GS-23006

General Supplemental Specifications
for
Highway and Bridge Construction

Effective Date
April 21, 2026

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.

TABLE OF CONTENTS

Division 11. General Requirements and Covenants.

Section 1101

1101.02, Definitions of Abbreviations

Add the Definition:
NASSCO - National Association of Sewer Service Companies

Section 1102

1102.19, B, 2, Equal Employment Opportunity.

Replace the Article:
In hiring and employment practices, the absence of discrimination on the basis of race, religion, sex, sexual orientation, ~~gender identity,~~ color, national origin, age, disability, or other protected classification under Federal, state, or local law

1102.19, B, 8, Segregated Facilities.

Replace the first sentence:
Employee facilities that are separated on the basis of race, religion, color, national origin, age, sex, sexual orientation, ~~gender identity,~~ or disability either by explicit directive or by fact because of habit, local custom, or any other reason.

1102.19, C, 1, The EEO/AA Operating Statement.

Replace the Article:
"It is the policy of this Company to ensure that applicants are employed, and that employees are treated during employment, without regard to their race, religion, sex, sexual orientation, ~~gender identity,~~ color, national origin, age, or disability. Such action shall include: employment, upgrading, demotion, or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship, pre-apprenticeship, and/or on-the-job training."

1102.19, F, Personnel Actions.

Replace the first sentence:
Wages, working conditions, employee benefits, and personnel actions of every type including hiring, upgrading, promotion, transfer, demotion, layoff, and termination shall be made without regard to race, color, religion, sex, sexual orientation, ~~gender identity,~~ national origin, age, or disability.

Section 1103

1103.01, I.

Replace the Article:
For failure to ~~file~~ submit and maintain with the Contracting Authority a current Certificate of Insurance meeting the requirements of Article 1107.02.

1103.04, Certificate of Insurance.

Replace the Article:
The Contractor's or Contractors' certificate(s) of ~~liability and property damage~~ insurance described in Article 1107.02 shall be ~~filed with~~ submitted to the Contracting Authority ~~on or~~ before the execution of the contract ~~and shall be maintained throughout the prosecution of the work and until final acceptance and completion of the contract~~. ~~A separate verification shall be required for contracts awarded on the basis of joint bids.~~

Section 1105

1105.04, A, 4.

Replace the Article:

Digital Contract Files. Shall apply only when digital contract files are available and the Contractor uses automated machine control guidance.

1105.12, B, 1.

Replace the first sentence:

When items or materials such as those listed, in an amount equal to or greater than 5000 tons per item or material, are to be transported to the work by truck, and when requested by the Contractor, or on its own initiative, the Department will designate a temporary Primary Road haul road.

Section 1107

1107.18, A, 2.

Replace the Article:

When required, the Contracting Authority will obtain a Section 404 permit and Section 401 Water Quality Certification for essential work on the right-of-way prior to the award of the contract. The Contractor shall adhere to the requirements of the permit. Activities occurring in or across waters of the United States not specifically reviewed and approved in the permit are not authorized, including dredging. If the Contractor desires to use construction methods that are not specifically approved by the permit, the Contractor shall be responsible for obtaining approval in the form of a new Section 404 permit from the U.S. Army Corps of Engineers, US Fish and Wildlife Service (USFWS), and possibly DNR. The Contractor shall not use construction methods that require additional mitigation by the Contracting Authority. The Contractor will not be granted additional compensation or contract time due to their request for a new permit. If, however, due to no fault of the Contractor, a Section 404 permit modification involving activities within the right-of-way is deemed necessary by the Engineer, additional contract time and/or compensation may be considered.

1107.18, A, 3, g, Temporary Fills.

Replace the Article:

If temporary crossings, causeways, or work pads are needed for the work, then temporary structures and fills shall be constructed in accordance with Section 2547. Use of excavated or dredged material from the stream is not allowed as temporary fill unless specifically allowed in the Section 404 permit.

Section 1113

1113.02, B, 2

Add to the end of the article:

When submitting documents, the Contractor certifies that they have thoroughly reviewed the documents and that they accurately represent the items included in the project. The Contractor further certifies that both the items and the accompanying certifications comply with all requirements of the contract document including, but not limited to, compliance with Buy America and BABA requirements as outlined in Article 1107.06 and Materials I.M. 107.

Division 20. Equipment Requirements

Section 2001

2001.01, D.

Replace the second sentence:

~~When~~ If diesel, kerosene, or other distillates~~,~~ or ~~other~~ solvents are used that are not approved release agents, allow the equipment to drain for a minimum of 5 hours after cleaning.

2001.22, Plant Equipment for Hot Mix Asphalt Mixtures.

Replace the first paragraph:

Ensure plant equipment will proportion each aggregate, dry and heat the aggregate (except mineral filler), proportion the aggregate and hot asphalt, and mix all materials. The plant may be of a batch type~~, continuous type,~~ or drum mixing type. Ensure the plant is equipped to produce uniform mixtures of required composition, heated to the desired temperature.

2001.22, F, 2, Continuous Plants.

Delete the Article and **renumber** following Article:

~~**2. Continuous Plants.**~~

~~**a.** Comply with the following:~~

~~**1)** To supply asphalt binder to the mixer, use a pump constructed to be under a positive pressure sufficient to maintain uniform delivery from the pump. The pressure is to be maintained within ± 0.5 psi of the recommended operating pressure.~~

~~**2)** Install accurate pressure gauges in readily accessible locations in lines feeding the metering pump and the mixer spray bars. Install gauges of such size that the normal operating pressure can be easily read to the nearest 1.0 psi.~~

~~**b.** For the mixer unit, comply with the following:~~

~~**1)** Equip with a surge tank or a deaeration chamber for supplying a constant pressure flow of asphalt binder to the metering pump.~~

~~**2)** The surge tank or the deaeration chamber is to be of dimensions and capacity to provide the pressure specified. The capacity is to be at least a 6-minute supply of asphalt binder at the normal mixing rate of the mixer unit.~~

~~**3)** The surge tank or the deaeration chamber is to be fitted with baffles and other appurtenances necessary to prevent the incorporation of air bubbles into the asphalt binder as the tank is being filled.~~

~~**4)** When the surge tank system is used, the pressure at the spray bar is to be no greater than 20 psi.~~

~~**5)** When a deaeration chamber system is used, the pressure difference between the return line and the spray bar is to be no greater than 20 psi.~~

~~**6)** Separate return lines are to be provided for each tank.~~

~~**7)** Obtain the Engineer's approval for the surge tank or the deaeration chamber.~~

2. ~~3.~~ Drum Mixing Plants.

Ensure the following:

a. The plant uses a pump to supply asphalt binder to the mixer, which is constructed to be under positive pressure sufficient to maintain uniform delivery from the pump.

b. A totalizing flow meter is placed in the line between the metering pump and mixer unit.

c. The asphalt control unit is interlocked with the aggregate weighing system specified in Article 2001.22, A, and is equipped to automatically adjust for variation in aggregate delivery.

d. The plant is operated with automatic controls, except when approved by the Engineer.

e. The asphalt control unit is equipped so the plant operator can monitor and adjust the flow rate of aggregate or asphalt binder.

2001.22, K, 2, Continuous Mixer.

Delete the Article and **renumber** following Article:

~~**2. Continuous Mixer.**~~

~~**a.** Use an approved twin shaft pugmill capable of producing uniform mixtures within the job mix or other specified limits.~~

~~**b.** Ensure paddles are of a type adjustable for angular position on the shafts and reversible to retard the flow of mix.~~

~~**c.** Equip the mixer with a discharge hopper holding approximately 1 ton and discharging intermittently by means of quick acting gates.~~

~~**d.** Regulate the distance to the receiving vehicle to minimize segregation.~~

~~e. Provide satisfactory means to afford positive interlocking control between the flow of aggregate from the bins and the flow of asphalt binder from the meter or other proportioning source. Accomplish control by interlocking mechanical means or by any positive method for accurate control.~~
~~f. Include an accurate revolution counter, operating continuously during production.~~
~~g. Equip the plant with positive means to govern and maintain a constant time of mixing.~~

~~3.~~ Drum Mixer.

a. Comply with the following:
  1) Use equipment capable of producing uniform mixtures within the job mix or other specified limits.
  2) Introduce the aggregate, asphalt binder, and additives, when furnished, continuously and uniformly. This is to be controlled by the plant operator.
  3) Discharge the mixture continuously and uniformly onto an elevator or conveyor that discharges into a hot mixture storage unit meeting requirements of Article 2001.22, L.
  4) Continue the mixing until the asphalt binder is uniformly distributed and the aggregate particles are uniformly coated.

b. The plant may be modified with a pugmill coater. The coater shall be inclined and positioned as an integral built-in unit, located between the drum and the hot elevator of the plant setup. Introduce the asphalt binder, and additives when furnished, continuously and uniformly at the lower end of the coater. This shall be controlled by the plant operator. Obtain the Engineer's approval for each plant modified.

c. When adding RAP, modify drum mixing equipment to process RAP according to Article 2001.22, A.

Division 21. Earthwork, Subgrades, and Subbases

Section 2105

2105.04, Method of Measurement.

Replace the Article:

A. Topsoil Stripped Onsite.

1. The number of cubic yards of topsoil moved will be computed on the basis of a uniform 12 inch cut, or the depth as specified in the contract documents, over the area involved. Sufficient field measurements will be taken to assure reasonable conformity with the required depth of cut. Payment will be made for the quantity shown in the contract documents unless there is a change in encountered depth.

2. Topsoil salvaged from excavated areas and paid for as topsoil will not be included in excavation quantities for which payment is made.

B. Topsoil Furnished by Contractor or Previously Stockpiled Onsite.

The number of cubic yards of topsoil will be computed on the basis of a uniform 8 inch placement, or the depth as specified in the contract documents, over the area involved. Sufficient field measurements will be taken to assure reasonable conformity with the required depth of placement. Payment will be made for the quantity shown in the contract documents.

Division 22. Base Courses

Section 2213

2213.02, A, 1, Asphalt Base Widening.

Replace the Article:

Use 1/2 inch or 3/4 inch Standard Traffic (ST) base mixture. For shoulder base widening ~~for shoulders~~, use PG 58-28S binder. For lane or a combination of lane and shoulder base widening use the binder specified in the surface mixture.

Section 2214

2214.03, D, 8.

Replace the first sentence:

When a scarified surface is open to traffic, ~~C~~commence overlay (HMA, PCC, Seal Coat, Slurry Seal, etc.) placement operations ~~within~~ no later than 10 working days after ~~completion of~~ commencing the scarification operation on any portion of the project.

Division 23. Surface Courses.

Section 2303

2303.02, D, 6.

Delete the second sentence:

~~When an adjoining surface is designed for Standard Traffic (ST) and is paved during the same project, use a base mixture at same traffic designation used in surface mixture.~~

2303.02, D, 7.

Replace the last sentence:

Temperature reductions may be achieved through additives or water injection systems (foamed asphalt).

2303.02, E, 2, g.

Replace the Article:

g. ~~The following anti-strip agents may be used:~~

~~**1) Hydrated Lime.**~~

~~Meet the requirements of AASHTO M 303, Type I or ASTM C 1097, Type S. Hydrated lime will not be considered part of the aggregate when determining the job mix formula.~~

~~**2) Liquid Anti-strip Additives.**~~

Liquid anti-strip additives will be used as the anti-strip agent. For each JMF, obtain approval for liquid anti-strip additives blended into the binder. Approval will be based on the following conditions:

~~**a**~~ **1)** The asphalt binder supplier provides test results that the additive does not negatively impact the asphalt binder properties, including short term and long term aged properties.

~~**b**~~ **2)** The design is to establish the optimal additive rate that produces the maximum SIP value. See Materials I.M. 319 for additional information.

~~**3) Polymer-based Liquid Aggregate Treatments.**~~

~~For each JMF, obtain approval for polymer-based liquid aggregate treatments. Approval will be based on the design establishing the optimum additive rate that produces the maximum SIP value.~~
~~See Materials I.M. 319 for additional information~~

2303.02, E, 4, WMA Technologies.

Replace the first sentence:

Chemical additives, organic additives, zeolites, or water injection systems (foamed asphalt) may be used at the rate established by the mixture design in the production of WMA.

2303.03, A, 2.

Replace the article:

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

a. ~~Apply Article 2303.03, D to asphalt mixture bid items when the plan quantity is greater than 1000 tons.~~ Asphalt mixture bid items that have a plan quantity of 1000 tons or less as well as patching, detours, and temporary pavement bid items will be considered small quantity HMA, apply Article 2303.03, E. For items bid in square yards, apply Article 2303.03, E when the plan quantity by weight (estimated with a unit weight of 145 pounds per cubic foot unless otherwise stated on the plans) does not exceed 1000 tons.

b. ~~Apply Article 2303.03, E, for asphalt mixture bid items that have a plan quantity of 1000 tons or less as well as patching, detours, and temporary pavement bid items. For items bid in square yards, apply Article 2303.03, E when the plan quantity by weight (estimated with a unit weight of 145 pounds per cubic foot unless otherwise stated on the plans) does not exceed 1000 tons.~~ For asphalt mixture bid items not considered small quantity HMA, apply Article 2303.03, D.

2303.03, C, 3, c, Handling Anti-Strip Agents.

Rename and **replace** the Article:

c. Handling Liquid Anti-Strip Agents.

~~**1) Hydrated Lime.**~~

~~**a) Added to a Drum Mixer.**~~

~~**(1)** Add hydrated lime at the rate of 0.75% by weight of the total aggregate (virgin and RAM) for Interstate and Primary projects. Add hydrated lime to a drum mixer using one of the following methods:~~

~~**(a)** Add to virgin aggregate on the primary feed belt, as a lime water slurry.~~

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

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

~~**b) Added to a Batch Plant.**~~

~~Add hydrated lime at the rate of 0.5% by weight of the total aggregate (virgin and RAM) for Interstate and Primary projects. Introduce it to a batch plant using one of the methods below. In any case, introduce the lime prior to the start of the dry mix cycle.~~

~~**(1)** Place on the recycle belt which leads directly into the weigh hopper.~~

~~**(2)** Add directly into the pugmill.~~

~~**(3)** Add directly into the hot aggregate elevator into the hot aggregate stream.~~

~~**c) Added to the Aggregate Stockpile.**~~

~~Add hydrated lime at a rate established by the optimization of the SIP as determined by Materials I.M. 319. Add it to the source aggregates defined in Article 2303.02, E, 2, thoroughly mixed with sufficient moisture to achieve aggregate coating, and then place in the stockpile.~~

~~**2) Liquid.**~~

~~**a**~~ **1)** ~~When liquid anti-strip additives are used, e~~Employ equipment complying with the anti-strip manufacturer's recommended practice to store, measure, and blend the additive with the binder.

~~**b**~~ **2)** The additive may be injected into the asphalt binder by the asphalt supplier or the Contractor. If the Contractor elects to add the liquid anti-strip agent, they assume the material certification responsibilities of the asphalt binder supplier. Ensure the shipping ticket reports the type and amount of additive and time of injection.

~~**c**~~ **3)** Ensure the asphalt supplier provides the Contactor and Engineer with the shelf life criteria defining when the anti-strip additive maintains its effectiveness. Do not use binder that has exceeded the shelf life criteria.

~~**d)** When using polymer-based aggregate treatment, comply with the manufacturer's recommended specifications and guidelines.~~

2303.03, C, 5, b, 2, e.

Replace the first sentence:

Only one test strip will be allowed for each mixture bid item and shall be declared to the Engineer prior to placement.

2303.03, D, 3, b, 1

Replace Table 2303.03-4:

Table 2303.03-4: Production Tolerances

Measured Characteristic	Target Value (%)	Specification Tolerance (%) ~~(a)~~
Cold feed gradation No. 4 and larger sieves (a)	by JMF	± 7.0
Cold feed gradation No. 8 (a)	by JMF	± 5.0

Measured Characteristic	Target Value (%)	Specification Tolerance (%) ~~(a)~~
Cold feed gradation No. 30 (a)	by JMF	± 4.0
Cold feed gradation No. 200 (a)	by JMF	± 2.0
Daily asphalt binder content (a)	by JMF	± 0.3
Lab voids ~~absolute deviation~~ AAD from target ~~(b)~~	0.0	≤ 1.0
Lab voids PWL	by JMF	± 1.0
Field voids PWL	n/a	0-8.5% 91.5-100% of G_{mm}

(a) Based on single test unless noted otherwise.
~~(b) When lab voids acceptance is not based on PWL.~~

2303.03, D, 4, f, 8.

Replace the second sentence:
The Engineer will test, record, and document each lot of cores according to Materials I.M. 321 at the Contractor's field quality control laboratory.

2303.03, E, 1, General.

Replace the Article:
~~For small quantities, a~~A lot will be the entire quantity of each HMA mixture bid item.

2303.03, F, 2, b, 1.

Replace the Article:
Use an approved mix design that incorporates a warm mix additive. Do not use water injection (foamed asphalt).

Section 2310

2310.03, C, 1, General.

Replace the Article:
~~**a.** Apply Section 2317 to all PCC Pavement bid items of a Primary project if any individual PCC Pavement bid item for that project is 5000 square yards or greater. Apply Section 2316 to all other Primary projects and when specifically required for other projects.~~
a. ~~b.~~ Clean existing surface of loose or adhering foreign material prior to and during placement of PCC.
b. ~~c.~~ Ensure existing pavement surface is free of standing water during PCC placement.
c. ~~d.~~ Ensure temperature of existing pavement surface does not exceed 120ºF during PCC placement. Water may be applied to cool existing pavement surface provided standing water is not present during PCC placement.
d. ~~e.~~ Introduce fiber reinforcement into the mix in accordance with the fiber manufacturer's recommendations, unless otherwise approved by the Engineer. Ensure uniform distribution and random orientation of fibers throughout the concrete.

2310.03, Construction.

Add the Article:
F. Smoothness.
Apply Section 2317.

Section 2317

2317, Pavement Smoothness.

Replace the Section:

2317.01 GENERAL.

Evaluate pavement smoothness for all Interstate and Primary main line pavement surfaces, and all other road surfaces included on Primary projects, except when specifically excluded or modified by the contract documents. For non-Primary projects, do not evaluate pavement smoothness unless specified in the contract documents. If this specification is required by contract documents on non-Primary projects let by the Department, it will be added in its entirety. Selected portions of the specification will not be deleted.

A. Main line pavement is defined as all permanent pavement for through lanes.

B. The index used for determining the pavement smoothness is the Mean Roughness Index (MRI) per segment as determined by the latest version of the FHWA's software, ProVAL.

C. The other measure of pavement smoothness is the Area of Localized Roughness (ALR) based on a continuous MRI computed over a 25-foot distance as determined by the latest version of ProVAL.

D. A pavement segment is defined as a continuous area of finished pavement ~~0.1 mile~~ 528 feet in length and one lane (10 to 12 foot nominal) in width. A partial segment may result from an interruption of the continuous pavement surface (in other words, bridge approaches, side road tie-ins, the completion of the daily paving operations, and so forth). Pay adjustments will be prorated for partial segments. If a segment is less than 100 feet in length and requires corrective work, the Engineer will waive the corrective work requirement for the segment and instead assess a prorated disincentive. The Contracting Authority will still subject the segment to ALR correction in accordance with Table 2317.05-1 and Table 2317.05-2.

2317.02 EQUIPMENT.

A. Provide and operate an inertial profiler meeting the requirements of AASHTO M328 and Materials I.M. 341~~, Appendix A~~. Ensure the operator is trained and certified to operate the profiler as required by the Contracting Authority.

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

2317.03 TESTING AND EVALUATION.

A. Testing.

1. Obtain profiles of both wheel paths for each lane according to the procedures shown in Materials I.M. 341~~, Appendix A~~. The wheel paths are defined as 3 feet and 9 feet from the center line or lane line. Average the two wheel path profile indexes for each segment.

2. The Engineer may use an inertial profiler, 10 foot straightedge, or other means to detect irregularities in excluded surface areas or areas outside the required wheel paths for required corrective action.

3. Test bridge approaches according to Section 2428.

4. Test the pavement within 5 working days of completion of paving.

5. Paved shoulders will be excluded from smoothness testing. When used as a temporary driving surface, evaluate paved shoulders for ALR. Take corrective action for ALR greater than 250.0 inches/ mile.

B. Evaluation.

1. 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:

a. Roads intersecting the mainline pavement less than 600 feet in length.
b. Road connections 150 feet before an intersection that end at a stop sign (or a yield sign at roundabouts).
c. Twenty feet on either side of bridges, bridge approaches, existing EF joints, manholes, or water valve boxes in the lane that the obstruction is located.
d. Ramps and loops.
e. Bridge approaches (evaluated according to Section 2428).
f. Storage lanes, turn lanes, and other auxiliary lanes less than 1000 feet.
g. Pavement less than 8.5 feet in width.
h. Single lift flexible pavement overlays 2 inches thick or less, unless the existing surface has been corrected by milling or scarification.
i. Single lift flexible pavement overlays 2 inches thick or less placed directly on PCC pavement.
j. Paved shoulders.
k. Detour pavement.
l. Crossovers.
m. Individual sections of pavement less than 100 feet in length.
n. Roundabouts

2. Determine ALR using the latest version of the ProVAL "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 or advisory speed over 35 mph except for:

a. Side road connections 150 feet before an intersection that end at a stop sign (or a yield sign at roundabouts).
b. Twenty feet on either side of bridges, bridge approaches, manholes, existing EF joints, or water valve boxes in the lane that the obstruction is located.
c. Bridge approaches (evaluated according to Section 2428).
d. Pavement less than 8.5 feet in width.
e. Paved shoulders (unless used as a temporary driving surface).
f. Detour pavement.
g. Crossovers.
h. Individual sections of pavement less than 50 feet in length.

3. The Engineer may determine and identify irregularities of ~~1/8 inch or more in 10 feet~~ 1/2 inch or more in 25 feet longitudinally for excluded surface areas or areas outside the required wheel paths.

4. Submit all preliminary profile summary sheets to the RCE and the DME within 7 calendar days of testing.

5. ~~4.~~ Submit all final profile summary sheets and all ALR graphs to the engineer within 14 calendar days following completion of paving on the project. If requested by the engineer, provide the ProVAL files. When all the testing is done at the completion of paving on the project, provide the engineer the ProVal files along with the profile summary sheets.

6. ~~5.~~ Submit all preliminary profile summary sheets on provided form (https://iowadot.gov/Construction_Materials/materialsforms/ProfileSummarySheet.xlsx) and final ProVAL compatible files to the Construction and Materials Bureau via email to smoothness.cmb@iowadot.us following completion of paving on the project.

2317.04 CORRECTIVE ACTIONS.

A. General.

1. Pavement will be evaluated in ~~0.1 mile~~ 528 feet segments using the inertial profiler, to determine pavement segments where corrective work or pay adjustments will be necessary.

2. Within each ~~0.1 mile~~ 528 feet segment, correct all ALR identified as grind in table 2317.05-1 or table 2317.05-2 regardless of the MRI value. Take corrective action.

3. Separately identify ALR.

4. On lanes over 8.5 feet in width, for through traffic which requires matching the surface of the new pavement to the surface of an existing pavement, Determine the MRI and ALR for the existing lane. Compare the MRI values and ALR areas according to Materials I.M. 341~~, Appendix A~~. If the MRI and ALR for the new pavement are less than the MRI and ALR for the existing surface, no negative payment adjustment or correction for MRI or ALR will be required.

B. MRI Correction.
Correct all ~~0.1 mile~~ 528 feet segments having an initial MRI of greater than those tolerances shown in Article 2317.05. Correct these segments to reduce the MRI to that shown in Table 2317.05-3 through Table 2317.05-6. The Contractor has the option to replace these segments. On segments where corrections are made, test the entire ~~0.1 mile~~ 528 feet segment of pavement to verify that corrections have met the MRI as shown in Table 2317.05-3 through Table 2317.05-6.

C. ALR Correction.
Correct ALR greater than those tolerances shown in Article 2317.05. Correct these segments to reduce the ALR to that shown in Table 2317.05-1 or Table 231705-2. The Contractor has the option to replace these areas. On segments where corrections are made, test the entire ~~0.1 mile~~ 528 feet segment of pavement to verify that corrections have met ALR level shown in Table 2317.05-1 or Table 2317.05-2.
Provide the engineer an image file for each area of ALR greater than 250 Inches per mile. Use ~~0.1 mile~~ 528 feet scale setting and label the file with the station location, lane, and direction.

D. Engineer Identified Irregularities.
Correct areas over ~~1/8 inch in 10 feet~~ 1/2 inch or more in 25 feet identified by the Engineer.

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

F. Corrective Work.
When the Contractor is not responsible for the adjoining surface, ALR in the 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. Complete the corrective work prior to determining pavement thickness. Do not use bush hammers or other impact devices.

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

2. **HMA Pavement.**
   a. On HMA pavement, make corrections by diamond grinding, by overlaying the area, by replacing the area, or by inlaying the area. If the surface is corrected by diamond grinding, perform the same work and use the same equipment as specified for PCC pavement~~.~~, except cover the ground surface with a seal coat according to Section 2307, with the following modifications:
      1) The binder bitumen may be the emulsion or cutback asphalt used for tack coat, applied at a rate of 0.10 gallon per square yard. 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 60ºF, 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.
   b. If the surface is corrected by overlay, replacement, or inlay, begin and end the surface correction with a transverse saw cut normal to the pavement lane lines or edge lines within any one area. The profile of the surface must be smooth with no bumps or dips at the beginning or end of correction.

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

G. Verification Testing.

1. The Engineer will perform verification testing to validate the Contractor's certified quality control testing. If the Engineer's verification test results validate the Contractor's test results, the Contractor's results will be used for acceptance. Disputes between the Contractor's and Engineer's test results will be resolved according to Materials I.M. 341~~, Appendix A~~.

2. The Engineer may test the entire project length if it is determined that the Contractor certified test results are inaccurate, The Contractor will be charged for this work at a rate of $800.00 per lane-mile, with a minimum charge of $1500.00.

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

2317.05 PAY ADJUSTMENTS.

A. General.

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

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

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

B. Areas of Localized Roughness

The payment for areas of localized roughness will be adjusted as shown in Table 2317.05-1 and Table 2317.05-2.

Table 2317.05-1: Schedule for Adjustment Payment for Areas of Localized Roughness for Primary and Interstate

ALR in 25 Foot Continuous Mean International Roughness Index (MRI) Inches per mile	Dollars per foot of pavement length per lane
200.0 to 250.0	-30.00 or grind[1]
Greater than 250.0	Grind[1]

1. Correct these areas to below 200.0 inches per mile

Table 2317.05-2: Schedule for Adjustment Payment for Areas of Localized Roughness for Non-Primary Projects

Segment Speed/Type	ALR in 25 Foot Continuous Mean International Roughness Index (MRI) Inches per mile	Dollars per foot of pavement length per lane
Speed greater than 45 mph	200.0 to 250.0	-15.00 or grind[1]
Speed greater than 45 mph	Greater than 250.0	Grind[1]
Speed greater than 35 mph and less than or equal to 45 mph or curbed	250.0 to 300.0	-15.00 or grind[2]

Segment Speed/Type	ALR in 25 Foot Continuous Mean International Roughness Index (MRI) Inches per mile	Dollars per foot of pavement length per lane
Speed greater than 35 mph and less than or equal to 45 mph or curbed	Greater than 300.0	Grind[2]

1. Correct these areas to below 200.0 inches per mile
2. Correct these areas to below 250.0 inches per mile

C. PCC Pavement.

The payment for MRI for PCC pavement will be adjusted as shown in Table 2317.05-3 and Table 2317.05-4.

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~~ 528 feet segment per lane (Design Thickness Greater than 6")	Dollars per ~~0.1 mile~~ 528 feet segment per lane (Design Thickness 6" or less)
Less than 47.5	1,500.00	1,250.00
47.5 to 57.5	8,625.00-(150*MRI)	7,187.50-(125*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

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

MRI (Inches per mile)	Dollars per ~~0.1 mile~~ 528 feet segment per lane
Less than 60.0	300.00
60.0 to70.0	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

D. HMA Pavement.

The payment for MRI for HMA pavement will be adjusted as shown in Table 2317.05-5 and Table 2317.05-6.

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~~ 528 feet segment per lane (Design Thickness greater than 4")	Dollars per ~~0.1 mile~~ 528 feet segment per lane (Design Thickness 4" or less)
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

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

MRI (Inches per mile)	Dollars per ~~0.1 mile~~ 528 feet 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]

MRI (Inches per mile)	Dollars per ~~0.1 mile~~ 528 feet segment per lane
Greater than 95.0	Grind[1]

1. Correct these areas to below 80.0 inches per mile

Division 24. Structures.

Section 2435

2435.05, B, 2.

Replace the Article:

Payment is full compensation for excavation, furnishing (if required) and placing bedding and backfill material, compaction, base, structural concrete, reinforcing steel, precast units (if used), fillets, pipe connections, castings, ~~and~~ adjustment rings, and the insert/boxout.

Division 25. Miscellaneous Construction.

Section 2504

2504.02, B, 1, General.

Replace the Article:

Comply with applicable sections of ASTM, NASSCO Specifications, and other applicable industry standards and codes.

2504.03, L, 2, b, Inspection Procedure.

Add the Article and **renumber** following Articles:

3) Pan camera around the circumference of each joint per NASSCO requirements.
4) ~~**3)**~~ Inspect all lateral connections and other observations at right angles utilizing the pan and tilt capabilities of the camera.
5) ~~**4)**~~ Center the video camera in the pipe during the inspection.
6) ~~**5)**~~ Do not exceed 30 feet of inspection per minute.

2504.03, L, 2, d, Inspection Acceptance.

Replace the Article:

The Engineer may reject ~~low quality videos or~~ videos failing to meet specifications. Any reinspection will be conducted at the Contractor's expense.

1) Videos can be rejected if the speed or comprehensiveness of the pan and tilt provided in the video does not allow full inspection of a lateral connection and joints.
2) Full observation of the new or rehabilitated pipe is required in the video provided after the inspection. If the amount of water, debris within the pipe, equipment present in the pipe, or other circumstances during the inspection results in a video not allowing the full observation of new or rehabilitated sewer pipe, the inspection can be rejected.

Section 2515

2515.02, A.

Add the following to the end of the Article:

Place according to Section 2301.

Section 2526

2526, Construction Survey.

Replace the Section:

2526.01 DESCRIPTION.

Perform survey for construction projects under one of the following four categories:

A. Monument Preservation: preserving existing monuments (section corners).

B. Control Point Survey: preserving existing control points and/or reestablishing missing control points for roadway alignments.

C. ROW Survey: locating existing or proposed ROW lines for projects.

D. Construction Location Survey: surveying and staking work necessary for construction of the project that is not covered under monument preservation, control point preservation or row survey.

2526.02 MATERIALS.

None.

2526.03 SURVEY.

A. General.

1. Ensure all survey work is completed by a Professional Engineer licensed in the State of Iowa in responsible charge or a Professional Land Surveyor licensed in the State of Iowa in responsible charge, according to the provisions of Iowa Code 542B. Submit a resume to the Engineer identifying the field survey personnel and their capabilities to perform the intended requirements.

2. If, in the opinion of the Engineer, the Contractor has destroyed or disturbed any of the original survey stakes or benchmarks, the cost of replacing will be charged to the Contractor. Bring design errors discovered to the Engineer's attention for review prior to staking.

3. All survey work documentation becomes the property of the Contracting Authority. Assemble required documentation into a single electronic package upon completion of the project and furnish to the Engineer. The work of this specification will be considered complete when the following documentation is furnished to and accepted by the Engineer:

- **a.** ASCII comma-delimited file of the coordinates formatted as: point number, northing, easting, elevation, and feature code (using the feature code list found in the Design Manual chapter 40B-1) with point description (a brief description of what was found or set). Identify coordinate system used.
- **b.** Recorded copy(ies) of any filed Monument Preservation Certificate(s).
- **c.** Recorded copy(ies) of any filed US Public Land Survey Corner Certificate(s).
- **d.** Secondary control monument coordinates including traverse check.
- **e.** Reference monument drawings.
- **f.** Benchmark coordinates.
- **g.** Required DTMs.
- **h.** Bridge and box culvert staking diagrams.
- **i.** Final profile grades.

4. For the purpose of subcontracting, these items will be considered a specialty item.

B. Monument Preservation.

1. Ensure monument preservation work is completed by a Professional Land Surveyor licensed in the State of Iowa in responsible charge, according to the provisions of Iowa Code 542B.

2. Preserve any existing survey monuments including right of way monuments, lot/property corners, centerline control, and section corners that are disturbed as a result of construction activities., This work shall be completed as required by Iowa Code 355.11 and 355.6A.

3. Survey monuments, ROW monuments, or section corners located on the project that are not disturbed by construction activity do not need to be preserved; however, they should be protected from damage during construction.

4. After construction, replace all disturbed survey monumentation with a reasonably permanent material solidly embedded in the pavement/ground. The surveyor shall affix a cap (or washer in the pavement) of reasonably inert material bearing an embossed or stencil cut marking of the Iowa registration number of the Land Surveyor completing the work. Other types of monumentation could be used (such as a cut "X" in the pavement) with the written consent of the contracting authority.

C. Control Point Network.

1. Primary Control Points.
A primary control point is a survey point the Contracting Authority establishes prior to project commencement. The point will be established by placing a control point marker in the ground.

2. Secondary Control Points.
A secondary control point is a survey point the Contractor establishes on grading or other projects specified in the plans and preserves on all other projects.

a. The Engineer will provide control point markers, similar to those the Department uses for GPS control.

b. Place secondary permanent horizontal control point markers, under the Engineer's direction, at locations likely to survive project construction and at intervals not to exceed 2640 feet. Place the control point marker in the ground along the project corridor. Place at higher elevations along the corridor to provide a view of the immediate project topography and to provide for visible clear line of sight to the nearest secondary permanent control monument in either direction. Primary project markers may be substituted if appropriate.

c. Plant secondary control point markers 1 to 4 inches below existing ground. Drive a metal fence post within 1 foot of the control point to mark its location. When the control point is near the ROW line the marker shall be placed in the ROW.

d. Carefully determine project coordinates relative to the nearest primary project control markers using project coordinate values the Engineer has provided. Ensure the resulting error radius of the secondary control point marker does not exceed 0.10 feet ±2 ppm relative to the primary control.

e. Perform an independent traverse check between the secondary control point markers by observing distance and angular measurements or by use of GPS. Provide the Engineer with a diagram indicating horizontal ground distances to nearest 0.01 foot and angles to at least the nearest 10 seconds between each secondary control point marker. Ensure inverses between the coordinate pairs as determined in the previous paragraph do not exceed 0.10 feet of the direct measurements.

f. Replace secondary control point markers disturbed during construction activities using procedures outlined above, at no additional cost to the Contracting Authority.

3. Alignments.
Obtain the Engineer's approval for the method of determining alignments and elevations and the method of preserving control points. This approval does not act to relieve the Contractor of the responsibility for the correctness of the survey work. Do not use plan cross-sections for vertical or horizontal control.

4. Benchmarks.

a. Establish permanent vertical control benchmarks at all bridges and reinforced concrete box culverts within the project. Use an Iowa DOT brass plug on bridge barrier rail or headwall of reinforced concrete box culvert to indicate the benchmark. If the Engineer approves, a sawn "X" on bridge barrier rail or headwall of reinforced concrete box culvert may be used.

b. Transfer all benchmark elevations from construction plan benchmarks to the permanent benchmarks using the three-wire method or by trigonometric leveling. Use temporary benchmarks of reasonable stability to preserve the plan benchmarks.

c. Ensure benchmark level loops do not exceed an error of 0.05 feet times the square root of the loop's length in miles. Distribute the error equally along the loop on all intermediate traverse/benchmark points.

D. ROW Survey.

1. On projects with new proposed ROW, Temporary Easement, or where existing ROW is to be reestablished.

2. All permanent monumentation will need to be placed in the ground. On projects with new ROW, monumentation is not to be placed until all ROW has been purchased.

a. A comma delineated ASCII point coordinate list will be provided by the contracting authority. The coordinate basis will be defined and provided by the Contracting Authority. The file format will be as follows:

- Point Number,
- Northing,
- Easting,
- Elevation,
- Feature Code and
- Description of what was found or set. (if applicable)

b. A 5/8 inch by 40 inch steel re-rod with an Iowa DOT aluminum cap or an equivalent land surveyors cap that includes their PLS number will be set as the right of way monumentation.

c. A green steel post with a “ROW” sign will be set within the new right of way, no more than a foot away from the right of way point. (Materials will be provided by the contracting authority.)

d. A check shot will be taken on the set monumentation to acquire a set of coordinates that will have the same coordinate basis as what was provided in number one as well as have the file format as follows:

- Point Number,
- Northing,
- Easting,
- Elevation,
- Feature Code and
- Description of what was set.

e. A feature code of “ROW” will be used.

f. The ASCII point list, of the checked points, will be provided to the contracting authority.

g. Submit required documentation per Article 2526.03, A, 3.

E. Construction Location Survey.

1. Furnish all survey necessary for construction of the project before work begins in the area. Comply with Iowa Code requirements under the direct supervision of an Iowa licensed land surveyor. Do not apply the provisions of Article 1105.14 to this work, except to preserve the original stakes set by the Engineer. Refer to Article 1105.15 for requirements when AMG is utilized. Construction location survey includes qualified personnel, equipment, and supplies required for, but not limited to, the following items:

2. Grading.

a. General.

- Survey right-of-way line between permanent right-of-way corners at 100 foot intervals, or less if needed, including borrows, temporary easements, and right of entry. Mark these points by placement of a metal pin or wood hub, flat, and lath at the same location as the slope stakes. Clearly mark the flat with the station number, distance from centerline, and elevation (cut or fill) to subgrade.
- Take existing and final elevations of all borrows. Provide existing and final digital terrain model (DTM) in LandXML-format, suitable for use by the Engineer to calculate excavation quantities.
- Set bridge berm slope stakes to establish all transitions, including the face of the berm. Set finish grade stakes (blue tops) on all roadway shoulder lines and roadway centerlines to project down the face of the bridge berm at the top, face of berm bench, and toe.
- When Class 12 excavation is an item, provide existing and final DTM in LandXML format for use by the Engineer to calculate the excavation quantities.
- Use a lath to locate on each side of roadway at the right-of-way line, agricultural drain tile shown in the contract documents. Clearly mark lath to show station location, distance from centerline, tile size and type, and flowline elevation.
- Establish benchmarks in the adjacent area before installing settlement plates in accordance with Article 2526.03, C, 4. Locate and determine elevations of settlement plates daily during construction and weekly during delays and following the completion of embankment construction,

unless approved otherwise by the Engineer. Submit elevations to the Engineer on Settlement Plate Data Form (available at the Bureau of Construction and Materials website).
- Check tie-ins with existing roadways for correctness of alignment prior to construction staking.

b. Areas Constructed Without AMG.
- Set slope stakes at 100 foot intervals, or less if needed, for embankment and excavation work including roadway, channel changes, and borrow areas. Interpolations may be necessary to match cross-sections. Set stakes at toe of foreslope or top of backslope, or both. Mark slope stakes with a flat and lath. Clearly mark flat with station location, distance, slope, and cut or fill information.
- Set grade check stakes at 100 foot intervals for bottoms of subgrade treatments. Set stakes on centerline for two-lane roads and in median for four-lane roads. Mark grade check stakes with a lath. Clearly mark lath with station location and cut or fill information.
- Set finish grade stakes (blue tops) at 100 foot intervals, or less if needed. Set blue tops at each shoulder line and each point where there is a change in cross slope. Mark blue tops with a wood hub and stake chaser or similar type tassel.

c. Areas Constructed with AMG.
- Establish elevation of secondary control points using differential leveling from project benchmarks, forming closed loops. Provide a copy of new control point information to Engineer prior to construction work. Contractor is responsible for errors resulting from their efforts. Correct deficiencies to the satisfaction of the Engineer at no additional cost to Contracting Authority.
- Set hubs at top of finished subgrade at hinge points on cross section at 1000 foot intervals on mainline and at least two cross sections on side roads and ramps. Establish these hubs, using means other than the machine guidance surface (such as plan typicals and cross sections, for use by Engineer to check accuracy of construction.
- Provide grade stakes at critical transition points such as, but not limited to, PC's, PT's, super elevation transition points, and other critical points required for construction of drainage and roadway structures.

3. Bridges.

a. Provide surveying and staking as appropriate to control the geometry of the work. Mark centerline of the approach roadway, centerline of the substructure units, and other points as necessary to establish the location, elevation and alignment of the structure.

b. Mark locations and elevations with metal pin or tack in a wood hub, flat, and lath. Clearly mark flat with the pier/abutment station location, design number, and offset distance from centerline of the approach roadway.

c. When a test pile, test shaft, or demonstration shaft is specified in the contract documents, mark the location with a wood hub.

d. Establish a minimum of three temporary benchmarks.

e. Perform an independent check of the above stakes. Independent check shall be performed using independent crew, calculations, equipment and/or methodology as necessary to validate the accuracy of the surveyed lines and stakes, without reuse of calculations, equipment setup, or data acquisition from the original survey.

f. Submit a staking diagram, accompanied by results of the original and independent check, to the Engineer prior to starting structure construction. The information shall be submitted in electronic (PDF) format and shall include:
- Dimensioned, graphical depiction of surveyed lines and stakes.
- Raw data and calculations from the original and check survey. Identify date/time, crew, equipment, datum and coordinate system, and primary controls used.

g. When the construction work and associated construction survey will be completed in separate phases, submit an updated staking diagram and independent check of new or relocated stakes, prior to each phase of work.

h. As verification of intended geometry, the following shall be checked using survey methods prior to permanent advancement of the associated production work:
- Location, orientation, and elevation of each separate spread footing, pile footing, pile cap, and/or drilled shaft. Submit to the Engineer as excavated and/or as formed, prior to concrete placement within the respective substructure element.
- Elevation of substructure beam seats, as built. Submit to the Engineer prior to installation of bearings and superstructure elements.
- Top of beam elevations, as erected. Locations for determining top of beam elevations shall be in

accordance with the design plans. Tabulate top of beam elevations in Excel spreadsheet format and provide comparison against intended/allowed plan geometry. Identify needs for deck grade adjustments, if discrepancies arise. Submit proposed final deck grades to the Engineer for acceptance

i. For bridges on Primary and Interstate routes, the required beam seat elevations and top of beam elevations shall be tabulated and submitted to the Engineer on the bridge e-File spreadsheet provided with the contract documents.

4. Reinforced Concrete Box Culverts.

a. Provide surveying and staking as necessary to establish the location, elevation and alignment of the structure and flow line.

b. Mark locations and elevations with metal pin or tack in a wood hub, flat, and lath. Clearly mark flat with the station location, design number, cut/fill elevation and offset distance from centerline of the approach roadway and back of parapet.

c. Perform an independent check of the above stakes. Independent check shall be performed using independent crew, calculations, equipment and/or methodology as necessary to validate the accuracy of the surveyed lines and stakes, without reuse of calculations, equipment setup, or data acquisition from the original survey.

d. Submit a staking diagram, accompanied by results of the original and independent check, to the Engineer prior to starting structure construction. The information shall be submitted in electronic (PDF) format and shall include:

- Dimensioned, graphical depiction of surveyed lines and stakes.
- Raw data and calculations from the original and check survey. Identify date/time, crew, equipment, coordinate system, and primary controls used.

e. When the construction work and associated construction survey will be completed in separate phases, submit an updated staking diagram and independent check of new or relocated stakes, prior to each phase of work.

f. Report to the Engineer questionable flow lines and alignments that do not match existing drainage.

5. Pipe Culverts.

a. Mark locations and elevations with metal pin or a wood hub, flat, and lath. Clearly mark the flat with the station location, cut/fill elevation, and offset distance to both ends or centerline of pipe.

b. Report to the Engineer questionable flow lines and alignments that do not match existing drainage.

6. Sanitary and Storm Sewers.

Mark locations and elevations with metal pin or tack in a wood hub, flat, and lath. Clearly mark the flat with the station location, pipe number, cut/fill elevation, and offset distance to centerline of pipe.

7. Water Mains.

Mark locations and elevations with metal pin or tack in a wood hub, flat, and lath. Clearly mark the flat with the station location, pipe number, cut/fill elevation, and offset distance to centerline of pipe.

8. Intakes and Utility Accesses.

Mark locations and elevations with metal pin or tack in a wood hub, flat, and lath. Clearly mark the flat 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.

9. Pavements (PCC & HMA).

a. General.

1) On PCC, PCC overlays, and HMA projects, when a proposed design profile grade is included in the contract documents.

a) Obtain elevations of adjacent pavement and bridges at centerline, edge of pavement, and other locations necessary to characterize existing profile and cross slope. Obtain elevations at maximum 10 foot intervals for a minimum of 100 feet

b) Adjust proposed design profile grade and cross slope to provide a smooth transition, free of bumps and dips, from the new pavement to the existing pavement or bridge. Submit final profile to the Engineer for approval before paving begins.

2) For full depth PCC and HMA pavements, when a proposed design profile grade is not included in the contract documents:

a) Obtain elevations of the existing pavement and bridges at 100 foot intervals on straight and level sections and 50 foot intervals on horizontal and vertical curves.

b) Using these elevations, design a profile grade and cross slopes to provide a smooth transition, free of bumps and dips, from the new pavement to the existing pavement or bridge. Design a smooth profile grade line to provide the required pavement or shoulder thickness as detailed in the contract documents. Submit final profile to the Engineer for approval before paving begins.

3) For PCC overlays, when a proposed design profile grade is not included in the contract documents:

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

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

c) Obtain elevations at maximum 50 foot intervals on straight and level sections and at maximum 25 foot intervals on horizontal and vertical curves.

d) Using these elevations, design a profile grade and cross slopes to provide a smooth transition, free of bumps and dips, from the new pavement to the existing pavement or bridge. Design a smooth profile grade line to provide the required pavement or shoulder thickness as detailed in the contract documents. Submit final profile to the Engineer for approval before paving begins.

b. Areas Constructed Without AMG.

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

c. Areas Constructed With AMG.

- When total stations are used for the AMG paving system, set additional control points at maximum 500 foot intervals, 250 foot staggered, on each side of pavement. Control points will be set using a suitable pin or stake, at least 14 inches long, with a flush identifiable location, such as a cap, divot, or tack. Ensure local point to point tolerance of 0.005 foot for elevation and 0.02 foot for position. Furnish x,y,z coordinates rounded to nearest 0.005 foot. Mark each control point with lath indicating point number and station. Where feasible, recess pin below grade to protect from equipment or weather.
- Mark with lath at A, A', B, C, C', and D points along superelevated curve transitions and at station equation locations. Additional paving hubs will not be required for mainline pavement.

10. Structural Walls.

a. Survey requirements for structural walls shall apply to the following work types:

- Mechanically Stabilized Earth (MSE) Walls.
- Cast in Place (CIP) Retaining Walls.
- Soil Nail Walls.
- Tie Back Walls.
- Noise Walls.
- Modular Block Retaining Walls.
- Segmental Retaining Walls.

b. Provide surveying and staking as necessary to establish the location, elevation and alignment of the structure.

c. Mark locations and elevations with a metal pin or a wood hub, flat, and lath. Clearly mark the flat with the station location, cut/fill elevation, and offset distance to face of wall.

F. Check tie-ins with existing roadways for correctness of alignment prior to construction staking.

2526.04 METHOD OF MEASUREMENT.

None. Lump sum items.

2526.05 BASIS OF PAYMENT.

A. Payment for the following items will be paid for at the lump sum contract price:
- Construction Survey, Monument Preservation.
- Construction Survey, Control Point Survey.
- Construction Survey, Right of Way.
- Construction Survey, Location Survey.

B. Payment is 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.

C. Delivery of all documents electronic and other will be required before final payment in made.

D. Payment for revisions after the letting will be paid for according to Article 1109.03, B.

E. Verifying form work slopes according to Article 2511.03, B, 1, b, shall be incidental to Construction Survey and will not be paid for separately.

F. Recorded copies of monument preservation and/or corner certificates will need to be provided to the Engineer before full payment is made.

Section 2527

2527.02, D, 2, b, 1.

Replace the Article:
Meet the requirements of Section 4183 and Materials I.M. 483.03 for fast dry paint.

2527.03, A, 2.

Replace the Article:
~~Table 2527.03-1 shows the minimum atmospheric and surface temperatures for application of pavement markings.~~ When waterborne or solvent based traffic paint is specified, use the following to determine which to apply. Monitor weather conditions to ensure equipment capable of placing the proper type of paint is available. The Engineer will not consider temperature conditions an excuse for delaying placement of pavement markings. Follow the manufacturer's written recommendations for other details of application.

a. From April 23rd to October 7th, use waterborne traffic paint when both the atmospheric and surface temperatures are at least 35˚F and rising. Only use solvent-borne paint if these requirements cannot be met.

b. From October 8th to April 22nd, solvent-borne paint may be used any time. Only use waterborne traffic paint if both the atmospheric and surface temperatures are at least 35˚F and rising at the time of application.

~~**Table 2527.03-1: Minimum Atmospheric and Surface Temperatures**~~

~~Type of Marking~~	~~Oct. 23 to Apr. 7~~	~~Apr. 8 to Apr. 22~~	~~Apr. 23 to Oct. 7~~	~~Oct. 8 to Oct. 22~~
~~Waterborne Paint~~	~~not allowed~~	~~45°F~~	~~45°F~~	~~45°F~~
~~Low Temperature Waterborne Paint (Per Materials I.M. 483.03)~~	~~35°F~~	~~35°F~~	~~35°F~~	~~35°F~~
~~Solvent Based Paint~~	~~no restrictions~~	~~no restrictions~~	~~(a)~~	~~no restrictions~~

~~(a) Solvent-based paint may be used only if temperature requirements cannot be met.~~

Section 2529

2529.02, B, Portland Cement Concrete.

Replace Articles 1 and 2:

1. Slump.

a. Slump, measured according to Materials I.M. 317 prior to addition of calcium chloride solution, ~~is to be between 1 inch and 2 1/2 inches as a target range, allowing a maximum of 3 inches. If calcium chloride solution is not to be added, the slump~~ is to be between 1 inch and 3 inches as a target range, allowing a maximum of 4 inches.

b. When a Type A Mid Range water reducing admixture is used, the slump, tested prior to the addition of calcium chloride, is to be between 1 inch and 4 inches as a target range, allowing a maximum of 5 inches.

2. Air Entrainment.

The entrained air content of the unconsolidated concrete will be determined according to Materials I.M. 318, prior to addition of calcium chloride if it is to be added. The air entrainment shall be ~~as follows:~~ 6.5%, with a maximum variation of -1.0% and +2.0%.

~~**a.** When calcium chloride is to be added: 5.0%, with a tolerance of ± 2.0%.~~

~~**b.** When no calcium chloride is to be added: 6.5%, with a tolerance of ± 1.5%.~~

2529.03, H, 1

Replace the Article:

Smoothness testing and evaluation is required for each patch with a length of 50 feet or more. ~~For full lane width patches, perform the testing near the center of the traffic lane after the patch is placed. For partial lane width patches, p~~Perform testing in the patched wheel path.

2529.03, H, 2.

Replace Articles b and c:

b. Standard Method.

1) Establish a Mean Roughness Index for the patch plus preexisting pavement, $MRI_{\text{patch plus preexisting pavement}}$.

2) Establish a Mean Roughness Index for the existing pavement on both ends of the patch, $MRI_{\text{preexisting pavement}}$.

3) Compare the $MRI_{\text{patch plus preexisting pavement}}$ to $MRI_{\text{preexisting pavement}}$. Perform surface correction according to Article 2317.04 so that the $MRI_{\text{patch plus preexisting pavement}}$ is less than or equal to the $MRI_{\text{preexisting pavement}}$ when ~~either of the below listed conditions exists:~~ the

~~**a)**~~ $MRI_{\text{patch plus preexisting pavement}}$ exceeds ~~75.0 inches per mile and exceeds~~ $MRI_{\text{preexisting pavement}}$ by more than ~~7.5 inches per mile~~ the tolerance described in Materials I.M. 216.

~~**b)** MRI_{patch} exceeds 90.0 inches per mile and exceeds $MRI_{\text{preexisting pavement}}$.~~

c. Alternate Method.

1) General.

a) Utilize a Profile Index.

b) Utilize zero blanking band.

2) Establish one Average Base Index (ABI) of the pavement for both ends of patch.

3) ~~Calculate a~~ Measure the new Profile Index (PI) for the entire length of the patch plus the pavements on both ends of patch.

4) ~~Calculate a profile index for the entire length.~~ Perform surface correction according to Article 2317.04 ~~to a profile index less than the ABI when either of the below listed conditions exists:~~ when the PI exceeds the ABI by more than the tolerance described in Materials I.M. 216.

~~**a)** New profile index exceeds 12.0 inches per mile and exceeds ABI by more than 2.0 inches per mile.~~

~~**b)** New profile index exceeds 30.0 inches per mile and exceeds ABI~~

Section 2531

2531.03, C, 1.

Replace the first sentence:

The Engineer will partly profile the pavement on the initial trace using the procedure described in ~~Article~~

~~2316.02, B~~ Section 2317.

2531.03, C, 3.

Replace the first sentence**:**

Provide a control profilograph trace as described in ~~Article 2316.02, b~~ Section 2317 prior to performing any grinding work.

2531.03, C, 6.

Replace the article:

6. Test and evaluate the milled surface according to Section ~~2316~~ 2317, with the following modifications:

- **a.** Run the test and evaluate the profilograph using the same procedure as for the control trace.
- **b.** Each segment for which continuous milling is designated will be evaluated individually, and it shall meet the smoothness and bump requirements specified above, regardless of its length.
- **c.** In excluded areas, smoothness requirements will be modified or may be waived by the Engineer.
- **d.** Certify smoothness of the finished surface according to ~~Article 2316.02, C~~ Section 2317.
- **e.** The Engineer may test for smoothness and bumps near the center line and at other spot locations where compliance is questioned. Additional milling may be required.
- **f.** Do not use the original and final profilograph trace to determine milling depth.

Section 2532

2532.03, B, 1, i.

Replace the Article**:**

On Interstate and Primary projects ~~W~~when the coarse aggregate used in the existing pavement is limestone, longitudinally groove the surface after grinding in accordance with Section 2557.

Section 2547

2547.02, Materials.

Replace the Article:

Furnish fill materials. Do not obtain by excavating or dredging from the stream unless specifically allowed elsewhere in the contract documents, including the Section 404 permit.

2547.03, E.

Replace the Article:

Completely remove temporary structures and return affected areas to preconstruction conditions within 30 calendar days of no longer being needed. Revetment that has been removed may be incorporated elsewhere in the project, provided it meets the specification for the intended final use. Remove all other fill material to an upland area, unless the Section 404 permit requires the channel material be returned to the removal area within the stream. Reshape, stabilize, and revegetate as appropriate all disturbed areas.

Section 2552

2552.05, Basis of Payment.

Replace the Articles:

F. PCC Pipe Support Over Existing Utility.

1. Payment will be at the unit price ~~per each~~ for each pipe support ~~specified~~.

2. Payment is full compensation for furnishing and placing ~~all required~~ PCC pipe supports and associated materials.

G. Reinforced PCC Beam Utility Line Support.

1. Payment will be at the unit price ~~per each~~ for each reinforced PCC beam utility line support ~~specified~~.

2. Payment is full compensation for furnishing and placing the ~~required length of~~ reinforced PCC beam utility line support and associated materials.

Section 2554

2554.05, A, 3, Fittings.

Replace the Article:

One of the following methods will be specified for payment of water main fittings:

a. Count.
Payment will be the contract unit price for each type and size of fitting. Payment is full compensation for furnishing and installing fittings, restrained joints, anchor blocks, and thrust blocks.

b. Weight.
Payment will be made at the contract unit price per pound. Payment is full compensation for furnishing and installing fittings, restrained joints, anchor blocks, and thrust blocks.

Division 41. Construction Materials.

Section 4101

4101.01, a, 2.

Replace the Article:

Limit the alkali content expressed as total equivalent sodium oxide to no more than 0.60% for all cements. For cements with alkali content greater than 0.60%, apply either of the following.

a. Limit alkali loading to 4.0 pounds per cubic yard, calculated in accordance with ASTM C1778 or

b. Submit ASTM C1567 test results demonstrating expansion of less than 0.10% at 14 days, with proposed mix design materials.

c. Submit annually or when materials change.

4101.01, B, ASTM C 595 Cements.

Delete Article 3 and **renumber** following Article:

~~**3.** To produce blended cement, use an approved Type I, II or IL cement with an alkali content expressed as a total equivalent being no more than 0.75% from the clinker portion.~~

3. ~~**4.**~~ Limit total replacement of Type IT to no more than 50 weight percent.

4101.01, C, ASTM C 1157 Cements.

Replace the Article:

Unless specified otherwise, meet the requirements of ASTM C 1157 and ~~the following requirements:~~

~~**1.** Limit the alkali content expressed as a total equivalent being no more than 0.75% from the clinker portion.~~

~~**2.** L~~limit total replacement to no more than 50 weight percent.

Section 4150

4150.02, E, 2, a, 1, a, 4.

Replace the Article:

~~**Tensile**~~ **Breaking Strength:** 150 pounds, minimum

4150.02, E, 2, a, 1, b, 8.

Replace the Article:

~~**Tensile**~~ **Breaking Strength:** 175 pounds, minimum

4150.02, E, 2, a, 2, i.

Replace the Article:

~~**Tensile**~~ **Breaking Strength:** 1100 pounds, minimum

Section 4151

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 ASTM A 1078, Type I. ASTM A 1078 Type 2 epoxy powders may be utilized for pavement dowel bars pursuant to meeting requirements of ASTM A 934. 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 4183

4183.03, B, 2, a.

Rename and **replace** the Article:

Color, Yellowness Index, and Daytime Luminance Factor.

1) ~~For white, the color after drying is to be a flat white, free from tint, furnishing good opacity and visibility under both daylight and artificial light.~~ The initial color of the unbeaded white and yellow paint shall satisfy the appropriate chromaticity coordinates indicated in Table 2 of AASHTO M 348 when tested in accordance with ASTM E 1349 and AASHTO M 348 requirements.
2) ~~For yellow, the color is to be within the following CIE chromaticity limits when measured with an instrument having a 2 degree observer, using a standard C illuminant, and 45/0 or 0/45 geometry.~~ The Yellowness Index for White shall be 0.12 max when tested in accordance with ASTM E313.

~~**Table 4183.03-1: CIE Chromaticity Limits**~~

~~**CIE Data Limits**~~	~~Y~~	~~x~~	~~y~~
~~Minimum~~	~~0.5400~~	~~0.462~~	~~0.428~~
~~Maximum~~	~~0.5910~~	~~0.501~~	~~0.455~~

3) ~~The yellow color chip with chromaticity readings can be obtained from the Office of Materials for correlation.~~ The Daytime Luminance Factor, Y (%), shall be 75 minimum for white and 45 Minimum for Yellow when tested per ASTM E 1349 and AASHTO M 348 requirements.

4183.03, B, 2, e, 2.

Replace the first sentence:

Test according to the requirements of ~~Federal Test 141a Method 4121~~ ASTM D 2805.

4183.06, A, 3, Retroreflectance.

Replace the Article:

a. Ensure ~~white and yellow~~ markings have initial ~~expected~~ minimum retroreflectance values of ~~as shown in Table 4183.06-1~~ 150 mcd/sq m/lux for white markings and 100 mcd/sq m/lux for yellow markings under dry, wet, and rainy conditions.
b. Measure and report dry retroreflectance values according ASTM E 1710 (AASHTO T 398).
c. ~~b.~~ Measure and report wet retroreflectance values under a “condition of wetness” according to ASTM E

2177.

d. ~~c.~~ Measure and report wet retroreflectance values under a “condition of continuous wetting” (simulated rain) according to ASTM E 2832.

~~Table 4183.06-1: Expected Initial R_L under dry, wet, and rainy conditions~~

~~WHITE~~	**~~Dry, Wet, & Rainy~~**
~~Entrance Angle~~	~~88.76 degrees~~
~~Observation Angle~~	~~1.05 degrees~~
~~Retroreflected Luminance R_L [(mcd • ft^{-2}) • fc^{-1}]~~	~~150~~
~~YELLOW~~	**~~Dry, Wet, & Rainy~~**
~~Entrance Angle~~	~~88.76 degrees~~
~~Observation Angle~~	~~1.05 degrees~~
~~Retroreflected Luminance RL [(mcd • ft-2) • fc-1]~~	~~100~~

4183.06, B, 2, Retroreflectance.

Replace the Article:

~~For white or yellow~~ Ensure tapes~~, meet the following~~ have initial minimum retroreflectance values ~~at 1.05 degree observation angle and 88.76 degree entrance angle, measured by a LTL 2000 retroreflectometer:~~ of 550 mcd/sq m/lux for white markings and 325 mcd/sq m/lux for yellow markings according ASTM E 1710 (AASHTO T 398).

	~~White~~	**~~Yellow~~**
~~Specific luminance, mcd/sq.ft./ft.-cdl.~~	~~550~~	~~325~~

4183.06, C, 3, Retroreflectance.

Replace the Article:

~~For white or yellow~~ Ensure tapes~~, meet the following~~ have initial minimum retroreflectance values ~~at 1.05 degree observation angle and 88.76 degree entrance angle, measured by a LTL 2000 retroreflectometer:~~ of 325 mcd/sq m/lux for white markings and 150 mcd/sq m/lux for yellow markings according ASTM E 1710 (AASHTO T 398).

	~~White~~	**~~Yellow~~**
~~Specific luminance, mcd/sq.ft./ft.-cdl.~~	~~325~~	~~150~~

4183.06, E, 3, Retroreflectance.

Replace the Article:

~~For white or yellow films, meet the following~~ Ensure tapes have initial minimum retroreflectance values ~~at 1.05 degree observation angle and 88.76 degree entrance angle, measured by a LTL 2000 retroreflectometer:~~ of 700 mcd/sq m/lux for white markings and 350 mcd/sq m/lux for yellow markings according ASTM E 1710 (AASHTO T 398).

	~~White~~	**~~Yellow~~**
~~Specific luminance, mcd/sq.ft./ft.-cdl.~~	~~700~~	~~350~~

4183.06, F, 3, Retroreflectance.

Replace the Article:

~~For white or yellow~~ Ensure tapes~~, meet the following~~ have initial minimum retroreflectance values ~~at 1.05 degree observation angle and 88.76 degree entrance angle, measured by a LTL 2000 retroreflectometer:~~ of 150 mcd/sq m/lux for white markings and 100 mcd/sq m/lux for yellow markings according ASTM E 1710 (AASHTO T 398).

	~~White~~	**~~Yellow~~**
~~Specific luminance, mcd/sq.ft./ft.-cdl.~~	~~150~~	~~100~~