MINUTES
OF
IOWA DOT SPECIFICATION COMMITTEE MEETING

April 9, 2026

Members Present:	Mark Dunn	Contracts & Specifications Bureau
	Dillon Feldmann	Local Systems Bureau
	Daniel Harness	Design
	Ben Hucker	Maintenance Bureau
	Frank Leong	Grimes RCE
	Shane Neuhaus	District 6 – Materials
	Christy Vanbuskirk	Fairfield RCE
Members Not Present:	Tony Gustafson	Chief Engineer
	Eric Johnsen, Chair	Contracts & Specifications Bureau
	Scott Nixon	Construction & Materials Bureau
	Michael Nop	Bridges & Structures Bureau
	Willy Sorenson	Traffic & Safety Bureau
Advisory Members Present:	Luke Bowdish	Fayette County
	David Carney	SUDAS
	Andy Case	Dallas County
	Jeff DeVries	Construction & Materials Bureau
	Nate Thede	Project Management
	Harold Adcock	Bridges & Structures Bureau
	Jeff Brinkman	Contracts & Specifications Bureau

The Specification Committee met on Thursday, April 9, 2026, at 9:00 a.m. Mark Dunn, Contracts & Specifications Engineer, opened the meeting. The items were discussed in accordance with the agenda dated March 31, 2026.

The agenda is as follows:

1. **Articles 2523.03 and 2523.05, Highway Lighting.**
Article 2525.03, Traffic Signalization.
Article 4185.02, Highway Lighting Materials.
Article 4189.05, Traffic Signal Equipment.

The Bridges and Structures Bureau requested to change select language to more widely accepted terminology as well as a few content changes.

2. **Article 2548.02, A, Milled Rumble Strips.**

The Construction and Materials and Maintenance Bureaus requested to update the type of cutting heads necessary when grooving for pavement markings.

3. **Article 4108.01, Supplementary Cementitious Materials.**

The Construction and Materials Bureau requested the change due to changes in the ASTM.

4. DS-23085 Diamond Grinding Rumble Strips.

The Construction and Materials Bureau requested a change due to several sheets being moved to the Standard Road Plans.

Form 510130 (07-24)

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SPECIFICATION REVISION SUBMITTAL FORM

Submitted by: Mike Nop	**Bureau/Office:** Bridges and Structures Bureau	**Item 1**
Submittal Date: March 2026	**Proposed Effective Date:** April 2027	
Article Nos.: 2523.03, and 2523.05 **Title:** Construction and Basis of Payment (Highway Lighting) **Article No.:** 2525.03 **Title:** Construction (Traffic Signalization) **Article No.:** 4185.02 **Title:** Poles and Supports (Highway Lighting Materials) **Article No.:** 4189.05 **Title:** Poles, Heads, and Signs (Traffic Signal Equipment**)**	**Other:**	

Specification Committee Action: Approved with changes.			
Deferred:	**Not Approved:**	**Approved Date:** 4/9/2026	**Effective Date:** 4/20/2027

Specification Committee Approved Text:

2523.03, B, 1, a, 1.

Replace the Article:
Lighting poles and mast arms.

2523.03, J, Poles and Mastarms.

Retitle and **Replace** the Article**:**
Poles and ~~Mastarms~~ Mast Arms.

1. Furnish and install poles at all locations indicated in the contract documents. Install poles of the lengths shown in the contract documents.

2. Carefully erect all poles and mast arms. Check for vertical alignment, mounting height, and overhang, after installation, with mast arms and luminaire installed.

3. Rake single mast arm poles so the side of the shaft opposite the mast arm is plumb. Erect poles without mast arms, or with more than one mast arm, so the center line of the pole shaft is plumb within a tolerance of 1/32 inch per foot.

4. Check the pole posture at no less than three radial locations on the shaft. For poles required to have plumb shaft center lines, space the checking positions approximately 120 degrees apart, as viewed from above. For raked poles required to have one side plumb, space the check points on the side to be plumbed at 90 degrees in either direction, as viewed from above.

5. Plumb the poles as follows:
- Transformer base: use base leveling shims.
- Slip base: use ~~base leveling shims or~~ leveling ~~bolts~~ nuts~~, whichever is appropriate for the slip base furnished~~.

6. Install anchor bolt washers according to the details in the contract documents.

7. Install mast arms of the type and length specified. Unless shown otherwise in the contract documents, mast arms greater than 8 feet in length are to be Type B, and all others Type A. Use the same type and material for all lighting poles and mast arms on a project.

8. Install insect barriers in the ends of all mast arms at the point of luminaire attachment.

9. Install wood poles of the length and class specified. Set them plumb in drilled holes as directed by the Engineer. Embed the poles no less than 8 feet. Additional embedment may be required by the Engineer if warranted by soil conditions.

2523.05, A, 2

Replace the Article:

Payment is full compensation for materials, equipment, excavation, and installation of the pole, luminaire, mast arm, foundation, base, ground rod, wiring within the pole, and connectors within the pole, according to the contract documents.

2525.03, A, 4, B, 5, b

Replace the Article:

Finish the top of the base level ~~and round the top edges with an edging tool having a radius of 1/2 inch~~. Provide a rubbed surface finish on the exposed surface of the footing.

2525.03, E, 2

Replace the Article:

a. Erect all poles vertically under normal load.

b. Follow the requirements of Article 4189.05, C, 4, b, 5 to ~~S~~securely bolt the bases to the cast-in-place concrete foundations ~~using the procedures in Articles 2522.03, H, 2, a through h~~.

~~**c.** Use a torque wrench to verify that a torque at least equal to the computed verification torque, T_v, is required to additionally tighten the top nuts. An inability to achieve this torque shall be interpreted to indicate the threads have stripped and shall be reported to the Engineer.~~

~~$T_v = 0.12 d_b F_i$~~
~~Where:~~
~~T_v = verification torque (inch kips)~~
~~d_b = nominal body diameter of the anchor rod (inches)~~
~~F_i = installation pretension (kips) equal to 50% of the specified minimum tensile strength of ASTM F 1554, Grade 36 rods, and 60% for the rest of threaded fasteners.~~

c. ~~d.~~ After leveling the poles, use non-shrink grout or a rodent guard between the pole base and the foundation. When non-shrink grout is used, neatly finish exposed edges of grout to present a pleasing appearance, and place a weep hole in the grout.

d. ~~e.~~ Apply anti-seize compound to all mechanical fasteners on pole access doors.

e. ~~f.~~ Install pedestrian push button post caps with tamper-proof set screws per manufacturer's direction or by driving the cap a minimum of 1/2 inch onto the post.

4185.02, POLES AND SUPPORTS

Replace the Article:

A. General.

1. Furnish steel, aluminum, or wood poles of the size and type specified.

2. Each lighting pole is to include provisions for supporting the luminaire or luminaires. If furnishing metal poles, furnish poles consisting of:

- A tapered round shaft, complete with a base, and removable pole top,
- Nameplate or other identification displaying the manufacturer's name, type, height, and shop order number, and
- Appurtenant supporting devices.

3. Dimensions and other details will be shown in the contract documents. Furnish poles and mast arms meeting the mounting height and mast arm length shown in the contract documents. Comply with AASHTO ~~2013 Standard~~ 2015 LRFD Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals.

4. The assembled lighting unit, consisting of the pole and all attachments including mast arms, luminaires, and breakaway base or slip base, as specified, complete and in place in the footing anchor bolts, is required to withstand a wind load corresponding to a ~~90~~ 115 mph basic wind speed (3 second gust) without fracture or apparent deformation of components. Furnish poles in one section. Ensure each standard is designed for a luminaire dead load of 75 pounds and a projected area of 1.5 square feet, except that in the case of twin mast arms, these values are applied to each mast arm.

5. Furnish castings incidental to poles that are smooth and clean, with all details well defined and true to pattern.

6. Furnish pole bases that telescope the pole shaft and are attached to the pole shaft by two welds (top and bottom) subject to approval of the Engineer. Ensure bases other than slip base poles have four anchor bolt holes located 90 degrees apart in the bolt circle. If slip bases are furnished, ensure they have three anchor bolt holes located 120 degrees apart in the bolt circle, oriented as shown in the contract documents. For poles with mast arms, ensure the centers of two adjacent anchor bolt holes are on a line parallel with the neutral plane of the pole shaft with respect to one mast arm, designated as the standard mast arm.

7. Obtain a template from the manufacturer for placement of anchor bolts.

8. With the pole, furnish metal ornamental covers for the upper ends of the anchor or attachment bolts for breakaway base poles.

9. Provide a wiring handhole, no less than 4 inches by 6 inches, with a weatherproof metal cover, for all metal poles not mounted on transformer bases, or as shown in the contract documents. Center the handhole on a point no less than 14 inches or no more than 18 inches above the bottom surface of the pole base mounting flange, and 90 degrees clockwise from the center line of the standard mast arm, as viewed from above. Ensure the pole shaft has a J-hook at the top for supporting cables.

10. Ensure each pole has an approved grounding lug. When a handhole is furnished, ensure the grounding lug is readily accessible through the handhole. Ensure grounding lugs for breakaway base poles are accessible from the bottom of the pole shaft.

B. Anchor Bolt and Slip-Base Plate Fasteners for Lighting Poles.

1. Furnish all bolts, nuts, and washers for pole attachment and anchoring according to the details in the contract documents. Ensure assembled fasteners are capable of withstanding the forces corresponding to a moment that will cause failure of the pole, transformer base, or other applicable mounting device.

2. **Anchor Bolts, Nuts, and Washers.**
Furnish each anchor bolt with one leveling nut (if required), one anchoring nut, and one jam nut (if required) on the exposed end and one of the following on the embedded end: nut, nut and plate, or nut and anchor bolt assembly ring plate. Use anchor bolts, nuts, and washers that comply with Materials I.M. 453.08. Meet the following requirements:

   a. **Anchor Bolts.**
      1) Use straight full-length galvanized bolts.
      2) Comply with ASTM F 1554, Grade 105, S4 (-20°F).
      3) Threads are to comply with ANSI/ASME B1.1 for UNC thread series, Class 2A tolerance.
      4) The end of each anchor bolt intended to project from the concrete is to be color coded to identify the grade.
      5) Do not bend or weld anchor bolts.

   b. **Nuts.**
      1) Comply with ASTM A 563, Grade DH or ASTM A 194, Grade 2H.
      2) Use heavy hex.
      3) Use ANSI/ASME B1.1 for UNC thread series, Class 2B tolerance.
      4) Nuts may be over-tapped according to the allowance requirements of ASTM A 563.
      5) ~~Refer to Articles 2522.03, H, 2, b through h for tightening procedure and requirements.~~ Tighten anchor-bolt nuts in double-nut connections (e.g., for slip bases) according to the procedure in Articles 2522.03, H, 2, b through h. Tighten anchor-bolt nuts in single-nut connections (e.g., for transformer bases) according to the procedure recommended by the lighting pole base manufacturer.

   c. **Washers.**
   Comply with ASTM F 436 Type 1.

   d. **Galvanizing.**
   Galvanize entire anchor bolt assembly consisting of anchor bolts, nuts, and washers (and plates or anchor bolt assembly ring plate, if used) according to the requirements of ASTM B 695, Class 55 Type 1 or ASTM F 2329 with zinc bath temperature limited to 850°F. Galvanize entire assembly by the same zinc-coating process with no mixed processes in a lot of fastener assemblies.

~~3. If slip bases are furnished, furnish 1 inch by 4 1/2 inch bolts that are high-strength bolts meeting the requirements of ASTM A 325.~~

~~4. Furnish washers that comply with ASTM F 436 Type 1.~~

~~5. Furnish nuts that meet the following requirements:~~
- ~~Comply with ASTM A 563, Grade DH or ASTM A 194, Grade 2H.~~
- ~~Use heavy hex.~~
- ~~Use ANSI/ASME B1.1 for UNC thread series, Class 2B tolerance.~~
- ~~Nuts may be over-tapped according to the allowance requirements of ASTM A 563.~~
- ~~Refer to Articles 2522.03, H, 2, b through h for tightening procedure and requirements.~~

~~**6. Galvanizing.**~~

~~Galvanize hardware according to the requirements of ADTM B 695, Class 55 Type 1 or ASTM F 2329 with zinc bath temperature limited to 850°F. Galvanize entire assembly by the same zinc-coating process, with no mixed processes in a lot of fastener assemblies.~~

3. Slip-Base Plate Fasteners.

If slip bases are furnished, supply slip-base plate high-strength fasteners that meet the following requirements:

a. **Bolts.**
   1) Use 1 inch diameter bolts with minimum length of 4 1/2 inches.
   2) Comply with ASTM F 3125, Grade A 325.

b. Nuts.
   1) Comply with ASTM A 563, Grade DH or ASTM A 194, Grade 2H.
   2) Use heavy hex.
   3) Use ANSI/ASME B1.1 for UNC thread series, Class 2B tolerance.
   4) Nuts may be over-tapped according to the allowance requirements of ASTM A 563.
   5) Tighten nuts according to the requirements in the contract documents.

c. Washers.
   Comply with ASTM F 436 Type 1.

d. Galvanizing.
   Galvanize hardware according to the requirements of ASTM B 695, Class 55 Type 1 or ASTM F 2329 with zinc bath temperature limited to 850°F. Galvanize entire assembly by the same zinc-coating process with no mixed processes in a lot of fastener assemblies.

C. ~~Mastarms~~ Mast Arms and Accessories.

1. When indicated in the contract documents, furnish single or twin mast arms as luminaire supports. The contract documents will show the horizontal span of the mast arm and the included angle between the center lines of twin mast arms. Such angles are defined as rotating from the standard mast arm, as viewed from above.

2. Furnish mast arms meeting the following requirements:
   a. Aluminum tube or galvanized steel to match the pole, with smooth openings into the pole shaft to provide an electrical raceway.
   b. Capable of accommodating a 2 inch slipfitter type luminaire.
   c. Type A mast arms: no braces or truss members.
   d. Type B mast arms: a single underbrace attached to the mast arm at no less than two locations.

3. Furnish mast arm bolts, nuts, and washers that are stainless steel and meet the requirements of Article 4187.01.

D. Breakaway (Transformer) Base.

Furnish bases meeting the following requirements:

1. Two piece weldments with internally welded inside corners/material 356 T6 complying with ASTM B 108-87 aluminum alloy permanent mold castings.

2. Designed according to AASHTO ~~2013 Standard~~ 2015 LRFD Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals.

3. Meet or exceed NCHRP Report 350, or AASHTO MASH criteria for any assembly system evaluated after January 1, 2011.

4. Capable of supporting the pole mounting height and mast arm length shown in the contract documents.

5. Equipped with a manufacturer furnished, other than aluminum (in other words, having no scrap value), access door with door opening area of no less than 100 square inches, unless shown otherwise.

E. Steel Poles and ~~Mastarms~~ Mast Arms.

1. Furnish poles meeting the following requirements:
   a. Shafts manufactured with a taper of approximately 0.14 inch per foot of length.
   b. Steel that is no less than 11 gage, with a minimum yield strength of 48,000 psi, after fabrication.
   c. Steel galvanized according to ASTM A 123. Steel 1/8 inch thick or less shall be galvanized to comply with requirements for 1/8 inch thick steel as described in ASTM A 123.

2. Furnish Type A and B mast arms meeting the following:
   a. Fabricated from standard weight, welded steel, 2 inch pipe meeting the requirements of ASTM A 53, Grade B or ASTM A 500, Grade B or C, and galvanized according to ASTM A 123.
   b. Underbrace for a Type B mast arm complying with requirements of the mast arm and connected to the mast arm by welded steel braces to form a truss type assembly.
   c. Mast arm to shaft brackets that provide a water tight connection.

F. Aluminum Poles and ~~Mastarms~~ Mast Arms.

1. Furnish poles meeting the following requirements:
   a. Fabricated from ASTM B 221 6063-T6 or 6061-T6 aluminum alloy tube or ASTM B 209 5086-H34 aluminum sheet.
   b. Minimum nominal wall thickness of 3/16 inch unless indicated otherwise in the contract documents.
   c. Shafts tapered approximately 0.14 inch per foot of length.
   d. Castings of ASTM A 356-T6 aluminum alloy meeting the requirements of Article 4187.01.
   e. Approved dampening device included.
   f. Blocked and paper-wrapped prior to shipment.

2. Furnish Type A and B mast arms meeting the following:
   a. Fabricated from alloy complying with requirements for the pole shaft.
   b. Types A and B mast arms fabricated from tubing or pipe with a minimum outside diameter of 2.375 inches, and swaged, when required, to accommodate a 2 inch slipfitter type luminaire.
   c. Welded braces used to connect the underbrace for a Type B mast arm to the mast arm in order to form a truss type assembly.

G. Wood Poles.

1. Furnish poles meeting the following requirements:
   a. ANSI (ATIS) 05.1, Group D.
   b. Pressure treated with pentachlorophenol according to AASHTO M 133.

2. The size and class of wood poles will be specified in the contract documents.

4185.03, A, 1, d.

Replace the Article:
A high grade porcelain enclosed socket and terminal block with pressure type terminals for connecting leads entering from the mounting bracket or mast arm.

4189.05, C, 2, Pole Design.

Replace the Article:
Comply with AASHTO ~~2013 Standard~~ 2015 LRFD Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals. Use a ~~90~~ 115 mph basic wind speed (3 second gust) ~~with a 50 year mean recurrence interval~~ for strength design. Use Category II for fatigue design. Apply only natural wind gust loads (i.e., do not apply galloping loads, vortex shedding loads, or truck-induced gust loads) for fatigue design. Install vibration mitigation devices that mechanically or statically minimize~~s~~ vibration on the mast arm caused by the wind on all traffic signal pole mast arms over 60 feet in length as shown in the standard details.

4189.05, C, 4, Anchor Bolts, Nuts, and Washers.

Replace the first sentence:
Furnish each anchor bolt with one leveling nut (if required), one anchoring nut, and one jam nut (if required) on the exposed end and one of the following on the embedded end: nut, nut and plate, or nut and anchor bolt assembly ring plate.

4189.05, C, 4, b, 5.

Replace the Article:

~~Refer to Articles 2522.03, H, 2, b through h for tightening procedure and requirements.~~ Tighten anchor-bolt nuts in double-nut connections according to the procedure in Articles 2522.03, H, 2, b through h. Tighten anchor-bolt nuts in single-nut connections (e.g., for transformer bases) according to the procedure recommended by the traffic signal pole base manufacturer.

Comments: Made four corrections to references to “Mast Arms” in titles for Capital “A” in “Arms”.

Specification Section Recommended Text:

2523.03, B, 1, a, 1.

Replace the Article:
Lighting poles and mast arms.

2523.03, J, Poles and Mastarms.

Retitle and **Replace** the Article**:**
Poles and Mast arms.

1. Furnish and install poles at all locations indicated in the contract documents. Install poles of the lengths shown in the contract documents.

2. Carefully erect all poles and mast arms. Check for vertical alignment, mounting height, and overhang, after installation, with mast arms and luminaire installed.

3. Rake single mast arm poles so the side of the shaft opposite the mast arm is plumb. Erect poles without mast arms, or with more than one mast arm, so the center line of the pole shaft is plumb within a tolerance of 1/32 inch per foot.

4. Check the pole posture at no less than three radial locations on the shaft. For poles required to have plumb shaft center lines, space the checking positions approximately 120 degrees apart, as viewed from above. For raked poles required to have one side plumb, space the check points on the side to be plumbed at 90 degrees in either direction, as viewed from above.

5. Plumb the poles as follows:

- Transformer base: use base leveling shims.
- Slip base: use ~~base leveling shims or~~ leveling ~~bolts~~ nuts~~, whichever is appropriate for the slip base furnished~~.

6. Install anchor bolt washers according to the details in the contract documents.

7. Install mast arms of the type and length specified. Unless shown otherwise in the contract documents, mast arms greater than 8 feet in length are to be Type B, and all others Type A. Use the same type and material for all lighting poles and mast arms on a project.

8. Install insect barriers in the ends of all mast arms at the point of luminaire attachment.

9. Install wood poles of the length and class specified. Set them plumb in drilled holes as directed by the Engineer. Embed the poles no less than 8 feet. Additional embedment may be required by the Engineer if warranted by soil conditions.

2523.05, A, 2

Replace the Article:

Payment is full compensation for materials, equipment, excavation, and installation of the pole, luminaire, mast arm, foundation, base, ground rod, wiring within the pole, and connectors within the pole, according to the contract documents.

2525.03, A, 4, B, 5, b

Replace the Article:

Finish the top of the base level ~~and round the top edges with an edging tool having a radius of 1/2 inch~~. Provide a rubbed surface finish on the exposed surface of the footing.

2525.03, E, 2

Replace the Article:

a. Erect all poles vertically under normal load.

b. Follow the requirements of Article 4189.05, C, 4, b, 5 to ~~S~~securely bolt the bases to the cast-in-place concrete foundations ~~using the procedures in Articles 2522.03, H, 2, a through h~~.

~~**c.** Use a torque wrench to verify that a torque at least equal to the computed verification torque, T_v, is required to additionally tighten the top nuts. An inability to achieve this torque shall be interpreted to indicate the threads have stripped and shall be reported to the Engineer.~~

~~$T_v = 0.12 d_b F_t$~~
~~Where:~~
~~T_v = verification torque (inch kips)~~

~~d_b = nominal body diameter of the anchor rod (inches)~~
~~F_t = installation pretension (kips) equal to 50% of the specified minimum tensile strength of ASTM F 1554, Grade 36 rods, and 60% for the rest of threaded fasteners.~~

c. ~~d.~~ After leveling the poles, use non-shrink grout or a rodent guard between the pole base and the foundation. When non-shrink grout is used, neatly finish exposed edges of grout to present a pleasing appearance, and place a weep hole in the grout.
d. ~~e.~~ Apply anti-seize compound to all mechanical fasteners on pole access doors.
e. ~~f.~~ Install pedestrian push button post caps with tamper-proof set screws per manufacturer's direction or by driving the cap a minimum of 1/2 inch onto the post.

4185.02, POLES AND SUPPORTS

Replace the Article:

A. General.

1. Furnish steel, aluminum, or wood poles of the size and type specified.

2. Each lighting pole is to include provisions for supporting the luminaire or luminaires. If furnishing metal poles, furnish poles consisting of:
- A tapered round shaft, complete with a base, and removable pole top,
- Nameplate or other identification displaying the manufacturer's name, type, height, and shop order number, and
- Appurtenant supporting devices.

3. Dimensions and other details will be shown in the contract documents. Furnish poles and mast arms meeting the mounting height and mast arm length shown in the contract documents. Comply with AASHTO ~~2013 Standard~~ 2015 LRFD Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals.

4. The assembled lighting unit, consisting of the pole and all attachments including mast arms, luminaires, and breakaway base or slip base, as specified, complete and in place in the footing anchor bolts, is required to withstand a wind load corresponding to a ~~90~~ 115 mph basic wind speed (3 second gust) without fracture or apparent deformation of components. Furnish poles in one section. Ensure each standard is designed for a luminaire dead load of 75 pounds and a projected area of 1.5 square feet, except that in the case of twin mast arms, these values are applied to each mast arm.

5. Furnish castings incidental to poles that are smooth and clean, with all details well defined and true to pattern.

6. Furnish pole bases that telescope the pole shaft and are attached to the pole shaft by two welds (top and bottom) subject to approval of the Engineer. Ensure bases other than slip base poles have four anchor bolt holes located 90 degrees apart in the bolt circle. If slip bases are furnished, ensure they have three anchor bolt holes located 120 degrees apart in the bolt circle, oriented as shown in the contract documents. For poles with mast arms, ensure the centers of two adjacent anchor bolt holes are on a line parallel with the neutral plane of the pole shaft with respect to one mast arm, designated as the standard mast arm.

7. Obtain a template from the manufacturer for placement of anchor bolts.

8. With the pole, furnish metal ornamental covers for the upper ends of the anchor or attachment bolts for breakaway base poles.

9. Provide a wiring handhole, no less than 4 inches by 6 inches, with a weatherproof metal cover, for all metal poles not mounted on transformer bases, or as shown in the contract documents. Center the handhole on a point no less than 14 inches or no more than 18 inches above the bottom surface of the pole base mounting flange, and 90 degrees clockwise from the center line of the standard mast arm, as viewed from above. Ensure the pole shaft has a J-hook at the top for supporting cables.

10. Ensure each pole has an approved grounding lug. When a handhole is furnished, ensure the grounding lug is readily accessible through the handhole. Ensure grounding lugs for breakaway base poles are accessible from the bottom of the pole shaft.

B. Anchor Bolt and Slip-Base Plate Fasteners for Lighting Poles.

1. Furnish all bolts, nuts, and washers for pole attachment and anchoring according to the details in the contract documents. Ensure assembled fasteners are capable of withstanding the forces corresponding to a moment that will cause failure of the pole, transformer base, or other applicable mounting device.

2. **Anchor Bolts, Nuts, and Washers.**
Furnish each anchor bolt with one leveling nut (if required), one anchoring nut, and one jam nut (if required) on the exposed end and one of the following on the embedded end: nut, nut and plate, or nut and anchor bolt assembly ring plate. Use anchor bolts, nuts, and washers that comply with Materials I.M. 453.08. Meet the following requirements:

   a. **Anchor Bolts.**
      1) Use straight full-length galvanized bolts.
      2) Comply with ASTM F 1554, Grade 105, S4 (-20°F).
      3) Threads are to comply with ANSI/ASME B1.1 for UNC thread series, Class 2A tolerance.
      4) The end of each anchor bolt intended to project from the concrete is to be color coded to identify the grade.
      5) Do not bend or weld anchor bolts.

   b. **Nuts.**
      1) Comply with ASTM A 563, Grade DH or ASTM A 194, Grade 2H.
      2) Use heavy hex.
      3) Use ANSI/ASME B1.1 for UNC thread series, Class 2B tolerance.
      4) Nuts may be over-tapped according to the allowance requirements of ASTM A 563.
      5) ~~Refer to Articles 2522.03, H, 2, b through h for tightening procedure and requirements.~~ Tighten anchor-bolt nuts in double-nut connections (e.g., for slip bases) according to the procedure in Articles 2522.03, H, 2, b through h. Tighten anchor-bolt nuts in single-nut connections (e.g., for transformer bases) according to the procedure recommended by the lighting pole base manufacturer.

   c. **Washers.**
      Comply with ASTM F 436 Type 1.

   d. **Galvanizing.**
      Galvanize entire anchor bolt assembly consisting of anchor bolts, nuts, and washers (and plates or anchor bolt assembly ring plate, if used) according to the requirements of ASTM B 695, Class 55 Type 1 or ASTM F 2329 with zinc bath temperature limited to 850°F. Galvanize entire assembly by the same zinc-coating process with no mixed processes in a lot of fastener assemblies.

~~3. If slip bases are furnished, furnish 1 inch by 4 1/2 inch bolts that are high-strength bolts meeting the requirements of ASTM A 325.~~

~~4. Furnish washers that comply with ASTM F 436 Type 1.~~

~~5. Furnish nuts that meet the following requirements:~~
- ~~Comply with ASTM A 563, Grade DH or ASTM A 194, Grade 2H.~~
- ~~Use heavy hex.~~
- ~~Use ANSI/ASME B1.1 for UNC thread series, Class 2B tolerance.~~
- ~~Nuts may be over-tapped according to the allowance requirements of ASTM A 563.~~
- ~~Refer to Articles 2522.03, H, 2, b through h for tightening procedure and requirements.~~

~~6. Galvanizing.~~
~~Galvanize hardware according to the requirements of ADTM B 695, Class 55 Type 1 or ASTM F 2329 with zinc bath temperature limited to 850°F. Galvanize entire assembly by the same zinc-coating process, with no mixed processes in a lot of fastener assemblies.~~

3. Slip-Base Plate Fasteners.
If slip bases are furnished, supply slip-base plate high-strength fasteners that meet the following requirements:

e. **Bolts.**
- **1)** Use 1 inch diameter bolts with minimum length of 4 1/2 inches.
- **2)** Comply with ASTM F 3125, Grade A 325.

f. Nuts.
- **1)** Comply with ASTM A 563, Grade DH or ASTM A 194, Grade 2H.
- **2)** Use heavy hex.
- **3)** Use ANSI/ASME B1.1 for UNC thread series, Class 2B tolerance.
- **4)** Nuts may be over-tapped according to the allowance requirements of ASTM A 563.
- **5)** Tighten nuts according to the requirements in the contract documents.

g. Washers.
Comply with ASTM F 436 Type 1.

h. Galvanizing.
Galvanize hardware according to the requirements of ASTM B 695, Class 55 Type 1 or ASTM F 2329 with zinc bath temperature limited to 850°F. Galvanize entire assembly by the same zinc-coating process with no mixed processes in a lot of fastener assemblies.

C. Mast Arms and Accessories.

1. When indicated in the contract documents, furnish single or twin mast arms as luminaire supports. The contract documents will show the horizontal span of the mast arm and the included angle between the center lines of twin mast arms. Such angles are defined as rotating from the standard mast arm, as viewed from above.

2. Furnish mast arms meeting the following requirements:
- **a.** Aluminum tube or galvanized steel to match the pole, with smooth openings into the pole shaft to provide an electrical raceway.
- **b.** Capable of accommodating a 2 inch slipfitter type luminaire.
- **c.** Type A mast arms: no braces or truss members.
- **d.** Type B mast arms: a single underbrace attached to the mast arm at no less than two locations.

3. Furnish mast arm bolts, nuts, and washers that are stainless steel and meet the requirements of Article 4187.01.

D. Breakaway (Transformer) Base.
Furnish bases meeting the following requirements:

1. Two piece weldments with internally welded inside corners/material 356 T6 complying with ASTM B 108-87 aluminum alloy permanent mold castings.

2. Designed according to AASHTO ~~2013 Standard~~ 2015 LRFD Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals.

3. Meet or exceed NCHRP Report 350, or AASHTO MASH criteria for any assembly system evaluated after January 1, 2011.

4. Capable of supporting the pole mounting height and mast arm length shown in the contract documents.

5. Equipped with a manufacturer furnished, other than aluminum (in other words, having no scrap value), access door with door opening area of no less than 100 square inches, unless shown otherwise.

E. Steel Poles and Mast arms.

1. Furnish poles meeting the following requirements:
   - **a.** Shafts manufactured with a taper of approximately 0.14 inch per foot of length.
   - **b.** Steel that is no less than 11 gage, with a minimum yield strength of 48,000 psi, after fabrication.
   - **c.** Steel galvanized according to ASTM A 123. Steel 1/8 inch thick or less shall be galvanized to comply with requirements for 1/8 inch thick steel as described in ASTM A 123.

2. Furnish Type A and B mast arms meeting the following:
   - **a.** Fabricated from standard weight, welded steel, 2 inch pipe meeting the requirements of ASTM A 53, Grade B or ASTM A 500, Grade B or C, and galvanized according to ASTM A 123.
   - **b.** Underbrace for a Type B mast arm complying with requirements of the mast arm and connected to the mast arm by welded steel braces to form a truss type assembly.
   - **c.** Mast arm to shaft brackets that provide a water tight connection.

F. Aluminum Poles and Mast arms.

1. Furnish poles meeting the following requirements:
   - **a.** Fabricated from ASTM B 221 6063-T6 or 6061-T6 aluminum alloy tube or ASTM B 209 5086-H34 aluminum sheet.
   - **b.** Minimum nominal wall thickness of 3/16 inch unless indicated otherwise in the contract documents.
   - **c.** Shafts tapered approximately 0.14 inch per foot of length.
   - **d.** Castings of ASTM A 356-T6 aluminum alloy meeting the requirements of Article 4187.01.
   - **e.** Approved dampening device included.
   - **f.** Blocked and paper-wrapped prior to shipment.

2. Furnish Type A and B mast arms meeting the following:
   - **a.** Fabricated from alloy complying with requirements for the pole shaft.

b. Types A and B mast arms fabricated from tubing or pipe with a minimum outside diameter of 2.375 inches, and swaged, when required, to accommodate a 2 inch slipfitter type luminaire.

c. Welded braces used to connect the underbrace for a Type B mast arm to the mast arm in order to form a truss type assembly.

G. Wood Poles.

1. Furnish poles meeting the following requirements:

a. ANSI (ATIS) 05.1, Group D.

b. Pressure treated with pentachlorophenol according to AASHTO M 133.

2. The size and class of wood poles will be specified in the contract documents.

4185.03, A, 1, d.

Replace the Article:

A high grade porcelain enclosed socket and terminal block with pressure type terminals for connecting leads entering from the mounting bracket or mast arm.

4189.05, C, 2, Pole Design.

Replace the Article:

Comply with AASHTO ~~2013 Standard~~ 2015 LRFD Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals. Use a ~~90~~ 115 mph basic wind speed (3 second gust) ~~with a 50 year mean recurrence interval~~ for strength design. Use Category II for fatigue design. Apply only natural wind gust loads (i.e., do not apply galloping loads, vortex shedding loads, or truck-induced gust loads) for fatigue design. Install vibration mitigation devices that mechanically or statically minimize~~s~~ vibration on the mast arm caused by the wind on all traffic signal pole mast arms over 60 feet in length as shown in the standard details.

4189.05, C, 4, Anchor Bolts, Nuts, and Washers.

Replace the first sentence:

Furnish each anchor bolt with one leveling nut (if required), one anchoring nut, and one jam nut (if required) on the exposed end and one of the following on the embedded end: nut, nut and plate, or nut and anchor bolt assembly ring plate.

4189.05, C, 4, b, 5.

Replace the Article:

~~Refer to Articles 2522.03, H, 2, b through h for tightening procedure and requirements.~~ Tighten anchor-bolt nuts in double-nut connections according to the procedure in Articles 2522.03, H, 2, b through h. Tighten anchor-bolt nuts in single-nut connections (e.g., for transformer bases) according to the procedure recommended by the traffic signal pole base manufacturer.

Comments:

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

Section 2523. Highway Lighting

. . .

2523.03 CONSTRUCTION.

...

B. Shop Drawings.

1. Before any items are ordered or installation is started, the following list of shop drawings shall be submitted for approval according to Article 1105.03:

a. Required Shop Drawings:

1) Lighting poles and ~~mastarms~~mast arms.

…

J. Poles and ~~Mastarms~~Mast Arms.

1. Furnish and install poles at all locations indicated in the contract documents. Install poles of the lengths shown in the contract documents.

2. Carefully erect all poles and ~~mastarms~~mast arms. Check for vertical alignment, mounting height, and overhang, after installation, with ~~mastarm~~mast arm and luminaire installed.

3. Rake single ~~mastarm~~mast arm poles so the side of the shaft opposite the ~~mastarm~~mast arm is plumb. Erect poles without ~~mastarms~~mast arms, or with more than one ~~mastarm~~mast arm, so the center line of the pole shaft is plumb within a tolerance of 1/32 inch per foot.

…

5. Plumb the poles as follows:

- Transformer base: use base leveling shims.
- Slip base: use ~~base leveling shims or~~ leveling ~~bolts~~nuts~~, whichever is appropriate for the slip base furnished~~.

…

7. Install ~~mastarms~~mast arms of the type and length specified. Unless shown otherwise in the contract documents, ~~mastarms~~mast arms greater than 8 feet in length are to be Type B, and all others Type A. Use the same type and material for all lighting poles and ~~mastarms~~mast arms on a project.

8. Install insect barriers in the ends of all ~~mastarms~~mast arms at the point of luminaire attachment.

…

2523.05 BASIS OF PAYMENT.

Payment for the quantities of the various items involved in constructing highway lighting will be the contract unit price as follows:

A. Lighting Poles.

…

2. Payment is full compensation for materials, equipment, excavation, and installation of the pole, luminaire, ~~mastarm~~mast arm, foundation, base, ground rod, wiring within the pole, and connectors within the pole, according to the contract documents.

2525 Traffic Signalization

2525.03 CONSTRUCTION.

A. Underground.

…

4. Footings and Foundations.

…

b. Foundation: Provide a means for holding all of the following elements rigidly in place while the concrete is being placed.

…

5) Concrete.

…

b) Finish the top of the base level ~~and round the top edges with an edging tool having a radius of 1/2 inch~~. Provide a rubbed surface finish on the exposed surface of the footing.

…

…

E. Poles, Heads, and Signs.

…

2. Traffic Signal and Pedestal Poles.

a. Erect all poles vertically under normal load.

b. Follow the requirements of Article 4189.05, C, 4, b, 5 to ~~S~~securely bolt the bases to the cast-in-place concrete foundations ~~using the procedures in~~ Articles 2522.03, H, 2, a through h.

~~**c.** Use a torque wrench to verify that a torque at least equal to the computed verification torque, T_v, is required to additionally tighten the top nuts. An inability to achieve this torque shall be interpreted to indicate the threads have stripped and shall be reported to the Engineer.~~

~~$T_v = 0.12 d_b F_i$~~
~~Where:~~
~~T_v = verification torque (inch kips)~~
~~d_b = nominal body diameter of the anchor rod (inches)~~
~~F_i = installation pretension (kips) equal to 50% of the specified minimum tensile strength of ASTM F 1554, Grade 36 rods, and 60% for the rest of threaded fasteners.~~

~~**d.**~~**c.** After leveling the poles, use non-shrink grout or a rodent guard between the pole base and the foundation. When non-shrink grout is used, neatly finish exposed edges of grout to present a pleasing appearance~~,~~ and place a weep hole in the grout.

~~**e.**~~**d.** Apply anti-seize compound to all mechanical fasteners on pole access doors.

~~**f.**~~**e.** Install pedestrian push button post caps with tamper-proof set screws per manufacturer's direction or by driving the cap a minimum of 1/2 inch onto the post.

Section 4185. Highway Lighting Materials

. . .

4185.02 POLES AND SUPPORTS.

A. General.

…

3. Dimensions and other details will be shown in the contract documents. Furnish poles and ~~mastarms~~mast arms meeting the mounting height and ~~mastarm~~mast-arm length shown in the contract documents. Comply with AASHTO ~~2013 Standard~~2015 LRFD Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals.

4. The assembled lighting unit, consisting of the pole and all attachments including ~~mastarms~~mast arms, luminaires, and breakaway base or slip base, as specified, complete and in place in the footing anchor bolts, is required to withstand a wind load corresponding to a ~~90~~115 mph basic wind speed (3 second gust) without fracture or apparent deformation of components. Furnish poles in one section. Ensure each standard is designed for a luminaire dead load of 75 pounds and a projected area of 1.5 square feet, except that in the case of twin ~~mastarms~~mast arms, these values are applied to each ~~mastarm~~mast arm.

…

6. Furnish pole bases that telescope the pole shaft and are attached to the pole shaft by two welds (top and bottom) subject to approval of the Engineer. Ensure bases other than slip base poles have four anchor bolt holes located 90 degrees apart in the bolt circle. If slip bases are furnished, ensure they have three anchor bolt holes located 120 degrees apart in the bolt circle, oriented as shown in the contract documents. For poles with ~~mastarms~~mast arms, ensure the centers of two adjacent anchor bolt holes are on a line parallel with the neutral plane of the pole shaft with respect to one ~~mastarm~~mast arm, designated as the standard ~~mastarm~~mast arm.

…

9. Provide a wiring handhole, no less than 4 inches by 6 inches, with a weatherproof metal cover, for all metal poles not mounted on transformer bases, or as shown in the contract documents. Center the handhole on a point no less than 14 inches or no more than 18 inches above the bottom surface of the pole base mounting flange, and 90 degrees clockwise from the center line of the standard ~~mastarm~~mast arm, as viewed from above. Ensure the pole shaft has a J-hook at the top for supporting cables.

…

B. Anchor Bolt and Slip-Base Plate Fasteners for Lighting Poles.

…

2. Anchor Bolts, Nuts, and Washers.

Furnish each anchor bolt with one leveling nut (if required), one anchoring nut, and one jam nut (if required) on the exposed end and one of the following on the embedded end: nut, nut and plate, or nut and anchor bolt assembly ring plate. Use anchor bolts, nuts, and washers that comply with Materials I.M. 453.08. Meet the following requirements:

…

b. Nuts.

…

5) ~~Refer to Articles 2522.03, H, 2, b through h for tightening procedure and requirements.~~Tighten anchor-bolt nuts in double-nut connections (e.g., for slip bases) according to the procedure in Articles 2522.03, H, 2, b through h. Tighten anchor-bolt nuts in single-nut connections (e.g., for transformer bases) according to the procedure recommended by the lighting pole base manufacturer.

…

~~**3. If slip bases are furnished, furnish 1 inch by 4 1/2 inch bolts that are high-strength bolts meeting the requirements of ASTM A 325.**~~

~~**4. Furnish washers that comply with ASTM F 436 Type 1.**~~

~~**5. Furnish nuts that meet the following requirements:**~~

- ~~Comply with ASTM A 563, Grade DH or ASTM A 194, Grade 2H.~~
- ~~Use heavy hex.~~
- ~~Use ANSI/ASME B1.1 for UNC thread series, Class 2B tolerance.~~
- ~~Nuts may be over-tapped according to the allowance requirements of ASTM A 563.~~
- ~~Refer to Articles 2522.03, H, 2, b through h for tightening procedure and requirements.~~

~~**6. Galvanizing.**~~

~~Galvanize hardware according to the requirements of ADTM B 695, Class 55 Type 1 or ASTM F 2329 with zinc bath temperature limited to 850°F. Galvanize entire assembly by the same zinc-coating process, with no mixed processes in a lot of fastener assemblies.~~

3. Slip-Base Plate Fasteners.

If slip bases are furnished, supply slip-base plate high-strength fasteners that meet the following requirements:

a. Bolts.

1) Use 1-inch diameter bolts with minimum length of 4 1/2 inches.
2) Comply with ASTM F 3125, Grade A 325.

b. Nuts.

1) Comply with ASTM A 563, Grade DH or ASTM A 194, Grade 2H.
2) Use heavy hex.
3) Use ANSI/ASME B1.1 for UNC thread series, Class 2B tolerance.
4) Nuts may be over-tapped according to the allowance requirements of ASTM A 563.
5) Tighten nuts according to the requirements in the contract documents.

c. Washers.

Comply with ASTM F 436 Type 1.

d. Galvanizing.
Galvanize hardware according to the requirements of ASTM B 695, Class 55 Type 1 or ASTM F 2329 with zinc bath temperature limited to 850°F. Galvanize entire assembly by the same zinc-coating process with no mixed processes in a lot of fastener assemblies.

…

D. Breakaway (Transformer) Base.
Furnish bases meeting the following requirements:
…

2. Designed according to AASHTO ~~2013 Standard~~2015 LRFD Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals.
…

4. Capable of supporting the pole mounting height and ~~mastarm~~mast arm length shown in the contract documents.
…

E. Steel Poles and ~~Mastarms~~Mast Arms.
…

2. Furnish Type A and B ~~mastarms~~mast arms meeting the following:
a. Fabricated from standard weight, welded steel, 2-inch pipe meeting the requirements of ASTM A 53, Grade B or ASTM A 500, Grade B or C, and galvanized according to ASTM A 123.
b. Underbrace for a Type B ~~mastarm~~mast arm complying with requirements of the ~~mastarm~~mast arm and connected to the ~~mastarm~~mast arm by welded steel braces to form a truss type assembly.
c. ~~Mastarm~~Mast arm to shaft brackets that provide a water tight connection.

Section 4189. Traffic Signal Equipment

. . .

4189.05 POLES, HEADS, AND SIGNS.
…

C. Traffic Signal Poles and Mast Arms.
…

2. Pole Design.
Comply with AASHTO ~~2013 Standard~~2015 LRFD Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals. Use a ~~90~~115 mph basic wind speed (3 second gust) ~~with a 50 year mean recurrence interval~~ for strength design. Use Category II for fatigue design. Apply only natural wind gust loads (i.e., do not apply galloping loads, vortex shedding loads, or truck-induced gust loads) for fatigue design. Install vibration mitigation devices that mechanically or statically minimize~~s~~ vibration on the mast arm caused by the wind on all traffic signal pole mast arms over 60 feet in length as shown in the standard details.
…

4. Anchor Bolts, Nuts, and Washers.
Furnish each anchor bolt with one leveling nut (if required), one anchoring nut, and one jam nut (if required) on the exposed end and one of the following on the embedded end: nut, nut and plate, or nut and anchor bolt assembly ring plate. Use anchor bolts, nuts, and washers that comply with Materials I.M. 453.08. Meet the following requirements:
…

b. Nuts.
…

5) ~~Refer to Articles 2522.03, H, 2, b through h for tightening procedure and requirements.~~Tighten anchor-bolt nuts in double-nut connections according to the procedure

	in Articles 2522.03, H, 2, b through h. Tighten anchor-bolt nuts in single-nut connections (e.g., for transformer bases) according to the procedure recommended by the traffic signal pole base manufacturer.

Reason for Revision:

2523:

"Mast arm" is more widely accepted than "mastarm" and conforms to the terminology used in Section 2525 "Traffic Signalization" and Section 4189 "Traffic Signal Equipment". The 2015 AASHTO *LRFD Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals* (AASHTO LRFDLTS-1) uses the term "mast arm".

A light pole slip base utilizes leveling nuts instead of leveling shims or leveling bolts for leveling purposes. In an anchor bolt (i.e., anchor rod) double-nut connection, (1) the leveling nuts are first turned onto the anchor bolts, (2) the base plate is then placed on top of the leveling nuts, and (3) the top nuts are finally turned onto the anchor bolts to secure the base plate to the anchor bolts. Leveling nuts allow for precise adjustment of the light pole inclination. Iowa DOT Standard Road Plan LI-211 "Slip Base for Light Poles" explicitly shows the use of leveling nuts.

2525:

The requirement to round the concrete foundation top edges to a radius of 1/2 inch is in conflict with the 1-inch chamfer shown on Standard Road Plan TS-102 "Traffic Signal Pole Foundation". Removal of the requirement would make the presentation of information consistent with what is done in Section 2523 "Highway Lighting".

Need to refer to Article 4189.05, C, 4, b, 5 instead of Articles 2522.03, H, 2, a through h for guidance pertaining to anchor-bolt nut tightening procedure as Article 4189.05 C, 4 includes information specifically addressing anchor bolts associated with traffic signal poles.

Based on field experience, the torque verification method described in Article 2525.03, E, 2, c does not provide reliable/repeatable results that are useful in accurately determining the installation pretension of the anchor bolts.

4185:

"Mast arm" is more widely accepted than "mastarm" and conforms to the terminology used in Section 2525 "Traffic Signalization" and Section 4189 "Traffic Signal Equipment". The 2015 AASHTO *LRFD Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals* (AASHTO LRFDLTS-1) uses the term "mast arm".

The Iowa DOT now requires highway lighting poles to be designed according to the AASHTO *LRFD Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals*, First Edition (AASHTO *LRFDLTS-1*, 2015). The *LRFDLTS-1* load-and-resistance-factor (LRFD) methodology improves on the earlier allowable-stress-design (ASD) methodology found in the AASHTO *Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals*, Sixth Edition (AASHTO *LTS-6*, 2013). The LRFD methodology accounts for variability in both structural resistance and loads, achieves relatively uniform levels of safety, and is based on risk assessment founded on reliability theory.

The calculated wind load corresponding to the *LRFDLTS-1* 115-mph wind speed is the same as the calculated wind load corresponding to the *LTS-6* 90-mph wind speed. The different methods in arriving at the same wind pressure for *LRFDLTS-1* and *LTS-6* are due to the classification of wind as an "extreme event" limit state in *LRFDLTS-1* but a "strength" limit state in *LTS-6*.

An anchor bolt in a single-nut connection (e.g., for a transformer base) does not utilize the leveling nut that is required in a double-nut connection.

Because the base of a highway lighting pole may be attached to the supporting anchor bolts using either a double-nut (moment) connection or a single-nut connection, a distinction must be made between the differing required procedures for the tightening of anchor-bolt nuts. Anchor-bolt nuts in double-nut connections are tightened using the turn-of-nut (strain-based) method. Anchor-bolt nuts in single-nut connections are typically tightened using the calibrated wrench (torque controlled, forced-based) method.

Current Articles 4185.02, B, 3-6 are reorganized into proposed Articles 4185.02, B, 3, a-d so that the

presentational format of the bolt, nut, washer, and galvanizing information for slip-base plate fasteners corresponds with that for anchor bolts in Articles 4185.02, B, 2, a-d.

Mast arms may be fabricated from ASTM A 500, Grade B (46 ksi minimum yield stress) or Grade C (50 ksi minimum yield stress) hollow structural sections in addition to ASTM A 53, Grade B pipe (35 ksi minimum yield stress).

4189:

The Iowa DOT now requires traffic signal poles to be designed according to the AASHTO *LRFD Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals*, First Edition (AASHTO *LRFDLTS-1*, 2015). The *LRFDLTS-1* load-and-resistance-factor (LRFD) methodology improves on the earlier allowable-stress-design (ASD) methodology found in the AASHTO *Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals*, Sixth Edition (AASHTO *LTS-6*, 2013). The LRFD methodology accounts for variability in both structural resistance and loads, achieves relatively uniform levels of safety, and is based on risk assessment founded on reliability theory.

The calculated wind load corresponding to the *LRFDLTS-1* 115-mph wind speed is the same as the calculated wind load corresponding to the *LTS-6* 90-mph wind speed. The different methods in arriving at the same wind pressure for *LRFDLTS-1* and *LTS-6* are due to the classification of wind as an “extreme event” limit state in *LRFDLTS-1* but a “strength” limit state in *LTS-6*.

An anchor bolt in a single-nut connection (e.g., for a transformer base) does not utilize the leveling nut that is required in a double-nut connection.

Because the base of a traffic signal pole may be attached to the supporting anchor bolts using either a double-nut (moment) connection or a single-nut connection, a distinction must be made between the differing required procedures for the tightening of anchor-bolt nuts. Anchor-bolt nuts in double-nut connections are tightened using the turn-of-nut (strain-based) method. Anchor-bolt nuts in single-nut connections are typically tightened using the calibrated wrench (torque controlled, forced-based) method.

New Bid Item Required (X one)	**Yes**	**No** X
Bid Item Modification Required (X one)	**Yes**	**No** X
Bid Item Obsoletion Required (X one)	**Yes**	**No** X
Comments: None		
County or City Comments: None		
Industry Comments: None		

Form 510130 (07-24)

IOWA | DOT

SPECIFICATION REVISION SUBMITTAL FORM

Submitted by: Scott Nixon/Elijah Gansen	**Bureau/Office:** Construction and Materials Bureau	**Item 2**
Submittal Date: 3/30/2026	**Proposed Effective Date:** October 2026	
Article No.: 2548.02, A **Title:** Milling (Milled Rumble Strips - HMA or PCC Surface)	**Other:** N/A	

Specification Committee Action: Approved as recommended.

Deferred:	**Not Approved:**	**Approved Date:** 4/9/2026	**Effective Date:** 10/20/2026

Specification Committee Approved Text: See Specification Section Recommended Text.

Comments: None.

Specification Section Recommended Text:

2548.02, A, Milling.

Replace the Article:

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

Comments:

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

2548.02, A

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

Reason for Revision: The switch to PCD teeth is being done in an effort to reduce damage to the pavement surface. The cutting teeth called for in the current specification cause excessive damage to PCC pavements leading to the desire to phase their use out.

New Bid Item Required (X one)	**Yes**	**No** X
Bid Item Modification Required (X one)	**Yes**	**No** X
Bid Item Obsoletion Required (X one)	**Yes**	**No** X

Comments:

County or City Comments: Not circulated due to lack of use on secondary roads or municipal streets.

Industry Comments: Change shared with industry and no concerns were noted due to most contractors already using these teeth in their equipment.

Form 510130 (08-15)

IOWA | DOT

SPECIFICATION REVISION SUBMITTAL FORM

Submitted by: Scott Nixon	**Office:** Construction & Materials	**Item 3**
Submittal Date: 3/30/2026	**Proposed Effective Date:** October 2026	
Article No.: 4108.01 **Title:** Fly Ash and Natural Pozzolans (Supplementary Cementitious Materials)	**Other:**	

Specification Committee Action: Approved as recommended.

Deferred:	**Not Approved:**	**Approved Date:** 4/9/2026	**Effective Date:** 10/20/2026

Specification Committee Approved Text:

4108.01, Fly Ash and natural pozzolans.

Replace and **Renumber** the Article:

A. Comply with ASTM C 1945 for Class N, ASTM C 618 ~~or ASTM C 1697, either Class N,~~ for Class F or Class C, or ASTM C 1697 for blended fly ash, except the value of alkalies are not to exceed 3.80% as determined by Materials I.M. 491.17.

~~**B.** When Class F is required, a Class C fly ash with minimum total oxides ($SiO_2 + Al_2O_3 + Fe_2O_3$) of 66% and minimum SiO_2 of 38% may be used.~~

B. ~~**C.**~~ Approval of the source of fly ash will be required. This is to be based on fly ash produced when the power plant is using specific materials, equipment, and processes. Any change in materials, equipment, and processes voids the source approval, and a new approval of the source will be required. Initial approval of Class N pozzolans will be based on meeting the additional requirements of Materials I.M. 491.17.

C. ~~**D.**~~ Inspection and acceptance of fly ash and natural pozzolans will be according to Materials I.M. 491.17.

D. ~~**E.**~~ Fly ash for soil stabilization shall meet ASTM C 618, Class C, except loss of ignition (LOI) requirement will not apply. Fly ash shall also contain a minimum of 22% calcium oxide (CaO).

Comments: Corrected error in strikethrough in the recommended text.

Specification Section Recommended Text:

4108.01 Fly Ash and natural pozzolans.

Replace and **Renumber** the Article:

A. Comply with ASTM C 1945 for Class N, ASTM C 618 or ASTM C 1697, either Class N, for Class F or Class C, or ASTM C 1697 for blended fly ash, except the value of alkalies are not to exceed 3.80% as determined by Materials I.M. 491.17.

~~**B.** When Class F is required, a Class C fly ash with minimum total oxides ($SiO_2 + Al_2O_3 + Fe_2O_3$) of 66% and minimum SiO_2 of 38% may be used.~~

B. ~~**C.**~~ Approval of the source of fly ash will be required. This is to be based on fly ash produced when the power plant is using specific materials, equipment, and processes. Any change in materials, equipment, and processes voids the source approval, and a new approval of the source will be required. Initial approval of Class N pozzolans will be based on meeting the additional requirements of Materials I.M. 491.17.

C. ~~**D.**~~ Inspection and acceptance of fly ash and natural pozzolans will be according to Materials I.M. 491.17.

D. ~~**E.**~~ Fly ash for soil stabilization shall meet ASTM C 618, Class C, except loss of ignition (LOI) requirement will not apply. Fly ash shall also contain a minimum of 22% calcium oxide (CaO).

Comments:

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

4108.01 FLY ASH AND NATURAL POZZOLANS.

A. Comply with ASTM C 1945 for Class N, ASTM C 618 ~~or ASTM C 1697~~, ~~either Class N,~~ for Class F or Class C, or ASTM C 1697 for blended fly ash, except the value of alkalies are not to exceed 3.80% as determined by <u>Materials I.M. 491.17</u>.

B. ~~When Class F is required, a Class C fly ash with minimum total oxides (SiO_2 + Al_2O_3 + Fe_2O_3) of 66% and minimum SiO_2 of 38% may be used.~~

Reason for Revision:

ASTM moving Class N to ASTM C1945. Paragraph B total oxides no longer applies, CaO percent splits Class C and Class F in current ASTM C618.

New Bid Item Required (X one)	**Yes**	**No** X
Bid Item Modification Required (X one)	**Yes**	**No** X
Bid Item Obsoletion Required (X one)	**Yes**	**No** X

Comments:

County or City Comments:

Industry Comments: Sent to ICPA/IRMCA

Form 510130 (07-24)

IOWA | DOT

SPECIFICATION REVISION SUBMITTAL FORM

Submitted by: Scott Nixon/Elijah Gansen	**Bureau/Office:** Construction and Materials Bureau	**Item 4**
Submittal Date: 3/26/2026	**Proposed Effective Date:** October 2026	
Article No.: **Title:**	**Other:** DS-23085 Diamond Grinding Rumble Strips	

Specification Committee Action: Approved as recommended.

Deferred:	**Not Approved:**	**Approved Date:** 4/9/2026	**Effective Date:** 7/21/2026

Specification Committee Approved Text: See attached Developmental Specifications for Diamond Grinding Rumble Strips.

Comments: None

Specification Section Recommended Text: See attached Developmental Specifications for Diamond Grinding Rumble Strips.

Comments:

Member's Requested Change: **(Do not use 'Track Changes', or 'Mark-Up'. Use ~~Strikeout~~ and Highlight.)**
Remove pages four through ten of the current developmental specification.

Reason for Revision: Information and details on sheets four through ten have been moved to Standard Road Plans PV-12 and PV-13 so these sheets need to be removed to prevent duplicate information and potential for conflicting information.

New Bid Item Required (X one)	**Yes**	**No** X
Bid Item Modification Required (X one)	**Yes**	**No** X
Bid Item Obsoletion Required (X one)	**Yes**	**No** X

Comments:

County or City Comments: Not distributed since they do not use these details

Industry Comments: Not shared with industry since information is being relocated and not modified

DS-23088
(Replaces DS-23085)

DEVELOPMENTAL SPECIFICATIONS
FOR
DIAMOND GRINDING RUMBLE STRIPS

Effective Date
July 21, 2026

THE STANDARD SPECIFICATIONS, SERIES 2023, ARE AMENDED BY THE FOLLOWING MODIFICATIONS AND ADDITIONS. THESE ARE DEVELOPMENTAL SPECIFICATIONS AND THEY PREVAIL OVER THOSE PUBLISHED IN THE STANDARD SPECIFICATIONS.

23088.01 DESCRIPTION.
Provide equipment, furnish all necessary labor and materials, and perform all operations necessary for diamond grinding standard or sinusoidal rumble strips in HMA or PCC surfaces. Diamond grind rumble strips to the dimensions and spacing shown in the contract documents. Apply diluted asphalt emulsion to the diamond ground shoulder rumble strips on HMA surfaces by means of a bituminous distributor.

23088.02 MATERIALS.

A. Use asphalt emulsion Grade CSS-1, CSS-1h, SS-1, or SS-1h meeting requirements of Section 4140 of the Standard Specifications.

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

23088.03 CONSTRUCTION.

A. General.

1. Notify the Engineer if degraded areas are encountered that will not accommodate diamond ground rumble strips. Skip those sections.

2. Allow PCC to cure for a minimum of 14 days prior to placing diamond ground rumble strips. When maturity is used for opening, placement of diamond ground rumble strips may begin when 350psi flexural strength is achieved.

B. Equipment.

1. Perform grinding using stacked diamond blades mounted on a self propelled machine that has been designed for grinding PCC or HMA surfaces. Polycrystalline diamond (PCD) heads are not considered an approved equal for stacked diamond blades. Ensure the equipment will not cause strain or damage to the underlying pavement.

2. Do not use grinding equipment that causes excessive ravels, aggregate fractures, spalls, or excessive disturbance of the transverse and/or longitudinal joints. The finished surface after grinding the rumble strips should have a corduroy like texture.

3. For standard rumble strips use grinding equipment with a minimum effective head width suitable for grinding the entire width of the rumble strip in one pass. For centerline rumble strips use a grinding head equipped to grind the rumble strip on each side of the centerline in one pass.

4. Select the blade type and number of blades per foot to provide proper surface texture based on the material being ground, in particular, the coarse aggregate type.

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

D. Grinding.

1. Grind shoulder rumble strips in a straight line, offset from the painted edge line as shown in the contract documents. Do not deviate from that offset more than ±2 inches. Ensure the depth of the rumble strips is as shown in the contract documents. The Engineer will randomly check the alignment and depth.

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

3. Continuously remove all slurry or residue resulting from the grinding operations. Do not deposit on the slab or shoulder. Leave pavement and paved shoulders in a clean condition. Ensure residue from grinding operations does not flow across lanes occupied by public traffic. This residue may be spread on the foreslope or removed according to Article 1104.08 of the Standard Specifications. When residue is deposited on the foreslope in areas where cable guardrail is present, spread the residue in a manner that prevents it from collecting in the sockets for the cable guardrail system. Take measures to prevent damage to vegetation during spreading of residue. If damage occurs, repair at no cost to the Contracting Authority. Do not allow discharge of slurry or residue into gutters, drainage facilities, or bodies of water.

E. Asphalt Emulsion Fog Seal.
Per Article 2548.03, C of the Standard Specifications.

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

23088.04 METHOD OF MEASUREMENT.
Measurement will be as follows:

A. Diamond Ground Shoulder Rumble Strips.
Stations shown in the contract documents for each type, measured along each edge of mainline

pavement. Unless stated otherwise in the contract documents, no deduction will be made for gapped areas. The quantity will be adjusted for the length of degraded shoulders skipped, as defined in Article DS-23088.03 of this specification. The quantity will be adjusted for test sections that were deemed unsatisfactory.

B. Diamond Ground Centerline Rumble Strips.
Stations shown in the contract documents for each type, measured along the centerline of mainline pavement. Unless stated otherwise in the contract documents, no deduction will be made for gapped areas. The quantity will be adjusted for the length of degraded pavement skipped, as defined in Article DS-23088.03 of this specification. The quantity will be adjusted for test sections that were deemed unsatisfactory.

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

23088.05 BASIS OF PAYMENT.
Payment will be the contract unit price as follows:

A. Diamond Ground Shoulder Rumble Strips.
Per station for the type specified.

B. Diamond Ground Centerline Rumble Strips.
Per station for the type specified.

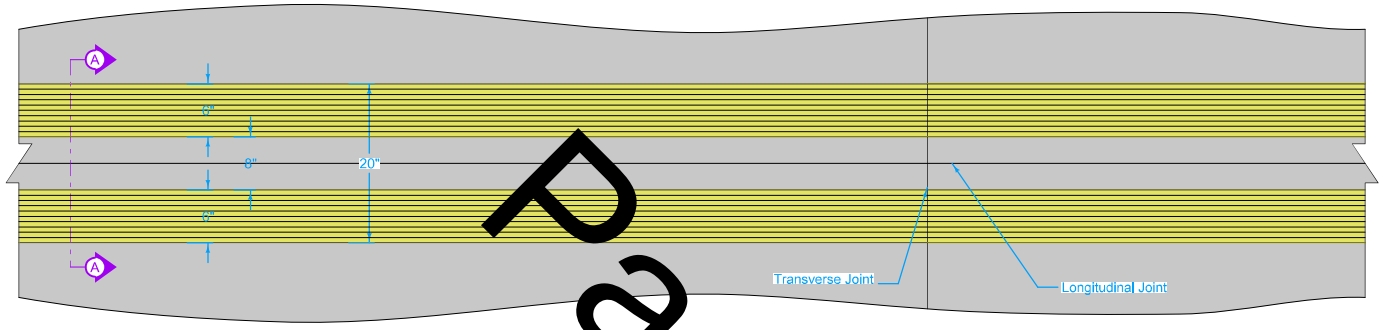
C. Asphalt Emulsion for Fog Seal (Shoulder Rumble Strips).

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

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

Centerline rumble strip placement is the same regardless of centerline pavement marking.

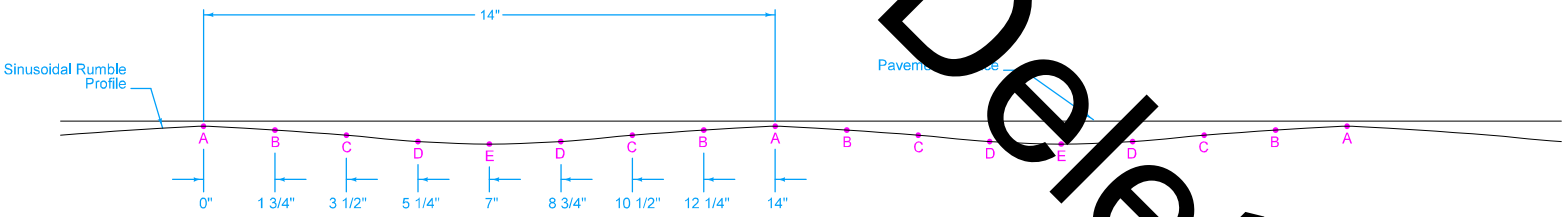
(1) Depth tolerance is ±1/16.



PLAN

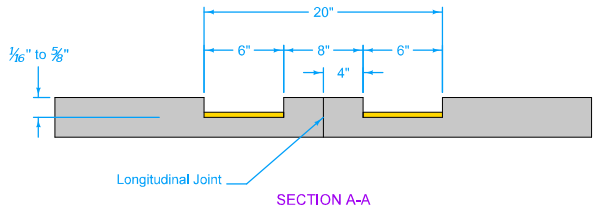
Rumble Strip

Possible Pavement Marking



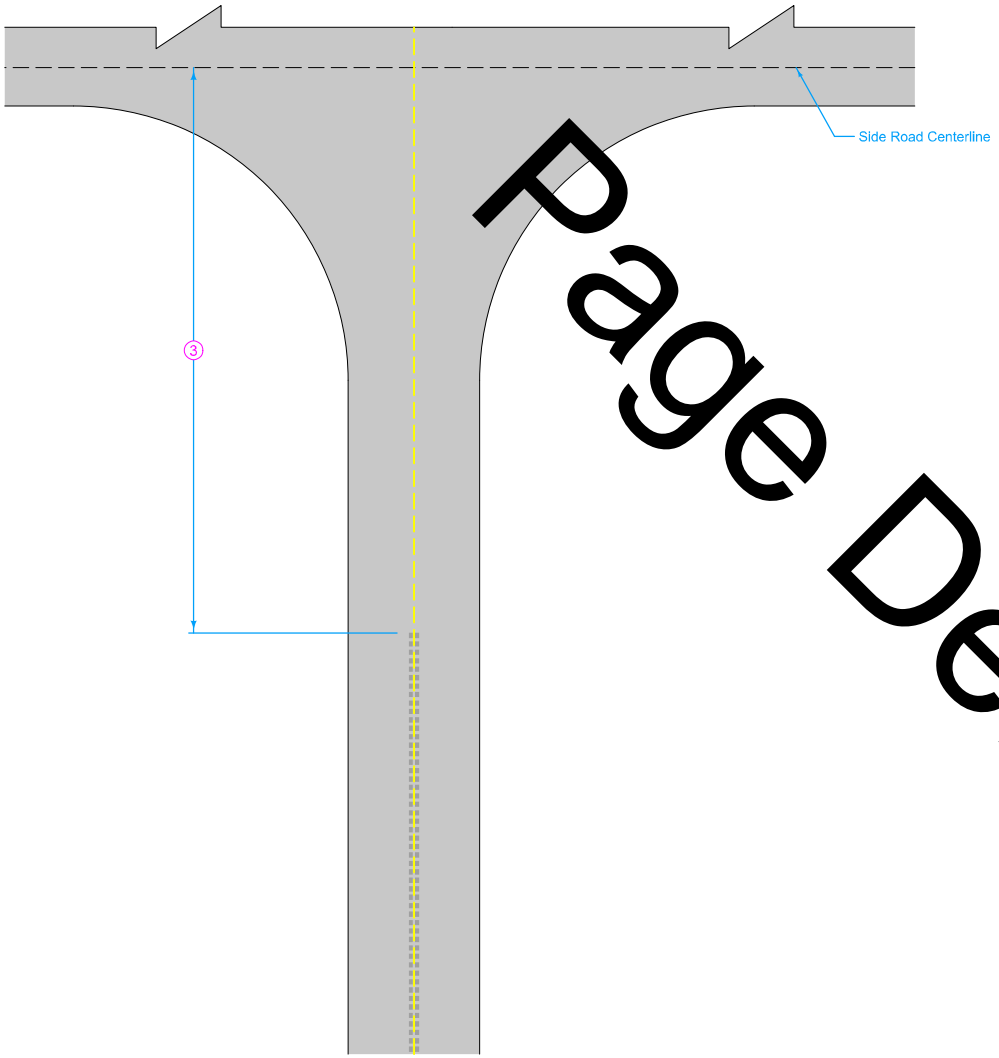
PROFILE

Location	Depth (1) (inches)
A	1/8
B	7/32
C	11/32
D	1/2
E	9/16

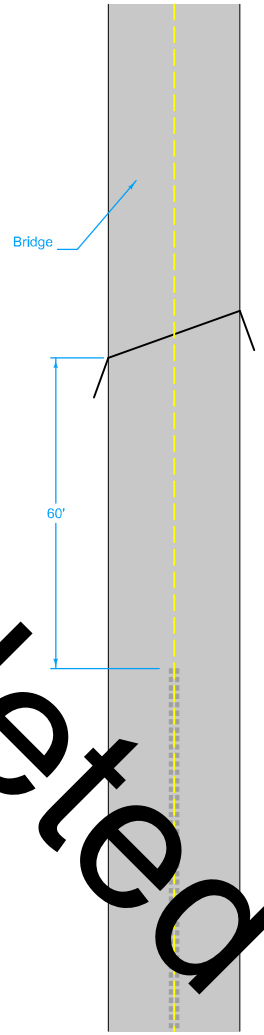


SECTION A-A

DIAMOND GROUND SINUSOIDAL CENTERLINE RUMBLE STRIPS



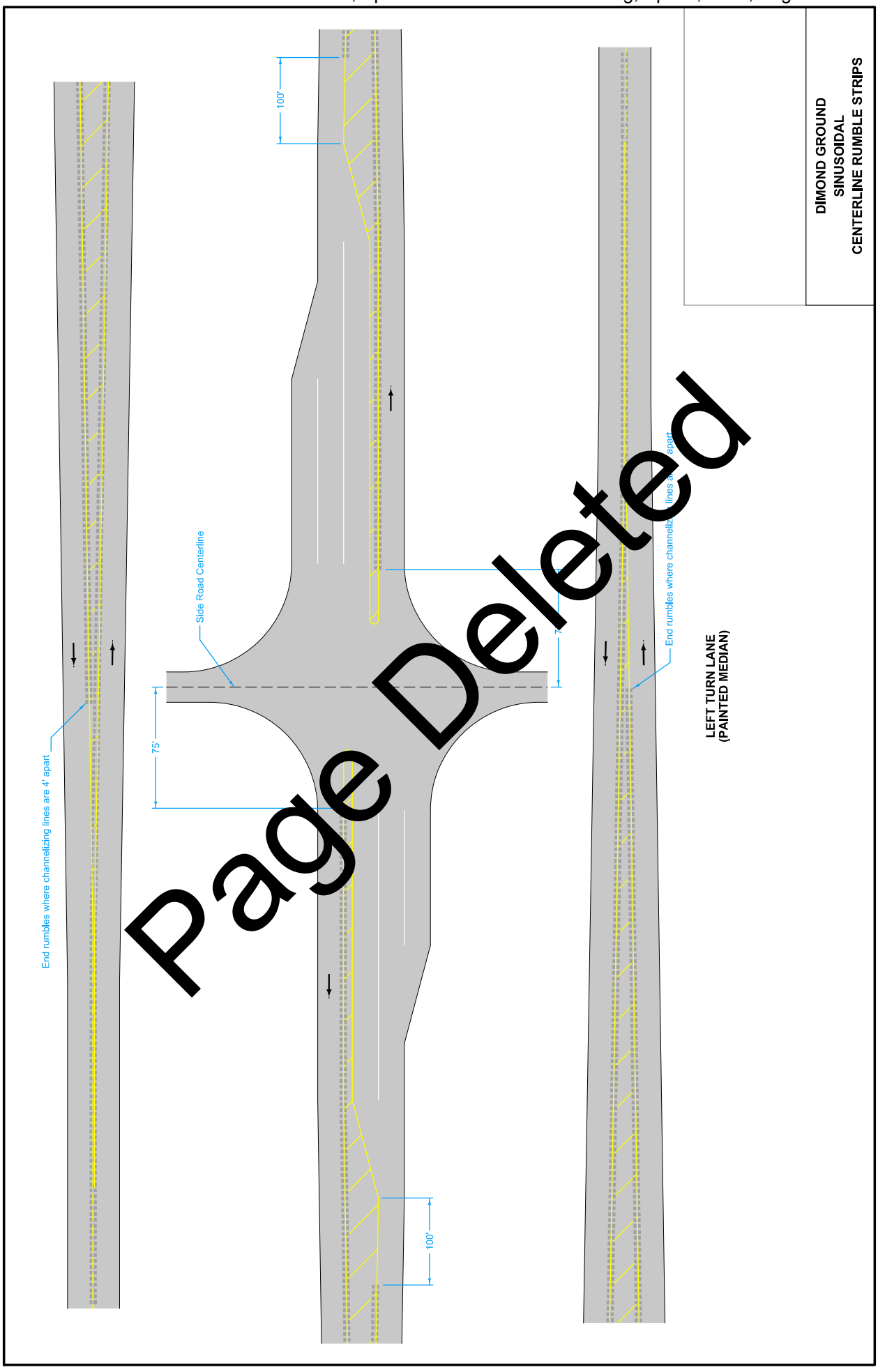
INTERSECTION WITH
SIDE ROAD



BRIDGE APPROACH

③ Stop rumbles 180 feet in advance of paved side roads or 75 feet for granular side roads.

DIMOND GROUND
SINUSOIDAL
CENTERLINE RUMBLE STRIPS



DIMOND GROUND
SINUSOIDAL
CENTERLINE RUMBLE STRIPS

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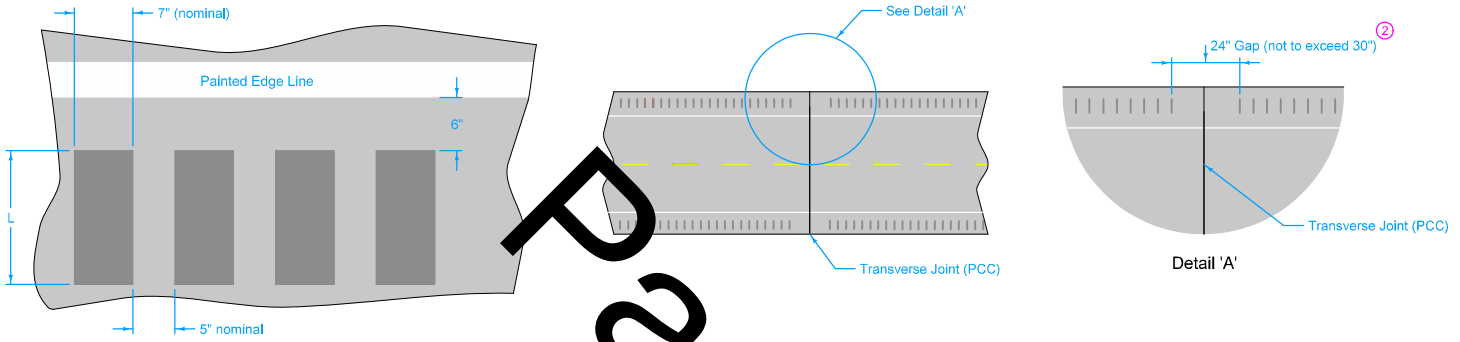
PASSING LANE SITUATIONS

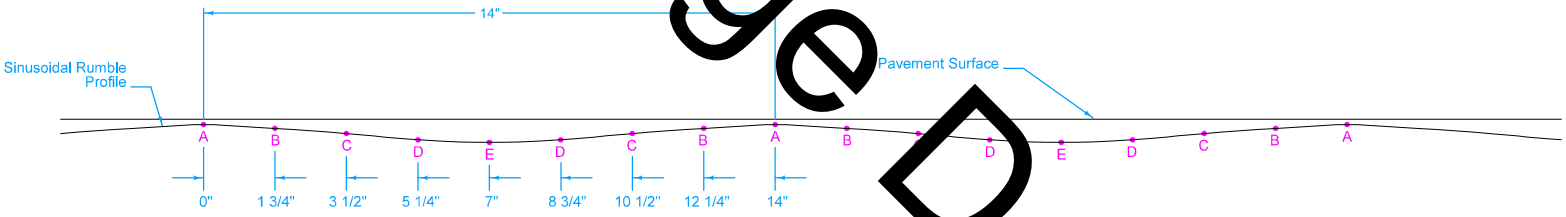


PLAN

① Place continuous Diamond Ground Rumble Strips (no 12 foot gaps) on all median side shoulders and on all interstate shoulders.

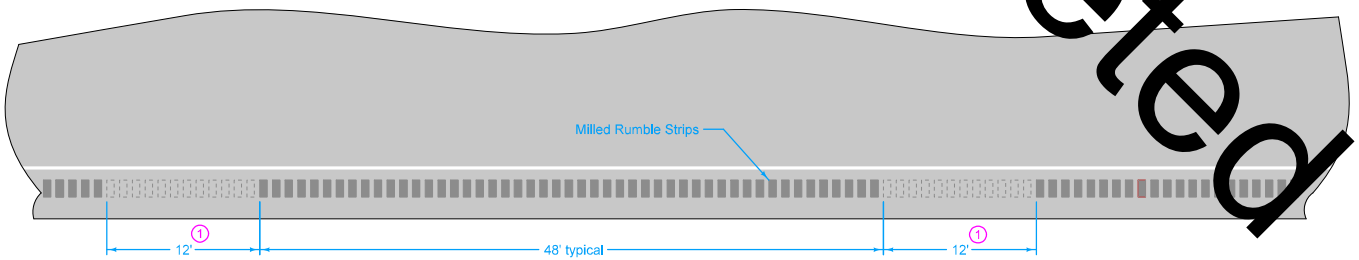
② Gap rumble strips at transverse joints. Centering the gap about the joint is desireable. Maintain a minimum of 3 inches between rumble and transverse joint.

③ Depth tolerance is $\pm 1/16$.



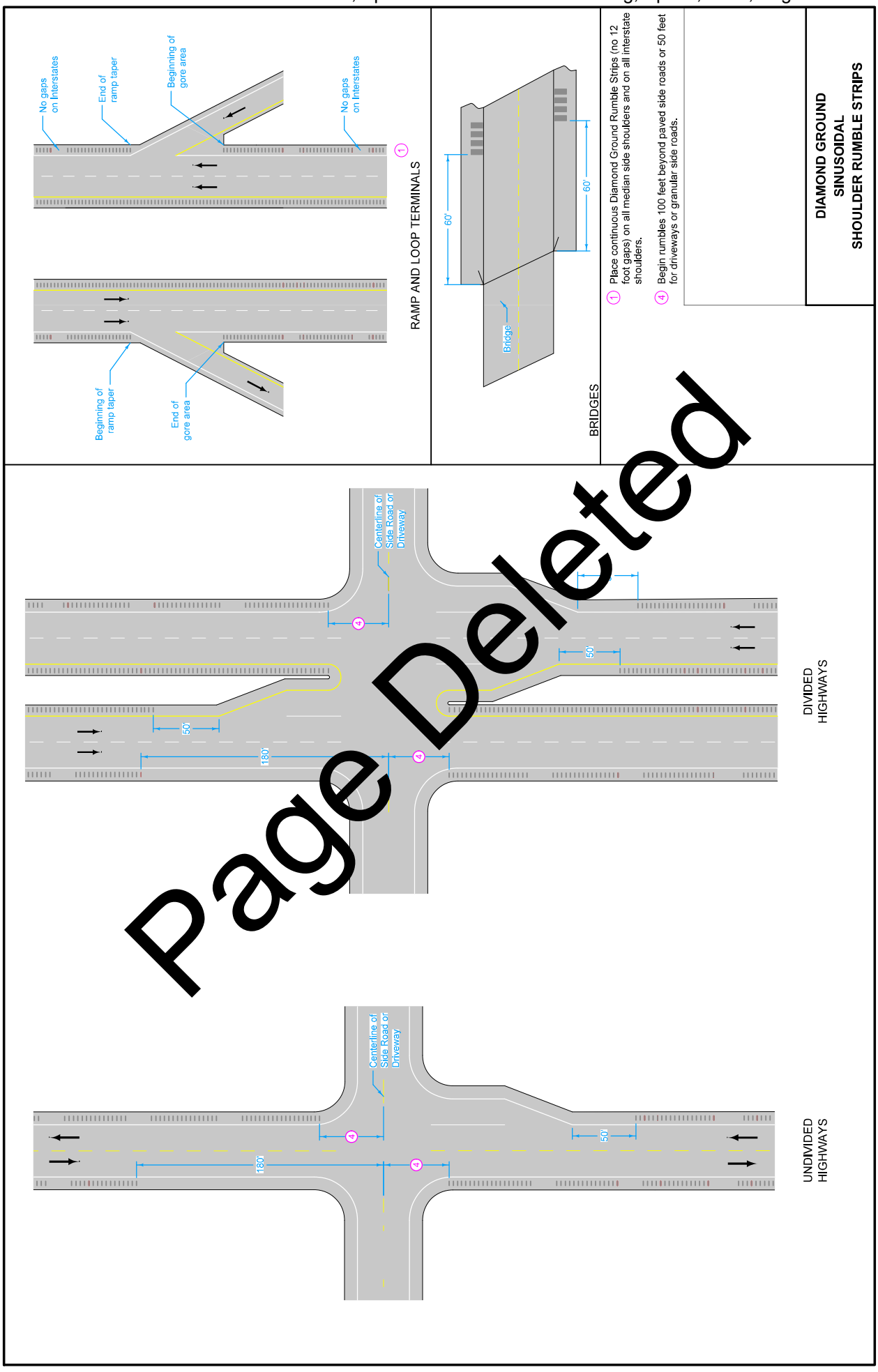
PROFILE

Location	Depth ③ (inches)
A	1/8
B	7/32
C	11/32
D	1/2
E	9/16

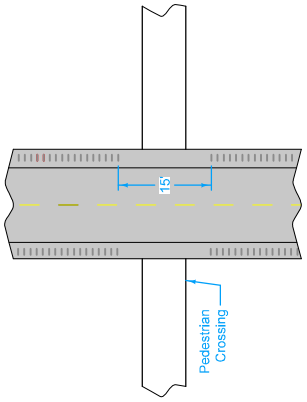


GAP DETAILS

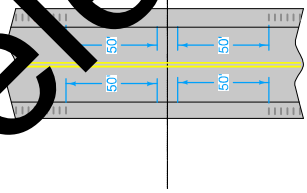
DIAMOND GROUND SINUSOIDAL SHOULDER RUMBLE STRIPS



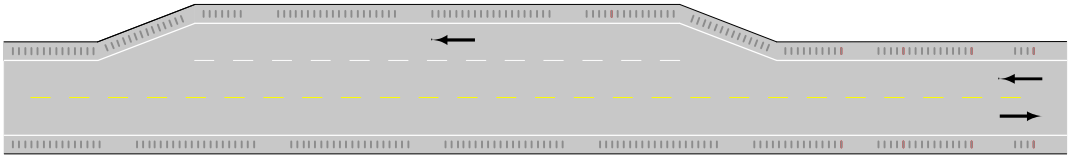
DIAMOND GROUND
SINUSOIDAL
SHOULDER RUMBLE STRIPS



PEDESTRIAN
CROSSING



RAILROAD
CROSSING



PASSING LANE