer of the durable paint product. Use an appropriate Modify the bead package as necessary to consistently meet or exceed the minimum retroreflectivity requirements. For wet reflective applications, mix paint with 5 pounds per gallon of reflective spheres / elements meeting [Materials I.M. 484 Appendix B](#).
- 3) Demonstrate to the Engineer at the start of the project the ability to meet the retroreflectivity requirements of these specifications when tested according to [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.
- 4) Final acceptance will be based on compliance with these specifications. Ensure the markings meet the following retroreflectivity requirements. The Engineer will Use the procedure in [Materials I.M. 386](#) to determine retroreflectivity. Provide average retroreflective values per mile to the Engineer. The Engineer may help define locations for measurement of retroreflectivity. In no case should there be less than five retroreflectivity checks per mile. Number of checks will be averaged against values obtained to determine compliance to minimum retroreflectivity values.

**Minimum Coefficient of Retroreflected Luminance
mcd/sq.ft./ft.-cdl.**

White line, symbols, and legends	300
Yellow line	200

d. High-Build Waterborne Paint Pavement Markings.

- 1) Provide high build waterborne paint listed in [Materials I.M. 483.03, Appendix C](#).
- 2) Supply Engineer with a copy of paint manufacturer's recommendations for applying marking material. Include in recommendations minimum pavement temperature required for painting. Install paint according to manufacturer's recommendations. Provide binder thickness of 0.022 0.025 inches ± 0.0025 0.0035 inches. Use glass beads / elements complying with [Materials I.M. 484](#). Use a Bead application rate, of 15 pounds per gallon. Utilize AASHTO M 247 Type 3 bead gradation, and Use bead coatings is at the discretion of the Contractor as recommended by the manufacturer of the high-build paint product. Provide a bead package that will ensure initial retroreflectivity requirements consistently at or above the minimum. For wet reflective applications, mix paint with 5 pounds per gallon of reflective spheres / elements meeting [Materials I.M. 484 Appendix B](#).
- 3) Demonstrate to Engineer at start of work the ability to meet initial retroreflectivity requirements.
- 4) Final acceptance will be based on compliance with these specifications. Ensure markings meet the following retroreflectivity requirements. Provide average retroreflective values per mile to the Engineer. The Engineer may help define locations for measurement of retroreflectivity. In no case should there be less than five retroreflectivity checks per mile. Number of checks will be averaged against values obtained to determine compliance to minimum retroreflectivity values.

Minimum Coefficient of Retroreflected Luminance**mcd / sq. ft. / ft.-cdl.**

White longitudinal lines	300
Yellow longitudinal lines	225

~~The Engineer will use the procedure in Materials I.M. 386 to determine retroreflectivity.~~

2527.03, H, 2, a, Groove width.**Replace the Article:**

For lines, a ~~Minimum of 8 inch width or the marking width plus 1 inch each side of marking, whichever is greater, with a tolerance of minus 0.0 inches and plus +/- 0.25 inches.~~ For symbols and legends, extend grooving 1 inch beyond the most extreme edge of the symbol in an allowable pattern as shown in the contract documents. Minimize grooved margin around symbols as determined by the Engineer.

2527.03, H, 2, b, Groove depth.**Replace the Article:**

~~For profiled marking tape, a~~ grooved depth of 0.080 inches +/- 0.010 inches applies to all pavement markings. ~~For all other markings, if a different groove depth as is recommended by the pavement marking manufacturer, the Engineer will determine the depth.~~

2527.03, H, 2, c, Groove length**Replace the first sentence:**

Full length of ~~tape~~ marking plus 3 inches minimum grooving transition on either end.

2527.04, B.**Replace the Article:**

The Engineer will measure the number of stations, based on a single ~~4 6~~ inch width, of painted, taped, and/or removed line. The length of each type of markings will be determined using beginning and ending points, and adjusting for breaks at side roads, median crossings, station equations, or other locations shown in the contract documents. The measurement for dashed and dotted lines will be adjusted to exclude skips. Measurement of lines wider or narrower than ~~4 6~~ inches will be adjusted by the quantity factor to a ~~4 6~~ inch line.

Section 2528**2528.03, J, Flaggers.****Replace the Article:**

1. Prior to flagging operations, ensure the flaggers are trained in safe flagging operations that comply with ~~Iowa DOT Flagger's Handbook~~ [Iowa DOT Flagger Training Materials](#), Part 6 of the MUTCD, and the Standard Specifications. Ensure training of flaggers includes the following:
 - a. ~~Issuing and reviewing Iowa DOT Flagger's Handbook~~ Reviewing the current [Iowa DOT Flagger Training Materials](#),
 - ~~b. Presentation of the current Iowa Professional Flagging Video,~~
 - ~~c~~ b. Issuing flagger training cards including the information below.
 - 1) Employee name,
 - 2) Date of training,
 - 3) Name of Instructor, and
 - 4) Expiration date of December 31 of the year following the training date.
2. Maintain a list of the flaggers trained and the date of the training.
3. Training is not required for short time, emergency, or relief assignment of employees to flagging operations. Payment will not be made in accordance with [Article 2528.05, I.](#)
4. Ensure flagger operations, equipment, and apparel comply with the current ~~Iowa DOT Flagger's Handbook~~ [Iowa DOT Flagger Training Materials](#).

5. When nighttime flagging is required, provide auxiliary lighting to illuminate the flagging stations according to the MUTCD, Part 6 and current ~~Iowa DOT Flagger's Handbook~~ [Iowa DOT Flagger Training Materials](#). Set up this lighting in such a manner to minimize glare to motorists. The cost of furnishing nighttime flagging station lighting is included in the lump sum price bid for Traffic Control.
6. Ensure flaggers always carry their flagger training card and show it upon request.

Section 2532

2532.03, A, Equipment.

Add the Article, **renumber** following Articles, and **replace** new Article 4:

2. Provide equipment with an effective wheelbase, or the distance between front wheel assembly transverse pivot point to the profile depth control drive wheels transverse pivot point, of no less than 12 feet.
3. Do not use grinding and texturing equipment that causes excessive ravels, aggregate fractures, spalls, or disturbance of the transverse and/or longitudinal joints.
4. Use grinding equipment with a minimum effective head width of 36 to 48 inches. For corrective work, use a minimum effective head of 36 inches.
5. Select the blade type and number of blades per foot (meter) to provide proper surface texture based on the concrete being ground, in particular, the coarse aggregate type.

2532.03, B, 1, e.

Replace the Article:

For multiple passes, carefully control the equipment to minimize the overlap. Ensure overlaps do not exceed ~~4 inch~~ 2 inches.

2532.03, B, 1, General.

Add the Article:

- i. When the coarse aggregate used in the existing pavement is limestone, longitudinally groove the surface after grinding in accordance with [Section 2557](#).

2532.03, C, 1, a.

Replace the last sentence:

The availability of this information will not constitute a guarantee that a profile other than that indicated will not be encountered at the time of ~~milling~~ grinding.

Section 2551

2551.02, Materials.

Replace Article C and **delete** Article D:

- C. For permanent crash cushions ~~and spare parts kits~~, use equipment and materials of new stock, unless the contract documents provide for the relocation or the use of fixtures furnished by others.
- ~~D. Refer to Materials I.M. 455, Appendix A, for parts to be included in spare parts kits. Spare parts kits are to be supplied by the crash cushion manufacturer and contain materials designated for repairing the specific brand and model of crash cushion furnished.~~

2551.04, Method of Measurement.

Delete Article C and **renumber** Article D:

- ~~C. **Crash Cushion Spare Parts Kits.**
By count for crash cushion spare parts kits delivered to the local maintenance office.~~

- D C.Backup structures, paved footings, and additional connection hardware.**
Not measured separately for payment.

2551.05, Basis of Payment.

Delete Article C and renumber Article D:

- ~~C. Crash Cushion Spare Parts Kits.~~
Each.

- D C.Backup structures, paved footings, and additional connection hardware.**
Incidental to crash cushions.

Section 2557

2557, Portland Cement Concrete Pavement Grooving.

Add the Section:

Section 2557. Portland Cement Concrete Pavement Grooving

2557.01 DESCRIPTION.

Use diamond grooving equipment to produce longitudinal grooves on existing PCC pavement surface.

2557.02 MATERIALS.

None

2557.03 CONSTRUCTION.

A. Equipment.

Use equipment meeting [Article 2532.03, A.](#)

B. Pavement Grooving.

1. Use equipment with longitudinal grooving blades 0.95 inches \pm 0.05 inches wide.
2. Cut grooves meeting the following:
 - a. 1/8 inch \pm 1/16 inch wide,
 - b. 1/8 inch to 3/16 inch deep and,
 - c. Uniformly spaced at 3/4 inch intervals, measured center to center of groove.
3. Ensure grooves are parallel to centerline of the roadway.
4. Do not groove within 3 inches of longitudinal joint or edge of pavement.

C. Limitations

Observe limitations in [Article 2532.03, D.](#)

2557.04 METHOD OF MEASUREMENT.

Square yards of Longitudinal Grooving of Concrete, Pavement, shown in contract documents

2557.05 BASIS OF PAYMENT.

Contract unit price per square yard for Longitudinal Grooving of Concrete, Pavement.

Division 26. Roadside Development.**Section 2601****2601.03, C, 3, a, Preparation and Application.**

Replace Article 2 and **add** the Article:

- 2) In areas without existing stabilizing crop residue, prepare seedbed according to [Article 2601.03, B, 4, a](#), and apply seed according to [Article 2601.03, B, 4, d](#), using only a drop seeder complying with [Article 2601.03, A, 19](#).
- 3) In areas with existing stabilizing crop residue, apply seed with a slit seeder or a native grass seed drill with a no till attachment. Seedbed preparation will not be required, except for areas with rills and gullies.

Section 2602**2602.03, L, 3.**

Add to end of Article:

Multiple mobilizations will also not be paid for the same equipment used to perform different items of erosion control work.

Division 41. Construction Materials.**Section 4136****4136.02, C, Preformed Elastomeric Joint Seal.**

Replace the Article:

Apply ~~AASHTO M 220~~ ASTM D 2628 for pavements or ASTM D 3542 for Bridges, including requirements for lubricant adhesive. Obtain Engineer's approval for the dimensions and shape.

4136.03, D, 1.

Replace the third sentence:

For the seal and the lubricant adhesive, meet the requirements of ~~AASHTO M 220~~ ASTM D 2628 for pavements or ASTM D 3542 for Bridges.

Section 4145**4145.02, B.**

Replace the third sentence:

Renew all markings ~~made using paint~~ before the original markings become unreadable.

Section 4148**4148.01, General Requirements.**

Replace the first sentence:

For concrete drain tile meet the requirements of AASHTO M 178 or ASTM C 412, standard quality, extra quality, or special quality, as specified, or for clay drain tile meet ~~AASHTO M 179~~ ASTM C 4, standard, extra quality, or heavy duty, as specified.

Section 4151**4151.02, B, 1, a, Solid Dowels.**

Replace the first sentence:

Use plain round or elliptical bars meeting requirements of:

4151.02, B, 3.**Replace the Article:**

Furnish dowels, with the exceptions of end of run and header joints, in approved assemblies as shown in the contract documents. Use tubular and elliptical dowels in load transfer assemblies only. Ensure all dowels, including end of run and header dowels, have an epoxy coating. Ensure the coating is applied by the electrostatic spray method complying with the requirements of AASHTO M 254, Type B, with a minimum coating thickness of 6 mils after cure ASTM A 1078. Epoxy powders approved for use are listed in [Materials I.M. 451.03B, Appendix B](#). Perform welding and tack welding on reinforcement according to Article 4151.06.

Section 4169**4169.10, B, Special Ditch Control.****Replace the Article:****1. Wood Excelsior Mat.**

A mat of interlocking wood fibers. Meet the following requirements:

- Plastic netting applied to both sides for holding the excelsior in place.
- Nontoxic to growth of plants and germination of seeds.
- Minimum dry weight of 0.68 pounds per square yard according to ASTM D 6475.
- Furnished in rolls with a minimum uniform width of 48 inches, with a tolerance of minus -1 inch and a minimum length of 80 feet.
- Furnished in plastic bags or otherwise protected to prevent damage from weather and handling.

2. Coconut Fiber Mat.

At the Contractor's option, coconut fiber mat may be substituted for wood excelsior mat specified in [Article 4169.10, B, 1](#) for special ditch control. Meet the following requirements:

- Uniform thickness with the coconut fiber evenly distributed over the entire area of the mat.
- Both sides of the mat covered with polypropylene netting attached with cotton thread.
- Minimum dry weight of 0.40 pounds per square yard according to ASTM D 6475.
- Furnished in rolls with a minimum uniform width of 48 inches with a tolerance of minus -1 inch and a minimum length of 80 feet.
- Furnished in plastic bags or otherwise protected to prevent damage from weather and handling.

3. Biodegradable Mat.

At the Contractor's option, a biodegradable mat may be substituted for wood excelsior mat specified in [Article 4169.10, B, 1](#) for special ditch control. Meet the following requirements:

- Consists of all-natural, biodegradable fibers mechanically bound together with a non-welded, movable jointed, all-natural, biodegradable netting applied to one or both sides or a netless mat made of natural fibers mechanically interlocked. Straw is not approved for use as all-natural, biodegradable fibers.
- Minimum dry weight (mass) of 0.40 pounds per square yard for coconut fiber or 0.68 for pounds per square yard for wood excelsior according to ASTM D 6475.
- Minimum shear stress (according to D 6460 or equivalent) of 2.0 psf.
- Furnished in rolls with a minimum uniform width of 48 inches with a tolerance of -1 inch and a minimum length of 80 feet.
- Furnished in bags or otherwise protected to prevent damage from weather and handling.

4169.10, C, Slope Protection.**Replace the Article:**

~~Wood excelsior mat, coconut fiber mat, straw mat, or straw coconut mat may be used for slope protection.~~

1. Wood Excelsior Mats.

A mat of interlocking wood fibers meeting the requirements of [Article 4169.10, B, 1](#), with the following exceptions:

- Plastic netting applied to one or both sides for holding the excelsior in place. ~~Mats without netting where the excelsior is mechanically stitched together to hold it in place may be allowed.~~
- Minimum dry weight of 0.50 pounds per square yard according to ASTM D 6475.

2. Straw Mat, Straw-Coconut Fiber Mat, or Coconut Fiber Mat.

At the Contractor's option straw mat, straw-coconut fiber mat, or coconut fiber mat may be substituted for wood excelsior mat specified in [Article 4169.10, C, 1](#) for slope protection. Meet the following requirements:

- Consistent thickness with the straw, straw-coconut fiber, or coconut fiber evenly distributed over the entire area of the mat.
- The top side of the mat covered with polypropylene netting attached with cotton thread.
- Minimum dry weight (mass) of 0.40 pounds per square yard according to ASTM D 6475.
- Furnished in rolls with a uniform width of 48 inches, with a tolerance of ~~minus~~ -1 inch and a minimum length of 80 feet.
- Furnished in ~~plastic~~ bags or otherwise protected to prevent damage from weather or handling.

3. Biodegradable Mat.

At the Contractor's option, a biodegradable mat may be substituted for wood excelsior mat specified in [Article 4169.10, C, 1](#) for slope protection. Meet the following requirements:

- Consists of all-natural, biodegradable fibers mechanically bound together with a non-welded, movable jointed, all-natural, biodegradable netting applied to one or both sides or a netless mat made of natural fibers mechanically interlocked.
- Minimum dry weight (mass) of 0.40 pounds per square yard for straw, straw-coconut, or coconut fiber or 0.50 for pounds per square yard for wood excelsior according to ASTM D 6475.
- C Factor (according to ASTM D 6459) less than or equal to 0.10 or minimum shear stress (according to D 6460 or equivalent) of 1.0 psf.
- Furnished in rolls with a minimum uniform width of 48 inches with a tolerance of -1 inch and a minimum length of 80 feet.
- Furnished in bags or otherwise protected to prevent damage from weather and handling.

4169.10, D, Netting.

Replace the Article:

- ~~1.~~ Comply with the following mesh netting sizes. A tolerance of ~~plus or minus~~ 0.10 inch applies to netting size.
 - Netting applied on wood excelsior mats: no more than 1 inch by 2 inches.
 - Netting applied on coconut fiber only mats for channel and slope: no more than 3/4 inch by 3/4 inch or 1/2 inch by 1 inch.
 - Netting applied on the top side of straw and straw-coconut fiber mats for slopes only: no more than 1/2 inch by 1/2 inch.
- ~~2.~~ ~~A minimum weight of 9 pounds per 1000 square yards is required for netting for special ditch control or slope protection.~~

4169.10, F, 2, d.

Replace the Article:

The top washer a minimum of 3 inches in diameter and constructed of a UV resistant plastic or metal alloy.

Section 4183**4183.03, A, 1, a.**

Replace the Article:

Is capable of being heated and spray applied up to a temperature of ~~140~~ 120°F without damaging the formulation or serviceability of the product and the traffic striping equipment.

4183.03, B, 1, Composition.

Replace Articles a through e:

a. Pigment Content.

Percent pigment by weight of the finished product to be from ~~45.0~~ 58.0% to ~~55.0~~ 63.0% by weight for white and ~~55.0% to 58.0% by weight for yellow~~ as tested by ASTM D 3723. The white paint must contain a minimum of 1 pound per gallon of TiO₂ ASTM D 476 Type II Rutile 92% minimum TiO₂ tested in

accordance with ASTM D 1394 or ASTM D 4764. The total solids of high build paint when tested in accordance with ASTM D 2369 must be a minimum of 76% by weight.

b. Resin Solids.

Composed of 100% acrylic emulsion polymer (per [Materials I.M. 483.03](#)) or approved equal that allow finished paint products to meet all other areas of the specifications.

c. Nonvolatile Vehicle.

- 1) No less than ~~43.0~~ 42.0% by weight for white paint and no less than ~~45.0~~ 44.0% by weight for yellow paint.
- 2) Use the the following formula for calculating nonvolatile vehicle (NVV):

$$NVV = (N - P) / (100 - P)$$

Where:

N = the percent by weight of non-volatiles as determined by ASTM D 2369

P = the percent weight of pigment as determined by ASTM D 3723

d. Volatile Organic Compounds.

Not to exceed 1.25 pounds per gallon excluding water and VOC exempt solvents. Use ASTM D 3960 to determine the level of VOCs.

e. Flash Point.

Closed cup flash point is to be no less than ~~100~~ 140°F as tested by ASTM D 56.

4183.03, B, 2, Laboratory Test Requirements.

Replace Articles b through e:

b. Viscosity.

- 1) For white: no less than 80 or no greater than ~~90~~ 95 Krebs Units at 77°F.
- 2) For yellow: no less than ~~75~~ 80 Kreb Units or no greater than ~~85~~ 95 Krebs Units at 77°F.
- 3) Use ASTM D 562 to measure viscosity.

c. No-Pick-Up Time.

- 1) Less than ~~5~~ 10 minutes.
- 2) Test according to the requirements of ASTM D 711, ~~except with a test stripe having a wet film thickness of 6 mils as measured by an Interchemical et film thickness gage and no air movement.~~

d. Directional Reflectance (without Glass Spheres).

- 1) For white: 84.0% minimum.
- 2) For yellow: ~~50.7~~ 50.0% minimum.

e. Dry Opacity.

- 1) ~~For white: a~~ A minimum contrast ratio of ~~0.955~~ 0.980.
- 2) ~~For yellow: a minimum contrast ratio of 0.930.~~
- 3) 2) Test according to the requirements of Federal Test 141a Method 4121. Use a test stripe with a wet film thickness of ~~7~~ 15 mil as measured by an Interchemical Wet Film Thickness Gage.

4183.03, B, 4, b.

Replace the Article:
Provide ~~M~~MSDS.

Section 4186

4186.12, Barrier Markers.

Replace the title and Add the Article:

4186.12 BARRIER MARKERS AND OBJECT MARKERS.

C. Furnish object markers meeting the following requirements:

1. Sign panels shall meet [Article 4186.02](#) and comply with [Standard Road Plan SI-173](#).
2. Object markers placed on the Interstate and Primary System shall use Type XI reflective sheeting.

3. Fastening accessories, sign identification, sign posts, and finished sign inspection shall be per [Section 4186](#).

4186.12, A.

Replace the first sentence:

Furnish **barrier** markers meeting the following requirements:

4186.12, B.

Replace the Article:

Approved **barrier** markers are listed in [Materials I.M. 486.08](#).

Section 4188**4188.01, B, 5, a.**

Replace the Article:

Category 3 devices include temporary barriers, fixed sign supports, crash cushions, **truck or trailer mounted attenuators**, and other work-zone devices not meeting the definitions of Category 1 or Category 2 devices.

Appendix.

Aggregate Gradation Table.

Replace the Aggregate Gradation Table:

Grad. No.	Section No.	Std. Sieve Sz. Intended Use	TABLE 4109.02-1: AGGREGATE GRADATION TABLE											Notes			
			1 1/2"	1.00"	3/4"	1/2"	3/8"	Percent Passing			4	8	30		50	100	200
1	4110, 4125, 4133, 4134	PCC FA, Cover Agg.						100	90-100	70-100	10-60					0-1.5	1
2	4112	PCC Intermediate				95-100				0-10							
3	4115 (57, 2-8), 4118	PCC CA & Pipe Bedding	100	95-100		25-60			0-10	0-5						0-1.5	2, 10
4	4115 (2-8)	PCC CA	100	50-100	30-100	20-75		5-55	0-10	0-5						0-1.5	10
5	4115 (67, 2-8)	PCC CA		100	90-100			20-55	0-10	0-5						0-1.5	10
6	4115.05 (Repair & Overlay)	PCC CA			100	90-100		40-90	0-30							0-1.5	10
7	4116 (Class V)	PCC FA & CA	100						80-92	60-75	20-40						
8	4116.03 (Class V)	Fine Limestone						100	90-100						0-30		
9	2556	Grout Aggregate				100		85-100		0-10					0-1.5		
10	4119, 4120.02, 4120.03 (C gravel)	Granular Surface			100				50-80	25-60							3, 11
11	4119, 4120.02, 4120.04, 4120.05, 4120.07, (A, B Cr. St.)	Granular Surface & Shoulder		100	95-100	70-90			30-55	15-40					6-16	4, 5, 11	
12a	4121 (Cr. St.)	Granular Subbase	100			40-80				5-25					0-6	6, 11	
12b	4121 (Cr. Gravel)	Granular Subbase	100			50-80				10-30				5-15	3-7	7, 11	
13a	4122.02 (Cr. St.)	Macadam St. Base	3" nominal maximum size screened over 3/4" or 1.00" screen.														
13b	4122.02	Macadam Choke St.	100												6-16	11	
14	4123	Modified Subbase	100		70-90					10-40					3-10	5, 7, 11	
18	4117 (No. 4 Cr. Gr., Cr. St., or Nat. Sand)	Leveling Aggregate						100	95-100	50-80				0-15	0-4	11	
19	4117, 4125 (1/2" Cr. Gr. or Cr. St.)	Cover Aggregate			100	97-100		40-90	0-30	0-15					0-1.5	11	
20	4125 (1/2" Scr. Gr.)	Cover Aggregate			100	95-100		40-80	0-15	0-7					0-1.5	11	
21	4117, 4125 (3/8" Cr. Gr. or Cr. St.)	Cover Aggregate				100		90-100	10-55	0-20	0-7				0-1.5	11	
22	4124	Fine Slurry Mixture						100	85-100	40-95	20-60	19-42			5-25	9, 11	
23	4124 (Cr. St.)	Coarse Slurry Mixture						100	70-90	40-70	19-42				5-15	11	
29	4131	Porous Backfill			100	95-100		50-100	0-50	0-8						11	
30	4132.02 (Cr. St.)	Special Backfill	100							10-40					0-10	5, 11, 14	
31	4132.03 (Gravel)	Special Backfill		100	90-100	75-100				30-55					3-7	11	
32	4133 (Sand/Gr./Cr. St.)	Granular Backfill	100% passing the 3" screen														
35	4134 (Natural Sand/Gr.)	Floodable Backfill	100							10-100					0-10	8, 11	
36	4134 (Natural Sand)	Floodable Backfill							100	20-90					0-4	11	
37	2320 (Quartzite/Granite/Slag)	Polymer-Modified Microsurfacing						100	90-100	65-90	30-50	18-30			5-15	12, 13	
38	2320 (limestone/Dolomite)	Polymer-Modified Microsurfacing						100	70-90	45-70	15-35	10-25			5-15	12, 13	

Notes: (Gradations No. 15, 16, 17, 24, 25, 26, 27, 28, 33, and 34 have been deleted)

1. For Section 4110, when the fine aggregate is sieved through the following numbered sieves - 4, 8, 16, 30, 50, and 100 - no more than 40% shall pass one sieve and be retained on the sieve with the next higher number.
2. When used in precast and prestressed concrete bridge beams, 100% shall pass the 1.00" sieve. When used for pipe bedding (4118) the No. 200 restriction does not apply.
3. When compaction of material is a specification requirement, the minimum percent passing the No. 200 sieve is 6%.
4. See specifications for combination of gravel and limestone.
5. Unwashed air dried samples of crushed composite material shall be tested for gradation compliance except that no gradation determination will be made for material passing the No. 200 sieve.
6. The gradation requirement for the No. 8 sieve shall be 5% to 20% when recycled material is supplied.
7. For Section 4121 gravel, one fractured face on 30% or more of the particles retained on the 3/8 inch sieve. For Section 4123 gravel, one fractured face on 75% or more of the particles retained on the 3/8 inch sieve.
8. Crushed stone shall have 100% passing the 1½" sieve.
9. Gradation limitations for the 30, 50, and 100 sieves shall not apply when slurry mixture is applied by hand lutes, such as for slurry leveling.
10. Maximum of 2.5% passing the No. 200 sieve allowed if for crushed limestone or dolomite when documented production is 1% or less.
11. When Producer gradation test results are used for acceptance, test results representing at least 90% of the material being produced shall be within the gradation limits and the average of all gradation results shall be within the gradations limits. Stockpiled material not meeting the criteria may, at the District Materials Engineer's discretion, be resampled using Materials I.M. 301 procedures. One hundred percent of the stockpile quality control and verification test results shall be within the gradation limits.
12. For Quartzite/Granite/Slag: 45% to 70% passing No. 16 Sieve; for Dolomite/Limestone: 25% to 50% passing No. 16 Sieve.
13. Percent passing shall not go from the high end to the low end of the range for any two consecutive screens.
14. If the material meets the quality requirements of Article 4120.04, a maximum of 14% passing the No. 200 sieve will be allowed.